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# STATE COMMISSION OF HORTICULTURE

January and February, 1913

## THE MONTHLY BULLETIN

VOLUME II

Nos. 1 and 2

DEVOTED TO THE DESCRIPTIONS, LIFE HABITS AND METHODS OF CONTROL OF INSECTS  
FUNGOID DISEASES AND NOXIOUS WEEDS AND ANIMALS, ESPECIALLY IN  
THEIR RELATIONS TO AGRICULTURE AND HORTICULTURE.

EDITED BY THE ENTIRE FORCE OF THE COMMISSION UNDER THE FOLLOWING DIRECTORS:

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SACRAMENTO, CALIFORNIA

1913



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INJURIOUS AND BENEFICIAL

INSECTS OF CALIFORNIA

BY

E. O. ESSIG

Secretary State Commission of Horticulture



and *Carum kelloggii*. In the Porterville section, as well as in the vicinity of Riverside, the larvæ feed upon orange trees and in the former district promise to be a pest.

**Control.**—The larvæ occur singly and in rather few numbers upon the trees, but their ravenous appetites and ability to consume great amounts of foliage often makes control necessary. As they are easily located hand picking is the remedy recommended.

**Natural Enemies.**—Fortunately natural enemies play a large part in the control of this insect, otherwise greater damage would be done. Mr. Karl R. Coolidge, who first called attention to it as an orange pest, states that a tachinid fly and a species of *Apanteles* prey upon the larvæ.

## COLEOPTERA (Order).

### SHEATH-WINGED INSECTS.

#### BEETLES AND WEEVILS.

The insects of this order are easily recognized by their hard, leathery elytra, commonly known as wing covers. The true wings are folded underneath these. All forms have complete metamorphoses, the young being wormlike and known as grubs. They usually have but six functional legs. The pupal stage is quiescent. The mouth-parts are for biting and chewing.

All of the members of this order are extremely destructive, the grubs and adults working throughout their entire existence. There are great numbers of destructive beetles and weevils in California but we can include only a few of the more important ones.

## COCCINELLIDÆ (Family).

### LADYBIRD BEETLES.

This family of beetles is one of the most important and beneficial among insects. Only one genus of a few species is destructive, while the rest are particularly noted for their work upon scale insects (*Coccidæ*) and plant lice (*Aphididæ*).

**Eggs.**—The eggs vary considerably with the different members of the family and are seldom if ever observed. Those most often met with are the salmon-colored masses (Fig. 189B) of the *Hippodamia* sps., which are laid on ends not unlike bunches of cigars. Others are deposited singly upon or underneath individual scale insects, in the egg-masses of mealy bugs or among plant lice.

**Larvæ.**—The young grubs or larvæ are exceedingly active and begin to feed soon after hatching. As the period of growth is short their ability to consume food must be great, and we find them unexcelled as predators. They have rather long, pointed and flattened bodies (Fig. 189 C), well developed mouth-parts and six legs. The colors are exceedingly variable, the bodies are hairy, some being covered with long,



white threads of wax (Fig. 208). Besides the coverings they are protected by offensive secretions and are not generally preyed upon by insectivorous animals. During their growth they moult four times and when fully matured seek shelter to pupate.

**Pupæ or Nymphs.**—The larvæ not having a waxy or exceedingly hairy or spiny covering, usually hang by the tail and pupate with the head downward (Fig. 189D), while the covered ones pupate within the larval skins which give ample protection. Offensive liquids are



FIG. 185.—Two species of *Coccinellidæ* (*Hippodamia convergens* Guér. and *H. ambigua* Lec.) emerging from hibernating quarters in the spring. (After Carnes.)

also secreted for protective purposes. The naked nymphs have the ability to move the suspended body very rapidly when disturbed.

**Adults.**—The adult beetles emerge through slits in the pupal skins. They are exceedingly active, feeding throughout their existence. In size they vary from one sixteenth to nearly one half inch in length. The color is usually showy and of many shades and combinations. The males are somewhat smaller than the females and sometimes with slightly different colorations. The winter is passed in hibernation. In some species thousands of individuals collect in the mountains in great colonies. With the first warm spring weather these emerge from the winter quarters and migrate to the lower valleys and disperse to give rise to succeeding generations.



## \*THE STRIPED LADYBIRD BEETLE.

*Paranæmia vittigera* (Mann.).*(Megilla vittigera* Mann.)

(Fig. 186.)

**General Appearance.**—The adult beetles vary from a straw or light pink to almost bronze and have three broad, longitudinal, black stripes on the back, dark head, and two black blotches on the prothorax.

**Distribution.**—The adults hibernate in quite large colonies and are found in most parts of the State, and especially in the southern part. They seem to prefer damp places and are usually common in sugar beet fields. At Oxnard, California, the writer found this species in great numbers.

**Hosts.**—Feed upon root lice, such as the beet louse (*Pemphigus betæ*), and other soft-bodied insects.

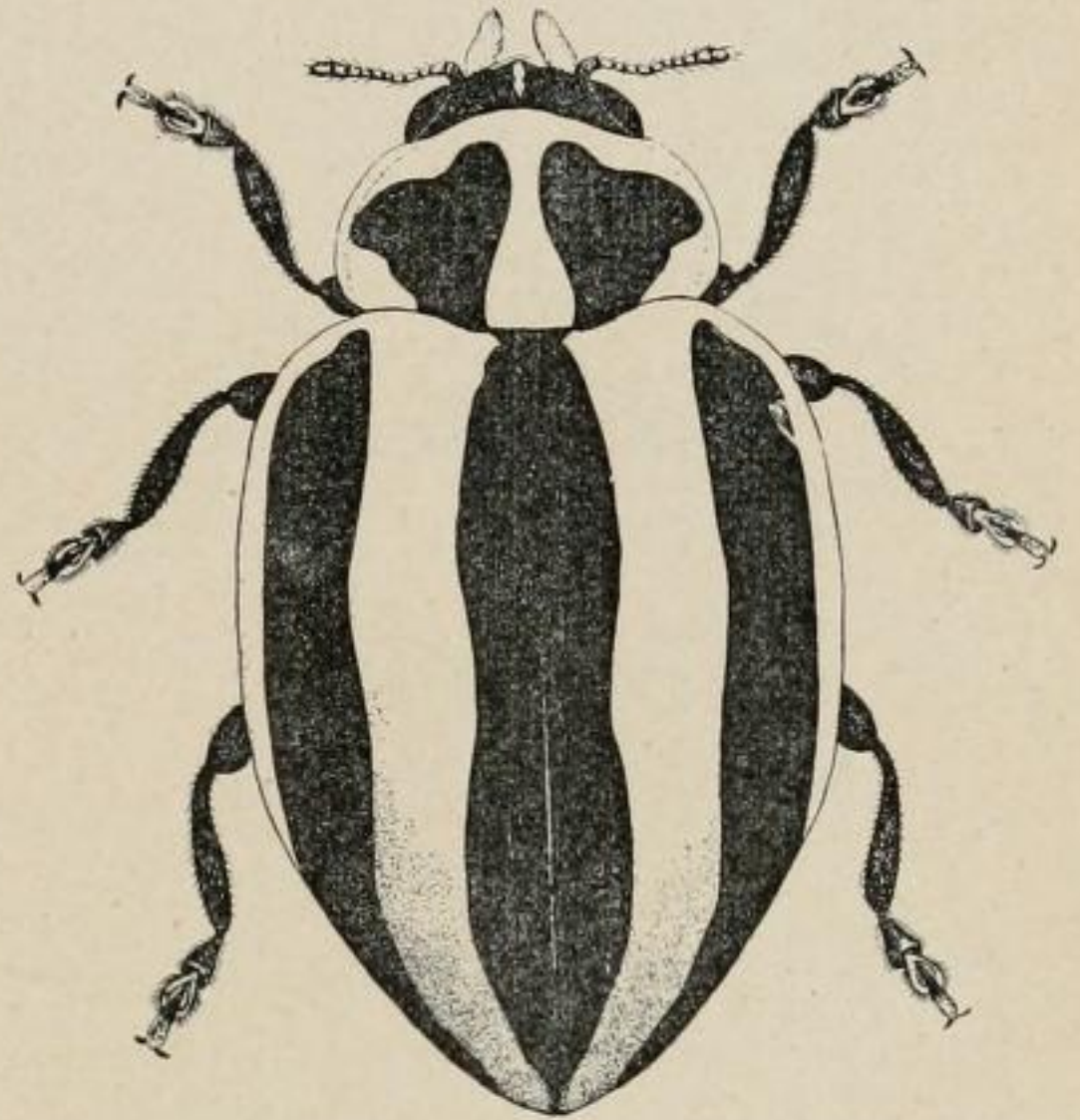


FIG. 186.—The striped ladybird beetle, *Paranæmia vittigera* (Mann.). (Original. Drawing by Birdnekoff.)

*Hippodamia 5-signata* Kirby.

(Fig. 187.)

**General Appearance.**—The adult beetles are slightly more than three sixteenths of an inch long and rather robust. The head is black with white front and margins; thorax black with white margins and sometimes two white spots near the middle; elytra, or wing covers, yellow or red with a broad black band extending nearly across the base, a wide black band behind the middle and a black spot near the tip of each. There is sometimes a very small black spot near the margin and base of each wing cover. The body proper and legs are black.

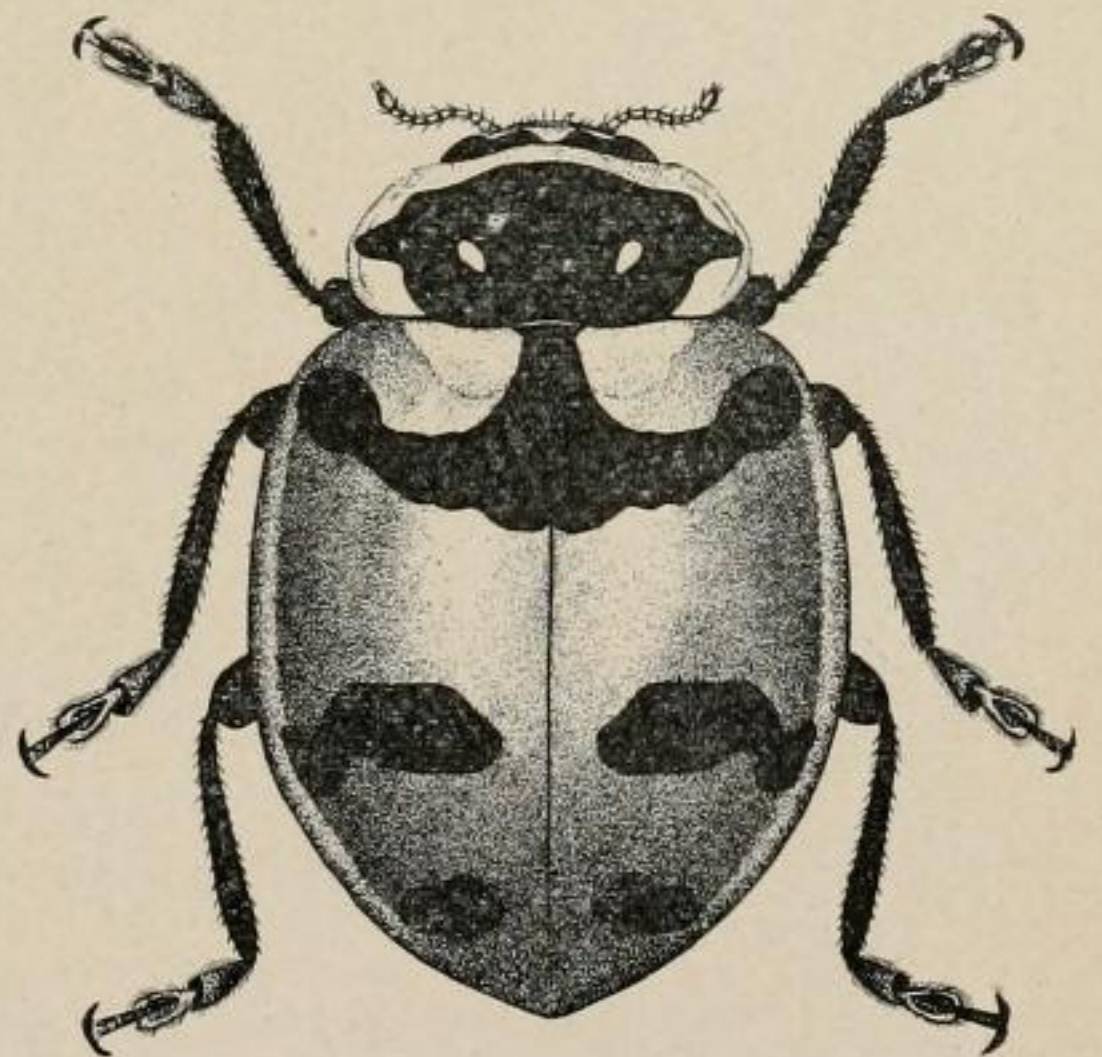


FIG. 187.—*Hippodamia 5-signata* Kirby. (Original. Drawing by Birdnekoff.)

**Distribution.**—Especially abundant in the northern part of the State, but is also found in all other sections, though only in limited numbers.

**Hosts.**—Prey particularly upon plant lice.

\*The writer is indebted to Mr. F. W. Nunenmacher for the correct naming of these species.



*Hippodamia lecontii* Muls.

(Fig. 188.)

**General Appearance.**—About the same size and shape as *Hippodamia convergens*. The head is black with a white spot in middle;



FIG. 188.—*Hippodamia lecontii* Muls.  
(Original. Drawing by Birdnekoff.)

thorax entirely black with lateral and front margins white; elytra red with one very faint small black and two well defined spots near the base of each—the two spots near the middle front of the elytra often unite with the scutellar spot at the extreme middle base to form an inverted “Y” (Fig. 188). Near the tip of each wing cover there are two spots, the hind one being small, while the other is large and often appears to be two spots united. In some individuals the markings may

appear almost identical with those of *Hippodamia convergens*, but the slender white spots are always lacking on the middle of the prothorax.

**Distribution.**—Throughout the entire State, but not abundant.

**Hosts.**—Preys principally upon plant lice.

### THE COMMON BLACK-SPOTTED RED LADYBIRD BEETLE.

*Hippodamia convergens* Guér.

(Fig. 189.)

**General Appearance.**—The commonest of all ladybird beetles in this State and easily distinguished by the red color and the twelve black spots on the elytra. The head and thorax are black, the latter with two narrow lateral white margins and a very small medium white spot at the base.

**Life History.**—The eggs are salmon-colored and deposited in clusters not unlike bunches of cigars on their ends. The dark larvæ soon after emerging search for food, which at first consists of very small insects, such as young scale insects. Full grown larvæ are nearly one half inch long and have several reddish or salmon-colored spots on the thoracic segments. The pupa varies from yellow to reddish with black markings. All stages of the species exist throughout the summer months and may be found almost anywhere.

**Distribution.**—Throughout the entire State. The species hibernates in great colonies in the high Sierras, from whence it descends into the lowlands as soon as warm weather melts the snow.



**Hosts.**—Soft bodied insects, such as plant lice, young scale insects, other species of ladybird beetles, and they may even be cannibalistic. The principal food consists of plant lice, chief of which are the melon



E

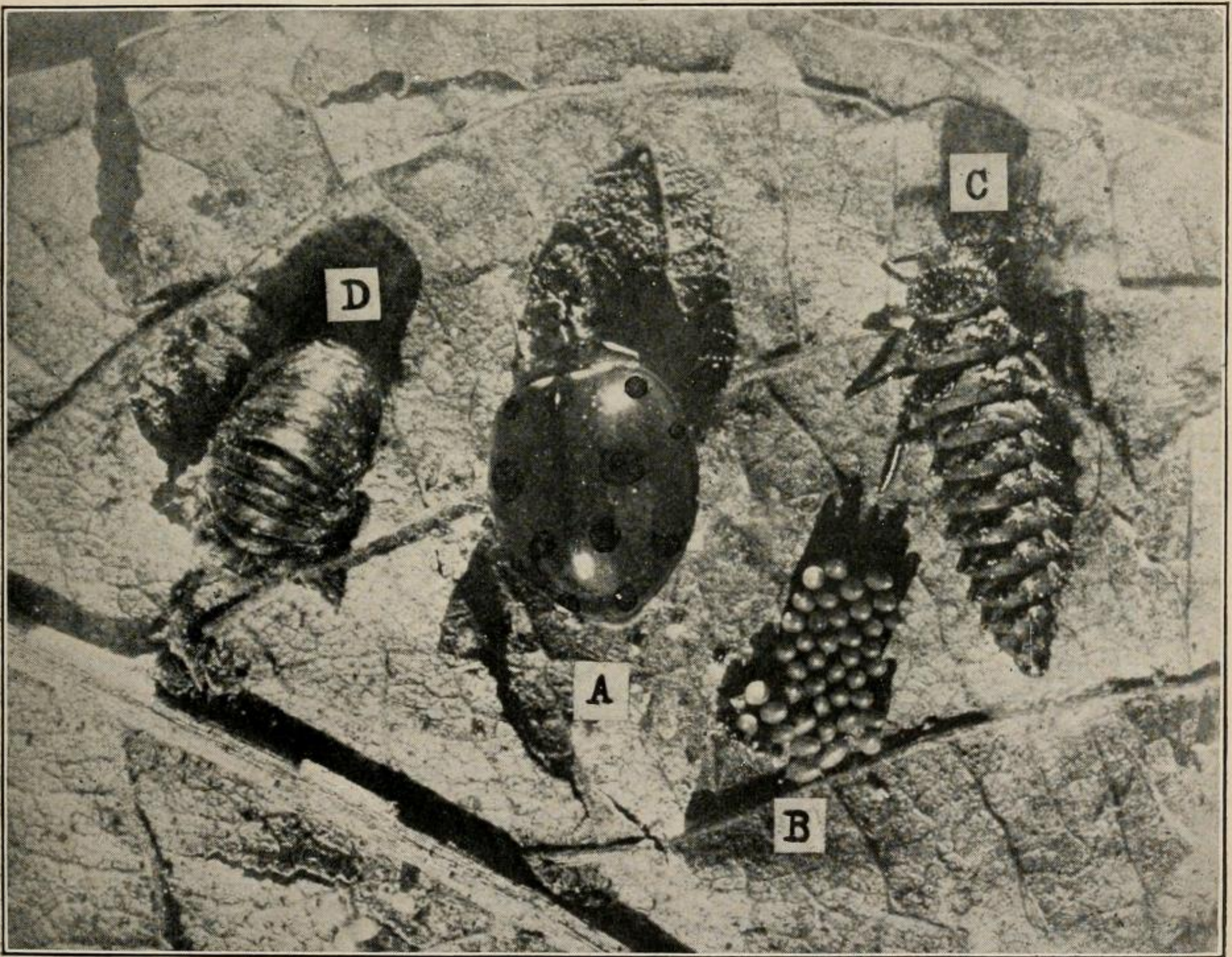


FIG. 189.—The common black-spotted red ladybird beetle (*Hippodamia convergens* Guér.). A and E, adults; B, eggs; C, larva; D, pupa. (Essig, P. C. Jr. Ent.)

aphis (*Aphis gossypii* Glover), the pea louse (*Macrosiphum destructor* Johns.), the bean aphis (*Aphis rumicis* Linn.) and the woolly aphis, *Eriosoma lanigera* (Hausm.)



## THE COMMON RED LADYBIRD BEETLE.

\**Hippodamia ambigua* Lec.

(Figs. 190, 191.)

**General Appearance.**—The adult beetles greatly resemble the black-spotted red ladybird beetle (*Hippodamia convergens*) in size and shape. The wing covers are entirely red with a single black spot at the middle of their bases and an indistinct light area on each side of

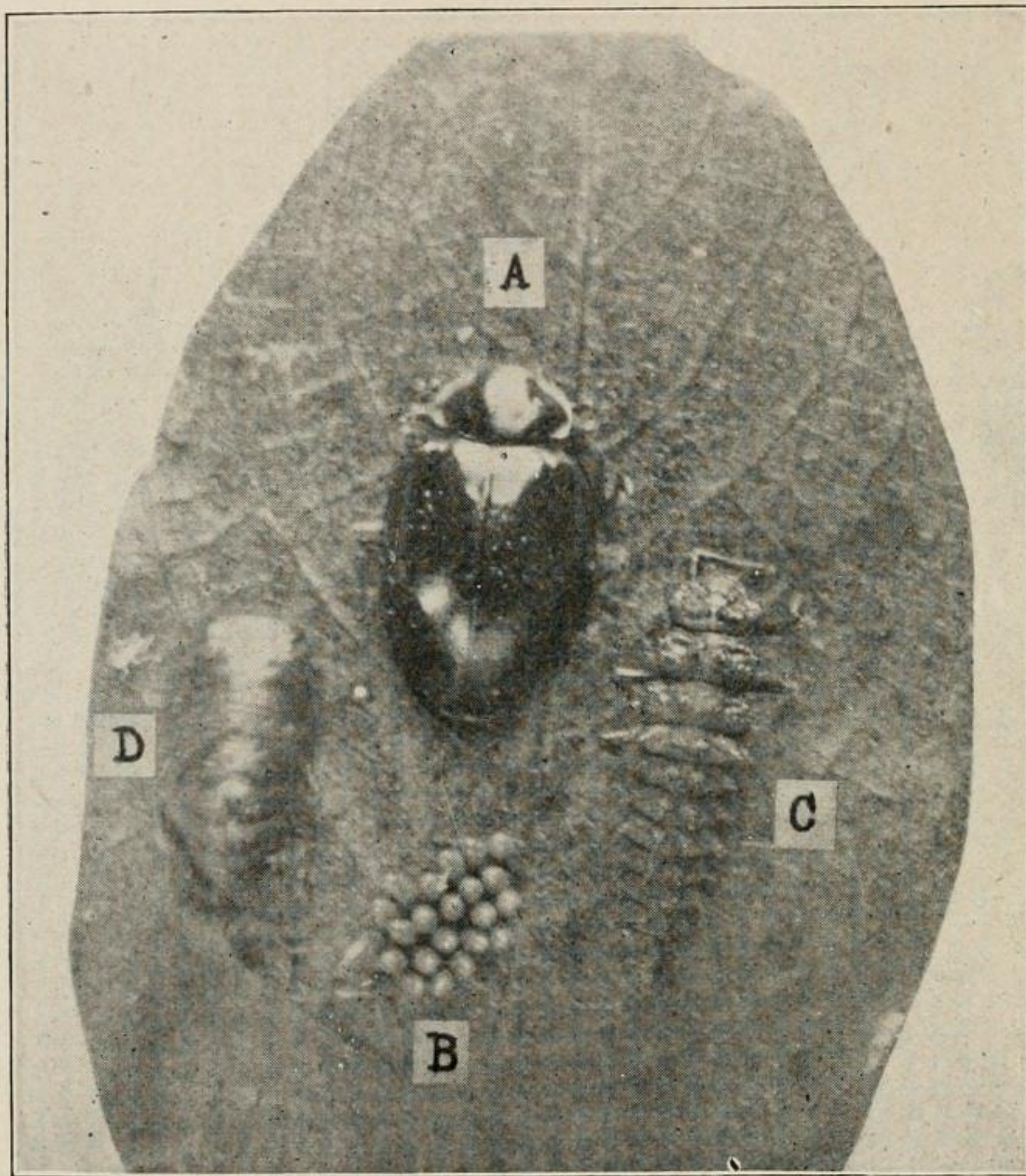


FIG. 190.—The common red ladybird beetle (*Hippodamia ambigua* Lec.). A, adult; B, eggs; C, larva; D, pupa. (Essig, P. C. Jr. Ent.)

this spot. The thorax is black with narrow lateral margin and two narrow median spots white. The head is black with median and marginal light spots. The eggs and immature forms are practically the same as those of *Hippodamia convergens*.

**Distribution.**—Throughout the entire State. A very common species, hibernating with and accompanying *Hippodamia convergens*.

\*This is now being considered as a varietal form of *Hippodamia convergens* Guér.



**Hosts.**—Feeds upon practically the same hosts as does *Hippodamia*.

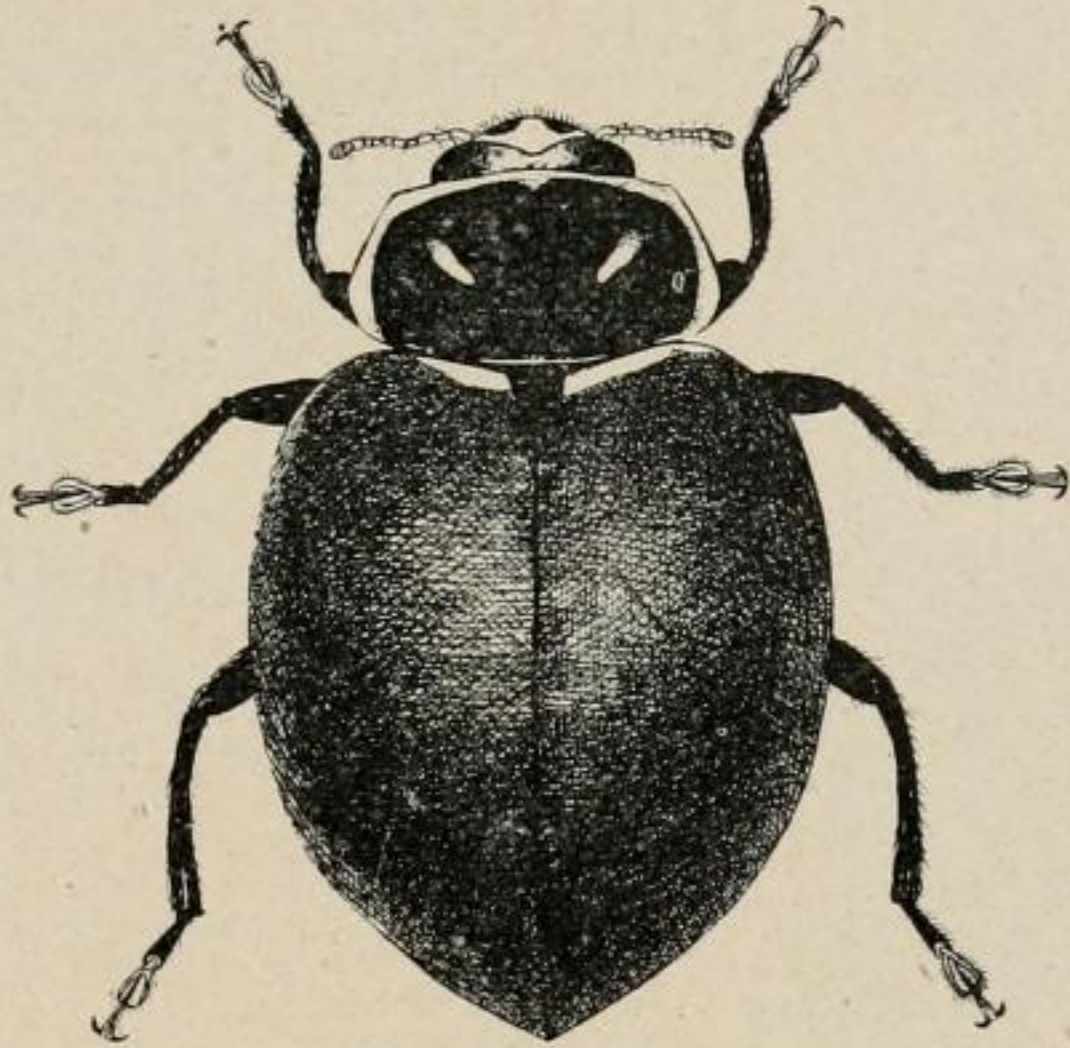


FIG. 191.—Adult of the common red ladybird beetle, *Hippodamia ambigua* Lec. (Original. Drawing by Birdnekoff.)

*convergens*, and has also been reported as preying upon young cottony cushion scale (*Icerya purchasi*).

#### THE TWO-SPOTTED LADYBIRD BEETLE.

*Adalia bipunctata* Linn.

(Fig. 192.)

**General Appearance.**—The adult beetles are red with a black spot on each wing cover; thorax black with white margins and two small light spots near the middle base; head black with light antennæ and palpi; legs black with pale feet.

**Distribution.**—This beetle was sent to California by Mr. B. M. Lelong in the year 1889, and has become established more particularly in the

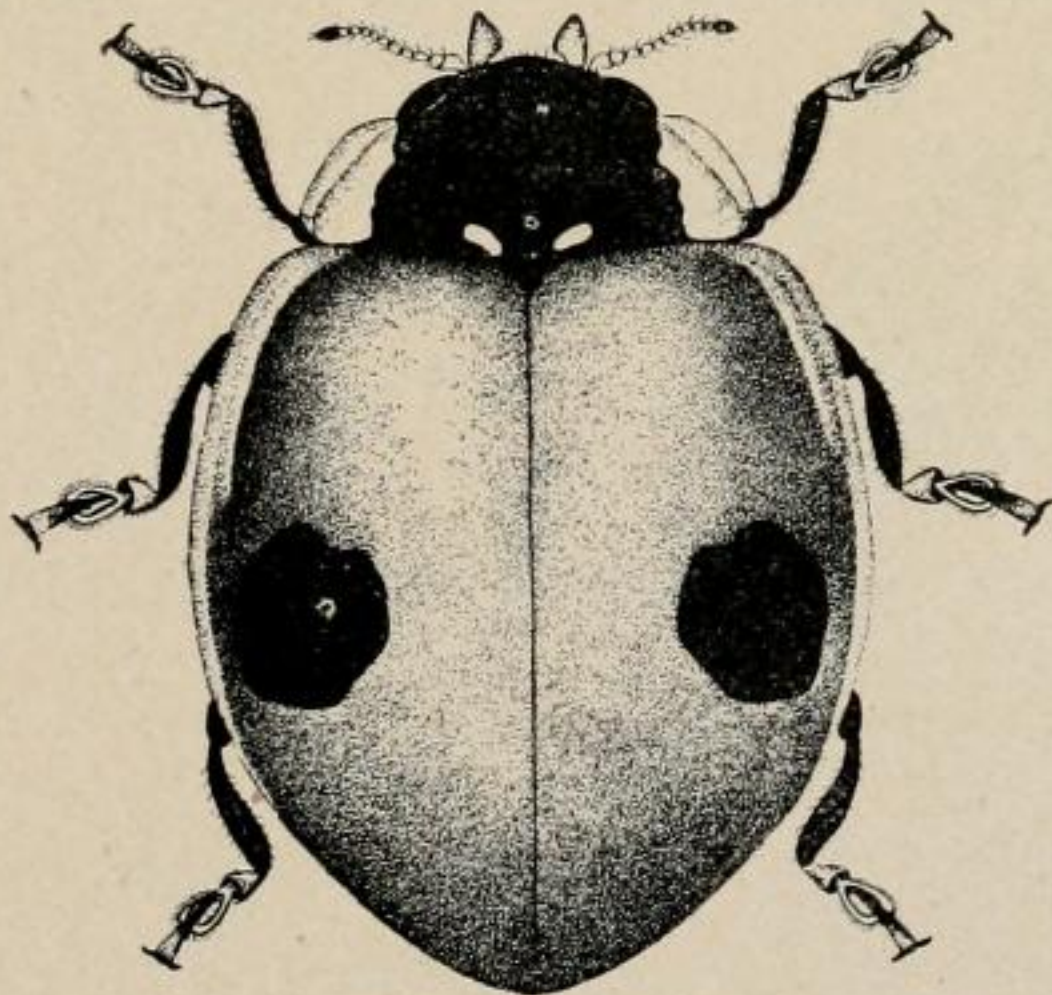


FIG. 192.—The two-spotted ladybird beetle, *Adalia bipunctata* Linn. (Original. Drawing by Birdnekoff.)

central part of the State. The writer has specimens collected in Alameda County.

**Hosts.**—The larvæ and adults of this ladybird beetle feed almost entirely upon plant lice.



*Adalia bipunctata* var. *humeralis* Say.

(Fig. 193.)

**General Appearance.**—The adult beetles are oval-elongate in shape

and three sixteenths of an inch long. The color is shiny black with the spots on the face and margins of the prothorax red. There are two large red spots at the marginal bases and two smaller circular red spots back of the middle of the wing covers.

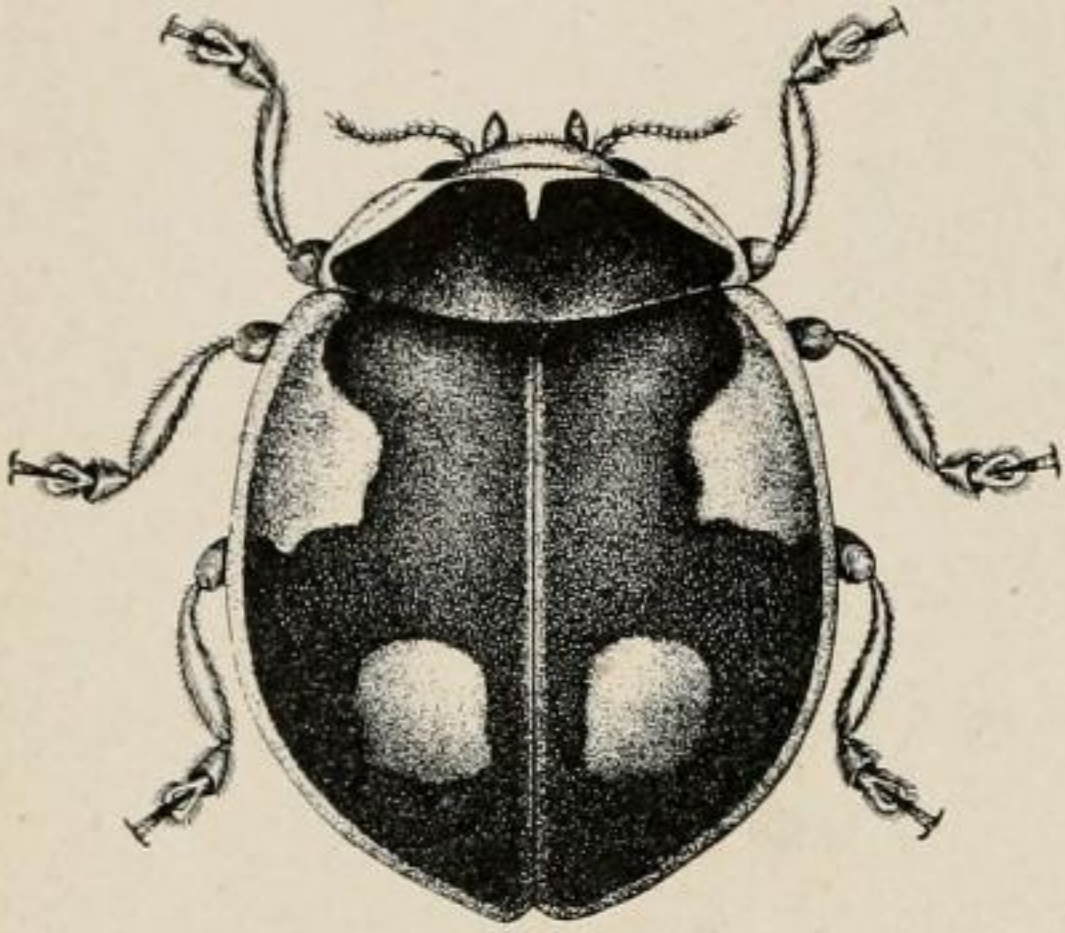


FIG. 193.—*Adalia bipunctata* var. *humeralis* Say. (Original. Drawing by Birdnekoff.)

plant lice.

**Distribution.**—Occurs in the central part of the State, though not at all numerous.

**Hosts.**—Works principally upon

*Coccinella trifasciata* var. *juliana* Muls.

(Fig. 194.)

**General Appearance.**—The adult beetles are oval in shape; convex

and three sixteenths of an inch long. The head is white except a narrow black line near the prothorax and the black eyes; prothorax black with all the front and lateral margins, except the extreme base, white; elytra, or wing covers, yellow or red with a single wide black band extending nearly across at the base. The body and legs are black.

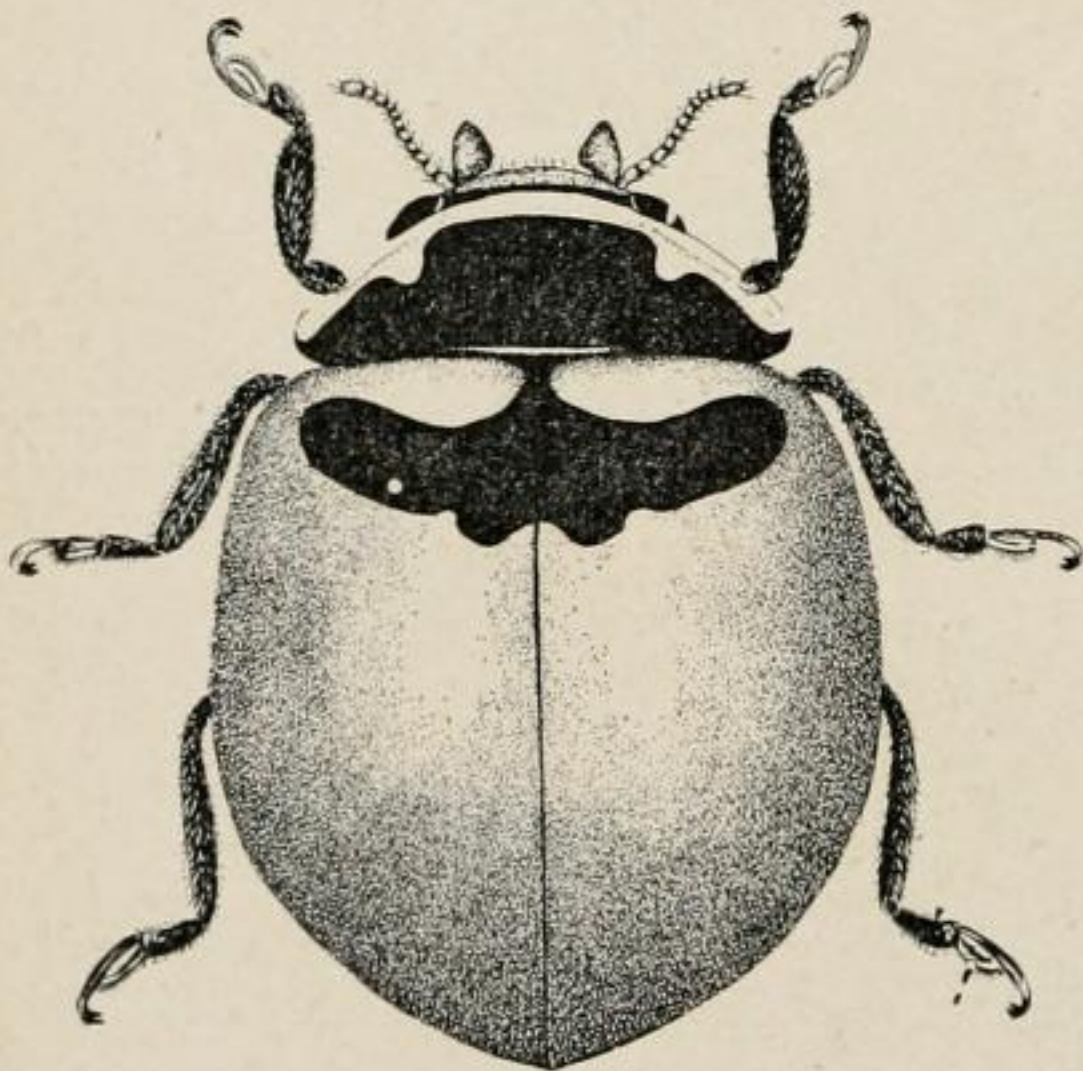


FIG. 194.—*Coccinella trifasciata* var. *juliana* Muls. (Original. Drawing by Birdnekoff.)

**Distribution.** — Occurs more abundantly in the northern and central parts of the State.

**Hosts.**—Works principally upon plant lice and other soft-bodied bugs.



## THE CALIFORNIA RED LADYBIRD BEETLE.

*Coccinella californica* Mann.

(Fig. 195.)

**General Appearance.**—Average sized ladybird beetle, rather short, being about three fourths as wide as long. The head is black; thorax black with a white or pale spot on each margin; elytra, orange or scarlet-red with no other marking than a small rhomoidal dark spot at their middle base, known as the scutellar spot.

**Distribution.**—A very common species to be found throughout the State and especially abundant in the northern coast counties.

**Hosts.** — Feeds largely upon aphids. In the northern and central parts of the State the cabbage aphid (*Aphis brassicae* Linn.) is a favorite host. It also feeds upon young scale insects.

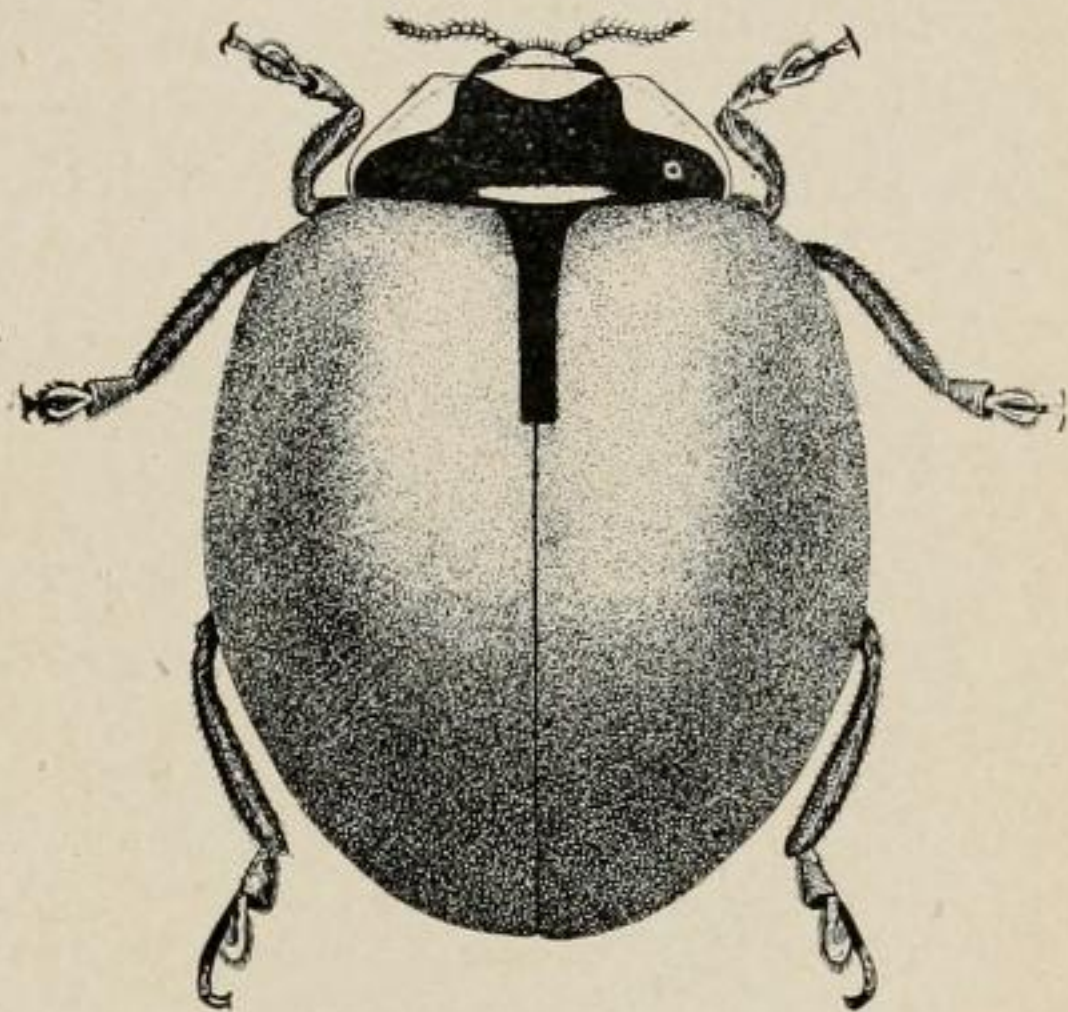


FIG. 195.—The California red ladybird beetle, *Coccinella californica* Mann. (Original. Drawing by Birdnekoff.)

## THE BLOOD-RED LADYBIRD BEETLE.

*Cycloneda sanguinea* (Linn.).

(Fig. 196.)

**General Appearance.**—The adults are about three sixteenths of an inch long and rounded oval, somewhat convex in shape. The elytra are dark red or yellowish in color with margins and bases paler. The head is black with front of male white and two white spots on the female; thorax is black with front white and in the shape of a broad “W,” but sometimes having two lateral black spots in the white area. The body proper is entirely black, the feet being a little paler.

**Distribution.**—Common throughout the entire State.

**Hosts.**—Preys upon plant lice and young scale insects.

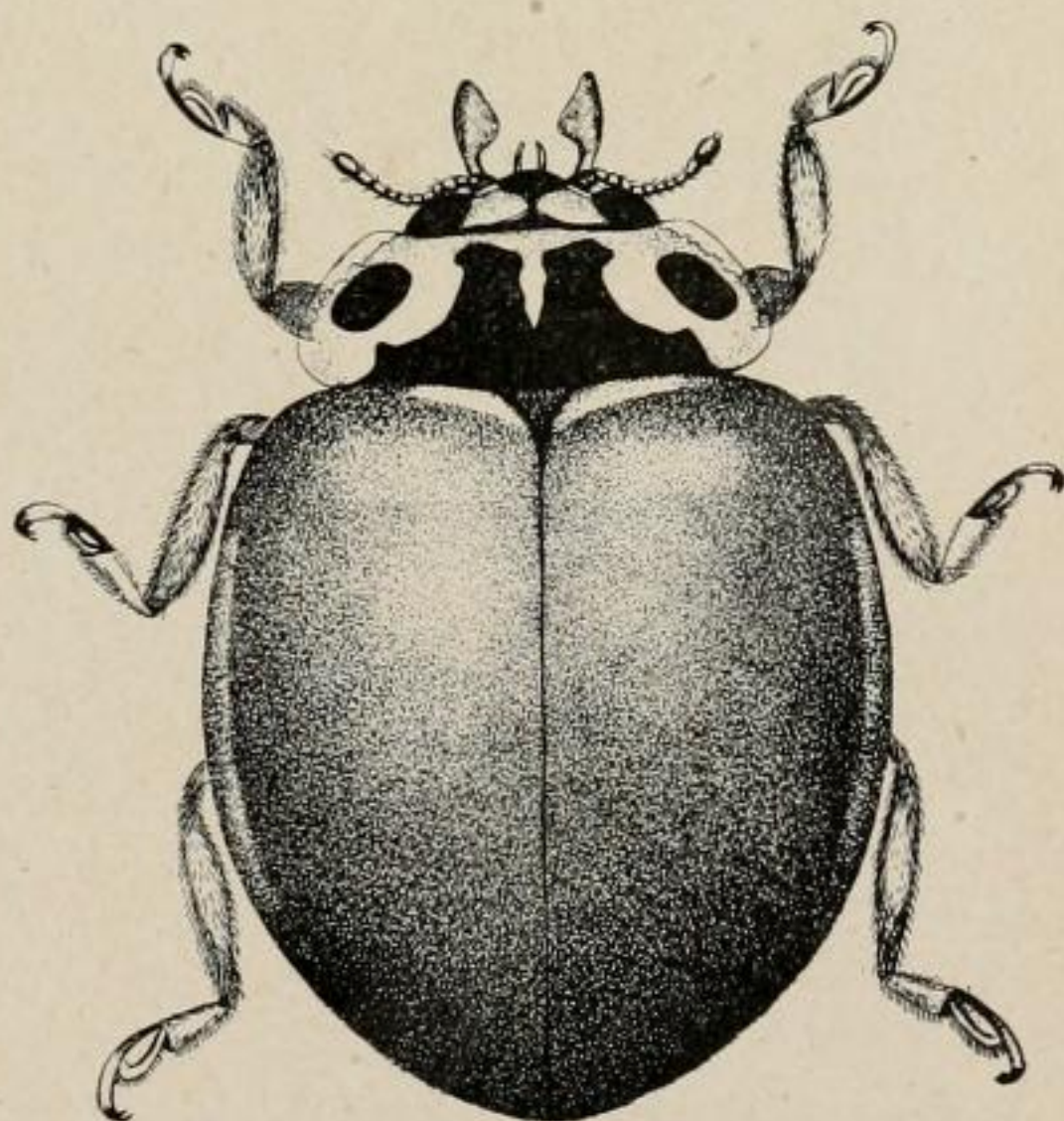


FIG. 196.—The blood-red ladybird beetle, *Cycloneda sanguinea* (Linn.). (Original. Drawing by Birdnekoff.)



## THE ASHY-GRAY LADYBIRD BEETLE.

*Olla abdominalis* Say.(*Cycloneda abdominalis* Say.)

(Figs. 197, 198.)

**General Appearance.**—Yellowish-gray ground color with many small dark spots on the dorsum. The body is average size, being about one fourth inch long and is distinctly broad or almost globular in shape.

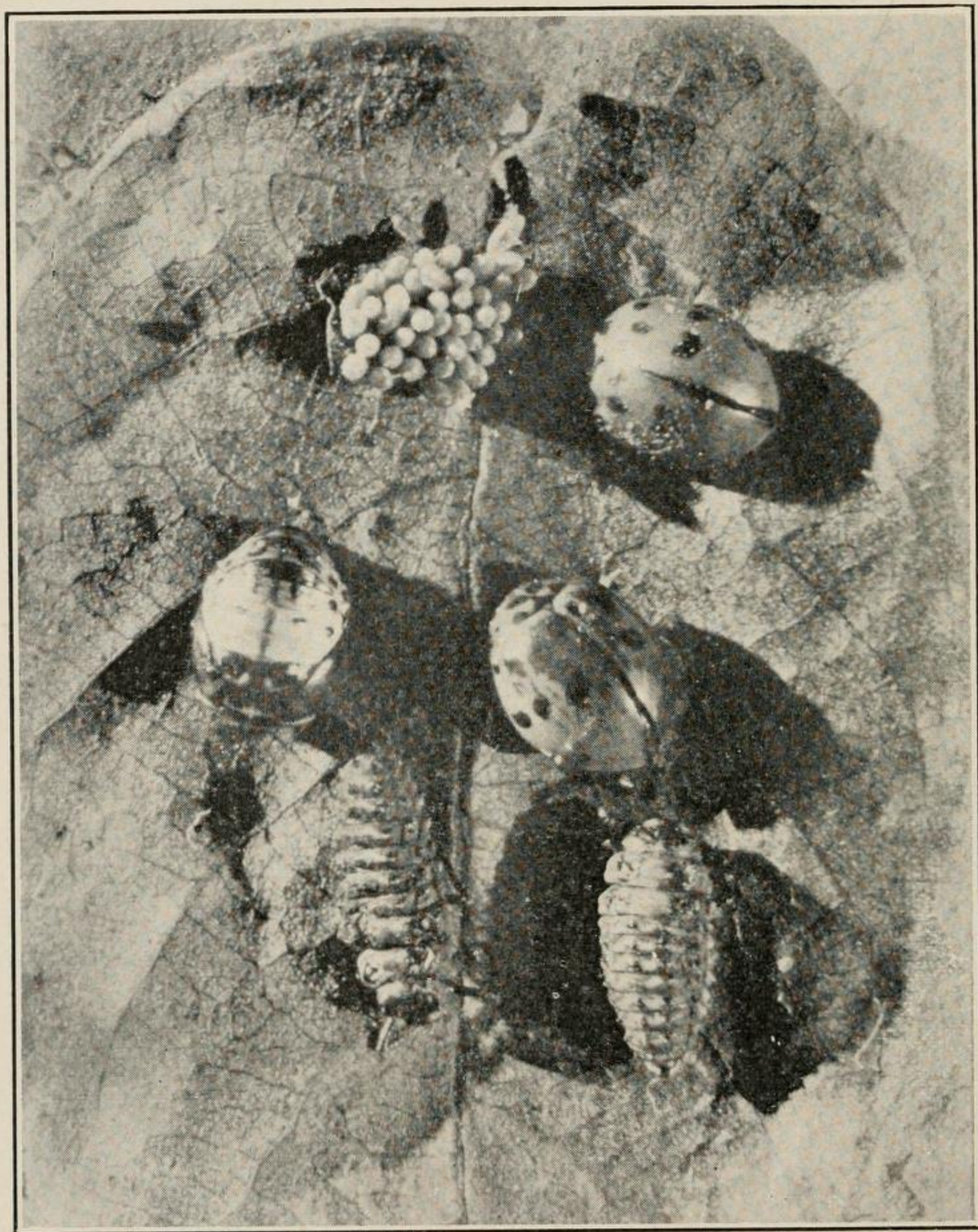


FIG. 197.—Ashy-gray ladybird beetle (*Olla abdominalis* Say), showing eggs at top, adults at right-hand middle, pupa at left-hand middle, larvæ at the bottom. (Essig, P. C. Jr. Ent.)

**Life History.**—Greatly resembles that of *Hippodamia convergens*. The larvæ have yellow spots on the dorsum instead of red and the pupa is much lighter in color. It is not known to hibernate in such numbers as the red forms and is not nearly as common. Works throughout the summer months.



**Distribution.**—Throughout the State, but abundant only in the southern part, especially in the walnut orchards of Ventura County.



FIG. 198.—Adult ash gray ladybird beetle, *Olla abdominalis* Say. (Essig, P. C. Jr. Ent.)

**Hosts.**—On many species of plant lice, but is the most effectual check on the walnut plant louse, which it often entirely subdues before winter.

### THE EYED LADYBIRD BEETLE.

*Olla oculata* Fab.

(*Cycloneda oculata* Fab.)

(Fig. 199.)

**General Appearance.**—The adults of this species are often mistaken for the two-stabbed ladybird (*Chilocorus bivulnerus*). They are somewhat larger with the spots on the wing covers reddish-yellow and larger. The head and lower edges of the thorax are also reddish-yellow.

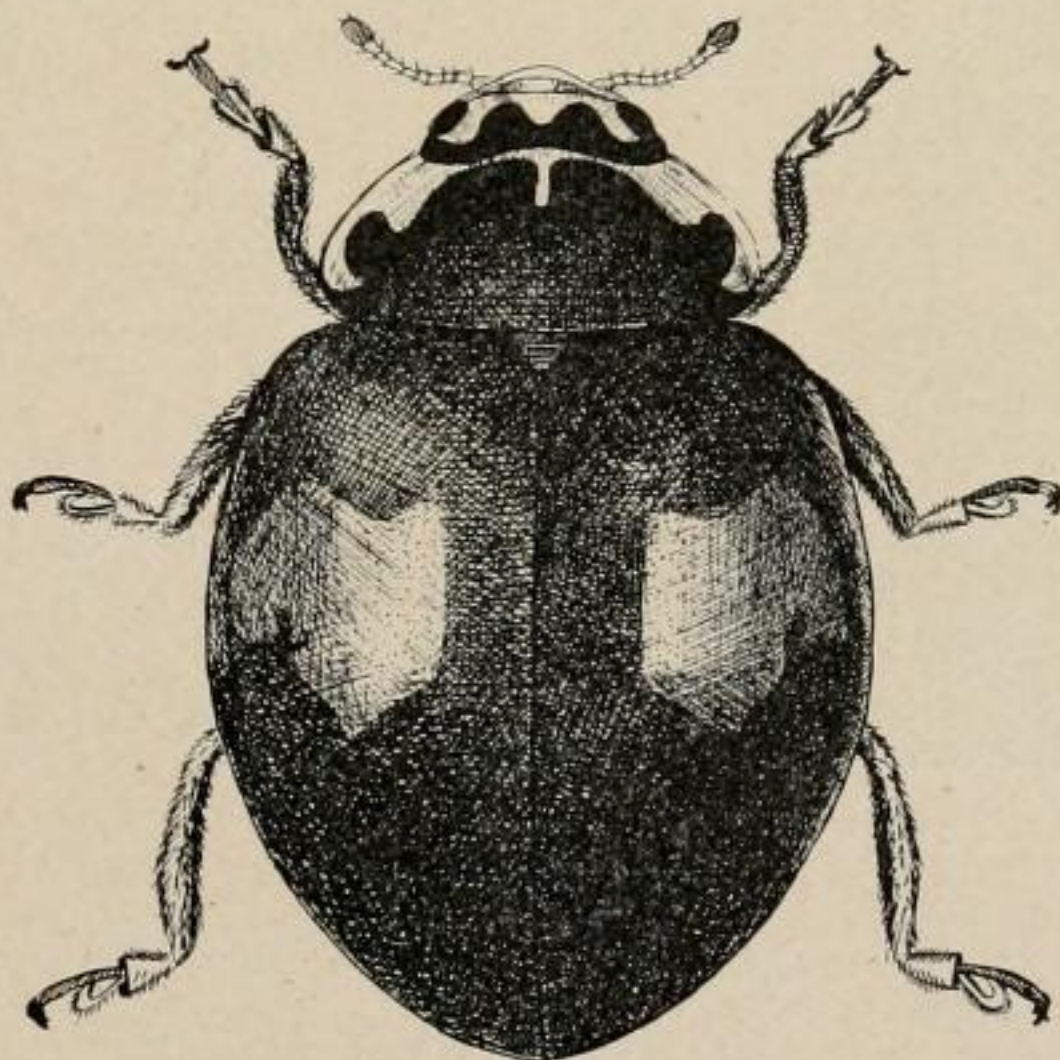


FIG. 199.—The eyed ladybird beetle, *Olla oculata* Fab. (Original. Drawing by Birdnekoﬀ.)

**Distribution.**—Quite common throughout the State and most abundant in the central and southern parts.

**Hosts.**—This species feeds upon scale insects.



*Olla plagiata* Casey.

(Fig. 200.)

**General Appearance.**—The adult beetles are broadly rounded; about three sixteenths of an inch long and three fourths as wide. The head is pale; pronotum black with pale lateral margins; wing covers black with a large, irregular, red blotch slightly in front of the middle of each. The under surface of the head and thorax and bases of the legs are black; tips of legs and abdomen pale.



FIG. 200.—*Olla plagiata* Casey. (After Quayle. Courtesy Cal. Exp. Sta.)

**Distribution.**—Throughout the central and southern parts of the State, but not abundant.

**Hosts.**—This species preys principally upon plant lice.

## THE SMALL GRAY LADYBIRD BEETLE.

*Psyllobora tædata* Lec.

(Fig. 201.)

**General Appearance.**—A very small gray beetle with many fine dark brown irregular spots or blotches on the elytra. Scarcely one eighth of an inch long and oblong in shape. The larvæ are also small and vary from straw to gray in color.

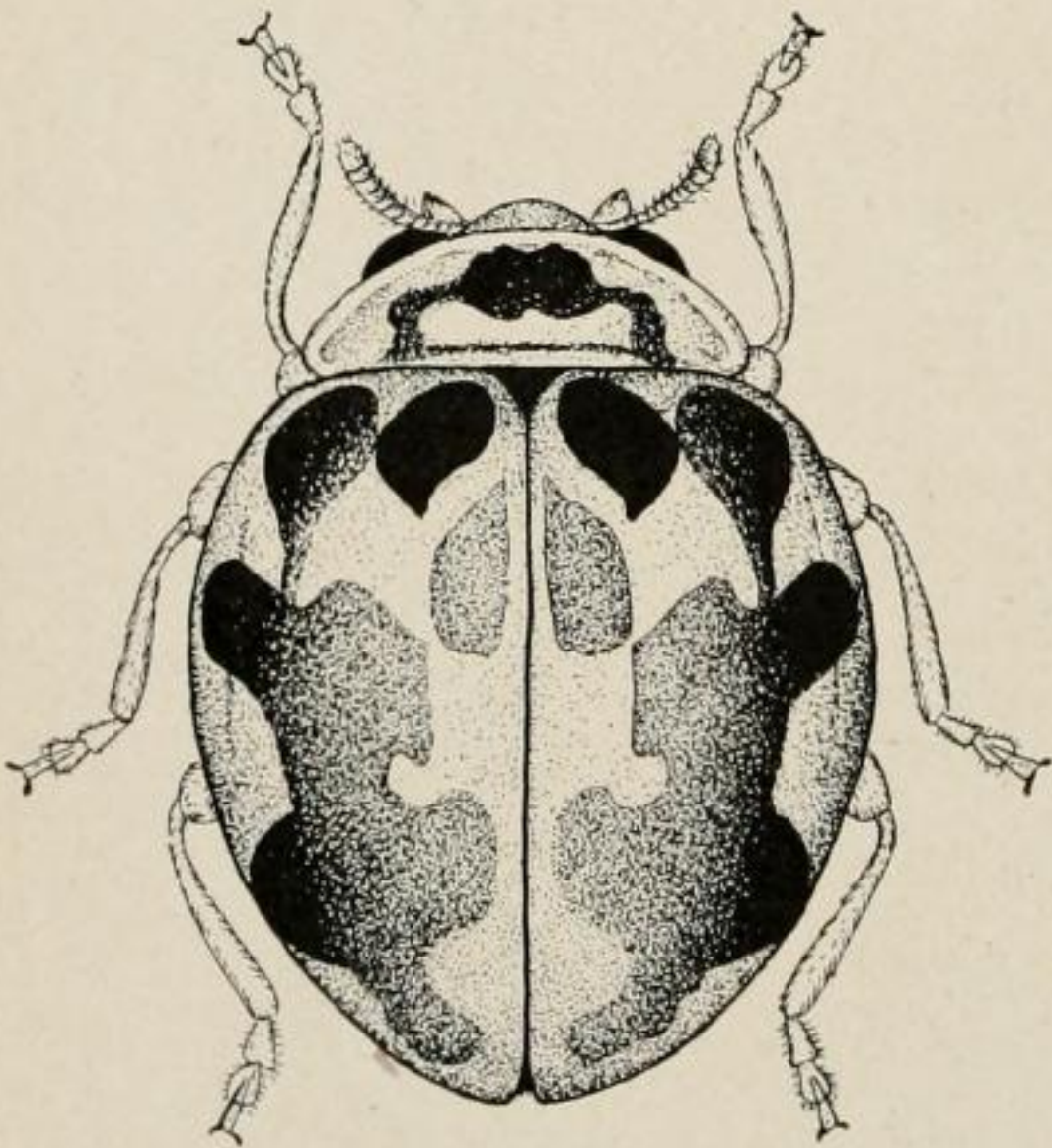


FIG. 201.—The small gray ladybird beetle, *Psyllobora tædata* Lec. (Original. Drawing by Birdnekoff.)

**Life History.**—This species is so small that only the first hatched scale insects are devoured, but the great numbers of the beetles enables them to do much good. The young and adults alike are very active and feed almost constantly.

**Distribution.**—A native species especially abundant in the southern part of the State in the coast counties from Santa Barbara to San Diego.

**Hosts.**—Young black scale, aphids and mites.



## THE TWO-STABBED LADYBIRD BEETLE.

*Chilocorus bivulnerus* Muls.

(Fig. 202.)

**General Appearance.**—The adults are broadly oval and about three sixteenths of an inch long. The color is shiny black with two round blood-red spots upon the elytra. The extreme margins of the prothorax are pale. The under side of the abdomen is red. The larvæ are very shiny, dark in color, with a yellow transverse band across the middle.

**Distribution.**—This is one of the native ladybird beetles and is to be found in almost every part of the State.

**Hosts.**—The larvæ and adults are voracious feeders upon the San José scale (*Aspidiotus perniciosus*), young of the black scale (*Saissetia oleæ*), mealy bugs (*Pseudococcus citri* and *P. longispinus*), oyster shell scale (*Lepidosaphes ulmi*), European elm scale (*Gossyparia spuria*) and other scale insects.

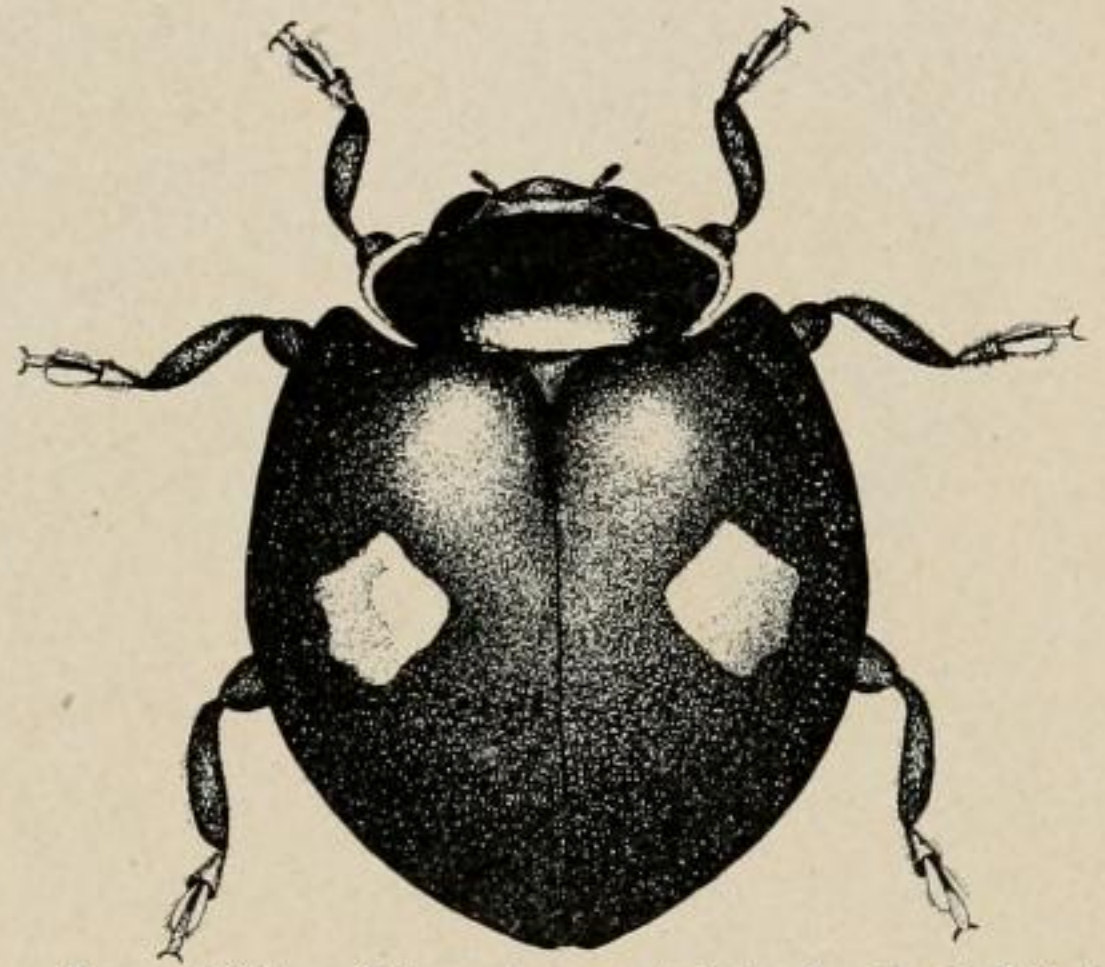


FIG. 202.—The two-stabbed ladybird beetle, *Chilocorus bivulnerus* Muls. (Original. Drawing by Birdnekoff.)

## THE STEEL-BLUE LADYBIRD BEETLE.

*Orcus chalybeus* (Boisd.).

(Fig. 203.)

**General Appearance.**—The adults of this beetle are metallic steel-blue or green in color, almost hemispherical in shape and between one eighth and three eighths of an inch in diameter. The head of the male is yellow.

**Distribution.**—Originally distributed throughout the entire southern part of the State, but is now almost entirely confined to the districts around Carpinteria in Santa Barbara County, where it is well established. Introduced into California by Albert Kœbele.

**Hosts.**—Feeds upon many armored coccids, including red scale (*Chrysomphalus aurantii*), yellow scale (*Chrysomphalus citrinus*), *Chrysomphalus rossi*, purple scale (*Lepidosaphes beckii*), San José scale (*Aspidiotus perniciosus*) and black scale (*Saissetia oleæ*).



FIG. 203.—The steel-blue ladybird beetle, *Orcus chalybeus* (Boisd.). Top natural size. (Agrcl. Gaz. N. S. W.)



*Axion plagiatus* Oliv.

(Fig. 204.)

**General Appearance.**—The adult beetles are quite large, attaining one fourth of an inch in length and nearly that much in width. The shape is broadly oval and convex, being almost hemispherical; color, shining black throughout with two large red blotches nearly covering the basal halves of the wing covers. These spots are smaller on the males. The apical margins of the pronotum are pale.

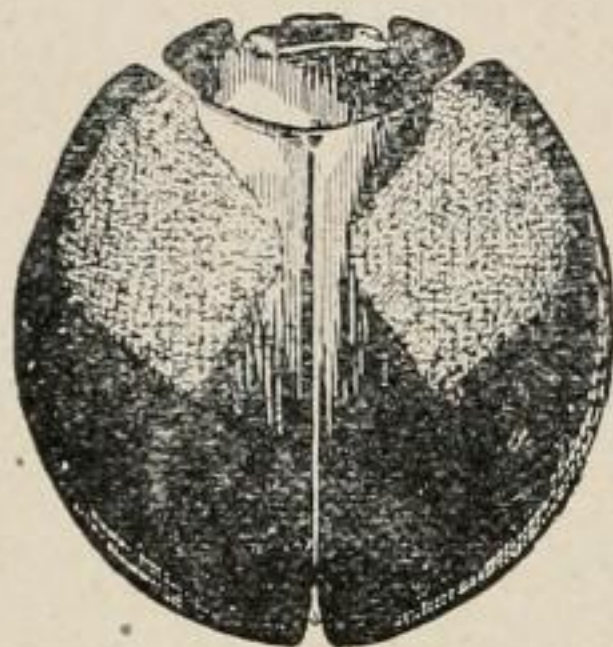


FIG. 204.—*Axion plagiatus* Oliv. (After Quayle. Courtesy Cal. Exp. Sta.)

**Distribution.**—Apparently limited to the southern part of the State.

**Hosts.**—Feeds upon young black scale and other young scale insects.

## PILATE'S LADYBIRD BEETLE.

*Axion pilatii* Muls.*(Exochomus pilatii* Muls.)

(Fig. 205.)

**General Appearance.**—The adult beetles resemble the two-stabbed and also the eyed ladybird, but are larger than the former and have smaller and darker red spots than the latter. They also differ from the two-stabbed ladybird beetle by having the under extremity of the abdomen black instead of red. The larvæ are larger and lighter than the young of the two-stabbed beetle but otherwise greatly resemble them.

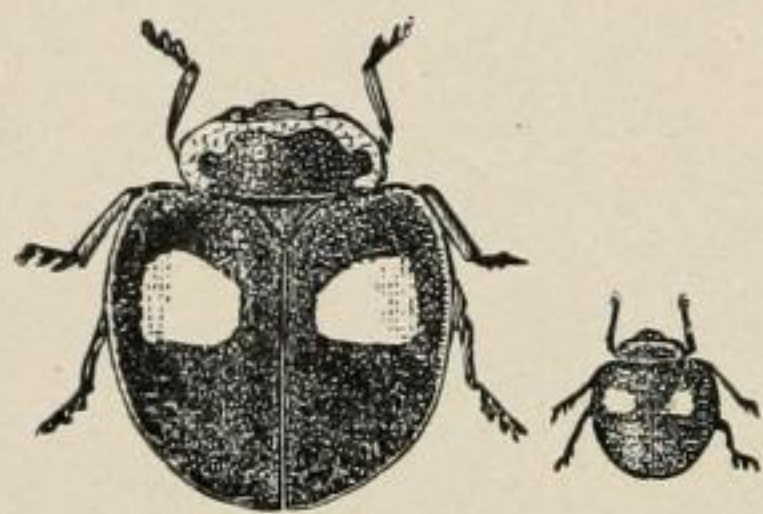


FIG. 205.—Pilate's ladybird beetle, *Axion pilatii* Muls. Enlarged and natural size. (Cal. Hort. Com.)

**Distribution.**—Occurs in limited numbers in the southern part of the State.

**Hosts.**—Feeds upon scale insects—young black scale seeming to be preferred.

*Exochomus californicus* Casey.

(Fig. 206.)

**General Appearance.**—The adult beetles are broadly oval, convex in shape and about three sixteenths of an inch long. The color is shiny black with a long reddish spot at the marginal base and a rounded spot of the same color near the tip of each wing cover.



**Distribution.**—Occurs throughout the entire State from Siskiyou to San Diego counties.



FIG. 206.—*Exochomus californicus* Casey. (Original. Drawing by Birdne-koff.)

**Hosts.**—The young and adults feed upon plant lice, scales and other small soft-bodied insects.

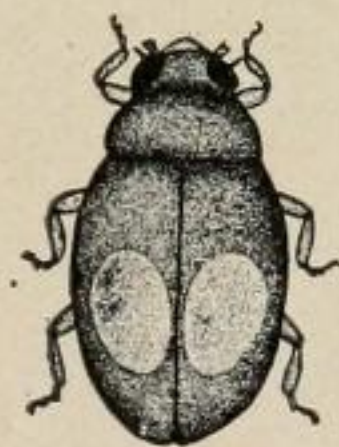
*Cryptogonus orbiculus* Schön.

(Fig. 207.)

**General Appearance.**—The adults appear at first sight to be black but upon closer examination it will be found that there are two quite large reddish-brown spots upon the back as shown in Fig. 207. They are elongate or oval in shape, scarcely one eighth of an inch long and are exceedingly active. The eggs are very small, oblong, yellow and laid singly. The larvæ have yellow bodies which are entirely covered with long white cottony-like filaments. The pupal stage is passed within the old larval skin.

**Distribution.**—The ladybird beetle was introduced into California by Geo. Compere from the Philippine Islands during the year 1910 and liberated in the central and southern parts of the State, where it has become established.

**Hosts.**—The larvæ and adults work primarily upon the eggs and young of the citrus mealy bug (*Pseudococcus citri*) and the long-tailed mealy bug (*Pseudococcus longispinus*).



C

FIG. 207.—*Cryptogonus orbiculus* Schön. (Essig, P. C. Jr. Ent.)



## THE MEALY BUG DESTROYER.

*Cryptolæmus montrouzieri* Muls.

(Figs. 208, 209.)

**General Appearance.**—Adults are as large as the ordinary red ladybird beetle, but decidedly pointed posteriorly. They are black with head, prothorax and posterior fourth of the elytra cinnamon red. The larvæ are yellow and covered with long filaments of white flocculence (Fig. 208A).

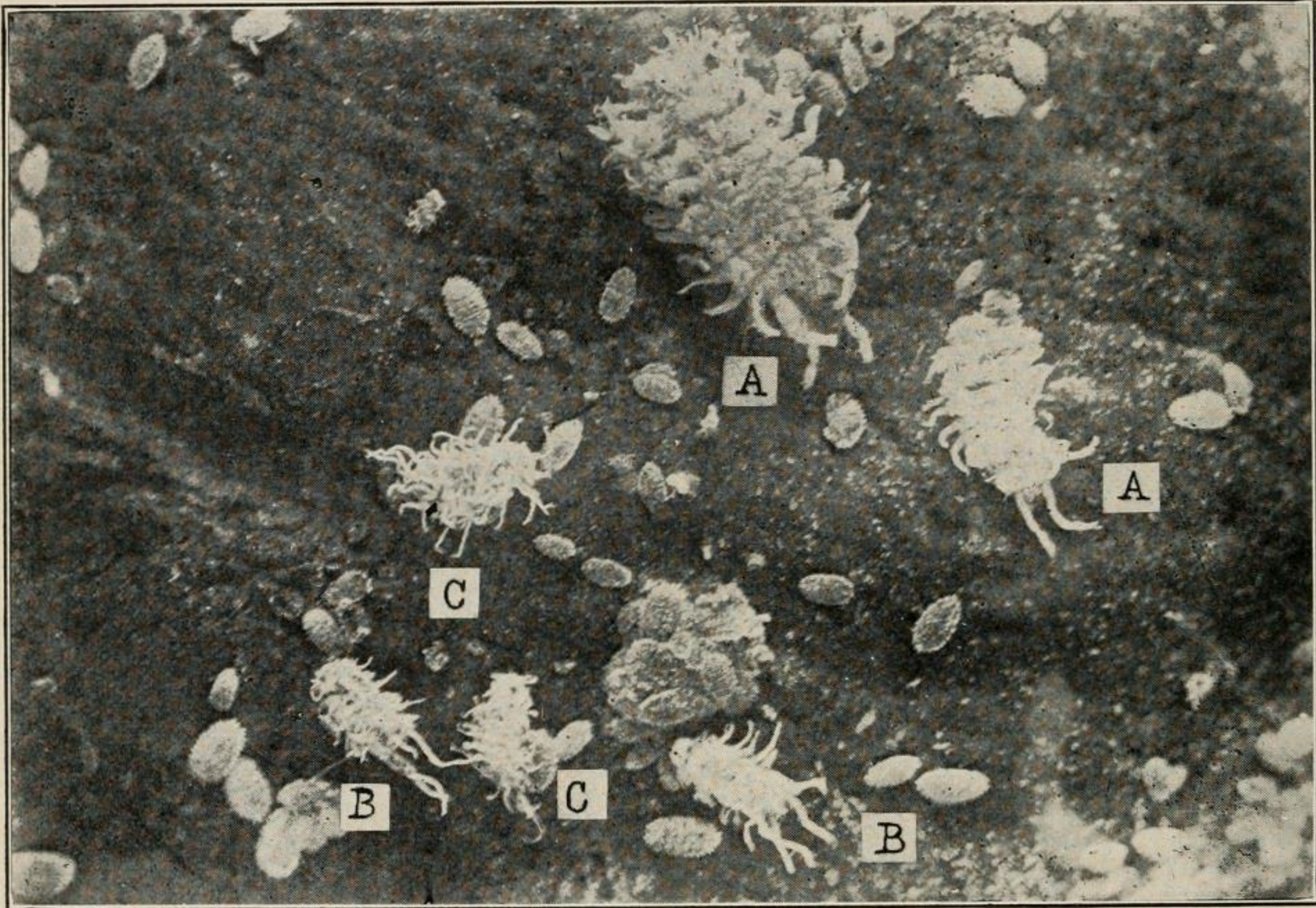


FIG. 208.—Larvæ of ladybird beetles. A, *Cryptolæmus montrouzieri* Muls. B, *Cryptogonus orbiculus* Schön.; C, *Scymnus guttulatus* Lec. (Essig, P. C. Jr. Ent.)

**Life History.**—The eggs are lemon yellow and deposited early in the summer among the egg masses of the mealy bugs. The young prey upon the eggs, young and adults of the host and work great havoc. They are most plentiful during the months of August and September. The pupal stage is passed within the old larval skin. The adults hibernate over winter.

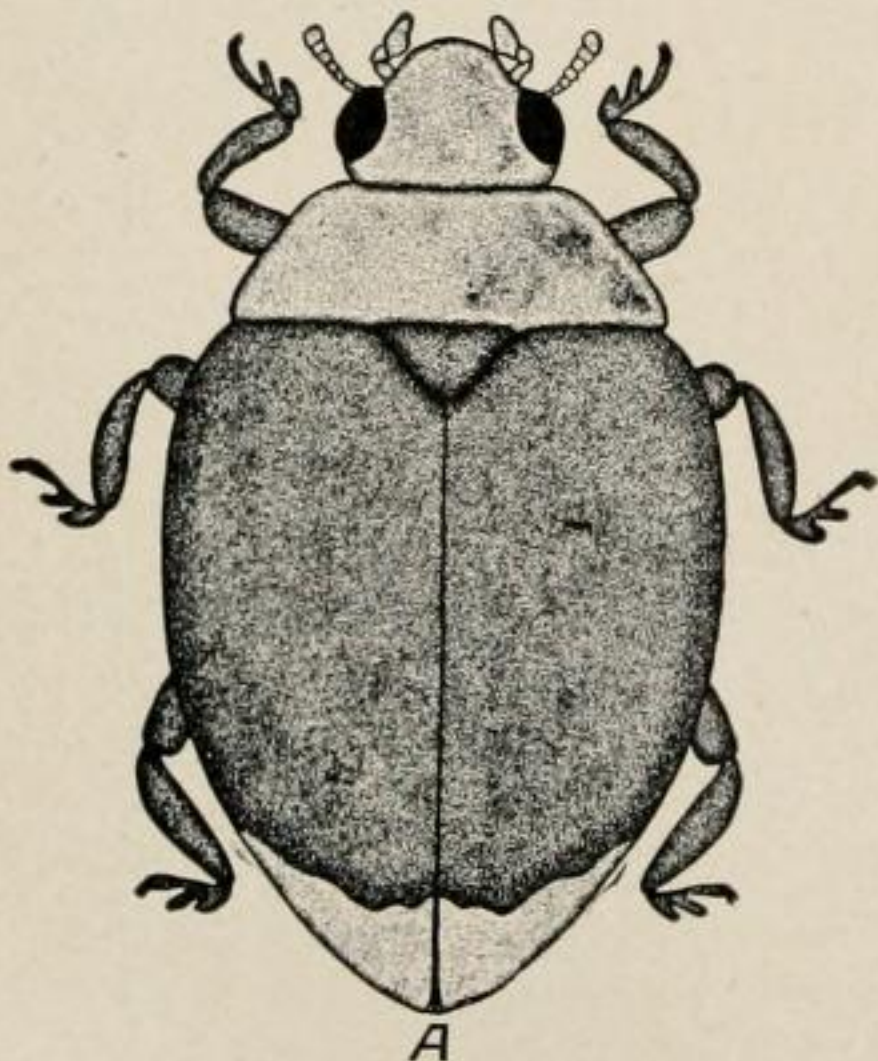


FIG. 209.—Adult female of *Cryptolæmus montrouzieri* Muls. (Essig, P. C. Jr. Ent.)

**Distribution.**—Throughout the mealy bug infested districts of the State. This species was introduced into California by Albert Kœbele and is redistributed from time to time by the State Insectary.



**Hosts.**—This is by far the most important natural enemy preying upon the various species of mealy bugs including *Pseudococcus citri*, *P. longispinus* *P. nipæ* as well as other species. In not a few cases it has done excellent work in destroying the citrus mealy bug.

*Hyperaspis lateralis* Muls.

(Fig. 210.)

**General Appearance.**—A rather small, black ladybird beetle, nearly hemispherical in shape and slightly more than one eighth of an inch in diameter. There are two red or yellow spots on the wing covers near the apex, two on the disc and two long narrow blotches on the front lateral margins. The edges of the thorax and front of head are yellow. The larvæ are yellow and entirely covered with long, white, cottony-like filaments. The pupæ of this ladybird are destroyed in great numbers by an internal hymenopterous parasite which keeps the species from doing effective work on the mealy bugs.

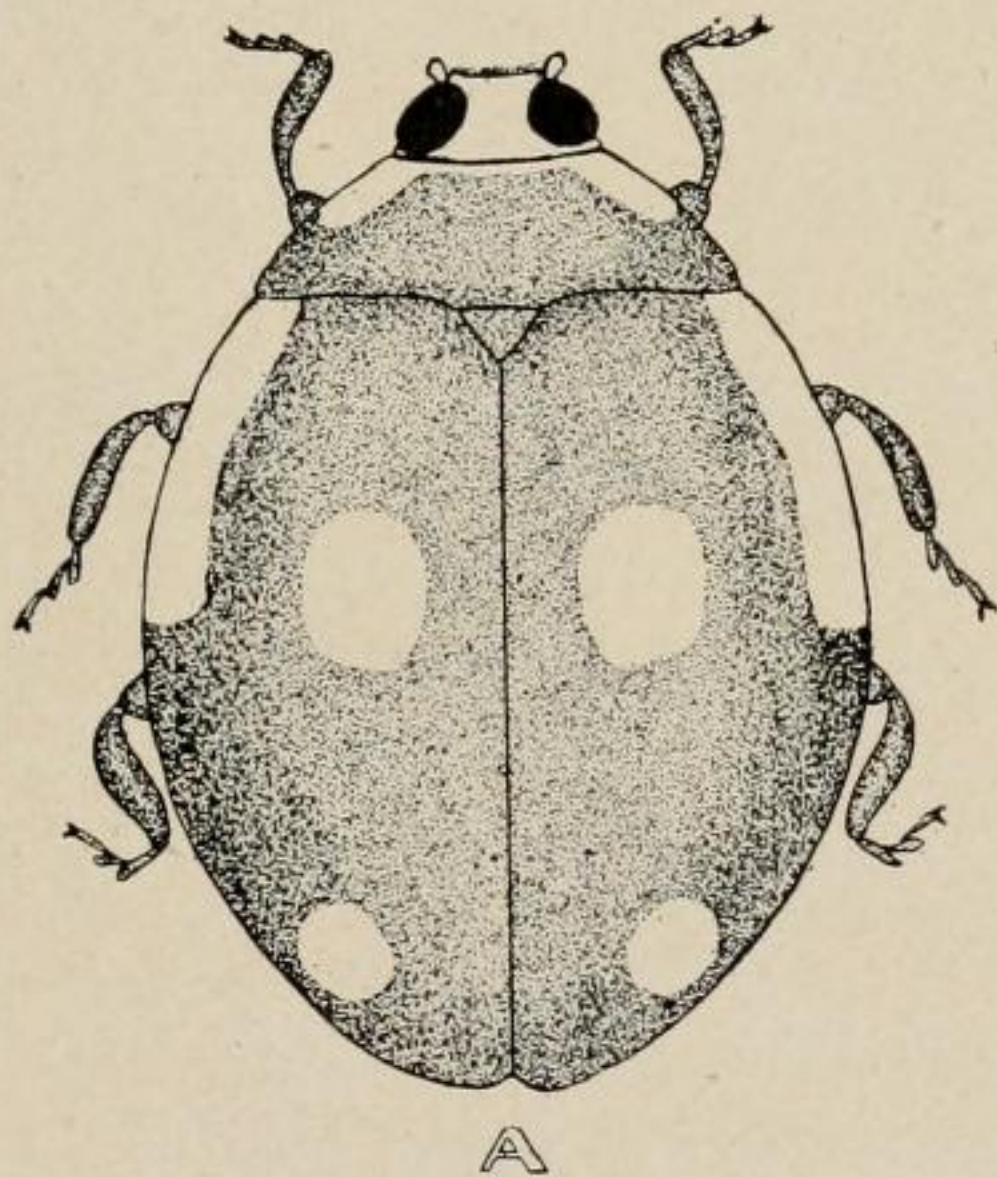


FIG. 210.—*Hyperaspis lateralis* Muls.

(Essig, P. C. Jr. Ent.)

**Distribution.**—One of the commonest of the coccid feeders, being more abundant along the coast in the central and southern portions of the State.

**Hosts.**—Adults and larvæ feed upon the mealy bugs and also upon the young of other scale insects.

*Hyperaspis undulata* Say.

(Fig. 211.)

**General Appearance.**—A very small species, the adults being less than one eighth of an inch long. The body is elongate-oval and shining black. The face and sides of thorax of the male are yellow, while in the female the former is black. Each wing cover has three yellow narrow spots on the margin and one oval yellow spot near the middle.



**Distribution.**—A common species, especially in moist locations, throughout the State.

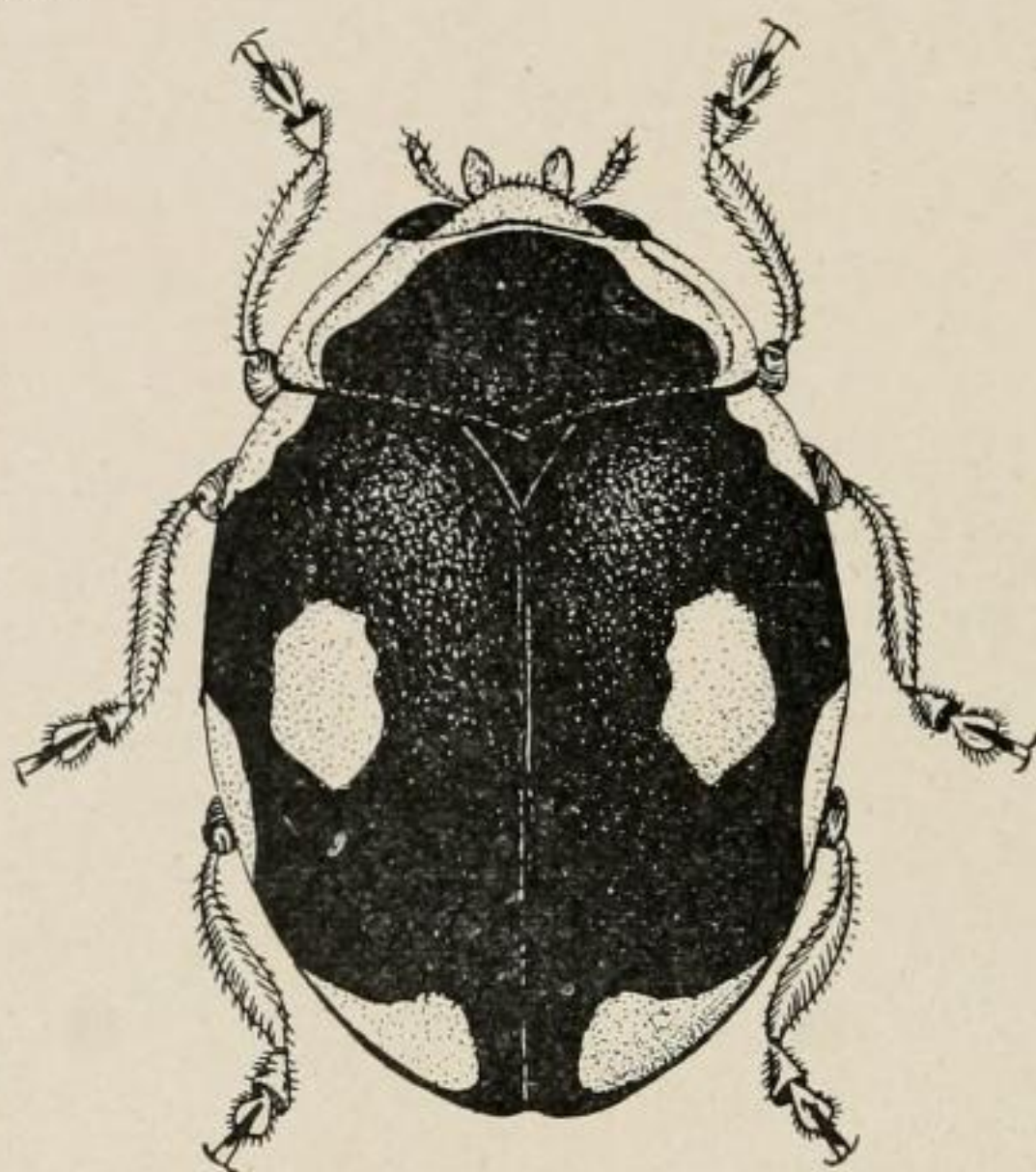


FIG. 211.—*Hyperaspis undulata* Say.  
(Original. Drawing by Birdnekoff.)

**Hosts.**—The larvæ and adults feed upon plant lice, coccids and other small soft-bodied insects.

*Hyperaspis dissoluta* Cr.

(Fig. 212.)

**General Appearance.**—This is one of the very small species, being little more than one sixteenth of an inch long. The body is elongate-oval and quite convex; shiny black; lateral margins of wing covers with narrow broken border which may appear as three distinct spots on each side. The legs are brownish.

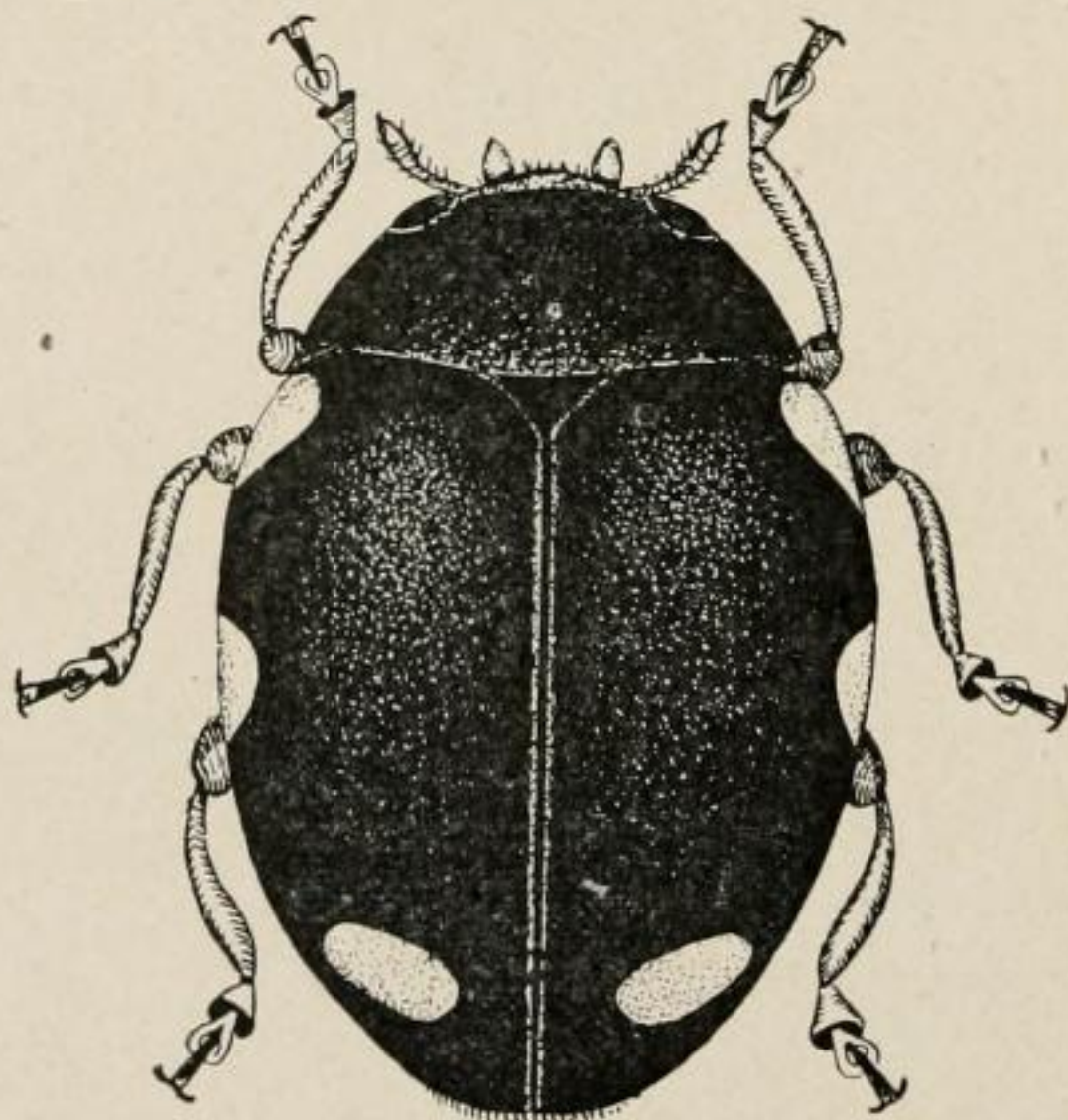


FIG. 212.—*Hyperaspis dissoluta* Cr.  
(Original. Drawing by Birdnekoff.)

**Distribution.**—Occurs in limited numbers in southern and central parts of the State, as specimens have been collected in Alameda and Los Angeles counties.

**Hosts.**—Feed upon young scale insects.



*Hyperaspis mærens* Lec.

(Fig. 213.)

**General Appearance.**—The adult beetles are very small, averaging about one tenth of an inch in length for the males and one eighth of an inch for the females. They are elongated in shape and shiny black with yellowish or reddish markings as shown in Fig. 213.

**Distribution.**—Common in the southern part of the State, especially in Ventura County.

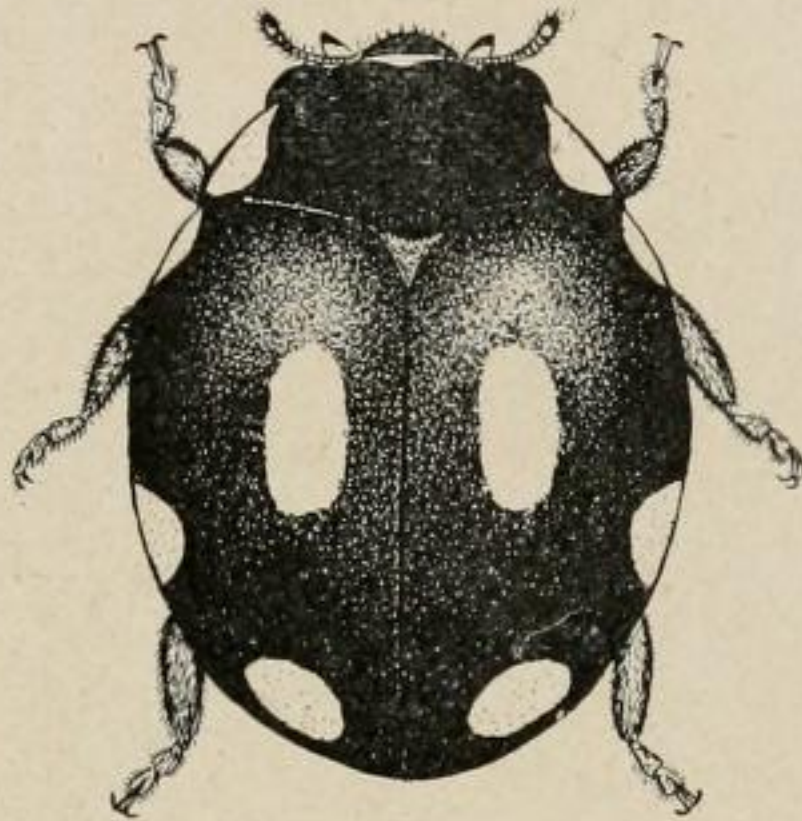


FIG. 213.—*Hyperaspis mærens*  
Lec. (Original.)

**Hosts.**—Large numbers of this species were taken in lemon orchards where they were feeding upon young black and purple scale.

*Hyperaspis spiculinota* Fall.

(Fig. 214.)

**General Appearance.**—The largest adult beetles are about one eighth of an inch long; elongated in shape; shiny black with yellowish or reddish markings as shown in Fig. 214 and with pale legs, antennæ and palpi.

**Distribution.**—Limited to the southern part of the State.



FIG. 214.—*Hyperaspis spiculinota*  
Fall. (Original.)

**Hosts.**—This species preys upon young scale insects.



## THE SMALL BROWN LADYBIRD BEETLE.

*Scymnus sordidus* Horn.

(Fig. 215.)

**General Appearance.**—Very small light brown beetle, scarcely more than one eighth of an inch long.

**Life History.**—The eggs are very minute and deposited in suitable feeding grounds. The larvæ cover themselves with a thick coat of long white waxy flocculence and greatly resemble mealy bugs. Though small they are voracious feeders, especially upon the smaller species of plant lice and also upon young scale insects. The pupæ are formed within the old larval skins.

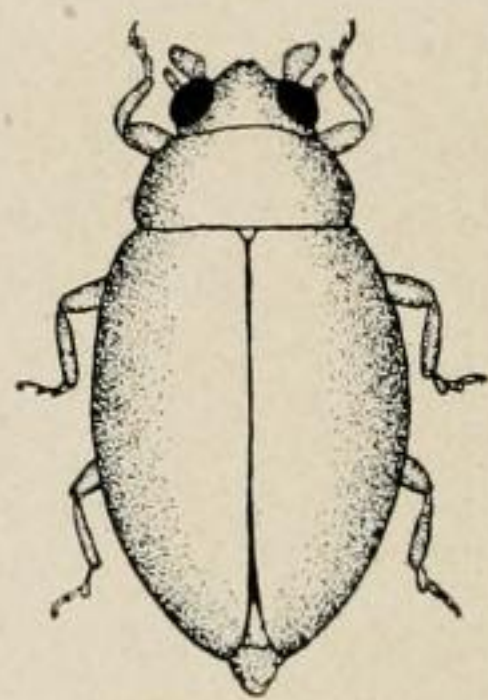
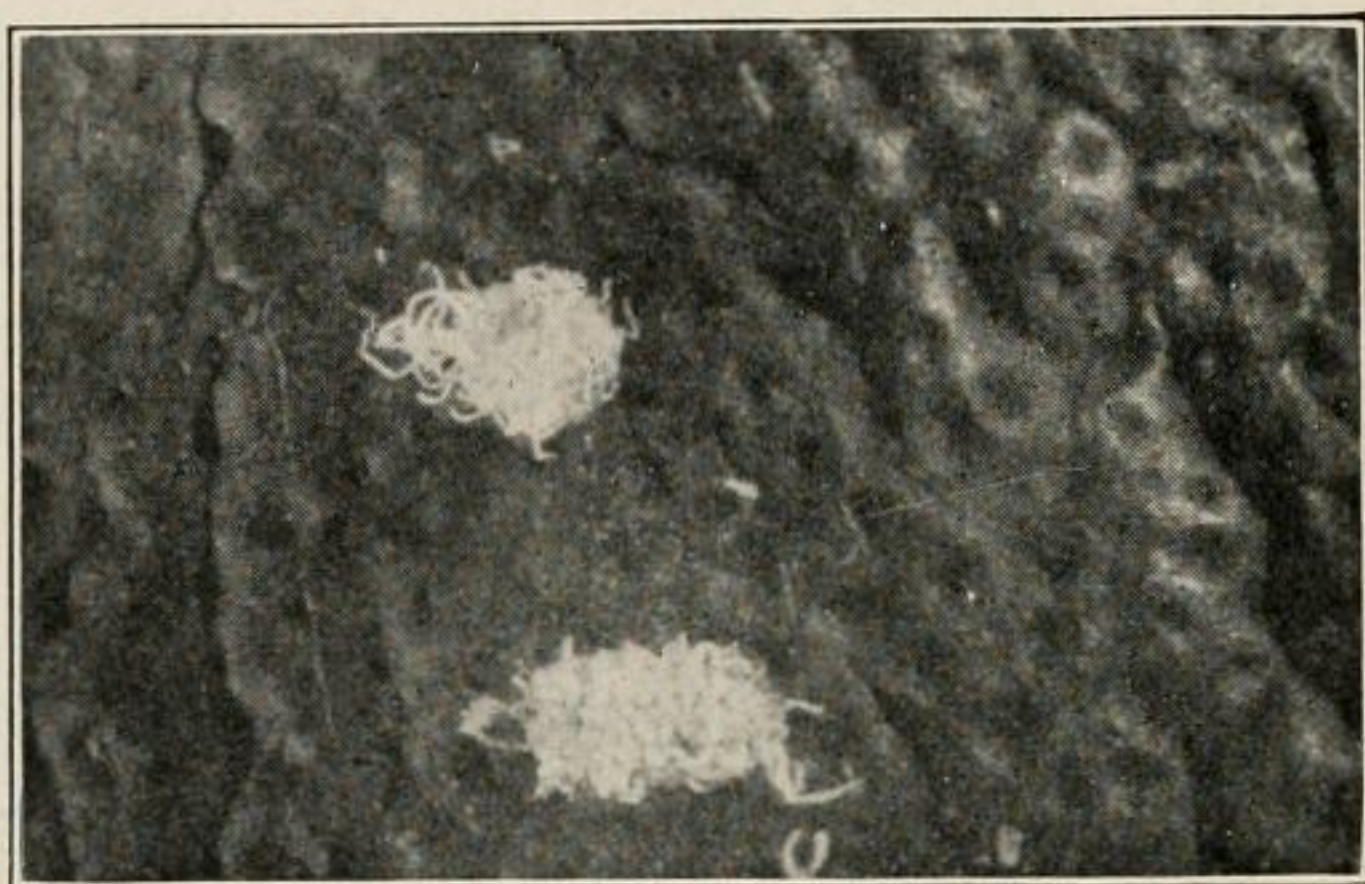


FIG. 215.—Larvæ and adult of *Scymnus sordidus* Horn. The former slightly and the latter greatly enlarged. (Essig, P. C. Jr. Ent.)

**Distribution.**—Throughout the entire State, but more abundant in the south.

**Hosts.**—This species preys upon mealy bugs, the young of the armored scales, plant lice (*Aphis gossypii*) and other soft-bodied insects. Large numbers of these ladybird beetles are to be found in the citrus groves of Ventura County.

*Scymnus guttulatus* Lec.

(Fig. 216.)

**General Appearance.**—The adult insects are oval-elongate in shape and scarcely one eighth of an inch in length. The general color is black, mottled with reddish-brown as shown in Fig. 216. The larvæ are about one fourth of an inch long with yellow bodies entirely covered with long, white, cottony filaments. (Fig. 208C.) The nymphs remain in the old larval skins in secluded quarters throughout the pupal stage.



FIG. 216.—Adult of *Scymnus guttulatus* Lec. (Essig, P. C. Jr. Ent.)

**Distribution.**—This is a native species, occurring throughout the entire State, having been often distributed by the State Insectary.



**Hosts.**—The larvæ and adults work upon various native mealy bugs as well as upon the citrus mealy bug (*Pseudococcus citri*) and the long-tailed mealy bug (*Pseudococcus longispinus*).

*Scymnus nebulosus* Lec.

(Fig. 217.)

**General Appearance.**—The adult beetles are exceedingly small, being less than one eighth of an inch in length. They are somewhat elongated in shape and vary from light to dark brown in color, with indistinct dark markings. The larvæ are covered with long, white cottony filaments.

**Distribution.**—Throughout the southern part of the State.



FIG. 217.—*Scymnus nebulosus* Lec. (After Quayle. Courtesy Cal. Exp. Sta.)

**Hosts.**—The writer has collected the larvæ of this species in large numbers in the canyons of Ventura County, where they were feeding upon a small native plant louse (*Eichochaitophorus populifolii* Essig). Quayle reports it as feeding upon red and purple scale. It also preys upon various species of mealy bugs doing effectual work upon the citrus species (*Pseudococcus citri*).

*Scymnus marginicollis* Mann.

(Fig. 218.)

**General Appearance.**—A small dull-black ladybird beetle with reddish prothorax and head—the former having a black spot at the base in the males and nearly all black at the base in the females. It is less than one eighth of an inch long and distinguished from *Lindorus loplanthæ* by its dull color, the latter being shiny.

**Life History.**—The young feed throughout the spring and summer. The adults which hibernate over winter begin to work early in the spring and continue until the next winter. They do nearly as much feeding as do the larvæ.

**Distribution.**—Throughout the entire State, especially along the coast. A native species.



**Hosts.**—This beetle feeds upon many species of aphids and coccids,

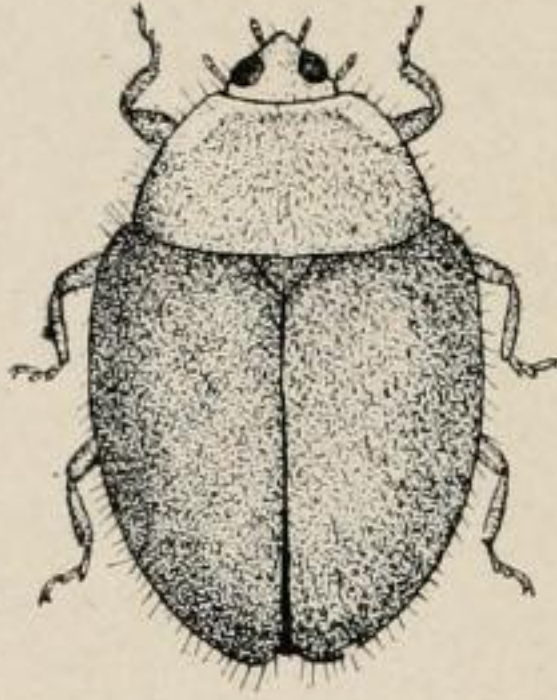


FIG. 218.—Adult female of *Scymnus marginicollis* Mann. (Essig, P. C. Jr. Ent.)

and are especially destructive to San José scale in the north and to red and purple scales in the south.

#### THE MINUTE BLACK LADYBIRD BEETLE.

*Stethorus vagans* Blackb.

(*Scymnus vagans* Blackb.)

(Fig. 219.)

**General Appearance.**—One of the smallest common species, so small as to be scarcely ever noticed, being scarcely one sixteenth of an inch long. Jet black in color and oblong in shape.

**Life History.**—The larvæ are not usually met with because of their small size and occurrence upon native shrubbery. The adults follow the infestations of mites, and feed almost entirely upon them. They are very active through the entire life history and become very numerous.



FIG. 219.—The minute black ladybird beetle, *Stethorus vagans* Blackb. (Original.)

**Distribution.**—A native species plentiful in the southern part of the State, and also abundant in the coast counties.

**Hosts.**—Small mites and spiders. Often abundant in citrus orchards, feeding upon the red spider (*Tetranychus mytilaspidis* Riley), and the common mite (*Tetranychus bimaculatus* Harv.). They also prey upon the clover mite (*Bryobia pratensis* Garman).



## THE VEDALIA.

*Novius cardinalis* Muls.

(Fig. 220.)

**General Appearance.**—Slightly less than one quarter of an inch in length and oval in shape. The color pattern is very pronounced and striking, being red and black, as shown in Fig. 220. In the females red predominates while in the males there is more black. The larvæ are often over one half of an inch long and lead-gray in color with reddish sides. They are often covered with whitish powder from the egg-sacs of the cottony cushion scale.

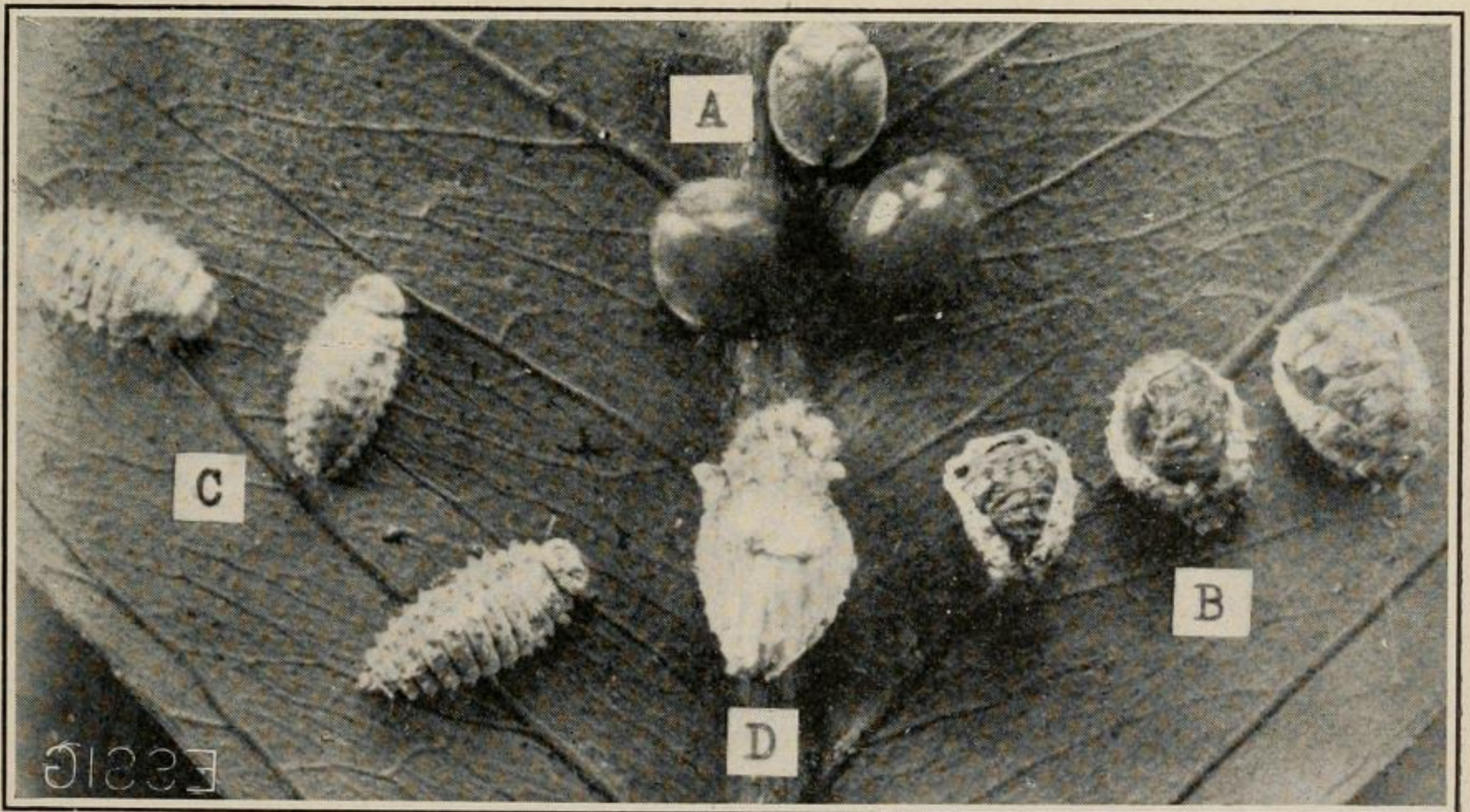
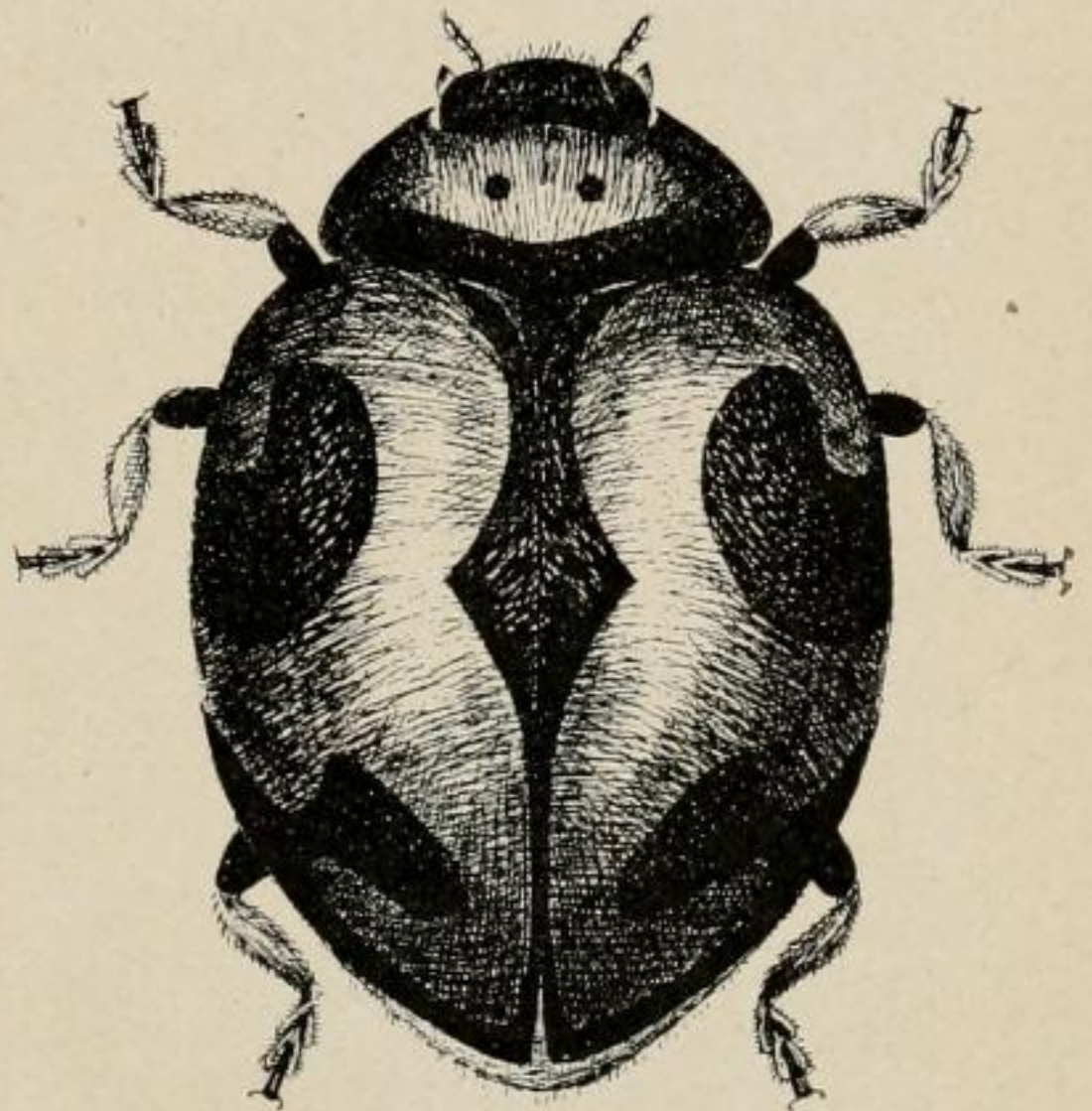
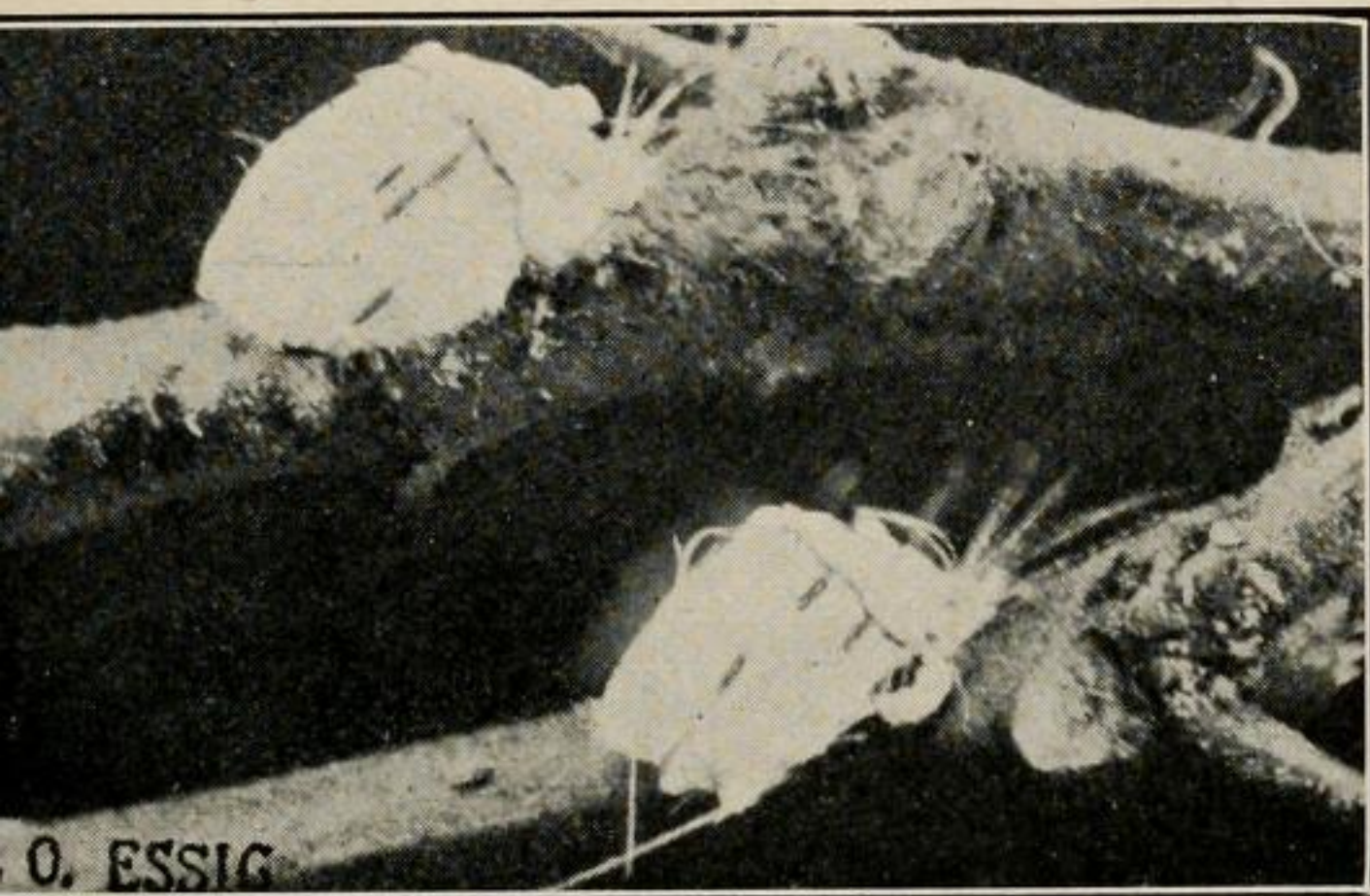


FIG. 220.—The vedalia (*Novius cardinalis* Muls.). Upper left picture shows eggs laid upon the egg-sacs of the cottony cushion scale (*Icerya purchasi* Mask.); upper right, adult beetle. In the lower picture A, adult beetles; B, pupæ; C, larvæ; D, cottony cushion scale to show comparative size. (Original. Drawing of adult by Birdnekoff.)



**Life History.**—The eggs are a little larger than those of *Novius kæbelei*, but are the same color and laid in similar places. The young feed upon the eggs and young scales and do great execution. The pupa stage is passed in the larval skin upon the leaves and limbs of the trees. Soon after the adult stage is reached copulation takes place and other broods are brought forth. The great prolificness and appetite of this species enables it to do what no other predator has yet done.

**Distribution.**—Throughout the citrus growing sections of the State. Disappears with the host and is constantly being sent out by the State Insectary. Introduced into California by Albert Kæbele.

**Hosts.**—It feeds entirely upon the eggs and young of the cottony cushion scale (*Icerya purchasi*). To this beetle is accredited the salvation of the citrus industry in California, which was threatened with destruction by the above scale.

### KÆBELE'S LADYBIRD BEETLE.

*Novius kæbelei* Olliff.

(Fig. 221.)

**General Appearance.**—A very small species being not longer than one eighth of an inch; the males are bright red with dark markings as shown in Fig. 221; the females red with dark head, prothorax, and marginal spot near the middle of each wing cover. The larvæ are dark red and about one fourth of an inch long.

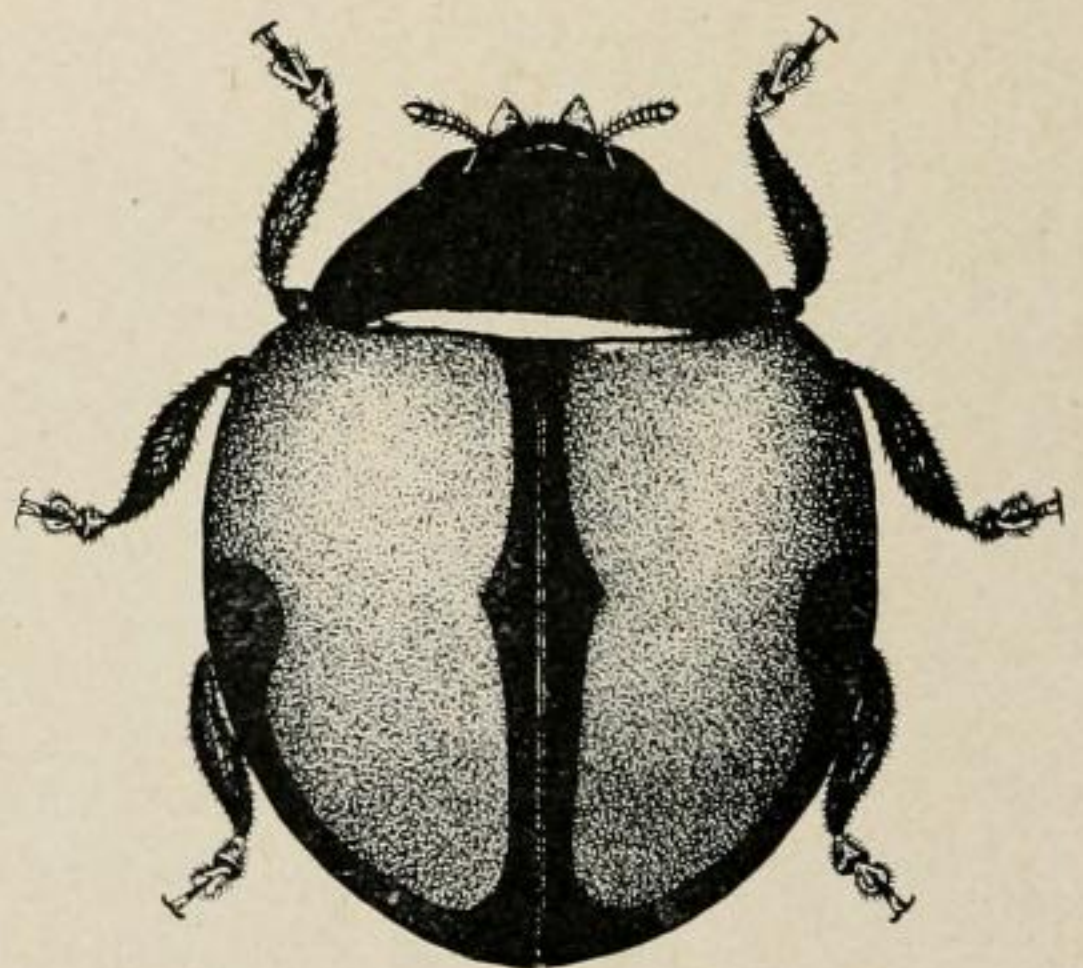
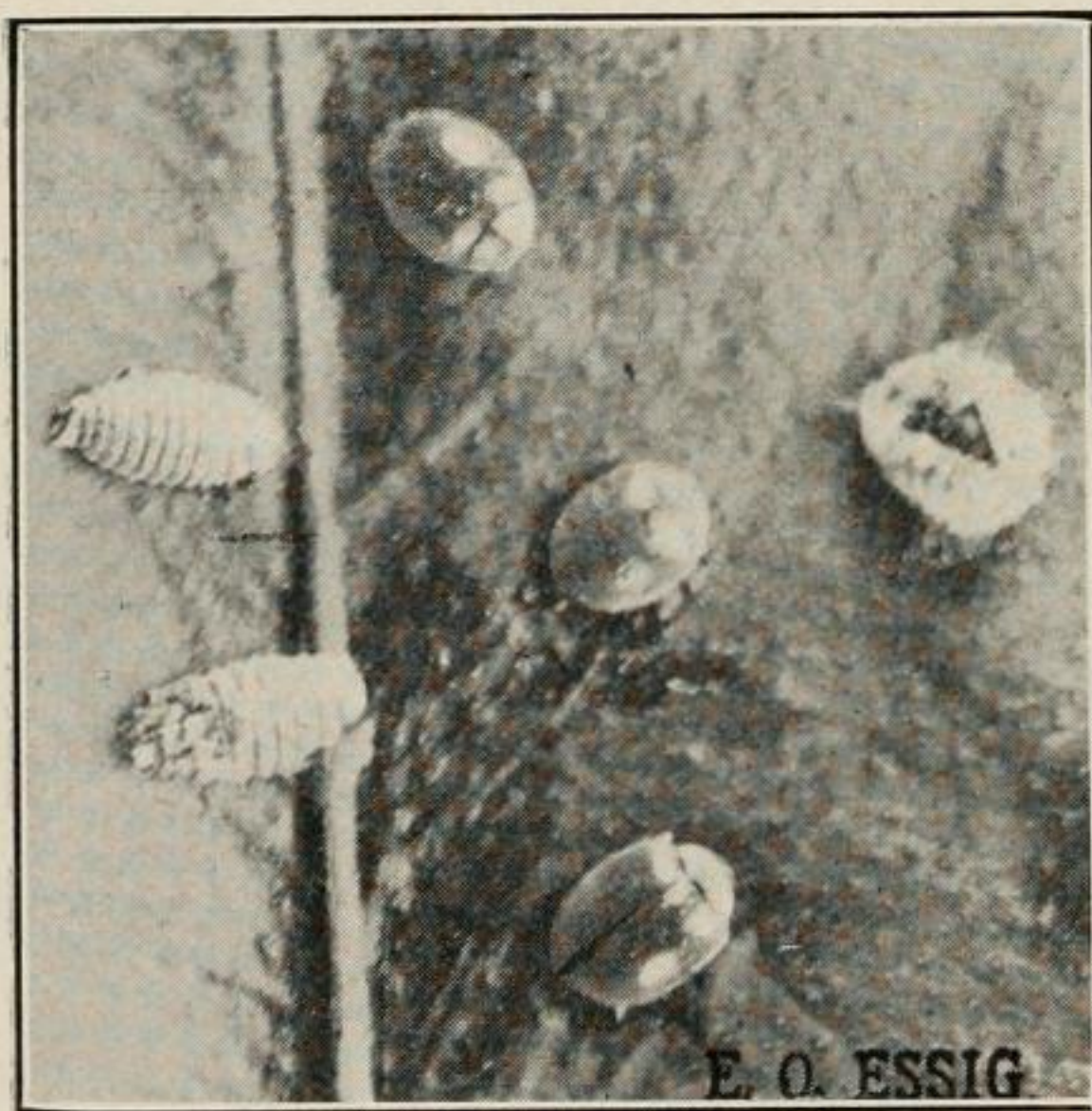


FIG. 221.—Kæbele's ladybird beetle (*Novius kæbelei* Olliff). Larvæ, pupa and adults at left. Enlarged four times. Adult male at right. Greatly enlarged. (Original. Drawing of male by Birdnekoff.)

**Life History.**—The small oblong red eggs are deposited by the females on the egg-sacs of the host and hatch within a few days. The young immediately enter the egg-sac and begin feeding upon the eggs and young hatched scales. They pupate within their larval skins on the trees and emerge as adults within a week or more. The adults mate and soon bring forth another brood. The females are very prolific and egg-laying continues throughout the entire spring and



summer until late fall. The adults hibernate during the colder winter months.

**Distribution.**—Throughout the citrus growing sections of the State. It was first introduced by Albert Kœbele and is continually being redistributed by the State Insectary.

**Hosts.**—Cottony cushion scale (*Icerya purchasi*). This species is often more numerous and does greater execution than does the Vedalia (*Novius cardinalis*), for which it is usually mistaken.

### BLACK LADYBIRD BEETLE.

*Rhizobius ventralis* Er.

(Fig. 222.)

**General Appearance.**—The adults are smaller than those of the common red ladybird; rather oval in shape; black and covered with

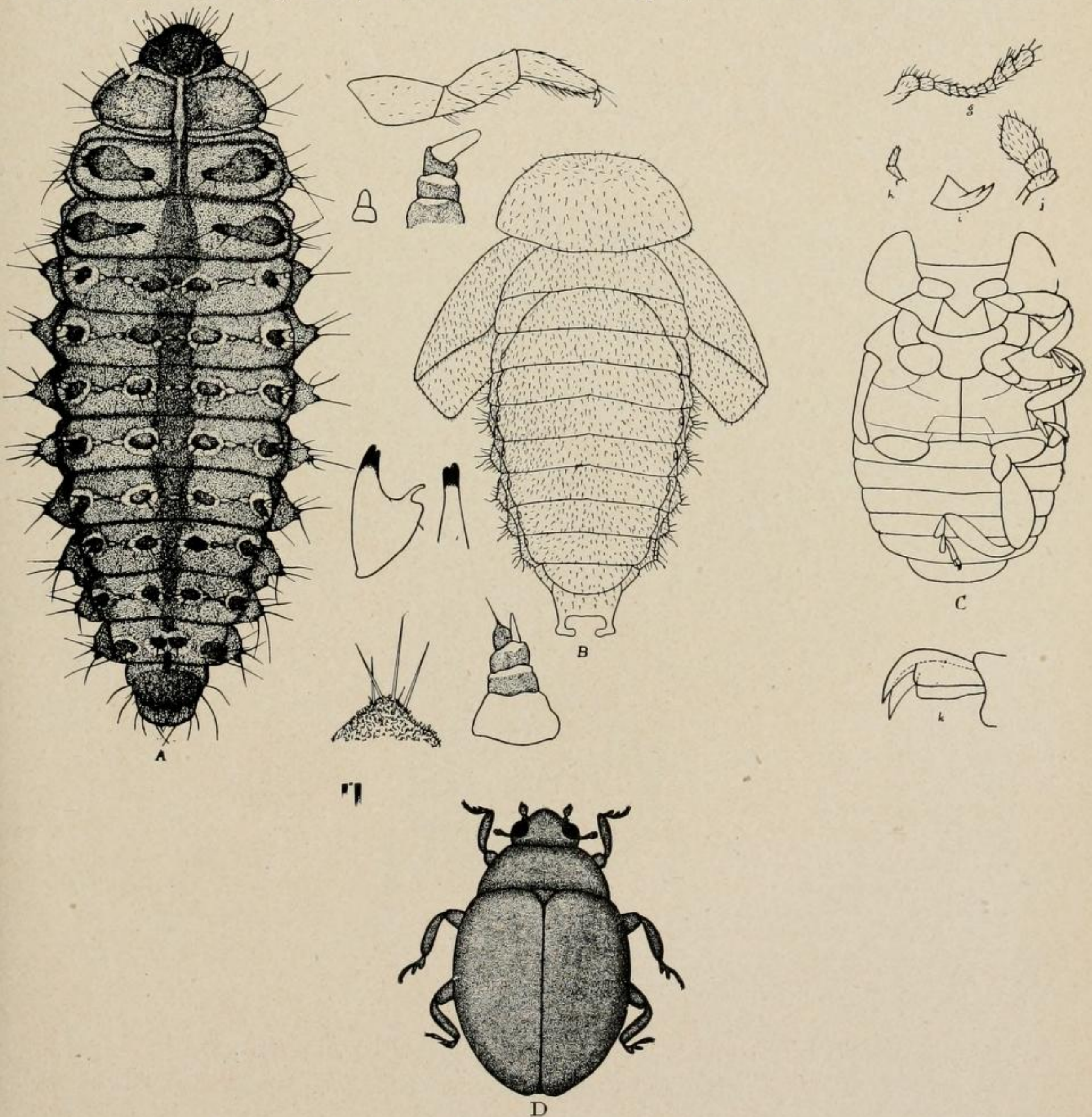


FIG. 222.—The black ladybird beetle (*Rhizobius ventralis* Er.). A, larva; B, pupa; C, ventral aspect of adult; D, dorsal aspect of adult. (Essig, P. C. Jr. Ent.)



fine hairs which give them a grayish appearance. The abdomen is salmon colored. The young are dark brown or black and covered with many spines.

**Life History.**—The eggs are deposited singly or a few at a place among the egg masses of mealy bugs, under the bodies of the black scale or among other scale insects. The young begin feeding as soon as they emerge upon the smaller hosts first. The numbers of the host are so great that the actual good done is not so marked as in the cases of many other predators. The adults move little except when annoyed.

**Distribution.**—Throughout the entire State. This species was imported by Albert Kœbele, especially as an enemy of black scale (*Saissetia oleæ*).

**Hosts.**—The young feed upon the eggs of the black scale, mealy bugs, hemispherical scale and other similar insects.

*Lindorus lophanthæ* Blaisd.

(*Rhizobius lophanthæ* Blaisd.)

(*Rhizobius toowoombæ* Blackb.)

(Fig. 223.)

**General Appearance.**—The adult beetles are rather broadly-oval in shape and about one eighth of an inch long. The color is bright metallic black or bronze. The head and thorax are reddish brown with a dark spot at the middle base of the latter. This species is very often confused with *Scymnus marginicollis* but may readily be distinguished from it by the lustrous bronze color. The larvæ are light brown in color with an elongated yellow spot on the middle of the back.

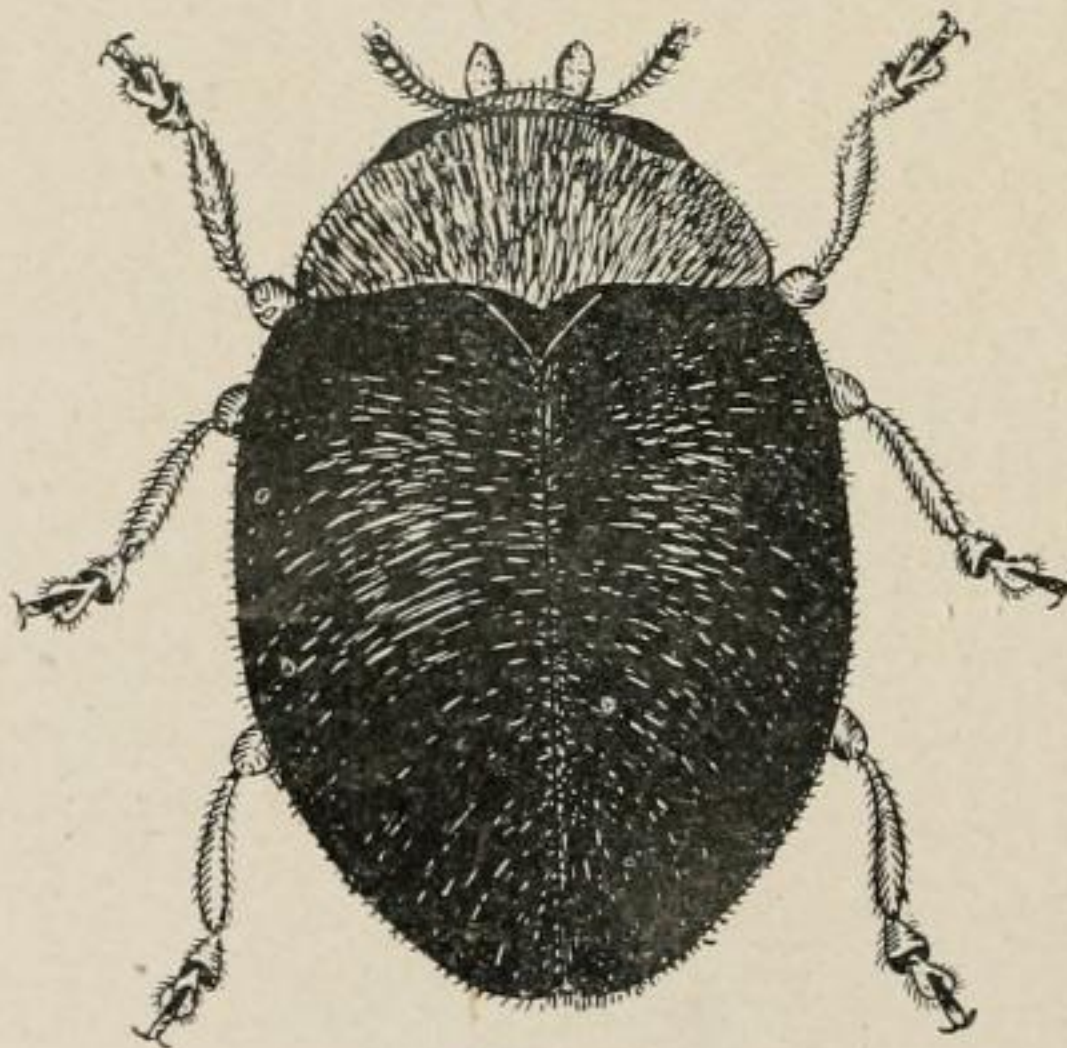


FIG. 223.—*Lindorus lophanthæ* Blaisd.  
(Original. Drawing by Birdnekoff.)

**Distribution.**—This species was introduced into California by Albert Kœbele and has become generally established in the southern part of the State.



**Hosts.**—The larvæ and adults of this beetle are voracious feeders upon red scale (*Chrysomphalus aurantii*), yellow scale (*Chrysomphalus citrinus*), ivy scale (*Aspidiotus hederæ*), pernicious scale (*Aspidiotus perniciosus*), purple scale (*Lepidosaphes beckii*), the citrus mealy bug (*Pseudococcus citri*) and black scale (*Saissetia oleæ*).

### THE CALIFORNIA GRAPE ROOT-WORM.

\**Adoxus obscurus* Linn. (Family Chrysomelidæ).

(Figs. 224, 225.)

**General Appearance.**—The adult beetles are about three sixteenths of an inch long, jet black in color and partially covered with fine whitish hairs giving them a grayish cast. The prothorax is noticeably narrower than the rest of the body. The antennæ and legs are usually black, but are sometimes brown. The eggs are elongated, yellowish-white and one twenty-fifth of an inch long. The full-grown larvæ are white with brown heads and about one fourth of an inch long. The heads are usually curved in towards the ventral surface of the body. The pupæ are white and about the same size as the fully developed larvæ.

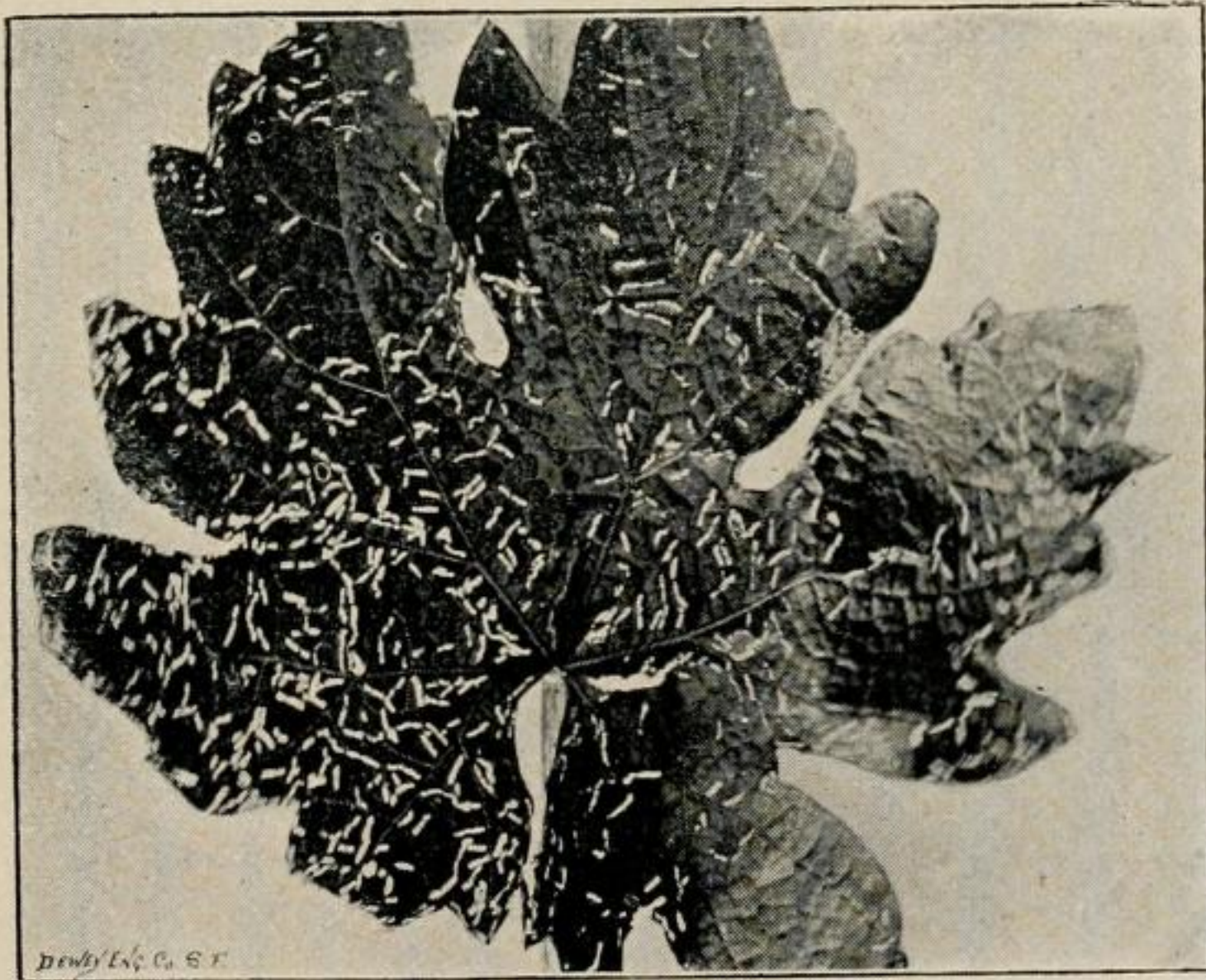


FIG. 224.—Work of the California grape root-worm (*Adoxus obscurus* Linn.) on leaf. (Cal. Hort. Com.)

**Life History.**—The eggs are laid early in the spring, usually in clusters of from one to two dozen in cracks or crevices beneath the bark upon the trunk of the vines, anywhere within six inches above the surface of the ground. They hatch in from eight to ten days and the young larvæ immediately seek the roots of the vines underneath the ground and attack first the small rootlets which are often entirely

\*The light-colored form has the wing covers, tibiæ and basal half of the antennæ brown, while the rest of the body is black. This species is known as *Adoxus vitis* Fourc., and the life history and habits are almost identical with those of *Adoxus obscurus* Linn.



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STATE COMMISSION OF HORTICULTURE

January and February, 1913

THE MONTHLY BULLETIN

VOLUME II

Nos. 1 and 2

DEVOTKI) TO THK DICSCRIPTIONS, LIFE HABITS AND METHODS OF CONTROL OF INSECTS

FUNGOID DISEASES AND >0X10US WEEDS AND ANIMALS, ESPECIALLY IN

THEIR RELATION\*; TO AGRICULTURE AND HORTICULTURE.

EDITED BY 1111 IMIRK FORCE OF THE COMMISSION UNDER THE FOLLOWING DIRECTORS:

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HARRY S. SMITH -

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**[Begin Page: Title Page]**

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INJURIOUS AND BENEFICIAL

Insects of California

BY

E. O. ESSIG

Secretary State Commission of Horticulture



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and *Carum kelloggii*. In the Porterville section, as well as in the vicinity of Riverside, the larvae feed upon orange trees and in the former district promise to be a pest.

Control. — The larvae occur singly and in rather few numbers upon the trees, but their ravenous appetites and ability to consume great amounts of foliage often makes control necessary. As they are easily located hand picking is the remedy recommended.

Natural Enemies. — Fortunately natural enemies play a large part in the control of this insect, otherwise greater damage would be done.

Mr. Karl E. Coolidge, who first called attention to it as an orange pest, states that a tachinid fly and a species of *Apanteles* prey upon the larvae.

COLEOPTERA (Order).

SHEATH-WINGED INSECTS.

BEETLES AND WEEVILS.

The insects of this order are easily recognized by their hard, leathery elytra, commonly known as wing covers. The true wings are folded underneath these. All forms have complete metamorphoses, the young



being wormlike and known as grubs. They usually have but six functional legs. The pupal stage is quiescent. The mouth-parts are for biting and chewing.

All of the members of this order are extremely destructive, the grubs and adults working throughout their entire existence. There are great numbers of destructive beetles and weevils in California but we can include only a few of the more important ones.

COCCINELLIDÆ: (Family).

LADYBIRD BEETLES.

This family of beetles is one of the most important and 'beneficial among insects. Only one genus of a few species is destructive, while the rest are particularly noted for their work upon scale insects {Coccidae.) and plant lice (Aphididæ) .

Eggs. — The eggs vary considerably with the different members of the family and are seldom if ever observed. Those most often met with are the salmon-colored masses (Fig. 189B) of the *Hippodamia* spp., which are laid on ends not unlike bunches of cigars. Others are deposited singly upon or underneath individual scale insects, in the egg-masses of mealy bugs or among plant lice.

Larvae. — The young grubs or larvae are exceedingly active and begin to feed soon after hatching. As the period of growth is short their ability to consume food must be great, and we find them unexcelled as



predators. They have rather long, pointed and flattened bodies (Fig. 189 C), well developed mouth-parts and six legs. The colors are exceedingly variable, the bodies are hairy, some being covered with long,

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white threads of wax (Fig. 208). Besides the coverings they are protected by offensive secretions and are not generally preyed upon by insectivorous animals. During their growth they moult four times and when fully matured seek shelter to pupate.

Pupae or Nymphs. — The larvte not having a waxy or exceedingly hairy or spiny covering, usually hang by the tail and pupate with the head downward (Fig. 189D), while the covered ones pupate within the larval skins which give ample protection. Offensive liquids are

Fig. 1S5. — Two species of CocchieUdw (*Hippodamia convergens* Guer. and *H. ambigua* Lee.) emerging from hibernating quarters in tlie spring. (After Carnes. )

also secreted for protective purposes. The naked nymphs have the ability to move the suspended body very rapidly when disturbed.

Adults.— The adult beetles emerge through slits in the pupal skins.



They are exceedingly active, feeding throughout their existence. In size they vary from one sixteenth to nearly one half inch in length. The color is usually showy and of many shades and combinations. The males are somewhat smaller than the females and sometimes with slightly different colorations. The winter is passed in hibernation. In some species thousands of individuals collect in the mountains in great colonies. With the first warm spring weather these emerge from the winter quarters and migrate to the lower valleys and disperse to give rise to succeeding generations.

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\*THE STRIPED LADYBIRD BEETLE.

*Paranwmia vittigera* (Maun.).

{*McgUla vittigera* Mann.)

(Fig. 186.)

General Appearance. — The adult beetles vary from a straw or light pink to almost bronze and have three broad, longitudinal, black



stripes on the back, dark head, and two black blotches on the prothorax.

Distribution. — The adults hibernate in quite large colonies and are found in most parts of the State, and especially in the southern part. They seem to prefer damp places and are usually common in sugar beet fields. At Oxnard, California, the writer found this species in great numbers.

Hosts. — Feed upon root lice, such as the beet louse (*Pampliigus* *hetce*), and other soft-bodied insects.

Fig. 186. — The striped ladybird beetle, *Paranwmia vittigera* (Mann.). (Original. DraAving by Birdnekoff. )

*Hippodamia 5-signata* Kirby.  
(Fig. 187.)

General Appearance. — The adult beetles are slightly more than three sixteenths of an inch long and rather robust. The head is black with white front and margins ; thorax black with white margins



and sometimes two white spots near the middle; elytra, or wing covers, yellow or red with a broad black band extending nearly across the base, a wide black band behind the middle and a black spot near the tip of each. There is sometimes a very small black spot near the mar-

.", 1 J, 1 . Fig. 187. — *Hippodamia 5-signata*

gm and base of each wing cover. Kirby. (Original. Drawing by Bird-

The body proper and legs are black. 'i«\*koff.)

Distribution. — Especially abundant in the northern part of the State, but is also found in all other sections, though only in limited numbers.

Hosts. — Prey particularly upon plant lice.

\*The writer is indebted to Mr. F. W. Nunenmacher for the correct naming of these species.

**[Begin Page: Page 202]**



THE MONTHLY BULLETIN.

*Hippodamia lecontii* Mul.s.

(Fig. 188.)

General Appearance. — About the same size and shape as *Hippodamia convergens*. The head is black with a white spot in middle;

thorax entirely black with lateral and front margins white ; elytra red with one very faint small black and two well defined spots near the base of each — the two spots near the middle front of the elytra often unite with the scutellar spot at the extreme middle base to form an inverted "Y" (Fig. 188). Near the tip of each wing cover there are two spots, the hind one being small, while the other is large and often appears to be two spots united. In some individuals the markings may appear almost identical with those of *Hippodamia convergens*, but the slender white spots are always lacking on the middle of the prothorax.

Distribution. — Throughout the entire State, but not abundant.

Hosts. — Preys principally upon plant lice.



Fig. 188. — *Hippodamia lecontei* Muls

(Original. Drawing by Birdnekoﬀ.)

#### THE COMMON BLACK-SPOTTED RED LADYBIRD BEETLE.

*Hippodamia convergens* Guer.

(Fig. 189.)

General Appearance. — The commonest of all ladybird beetles in this State and easily distinguished by the red color and the twelve black spots on the elytra. The head and thorax are black, the latter with two narrow lateral white margins and a very small medium white spot at the base.

Life History. — The eggs are salmon-colored and deposited in clusters not unlike bunches of cigars on their ends. The dark larvae soon after emerging search for food, which at first consists of very small insects, such as young scale insects. Full grown larvae are nearly one half inch long and have several reddish or salmon-colored spots on the thoracic segments. The pupa varies from yellow to reddish with black markings. All stages of the species exist throughout the summer months and may be found almost anywhere.

Distribution. — Throughout the entire State. The species hibernates in great colonies in the high Sierras, from whence it descends into the lowlands as soon as warm weather melts the snow.



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THE MONTHLY BULLETIN.

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Hosts. — Soft bodied insects, such as plant lice, young scale insects, other species of ladybird beetles, and they may even be cannibalistic.

The principal food consists of plant lice, chief of which are the melon

B

Fig. 189. — The common black-spotted red ladybird beetle (*Hi*)*podamia convergens* Guer.). A and E, adults; B, eggs; C, larva; D, pupa. (Essig, P. C. Jr. Ent.)

aphis (*Aphis gossijpii* Glover), the pea louse (*Macrosipkum destructor* Johns.), the bean aphis (*Aphis rumicis* Linn.) and the woolly aphis, *Eriosoma lanigera* (Hausm.)

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THE MONTHLY EULLETIN.

THE COMMON RED LADYBIRD BEETLE.



*Hippodamia convergens* Lec.

(Pl. figs. 190, lill.)

General Appearance.— The adult beetles greatly resemble the black-spotted red ladybird beetle (*Hippodamia convergens*) in size and shape. The wing covers are entirely red with a single black spot at the middle of their bases and an indistinct light area on each side of

Fig. 190. — The common red ladybird beetle (*Hippodamia ambigua* Lec). A, adult; B, eggs; C, larva; D, pupa. (Essig, P. C. Jr. Ent.)

this spot. The thorax is black with narrow lateral margin and two narrow median spots white. The head is black with median and marginal light spots. The eggs and immature forms are practically the same as those of *Hippodamia convergens*.

Distribution. — Throughout the entire State. A very common species, hibernating with and accompanying *Hippodamia convergens*.

\*This is now being considered as a varietal form of *Hippodamia convergens* Guer.

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Hosts. — Feeds upon practically the same hosts as does *Hippodamia*

Fig. 191. — Adult of the common red ladybird beetle, *Hippodamia ambigua* Lee. ( Original. Drawing by Birdnekoff. )

*convergens*, and has also been reported as preying upon young cottony cushion scale (*Icerya purchasi*) .

#### THE TWO-SPOTTED LADYBIRD BEETLE.

*Adalia bipunctata* Linn.

(Fig. 192.)

General Appearance. — The adult beetles are red with a black spot on each wing cover; thorax black with white margins and two small light spots near the middle base ; head black with light antenna? and palpi ; legs black with pale feet.

Distribution. — This beetle was sent to California by Mr. B. M. Lelong in the year 1889, and has become established more particularly in the

Fig. 192. — The two-spotted ladybird beetle, *Adalia bipunctata* Linn. (Original. Drawing by Birdnekoff. )

central part of the State. The writer has specimens collected in



Alameda Comity.

Hosts. — The larvae and adults of this ladybird beetle feed almost entirely upon plant lice.

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THE MONTHLY BULLETIN.

*Adulia hipuictatu* var. *humeralis* Say.

(Fig. 193.)

General Appearance. — The adult beetles are oval-elongate in shape

and three sixteenths of an inch

long. The color is shiny black

with the spots on the face and

margins of the prothorax red.

There are two large red spots at

the marginal bases and two

smaller circular red spots back of

the middle of the wing covers.

Distribution. — Occurs in the

central part of the State, though



not at all numerous.

Fig. 193. — *Adalia bipunctata* var.

*humeralis* Say. (Original. Drawing by

Birdnelioff. )

Hosts. — Works principally upon

plant lice.

*Coccinella trifasciata* var. *Juliana* Muls.

(Fig. 194.)

General Appearance.— The adult beetles are oval in shape; convex

and three sixteenths of an inch long.

The head is white except a narrow

black line near the prothorax and

the black eyes; prothorax black

with all the front and lateral

margins, except the extreme base,

white; elytra, or wing covers,

yellow or red with a single wide

black band extending nearly across

at the base. The body and legs

are black.

Distribution. — Occurs more

abundantly in the northern and



central parts of the State.

Hosts.— Works principally upon plant lice and other soft-bodied bugs.

Fig. 194. — *Coccinella trifasciata* var.

Juliana Muls. (Original. Drawing by  
Birdnekoff. )

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THE MONTHLY BULLETIN.

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THE CALIFORNIA RED LADYBIRD BEETLE.

*Coccinella callifornica* Mann.

(Fig. 195.)

General Appearance. — Average sized ladybird beetle, rather short,  
being about three fourths as wide  
as long. The head is black; thorax  
black Avith a white or pale spot on  
each margin; elytra, orange or  
scarlet-red with no other marking  
than a small rhomoidal dark spot  
at their middle base, known as the  
scutellar spot.



Distribution. — A very common species to be found throughout the State and especially abundant in the northern coast counties.

Fig. 19.5. — The California red ladybird

Hosts. — Feeds largely upon beetle, *Cocdnella callornica* Mann, aphids. In the northern and central ^ Original. Drawing by Birdnekoff.)

parts of the State the cabbage aphid (*Aphis brassicce* Linn.) is a favorite host. It also feeds upon young scale insects.

#### THE BLOOD-RED LADYBIRD BEETLE.

*Cycloneda sanguinea* (Linn.).

(Fig. 196.)

General Appearance. — The adults are about three sixteenths of an inch long and rounded oval, somewhat convex in shape. The elytra are dark red or yellowish in color with margins and bases paler. The head is black with front of male white and two white spots on the female ; thorax is black with front white and in the shape of a broad "W," but sometimes having two



lateral black spots in the white  
area. The body proper is entirely  
black, the feet being a little paler.

Distribution. — Common through-  
out the entire State.

Hosts. — Preys upon plant lice  
and young scale insects.

Fig. 196. — The blood-red ladybird  
beetle, *Cycloneda sanguinea* (Linn.).  
(Original. Drawing by Birdnekoff.)

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THE MONTHLY BULLETIN.

THE ASHY-GRAY LADYBIRD BEETLE.

*Olla ahdoiniialis* Say.

{*Cycloneda ahdonniialis* Say.)

(Figs. 197, 198.)



General Appearance. — Yellowish-gray ground color with many small dark spots on the dorsum. The body is average size, being about one fourth inch long and is distinctly broad or almost globular in shape.

Fig. 197. — Ashy-gray ladybird beetle (*Olla abdominalis* Say), showing eggs at top, adults at right-hand middle, pupa at left-hand middle, larvae at the bottom. (Essig, P. C. Jr. Ent. )

Life History. — Greatly resembles that of *Hippodamia convergens*. The larva:" have yellow spots on the dorsum instead of red and the pupa is much lighter in color. It is not known to hibernate in such numbers as the red forms and is not nearly as common. Works throughout the summer months.

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THE MONTHLY BULLETIN.

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Distribution. — Throughout the State, but abundant only in the southern part, especially in the walnut orchards of Ventura County.

Fig. 198. — Adult ashy gray ladybird beetle,  
*Olla abdominalis* Say.



(Essig, P. C. Jr. Ent. )

Hosts. — On many species of plant lice, but is the most effectual check on the walnut plant louse, which it often entirely subdues before winter.

#### THE EYED LADYBIRD BEETLE.

*Olla oculata* Fab.

(*Cycloneda oculata* Fab.)

(Fig. 199.)

General Appearance. — The adults of this species are often mistaken for the two-stabbed ladybird (*Chilocorus hivulnerus*). They are somewhat larger with the spots on the wing covers reddish-yellow and larger. The head and lower edges of the thorax are also reddish-yellow.

Fig. 199. — The eyed ladybird beetle,  
*Olla oculata* Fab. (Original. Drawing  
by Birdnekoff.)

Distribution. — Quite common throughout the State and most abundant in the central and southern parts.

Hosts. — This species feeds upon scale insects.



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THE MONTHLY BULLETIN,

*Oua plagiata* Casey.

(Fig. 200.)

General Appearance. — The adult beetles are broadly rounded; about

three sixteenths of an inch long and three fourths as wide. The head is pale; pronotum black with pale lateral margins; wing covers black with a large, irregular, red blotch slightly in front of the middle of each. The under surface of the head and thorax and bases of the legs are black; tips of legs and abdomen pale.

Distribution. — Throughout the central and southern parts of the State, but not abundant.

Hosts. — This species preys principally upon plant lice.

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Fig. 200. — OUa pla-  
giata Casey. (After  
Quayle. Courtesy Cal.  
Exp. Sta.)

#### THE SMALL GRAY LADYBIRD BEETLE.

General Appearance. -

*Psyllobora twdata* Lee.

(Fig. 201.)

-A very small gray beetle with many fine  
dark brown irregular spots or  
blotches on the elytra. Scarcely  
one eighth of an inch long and  
oblong in shape. The larvae are also  
small and vary from straw to gray  
in color.

Life History. — This species is so  
small that only the first hatched  
scale insects are devoured, but the  
great numbers of the beetles enables  
them to do much good. The young  
and adults alike are very active  
and feed almost constantly.



Fig. 201. — The small gray ladybird beetle, *Psylliobora twadata* Lee. (Original. Drawing by Birdnekoﬀ. )

Distribution.— A native species especially abundant in the southern part of the State in the coast counties from Santa Barbara to San Diego. Hosts.— Young black scale, aphids and mites.

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THE MONTHLY BULLETIN.

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THE TWO-STABBED LADYBIRD BEETLE.

*Ohiloricoris bivulnerus* Muls.

(Fig. 202.)

General Appearance. — The adults are broadly oval and about three sixteenths of an inch long. The color is shiny black with two round blood-red spots upon the elytra. The extreme margins of the prothorax are pale. The under side of the abdomen is red. The larvae are



very shiny, dark in color, with a yellow transverse band across the middle.

Distribution. — This is one of the native ladybird beetles and is to be found in almost every part of the State.

Hosts. — The larvae and adults are voracious feeders upon the San Jose scale (*Aspidiotus perniciosus*), young of the black scale (*Smssetia olece*), mealy bugs (*Pseudococcus citri* and *P. longispinus*), oyster shell scale (*Lepidosaphes tilnii*), European elm scale (*Gossyparia spuria*) and other scale insects.

Fig. 202. — The two-stabbed ladybird beetle, *Chilocorus bivulnerus* Muls. (Original. Drawing by Blrdnekoff. )

#### THE STEEL-BLUE LADYBIRD BEETLE.

*Orcus chahjheus* (Boisd.).

(Fig. 203.)

General Appearance. — The adults of this beetle are metallic steel-blue or green in color, almost hemispherical in shape and between one eighth and three eighths of an inch in diameter. The head of the male is



yellow.

Distribution. — Originally distributed throughout the entire southern part of the State, but is now almost entirely confined to the districts around Carpinteria in Santa Barbara County, where it is well established. Introduced into California by Albert Kcebele.

Hosts. — Feeds upon many armored coccids, including red scale {*Chrysomphalus aurantii*}, yellow scale {*Chrysomphalus citrinus*}, *Chrysomphalus rossi*, purple scale {*Lepidosaphes heckii*}, San Jose scale {*Aspidiotus perniciosus*} and black scale {*Saissetia olece*}.

Fig. 203. — The steel-blue ladybird beetle, *Orcus chalybeus* (Boisd.). Top natural size. (Agrcl. Gaz. N. S. W.)

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## THE MONTHLY BULLETIN.

General Appearance.

*Axion plagiatus* Oliv.

(Fig. 204.)

The adult beetles are quite large, attaining one fourth of an inch in length and nearly that much in width. The shape is broadly oval and convex, being almost hemispherical ; color, shining black throughout with two large red blotches nearly covering the basal halves of the wing covers. These spots are smaller on the males. The apical margins of the pronotum are pale.

Distribution. — Apparently limited to the southern part of the State.

Hosts. — Feeds upon young black scale and other young scale insects.

Fig. 20L — *Axion plagiatus* Oliv. (After Quayle  
Courtesy Cal. Exp. Sta.)

PILATE'S LADYBIRD BEETLE.



*Axion pilatii* Muls.

{*Exochomus pilatii* Muls.)

(Fig. 205.)

General Appearance. — The adult beetles resemble the two-stabbed

and also the eyed ladybird, but are larger than the former and have smaller and darker red spots than the latter. They also differ from the two-stabbed ladybird beetle by having the under extremity of the abdomen black instead of red. The larvae are larger and lighter than the young of the two-stabbed beetle but otherwise greatly resemble them.

Distribution. — Occurs in limited numbers in the southern part of the State.

Hosts. — Feeds upon scale insects — young black scale seeming to be preferred.

Fig. 205. — Pilate's ladybird

beetle, *Axion pilatii* Muls.

Enlarged and natural size.

(Cal. Hort. Com.)



*Exochomus californiciis* Casey.

(Fig. 206.)

General Appearance. — The adult beetles are broadly oval, convex in shape and about three sixteenths of an inch long. The color is shiny black with a long reddish spot at the marginal base and a rounded spot of the same color near the tip of each wing cover.

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Distribution. — Occurs throughout the entire State from Siskiyou to San Diego counties.

Fig. 206. — *Exochomus californicus* Casey. (Original. Drawing by Birdne-koff.)

Hosts.— The young and adults feed upon plant lice, scales and other small soft-bodied insects.

*Cryptogonus orbichhis* Schon.

(Fig. 207.)



General Appearance.— The adults appear at first sight to be black but upon closer examination it will be found that there are two quite large reddish-brown spots upon the back as shown in Fig. 207. They are elongate or oval in shape, scarcely one eighth of an inch long and are exceedingly active. The eggs are very small, oblong, yellow and laid singly. The larva? have yellow bodies which are entirely covered with long white cottony-like filaments. The pupal stage is passed within the old larval skin.

Distribution. — The ladybird beetle was introduced into California by Geo. Compere from the Philippine Islands during the year 1910 and liberated in the central and southern parts of the State, where it has become established.

Hosts. — The larva? and adults work primarily upon the eggs and young of the citrus mealy bug (*Pseudococcus citri*) and the long-tailed mealy bug (*Pseudococcus longispinus*).

Fig. 207. — *Cryptogonus orbiculus* Scion.  
(Bsslg, P. C. Jr. Ent.)



THE MONTHLY BULLETIN.

THE MEALY BUG DESTROYER.

*Cryptolcemus montrouzieri* Muls.

(Figs. 208, 209.)

General Appearance. — Adults are as large as the ordinary red ladybird beetle, but decidedly pointed posteriorly. They are black with head, prothorax and posterior fourth of the elytra cinnamon red. The larvae are yellow and covered with long filaments of white flocculence (Fig. 208A).

Fig. 208. — Larvae of ladybird beetles. A, *Cryptolcemus montrouzieri* Muls. B, *Cryptogonus orbiculus* Schon. ; C, *Scymnus guttulatus* Lee. (Essig, P. C. Jr. Ent. )

Life History. — The eggs are lemon yellow and deposited early in the

summer among the egg masses of the mealy bugs. The young prey upon the eggs, young and adults of the host and work great havoc. They are \*most plentiful during the months of August and September. The pupal stage is



passed within the old larval skin. The adults hibernate over winter.

Distribution. — Throughout the mealy bug infested districts of the State. This species was introduced into California by Albert Koebele and is redistributed

Fig. 209.— Adult female of from time to time by the State

*Cryptolwmus montrousieri* Muls.

(Essig, P. c. Jr. Ent.) luscctary.

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THE MONTHLY BULLETIN.

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Hosts. — This is by far the most important natural enemy preying upon the various species of mealy bugs including *Pseudococcus citri*, *P. longispinus* *P. nipa* as well as other species. In not a few cases it has done excellent work in destroying the citrus mealy bug.

*Hypcraspis lateralis* Muls.

(Fig. 210.)



General Appearance. — A rather small, black ladybird beetle, nearly hemispherical in shape and slightly more than one eighth of an inch in diameter. There are two red or yellow spots on the wing covers near the apex, two on the disc and two long narrow blotches on the front lateral margins. The edges of the thorax and front of head are yellow. The larva? are yellow and entirely covered with long, white, cottony-like filaments. The pupaj of this ladybird are destroyed in great numbers by an internal hymenopterous parasite which keeps the species from doing effective work on the mealy bugs.

Fig. 210. — *Hyperaspis lateralis* Muls.

(Essig, P. C. Jr. Ent.)

Distribution. — One of the commonest of the coccid feeders, being more abundant along the coast in the central and southern portions of the State.

Hosts. — Adults and larvae feed upon the mealy bugs and also upon the young of other scale insects.

*Hyperaspis undilata* Say.

(Fig. 211.)

General Appearance. — A very small species, the adults being less than one eighth of an inch long. The body is elongate-oval and shining black. The face and sides of thorax of the male are yellow, while in the female the former is black. Each wing cover has three yellow narrow spots on the margin and one oval yellow spot near the middle.



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THE MONTHLY BULLETIN.

Distribution. — A common species, especially in moist locations<sup>^</sup> throughout the State.

Fig. 211. — *Hyperaspis undulata* Say.

(Original. Drawing by Birdnekoff. )

Hosts. — The larv<sup>^</sup> and adults feed upon plant lice, coccids and other small soft-bodied insects.

*Hyperaspis dissoluta* Cr.

(Fig. 212.)

General Appearance. — This is one of the very small species, being little more than one sixteenth of an inch long. The body is elongate-oval and quite convex; shiny black; lateral margins of wing covers Avith narrow broken border which may appear as three distinct spots on each side. The legs are brownish.

Fig. 212.- — *Hyperaspis dissoluta* Cr.

(Original. Drawing by Birdnekoff . )



Distribution. — Occurs in limited numbers in southern and central parts of the State, as specimens have been collected in Alameda and Los Angeles counties.

Hosts. — Feed upon young scale insects.

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THE MONTHLY BULLETIN. 217

*Hyperaspis mccrens* Lee.

(Fig. 213.)

General Appearance. — The adult beetles are very small, averaging .about one tenth of an inch in length for the males and one eighth of .an inch for the females. They are elongated in shape and shiny black with yellowish or reddish markings as shown in Fig. 213.

Distribution. — Common in the southern part of the State, especially in Ventura County.

Fig. 213. — *Hyperaspis niarens*

Lee. (Original.)

Hosts. — Large numbers of this species were taken in lemon orchards where they were feeding upon young black and purple scale.



*Hyperaspis spiculinota* Fall.

(Fig. 214.)

General Appearance. — The largest adult beetles are about one eighth of an inch long ; elongated in shape ; shiny black with yellowish or reddish markings as shown in Fig. 214 and with pale legs, antennae and palpi.

Distribution. — Limited to the southern part of the State.

•=3a"<

Fig. 214. — *Hyperaspis spiculinota*

Fall. (Original.)

Hosts. — This species preys upon young scale insects.

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THE MONTHLY BULLETIN.

THE SMALL BROWN LADYBIRD BEETLE.

*Scymniits sordidus* Horn.

(Fig. 215.)



General Appearance.— Very small light brown beetle, scarcely more than one eighth of an inch long.

Life History. — The eggs are very minute and deposited in suitable-feeding grounds. The larva cover themselves with a thick coat of long white waxy flocculence and greatly resemble mealy bugs. Though small they are voracious feeders, especially upon the smaller species of plant lice and also upon young scale insects. The pupae are formed within the old larval skins.

Fig. 215. — Larva and adult of *Scymnus sordidus* Horn. The former slightly and the latter greatly enlarged. (Essig, P. C. Jr. Ent. )

Distribution. — Throughout the entire State, but more abundant in the south.

Hosts. — This species preys upon mealy bugs, the young of the armored scales, plant lice (*Aphis gossypii*) and other soft-bodied insects. Large numbers of these ladybird beetles are to be found in the citrus groves of Ventura County.

- *Scymnus gutturalis* Lee.

(Fig. 216.)

General Appearance. — The adult insects are oval-elongate in shape



and scarcely one eighth of an inch in length. The general color is black, mottled with reddish-brown as shown in Fig. 216. The larva? are about one fourth of an inch long with yellow bodies entirely covered with long, white, cottony filaments. (Fig. 208C.) The nymphs remain in the old larval skins in secluded parts throughout the pupal stage.

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Fig. 216. — Adult of  
*Bcymnns Quttulatns*

Lee. (Essig, P. C. Jr.  
Ent.)

Distribution. — This is a native species, occurring throughout the entire State, having been often distributed by the State Insectary.

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THE MONTHLY BULLETIN. 219

Hosts. — The larva? and adults work upon various native mealy bugs as well as upon the citrus mealy bug (*Pseudococcus citri*) and the long-



tailed mealy bug (*Pseudococcus longispinus*) .

*Scymniis nichulosus* Lee.

(Fig. 217.)

General Appearance.— The adult beetles are exceedingly small, being less than one eighth of an inch in length. They are somewhat elongated in shape and vary from light to dark brown in color, with indistinct dark markings. The larva<sup>s</sup> are covered with long, white cottony filaments.

Distribution. — Throughout the southern part of the State.

Fig. 217. — *Scymnus nichulosus* Lee. (After Quayle. Courtesy Cal. Exp. Sta. )

Hosts.— The writer has collected the larva<sup>s</sup> of this species in large numbers in the canyons of Ventura County, where they were feeding upon a small native plant louse (*Eichochaitophorus populifolii* Essig). Quayle reports it as feeding upon red and purple scale. It also preys upon various species of mealy bugs doing effectual work upon the citrus species (*Pseudococcus citri*).

*Scymnus fuscicornis* Mann.

(Fig. 218.)

General Appearance.— A small dull-black ladybird beetle with red-



dish prothorax and head— the former having a black spot at the base m  
the males and nearly all black at the base in the females. It is less than  
one eighth of an inch long and distinguished from *Lindorus lophanthcB*  
by its dull color, the latter being shiny.

Life History.— The young feed throughout the spring and summer.  
The adults which hibernate over winter begin to work early in the  
spring and continue until the next winter. They do nearly as much  
feeding as do the larvfp.

Distribution.— Throughout the entire State, especially along the  
coast. A native species.

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Hosts. — This beetle feeds upon many species of aphids and coccids.

Fig. 218. — Adult female  
of *Scymnus marginicolUs*  
Mann. (Essig, P. C. .Jr.  
Ent.)

and are especially destructive to San Jose scale in the north and to  
red and purple scales in the south.



THE MINUTE BLACK LADYBIRD BEETLE.

*Stethorus vagans* Blackb.

{*Scymnus vagans* Blackb. }

(Fig. 219.)

General Appearance. — One of the smallest common species, so small as to be scarcely ever noticed, being scarcely one sixteenth of an inch long. Jet black in color and oblong in shape.

Life History. — The larvae are not usually met with because of their small size and occurrence upon native shrubbery. The adults follow the infestations of mites, and feed almost entirely upon them. They are very active through the entire life history and become very numerous.

Fig. 219. — The minute black ladybird beetle,

*Stethorus vagans* Blackb.

(Original.)

Distribution. — A native species plentiful in the southern part of the State, and also abundant in the coast counties.

Hosts. — Small mites and spiders. Often abundant in citrus, orchards, feeding upon the red spider (*Tetranychus mytilaspidis*-



Riley), and the common mite (*Tetranychus bimaculatus* Harv.). They also prey upon the clover mite (*Bryobia pratensis* Garman).

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THE MONTHLY BULLETIN.

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THE VEDALIA.

*Nocitius cardinalis* Muls.

(Fig. 220.)

General Appearance. — Slightly less than one quarter of an inch in length and oval in shape. The color pattern is very pronounced and striking, being red and black, as shown in Fig. 220. In the females red predominates while in the males there is more black. The larvae are often over one half of an inch long and lead-gray in color with reddish sides. They are often covered with whitish powder from the egg-sacs of the cottony cushion scale.

Fig. 220. — The vedalia (*Nocitius cardinalis* Muls.). Upper left picture shows eggs laid upon the egg-sacs of the cottony cushion scale (*Icerya purchasi* Mask.); upper right, adult beetle. In the lower picture A, adult beetles; B, pupae; C, larvae; D, cottony cushion scale to show comparative size. (Original drawing of adult by Birdnekoﬀ.)



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#### THE MONTHLY BULLETIN.

Life History. — The eggs are a little larger than those of *Novius koehleri*, but are the same color and laid in similar places. The young feed upon the eggs and young scales and do great execution. The pupa stage is passed in the larval skin upon the leaves and limbs of the trees. Soon after the adult stage is reached copulation takes place and other broods are brought forth. The great prolificness and appetite of this species enables it to do what no other predator has yet done.

Distribution. — Throughout the citrus growing sections of the State. Disappears with the host and is constantly being sent out by the State Insectary. Introduced into California by Albert Koebele.

Hosts. — It feeds entirely upon the eggs and young of the cottony cushion scale (*Icerya purchasi*). To this beetle is accredited the salvation of the citrus industry in California, which was threatened with destruction by the above scale.

#### KOEBELE'S LADYBIRD BEETLE.

*Novius kachelei* Olliff.



(Fig. 221.)

General Appearance. — A very small species being not longer than one eighth of an inch ; the males are bright red with dark markings as shown in Fig. 221 ; the females red with dark head, prothorax, and marginal spot near the middle of each wing cover. The larvae are dark red and about one fourth of an inch long.

Fig. 221. — Koebele's ladybird beetle (*Novius krrhelei* Olliff). Larvae, pupa and adults at left. Enlarged four times. Adult male at right. Greatly enlarged. (Original. Drawing of male by Birdnekoff. )

Life History. — The small oblong red eggs are deposited by the females on the egg-sacs of the host and hatch within a few days. The young immediately enter the egg-sac and begin feeding upon the eggs and young hatched scales. They pupate within their larval skins on the trees and emerge as adults within a week or more. The adults mate and soon bring forth another brood. The females are very prolific and egg-laying continues throughout the entire spring and

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summer until late fall. The adults hibernate during the colder winter



months.

Distribution. — Throughout the citrus growing sections of the State.

It was first introduced by Albert Koebele and is continually being redistributed by the State Insectary.

Hosts. — Cottony cushion scale (*Icerya purchasi*). This species is often more numerous and does greater execution than does the *Vedalia* (*Novius cardinalis*), for which it is usually mistaken.

#### BLACK LADYBIRD BEETLE.

*Rhizohius ventralis*. Er.

(Fig. 222.)

General Appearance. — The adults are smaller than those of the common red ladybird; rather oval in shape; black and covered with

Fig. 222. — The black ladybird beetle (*Rhizohius ventralis* Er.). A, larva; B, pupa; C, ventral aspect of adult; D, dorsal aspect of adult. (Essig, P. C. Jr. Ent.)

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fine hairs which give them a grayish appearance. The abdomen is salmon colored. The young are dark brown or black and covered with



many spines.

Life History. — The eggs are deposited singly or a few at a place among the egg masses of mealy\* bugs, under the bodies of the black scale or among other scale insects. The young begin feeding as soon as they emerge upon the smaller hosts first. The numbers of the host are so great that the actual good done is not so marked as in the cases of many other predators. The adults move little except when annoyed.

Distribution. — Throughout the entire State. This species was imported by Albert Koebele, especially as an enemy of black scale (*Saissetia olea*).

Hosts. — The young feed upon the eggs of the black scale, mealy bugs, hemispherical scale and other similar insects.

*Lindorufi loihii* Blaisd.

(*RMzohiiis lopanthw* Blaisd.)

{*Rjihohius foovoomice* Blackb. )

(Fig. 223.)

General Appearance. — The adult beetles are rather broadly-oval in shape and about one eighth of an inch long. The color is bright metallic black or bronze. The head and thorax are reddish brown with a dark spot at the middle base of the latter. This species is very often confused with *Scymnis marginicolus* but may readily be distin-



guished from it by the lustrous bronze color. The larva; are light brown in color with an elongated yellow spot on the middle of the back.

Fig. 223. — *Lmdorus lopanthw* Blaisd.

(Original. Drawing by Birdnekoff. )

Distribution. — This species was introduced into California by Albert Ktebele and has become generally established in the southern part of the State.

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Hosts. — The larvae and adults of this beetle are voracious feeders upon red scale (*Chrysomphalus aurantii*), yellow scale (*Chrysomphalus citrinus*), ivy scale (*Aspidiotus hederce*), pernicious scale (*Aspidiotus perniciosus*), purple scale (*Lepidosaphes heckii*), the citrus mealy bug (*Pseudococcus ciferri*) and black scale (*Saissetia oleae*).

THE CALIFORNIA GRAPE ROOT-WORM.

\**Adoxus obscurus* Linn. (Family Chrysomelidae).

(Figs. 224, 225.)



General Appearance. — The adult beetles are about three sixteenths of an inch long, jet black in color and partially covered with fine whitish hairs giving them a grayish cast. The prothorax is noticeably narrower than the rest of the body. The antennae and legs are usually black, but are sometimes brown. The eggs are elongated, yellowish-white and one twenty-fifth of an inch long. The full-grown larvae are white with brown heads and about one fourth of an inch long. The heads are usually curved in towards the ventral surface of the body. The pupae are white and about the same size as the fully developed larvae.

Fig. 224. — Work of the California grape root-worm (*Adoxus obscurus* Linn.) on leaf. (Cal. Hort. Com.)

Life History.— The eggs are laid early in the spring, usually in clusters of from one to two dozen in cracks or crevices beneath the bark upon the trunk of the vines, anywhere within six inches above the surface of the ground. They hatch in from eight to ten days and the young larvae immediately seek the roots of the vines underneath the ground and attack first the small rootlets which are often entirely

\*The light-colored form has the wing covers, tibiae and basal half of the antennae brown, while the rest of the body is black. This species is known as *Adoxus vitis* Fourc, and the life history and habits are almost identical with those of *Adoxus obscurus* Linn.



