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A Revision of the Forms of *Coccinella* L. Occurring in America North of Mexico (Coleoptera: Coccinellidae)

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This paper offers a taxonomic arrangement of the forms of *Coccinella* L. that occur in the United States, Canada, and Greenland. Eighteen forms, which are arranged as 12 species, are considered to merit names. The forms of the United States and Canada were reviewed last by Dobzhansky in 1931. The arrangement proposed below differs from his as detailed in the summary that follows the taxonomic treatment. The principal difference is in the subspecies concept that is applied.

Coccinella differs from allied genera in the color pattern of the pronotum. Each anterior pronotal angle bears a large, subtrapezoidal or triangular white spot (Figs. 15-17); the spots are sometimes joined together by a pale band along the anterior pronotal margin and are rarely narrowly extended to the basal pronotal angles. Other pronotal maculation is lacking. Most of the species are readily distinguished by color characters, but the color patterns vary, often greatly, both geographically and within local populations. Many color differences could not be evaluated by the methods of earlier authors, and the taxonomy was badly confused until 1931, when Dobzhansky related the forms to one another and to Eurasian forms by genital characters.

Dobzhansky treated as subspecies some color forms that are not largely restricted to different regions. Two or more of his subspecies and their intergrades sometimes occur within one local population. In the arrangement proposed below, the subspecies is conceived as the well-characterized geographic race. This concept, like the other, results in arbitrary arrangements when applied to the species that vary clinally and also when applied to the very similar forms that are strictly allopatric. However, I believe that the arrangement given below is the most meaningful that can be achieved on the basis of present knowledge. When clinal change is gradual, as in *C. novemnotata* Hbst. and to a lesser degree in *C. monticola* Muls., it is impossible to delimit well-characterized geographic races, and it seems best to include under one name forms that differ, sometimes strikingly, in color pattern. In strictly allopatric forms that are very closely allied, the trinomial indicates that differences have evolved, that the relationship is very close, and also the allopatry. In the arrangement proposed below, all forms considered subspecifically distinct from one another differ only in color pattern except *transversoguttata ephippiata* Zett.

The descriptions below are diagnostic and omit mention of characters that are sometimes useful in critical studies. Species may differ in the form of the tarsal claws, and the apical ventral segment of the male is more strongly modified in some species than in others. The two carinae of the prosternum may be parallel or may converge anteriorly. Dobzhansky (1931) noted characters in the siphon and basal piece of the male genitalia and in the female genitalia. As a rule, species that show differences in these parts are readily separable by more obvious characters.

Most of the specimens on which this study is based are contained in the Canadian National Collection, which includes the type specimen of *C. fulgida* Watson. Important material studied in other collections is described in the acknowledgments that conclude this paper.

Key to Species and Subspecies

1. Elytra very largely or entirely black 2
Elytra with extensive pale areas, at least basally 3
2. Elytra entirely black. Mesepimera white. Length 5.5 to 6.3 mm. San Jacinto Mountains, Riverside Co., California 6b. *prolongata bridwelli* Nunen.
Elytra with the epipleurae largely or entirely pale, sometimes with the lateral and basal margins pale (Fig. 42). Mesepimera black. Length 4.0 to 4.8 mm. Vancouver Island to northern California 12b. *hieroglyphica humboldtiensis* Nunen.
3. Elytral suture very narrowly margined with dark brown or black, at least apically... 4
The sutural margins red, not or only slightly darker than the pale discal areas 9
4. Each elytron with a very large black spot, which usually encloses a pale spot and is usually joined to the scutellar spot (Fig. 31). Tulare Co. and Mono Co., California 6a. *prolongata sequoiae* Dobz.
Elytral markings different 5
5. Head with two pale spots on the front 6
Head with a broad, pale band between the eyes. Anterior pronotal margin entirely pale. Each elytron usually with four spots in addition to the scutellar spot, the spots except the scutellar often lacking in part or entirely in western specimens (Figs. 28-29). Quebec to Georgia, Texas, southern California, and British Columbia 5. *novemnotata* Hbst.
6. Elytra with a small scutellar spot, lacking other spots. Anterior pronotal margin black at middle. Southwestern British Columbia to southern California 3. *californica* Mann.
Elytra with a scutellar spot and at least traces of other spots 7
7. Pale area of each side of pronotum extending almost to the posterior pronotal angle and, inwardly, deeply penetrating the dark discal area, the pattern thus formed unique (Fig. 16); anterior margin of pronotum sometimes entirely pale, sometimes dark at middle. Western Nebraska to British Columbia and northern California 6. *prolongata prolongata* Crotch
Pale areas of pronotum smaller, not extending beyond the basal two-fifths, not penetrating the dark discal area to an unusual depth; anterior margin of pronotum always black at middle 8
8. Each elytron with two moderately large spots in addition to the scutellar spot, lacking the humeral spot (Fig. 32). High elevations; Alberta to Utah and Fresno Co., California 7. *alta*, n. sp.
Elytral spots small, usually more numerous, the humeral spots usually present (Fig. 27). Occurring near the coast; southern Alaska to southern California 4. *johnsoni* Csy.
9. Head pale except for a black band across the base (δ); or dark and with a broad, pale band between the eyes, the band rarely narrowly interrupted medially (φ)... 10
Head dark, with two well-separated pale spots on the front 11
10. Elytra with three well-developed transverse fasciae, the median and subapical fasciae interrupted at the suture (Fig. 18). Newfoundland to New Jersey, New Mexico, British Columbia, and Alaska 1. *trifasciata perplexa* Muls.
Elytral markings variably reduced (Figs. 19-21). Southwestern British Columbia to southern California 1a. *trifasciata subversa* Lec.
11. Ventral white spot of each anterior pronotal angle small, usually subtriangular, extended posteriorly not more than half as far as the dorsal spot of the angle except very rarely 12
Ventral spot of the angle large, usually trapezoidal, extended posteriorly as far or almost as far as the dorsal spot except in the very few specimens of *b. kirbyi* and *u. undecimpunctata* in which the dorsal spot is narrowly prolonged to the posterior pronotal angle 15
12. Elytra usually with a subbasal fascia, this sometimes reduced to a scutellar spot and a small spot on each humerus or to a scutellar spot only; the sublateral spot at basal two-fifths lacking when the fascia is strongly reduced 13
Elytra never with a subbasal fascia or with spots on the humeri; often with a small sublateral spot at basal two-fifths 14

13. Larger; length of males 5.0 to 7.5 mm.; of females, 5.9 to 7.8 mm. Elytra with the median and subapical spots transversely more elongate (Figs. 22-24). Newfoundland to Virginia, Texas, California, and Alaska—2. *transversoguttata richardsoni*, n. n. Length of males, 4.1 to 5.4 mm.; of females, 4.7 to 6.0 mm. Elytra always with a subbasal fascia (Fig. 25). Restricted to Greenland 2a. *transversoguttata ephippiata* Zett. 16
14. Slightly larger and less elongate; length 5.0 to 6.0 mm. Montana to Colorado and northern California 8. *difficilis* Crotch 17
Length 4.5 to 5.6 mm. Occurring at and north of the northern limit of trees; Ungava Bay to Alaska 9. *fulgida* Watson 19
15. Elytra with three transverse fasciae, the median and subapical fasciae interrupted at the suture (Fig. 18). Newfoundland to New Jersey, New Mexico, British Columbia, and Alaska 1. *trifasciata perplexa* Muls. 16
Elytra never trifasciate 16
16. Mesepimera black, or pale and more or less infuscate; the elytra with a tricusate subbasal band (Fig. 38) in specimens with whitish mesepimera 17
Mesepimera largely or entirely white. Elytra never with a subbasal band 19
17. Elytra with a more or less strongly tricusate subbasal band and with a transverse subapical spot on each 18
Elytra lacking a subbasal band; with a scutellar spot; frequently with two transverse spots on each; frequently with the transverse spots broken into round spots or lacking entirely or in part (Figs. 40-41). Vancouver Island to northern California 12b. *hieroglyphica humboldtensis* Nunen. 18
18. Subbasal band strongly tricusate (Fig. 38). Anterior margin of pronotum frequently entirely pale. Nova Scotia and New Hampshire to Montana, central British Columbia, and Yukon Territory 12. *hieroglyphica kirbyi* Crotch 19
Subbasal band less strongly or feebly tricusate (Fig. 39). Anterior margin of pronotum always broadly dark at middle. Subarctic; Alaska to northernmost Manitoba 12a. *hieroglyphica mannerheimii* Muls. 18
19. Each elytron usually with four small, round spots in addition to a humeral and the scutellar spot, the two submedian spots sometimes joined, the outer subapical or the humeral spot sometimes lacking (Fig. 35). Length 4.0 to 5.0 mm. Newfoundland to New York City and eastern Ontario—10. *undecimpunctata undecimpunctata* L. 19
Elytral spots less numerous; except for the scutellar, entirely lacking in some western specimens; each elytron in eastern and northern specimens with a large, oblique spot near middle and a large subapical spot; the humeral spot always lacking (Figs. 36-37). The size greater. Nova Scotia and Massachusetts to Minnesota, southern New Mexico, central California, Vancouver Island, and northwestern Northwest Territories 11. *monticola* Muls. 19

1. *Coccinella trifasciata perplexa* Mulsant

- Coccinella trifasciata*, Mulsant, 1850, p. 119 (in part); Mulsant, 1866, p. 98 (in part); Crotch 1873, p. 370 (in part); Crotch, 1874, p. 115 (in part); Wickham, 1894, p. 301, Fig. 43; Bowditch, 1902, p. 205; Leng, 1903, p. 200, Pl. 15, Fig. 19; B'atchley, 1910, p. 514, Fig. 191c; Dobzhansky, 1931, p. 22, Figs. 10, 20, 27; Dobzhansky, 1933, p. 111, Fig. 4F.
- Coccinella perplexa* Mulsant, 1850, p. 1021 [cotypes: North America]; Casey, 1899, p. 89; Johnson, 1910, p. 57, Figs. 47, 48, 49a.
- Coccinella eugenii* Mulsant, 1866, p. 95: see entries under, and the discussion following the description of, *Coccinella trifasciata subversa* Lec.

Length 4.0 to 5.5 mm. Head pale except for a black band across the base (δ) or black and with two pale spots (♀); the spots very rarely separated by a distance greater than one-half the diameter of a spot, usually much more approximate, sometimes confluent or almost so. Pronotum with the anterior margin pale at middle except in some females; the ventral pale spot of each anterior angle large, trapezoidal, extended posteriorly as far or almost as far as the dorsal spot. Elytra with three transverse, black fasciae, the median and subapical fasciae interrupted at the suture (Fig. 18); the fasciae varying only moderately, the median very rarely broken externally; the elytral suture not darkened. Mesepimera and metepimeral regions whitish.

Male.—Anterior face of each anterior coxa with a large pale spot; anterior femora entirely black. Genital organ: the basal portion of the median lobe (Fig.

1) subcircular; the apical portion quite slender, its sides feebly converging before the broadly rounded apex which attains but does not surpass the apices of the lateral lobes.

Distribution.—Transcontinental but with a very peculiar distribution in eastern and central Canada. The northernmost localities are Fogo Island, eastern Newfoundland at 49°45'N.; Davis Inlet, coast of Labrador at 56°N.; Mount Lyall, eastern Quebec at 48°40'N.; North Bay, eastern Ontario at 46°20'N.; Riding Mountain National Park, western Manitoba at 50°40'N.; Prince Albert, central Saskatchewan at 53°15'N.; Yellowknife and Norman Wells, western Northwest Territories at 62°31'N. and 65°10'N. respectively; Rampart House, Alaska-Yukon boundary at 67°25'N.; Matanuska, central Alaska at 61°30'N.; Unalakleet, coast of Alaska at 63°54'N. Southernmost localities are east-central Pennsylvania (Pocono Lake), northeasternmost Indiana (Steuben Co.), southern Wisconsin (Madison), North Dakota, northernmost New Mexico (Maxwell), northernmost Utah (Logan), and southeastern Vancouver Island where it grades into *t. sub-versa*. Although it extends to the coast of central Labrador and into subarctic regions of the West, *t. perplexa* is scarce or unknown in all regions bordering the Gulf of St. Lawrence and is known in eastern Quebec only from the central part and the Gaspé Peninsula. It is unknown east of southwestern Manitoba and Saskatchewan in the huge region that drains into Hudson Bay and James Bay. It is very abundant throughout much of its range.

Notes.—In Europe *t. trifasciata* has been reported only from Norway, Sweden, Finland, northern Russia, and, as a relict, from a very small region in the Alps (Holdhaus and Lindroth, p. 176, Pl. 12, Fig. 13). It is transcontinental and widely distributed in northern Asia. Dobzhansky (1933, p. 111) stated that the elytral markings tend to become reduced and broken in southern Siberia and Mongolia; otherwise no geographical variation has been reported in Eurasia. The North American form, *t. perplexa*, differs by color characters that are constant enough except in some specimens from the northern parts of the range. The two forms may be compared as follows (the anterior pronotal margin is entirely pale in males of both forms).

Spot of each anterior pronotal angle not or only feebly penetrating the dark discal area antero-medially, the spot therefore triangular. Fasciae of the elytra nearly always heavier than in average specimens of, and frequently slightly heavier than in any specimens of *t. perplexa*. Female: the two pale spots of the head usually separated by a distance equal to two-thirds the diameter of a spot, sometimes more approximate; anterior pronotal margin black at middle. Eurasia *trifasciata trifasciata* L.

Spot of each anterior pronotal angle usually penetrating the dark discal area rather strongly antero-medially; the spot therefore trapezoidal or subrectangular, frequently triangular as in *t. trifasciata* in northern but very rarely so in southern specimens. Elytra slightly less heavily maculate. Female: the two pale spots of the head very rarely separated by a distance greater than half the diameter of a spot in northern specimens, usually narrowly separated, sometimes confluent or almost so; anterior pronotal margin usually entirely pale, frequently black at middle as in *t. trifasciata* in northern and rarely so in southern specimens. North America *trifasciata perplexa* Muls.

Some authors, following Mulsant, have considered the Eurasian and American forms specifically distinct on the basis of one or more of these characters. But the color varies clinally as indicated in the couplet above; specimens of *t. perplexa* that vary toward *t. trifasciata* are common in northern parts of the range but are rare in southernmost Canada. In the 61 specimens from Newfoundland, Labrador, northernmost British Columbia, western Northwest Territories, Yukon Territory, and Alaska, the pronotal spots are triangular in 22, and the anterior pronotal margin is black at middle in 11 of the 42 females. In 179 specimens from Ontario and westward in southernmost Canada, the pronotal spots are triangular in four,

and the anterior pronotal margin is black at middle in eight of the 105 females. All American specimens, except a few from northern localities, can be properly placed without reference to locality labels.

1a. *Coccinella trifasciata subversa* LeConte

- Coccinella subversa* LeConte, 1854, p. 19 [cotypes: Oregon]; LeConte, 1860, p. 71; Crotch, 1874, p. 116.
Coccinella trifasciata subversa, Crotch, 1873, p. 370; Leng, 1903, p. 200, Pl. 15, Figs. 21-24; Dobzhansky, 1931, p. 23.
Coccinella trifasciata, ab. *subversa*, Mader, 1936, p. 375.
Coccinella perplexa subversa, Johnson, 1910, p. 57, Fig. 49h, d.
Coccinella juliana Mulsant, 1856, p. 141 [type: California]; Casey, 1899, p. 89.
Coccinella trifasciata juliana, Crotch, 1873, p. 370; Crotch, 1874, p. 115; Leng, 1903, p. 200, Pl. 15, Fig. 20; Dobzhansky, 1931, p. 25.
Coccinella trifasciata, ab. *juliana*, Mader, 1930, p. 163, Pl. 30, Fig. 31.
Coccinella perplexa juliana, Johnson, 1910, p. 57, Fig. 49f, g, o.
Coccinella barda LeConte, 1860, p. 286 [type: Punto de los Reyes, Marin Co., California].
Coccinella eugenii Mulsant, 1866, p. 95 [type: California]; Crotch, 1874, p. 115; Casey, 1899, p. 90.
Coccinella trifasciata eugenii, Crotch, 1873, p. 370; Leng, 1903, p. 200, Pl. 15, Figs. 25-27; Dobzhansky, 1931, p. 24.
Coccinella trifasciata, ab. *eugenii*, Mader, 1936, p. 375.
Coccinella perplexa eugenii, Johnson, 1910, p. 57, Fig. 49k-m.
Coccinella perplexa fennica, Johnson, 1910, p. 57, Fig. 49d, j, n.
Coccinella trifasciata, ab. *praedicta* Mader, 1930, p. 163, [cotypes: Alameda, California].
Coccinella trifasciata, Dobzhansky, 1933, p. 111, Fig. 4G-K.

Head of the female blackish; with a broad, pale band between the eyes; the band rarely very narrowly interrupted medially. Elytra with the ground color pale brownish-yellow, rather than red, except in most specimens of form *eugenii*; the maculation reduced or entirely lacking. Other characters as in *t. perplexa*.

Elytral maculation of three general types as follows. Form *subversa* (Fig. 21): elytra infrequently immaculate; frequently with only a small scutellar spot; frequently each with a small to very small, usually transverse, median spot in addition to the scutellar; rarely each with a very small, round sublateral spot at apical fourth in addition to the other spots. Form *juliana* (= *barda*) (Fig. 20): elytra with a subbasal fascia; this similar to that of *t. perplexa*, rarely broken externally; usually without other maculation, rarely with traces of a median or subapical spot. Form *eugenii* (Fig. 19): elytra trifasciate as in *t. perplexa* but with the fasciae reduced and usually more or less broken.

Distribution.—Low altitudes in the lower Fraser Valley in southwestern British Columbia; low altitudes west of the Cascade Mountains in Washington and Oregon; low altitudes in coastal and adjacent Californian counties south to Alameda Co. (form *subversa*), Santa Clara Co. (form *eugenii*), and Los Angeles Co. (form *juliana*); form *eugenii* extending in California across the northernmost counties and south in the Sierra Nevada to El Dorado Co.

Dobzhansky (1931, p. 22-26) showed that all American forms of *trifasciata* overlap in distribution. He reported *perplexa* in the Far West from Alaska to 40°45'N. (Eureka, Calif.), *subversa* from 49°15'N. (Agassiz, B.C.) to 37°45'N. (Oakland, Calif.), *eugenii* from 45°53'N. (Cannon Beach, Ore.) to 37°15'N. (Los Gatos, Calif.), and *juliana* from 41°31'N. (Klamath, Calif.) to 34°27'N. (Santa Paula, Calif.). He reported all forms from Klamath, Calif., and two or three forms from numerous localities between 40°45'N. (Eureka, Calif.) and 37°15' (Los Gatos, Calif.). Actually all forms with reduced maculation occur north to southwestern British Columbia, although only *subversa* is abundant in Oregon, Washington, and in the lower Fraser Valley. Moreover, typical *t. perplexa* does not occur in Oregon and California, where all specimens have the markings at least slightly reduced. The most heavily maculate Californian spec-

imens are from the Sierra Nevada Mountains, from El Dorado Co. northward, and from the Klamath and Siskiyou Mountains to the north, where nearly all specimens are as heavily maculate as *t. perplexa* and differ only in having the subbasal band divided into a scutellar and humeral spots. Dobzhansky noted that *eugenii* is more frequent than *juliana* in northern California but that the reverse is true in the San Francisco region. Johnson (p. 58) found, in a random collection of 110 specimens made in a garden at Berkeley, Calif. (37°49'N.), specimens that he referred to all forms, including at least 78 of *juliana*. Thus, throughout the ranges of these forms with reduced maculation, the range of variation is much the same except in the region south of 37°N., from which only *juliana* is known, and in inland northern California, where only heavily maculate *eugenii* occurs. Except within these areas, the frequencies of the forms differ from one region to another.

Notes.—Forms *subversa* and *juliana* are only moderately variable as noted in the description above, and they do not intergrade. Both evidently grade into *t. perplexa* through form *eugenii*, which is intermediate and which is more variable in color except in the Sierra Nevada Mountains.

The distributions suggest that *t. subversa* arose in the south as an incipient, dichromatic species from *trifasciata* stock and that restricted zones of secondary intergradation or hybridization developed later in northern California, southwestern British Columbia, and in some intervening areas. Distribution also suggests that gene flow is restricted by differing ecological tolerances of the forms, for only *juliana* occurs in southern California, and only *subversa* is abundant from Oregon to the Fraser Valley. The British Columbian series give evidence of restricted interbreeding. Of 80 specimens taken in the Fraser Valley between Vancouver and Agassiz, B.C., 70 are form *subversa*, one is *juliana*, and nine are *eugenii* or are more or less intermediate between *eugenii* and form *subversa* or *t. perplexa*. On nearby southeastern Vancouver Island, the situation is very different; of 27 specimens, two are form *subversa*, two are *eugenii*, two are intermediate between *eugenii* and *t. perplexa*, and 21 are *t. perplexa*. The nature of the mountains in the two regions and their influence on the frequency of the differing habitats of *t. subversa* and *t. perplexa* are evidently responsible for the difference. The low part of the Fraser Valley is abruptly limited on the north by the Tantalus Range and on the east by the coast mountains and the Lillooet Range; on Vancouver Island, the mountains are dissected.

2. *Coccinella transversoguttata richardsoni*, new name

Coccinella quinque-notata Kirby (not *Coccinella quinquenotata* Haworth, 1812), 1837, p. 230 [cotypes: "54°" (Cumberland House, Saskatchewan) and "Canada" (Ontario)].

Coccinella 5-notata, Fitch, 1862, p. 849; Crotch, 1873, p. 370; Casey, 1899, p. 89; Palmer, 1914, p. 219, Pl. 32, Figs. 12-15.

Coccinella 5-notata interrupta Fitch (not *Coccinella interrupta* Fourcroy, 1785), 1862, p. 851 [cotypes: New York].

Coccinella transversoguttata, Mulsant, 1850, p. 117 (in part); Mulsant, 1866, p. 97 (in part); Crotch, 1874, p. 116 (in part); Wickham, 1894, p. 301, Fig. 46; Leng, 1903, pp. 197, 199 (in part), Pl. 14, Fig. 14; Johnson, 1910, p. 61 (in part), Figs. 47, 54; Dobzhansky, 1931, p. 14, Figs. 6, 24; Dobzhansky, 1933, p. 109 (in part), Fig. 4B; Dobzhansky, 1935, p. 334.

Coccinella transversoguttata transversalis, Wickham, 1894, p. 306.

Coccinella transversoguttata ab. *ephippiata*, Mader, 1930, p. 151, Pl. 28, Fig. 36 (in part).

(?) *Coccinella transversoguttata* ab. *zetterstedti* Mader, 1930, p. 151, Pl. 28, Fig. 35 [cotypes: Lapland, Canada].

Coccinella transversoguttata nugatoria, Leng, 1903, p. 199; Dobzhansky, 1931, p. 16 (in part); Dobzhansky, 1935, p. 334.

Length of males, 5.0 to 7.5 mm., the average about 6.4 mm.; length of females, 5.9 to 7.8 mm., the average about 6.8 mm.; the size as in *t. transversoguttata*. Head black, with two well-separated pale spots. Pronotum with the anterior

margin black at middle; the ventral pale spot of each anterior angle small, variably triangular, extended posteriorly from one-third to one-half as far as the dorsal spot, very rarely slightly longer. Elytra (Figs. 22-24, Table I) usually with a subbasal fascia; each elytron with a median and a subapical transverse spot, and, infrequently, with a small sublateral spot at basal two-fifths; the markings similar to but relatively smaller than those of *t. transversoguttata* and *t. ephippiata*; the subbasal band sometimes interrupted on each side, sometimes reduced to a scutellar spot; the median and subapical spots transversely more elongate than in the forms mentioned, about twice as long as wide or even longer, never subcircular; the sublateral spot, when present, usually much smaller than in average specimens of the allied forms; the elytral suture not darkened. Mesepimera whitish. Metepimera pale and more or less infuscate or entirely black.

Male.—Anterior face of each anterior coxa with a large pale spot; ventral face of each anterior femur with a long pale stripe. Genital organ: apical portion of the median lobe (Fig. 3) hastate, a little more broadly so in some specimens than in others, frequently as slender as in *t. ephippiata*, never quite as broad as in *t. transversoguttata*, extended well beyond the apices of the lateral lobes.

Distribution.—Newfoundland to Virginia, Texas, the mountains of Arizona and east-central California, and Alaska. The species is very abundant and generally distributed in southern Canada from Newfoundland to the Coast Ranges of British Columbia. It is not represented in the Canadian National Collection from coastal regions of the West but has been recorded (Dobzhansky, 1931) from Vancouver, B.C., Skagway, Alaska, and Tacoma and Seattle, Wash. It extends northward virtually to the northern limit of trees, where it is rare. Peripheral northern localities are: Lewisporte, eastern Newfoundland at 49°N., Davis Inlet, coast of Labrador at 56°N.; Great Whale River, eastern shore of Hudson Bay at 55°15'N.; Fort Churchill, western shore of Hudson Bay at 58°40'N.; Yellowknife, northern shore of Great Slave Lake at 62°30'N.; Norman Wells, on the Mackenzie River at 65°10'N.; Dawson, western Yukon Territory at 64°N.; Old Rampart House, easternmost Alaska at 67°25'N.; Unalakleet, coast of Alaska at 63°54'N. Southernmost localities are: Fredericksburg, Va.; Lake Co., Ohio; San Antonio, Tex.; Las Vegas district, N. Mex.; Chiricahui Mountains, Ariz.; and Big Pine, northern Inyo Co., Calif. (Dobzhansky, 1931).

Notes.—The range of variation is the same in all regions, but the frequencies of the variants vary from one region to another as shown in Table I. The series from eastern and northwestern Canada agree fairly well; otherwise the subbasal band tends increasingly to reduction from east to west and, in the West, from north to south. The sublateral spot is present less frequently in western regions. Dobzhansky (1931) noted the same variation in the subbasal band and found (1935), in more than 240 specimens from southern British Columbia, that the band was entire in 73 per cent, broken in 20 per cent, and reduced to a scutellar spot in seven per cent. He stated (1935) that Alaskan specimens are larger than those from British Columbia and (1931) that western, lightly maculate specimens are smaller, less strongly convex, and more finely punctate than are those of the "typical" American form. Such differences are not evident in the material at hand, which shows no geographical variation except that indicated in Table I. Very rarely the subapical spot is broken externally on one or both elytra; *transversoguttata* ab. *zetterstedti* Mader is based on such specimens from "Canada" and "Lapland", but Mader's figure shows the median spot much less elongate transversely than in Canadian specimens, and *transversoguttata* does not occur in Europe (Lindroth, 1957, p. 262, and in litt.).

TABLE I
Frequencies (percentages) of factors in elytral patterns
in *Coccinella transversoguttata richardsoni* Brown

Region	Subbasal band			Sublateral spot present	Number of specimens
	entire	broken	reduced to a scutellar spot		
Eastern Ontario and eastward in Canada	96	3	1	15	124
Manitoba, Saskatchewan and Alberta	86	11	3	4	231
Western Northwest Territories and Yukon Territory	91	7	3	9	76
Southern British Columbia	63	26	11	2	112
Oregon	58	27	16	1	90

Four forms, which are readily separable and strictly allopatric, have been referred to *transversoguttata*. These are the true *transversoguttata* Faldermann of Siberia, *nugatoria* Mulsant of the highlands of southern Mexico, *ephippiata* of Greenland (see below), and *richardsoni*. The 33 specimens of true *transversoguttata* measure from 6.0 to 7.2 mm. and average about 6.5 mm.; the sublateral spot of each elytron is distinct in all; the apical hastate portion of the median genital lobe (Fig. 2) in the six males dissected is constantly wider than in the specimens of the other forms. In *ephippiata* the size is smaller, and the apical portion of the median genital lobe is constantly much narrower; otherwise the two forms are inseparable. In *richardsoni* the maculation differs as described above. With rare exceptions, specimens of these three forms can be readily placed without reference to locality labels. *C. nugatoria* is more strongly characterized and should be considered specifically distinct. It is much less strongly convex and has the elytral punctures much finer and sparser. Its male genitalia are similar to and vary like those of *richardsoni*. In maculation (Fig. 26) it approaches those specimens of *richardsoni* in which the subbasal markings are reduced to a scutellar spot and a spot on each humerus, but in *nugatoria* the humeral spots are larger, and the sublateral spots are quite distinct in 29 of the 30 specimens.

C. t. richardsoni is compared with *difficilis* in the notes on that species.

2a. *Coccinella transversoguttata ephippata* Zetterstedt

Coccinella trifasciata, O. Fabricius, 1780, p. 186.

Coccinella ephippata Zetterstedt, 1838, p. 235 [type: Greenland].

Coccinella transversoguttata, Mulsant, 1850, p. 117 (in part); Crotch, 1874, p. 116 (in part); Henriksen and Lundbeck, 1918, p. 515; Henriksen, 1939, p. 45.

Smaller than *t. transversoguttata* and *t. richardsoni*; length of males, 4.1 to 5.4 mm., the average about 5.0 mm.; length of females, 4.7 to 6.0 mm., the average about 5.4 mm. Elytra (Fig. 25) maculate as in *t. transversoguttata*; the subbasal band never broken or reduced; the median and subapical spots less elongate transversely than in *t. richardsoni*; the sublateral spot present in 90 per cent of the

specimens, well-developed or quite distinct in 82 per cent, very small or rather indistinct in eight per cent. Male genitalia much as in the allied forms; the hastate, apical portion of the median lobe (Fig. 4) less variable than in the others, more slender than in *t. transversoguttata* or in some specimens of *t. richardsoni*. Other characters as in the allied forms.

Distribution.—Restricted to Greenland. According to Henriksen, this subspecies occurs from the southern tip to latitude $70^{\circ}25'$ on the western and to $73^{\circ}40'$ on the eastern coast.

Note.—The elytral markings vary moderately; in a single specimen of 88 from Sondrestrom Fiord, 67°N. , West Greenland, the markings approach those of average specimens of *t. richardsoni*. *C. t. ephippiata* is compared with allied forms in the notes following the description of *t. richardsoni*.

3. *Coccinella californica* Mannerheim

- Coccinella californica* Mannerheim, 1843, p. 312 [cotypes: California]; Mu'sant, 1850, p. 110; Mulsant, 1866, p. 91; Casey, 1899, p. 88; Johnson, 1910, p. 62, Figs. 47, 56, 57; Dobzhansky, 1931, p. 11 (in part), Figs. 4, 15, 22; Wingo, 1952, p. 46.
Coccinella 5-notata californica, Crotch, 1873, p. 370.
Coccinella transversoguttata californica, Crotch, 1874, p. 116; Weise, 1892, p. 25; Leng, 1903, p. 200, Pl. 14, Fig. 18.
Coccinella transversoguttata, ab. *californica*, Mader, 1930, p. 151, Pl. 28, Fig. 33.
Coccinella californica melanocollis Johnson, 1910, p. 62, Fig. 57d [cotypes: Berkeley, California].
Coccinella transversoguttata, ab. *melanocollis*, Korschevsky, 1932, p. 496; Mader, 1936, p. 374.

Length 5.1 to 6.8 mm. Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle elongate-triangular, extended posteriorly from two-fifths to three-fourths as far as the dorsal spot. Elytra with a small scutellar spot, with the sutural margins very narrowly dark brown, lacking other maculation. Mesepimera whitish. Metepimeral regions entirely blackish.

Male.—Anterior face of each anterior coxa with a large pale spot; ventral face of each anterior femur with a long pale stripe. Genital organ: apical portion of the median lobe (Fig. 5) broadly triangular, a little more broadly so in some specimens than in others, separated from the basal portion by a small notch on each side, extended well beyond the apices of the lateral lobes.

Distribution.—Southwestern British Columbia to southwestern California. The species is restricted in British Columbia to the lower Fraser Valley, from Chilliwack westward, and to the coast of southeastern Vancouver Island; in Washington to the region west of the Cascade Mountains; in Oregon to the coast and to the western slopes of the Coast Ranges. In California it occurs on and very near the coast south to the San Diego region. Dobzhansky (1931, p. 13) reported *californica* from Sacramento Co. and Merced Co., which are situated in the Central Valley; I have seen several specimens labelled Tuolumne, Mariposa, and Placer Counties, all situated in east-central California, and also one specimen labelled Cleveland Co., Oklahoma. Wingo reported specimens from Iowa and Missouri and suspected that they were carried there by commerce. *C. californica* probably does not breed east of the low regions adjacent to the western coast. The species is very common.

Notes.—*C. californica* is very closely allied to *johnsoni*, with which it is compared in the notes following the description of that species. It is frequently confused with *novemnotata*, which differs in having the interocular region and the anterior pronotal margin entirely pale.

4. *Coccinella johnsoni* Casey

Coccinella johnsoni Casey, 1908, p. 403 [type: San Diego, California]; Johnson, 1910, p. 61, Fig. 47; Dobzhansky, 1931, p. 13, Figs. 5, 23.

Coccinella novemnotata johnsoni, Leng, 1920, p. 216.

Coccinella novemnotata, ab. *johnsoni*, Korschevsky, 1932, p. 512.

Differing from *californica* only in having additional markings on the elytra. Each elytron with, in addition to the scutellar spot and dark suture, at least a small humeral spot and a small submedian spot, these sometimes subobsolete when other spots are reduced or lacking; fully marked specimens with a small sublateral spot at basal two-fifths and one or two small subapical spots (Fig. 27).

Distribution.—On and very near the coast, southernmost Alaska to southernmost California. The 71 specimens are from Wrangell and Metlakatla, Alaska; Ailford Bay, Queen Charlotte Islands; Bowser, the Victoria district, and Ucleulet, Vancouver Island; Coronado, San Nicolas Island, San Diego, Santa Ana, Costa Mesa, and San Clemente Island, California. Reported by Dobzhansky from Washington and northern and central California.

Notes.—*C. californica* and *johnsoni* are separable only by maculation as noted above. Unlike *californica*, *johnsoni* is unknown from the mainland of British Columbia. Unlike *johnsoni*, *californica* is not known from Alaska, the Queen Charlotte Islands, or the western coast of Vancouver Island, localities where *johnsoni* is fully or almost fully maculate. Both occur at Bowser and in the Victoria district, southeastern Vancouver Island. Of the 21 specimens from Bowser, 14 are *californica*; the seven of *johnsoni* have four or five spots on each elytron in addition to the scutellar spot. Of the 19 from the Victoria district, 90 miles to the southeast, one is *californica* and eight are fully marked *johnsoni*; ten are *johnsoni* with some spots lacking, and two of these show only the humeral and submedian spots in addition to the scutellar spot. Thus there is some evidence that *californica* and *johnsoni* may be forms, more or less geographic, of one species. A field study to settle the matter is desirable. The 23 specimens of *johnsoni* from the five localities of southern California are fully or almost fully maculate. Dobzhansky referred to *californica* lightly maculate specimens that agree with my concept of *johnsoni*. I have seen approximately 400 specimens of *californica*, including series from many localities. These series include no specimens with spots other than the scutellar except those series from the localities at which fully marked *johnsoni* occurs. Consequently, I refer all specimens with humeral and discal spots to *johnsoni*. The male genitalia of *johnsoni* vary like those of *californica*.

C. johnsoni resembles some western forms of *novemnotata*, which differ in having the interocular region and the anterior pronotal margin entirely pale.

5. *Coccinella novemnotata* Herbst

Coccinella 9-notata Herbst, 1793, p. 269, Pl. 55, Fig. 8 [type: North America]; Fabricius, 1798, p. 78; Fabricius, 1801, p. 366; Mulsant, 1850, p. 123; Mulsant, 1866, p. 99; Fitch, 1862, p. 106; Crotch, 1873, p. 370; Crotch, 1874, p. 117; Wickham, 1894, p. 301, Figs. 36, 44, 45; Casey, 1899, p. 88; Bowditch, 1902, p. 205; Leng, 1903, p. 198, Pl. 14, Figs. 10-12; Blatchley, 1910, p. 514, Fig. 189; Johnson, 1910, p. 59, Figs. 47, 50-53; Palmer, 1914, p. 226, Pl. 23, Figs. 20-23; Dobzhansky, 1931, p. 4, Figs. 1, 2, 13, 21; Dobzhansky, 1933, p. 111, Figs. 3A, B, E.

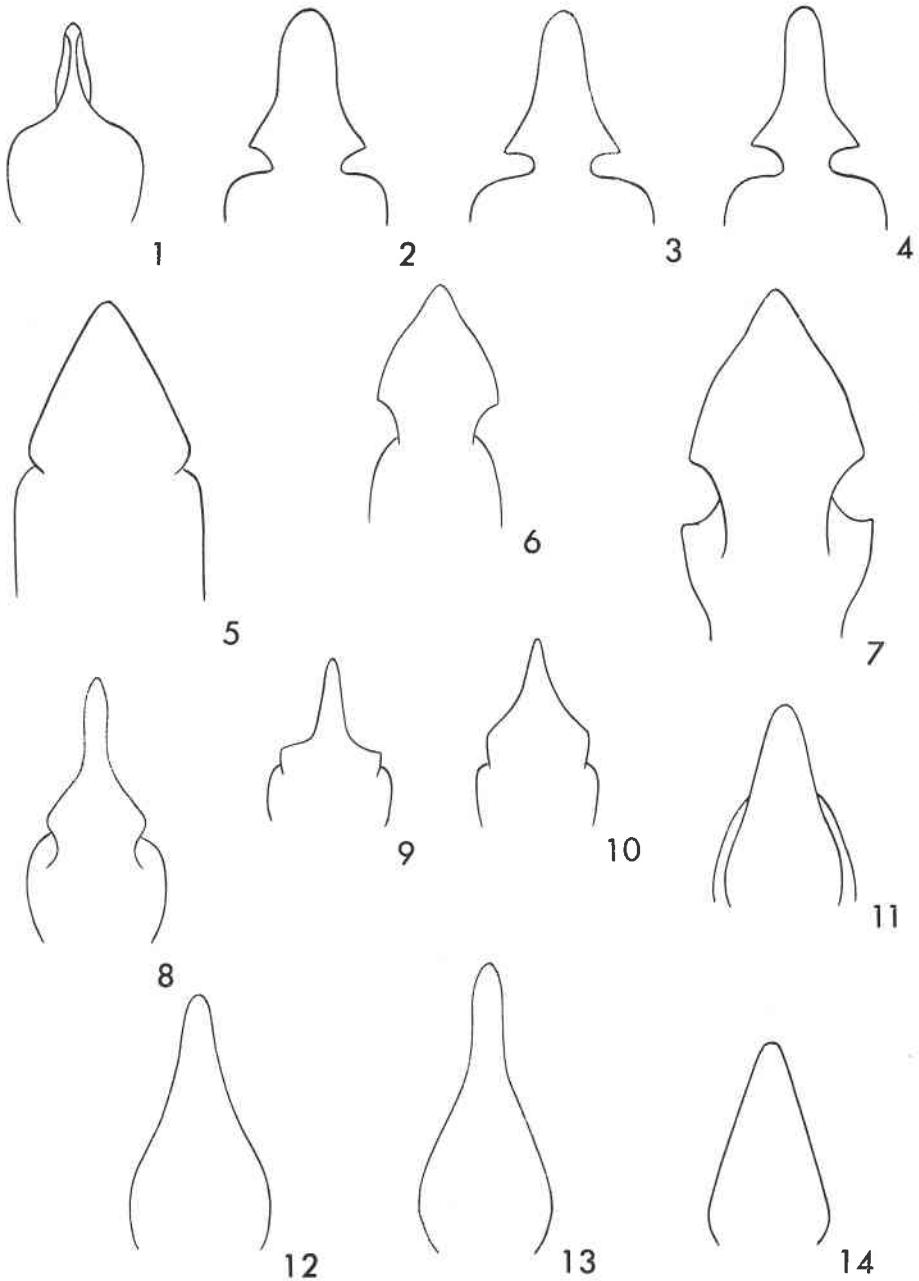
Coccinella franciscana Mulsant 1853, p. 147 [type: California].

Coccinella 9-notata franciscana, Crotch, 1873, p. 370; Leng, 1903, p. 198; Johnson, 1910, p. 59; Dobzhansky, 1931, p. 8; Dobzhansky, 1933, p. 111, Fig. 3F.

Coccinella novemnotata inaequalis Fitch (not *Coccinella inaequalis* Fabricius, 1775), 1862, p. 107 [cotypes: New York].

Coccinella novemnotata parvamaculata Fitch, 1862, p. 107 [type: New York].

Coccinella novemnotata conjuncta Fitch, 1862, p. 107 [cotypes: New York]; Johnson, 1910, p. 59.



Figs. 1-14. Median lobes of the male genitalia of *Coccinella* spp. 1, *C. trifasciata perplexa* Muls. 2, *C. transversoguttata transversoguttata* Fald. 3, *C. t. richardsoni*, new name. 4, *C. t. ephippiata* Zett. 5, *C. californica* Mann. 6, *C. novemnotata* Hbst. 7, *C. prolongata prolongata* Crotch. 8, *C. alta*, new species. 9, *C. difficilis* Crotch. 10, *C. fulgida* Watson. 11, *C. undecimpunctata undecimpunctata* L. 12, *C. monticola* Muls. 13, *C. nivicola* Muls. 14, *C. hieroglyphica kirbyi* Crotch.

- Coccinella novemnotata confluenta* Fitch, 1862, p. 107 [type: New York]; Johnson, 1910, p. 59.
Coccinella novemnotata divisicollis Fitch, 1862, p. 107 [type: New York]; Johnson, 1910, p. 59.
Coccinella degener Casey, 1899, p. 88 [cotypes: Fort Wingate, New Mexico; canyon of the Colorado River, Arizona; Colorado].
Coccinella novemnotata degener, Leng, 1903, p. 198; Casey, 1908, p. 404; Johnson, 1910, p. 59; Dobzhansky, 1931, p. 6; Dobzhansky, 1933, p. 112.
Coccinella novemnotata oregona Casey 1908, p. 403 [type: southern Oregon]; Leng, 1920, p. 216; Dobzhansky, 1931, p. 7.

Length 4.7 to 7.0 mm. Head with a broad, pale band between the eyes, black anteriorly and posteriorly; the labrum brown. Pronotum with the anterior margin entirely pale; the ventral pale spot of each anterior angle large, trapezoidal, extended posteriorly as far or almost as far as the dorsal spot. Elytra always with a scutellar spot, the sutural margins very narrowly blackish; each elytron with spots that decrease in size and number from east to west and, in the Far West, from north to south, these spots entirely lacking in many western specimens. Eastern specimens (Fig. 28): each elytron with a small, rounded humeral spot; a similar submarginal spot at basal two-fifths; a larger, rounded or transverse submedian spot; and a similar, always transverse, sublateral spot at apical fourth; two or more of the spots rarely joined together. Manitoba to Alberta and southward: elytra infrequently as heavily maculate as in average eastern specimens; all spots usually small to very small, the sublateral at basal two-fifths and the humeral sometimes barely evident or lacking; all of these spots very rarely lacking in specimens from southwestern Alberta to Arizona and New Mexico. British Columbia and southward (Fig. 29): these spots averaging smaller still, frequently lacking in part and rarely entirely lacking in specimens from British Columbia, usually entirely lacking in specimens from central California, and nearly always entirely lacking in those from southern California. Mesepimera and metepimeral regions whitish.

Male.—Anterior face of each anterior coxa with a large pale spot. Ventral face of each anterior femur with a long pale stripe. Genital organ: apical portion of the median lobe (Fig. 6) broadly triangular, separated from the basal portion by a large notch on each side, extended well beyond the apices of the lateral lobes.

Distribution.—Southernmost Canada, Quebec to Vancouver Island, but north through Alberta to Great Slave Lake; south to southwestern Georgia (Thomasville), northeastern Louisiana (Tallulah), northeastern Texas (Dallas), central New Mexico (Albuquerque), central Arizona (Clemenceau), and southernmost California (San Diego Co.). The northernmost localities are Fort Coulonge, western Quebec at 46°N.; Arnprior, eastern Ontario at 45°30'N., Carberry, Manitoba, at 50°N.; Saskatoon, Saskatchewan, at 52°30'N.; Gros Cap, Great Slave Lake, Northwest Territories, at 62°N.; Salmon Arm, British Columbia, at 50°45'N. The species is not known from the Maritime Provinces or from the coasts of British Columbia except on Vancouver Island (Victoria district, Courtenay); it is not known from the coastal counties of the Pacific States except King Co., Washington, and Santa Barbara Co. and southward in southern California.

Notes.—The variation in elytral maculation is clinal; it is impossible to delimit well-characterized races, although variation in most local populations and in many large regions is moderate. Many specimens from the Great Plains and Rocky Mountains match average eastern specimens or average specimens from British Columbia and Oregon. Of 62 specimens from Modesto, central California, 56 lack all spots except the scutellar; the others are fully maculate, although one or more of the spots are barely evident in most of them. Such fully but lightly maculate forms are infrequent in California except in northern parts, but they

occur as far south as Los Angeles Co. The name *novemnotata* applies to the eastern form, *franciscana* to the form with no spots except the scutellar, and *degener* and *oregona* to the lightly maculate forms of the central and Pacific regions respectively.

Specimens with only the scutellar spot resemble *californica*, but the anterior pronotal margin is black at middle in the latter. Small, lightly maculate specimens somewhat resemble *trifasciata subversa*, in which the margins of the elytral suture are not darkened.

6. *Coccinella prolongata prolongata* Crotch

Coccinella prolongata Crotch, 1873, p. 371 [cotypes: Utah, Kansas, California]; Casey, 1899, p. 88; Dobzhansky, 1931, p. 9, Figs. 3, 14; Johnson, 1910, p. 64, Figs. 47, 62.

Coccinella transversoguttata prolongata, Leng, 1903, p. 199, Pl. 14, Fig. 16.

Coccinella monticola prolongata, Leng, 1920, p. 216.

Length 5.7 to 7.0 mm. Head black; with two large pale spots. Pronotum with the dorsal pale markings (Fig. 16) penetrating the dark area more deeply than in any other species or subspecies, extending to or almost to the posterior pronotal angles and to the same depth internally; the dark area reduced to a broad basal band and to a wider, parallel-sided median area that may or may not extend to the anterior margin; the ventral pale spot of each anterior angle large, usually triangular, extended posteriorly from two-thirds to three-fourths as far as the pale dorsal area. Elytra (Fig. 30) with a scutellar spot, the sutural margins very narrowly dark brown; each elytron with a very small submarginal spot at basal two-fifths, with a small, transverse discal spot at middle, and with a similar spot which is sometimes broken at apical fourth. Mesepimera and metepimeral regions whitish, the latter usually infuscate in part.

Male.—Anterior face of each anterior coxa with a large, pale spot; ventral face of each anterior femur sometimes with a transverse pale spot near the trochanter. Genital organ: median lobe (Fig. 7) with the apical portion broadly triangular; much as in *californica* but separated from the basal portion by a much larger, deeper notch; extended well beyond the apices of the lateral lobes.

Distribution.—Southern British Columbia to western Nebraska and northernmost California. The specimens seen are from Aspen Grove, Vernon, Nicola, Oliver, and Osoyoos, British Columbia; Helena and Yellowstone National Park, Montana; Montpelier (6,100 ft.), McCall, and Paris (6,000 ft.), Idaho; Puyallup, Pullman, and Chelan, Washington; Summer Lake and Upper Klamath Marsh, Oregon; Franktown, Nevada; Clear Creek, Boulder, and Rabbit Ears Pass (9,000 ft.), Colorado; Sioux Co., Nebraska; Salt Lake City (5,000 ft.), Utah; Siskiyou Co., California.

6a. *Coccinella prolongata sequoiae* Dobzhansky

Coccinella prolongata sequoiae Dobzhansky, 1931, p. 10 [type: near Camp Wolverton, 7,000 to 9,000 ft., Sequoia National Park, California].

Pronotum with the dorsal pale spots not extended to an unusual degree but wider than in *p. bridwelli*; the anterior margin black or, rarely, very narrowly pale at middle. Elytra (Fig. 31) with the scutellar spot much larger than in *p. prolongata*; each elytron with a very large, irregular black spot on the apical three-fifths which encloses, except in one of the two specimens from Mono Co., a rather small pale spot; the black spot sometimes free, usually narrowly joined to the scutellar spot at the basal two-fifths of the elytron, broadly joined to the scutellar spot in the Mono Co. specimens and in five of the 51 specimens from the type locality. Femora entirely black. Other characters as in *p. prolongata*.

Distribution.—Known only from Sequoia National Park (7,000 to 9,000 ft.), Tulare Co., and from Mono Co., both in east-central California.

6b. *Coccinella prolongata bridwelli* Nunenmacher

Coccinella bridwelli Nunenmacher, 1913, p. 76 [cotypes: Tahquitz Valley, San Jacinto Mountains, California].

Coccinella prolongata bridwelli, Dobzhansky, 1931, p. 11.

Pronotum with the dorsal pale markings not extended to an unusual degree, subtrapezoidal; the anterior pronotal margin black at middle. Elytra entirely black. Anterior face of each anterior coxa with or without a large pale spot; anterior femora entirely black. Other characters as in *p. prolongata*.

Distribution.—Known only from the Tahquitz Valley or Canyon, Santa Rosa Peak (8,000 ft.), and Idyllwild, all situated in the San Jacinto Mountains, Riverside Co., California.

7. *Coccinella alta*, new species

(?) *Coccinella suturalis* Casey (not *Coccinella suturalis* Olivier, 1791), 1899, p. 89 [type: Colorado].

(?) *Coccinella monticola suturalis*, Leng, 1903, p. 198.

Coccinella suturalis, Dobzhansky, 1931, p. 21, Fig. 8.

Length 4.8 to 5.3 mm. Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle small, triangular, extended posteriorly from one-third to one-half as far as the dorsal spot. Elytra with the lateral margins much more broadly explanate, except near the apex, than in any other species; with a rather large scutellar spot; the sutural margins blackish, this sutural stripe narrow but wider than in any other species; each elytron with an oblique submedian spot and with a transversely oval spot at apical fourth, these rather heavy (Fig. 32). Mesepimera whitish. Metepimera black or strongly infusate.

Male.—Anterior coxae entirely black or with a somewhat pallid area on the anterior face of each. Anterior femora entirely black. Genital organ: median lobe (Fig. 8) not abruptly but very strongly narrowed; the apical portion slender, very narrowly rounded at apex, extended well beyond the apices of the lateral lobes.

Distribution.—High altitudes, southwestern Alberta to north-central Utah and central California; Colorado (?).

Holotype.—♂, Alta, Salt Lake Co., Utah, June 30; in the collection of the U.S. National Museum.

Paratypes.—4 ♂, 1 ♀, same data as holotype; 1 ♀, Mount Rae, 38 miles south of Morley, Alberta, Aug. 9, 1956 (10,000 ft.); 1 ♂, Mount Kaiser, California, July 19, 1919 (10,000 ft.), E. P. Duzee; 1 ♀, Mount Gold, California, July 11, 1910 (12,000 ft.), E. C. Van Dyke; 1 ♂, Bubbs Creek Canyon, Kings River, California, July 9, 1910 (9,700 ft.). All Californian localities are situated in Fresno County. Paratypes are deposited in the U.S. National Museum, the California Academy of Sciences, and the Canadian National Collection.

Notes.—The types of *alta* are probably conspecific with the type of the homonym *suturalis* Casey. The latter is a female from Colorado. It measures 5.7 mm. It has the strongly explanate elytra and the relatively wide sutural stripe of *alta*. Its elytral spots, however, are not heavy. Its scutellar spot is only two-thirds as large as in *alta*; the submedian spots are as long, transversely, as in *alta* but only two-thirds as wide. *C. alta* resembles superficially some specimens of *monticola*. In the latter, the elytral suture is not darkened, and the ventral pale spot of each anterior pronotal angle is large and trapezoidal.

8. *Coccinella difficilis* Crotch

Coccinella difficilis Crotch, 1873, p. 370 [type: Utah]; Leng, 1903, p. 200, Pl. 15, Fig. 28; Johnson, 1910, p. 64, Fig. 47; Dobzhansky, 1931, p. 20, Figs. 9, 16, 26.
Coccinella monticola difficilis, Leng, 1920, p. 216.
Coccinella vandykei Nunenmacher, 1909, p. 161 [co:types: Goldfield, Nevada].
Coccinella transversoguttata vandykei, Leng, 1920, p. 216.

Length 5.0 to 6.0 mm. Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle small, subtriangular, extended posteriorly from one-third to three-fifths as far as the dorsal spot. Elytra with a moderately large scutellar spot, the suture not darkened; each elytron with a very small sublateral spot at basal two-fifths which is rarely lacking, with a rather small, transverse median spot which is rarely joined to the sublateral spot, and with a larger transverse spot at apical fifth (Fig. 33). Mesepimera white. Metepimera pale but more or less strongly infuscate.

Male.—Anterior face of each anterior coxa with a large pale spot. Ventral face of each anterior femur with a long pale stripe. Genital organ: median lobe (Fig. 9) abruptly and very strongly narrowed; the apical portion slender, very narrowly rounded at apex, barely extended beyond the apices of the lateral lobes.

Distribution.—Western Montana to Colorado, northern Arizona, and north-western California. The specimens seen are from Green River City (7,000 ft.) Wyoming; Glenwood Springs (5,800 ft.) and Maiden, Colorado; Pocatello, Idaho; Milford, Fort Douglas, Logan, and Salt Lake Valley (4,300 ft.), Utah; San Francisco Mountains at Flagtaff (9,400 ft.), Arizona; Grant Co. (several localities, 7,400 to 8,200 ft.) and Unity, Oregon; Elko and Lovelock, Nevada; Alturas and Adin, California; recorded from western Montana by Dobzhansky.

Notes.—Specimens of *t. richardsoni* in which the subbasal band is reduced to a scutellar spot are frequently confused with *difficilis*. In such specimens, the size is usually greater; the sublateral spot of each elytron is lacking; the discal spots are transversely more elongate; and the subapical spot, compared to the median spot, is larger. Some specimens of *difficilis* resemble some of *monticola*, but in the latter the ventral pale spot of each anterior pronotal angle is large and trapezoidal and extends posteriorly as far or almost as far as the dorsal spot.

9. *Coccinella fulgida* Watson

Coccinella nugatoria, Leng, 1919, p. 17.
Coccinella undecimpunctata, Dobzhansky, 1931, p. 28 (in part).
Coccinella fulgida Watson, 1954, p. 45, Figs. 5-9 [type: Cape Henrietta Maria, north-central Ontario at 55°N., 82°15'W.].
Coccinella difficilis, Chapin, 1956, p. 152 (in part).

Length 4.5 to 5.6 mm. More elongate than usual, the form as in *hieroglyphica*. Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle triangular, small or very small, extended posteriorly from one-fifth to three-fifths as far as the dorsal spot. Elytra with a small or, usually, moderately large scutellar spot, the sutural margins not darkened; each elytron with a small sublateral spot at basal two-fifths which is lacking in one of the 20 specimens and which is joined to the transverse median spot in 11 specimens to produce a strongly oblique spot, with a transverse spot at apical fifth in all specimens (Fig. 34). Mesepimera sometimes white, usually more or less strongly infuscate, rarely black. Metepimeral regions usually black or strongly infuscate, rarely pale.

Male.—Anterior coxae and femora entirely black. Genital organ: median lobe (Fig. 10) subparallel basally, strongly narrowed apically to the acute apex, which barely attains the apices of the lateral lobes.

Distribution.—Arctic and subarctic regions; Ungava Bay to the southern shores of Hudson Bay and Alaska. The specimens are from Fort Chimo (58°10'N., 68°15'W.), Quebec; Cape Henrietta Maria (55°N., 82°15'W.), Ontario; Bathurst Inlet (66°50'N., 108°W.), Kater Point (67°42'N., 109°W.), Langton Bay (69°22'N., 124°11'W.), and Reindeer Depot (68°42'N., 134°W.), Northwest Territories; Summit Lake (58°50'N., 125°W.), British Columbia; Rampart House, Alaska-Yukon border at 67°25'N.; 60 to 70 miles north of Old Rampart House (68°10'N., 142°W.), Mead River south of Point Barrow (70°40'N., 157°W.), and Toms Lake (Alaska Peninsula), Alaska.

Notes.—Some specimens of several species and subspecies resemble somewhat some specimens of *fulgida*. Of those forms, *undecimpunctata*, *humboldtiensis*, and *monticola* differ in having the ventral spot of each anterior pronotal angle large, trapezoidal, and extended posteriorly as far or almost as far as the dorsal spot. In *difficilis* the body is much less elongate and the size is usually larger, and in *alta* the sutural margins of the elytra are black. *C. fulgida* may have an unusual sex ratio; only three of the 20 known specimens are male. The Alaskan specimens of the U.S. National Museum that were identified by Dobzhansky as *undecimpunctata* and by Chapin as *difficilis* are females, as are all others except three from Cape Henrietta Maria, Ont., Summit Lake, B.C., and the Alaska Peninsula.

10. *Coccinella undecimpunctata undecimpunctata* Linnaeus

Coccinella 11-punctata Linnaeus, 1758, p. 366 [type: "Europa"].

Coccinella undecimpunctata, Schaeffer, 1912, p. 104; Dobzhansky, 1931, p. 27 (in part), Figs. 12, 20, 29, 30; Davis, 1932, p. 101; Brown 1940, p. 72; Chapin, 1956, p. 155.

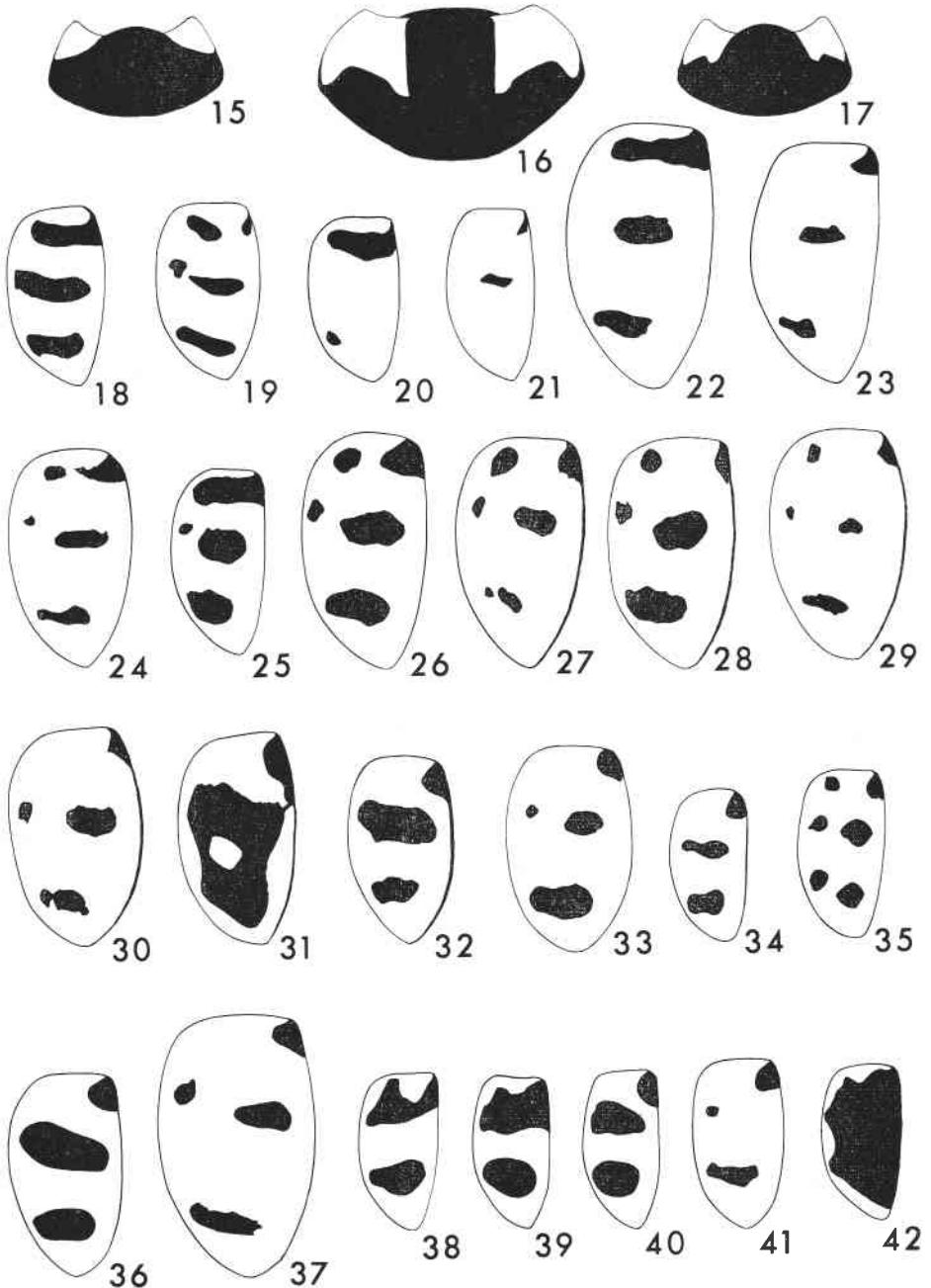
Length 4.0 to 5.0 mm. More elongate and less strongly convex than any other species, approaching *fulgida* in this respect. Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle large, trapezoidal, extended posteriorly as far or almost as far as the dorsal spot except (in two of 38 specimens) when the dorsal spot is narrowly prolonged to or almost to the posterior pronotal angle. Elytra with a small scutellar spot; each elytron usually with five other small, discrete spots; these humeral, sublateral at basal two-fifths and at apical third, and subsutural near the middle and at apical fourth (Fig. 35); the humeral spot sometimes, the sublateral at apical third rarely, lacking; the sublateral at basal two-fifths sometimes joined to the submedian discal spot; the elytral suture not darkened. Mesepimera whitish. Metepimeral regions often entirely black, often pale in part and heavily infuscate.

Figs. 15-17. Pronota of *Coccinella* spp. 15, *C. hieroglyphica mannerheimii* Muls. 16, *C. prolongata prolongata* Crotch. 17, *C. hieroglyphica kirbyi* Crotch.

Figs. 18-42. Left elytra of *Coccinella* spp. 18, *C. trifasciata perplexa* Muls. (Peterborough, Ont.). 19, *C. t. subversa* Lec., form *eugenii* Muls. (Horne Lake, Vancouver Island). 20, *C. t. subversa*, form *juliana* Muls. (Agassiz, B.C.). 21, *C. t. subversa*, form *subversa* (Agassiz, B.C.). 22, *C. transversoguttata richardsoni*, new name (Ottawa, Ont.). 23, *C. t. richardsoni* (McMurray, Alta.). 24, *C. t. richardsoni* (Mt. Washington, N.H.). 25, *C. t. ephippiata* Zett. (Sondestrom Fiord, West Greenland). 26, *C. nugatoria* Muls. (near Apizaco, Tlaxcala, Mexico). 27, *C. johnsoni* Csy. (Saanch, B.C.). 28, *C. novemnotata* Hbst. (Marmor, Ont.). 29, *C. novemnotata* (Penticton, B.C.). 30, *C. prolongata prolongata* Crotch (Nicola, B.C.). 31, *C. prolongata sequoiae* Dobz. (Sequoia National Park, Calif.). 32, *C. alta* n. sp. (Alta, Utah). 33, *C. difficilis* Crotch (Logan, Utah). 34, *C. fulgida* Watson (holotype). 35, *C. undecimpunctata undecimpunctata* L. (Tracadie, N.B.). 36, *C. monticola* Muls. (Treesbank, Man.). 37, *C. monticola* (Denver, Colo.). 38, *C. hieroglyphica kirbyi* Crotch (Knowlton, Que.). 39, *C. h. mannerheimii* Muls. (Matanuska, Alaska). 40, *C. h. humboldtiensis* Nunen. (Courtenay, B.C.). 41, *C. h. humboldtiensis* (Lechtown, B.C.). 42, *C. h. humboldtiensis* (Courtenay, B.C.).

Male.—Anterior coxae usually entirely black, rarely with a strongly infuscated pale spot on the anterior face of each; anterior femora entirely dark. Genital organ: median lobe (Fig. 11) evenly narrowed apically; its apex broadly rounded and extended well beyond the apices of the lateral lobes.

Distribution.—Northern Newfoundland to southern New York; easternmost Ontario. This introduced Eurasian species was reported from North America in 1912 by Schaeffer, who had specimens from Wollaston, Massachusetts. Sub-



sequently Dobzhansky reported it from other localities in Massachusetts, and Davis recorded it from Long Island, N.Y. It has been taken in New York City. Brown recorded it from Prince Edward Island, northeastern New Brunswick, and Rimouski, Que. Chapin reported it from Halifax, N.S., Miquelon Island, and from localities in Newfoundland as far north as Cow Head Harbour (50°N.). All American localities are coastal except Ottawa, Ont., where several specimens were collected in 1960. Dobzhansky incorrectly stated that the species occurs in Greenland, and his Alaskan records are based on specimens of *fulgida*. Californian records also are erroneous; they are based on cotypes of the synonym *menetriesi* Mulsant (1850, p. 104), which were said to be from northern California and Asia, but there are no subsequent records from California.

Note.—The species is strongly characterized. It bears some resemblance to *fulgida*, which is arctic and subarctic and in which the ventral spots of the anterior pronotal angles are triangular and small.

11. *Coccinella monticola* Mulsant

- Coccinella monticola* Mulsant, 1850, p. 115 [type: Rocky Mountains]; Mulsant, 1866, p. 96; Crotch, 1873, p. 371; Crotch, 1874, p. 115; Wickham, 1894, p. 301, Fig. 47; Casey, 1899, p. 89; Leng, 1903, p. 198, Pl. 14, Fig. 13; Johnson, 1910, p. 63, Figs. 58a-b, 59; Palmer, 1914, p. 222, Pl. 33, Figs. 16-19.
- Coccinella nivicola monticola*, Dobzhansky, 1931, p. 17, Figs. 7, 18, 25; Dobzhansky, 1933, p. 111, Fig. 5b.
- Coccinella lacustris* LeConte, 1852, p. 131 [cotypes: Lake Superior].
- Coccinella alutacea* Casey, 1899, p. 89 [cotypes: New Mexico].
- Coccinella transversoguttata alutacea*, Leng, 1903, p. 200, Pl. 14, Fig. 17.
- Coccinella monticola alutacea*, Johnson, 1910, p. 63, Figs. 60d-e.
- Coccinella nivicola alutacea*, Dobzhansky, 1931, p. 19; Dobzhansky, 1933, p. 111, Figs. 5c-d.
- Coccinella impressa* Casey (not *Coccinella undecimpunctata impressa* Verhoeff, 1891), 1899, p. 89 [type: California].
- Coccinella transversoguttata impressa*, Leng, 1903, p. 199.
- Coccinella monticola impressa*, Casey, 1908, p. 404.
- Coccinella monticola* ab. *impressa*, Johnson, 1910, p. 63.
- Coccinella nevadica* Casey, 1899, p. 88 [type: Reno, Nevada]; Casey, 1908, p. 402.
- Coccinella*, var. *nevadica*, Leng, 1903, p. 201.
- Coccinella transversoguttata nevadica*, Leng, 1920, p. 216.
- Coccinella transversoguttata*, ab. *nevadica*, Mader, 1936, p. 374.
- Coccinella californica nevadica* (?), Dobzhansky, 1931, p. 12.
- Coccinella monticola sellica* Johnson, 1910, p. 63, Fig. 58d [cotypes: California, New Hampshire].
- Coccinella monticola postica* Johnson (not *Coccinella postica* Mulsant, 1850), 1910, p. 63, Fig. 58c [type: California].
- Coccinella monticola confluenta* Johnson (not *Coccinella novemnotata confluenta* Fitch, 1862), 1910, p. 63, Fig. 58e [type: California].
- Coccinella monticola biguttata* Johnson (not *Coccinella biguttata* Fabricius, 1787), 1910, p. 63, Fig. 60a [type: Buena Vista, Colorado].

Length 5.2 to 7.2 mm. Head black; with two pale spots, these smaller than usual, separated by a distance almost as great as their combined diameters. Pronotum with the anterior margin black at middle; the ventral pale spot of each anterior angle large, trapezoidal, extended posteriorly almost as far or fully as far as the dorsal spot. Elytra with a well-developed scutellar spot; other spots heavy, reduced, or entirely lacking, depending on locality; the suture never darkened. All eastern and all Canadian populations except those of southern Saskatchewan and southern Alberta (Fig. 36): each elytron with a heavy, somewhat oblique spot near middle and with a heavy, transverse spot at apical fourth. Southern Saskatchewan, southern Alberta, and the Rocky Mountains of the United States (Fig. 37): the discal spots rarely heavy, usually moderately reduced, the submedian spot frequently broken laterally. Elko, northeastern Nevada: the spots very small, the submedian lacking in one and the subapical lacking in another of the nine specimens, which run smaller (5.2 to 5.7 mm.) than those of any other

series. Reno, Carson City, Yerington, and Mina, westernmost Nevada: spots except the scutellar entirely lacking in all of the nine specimens. California and Oregon: the spots varying from large to very small, depending on locality. Mese-pimera whitish. Metepimera usually black, sometimes bicolored or infuscate.

Male.—Anterior coxae and femora entirely black. Genital organ: median lobe (Fig. 12) gradually narrowed apically; the apical portion less slender than in *alta*, very narrowly rounded at apex, extended well beyond the apices of the lateral lobes.

Distribution.—Northern Nova Scotia to Massachusetts and the mountains of New York; east-central Ontario; northern Minnesota to southern New Mexico, central California, Vancouver Island, and northwesternmost Northwest Territories. Peripheral northern localities are Baddeck (46°10'N.), Nova Scotia; Fredericton (46°N.), New Brunswick; Sudbury (46°30'N.), Ontario; Treesbank (49°50'N.), Manitoba; Waskesiu Lake (53°N.), Saskatchewan; Fort Smith (60°N.) and Fort McPherson (67°20'N.), western Northwest Territories. Peripheral southern localities are Springfield, Massachusetts; Duluth, Minnesota; Rincon, New Mexico; Prescott, Arizona; Mono Co., California. The species is rare throughout much of its range, especially in the East. It is not known in Quebec except for a record from Quebec City, and it has been taken in Ontario only at Sudbury. It occurs to altitudes of 10,000 feet in Colorado and California.

Notes.—Variation in elytral maculation is clinal and does not permit the recognition of well-characterized races, although variation within local populations and in some large regions is moderate. Specimens from the Rocky Mountains of the United States and from southern Saskatchewan and southern Alberta vary only moderately and are rather constantly more lightly maculate than the moderately variable specimens of all other Canadian localities and all eastern regions. The names *monticola* and *alutacea* are based on Rocky Mountain specimens, and the name *lacustris* applies to the northern form. The specimens from the eastern margins and some from the northern margins of the Great Basin have the discal spots very small and sometimes lacking in part. Those from west-central Nevada lack all spots except the scutellar; the name *nevadica* applies to them. The limited material from California and Oregon shows great variation from one locality to another.

Dobzhansky (1931, p. 17; 1933, p. 111) placed the American forms of *monticola* as subspecies of the Siberian species *nivicola* Mulsant (1850, p. 109). The cotypes of *nivicola* came from Kamchatka and Sitka, but recent authors have restricted the name to the Siberian form. Mader (pp. 142, 149, 373) identified the form treated as typical *nivicola* by Dobzhansky as *whitii* Mulsant (1850, pp. 108, 1064; alternate spellings: *withii*, *witheii*); he considered *whitii* and *nivicola*, probably incorrectly, as specifically distinct. However, the American and Siberian forms differ by characters that commonly distinguish species in this genus. They may be compared as follows.

- Tooth of each tarsal claw at the basal third of the claw. Median lobe of the male genital organ more slender apically, its sides in the apical third parallel (Fig. 13). Ventral white spot of each anterior pronotal angle small, transversely crescentic, extended posteriorly only one-third as far as the dorsal spot. Elytral spots relatively large. Siberia *nivicola* Muls. (in the sense of Dobzhansky).
- Tooth of each tarsal claw at the middle of the claw. Median lobe of the male genital organ less slender apically, its sides converging almost to the apex (Fig. 12). Ventral white spot of each anterior pronotal angle large, trapezoidal, extended posteriorly almost as far or fully as far as the dorsal spot. Elytral spots in the most heavily maculate specimens smaller than in most specimens of *nivicola*. North America *monticola* Muls.

The western specimens of *monticola* with reduced maculation resemble closely western specimens of several other species in which, however, the elytral suture is narrowly dark, or the ventral spot of each anterior pronotal angle is small and triangular.

12. *Coccinella hieroglyphica kirbyi* Crotch

- Coccinella tricuspis* Kirby (not *Coccinella tricuspis* Thunberg, 1795), 1837, p. 231 [cotypes: between New York and Cumberland House, Saskatchewan]; Mulsant, 1850, p. 107; Mulsant, 1866, p. 88; Crotch, 1873, p. 371; Wesie, 1892, p. 25 (in part); Wickham, 1894, p. 301; Casey, 1899, p. 90; Leng, 1903, p. 201 (in part), Pl. 15, Fig. 29; Johnson, 1910, p. 59, Fig. 47.
Coccinella hieroglyphica tricuspis, Dobzhansky, 1931, p. 26, Figs. 11, 28.
Coccinella Mannerheimi tricuspis, Mader, 1930, p. 160, Pl. 33, Fig. 18.
Coccinella Kirbyi Crotch (new name for *tricuspis* Kirby, not Thunberg), 1874, p. 37.
Coccinella hieroglyphica kirbyi, Timberlake, 1943, p. 14.
Coccinella Mannerheimii, Crotch, 1874, p. 115 (in part).

Length 3.7 to 4.7 mm. More elongate than usual, the form as in *fulgida*. Head black; with two well-separated pale spots of variable size. Pronotum with the anterior margin narrowly pale at middle in nearly all males and few females, the pale band sometimes very narrowly interrupted on the median line; this margin black except laterally in very few males and most females; the dorsal pale spot of each anterior angle usually penetrating the dark discal area and therefore subtrapezoidal or subrectangular (Fig. 17), infrequently not penetrating the dark area and then triangular; the ventral pale spot of each anterior angle large, trapezoidal, extended posteriorly as far or almost as far as the dorsal spot except in the very few specimens in which the dorsal spot is narrowly prolonged to the posterior pronotal angle. Elytra with a heavy, tricusate, subbasal band and with a large transverse spot on each at apical fourth (Fig. 38); the band with the sutural cusp extending to the scutellum and with each lateral cusp extending almost to the base; the cusps separated from one another by deep U-shaped spaces; the posterior margin of the band straight or almost so; the elytral suture red. Mesepimera usually brown or bicolored, commonly largely white, sometimes entirely black. Metepimera entirely black, the adjacent angle of the abdomen sometimes pale.

Male.—Anterior face of each anterior coxa with a large pale spot, which is usually somewhat obscure. Anterior femora entirely black. Genital organ: median lobe (Fig. 14) elongate-triangular, the apex bluntly pointed and just attaining or barely surpassing the apices of the lateral lobes; the median and lateral lobes more elongate in some specimens than in others, thus varying moderately as in all other forms of *hieroglyphica*.

Distribution.—Very local; Nova Scotia and New Hampshire to Yukon Territory, south-central British Columbia, and Montana. The northernmost localities are Mount Lyall, eastern Quebec at 48°40'N.; Sudbury, eastern Ontario at 46°30'N.; Gillam, eastern Manitoba at 56°20'N.; McMurray, eastern Alberta at 56°40'N.; Summit Lake, eastern British Columbia at 58°55'N.; Dawson, western Yukon Territory at 64°N. Southernmost localities are southern New Hampshire (Barnstead), northeastern New York (Essex Co.), southern Minnesota (Minneapolis), and northern Montana (Bear Paw Mountain).

Notes.—*C. h. kirbyi* may be compared with the Eurasian subspecies, *h. hieroglyphica*, as follows.

Pronotum with the anterior margin black except laterally; the dorsal pale spot of each anterior angle not or scarcely penetrating the dark discal area and therefore triangular. Elytra extremely variable in color; the subbasal markings, when in the form of a tricusate band, prolonged posteriorly and nearly always joined to the subapical spots. Mesepimera always black. Eurasia *hieroglyphica hieroglyphica* L.

Pronotum with the anterior margin narrowly pale between the lateral spots except in a few males and most females; the dorsal pale spot of each anterior angle usually penetrating the dark discal area and therefore subtrapezoidal or subrectangular (Fig. 17), infrequently triangular. Elytra varying in color only moderately; the posterior margin of the tricusate band straight or almost so, always distant from the subapical spots. Mesepimera usually brown or bicolored, infrequently black. North America

hieroglyphica kirbyi Crotch.

In all of the six specimens from northernmost British Columbia (Summit Lake) and Yukon Territory (Dawson), the elytral pattern is typical enough, but all have the mesepimera black and the dorsal pale spots of the pronotum triangular, characters that are quite infrequent in the southern parts of the range. Thus specimens from the northwesternmost regions vary toward *h. hieroglyphica* and *h. mannerheimii*.

12a. *Coccinella hieroglyphica mannerheimii* Mulsant

Coccinella mannerheimii Mulsant, 1850, p. 106 [cotypes: Siberia]; Mulsant, 1866, p. 88; Crotch, 1874, p. 115 (in part); Mader, 1930, p. 160, Pl. 33, Fig. 19.

Coccinella tricuspis Mannerheimi, Weise, 1892, p. 26.

Coccinella hieroglyphica mannerheimi, Dobzhansky, 1926, p. 24.

Pronotum with the anterior margin always black except laterally; the dorsal pale spot of each anterior angle nearly always triangular (Fig. 15), rarely penetrating the dark discal area as in *kirbyi* and then subtrapezoidal. Elytra (Fig. 39) with the subbasal band, except rarely, much less strongly tricusate than in *kirbyi*; the lateral cusps frequently only feebly extended; the posterior margin of the band frequently arcuate. Epimera always entirely black. Anterior face of the male anterior coxa frequently entirely black. Other characters as in *h. kirbyi*.

Distribution.—Subarctic; Hudson Bay to Alaska and central Siberia. The North American localities are Matanuska, Alaska (61°35'N., 149°05'W.), Aklavik and Reindeer Depot, Northwest Territories (the western and eastern sides of the Mackenzie Delta at 68°12'N. and 68°42'N.), and Churchill, Manitoba (western coast of Hudson Bay at 58°46'N.).

Notes.—This subspecies has not been reported previously from North America. As stated in the notes on *h. kirbyi*, northwestern specimens of the latter vary toward *h. mannerheimii*, and a few Siberian specimens of *h. mannerheimii* approach *h. kirbyi*. In three of the 44 Siberian specimens, the subbasal band is as strongly tricusate as in *h. kirbyi*. One of these, from Irkutsk, has the dorsal pronotal spots subquadrate and resembles an average specimen of *h. kirbyi*. All of the 25 North American specimens of *h. mannerheimii* are typical enough. More specimens from northwestern America are needed to show the intergradation, if such occurs. In Eurasia *h. mannerheimii* is restricted to eastern Siberia and is replaced in western Siberia and Europe by *h. hieroglyphica* (L.). There seems to be nothing in the European literature to suggest that these forms overlap or intergrade.

12b. *Coccinella hieroglyphica humboldtiensis* Nunenmacher

Coccinella humboldtiensis Nunenmacher, 1912, p. 448 [cotypes: Crescent City, Del Norte Co., California].

Coccinella hieroglyphica humboldtiensis, Dobzhansky, 1931, p. 27.

Length 4.0 to 4.8 mm. Occurring in two variable color phases, one with the elytra red and maculate with black, the other with the elytra largely black.

Pale phase (Figs. 40-41).—Head black, with two well-separated pale spots. Pronotum with the anterior margin black at middle; the dorsal pale spot of each anterior angle penetrating the black discal area, subtrapezoidal; the ventral pale spot of each anterior angle large and trapezoidal as in the other subspecies. Elytra

always with a scutellar spot; lacking other maculation in three of the 13 specimens; each elytron with a very small, round, sublateral spot at basal third and a rather small, transverse spot at apical fourth in one specimen; nine specimens with a slightly oblique, transverse spot at basal third and a transverse spot at apical fourth, the spots of moderate size or large. Mesepimera usually black, brown in one specimen, bicolored in another. Metepimera black, the adjacent angles of the abdomen sometimes pale.

Dark phase (Fig. 42).—Prothorax as in the pale phase. Two specimens with the head entirely black, and with the elytra entirely black above except a narrow, obscure, reddish streak at the middle of each lateral margin; the epipleurae red but margined externally with black. Two specimens with the head bimaculate and the elytral disk black; the elytral margins except the sutural moderately widely red; the margins of the black discal area undulate, moderately invading the pale area at each humeral umbone and at basal and apical two-fifths; the epipleurae entirely red. Epimera black.

Other characters as in *b. kirbyi*.

Distribution.—Largely coastal; northern and east-central California to Vancouver Island. The specimens are from Siskiyou Co., Crescent City, and Mammoth, California; Olympia, Washington; and from Duncan to Courtenay, southeastern Vancouver Island.

Notes.—According to the original description, the transverse spots of the elytra may be broken. Most of the spotted specimens are maculate much like the most heavily maculate specimens of *monticola* and *fulgida*. The four specimens of the dark phase are from Errington, Parksville, and Courtenay, Vancouver Island. They have in both sexes the genitalia of the *hieroglyphica* complex, and they match very well some specimens of the European *b. hieroglyphica*. However, it seems probable that they represent a phase of *b. humboldtiensis*, spotted specimens of which are from the same localities, rather than an introduced and established population of *b. hieroglyphica*.

Summary

A key, descriptions, bibliographies, and synonymies are offered for the 18 forms considered to merit names, which are arranged as 12 species. Geographic variation is described, and the nature of the presumed subspecies is discussed. The arrangement differs from that proposed by Dobzhansky in 1931 as follows. One additional species, the recently described *fulgida* Watson, and two additional subspecies, *transversoguttata ephippiata* Zetterstedt and *hieroglyphica mannerheimii* Mulsant, are included; the first of these subspecies is a Greenland form that has been confused with its nominate form, and the second is a Siberian form that extends through Alaska to Hudson Bay. *C. monticola* Mulsant is considered specifically, rather than subspecifically, distinct from the Siberian *nivicola* Mulsant. *C. transversoguttata richardsoni*, new name for the homonym *quinquenotata* Kirby, and *trifasciata perplexa* Mulsant are considered subspecifically distinct from, rather than synonymous with, their Old World nominate forms. *C. nugatoria* Mulsant, which was considered a subspecies of *transversoguttata* Faldermann and confused with *t. richardsoni*, is raised to specific rank and is considered extralimital. Six forms that were considered subspecies are reduced to synonymy with their nominate forms; these are *novemnotata degener* Casey, *n. oregona* Casey, *n. franciscana* Mulsant, *trifasciata eugenii* Mulsant, *t. juliana* Mulsant, and *monticola* (*nivicola* in Dobzhansky) *alutacea* Casey. The name *kirbyi* Crotch replaces the homonym *tricuspis* Kirby. One species, *alta*, is described as new; its type specimen is probably conspecific with that of the homonym *suturalis* Casey.

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