

KEY TO THE NEARCTIC SPECIES AND VARIETIES OF ERYTHRONEURA

(HOMOPTERA; EUPTERYGIDAE)

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The present treatment of the genus *Erythroneura* Fitch differs from the preceding revision, that of Gillette in 1898,¹ in the following points: the genus is recognized as distinct from *Typhlocyba* Germar² and the species, all of which Gillette included in the latter group, are distributed according to their characters; two species referred to other genera are omitted (*Empoa coccinea* Fitch to *Empoasca*, fide Van Duzee and Ball, and *Typhlocyba sanguinea* Gillette and Baker to *Dikraneura*, fide Van Duzee); the composite species *Typhlocyba comes* Say (embracing forms with three different types of venation, not to speak of radically different color patterns) is divided into six species and probably should be further subdivided; and four new species and thirty-eight new varieties are described.

Some reference is made to every Nearctic form in the literature, except *Erythroneura rubricata* Van Duzee which I have not seen. It may be mentioned here that *Typhlocyba tunicarubra* Gillette and *Empoa albicans* Walsh, forms about which there might otherwise be some question, belong to the genus *Typhlocyba* s. s.

Erythroneura is the most intricate of the Nearctic *Eupterygidae*, in the relations of its species and especially of its color varieties, and in making determinations all characters require attention. First as to recognition of the genus: there are no ante-apical cells in the tegmen, and the membrane is not appendiculate; there is no submarginal vein in the wing, and there are two apical wing cells, the first and second wing-veins being confluent. Finally separating it from *Typhlocyba*, which agrees with it to this point, the fourth (inner) apical vein of tegmen terminates in

¹Proc. U. S. Nat. Mus. xx, pp. 750 to 773.

²For discussion of this subject see Proc. Biol. Soc. Wash., xxxi, pp. 109 to 124, Nov. 29, 1918.

the apical margin and the second apical cell is oblong and based on a cross-vein. In *Typhlocyba* the fourth apical vein is curved, terminating in radial margin, and the second apical cell is triangular, sometimes even stalked. In the identification of species the character of the fourth apical cell, the shape of vertex and the color pattern appear to be the most important external characters. The differences between groups are more or less bridged by fluctuations in this extremely variable genus. On this account it may be necessary to run some specimens through the keys of both Groups 4 and 5 as subsequently defined. The species are not numerous, and as aggregates are easily recognizable after a little experience, but variation is so great that it is difficult if not impossible to construct a synopsis, subject to so few exceptions, that identification of chance individuals will be easy and certain. Numerous new varieties are named in the present paper, and the policy governing such naming will be only briefly expressed here.³ Insects have varieties, different from the subspecies of ornithology and mammalogy that seem to require recognition in nomenclature; they have others which should not be named. Conspicuous examples of the latter type or mere color phases, are the varying red to yellow forms of *Erythroneura*. Where the color pattern is the same but a transition in color occurs, as from yellow to red, or from red to black, I have endeavored to avoid nomenclatorial recognition of the variants. However where the color pattern differs, in shape, notably in extent, or otherwise in any essential way the variety has been named. The writer believes the accumulation of knowledge relating to these varieties will be retarded if not prevented, by lack of means of referring to them in entomological literature, in other words, of names.

The system of measurements used in this paper is intended to enable the student, if he so desires, to draw an approximately accurate outline of each form. Total length of the specimen measured is given in units and hundredths of millimeters; all of the other measurements are ratios or readings from an eyepiece micrometer each division of which has, with the magnification used,

³A paper especially devoted to this subject is in *Entomological News*, xxxi, No. 2, Feb. 1920, pp. 47-55, and No. 3, March, 1920, pp. 61-65.

a value of .033 mm. in the focal plane. The measurements or ratios given are median length of vertex (LM), length straight across vertex from anterior angle of eye (LE), width between anterior angles of eyes (WA), greatest width of head (WP), distance from median point of posterior margin of vertex to anterior angle of eye (OA), from same point to posterior angle of head (OP), from same point to posterior angle of pronotum (OH), median length and greatest width of pronotum, and distance from humeral angle of tegmen to point nearest apex of scutellum and from thence to apex of tegmen. Unless otherwise stated measurements are from type specimens.

Key to the Groups of Species

For the purposes of this key, and throughout the paper, the apical cells and cross-veins of tegmina are given numbers, in order according to their position from costal to radial margin. The cross-veins are, respectively: one, between costal margin and first sector; two, between first and second sectors; three, between second and third sectors; and four, between third sector and radial margin.

- A. Normally the third sector and third apical vein are not continuous, a portion of the angulate or curved third cross-vein being interposed between them, the fourth apical cell, therefore, being angulate or curved at base. (Figs. 7 to 10.)
- B. Normally the base of the fourth apical cell is distinctly angulate. (Figs. 7, 9, 10.)
- C. Second apical cell distinctly shorter than third, and a fourth or more shorter than fourth apical cell (fig. 7); vertex rather long and pointed. (Fig. 5.) GROUP 1
- CC. Second apical cell about the same length as third; not a fourth shorter than fourth. (Figs. 9, 10.)
- D. Normally half or more of third cross-vein bordering fourth apical cell, which is unusually wide and lacks a black dot near base. GROUP 3
- DD. Normally less than half of third cross-vein borders fourth apical cell, which is narrower and almost invariably is black or has a black dot at base. GROUP 4
- BB. Normally the base of the fourth apical cell is a smoothly curved line (fig. 8); vertex of medium length and acuteness (fig. 4) GROUP 2
- AA. Normally the third sector and the third apical vein are continuous, and the fourth apical cell is merely oblique or rectangular at base. (Figs. 11, 12.)
- B. Fourth cross-vein normally oblique, joining radial margin so that posterior angle formed by their juncture is less than a right angle (fig. 11); apex of second apical cell not marked with black. GROUP 5

- BB. Fourth cross-vein normally in line with or parallel to third, and joining radial margin approximately at right angles (fig. 12); apex of second apical cell black or with a black spot.....GROUP 6

Key to the Species by Groups

GROUP 1

- A. Consists of a single species, which in all its color forms, retains traces at least of a narrow median pale vitta on vertex, pronotum and scutellum.
E. vulnerata Fitch, p. 272.

GROUP 2

- A. Tegmina hyaline, or color markings when present chiefly longitudinal, consisting of oblique vittae, which in some varieties are fused into broad stripes.....**E. obliqua** Say, p. 275.
AA. Principal color markings transverse, or occupying nearly all of tegmina to cross-veins.
B. An oblique cross-band at about middle of tegmen; scutellum, and more or less of thorax red.....**E. rubroscuta** Gillette, p. 282.
BB. Dorsal surface chiefly occupied by a reddish saddle spot (dusky within) which extends to apex of clavus on the median line, but only to the middle along costa.....**E. crevecoeuri** Gillette, p. 283.

GROUP 3

- A. Vertex very short, nearly as long at inner margin of eye as at middle (fig. 1); vertex and scutellum each with two distinct dark dots.
E. bipunctata Gillette, p. 283.
AA. Vertex distinctly longer at middle than along inner margin of eye (figs. 2, 3), without dark dots.
B. Length 3.8 to 4.5 mm.; vertex long but bluntly rounded (fig. 2); color clear pale yellow.....**E. ador** McAtee, p. 284.
BB. Smaller species; vertex not so long nor so blunt (fig. 3).
C. Genital plate of female ending in a broad, notched process; tegmina stramineous with orange-yellow vittae; western species.
E. dentata Gillette, p. 285.
CC. Genital plate of female, and coloration of tegmina chiefly otherwise; eastern species.....**E. abolla** new species, p. 285.

GROUP 4

- A. Vertex rather bluntly rounded (fig. 6); clavus roof-shaped when at rest; basal triangles of scutellum and two dots on vertex black.
E. tecta new species, p. 288.
AA. Vertex more pointed (figs. 3, 4, 5); other characters not agreeing with the preceding.
B. Vertex very pointed (fig. 5); a broad dark stripe the whole length of the insect, black on vertex, pronotum and scutellum and smoky brown on tegmina.....**E. aelys** new species, p. 290.

- BB. Vertex less pointed (figs. 3,4), coloration otherwise.
- C. Chief color markings small black or red dots; black dots in base of fourth apical cell, one on middle of costa and another on corium near middle of clavus, the latter usually ocellate with red.
E. illinoiensis Gillette, p. 290.
- CC. Chief color markings not small black or red dots.
- D. Tegmina with a complete transverse dark band, or chiefly red with a large pale discal spot.
- E. Broad band across tegmina at cross-veins and posterior half of thorax smoky to black..... **E. morgani** DeLong, p. 292.
- EE. Tegmina chiefly red with a large discal pale spot.
E. hartii Gillette, p. 293.
- DD. Tegmina otherwise; scutellum, adjacent parts of thorax, and sometimes more or less of head smoky to black.
E. scutelleris Gillette, p. 294.

GROUP 5

- A. Posterior half of pronotum, scutellum and anterior third of tegmina yellow, pink or sanguineous..... **E. basilaris** Say, p. 294.
- AA. Coloration otherwise.
- B. Color pattern, when present (hyaline varieties exist), made up chiefly of red, sanguineous or yellow irregular spots, some of which in varieties are more or less fused..... **E. maculata** Gillette, p. 296.
- BB. Chief color markings, zigzag scarlet vittae from scutellum to cross-veins..... **E. ligata** new species, p. 301.

GROUP 6

- A. Nearly the whole upper surface smoky brown to black.
E. infuscata Gillette, p. 302.
- AA. Upper surface colored otherwise.
- B. Upper surface with a large red saddle-spot, with red to dusky cross-bands, or chiefly red.
- C. Anterior cross-band covering bases of tegmina.
E. vitis Harris, p. 303.
- CC. Anterior cross-band not covering bases of tegmina.
E. tricineta Fitch, p. 306.
- BB. Upper surface nearly colorless, or with a color pattern consisting of irregular red to yellow spots of which three (the upper two sometimes fused) are on clavus, and those on corium tend to be arranged in three oblique series; these markings sometimes fused into red to dusky angulate vittae; dorsum sometimes ornamented by black spots.
E. comes Say, p. 310.

Erythroneura vulnerata Fitch

E. [rythroneura] vulnerata, Fitch, Asa. Catalogue, with References and Descriptions of the Insects Collected and Arranged for the State Cabinet of Natural History. Fourth Annual Report of the Regents of the University of the State of New York on the State Cabinet of Natural History, 1851, pp. 62-63. Reprint J. A. Lintner, Ninth Report on Insects of New York, 1893, pp. 402-403. [New York.]⁴

This species is quite distinct from the other Nearctic forms; it is especially characterized by the short second apical cell, by the angulate base of the fourth apical cell (fig. 7) and the rather sharply pointed vertex (fig. 5). It has a number of color varieties, the details of coloration that come nearest to occurring in all specimens being the pale median line, which in its typical development is percurrent over vertex, pronotum and scutellum, the pale cross-veins and dark apical cells, hyaline at tip, and with a hyaline band near apex across at least the fourth cell.

The known range of *E. vulnerata*, as a whole, extends from Quebec, Ontario and Colorado south to Virginia, Texas and Arizona.

Key to the Color Varieties

- A. Clavus with conspicuous pale areas other than a single large spot.
 - B. Tegminal color markings chiefly smoky brown to black, pale areas conspicuous by contrast. var. **decora** new variety, p. 274.
 - BB. Tegminal color markings otherwise, pale areas less conspicuous.
 - C. Markings of scutellum and anterior parts about the same color as those of tegmina.
 - D. Tegminal color markings greenish brown to fulvous.
 - var. **vulnerata** Fitch, p. 273.
 - DD. Tegminal color markings yellowish red to maroon.
 - var. **vulnerata** Fitch, red form, p. 273.
 - CC. Markings of scutellum and anterior parts smoky to black; of tegmina vivid maroon. var. **fulmina** new variety, p. 274.
 - AA. Clavus with inconspicuous pale areas, except sometimes a large basal spot; smoky brown to black varieties.
 - B. Clavus with a single large whitish-yellow basal spot.
 - var. **niger** Gillette, p. 274.
 - BB. Clavus with only inconspicuous semi-hyaline pale areas.
 - var. **nigerrima** new variety, p. 275.

⁴ References given in full the first time cited, abbreviated thereafter.

Erythroneura vulnerata var. **vulnerata** Fitch

Bibliographical citation same as for species.

In this description the "color markings" of the key are assumed to be the ground color. In variety *vulnerata* this varies from greenish brown to fulvous and is relieved by the following pale areas and color markings; anterior margin of vertex, a vitta bordering each eye, and a median vitta expanded in front which is more or less continuous over vertex, pronotum and scutellum; pronotum with a curved pale vitta and interior pale spot on each side, scutellum often pale yellowish or reddish laterally, clavus with a large irregularly lunate whitish hyaline spot on inner side at base, sometimes divided and a smaller one beyond middle; corium whitish hyaline between sectors, a well defined spot near posterior claval spot; costal plaque opaque whitish, marked off at each end by an oblique dark line; middle part of costal margin narrowly yellow, a pale area behind costal plaque and of about the same color interrupted posteriorly by red streaks on the first cross-vein and first sector; other cross-veins, apical veins and the sectors more or less pale; apical cells and adjacent tegminal surface the other side of cross-veins, smoky to black, crossed near apex by an oblique hyaline band, second cell with an additional hyaline spot near base, and the first chiefly hyaline within. Underside chiefly slaty, upper part of face livid to yellowish, legs stramineous to yellow, edge of abdomen pale yellow.

Length, 2.97 mm.; vertex: LM 7.5, LE 3, WA 12, WP 21, OA 6, OP 11.5, OH 16; pronotum: L 11, W 21; tegmen 14-61. Measurements from a female collected at Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee).

Other specimens (2.64 to 3.03 mm.) examined were collected at Odenton, Laurel, Beltsville and Plummer's Island, Maryland; Washington, District of Columbia, Virginia and Denver, Colorado. [Collections of U. S. National Museum and of W. L. McAtee.]

Erythroneura vulnerata var. **vulnerata** Fitch, red form

Distribution and relative extent of color markings and pale areas, about as in variety *vulnerata*, but the color markings decidedly reddish (bright red to maroon).

Length, 2.8 mm.; vertex: LM 7, LE 3, WA 10, WP 17, OA 5.5, OP 10, OH 15; pronotum: L 10, W 20; tegmen 12-58. Measurements from a female, Plummer's Island, Maryland, Nov. 4, 1906, (W. L. McAtee).

Other specimens (2.3 to 3.03 mm.) examined were collected at Riverdale and Plummer's Island, Maryland; Washington and Anacostia, District of Columbia; Dead Run, Virginia; Long Island, New York and Denver, Colorado. [W. L. M., U. S. N. M.]

Specimens from the west, which may prove, ultimately, to deserve sub-specific recognition, have the pale areas of the tegmina notably more extensive, and the color markings yellowish to orange-red; underside much paler, face and genitalia sometimes entirely pale yellow.

Length, 2.83 mm.; vertex: LM 8, LE 3.5, WA 13, WP 20.5, OA 6.5, OP 12, OH 16; pronotum: L12, W 21; tegmen 13-56. Measurements from a female; Riley County, Kansas, July, [U. S. N. M.]

Other specimens (2.7 to 2.83 mm.) from Riley County, Kansas; Wichita Falls and Victoria, Texas, and Higley and Graham Mountains, Arizona. [U. S. N. M., Biological Survey.].

Erythroneura vulnerata var. **fulmina** new variety

Scutellum and anterior parts with color markings chiefly smoky to black, pale areas much reduced; tegmina with ground color opaque whitish, color markings pinkish to maroon, ground color of apical cells black. A most beautiful variety, the dark fore and hind parts contrasted with the paler mid-section, the latter in turn colored with beautifully contrasting milky white and dark red, the costa flushed and the sectors and first cross-vein dotted with bright pinkish red.

Length, 2.97 mm.; vertex: LM 7, LE 3, WA 12, WP 20.5, OA 6, OP 12.5, OH 16; pronotum: L 11, W 21; tegmen 13-63.

Type—♀; Plummer's Island, Maryland, January 6, 1907, (A. K. Fisher), [W. L. M.]. Allotype—♂; same data.

Erythroneura vulnerata var. **decora** new variety

Color markings smoky to black, pale areas conspicuous by contrast, and much larger than in variety *vulnerata*, vertex pale yellow with two broad black vittae inclosing a narrow median pale one, pronotum with median and two discal pale yellow spots, sometimes merged, spots and dashes of same color near lateral and anterior margins; median scutellar vitta broad and basal triangles paler within; tegminal pale areas large, that on base of clavus conspicuous, pale yellow; costal plaque pale yellow.

Length, 2.83 mm.; vertex: LM 7, LE 3, WA 12, WP 18.5, OA 6, OP 11, OH 16; pronotum: L 10.5, W 20; tegmen 12-58.

Type—♀; Plummer's Island, Maryland, May 9, 1913, (W. L. McAtee), [W. L. M.]. *Paratypes*—same locality, June and November, (W. L. M.).

Erythroneura vulnerata var. **niger** Gillette

Typhlocyba vulnerata var. *niger*. Gillette, C. P. American Leaf-hoppers of the Subfamily Typhlocybinae. Proceedings of the U. S. National Museum, xx, 1898, p. 765. [Type No. 3452, U. S. N. M., which is labelled Washington, D. C.]

Typhlocyba nigradorsum. De Long, D. M. The Leafhoppers or Jassoidea of Tennessee. Bul. No. 17, Tennessee State Board of Entomology, June, 1916, p. 110. [Clarksville, Tennessee.]

Color above chiefly smoky brown to black, vertex and pronotum each with a median streak and two discal spots, or the latter wanting, and scutellum with a median streak, pale yellow; pale areas of tegmina much reduced, a large spot at inner side of base of clavus and the costal plaque pale yellow, or the latter opaque whitish.

Length, 2.73 mm.; vertex: LM 7.5, LE 3, WA 12, WP 18.5, OA 6, OP 11, OH 15; pronotum: L 10, W 19; tegmen 11-56.

Specimens other than the type examined were collected at Plummer's Island, Seven Locks and Beltsville, Maryland, and at Falls Church, Virginia, (W. L. McAtee), (W. L. M.).

Erythroneura vulnerata var. **nigerrima** new variety

A darker form even than variety *niger*, the pale areas on clavus being smaller, semi-hyaline and inconspicuous; in extreme examples there is only a single pale point at two-thirds length of clavus, and one on corium near it, besides the pale yellow costal plaque and paler costal area just posterior.

Length, 2.64 mm.; vertex: LM 6, LE 3, WA 10.5, WP 17, OA 5.5, OP 10, OH 15; pronotum L 10, W. 19; tegmen 13-54. Measurements taken from a female paratype; Maryland, near Plummer's Island, June 17, 1913, (W. L. McAtee).

Type—♀ (about 2.14 mm.); Maywood, Alexandria County, Virginia, February 20, 1916, (W. L. McAtee), [W. L. M.]. *Paratypes*—Plummer's Island, Maryland, June and November, [W. L. M.]; Fort Washington, Maryland, and Washington, District of Columbia, [U. S. N. M.].

Erythroneura obliqua Say

T. [ettigonia] obliqua. Say, Thomas. Descriptions of new Hemipterous Insects collected in the Expedition to the Rocky Mountains, performed by order of Mr. Calhoun, Secretary of War, under command of Major Long. Journal of the Academy of Natural Sciences of Philadelphia, iv, 1825, p. 342; The Complete Writings of Thomas Say on the Entomology of North America, Vol. II, 1859, p. 259. [Engineer Cantonment on the Missouri.]

This species and the following two forms, which may prove to be no more than varieties of it, constitutes a group, easily recognizable among Nearctic *Erythroneura* by the broad fourth apical cell with smoothly curved base which joins radial margin at a very acute angle (fig. 8); in addition practically all of the individuals of the group have, in some form, two strong posteriorly diverging longitudinal color vittae on vertex, which are often continued on pronotum.

The known range of *E. obliqua* extends from Quebec, Ontario and Colorado to Virginia, Louisiana and California. The single previously published California record⁵ is supported, to a degree, by the locality of var. *aucta* hereafter described, which, however,

⁵ Gillette, Am. Typhlocybinae, 1898, p. 757.

may prove to be a distinct species. At any rate, information is much needed relating to the status of *E. obliqua* west of the continental divide.

Key to the Color Varieties

- A. Color markings present.
 - B. Color markings more or less run together, especially on vertex and pronotum, forming a dorsal stripe.
 - C. Stripe on tegmina confined to clavi, which are red, the remainder of tegmina being sulphur yellow. . . . var. **clavata** DeLong, p. 278.
 - CC. Stripe on tegmina otherwise.
 - D. Stripe on tegmina, not of uniform width, obviously made up of two heavy vittae, the claval and corial.
 - E. Stripe chiefly red on head and pronotum.
 - var. **dorsalis** Gillette, p. 278.
 - EE. Stripe chiefly dark on head and pronotum.
 - var. **dorsalis** Gillette, dark form, p. 279.
 - DD. Stripe on tegmina continuous, more nearly of uniform width.
 - E. Stripe dusky to black throughout.
 - var. **stolata** new variety, p. 279.
 - EE. Stripe bright red along margins, duskier red within.
 - var. **aucta** new variety, p. 279.
 - BB. Color markings chiefly in the form of distinct vittae.
 - C. Scutellum dark or with dark markings.
 - D. Scutellum with two black triangles at base.
 - var. **parma** new variety, p. 280.
 - DD. Scutellum and sometimes adjacent parts of thorax smoky to black.
 - E. Tegminal vittae chiefly red. . . . var. **noevus** Gillette, p. 280.
 - EE. Tegminal vittae chiefly yellow.
 - var. **noevus** Gillette, yellow form, p. 280.
 - CC. Scutellum without dark markings.
 - D. Dorsum of abdomen usually dark or with a distinct dark blotch showing through the tegmina, ground color of scutellum and pronotum also, often darker.
 - E. Dusky markings, if any, on tegmina, in form of cross-bands; apical cells entirely dusky.
 - F. Tegminal vittae red; apical cells often very dark.
 - var. **fumida** Gillette, p. 281.
 - FF. Tegminal vittae yellow.
 - var. **fumida** Gillette, yellow form, p. 282.
 - EE. Tegmina with broad longitudinal dusky vittae; third and fourth apical cells abruptly hyaline.
 - var. **electa** new variety, p. 282.
 - DD. Dorsum of abdomen usually pale; ground color of scutellum and pronotum paler.
 - E. Scutellum chiefly deep orange. . . var. **pelta** new variety, p. 278.

EE. Scutellum otherwise.

F. Color markings red var. **obliqua** Say, p. 277.

FF. Color markings yellow to pellucid or livid.

var. **obliqua** Say, yellow form, p. 277.

AA. Color markings nearly or entirely absent.

var. **eluta** new variety, p. 277.

Erythroneura obliqua var. **obliqua** Say

Bibliographical references same as for species.

Ground color of scutellum and anterior upper surface pale opaque yellow, markings two orange-red vittae connivent on vertex, forming an inverted V-shaped mark common to vertex and pronotum; scutellum with median pale yellow opaque vitta, bordered by two narrow orange red lines, tip orange red. Tegmina whitish hyaline, bearing orange-red markings as follows: vitta on clavus interrupted except for dots near radial margin, then continued along that margin nearly to tip of clavus; a long vitta along third sector, curved at apex along part of base of fourth apical cell; narrow stripe along anterior half or more of costal margin; thread of color along first sector, and sometimes along cross-veins; apical cells slightly yellowish smoky; costal plaques greenish yellow. Ground color below pale yellow, stripe along pleura pale reddish; arcuate cross-band on lower surface of vertex and touches of color elsewhere on face, orange-yellow to red; fore tibiae washed with reddish; claws black.

Length, 3 mm.; vertex: LM 8, LE 3.5, WA 12, WP 17, OA 8, OP 11, OH 15; pronotum: L 11, W 18; tegmen 14-61. Measurements from a female; Plummer's Island, Maryland, Nov. 30, 1913, (W. L. McAtee).

Other specimens (2.6 to 3.1 mm.) examined were collected at Plummer's Island, Bladensburg and Branchville, Maryland; Dead Run, Maywood and Mount Vernon, Virginia, and Iowa City, Iowa, (W. L. M.): Washington, District of Columbia; Clarksville, Tennessee, and Opelousas, Louisiana, [U. S. N. M.].

Erythroneura obliqua var. **obliqua** Say, yellow form

Color pattern as in the red form, but with the color markings varying from yellow through light-greenish-yellow to pellucid or livid; tegmina more hyaline; costal plaques whitish usually obscured by the color markings.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 12, WP 17, OA 6, OP 10.5, OH 14; pronotum: L 11, W 19; tegmen, 13-59. Measurements from a female; Plummer's Island, Maryland, April 27, 1913, (W. L. McAtee).

Other specimens examined were collected at Plummer's Island, Odenton, Laurel, and Beltsville, Maryland; Anacostia, District of Columbia; Bluemont, Great Falls, Maywood and Glencarlyn, Virginia, and Oxford, Indiana, (W. L. M.).

Erythroneura obliqua var. **eluta** new variety

Scutellum and anterior parts and under surface pale yellowish; tegmina whitish hyaline.

Length, 3.03 mm.; vertex: LM 6.5, LE 3.5, WA 12, WP 19.5, OA 7, OP 10, OH 16; pronotum: L 11, W 21; tegmen 15-62.

Type—♀; Oxford, Indiana, Nov. 1, 1914, (W. L. McAtee), [W. L. M.]. Paratypes—(2.9 to 3.1 mm.) same data; Dunn-Loring, Virginia, August 30, 1916; Scott's Run to Balls Hill, Virginia, August 12, 1917, (W. L. McAtee), [W. L. M.].

Erythroneura obliqua var. **pelta** new variety

Differs from the yellow form of the typical variety in having the scutellum (except pale median vitta and basal triangles), and mesopleurae deep orange and the longitudinal color vittae somewhat deeper yellow.

Length, 2.7 mm.; vertex: LM 6, LE 3, WA 12, WP 18; OA 6.5, OP 11.5, OH 16; pronotum L 11, W 20; tegmen 17–55.

Type—sex unknown (abdomen missing); Plummer's Island, Maryland, June 8, 1913, (W. L. McAtee), [W. L. M.].

Erythroneura obliqua var. **clavata** De Long

Typhlocyba obliqua var. *clavata*. De Long, D. M. Jassoidea of Tennessee. Bull. 17, Tenn. State Bd. Ent., June, 1916. [Clarksville, Tennessee.]

Markings of vertex and pronotum similar to those of var. *obliqua* but heavier, scutellum chiefly, and clavi entirely, bright red, the remainder of tegmina uniform sulphur-yellow to apical area, which is milky white to pale yellow.

Length, 3.06 mm.; vertex: LM 6.5, LE 4, WA 12, WP 20.5, OA 7, OP 12, OH 17.5; pronotum: L 11.5, W 23; tegmen 15–62. Measurements from the type specimen, very kindly loaned by Mr. D. M. De Long, who collected it at Clarksville, Tennessee, June 29, 1915.

Erythroneura obliqua var. **dorsalis** Gillette

Typhlocyba obliqua var. *dorsalis* Gillette, C. P. Am. Typhlocybinae, 1898, p. 757. ["Many localities."]

Gillette states that: "Variety *dorsalis*, new variety has the red markings so run together as to form a continuous red or dark (sometimes almost black) dorsal stripe the entire length of the insect." No type was designated and no locality mentioned. The varietal name *dorsalis* Gillette, therefore, is hereby restricted to the form of *obliqua* in which the typical red vittae are so broadened and run together as to form a practically continuous stripe. Other varieties with longitudinal stripes not answering to this description are mentioned in succeeding paragraphs.

In its best development variety *dorsalis* has the head and pronotum, except narrow lateral margins and the scutellum and clavi, entirely covered by a broad continuous red stripe; the corial vittae are unusually broadened, originate about middle of corium and are cut sharply off at cross-veins; apical

cells dusky. The principal variations are that narrow slaty-drab vittae and edgings may mark the places where more extensive pale areas are present in variety *obliqua*, or the tegminal vittae may be well separated as in typical form; the inner apical cells are quite black sometimes, continuing the dorsal stripe to apices of tegmina.

Length, 2.57 mm.; vertex: LM 7, LE 3.5, WA 12, WP 18, OA 6, OP 10, OH 14; pronotum: L 10, W 18; tegmen 12-53. Measurements from a female; Hutchinson, Kansas, Oct. 23, 1914, [U. S. N. M.].

Other specimens examined are from Plummer's Island, and Branchville, Maryland; Mount Vernon, Virginia; Oxford, Indiana, and Clarksville, Tennessee, [W. L. M., U. S. N. M.].

Erythroneura obliqua* var. *dorsalis Gillette dark form

Like *dorsalis* except that the dorsal stripe is black on head, pronotum and scutellum, remaining red or reddish, at least in part, on tegmina. This is a very pretty variety as the black anterior part of the stripe is strongly contrasted with pale yellow margins from humeri forward, while the tegmina exterior to stripe are whitish hyaline, the costal plaques denser white; apical cells or a little more of apical parts of tegmina dusky. Face sometimes with a median dark vitta expanded into a triangular mark on lower side of vertex.

Length, 2.97 mm.; vertex LM 7, LE 3, WA 12.5, WP 19.5, OA 6, OP 12, OH 16; pronotum L 12, W 21; tegmen 13-62. Measurements from a female; Branchville, Maryland, April 2, 1915, on *Pinus virginiana*, (W. L. McAtee).

Other specimens examined are from Montgomery County, Maryland, and Mt. Vernon, Virginia, all from the same species of pine, (W. L. M.).

Erythroneura obliqua* var. *stolata new variety

Dorsal stripe continuous, not obviously made up of distinct vittae, entirely dusky to black, darkest anteriorly; in the type all other parts of dorsal surface are pale yellow, more or less overlaid by pruinosity, densest around margins of costal plaques; the pruinosity in dilute form extends even on the dorsal stripe; apical cells wholly dusky; other specimens are less pruinose and show some tendency toward a dark vitta on face.

Length, 2.87 mm.; vertex: LM 8, LE 3.5, WA 12, WP 19, OA 6, OP 10.5, OH 16; pronotum, L 11, W 20; tegmen 13-59.

Type—♀; Maywood, Alexandria County, Virginia, February 20, 1916, (W. L. McAtee), [W. L. M.]. *Paratypes*—(2.8 to 2.87 mm.), Mount Vernon, Virginia, March 21, 1915, L. O. Jackson; Beltsville, Maryland, Sept. 3, 1916, (W. L. McAtee), [W. L. M.].

Erythroneura obliqua* var. *aucta new variety

Dorsal stripe bright red along edges, fading to pale red or dusky within and more or less evanescent posterior of clavi; vittae the fusion of which

makes the stripe, paler on vertex, and narrowly separated there and on anterior margin of pronotum; color of dorsal surface except stripe pale greenish yellow; under-parts and legs pale yellow.

Length, 2.98 mm.; vertex: LM 6.5, LE 3.5, WA 12, WP 21, OA 6, OP 12, OH 14; pronotum: L. 11.5, W 21; tegmen 13-64.

Type and paratype—sex unknown; Folsom, California, 8-7, '85, [U. S. N. M.]. More and better material may prove this to be a distinct species.

Erythroneura obliqua var. **parma** new variety

Like variety *obliqua* except that scutellum is entirely red, marked with an incomplete and interrupted median pale vitta and with two nearly triangular black spots within the basal angles; costal plaques creamy yellow; face yellowish above, pinkish below: genitalia reddish laterally.

Length, 3.04 mm.; vertex: LM 6.5, LE 3.5, WA 12, WP 19, OA 6, OP 11, OH 21; pronotum L 11.5, W 21; tegmen 14-61.

Type—♂; Onaga, Kansas, (F. F. Crevecœur), [U. S. N. M.].

Erythroneura obliqua var. **noevus** Gillette

Typhtochyba obliqua var. *noevus*. Gillette, C. P. Am. Typhlocybinae, 1898, pp. 757 to 758. [Onaga, Kansas.]

The original description states that this "variety has the typical red lining, but the scutellum and hind margin of the pronotum are more or less black" (p. 757). In view of this statement the selection of the type (type no. 3444, U. S. N. M.) was unfortunate in that it is an individual having the color vittae of scutellum and anterior dorsal surface, yellow. However, the inner tegminal vitta is reddish, so that it is possible to class the type with the red form of the variety as Gillette no doubt intended.

The scutellum of this variety may have a more or less obvious median pale area or vitta; the outer tegminal vittae may be more or less yellowish and the undersurface is pale yellow with greenish yellow to reddish markings.

Length, 2.77 mm.; vertex: LM 6.5, LE 3, WA 11, WP 19, OA 6, OP 10, OH 15; pronotum: L 11, W 21; tegmen 11-62.

Other specimens (2.8 to 2.97 mm.) were collected at Plummer's Island, Maryland; Oxford, Indiana and Manhattan, Kansas, [W. L. M., U. S. N. M.].

Erythroneura obliqua var. **noevus** Gillette, yellow form

Like the preceding but color markings yellow; in other words it is the *noevus* form of *E. obliqua* variety *obliqua*, yellow form.

Length, 2.87 mm.; vertex: LM 7, LE 3.5, WA 12, WP 19; OA 6, OP 11, OH 15; pronotum L 11, W 21; tegmen 13-58. Measurements from a female;

Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee). Another specimen (2.8 mm.), same data (W. L. M.).

***Erythroneura obliqua* var. *fumida* Gillette**

Typhlocyba obliqua var. *fumida* Gillette, C. P. Am. Typhlocybinae, 1898, p. 758. [Onaga, Kansas.].

This and the following variety of *Erythroneura obliqua* owe their characteristic appearance to the chiefly dark dorsum of abdomen, and of underlying parts of scutellum and pronotum which show through the wings and superficial layers of anterior parts, giving the insects a more or less pronounced dusky appearance. Besides this transmitted darkening the exterior surface may have dark coloring of its own in addition to the usual color markings of the species.

In variety *fumida* the dark markings are chiefly in the form of three transverse bands, an underlying one influencing appearance of posterior part of pronotum and anterior part of tegmina, another at about middle of tegmina, and the third an actual fumose band across tegmina over cross-veins. Between these markings in the type specimen the tegmina are distinctly whitish; costal plaques opaque whitish; the red vittae are wide, the scutellum wholly red except for a central spot and the vittae on pronotum and vertex unusually heavy.

The under surface of the type specimen also is unusually heavily pigmented; the whole face except lower surface of vertex being red, pinkish laterally, the remaining lower surface slaty brown, with the edges of abdominal segments pale.

A paratype has all the details of color pattern less pronounced.

Length, 2.7 mm.; vertex: LM 6, LE 3, WA 11.5, WP 19; OA 5.5, OP 10; OH 15; pronotum, L 10, W 19; tegmen 14-57.

Type—♀; Onaga, Kansas; [No. 3445, U. S. N. M.] Paratype—same data.

A considerable number of specimens (2.9 to 3.03 mm.) of this variety, collected at Mount Vernon, Virginia; Branchville and Plummer's Island Maryland; Anacostia, District of Columbia, and at Oxford, Indiana, also, have been examined. The obscuration of dorsal surface varies, the anterior two bands often more or less fused; the color markings, also, vary in detail, the color vittae on scutellum and anterior parts sometimes varying strongly toward yellow.

Erythroneura obliqua var. **fumida** Gillette, yellow form

Like variety *fumida* Gillette, except that the color vittae of tegmina are golden yellow, and those of anterior parts yellow more or less overlaid by red; veins and margins of tegmina beautifully pencilled in red; costal plaques opaque whitish.

Length, 3.1 mm.; vertex: LM 6, LE 3, WA 12, WP 20; OA 7, OP 14, OH 16; pronotum L 12, W 21.5; tegmen 14-65. Measurements from a female; Maywood, Alexandria County, Virginia, Jan. 2, 1916, (W. L. McAtee).

Other specimens were collected near Benning, District of Columbia, and Branchville, Maryland, all on *Pinus virginiana*, (W. L. McAtee), [W. L. M.].

Erythroneura obliqua var. **electa** new variety

The vittae on head and pronotum of this variety lack the usual high colors and vary from dull greenish yellow to slaty; the tegminal vittae are about typical in form but are duller red than in variety *obliqua*, and are somewhat obscured by the general duskiness of tegmina, to which however the following areas are exceptions: whitish costal plaques (when developed), two long, triangular areas on inner margin of clavus; and separated very sharply, the clear third and fourth apical cells. General color of body slaty, margins of abdominal segments pale greenish yellow.

Length, 2.54 mm.; vertex: LM 7, LE 3, WA 10, WP 15.5; OA 4.5, OP 8, OH 13; pronotum L 9, W 12; tegmen 11-50.

Type—♀; Maywood, Alexandria County, Virginia, March 12, 1916, (W. L. McAtee), [W. L. M.]. Allotype—♂; same locality, February 20, 1916, (W. L. McAtee), [W. L. M.].

This form differing from all the varieties of *Erythroneura obliqua* in having two of the apical cells hyaline, and sharply marked off from the remainder of tegmen, may be a distinct species.

Erythroneura rubroscuta Gillette

Typhlocyba rubroscuta Gillette, C. P. Am. Typhlocybinae, 1898, p. 755. [Onaga, Kansas.].

Ground color of head and thorax pale yellow, of tegmina whitish hyaline; with the following pinkish red markings: scutellum (paler medianly), an oblique narrow band on each tegmen across apical third of clavus and running to or nearly to costal plaque, lines on some of the veins especially the cross-veins and on base of costa, flecks on pronotum and head, in the form of inverted V-shaped marking, the rami of which are broad on (about one-third the width of) pronotum uniting to solidly occupy all of pronotum except a small semicircle on anterior margin; face sometimes with pinkish-red markings tending to be transverse; costal plaques whitish to yellowish.

Length, 3.2 mm.; vertex: LM 7.5, LE 3.5, WA 14.5, WP 22, OA 6.5, OP 13, OH 18; pronotum L 12, W 23; tegmina 14-70.

Type—♀; Onaga, Kansas (Kans. 2047), February, (F. F. Crevecoeur), [Type no. 3443 U. S. N. M.]. Paratype—same data,

and another female specimen same locality, same collector, [U. S. N. M.].

The species has been recorded also from Illinois.

Erythroreura crevecoeuri Gillette

Typhlocyba crevecoeuri, Gillette, C. P. Am. Typhlocybinae, 1898, pp. 767 to 768. [Onaga, Kanasa.]

Ground color of scutellum and anterior parts pale yellow, of tegmina whitish hyaline. Head and pronotum with an orange-reddish, inverted V-shaped marking; the rami of which are rather narrow and almost parallel on pronotum; scutellum reddish, basal triangles paler; tegmina with a large saddle marking extending nearly to cross-veins, broad margins of which are pinkish-red, the interior dusky; cross-veins and immediately adjoining parts of longitudinal veins orange-red, costal plaques denser white than remainder of tegmina, but obscured by pinkish-red. Below pale yellow, face and pleurae marked with red or reddish.

Length, 3.03 mm.; vertex LM 7, LE 3.5, WA 14, WP 21, OA 6, OP 12, OH 18; pronotum: L 11, W 22.5; tegmen 14-64.

Type—♀; Onaga, Kansas (Kans. 2047), early spring, (F. F. Crevecoeur) [Type no. 3455, U. S. N. M.]. *Paratypes*—♀; same data; and ♀, same locality and collector, [U. S. N. M.].

The species has been recorded, also, from New York, North Carolina and Ohio.

Erythroneura bipunctata Gillette

Typhlocyba bipunctata. Gillette, C. P. Am. Typhlocybinae, 1898, p. 751. [Tucson, Arizona.]

A strongly marked species, with the vertex of almost uniform length at all points (fig. 1); the fourth apical cell wide and angulate at base, and the vertex and scutellum each with two distinct dark dots.

Key to the Color Forms

Color markings of upper surface cherry red. red form, p. 283.
Color markings of upper surface smoky brown. dark form, p. 284.
Color markings of upper surface greenish yellow. yellow form, p. 284.

Erythroneura bipunctata Gillette, red form

Ground color of head, pronotum and scutellum ivory; vertex with three red vittae confluent along hind margin, and enclosing anteriorly two pale areas each with a round black spot; each eye with a similar spot on the posterior part; pronotum with irregular antero-lateral vittae cherry red and median and posterior parts of a more suffused red; scutellum with two spots of ground color flanked exteriorly by triangular black spots, a squarish median vitta anteriorly and remaining parts red, paler near apex; tegmen with basal

half of first sector, claval suture, first apical cell, fourth cross-vein and inner half of clavus, whitish hyaline; apical cells two, three and four, and distal half of areas between sectors one and two, and two and three, smoky; remainder cherry red; costal plaques inconspicuous. Legs and ground color of other lower parts (except underside of vertex) brownish ivory; face: lower side of vertex cherry red except for two round spots above bases of antennae, two convergent vittae from upper angles of front and two small lunes above them of ground color (ivory); front prominent with about seven pairs of red-brown vittae along sides flanking a median area of ground color wider below; clypeus black; cheeks with two to three flecks of red.

Length, 2.3 mm.; vertex: LM 4.5, LE 4, WA 11, WP 18; OA, 7, OP 10, OH 14; pronotum: L 11, W 19; tegmen 13-46.

Described from the type specimen. ♀; Tucson, Arizona, April 4, (R. E. Kunze), [No. 3441, U. S. N. M.].

Erythroneura bipunctata Gillette, dark form

This is the form mentioned by Gillette, (loc. cit.) in the following quotation: "I have received an additional female from Dr. Kunze taken at the same place April 30. It differs from the type in being nearly a half millimeter longer and having smoky brown coloration in place of the red."

Erythroneura bipunctata Gillette, yellow form

Like the red form except that ground color is pale yellow and the markings greenish-yellow. This small contrast sometimes results in various parts of the insect appearing almost unicolorous; the legs are stramineous. Costal plaques opaque whitish, inconspicuous in the more deeply colored specimens.

Length, 2.5 mm.; vertex: LM 4, LE 3, WA 11, WP 19; OA 5.5, OP 11, OH 14; pronotum: L 11, W 20; tegmen 13-51. (Measurements from a male, Victoria, Texas, Oct. 14, 1905, on huisache (*Vachellia farnesiana*), (J. D. Mitchell), [U. S. N. M.].

Numerous other specimens (2.3 to 2.6 mm.;) from same locality, July 29, 1903, and August 16, 1915, (J. D. Mitchell), [U. S. N. M.].

Erythroneura ador McAtee

Erythroneura ador. McAtee, W. L. Notes on Nova Scotian Eupterygid Leaf-hoppers, including descriptions of two new species. Can. Ent. xxix, No. 9, Nov. 1918, p. 361. [Halifax, Nova Scotia.]

An unusually large species for the genus, with long but blunt vertex (fig. 2) and long, and wide fourth apical cell, angulate at base. Color pale yellow, tegmina varying thru greenish to golden yellow, paler apically; costal plaques somewhat denser yellow; eyes brownish yellow; clavus dark.

Length, 3.8-4.5 mm.; vertex: LM 7.5, LE 4.5, WA 18, WP 22; OA 7, OP 11, OH 19; pronotum: L 14, W 25; tegmen 15-86.

Type—♀; Halifax, Nova Scotia, August 5, 1917, on elm, [N. S. Dept. Agriculture.

Paratypes—Same data, also, same locality, Sept. 1, 1917, [N. S. Dept. Agriculture; W. L. M.].

Erythroneura dentata Gillette

Typhlocyba dentata, Gillette, C. P. Am. Typhlocybinae, 1898, pp. 765 to 766, figs. 130 to 131. [Folsom, California.]

Ground color stramineous, markings pale yellow to orange yellow, as follows: two pairs of flecks on vertex the posterior larger, a pair of large roundish spots on disc of pronotum, angles of scutellum, a wide vitta on clavus, another on corium, and parts of radial margin of tegmen; costal plaques not evident. Underside and legs of ground color, almost unicolorous, claws dark.

The last ventral segment of the female is more produced than usual in the genus and more or less notched in all the specimens so far examined; in one of the two specimens available for the present study, the notch is merely a shallow emargination, in the other it consists of two divergent slits bordering a central tongue or tooth which reaches almost to the posterior edge of the segment. The value of such notches for taxonomic purposes is questionable; it has been suggested more than once that they are made during copulation, a view which is supported by their variability.

Length, 3.36 mm.; vertex: LM 8, LE 5.5, WA 9, WP 25; OA 8, OP 14, OH 20; pronotum L 13, W 26; tegmen 17-70.

Type and paratype—(3.46 mm.), both females, Folsom, California, August 7, 1885, [Type no. 3453, U. S. N. M.].

Erythroneura abolla new species

A species with a wide, fourth apical cell, distinctly angulate at base, and with a comparatively blunt vertex (fig. 3), easily distinguished from the three other species in its group by the characters given in the key. The present species has a number of color varieties, two of which resemble in appearance parallel varieties of *E. obliqua*. However the blunter vertex and angulate, not smoothly curved, base of fourth apical cell identifies them with *E. abolla*.

With little doubt a variety of this species is the form Gillette speaks of in connection with *E. obliqua*, as having been found among Hart's Illinois material, "having the red coloration almost evenly diffused over the vertex, pronotum, scutellum and anterior two-thirds of the elytra."⁶ I have seen the species in the

⁶Gillette, C. P., Am. Typhlocybinae, 1898, p. 758.

Hart collection, and apparently about the same range of color varieties is present in Illinois as in the vicinity of Washington, D. C.

Key to the Color Varieties

- A. Tegmina dusky hyaline, or of about uniform color to cross-veins.
 - B. Colors more or less contrasted anterior and posterior to cross-veins.
 - C. Tegmina anterior to cross-veins, solid bright to dusky red.
 - D. Vertex and pronotum chiefly red.
 - var. **accensa** new variety, p. 288.
 - DD. Vertex and pronotum chiefly yellow.
 - var. **accensa** new variety, yellow form, p. 288.
 - CC. Tegminal coloration otherwise.
 - D. Tegmina to cross-veins diffuse pinkish red to dusky.
 - var. **abolla** new variety, p. 286.
 - DD. Tegmina to cross-veins yellowish hyaline.
 - var. **abolla** new variety, yellow form, p. 286.
 - BB. Color of entire tegmina about uniform dusky hyaline.
 - var. **iconica** new variety, p. 287.
 - AA. Tegmina with more or less distinct longitudinal color vittae.
 - B. Vittae reddish..... var. **varia** new variety, p. 287.
 - BB. Vittae yellowish.... var. **varia** new variety, yellow form, p. 287.

Erythroneura abolla var. **abolla** new variety

Because most abundant this is considered the typical variety; its type, therefore, is the type of the species.

The general color varies from diffuse pinkish-red to dusky-hyaline with a pinkish cast, the color extending to or nearly to cross-veins, beyond which the tegmina are hyaline more or less clouded with whitish to dusky; costal plaques whitish opaque. The scutellum and anterior parts in some cases are yellowish, and the red color on tegmina may be almost entirely restricted to the veins, along which it tends to form streaks. Face varying from yellowish to pinkish red, sometimes with median vitta and underside of vertex paler; legs pale, they and pleura more or less tinged with same color as face; body slaty with margins and incisures of abdominal segments, and genitalia chiefly paler.

Length, 2.83 mm.; vertex: LM 5.5, LE 3, WA 12, WP 20, OA 6, OP 12, OH 17; pronotum: L 12, W 22; tegmen 13-60.

Type—♀; Mount Vernon, Virginia, February 28, 1915, (L. O. Jackson), [W. L. M.].

Other specimens (2.73 to 3.13 mm.) examined were from same locality as the type (W. L. McAtee); Branchville, Maryland, and Maywood Virginia, (W. L. McAtee), all on *Pinus virginiana*, [W. L. M.].

Erythroneura abolla var. **abolla**, yellow form

Upper surface pale yellow, except dark eyes, tegmina yellowish hyaline, apical cells and small clouds between sectors anterior to cross-veins dusky.

Undersurface, except mesosternum, and legs pale yellowish, dorsum of abdomen chiefly slaty.

Length, 3.23 mm.; vertex: LM 6.5, LE 3.5, WA 14, WP 21, OA 7, OP 12, OH 19, pronotum: L 13, W 24; tegmen 15-66. Measurements from a female; Forest Glen, Maryland, July 24, 1916, (Otto Heidemann), [U. S. N. M.], the only specimen seen.

Erythroneura abolla var. **iconica** new variety

In this variety are ranged the specimens of *E. abolla* in which the tegmina are about uniformly colored throughout, without contrast anterior and posterior of region of cross-veins as in the preceding varieties. In the specimens examined this color is dusky hyaline, varying in depth, and more or less modified by pruinosity or tinge of red. Scutellum and anterior parts chiefly sordid yellowish; face of same color more or less tinged with reddish; legs and body as in preceding varieties.

Length, 3.23 mm.; vertex: LM 7, LE 4, WA 14, WP 22.5, OA 8, OP 14, OH 18; pronotum: L 13, W 25; tegmen 15-65.

Type—♀; Mount Vernon, Virginia, Feb. 28, 1915, (W. L. McAtee), [W. L. M.]. *Allotype*—♂; (2.73 mm.), same data. *Paratype*—(2.93 mm.) ♀; Corner Conduit and Potomac Roads, Montgomery County, Maryland, on *Pinus virginiana*, March 28, 1915, (W. L. McAtee), [W. L. M.].

Erythroneura abolla var. **varia** new variety

Ground color dull yellowish, with reddish markings as follows: more or less distinct inverted U-shaped mark on head, two nearly parallel short vittae on disk of pronotum, apex of scutellum, most of clavus, and vittae along third sector and costa, the latter interrupted by the opaque whitish costal plaque; other veins also red in some specimens. Face and legs tinged or marked with yellowish to red, and sometimes dusky; body slaty, incisures and margins of segments pale yellow.

Length, 2.73 mm.; vertex: LM 5, LE 3.5, WA 11, WP 19, OA 6, OP 11.5, OH 15; pronotum: L 10, W 20; tegmen 12-55.

Type—♂; Mount Vernon, Virginia, Feb. 28, 1915, (W. L. McAtee), [W. L. M.]. *Paratypes*—(2.6 to 2.9 mm.), males, Plummer's Island, Maryland, January 11, 1914, and Corner of Conduit and Potomac Roads, Montgomery County, Maryland, on *Pinus virginiana*, March 14, 1915, (W. L. McAtee), [W. L. M.].

Erythroneura abolla var. **varia**, yellow form

General color above dull greenish yellow, relieved by the following somewhat brighter yellow markings: anterior border, and fleck on posterior border of pronotum, basal angles of scutellum and vitta on clavus, and along third sector of tegmen; costal border of tegmen also brighter yellowish; tegmina

from just before apical cells dusky; face and body dull greenish yellow, legs stramineous.

Length, 2.76 mm.; vertex: LM 5, LE 3, WA 13, WP 18, OA 7, OP 10.5, OH 14; pronotum: L 10.5, W 20; tegmen 12-55. Measurements from a female; Plummer's Island, Maryland, Oct. 4, 1914, (W. L. McAtee), [W. L. M.], the only specimen seen.

Erythroneura abolla var. **accensa** new variety

Upper surface anterior to cross-veins cherry to dusky red, relieved by yellowish edgings on vertex (paler medianly here also) and pronotum; posterior third of tegmina whitish hyaline, costal plaques opaque whitish, leaving, when scaled off, an area dusky hyaline rather than color of remainder of tegmina. Face pale to bright reddish, sometimes with a pale yellow median vitta, and with two oval yellow areas between eyes; legs pale yellow more or less tinted with red; body dark, edges and incisures of abdomen pale yellow; genitalia pale, marked with red or darker.

Length, 2.83 mm.; vertex: L 6, LE 4, WA 12, WP 20, OA 6, OP 11, OH 16; pronotum: L 11, W 21; tegmen 13-58.

Type—♀; Maywood, Virginia, on *Pinus virginiana*, Feb. 20, 1916, (W. L. McAtee), [W. L. M.]. *Allotype*—♂ (2.77 mm.); Mount Vernon, Virginia, Feb. 28, 1915, (W. L. McAtee), [W. L. M.].

Erythroneura abolla var. **accensa** yellow form

Like the preceding except that the vertex and anterior parts of pronotum are pale yellow, shading to the general color or to dusky on posterior parts of pronotum and on scutellum; costal plaques obscured by general color of tegmina; face yellow, paler between eyes; legs pale yellow; body dark, edges and incisures of abdomen pale yellow; genitalia pale yellow, strikingly contrasted to body color.

Length, 2.73 mm.; vertex: L 6, LE 4, WA 13, WP 20, OA 6, OP 12, OH 17; pronotum: L 11, W 21; tegmen 12-56. Measurements from a female; Odenton, Maryland, on hickory, August 14, 1918, W. L. McAtee (W. L. M.). One other specimen examined, a female, Anacostia, District of Columbia, July 22, 1913, (W. D. Appel), [W. L. M.].

Erythroneura tecta new species

A very distinctly marked species, larger than most of the genus, with bluntly rounded vertex (fig. 6), swollen face, pronotum decidedly arcuate posteriorly, clavus distinctly roof-shaped, the part within claval (second anal) vein lying horizontally, when tegmina are closed, and that without sloping sharply; fourth apical cell angulate (fig. 9); ventral plate of female arcuate laterally, much produced medianly, this process more or less split longitudinally.

Key to the Color Varieties

A. Averaging larger (2.9 to 3.46 mm.); pronotum and scutellum chiefly yellow; tegmina usually with considerable red markings.

var. **tecta** new variety, p. 289.

AA. Averaging smaller (2.64 to 2.97 mm.); pronotum and scutellum chiefly dusky; tegmina with few or no red markings.

var. **carbonata** new variety, p. 289.

Erythroneura tecta var. **tecta** new variety

Ground color of scutellum and anterior parts pale yellow; vertex with two round dusky spots on disc which are more or less connected with each other, with inner side of orbits, and with posterior margin by arcuate reddish markings; pronotum with an angulate brown vitta, sometimes broken up into dusky spots on each side, and two discal spots sometimes concealed by reddish markings, which when fully developed form a U based on posterior margin; scutellum with basal triangles black, margins and apex reddish; tegmina whitish hyaline (dorsal pale areas more or less opaque); clavus is perhaps best described by saying it is red, sometimes brownish, except the whitish hyaline extreme base, a large more opaque whitish or pale yellow area near scutellum and entirely within claval (second anal) vein a smaller whitish area overlapping apex of last but entirely outside claval vein, and a small transverse whitish band just before apex; corium more or less bluish or dusky between veins, the veins often reddish; two whitish areas bounded by red between third sector and claval suture, costal plaque pale yellow, more or less overlaid by opaque white, bounded at both ends by dusky clouds, costa hyaline posteriorly, interrupted by red cross-vein; apical cells fumose with a darker area at base of fourth cell and another at apex of wing, common to second and third cells, often forming an oblique vitta. Face pale yellowish a dark spot on base of clypeus, two others above just within antennal bases, lower surface of vertex marked by a few reddish lines; legs pinkish livid; body slaty, or with pale yellowish edgings.

Length, 3.39 mm.; vertex: LM 8, LE 4, WA 18, WP 24.5, OA 8, OP 13, OH 20; pronotum: L 12, W 26; tegmen 17-69.

Type—♀; Maryland, near Plummer's Island, January 25, 1914, among mullen leaves, (W. L. McAtee), [W. L. M.]. *Paratypes*—(2.9 to 3.46 mm.), both sexes from same locality, March, June, and September, and from Plummer's Island, itself, January, March April, May, October and November, (W. L. McAtee), [W. L. M.].

Erythroneura tecta var. **carbonata** new variety

A smaller, dusky form, the scutellum and pronotum especially being much darker than in the typical variety, the tegmina with much less red, the tip of clavus and margin of pale spot near base of clavus, however, sometimes red.

Length, 2.8 mm.; vertex: LM 6.5, LE 3.5, WA 14, WP 21, OA 7, OP 12, OH 16; pronotum: L 11, W 21; tegmen 14-56.

Type—♂; Plummer's Island, Maryland, Dec. 14, 1913, (W. L. McAtee), [W. L. M.]. *Paratypes*—(2.64 to 2.97 mm.), both sexes, from same locality, October, November, and from Maryland near Plummer's Island, July, August and September

Erythroneura aclys new species

Base of fourth apical cell angulate, vertex rather pointed; color pattern consisting of a broad brown to black stripe extending whole length of insect, margined by pale yellow. The dorsal stripe nearly black on scutellum and anterior parts sharply cut off from a pale yellow margin about the width of eye; on tegmina the stripe is smoky brown, greatly expanded and irregularly set off from the pale yellow costal margin, percurrent to second apical cell which is about the width of costal plaque; the latter has a slight opaque whitish coating, is margined interiorly and anteriorly by reddish, and underlaid posteriorly by blackish; there are touches of red upon apex of clavus and first cross-vein and more or less hyaline spots at extremities of apical third of clavus, on the corium nearby and in middle of fourth apical cell. The legs, pleura and face vary from flesh-color to pale yellow, and the venter is pale yellow with a median series of slaty spots, the posterior ones extending entirely across last abdominal segment and across base of genitalia; dorsum slaty.

Length, 2.64 mm.; vertex: LM 7, LE 3, WA 11, WP 17.5, OA 5, OP 10, OH 16; pronotum: L 11, W 20; tegmen 13-55.

Type—♂; Plummer's Island, Maryland, December 21, 1913, (W. L. McAtee), [W. L. M.].

Erythroneura illinoiensis Gillette

Typhlocyba illinoiensis. Gillette, C. P. Am. Typhlocybinae, 1898, pp. 758 to 759. [Illinois, Mississippi, Michigan.]

This species is recognizable by the narrow fourth apical cell, distinctly angulate at base (fig. 10), and the color pattern of chiefly discrete spots, three large round ones of which are on the median line of vertex, pronotum and scutellum, and a large black one on corium is usually ocellate with yellow or red. The latter spot, not ocellate, is the best mark for recognition of the pale variety of *illinoiensis*. The known range of the species extends from New York and Michigan to Kansas, Mississippi and North Carolina.

Key to the Color Varieties

- A. Tegmina practically without color markings other than the three black dots on each. var. **spectra** new variety, p. 292.

AA. Tegmina with other markings.

B. Tegminal color markings chiefly red. . . var. **illinoiensis** Gillette, p. 292.

BB. Tegminal color markings chiefly yellow.

var. **illinoiensis** Gillette, yellow form, p. 291.

Erythroneura illinoiensis var. **illinoiensis** Gillette

Since the red-spotted form of *illinoiensis* was evidently considered typical by Gillette (vide loc. cit.), the name *illinoiensis* as a varietal term is hereby restricted to that form.

General color pale yellow, the scutellum and parts anterior often being ivory color to livid, with flecks or streaks of pale yellow; vertex, pronotum and scutellum each with a large round spot of bright red, discal in the first two parts of body and apical on last; clavus with a spot near base and apex and a streak along inner side; corium with basal spot, streak along costa, on first cross-vein and on second and third sectors, the last three spots in a step-like series, the inner spot farthest cephalad, red; large black spot on corium ocellate with orange-red (in some specimens the colors appear as if they had "run" from the spots, giving a diffusely streaked appearance); apical cells yellowish fumose; underside pale yellow except face which sometimes is rather livid; legs stramineous except for dark claws.

Length, 2.8 mm.; vertex: LM 7, LE 4, WA 10, WP 17, OA 5, OP 8, OH 14; pronotum: L 10, W 19; tegmen 13-57. The supposed type specimen being in poor condition description and measurements are taken from a female specimen, collected at Plummer's Island, Maryland Dec. 14, 1913, (W. L. McAtee).

Gillette undoubtedly intended Illinois to be the type locality of the species he named for that state, although he does not specifically say so. The type is recorded simply as No. 3446 U. S. N. M. There is no specimen from Illinois in the National Collection, but there are four specimens bearing type number 3446. Three of these are from the lot without locality, but labelled "On Vogelleim grape," mentioned by Gillette, but these belong to the two forms hereafter described. The remaining specimen bearing the type label is of the typical variety; it was collected at Agricultural College, Mississippi, Oct. 27, 1894, by H. E. Weed. It must therefore be regarded as the type of *illinoiensis*, unless an Illinois specimen with better credentials be discovered.

Other specimens (2.7 to 2.9 mm.) of the typical variety examined were collected at Washington and Anacostia, District of Columbia; Plummer's Island, and Beltsville, Maryland; Maywood, Virginia, and Oxford, Indiana.

Erythroneura illinoiensis var. **illinoiensis**, yellow form

Like the typical variety, except that the color markings on tegmina are chiefly or entirely yellow instead of red; sometimes the dots on scutellum, pronotum and vertex also are in part yellow.

Length, 2.8 mm.; vertex: LM 7.5, LE 3.5, WA 12, WP 18, OA 6, OP 9, OH 15, pronotum: L 11, W 18.5; tegmen 13-60. Measurements from a female; Riley, County, Kansas, July (Marlatt), [U. S. N. M.].

Paratypes, with same data, and from District of Columbia also without locality, but annotation "On Vogelleim Grape," Sept. 12, 1873 (part of original type material), [U. S. N. M.], and from Plummer's Island, Maryland and Maywood, Virginia, (W. L. M.).

Erythroneura illinoiensis var. **spectra** new variety

Red or yellow coloration nearly or entirely lacking, the body being pale yellow and the wings and tegmina hyaline, the latter with the characteristic black spots.

Length, 2.8 mm.; vertex: LM 6, LE 3, WA 11, WP 17, OA 5, OP 9, OH 14; pronotum: L 9, W 17; tegmen 12-59.

Type—♂; Anacostia, District of Columbia, April 30, 1913, (W. D. Appel), [W. L. M.]. *Paratypes*—Plummer's Island, Maryland and Scott's Run to Balls Hill, Virginia (W. L. M.) and without locality, but annotation "On Vogelleim Grape," Sept. 12, 1873, [U. S. N. M.]

Erythroneura morgani De Long

Typhlocyba morgani, De Long, D. W. Jassoidea of Tennessee., Bull. 17, Tenn. State Bd. Ent., June, 1916, p. 104. [Clarksville, Tenn.].

Ground color of scutellum and anterior parts pale yellow, of tegmina whitish hyaline. In five specimens examined the eyes are of three different colors, greenish, livid and black; vertex with an anterior series of three spots, varying from translucent ground color to red, and a posterior series of four, the outer ones of the latter series connected with the inner pair and the latter to hind margin of vertex; pronotum with an anterior series and a discal pair of spots more translucent than ground color, posterior half of pronotum occupied by a brown to black band the forward edge of which is deeply emarginate medianly, and extended in a pair of curved finger-like markings behind eyes; scutellum with two brown to black spots within basal triangles and sometimes a smaller one in middle of base; tegmina with the following yellow to red markings: three on clavus of which the upper two may be united, two dots on corium of which one is basal, and one on front edge of costal plaque, a streak along third sector, and sometimes the first cross-vein and adjacent costal margin; a broad brown band in front of cross-veins, darkest, sometimes black, at base of fourth apical cell and at posterior edge of costal plaque. Underside stramineous to ivory color.

Length, 2.97 mm.; vertex: LM 6, LE 4, WA 13, WP 21, OA 6, OP 13, OH 18; pronotum: L 12, W 22; tegmen 15-61. Measurements from a female from Plummer's Island, Maryland, (W. L. McAtee).

Key to the Color Varieties.

- A. Tegminal spots yellow..... var. **morgani** De Long, p. 292.
 AA. Tegminal spots red..... var. **morgani** De Long, red form, p. 292.

Mr. De Long has kindly sent me for examination, two specimens from the type collection, obtained by him on sycamore, at Clarksville, Tennessee, July 22, 1915. There is a similar yellow-spotted specimen in the National Collection, labelled Glen Echo, Maryland, 10.5. The species has been recorded also from Ohio. The red-spotted form I have collected, at Plummer's Island, Maryland, October 26 and December 14, 1913.

Erythroneura hartii Gillette

Typhlocyba harti. Gillette, C. P. Am. Typhlocybinae, 1898, p. 754. [Illinois.]

Ground color of scutellum and anterior parts ivory-white to pale yellow, of tegmina whitish hyaline to ivory-white; three spots on transition from vertex to front, and four on vertex between eyes, of which the central pair may be connected with lateral spots and with posterior margin of vertex, translucent to red; pronotum with a series of three large spots across middle and four small ones near anterior margin, sometimes connected into simple lateral and U-shaped median vittae, translucent to red; scutellum with basal triangles and sometimes apex similarly colored; tegmen bright red to cross-veins, a narrow irregular costal margin, and a nearly semi-circular spot in middle of clavus and adjacent corium of ground color (whitish hyaline to ivory-white), apical cells yellow fumose, costal plaque (when developed) chalky white, a dark spot at posterior edge of costal plaque and another within base of fourth apical cell. Face more or less marked with yellowish to red or plain stramineous to livid; legs and venter stramineous to pale yellow.

Length, 2.64 mm.; vertex: LM 6.5, LE 3.5, WA 11, WP 17.5, OA 6.5, OP 10.5, OH 15; pronotum: L 10.5, W 20; tegmen 13-53. Measurements taken from a specimen, sex unknown, abdomen missing, collected on Plummer's Island, Maryland, Dec. 14, 1913, (W. L. McAtee), [W. L. M.].

Other specimens examined are from the same locality and from Washington, District of Columbia; Mount Vernon and Vienna, Virginia, and Oxford, Indiana (W. L. M.). The species has been recorded also from Pennsylvania.

Erythroneura scutelleris Gillette

Typhlocyba comes var. *scutelleris*. Gillette, C. P. Am. Typhlocybinae, 1898, p. 764. [Type No. 3449, U. S. N. M., which is labelled "Kans. 2047."]

Because most of the specimens I have examined have the fourth apical cell distinctly angulate instead of merely oblique, and because I have seen no intergrades in the matter of scutellar coloration, I am separating *scutelleris* as a species distinct from *E. maculata*, to which it is similar in general coloration. The typical variety has the color markings red; there is also a yellow-spotted form. The known range of *E. scutelleris* extends from Maryland and Virginia to Ohio, Tennessee and Kansas.

Erythroneura scutelleris Gillette, red form

Bibliographical reference same as for the species.

Vertex pale yellow with a red marking connecting two discal spots with front and hind margins and inner borders of eyes, or traces of such markings; pronotum pale yellow anteriorly with obscure reddish markings; scutellum and posterior half, sometimes all, of pronotum and parts of head smoky to black; tegmina whitish to yellowish hyaline, marked with irregular red spots, of which three are on clavus (the upper two tending to fuse), and those on corium tend to be arranged in two oblique series; a ramose red line on cross-veins.

Length, 2.73 mm.; vertex: LM 5.5, LE 3, WA 10.5, WP 17.5, OA 4.5, OP 10, OH 14; pronotum: L 10, W 19; tegmen 12-59.

Other specimens than the type examined (2.3 to 2.77 mm.) were collected at Plummer's Island, Maryland, and Maywood, Alexandria County, Virginia, (W. L. McAtee), [W. L. M.].

Erythroneura scutelleris Gillette, yellow form

Like the preceding except that the color markings are orange-yellow.

Length, 2.77 mm.; vertex: LM 6, LE 3, WA 10.5, WP 18, OA 5, OP 9.5, OH 14; pronotum: L 9, W 19; tegmina 14-59. Measurements from a male, collected two miles west of St. Louis, Missouri, April 25, 1904, (W. V. Warner) [U. S. N. M.], the only specimen seen.

Erythroneura basilaris Say

T.[ettigonia] basilaris. Say, Thomas. Desc. new Hem. Ins., Journ. Ac. Nat. Sci. Phila. iv, 1825, p. 345. Compl. Writings, II, 1859, p. 260. [Missouri.].

Typhlocyba comes variety *basilaris*. Gillette, C. P. Am. Typhlocybinae, 1898, p. 760.

I have discovered no intergrades between *basilaris* and other forms of *Erythroneura*, so treat it as a species. It differs structurally from *E. comes* Say in having the inner (fourth) cross-vein

distinctly oblique. The known range of the species extends from New York and Wisconsin to Virginia, Tennessee and Kansas.

Key to the Color Varieties

- A. Color markings, in part, red to sanguineous.
 - B. Basal tegminal band sanguineous to dusky.
 - C. Other markings chiefly red. var. **basilaris** Say, p. 295.
 - CC. Other markings chiefly yellow.
 - var. **basilaris** Say, yellow form, p. 295.
 - BB. Basal tegminal band pinkish, other markings chiefly yellow.
 - var. **dulcis** new variety, p. 296.
- AA. All color markings yellow. var. **affinis** Fitch, p. 296.

Erythroneura basilaris var. **basilaris** Say

Ground color of body pale yellow, of tegmina whitish hyaline. Vertex marked with reddish to livid, often leaving only two pairs of small spots near eyes and a larger median one of ground color exposed; pronotum slaty behind, a triangular red patch on each side and a U-shaped marking in middle more or less connected with four smaller reddish markings along anterior margin; scutellum, either partly or entirely sanguineous to dusky; basal third (about to middle of but not involving costal plaque) of tegmen of same color, relieved by more translucent spots near humerus, inner apical angle, and an irregular transverse one on corium midway between costal plaque and humeral spot; paler red markings on tegmen as follows: spot near tip of clavus, near this on corium, an inverted V-shaped marking with inner ramus much longer (sometimes broken up into spots), first and second cross-veins and faint-costal edging; apical cells yellowish fumose caudally, a black spot at base of the fourth cell. Face and legs more or less tinged with yellowish to reddish.

Length, 1.83 mm.; vertex: LM 6, LE 4, WA 13, WP 19.5, OA 7, OP 11.5, OH 16; pronotum L 11, W 21; tegmen 13-58. Measurements taken from a male, collected at Plummer's Island, Maryland, Dec. 14, 1913, (W. L. McAtee).

Other specimens examined came from Plummer's Island, Maryland; Maywood, Virginia; Oxford, Indiana; Iowa City, Iowa; Manhattan and Onaga, Kansas, and Clarksville, Tennessee.

Erythroneura basilaris var. **basilaris** Say, yellow form

Like the preceding except that the red markings on head, pronotum, and tegmina are replaced by pale yellow; markings on head and anterior part of pronotum sometimes livid.

Length, 2.7 mm.; vertex: LM 5, LE 3, WA 12, WP 19, OA 5.5, OP 11, OH 16; pronotum: L 9.5, W 20; tegmen 14-56. Measurements from a female; Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee), [W. L. M.].

Other specimens seen were from the same locality as the measured specimens, March 14, 1915, (W. L. M.); Piney Branch, District of Columbia Sept. 12, 1914, (W. L. M.); Iowa City, Iowa, (L. L. Buchanan), [W. L. M.]; Forest Glen, Maryland, July 24, 1916, Aug. 10, (Otto Heidemann); two specimens without data, [U. S. N. M.].

Erythroneura basilaris var. **dulcis** new variety

Tegminal band pinkish, tegminal spots yellow, markings on scutellum and anterior parts translucent to livid.

Length, 2.64 mm.; vertex: LM 6, LE 3, WA 11, WP 18, OA 5.5, OP 10, OH 14.5; pronotum: L 9.5, W 19; tegmen 13-55.

Type—♀; Plummer's Island, Maryland, March 18, 1917, (W. L. McAtee), [W. L. M.].

Erythroneura basilaris var. **affinis** Fitch

E. [erythroneura] affinis. Fitch, Asa. Cat. State Cabinet, N. Y., 1851, p. 63. Lintner, Reprint, 1893, p. 403. [New York.]

Tegminal band yellowish brown, other color markings yellow, those on anterior part of pronotum and on vertex sometimes obsolete.

Length, 2.77 mm.; vertex: LM 7, LE 3.5, WA 12.5, WP 20, OA 6, OP 10, OH 20; pronotum: L 10, W 20; tegmen 13-57. Measurements from a female, one of three specimens, from Manhattan, Kansas, April 26, 1877, on wild gooseberry, A. N. Godfrey, [U. S. N. M.].

Erythroneura maculata Gillette

Typhlocyba comes var. *maculata*. Gillette, C. P. Am Typhlocybinae, 1898, p. 764. [Type No. 3448, U. S. N. M., which was collected at Onaga, Kansas.].

This species, which in numerous specimens may agree almost exactly in color with examples of *E. comes* Say, is distinguished by the greater obliquity of the fourth cross-vein (fig. 11) and lack of a black dot or cloud in apex of second apical cell. Occasional puzzling individuals may be found, but in general the distinction is clear and the species easily recognized. The known range extends from Maryland and Wisconsin to Virginia, Georgia, Texas and Kansas.

Specimens of *maculata* occur with the color markings paler anteriorly, with part of the markings yellow and part red, and sometimes even with one tegmen red-marked, the other yellow. It has not, therefore, seemed advisable to recognize such variants by name. A form in this category, however, has been named,

viz. *T. comes* var *apicalis* De Long⁸. It has the markings on clavus and on corium anterior to costal plaque sulphur yellow, and from costal plaque to cross-veins and sometimes streaks on apical veins orange-red; scutellum and parts anterior pale yellow, with translucent to sulphur-yellow markings. Through the kindness of Mr. De Long I have examined two specimens from the type lot collected by him at Covington, Tennessee, June 18, 1915; the form pertains to *maculata* rather than *comes*.

Key to the Color Varieties

- A. Color markings present.
 - B. Clavus with a conspicuous red patch or band sometimes extending over adjacent parts of corium.
 - C. Anterior two-thirds of clavus red.
 - D. No more than a trace of red on corium adjacent to claval marking.
 - E. Subsidiary tegminal markings red.
 - var. **bella** new variety, p. 300.
 - EE. Subsidiary tegminal markings yellow.
 - var. **bella** new variety, yellow form, p. 300.
 - DD. A band of red across corium from claval marking.
 - var. **osborni** De Long, p. 300.
 - CC. Claval marking otherwise.
 - D. Middle of clavus with a red band, which sometimes is extended more or less continuously across corium.
 - E. Subsidiary tegminal markings red.
 - var. **era** new variety, p. 299.
 - EE. Subsidiary tegminal markings yellow.
 - var. **era** new variety, yellow form, p. 300.
 - DD. Posterior third of clavus occupied by a red spot.
 - var. **accola** new variety, p. 299.
 - BB. Clavus not so marked.
 - C. Vertex and pronotum chiefly red. . var. **ardens** new variety, p. 299.
 - CC. Vertex and pronotum with only the usual color markings.
 - D. Tegminal markings red to sanguineous
 - var. **maculata** Gillette, p. 298.
 - DD. Tegminal markings orange to greenish yellow.
 - var. **maculata** Gillette, yellow form, p. 298.
 - AA. Color markings nearly or entirely lacking.
 - B. With a dark spot in basal angle of fourth apical cell, and a smaller one just within posterior border of costal plaque.
 - var. **bigemina** new variety, p. 300.
 - BB. With only the former spot present.
 - var. **gemina** new variety, p. 301.

⁸Leafhoppers of Tennessee, Bull. 17, Tenn. State Bd. Ent., 1916, pp. 108 to 109.

Erythroneura maculata var. **maculata** Gillette

Bibliographic reference same as for the species.

Description of Type.—Ground color of scutellum and anterior parts ivory, of tegmina yellowish hyaline: with the following scarlet markings; median vitta on vertex, discal and two lateral large spots, besides two faint ones near anterior margin, on pronotum, basal angles and apex of scutellum, three well-separated spots on clavus, a spot at base of corium, an oblique streak over front of costal plaque, spot between latter and clavus, three streaks along sectors just posterior to costal plaque, and a line on cross-veins extending slightly also on adjacent parts of sectors and apical veins; apical cells yellowish fumose, a dark dot in base of fourth. Undersurface and legs stramineous to yellowish.

Length, 2.64 mm.; vertex: LM 7, LE 3.5, WA 10.5, WP 16.5, OA 5.5, OP 9, OH 15: pronotum: L 9.5, W 13: tegmen 13–54. (Type, a male.)

There is considerable variation in the details of coloration of this form, some specimens having the markings more broken up into spots, but most of them showing a tendency for the markings to become larger and fuse, this being especially true of the spots on clavus, vertex and pronotum. Markings of the last two divisions of the body frequently approximate the normal type for leaf-hoppers of this group, namely three spots across rondure of vertex, four between eyes, the central pair large and often fusing with spots nearest them or extending to posterior margin of vertex; for the pronotum, four spots near anterior margin, the outer often forming lateral vittae, and a discal pair, frequently uniting with each other and with median pair of anterior spots. In highly colored specimens the face, pleura and legs may be more or less tinged or spotted with red. About half of the specimens have the upper two spots on clavus fused, this condition usually being accompanied by heavier coloring elsewhere.

Specimens (2.64 to 3.03 mm.) other than the type examined were collected at Plummer's Island, Hyattsville, Beltsville, and Laurel, Maryland; Washington, and Anacostia, District of Columbia; Dead Run, Fairfax County, and Maywood, Alexandria County, Virginia; Oxford, Indiana, and Iowa City, Iowa, [W. L. M.]; Washington, District of Columbia; Clarksville, Tennessee; St. Louis, Missouri, and Onaga, Kansas, [U. S. N. M.].

Erythroneura maculata var. **maculata** Gillette, yellow form

Like the preceding except that the color markings are of varying shades of (greenish to orange) yellow instead of red. This being a generally paler form the markings of scutellum and anterior parts often are merely translucent ground color.

Length, 3.03 mm.; vertex: LM 7, LE 4, WA 12.5, WP 20.5, OA 6.5, OP 10.5, OH 16; pronotum: L 12, W 22; tegmen 13-60. Measurements from a female; Washington, District of Columbia, June 15, 1913, (W. L. McAtee), [W. L. M.].

Other specimens (2.47 to 2.97 mm.) were collected at Plummer's Island, Odenton, Beltsville, and Forest Glen, Maryland; Washington, Binning and Anacostia, District of Columbia; Great Falls, Scotts Run, Dead Run, Falls Church and Mount Vernon, Virginia, and Oxford, Indiana, [W. L. M.]; Baltimore, and Glen Echo, Maryland; Washington, District of Columbia; Augusta, Georgia; Dallas and Tyler, Texas, and St. Louis, Missouri, [U. S. N. M.].

Erythroneura maculata var. **ardens** new variety

A highly colored form with vertex and pronotum chiefly red, tegminal markings heavier, the upper two on clavus fused, and face, pleura, legs and genitalia tinged with red. The posterior part of pronotum and the scutellum are dusker than usual, the latter with margin, and three vittae, the median interrupted, darker, and apex dark red.

Length, 2.64 mm.; vertex: LM 5.5, LE 3, WA 11, WP 17, OA 6, OP 9.5, OH 14; pronotum: L 10, W 18.5; tegmen 13-57.

Type—♂; Plummer's Island, Maryland, March 28, 1915, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **accola** new variety

Like variety *maculata*, red form except that posterior third of clavus is occupied by a solid red patch of deeper red color than the other tegminal markings.

Length, 2.83 mm.; vertex: LM 5.5, LE 3.5, WA 10, WP 17.5, OA 6.5, OP 10.5, OH 15; pronotum: L 11, W 20; tegmen 13-60.

Type—♂; Plummer's Island, Maryland, Dec. 21, 1913, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **era** new variety

Middle of clavus has a distinct red band, which is extended more or less continuously across corium to front of costal plaque; subsidiary tegminal markings red.

Length, 2.64 mm.; vertex: LM 6.5, LE 4, WA 10, WP 18, OA 5, OP 9, OH 15; pronotum: L 10, W 19; tegmen 12-53. (Measurements from a paratype.)

Type—♂; (2.9 mm.), Maywood, Alexandria County, Virginia, February 20, 1916, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.64 to 2.9 mm.) from same locality, January 2, 1916, [W. L. M.].

Erythroneura maculata var. **era**, yellow form

Like the preceding except that the subsidiary markings are yellow.

Length, 2.77 mm.; vertex: LM 6.5, LE 3.5, WA 12, WP 19, OA 6, OP 11, OH 15; pronotum: L 10, W 19; tegmen 14-56. (Measurements from a paratype.)

Type—♂; Stubblefield Fall, Fairfax County, Virginia, July 4, 1918, on hickory, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.8 mm.); Four-mile Run, Virginia, September 27, 1914, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **bella** new variety

Like the red form of var. *maculata* except that the anterior two-thirds of the clavus and sometimes a spot on adjoining corium is red.

Length, 2.9 mm.; vertex: LM 6.5, LE 3, WA 11, WP 18.5, OA 5.5, OP 10, OH 15; pronotum: L 11, W 20; tegmen 13-59.

Type—♀; Plummer's Island, Maryland, Dec. 21, 1913, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.83 mm.); same locality, Oct. 10, 1906, (A. K. Fisher) and October 26, 1913, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **bella**, yellow form

Like the yellow form of variety *maculata* except that the anterior two-thirds of the clavus, and sometimes a small spot on adjoining corium, is red.

Length, 2.76 mm.; vertex: LM 7, LE 3.5, WA 11.5, WP 18.5, OA 6, OP 10, OH 15; pronotum: L 10, W 20; tegmen 14-60. Measurements from a female; Plummer's Island, Maryland, Sept. 13, 1914, (W. L. McAtee), [W. L. M.]. Other specimens (2.9 mm.) were collected at the same locality, July 27, September 13, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **osborni** De Long

Typhocyba osborni. De Long, D. M. Jassoidea of Tennessee. Bull. 17, Tenn. State Bd. Ent., June, 1916, pp. 103 to 104. [Clarksville, Tennessee.]

Like the yellow form of variety *maculata* except that the basal third of tegmina (including basal two-thirds of clavi) is red.

Length, 2.9 mm.; vertex: LM 5.5, LE 3, WA 10.5, WP 17, OA 4.5, OP 10, OH 14; pronotum: L 9.5, W 18; tegmen 12-53. Measurements from a female; Oxford, Indiana, Nov. 1, 1914, (W. L. McAtee), [W. L. M.].

Through the kindness of Mr. D. M. DeLong, I have been permitted to examine specimens from the type lot, collected by Mr. DeLong at Clarksville, Tennessee, July 22 and 25, 1915.

Erythroneura maculata var. **bigemina** new variety

Scutellum and parts anterior pale yellowish; tegmina whitish hyaline, black dots on costal plaques and in bases of fourth apical cells.

Length, 2.7 mm.; vertex: LM 6, LE 3, WA 11, WP 16, OA 6, OP 9, OH 13; pronotum: L 9, W 18; tegmen 11-57.

Type—♀; Plummer's Island, Maryland, August 20, 1914, (W. L. McAtee), [W. L. M.]. *Paratypes* include specimens from the same locality as the type, dates from July 5 to September 14; Odenton, Maryland, July 29, 1917, on hickory; Beltsville, Maryland, June 9, 1915, Sept. 3, 1916; Dunn-Loring, Virginia, Aug. 30, 1916; Scott's Run to Balls Hill, Virginia, Aug. 12, 1917, (W. L. McAtee), [W. L. M.].

Erythroneura maculata var. **gemina** new variety

Whitish to pale yellowish, with only the dark spots in bases of fourth apical cells present.

Length, 2.68 mm.; vertex: LM 6, LE 3, WA 11, WP 17.5, OA 6, OP 10, OH 15; pronotum: L 10, W 19; tegmen 13-56.

Type—♀; Virginia opposite Washington, District of Columbia, June 15, 1902, [U. S. N. M.]. *Allotype*—♂; Scott's Run, Virginia, July 4, 1918, (W. L. McAtee), [W. L. M.]; this specimen is not in condition for measurement.

Erythroneura ligata new species

A species easily distinguished in its venational group by the broad zigzag scarlet vittae on tegmina, which enclose two pale saddle-spots, a smaller one on inner anterior portions of clavi and a larger one, embracing apical third of clavi and adjacent parts of corium. For further description, designation of type, etc., see account of typical variety.

Key to the Color Varieties

A. Head and pronotum with faint yellow markings, tip of clavus unmarked.

var. **ligata** new variety, p. 301.

AA. Head and pronotum with red markings, tip of clavus with a red spot.

var. **allecta** new variety, p. 302.

Erythroneura ligata var. **ligata** new variety

Ground color of scutellum and anterior parts ivory white, of tegmina whitish hyaline. Vertex with translucent to yellow spots, arranged as in *E. hartii*, three on transition from vertex to front, and four between eyes, of which the central pair are larger and may be connected with lateral spots or with posterior margin of vertex. Pronotum with two broad lateral, and two narrower discal vittae, which may be broken into smaller anterior and larger posterior spots, translucent to yellow. Scutellum with yellow basal triangles outlined by scarlet, apex yellow. Tegmina with broad zigzag scarlet vittae,

which enclose two pale saddle-spots, a smaller on inner anterior portions of clavi and a larger embracing posterior third of clavi and adjacent parts of corium; the anterior part of each vitta is confined to clavus, and the posterior part, after angling laterally to costal plaque returns to radial margin and ends abruptly at the cross-veins, a lateral prolongation following them to costal margin; a faint yellow dot at base of corium, usually an oblique yellow streak on anterior margin of costal plaque, plaque itself whitish, a black or bluish dot at its posterior margin, a dusky cloud in base of fourth apical cell, apical cells in general slightly fumose. Undersurface stramineous to yellowish.

Length, 2.9 mm.; vertex: LM 4, LE 6, WA 12, WP 21, OA 6, OP 11, OH 17; pronotum: L 12, W 22; tegmen 15-59.

Type—♂; Washington, District of Columbia, July, 1907, (Wm. Palmer), [U. S. N. M.]. *Paratypes*, same locality, May 28th, July 19th, (Wm. Palmer), (Otto Heidemann), [U. S. N. M.].

***Erythroneura ligata* var. *allecta* new variety**

Like typical variety except that yellow markings of pronotum, vertex and costal margin are replaced by red; apex of scutellum and a spot near tip of clavus also red; touches of red on pleura and face in some specimens.

Length, 3.03 mm.; vertex: LM 6.5, LE 3.5, WA 14, WP 21.5, OA 7, OP 12, OH 17.5; pronotum: L 12, W 22; tegmen 15-60.

Type—♂; Washington, District of Columbia, July 19, [U. S. N. M.]. *Paratypes*—♂; labelled "Peab.", Uhler Collection, [U. S. N. M.].

***Erythroneura infuscata* Gillette**

Typhocyba comes var. *infuscata*. Gillette, C. P. Am. Typhlocybinae, 1898, p. 764. [Type No. 3451, U. S. N. M., which is labelled "Agricultural College, Mississippi."].

Almost entirely smoky to black, and the only species so colored that is known in its group, namely those with the third sector and fourth apical vein practically continuous and the third and fourth cross-veins in a line almost at right angles to radial margin.

Smoky brown to black above, in some cases underlaid by deep dull red, a little paler at rondure of vertex, especially on sides, pronotum sometimes faintly paler on disc, and scutellum sometimes with a pale median vitta; tegmina with more or less hyaline spots at base, middle and apex of inner margin of clavus, middle of radial margin of fourth apical cell and on costal margin of second apical cell; costal plaque opaque whitish, tinged with red, an almost equal area of dull red just posterior, and costal margin and to some extent the cross-veins pencilled with dull red. Face and legs pale yellow more or less tinged or marked with red, remainder of under surface slaty, abdominal incisures, etc., sometimes pale yellow.

Length, 2.64 mm.; vertex: LM 7, LE 3, WA 11, WP 16.5, OA 5, OP 10, OH 14; pronotum: L 10, W 19; tegmen 14-54. (Type, a female.).

Other specimens examined include: a female from Onaga, Kansas, (F. F. Crevecoeur), [this is labelled Type No. 3440, U. S. N. M. and was part of the type material of *Eupteryx flavoscuta* Gillette]; a male from Plummer's Island, Maryland, March 24, 1907, (W. L. McAtee), [W. L. M.]. The species has been recorded also from Tennessee.

Erythroneura vitis Harris

Tettigonia vitis. Harris T. W. Encyclopedia Americana, VIII, 1831, p. 43.

It may be well to reproduce the brief original description of this species, as the obsolete work in which it was published is not everywhere available. The description of insect follows:

"It may be called *tettigonia vitis* (Harris). It is, in its perfect state, nearly one tenth of an inch long; of a straw color, with two broad, scarlet bands across the wing cases, one at the base and the other on the middle, and the tips of the wing cases are blackish."

No locality is mentioned, but Harris no doubt became acquainted with the insect in Massachusetts, which state is here designated as the type locality. In the first edition of a Report on the Insects of New England Injurious to Vegetation (1841, p. 184), Harris slightly amplifies the description of this insect. However, the original description is sufficient for identification as the species is the only one of its size (which alone places it in the *Eupterygidae*) that has a red band across the bases of the tegmina. Gillette⁸ places *vitis* Harris as a variety of *comes* Say, but to the writer these forms do not appear to intergrade.

The known range of *E. vitis* extends from Maine, Quebec and Wisconsin to the District of Columbia, Mississippi, Kansas and Colorado.

Key to the Color Varieties

- A. Anterior cross-band extending beyond apex of scutellum at least along costal margin; middle cross-band usually broader, extending to or beyond apex of clavus.
- B. Middle cross-band or saddle-spot bounded by nearly or quite uninterrupted pale bands, like parentheses placed longitudinally on the insect. var. **vitis** Harris, p. 304.
- BB. Pale areas bounding middle cross-band interrupted or replaced by red markings.

⁸Am. Typhlocybinae, 1898, pp. 760 to 761.

C. Cross-band bounded by a wreath of pale spots, about three on each tegmen anteriorly and four posteriorly

var. **corona** new variety, p. 304.

CC. Cross-band bounded anteriorly by a more or less interrupted pale area, sometimes reduced to a single spot on clavus, and posteriorly broadly joined to red markings on cross-veins, leaving a pale area only at and adjacent to apex of clavus; the tegmen therefore chiefly red, sometimes with only two pale areas at base and apex of clavus, which latter the middle cross-band usually does not reach.

var. **bistrata** new variety, p. 305.

AA. Anterior cross-band not extending beyond apex of scutellum, middle cross-band narrower, not reaching apex of clavus.

B. Pronotum and scutellum chiefly red to dusky.

var. **stricta** new variety, p. 305.

BB. Pronotum and scutellum, and sometimes anterior cross-band chiefly yellow..... var. **stricta** new variety, yellow form, p. 306.

Erythroneura vitis var. **vitis** Harris

Bibliographical references same as for species.

Vertex yellowish with two parallel orange-reddish vittae, broader and deeper colored behind, sometimes almost wholly red; pronotum scarlet with a short median vitta in front, extreme anterior margin, and obsolete discal parentheses, pale yellow; scutellum chiefly scarlet, basal triangles and basal median vitta sometimes pale; tegmen with three cross-bands, the anterior scarlet extending well beyond apex of scutellum, the median scarlet (often paler red to dusky within), broad, from middle to near tip of clavus; those on the two tegmina together forming a large roundish saddle-spot, sometimes slightly projected along the sectors or connected to anterior band or posterior ramose line at a few points, and terminating laterally at costal plaque, which is blackish posteriorly and sometimes followed by a yellowish area; third cross-band made by the blackish apical cells which are hyaline basally; a ramose red line on cross-veins and adjoining parts of longitudinal veins. Under surface and legs chiefly pale yellow; mesosternum sometimes dark and pleura touched with red.

Length, 2.77 mm.; vertex: LM 7.5, LE 4, WA 13, WP 21, OA 7, OP 13, OH 16; pronotum: L 11, W 21; tegmen 15 to 56. Measurements from a female; Washington, District of Columbia, June 24, 1914, (L. O. Jackson).

Other specimens examined were collected at Plummer's Island, Maryland; Washington, District of Columbia, and Riley County, Kansas.

Erythroneura vitis var. **corona** new variety

Similar to variety *vitis* Harris, but middle cross-band on tegmina connected by red lines along longitudinal veins to anterior cross-band and to ramose marking on cross-veins, so that the saddle mark appears to be surrounded by a wreath of pale spots.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 15, WP 21, OA 7, OP 13, OH 17; pronotum: L 12, W 21.5; tegmen 13-56.

Type—♀; Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee), [W. L. M.]. *Paratypes*, same locality as type, October, November, December; Great Falls, Maryland, May 23, and Washington, District of Columbia, October, 1895, (F. C. Pratt), July 15, and other specimens from grape, [U. S. N. M.].

***Erythroneura vitis* var. *bistrata* new variety**

This variety illustrates the extreme degree of erythrization of this species I have seen; the vertex may be pale yellow, but usually it has the normal pair of vittae strongly developed, and it may be almost entirely red; the pronotum is red with touches of pale yellow on anterior border, with a dot in middle and traces of pale yellow at about two points on the hind margin; scutellum red with a pale median vitta enlarged at apex; tegmen often entirely red with the exception of a pale spot at inner base of clavus and another involving apex of clavus and adjoining corium; there may be other traces, however, of both anterior and posterior pale bands, and the costal plaque, except for its posterior blackish marking, and an equal sized area behind it and the bases of the apical cells are pale; undersurface and legs chiefly pale yellow.

Length, 2.83 mm.; vertex: LM 7, LE 3, WA 12, WP 19, OA 6, OP 11, OH 17; pronotum: L 12, W 22; tegmen 14-59.

Type—♂; Plummer's Island, Maryland, March 28, 1915, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.64 to 2.97 mm.); from same locality as type, January, February, March, April, May, November, December; Maryland near Plummer's Island, January, and Bladensburg, Maryland, September 7, 1913, (W. L. McAtee), [W. L. M.].

***Erythroneura vitis* var. *stricta* new variety**

Ground color whitish hyaline to pale yellow; vertex chiefly pale, sometimes with a few touches of red, pronotum and scutellum chiefly red to dusky, the latter sometimes pale medianly and at tip; tegmen with three cross-bands, the anterior red, narrow, not exceeding scutellum, the middle one narrower than in the other varieties, usually nearly quadrilateral in shape; the posterior much as in last variety, pale spaces between the bands broader than in the other varieties: usually half or more of costal plaque bluish or blackish, often overlaid by opaque white; lower surface stramineous to pale yellow.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 12, WP 19, OA 7, OP 11, OH 16; pronotum: L 11, W 20; tegmen 14-56. Measurements from a male; Washington, District of Columbia, October 18, 1895, on *Cercis canadensis*, [U. S. N. M.].

Type—♀; Oxford, Indiana, November 1, 1914, (W. L. Mcsee), [W. L. M.]. *Paratypes*, with same data, as measured specimen; Iowa City, Iowa, Sept. 24, 1915, (L. L. Buchanan), [W. L. M.]; Boulder, Colorado, December 5, 8, 1887, on grape, ('C. S. Faurot); Philadelphia, Pennsylvania, July 10, 1880, on grape, (W. H. Batt), [U. S. N. M.]: same data as type; Plummer's Island, Maryland, November 30, 1913, September 13, 1914, July 14, 1915, (W. L. McAtee), [W. L. M.].

Erythroneura vitis* var. *stricta new variety, yellow form

Vertex, pronotum and scutellum chiefly yellow, the last two more or less underlaid by brownish; tegmen with three cross-bands, the anterior yellow to red, involving base of corium not beyond apex of scutellum and narrowly extended along costa, the median broad, semi-elliptical, red, duller within, terminating laterally in a blackish marking on posterior third of costal plaque; posterior cross-band formed by dusky clouds in apical cells; a branching red line on cross-veins and adjacent parts of longitudinal veins. Legs and face pale yellow; mesosternum black; body slaty with lighter edgings, varying to wholly pale yellowish.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 13.5, WP 21, OA 7, OP 12, OH 17; pronotum: L 11, W 22; tegmen 15-55.

Type—♀; labelled "Colo. 2186," [U. S. N. M.]. *Allotype*—♂; Riley County, Kansas, (Marlatt), [U. S. N. M.].

Erythroneura tricineta Fitch

E.[rythroneura] tricineta. Fitch, Asa. Cat. State Cabinet, N. Y., 1851, p. 63. Lintner Reprint, 1893, p. 403. [New York].

One of the most easily recognized species; with three distinct red or dusky cross-bands, the anterior not covering bases of tegmina; pale areas between the tegminal bands usually with longitudinal color streaks. Some of the more highly colored forms of this species, particularly those with red markings on vertex well developed, suggest affinity with *E. comes*; however, the anterior cross-band always is unlike any pronotal marking of the *comes* varieties, and the red or yellow markings on tegmina are long streaks along the veins, instead of irregular spots, often connected obliquely across tegmen as in *comes*.

The known range extends from New Hampshire Ontario and Wisconsin to North Carolina, Texas and Colorado.

Key to the Color Varieties

- A. Cross-band one (anterior) involving base of scutellum.
 - B. Cross-band one extending along sides of pronotum, leaving disc uncolored; cross-band two (middle) sanguineous to dusky, black on costa.
 - C. Longitudinal color streaks present between cross-bands.
 - D. Streaks red..... var. **calycula** new variety, p. 308.
 - DD. Streaks yellow... var. **calycula** new variety, yellow form, p. 309.
 - CC. Streaks obsolete..... var. **erasa** new variety, p. 309.
 - BB. Cross-band one covering all of pronotum except a small part of anterior margin.
 - C. Cross-bands one and two sanguineous to black.
 - D. Longitudinal color streaks yellow... var. **tricincta** Fitch, p. 307.
 - DD. Streaks red..... var. **tricincta** Fitch, red form, p. 308.
 - CC. Cross-bands one and two bright red; longitudinal color streaks yellow..... var. **diva** new variety, p. 308.
 - AA. Cross-band one not covering base of scutellum.
 - B. Cross-band one sanguineous to dusky, covering most of pronotum; cross-band two sanguineous to bright red, black on costa; cross-band three yellow-brown on apical half.
 - C. Longitudinal color streaks red... var. **integra** new variety, p. 309.
 - CC. Longitudinal color streaks yellow.
 - var. **integra** new variety, yellow form, p. 309.
 - BB. Cross-band one dusky to black, profoundly emarginate anteriorly, leaving a large part of disk of pronotum uncolored.
 - C. Cross-band continuous across hind margin of pronotum.
 - var. **cymbium** new variety, p. 310.
 - CC. Cross-band (?) broadly interrupted, covering only sides of pronotum..... var. **disjuncta** new variety, p. 310.

Erythroneura tricincta var. **tricincta** Fitch

Bibliographical reference same as for species.

In this variety the anterior cross-band covers most of pronotum, as well as base of scutellum; cross-band two is sanguineous to dusky, terminating laterally in black, and the interspaces between cross-bands are streaked or even generally suffused with sulphur yellow. There is no doubt that this is the typical variety of Fitch; the anterior cross-band is as he described it, and he speaks of the whole insect as pale yellow, which he would not have done had he the red-streaked form before him.

Length, 2.7 mm.; vertex: LM 7, LE 4, WA 15, WP 21, OA 6.5, OP 12, OH 16; pronotum: L 10, W 21; tegmen 14-53. Measurements from a female; Plummer's Island, Maryland, July 19, 1914, W. L. McAtee.

Other specimens (2.64 to 2.7 mm.) examined were from the same locality as measured individual, March, April, August, September; Dead Run, Fairfax County, Virginia, April 6, 1913; Bluemont, Virginia, July 1, 1914, (W. L. McAtee); Iowa City, Iowa, June 11, 1915, (L. L. Buchanan), [W. L. M.]; Riley County, Kansas, July, (Marlatt); Iowa, (Gillette); Central Missouri, on grapevine, July, [U. S. N. M.].

Erythroneura tricineta var. **tricineta**, red form

Like the preceding but with longitudinal color streaks red; basal half of scutellum and most of pronotum covered by the dusky anterior cross-band; cross-band two sanguineous to dusky, bluish to black on costa.

Length, 2.77 mm.; vertex: LM 7, LE 3.5, WA 12.5, WP 19, OA 6.5, OP 10, OH 14; pronotum: L 10, W 19; tegmen 13-56. Measurements from a female; Plummer's Island, Maryland, March 28, 1915, (W. L. McAtee).

Other specimens (2.64 to 2.97 mm.) examined, from the same locality as the measured individual, January, March, April, December, (W. L. M.); Onaga, Kansas, (F. F. Crevecoeur); Clarksville, Tenn., April 28, 1909, [U. S. N. M.].

Erythroneura tricineta var. **diva** new variety

Cross-bands one and two chiefly bright red; cross-band one covering most of pronotum and base of scutellum, where its color sometimes is brownish yellow instead of red; cross-band two, bright red to costal plaque which is chiefly blackish, more or less overlaid by opaque white; longitudinal color markings sulphur yellow. This is Fitch's "var. a."

Length, 2.8 mm.; vertex: LM 7, LE 4, WA 13, WP 22, OA 7, OP 12, OH 16; pronotum: L 11, W 21; tegmen 14-55.

Type—♀; Plummer's Island, Maryland, July 26, 1914, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.77 to 2.97 mm.) from same locality as type, January, September, October, December; Dyke, Virginia, May 19, 1918, (W. L. McAtee), [W. L. M.]; Riley County, Kansas, July (Marlatt); Washington, District of Columbia, May 30, 1896, [U. S. N. M.].

Erythroneura tricineta var. **calycula** new variety

Ground color ivory, a broad U-shaped dusky to black band on base of scutellum and sides of pronotum, the often concolorous eyes extending it on vertex; cross-band two sanguineous to dusky, black on costa; longitudinal color streaks red.

Length, 2.87 mm.; vertex: LM 7.5, LE 3.5, WA 13, WP 20, OA 6.5, OP 11.5, OH 16; pronotum: L 11, W 21; tegmen 13-58.

Type—♂; Plummer's Island, Maryland, December 14, 1913, (W. L. McAtee), [W. L. M.]. *Paratypes* from the same locality as type, January, March, November and December, (W. L. M.).

Erythroneura tricineta var. **calycula** new variety, yellow form

Like the preceding except that color streaks are yellow.

Length, 2.83 mm.; vertex: LM 7, LE 3.5, WA 14, WP 21, OA 6, OP 11.5, OH 14; pronotum: L 10, W 19; tegmen 13-58. Measurements from a male; Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee), [W. L. M.].

Other specimens (2.7 to 2.9 mm.) from same locality, April, August, September and December, (W. L. M.).

Erythroneura tricineta var. **erasa** new variety

The U-shaped cross-band one, involving base of scutellum and sides of pronotum and cross-band two sanguineous to dusky, black on costa, but paler than in other varieties; longitudinal color streaks nearly or entirely obsolete.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 13, WP 21, OA 6, OP 12, OH 15; pronotum: L 10, W 20.5; tegmen 13-59.

Type—♀; Plummer's Island, Maryland, July 26, 1914, (W. L. McAtee), [W. L. M.]. *Paratypes*—♀; (2.6 mm.) Maywood, Virginia, February 20, 1916, (W. L. McAtee), [W. L. M.].

Erythroneura tricineta var. **integra** new variety

Cross-band one, sanguineous to dusky, confined to pronotum, most of which it covers; cross-band two bright red to sanguineous, bluish to black on costa; longitudinal color markings red.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 12.5, WP 20.5, OA 7, OP 12, OH 15; pronotum: L 10, W 20; tegmen 13-58.

Type—♀; Plummer's Island, Maryland, March 28, 1915, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.7 to 2.97 mm.) from same locality as type, March and November.

Erythroneura tricineta var. **integra** new variety, yellow form

Like the preceding except that longitudinal color streaks are yellow.

Length, 2.8 mm.; vertex: LM 7, LE 3.5, WA 12, WP 19.5, OA 7, OP 11.5, OH 14; pronotum: L 11, W 19.5; tegmen 14-57. Measurements from a female; Plummer's Island, Maryland, July 26, 1914, (W. L. McAtee), [W. L. M.].

Other specimens (2.64 to 2.9 mm.) examined from same locality as measured individual, July, December, (W. L. M.).

Erythroneura tricineta var. **cymbium** new variety

Cross-band one, dusky to black confined to pronotum, profoundly emarginate anteriorly, leaving a large part of disk uncolored: cross-band two sanguineous to red, bluish to black on costa; longitudinal color streaks yellow.

Length, 2.73 mm.; vertex: LM 7, LE 3.5, WA 11.5, WP 18, OA 6, OP 9, OH 13.5; pronotum: L 9, W 19; tegmen 13-56.

Type—♀; Benton Harbor, Michigan, May 28, 1912, on grape, (E. H. Seigler), [U. S. N. M.]. *Paratypes* (2.7 to 2.83 mm.), same data as type; Northeast, Pennsylvania, June 6, 1912, (F. Johnson), Quaintance No. 6994; Dallas, Texas, September 12, 1907, on grape, (F. C. Bishopp), [U. S. N. M.].

Erythroneura tricineta var. **disjuncta** new variety

Like the last, but cross-band (if it may be so called) one, broadly interrupted in the middle, covering only sides of pronotum.

Length, 2.8 mm.; vertex: LM 6.5, LE 3.5, WA 10.5, WP 18, OA 6.5, OP 10, OH 14.5, pronotum: L 10, W 19; tegmen 14-57.

Type—♀; Northeast, Pennsylvania, June 6, 1912, (F. Johnson), Quaintance No. 6994, [U. S. N. M.]. *Paratype*—♀; (2.8 mm.) same place and collector as type, June 27, 1912, Quaintance No. 9015.

Erythroneura comes Say

T. [ettigonia] comes. Say, Thomas. Desc. New Hem. Ins., Journ. Ac. Nat. Sci. Phila., IV, 1825, p. 343; Compl. Writings, II, 1859, p. 259. [Missouri.]

Among species of its group, with third and fourth cross-veins in line approximately at right angles to the radial margin (fig. 12), *E. comes* is distinguished by its basic color pattern of yellow to red, irregular spots, of which three (the upper two sometimes fused) are on clavus, and those on corium tend to be arranged in three oblique series. In some of the varieties these markings tend to be greatly extended, resulting in various distinct color patterns, or to fuse into red, through sanguineous to dusky longitudinal angulate vittae. Small dusky to black dots usually are present in the base of fourth apical cell, in the apices of second and fourth apical cells, and on posterior half of costal plaque; in some varieties there are additional dark markings. The black dots or clouds in apices of second apical cells appear to be diagnostic of *comes* and to afford a means of recognizing the species in the few cases in which the fourth cross-vein is oblique, a character which, otherwise, would throw the specimen into the *maculata* group. *E. comes* ranges over the whole United States and southern Canada.

Key to the Color Varieties

- A. Upper surface with distinct color markings.
 - B. Dominant markings sanguineous to dusky angulate vittae extending from humeri to cross-veins; apex of clavus with a marking not involved in the longitudinal vittae.
 - C. Sanguineous vitta extending from humerus to costal plaque, thence to cross-veins; upper surface, from scutellum to cross-veins, occupied by a pale diamond-shaped saddle spot traversed by red streaks.
 - var. **cancellata** new variety, p. 320.
 - CC. Sanguineous to dusky vitta extending from humerus onto clavus, leaving a pale area anterior to costal plaque; dorsal saddle spot vase-shaped ornamented by red to yellow spots.
 - D. Color markings other than angulate vittae, yellow.
 - var. **ziczac** Walsh, p. 320.
 - DD. Color markings other than angulate vittae, red.
 - var. **ziczac** Walsh, red form, p. 320.
 - BB. Dominant markings otherwise, or if they are angulate vittae, they are either not sanguineous to dusky, or not unicolorous, or not continuous from humeri to cross-veins.
 - C. Dorsal surface with dark markings other than the usual spots on costal plaques and in the apical cells.
 - D. Tegminal vittae dusky, interrupted behind costal plaque by a broad transverse whitish hyaline area; pronotum and basal triangles of scutellum ruby-red, apex of scutellum narrowly margined with black. var. **venusta** new variety, p. 319.
 - DD. Tegminal vittae or spots red to yellow.
 - E. Scutellum without dark markings; spots on inner margins of clavi black.
 - F. Tegmina whitish hyaline, almost lacking color markings.
 - var. **octonotata** Walsh, p. 317.
 - FF. Tegmina with well developed color markings.
 - G. Color markings red. . var. **accepta** new variety, p. 317.
 - GG. Color markings yellow.
 - var. **accepta** new variety, yellow form, p. 318.
 - EE. Scutellum with dark markings.
 - F. Scutellum with a median vitta, or the apex black.
 - G. Scutellum with a median black vitta sometimes developed only basally; black spots on clavi; tegminal markings in the form of spots.
 - H. Color markings red. . var. **compta** new variety, p. 318.
 - HH. Color markings yellow.
 - var. **compta** new variety, yellow form, p. 318.
 - GG. Scutellum with the apex and apical part of sides black; most of clavus and a band between clavus and costal plaques red. var. **amanda** new variety, p. 319.
 - FF. Scutellum with the basal triangles black; color markings red.
 - var. **coloradoensis** Gillette, p. 318.

- CC. Dorsal surface without dark markings other than on costal plaques and in apical cells.
- D. Ground color milky white, nearly opaque.
- E. Color markings red. var. **delicata** new variety, p. 317.
- EE. Color markings yellow.
var. **delicata** new variety, yellow form, p. 317.
- DD. Ground color otherwise.
- E. Dorsal surface of abdomen chiefly dark, showing through the whitish to greenish-yellow hyaline tegmina; color markings often less contrasted, the red of a vermilion hue (jasper red).
- F. Color markings usually paler within, covering half or more of tegmina. var. **rubra** Gillette, p. 315.
- FF. Color markings not paler within, covering less than half of tegmina. var. **rubrella** new variety, p. 316.
- EE. Dorsal surface of abdomen usually pale; color markings (when red more contrasted), paler than jasper red.
- F. Tegminal markings rather attenuate and more or less interrupted.
- G. Color markings red. var. **comes** Say, p. 312.
- GG. Color markings yellow.
var. **comes** Say, yellow form, p. 313.
- FF. Tegminal markings broader and more fused.
- G. Markings narrower, interrupted by sanguineous, only at middle, if at all; a color mark on apex of clavus.
- H. Color markings red. var. **vitifex** Fitch, p. 314.
- HH. Color markings yellow.
var. **vitifex** Fitch, yellow form, p. 314.
- GG. Markings broader, pale red to sanguineous, outlined by brighter red; apex of clavus pale.
var. **elegans** new variety, p. 315.
- AA. Upper surface pale yellowish to whitish hyaline; apical cells somewhat fumose. var. **nudata** new variety, p. 316.

Erythroneura comes var. **comes** Say

T.[ettigonia] comes. Say, Thomas. Desc. New Hem. Ins., Journ. Ac. Nat. Sci., Phila., iv, 1825, p. 343; Compl. Writings. ii, 1859, p. 259. [Missouri.]

The "*comes*" type of coloration has been referred to several times in preceding pages; conception of it is based on this variety which on account of its prior description has been taken as a standard for comparative remarks. The essential features of the "*comes*" color pattern are: vertex with an inverted narrowly U-shape vitta connected to spots on inner sides of orbits, or these

markings more or less interrupted; pronotum with simple longitudinal vittae on sides and a Y-shaped vitta on disk, also often broken up into spots; scutellum with basal triangles outlined, and apex touched with color; clavus with three irregular spots, the upper two of which often are united; corium with an oblique streak near base, costal plaque margined on front and inner side by a color streak, which sends a branch toward middle of clavus, and is extended posteriorly, joining a ramose marking on cross-veins at juncture of third and fourth veins, this entire vitta often more or less interrupted. There is an oblique dark streak across posterior part of costal plaque and dark dots at base of fourth apical, and at apex of second apical cells.

It is convenient to separate specimens with narrower, often interrupted markings from those with heavier, continuous color vittae. Say's description evidently applies to the former, and Fitch's description of *vitifex* to the latter. Say refers to the color spots as sanguineous, hence the red phase must be considered typical of the variety *comes*.

Length, 2.7 mm.; vertex: LM 7, LE 3.5, WA 11.5, WP 18, OA 6, OP 10, OH 14; pronotum: L 10, W 19; tegmen 12-56. Measurements from a female; Washington, District of Columbia, October 10, 1885, (C. L. Marlatt), [U. S. N. M.].

Other specimens (2.64 to 2.83 mm.) examined were from North East Pennsylvania, May 10, 1912 (Quaintance No. 6967), May 20, 1912 (Q. No. 6975), August 24, 1912 (Q. No. 9023), (F. Johnson); Stirling, Virginia, October 9; Washington, District of Columbia, January 1879, sieved; Riley County, Kansas, July, (Marlatt), and others less definitely labelled, [U. S. N. M.]: Beltsville, Maryland, May 2, 1915, exceedingly abundant and almost all in copula, on *Rubus*; March 2, 1913, in sphagnum; Plummer's Island, Maryland, March 14, 1915; Oxford, Indiana, November 1, 1914, (W. L. McAtee), [W. L. M.].

Erythroneura comes var. **comes** Say, yellow form

Like the preceding except that color markings are yellow.

This form was abundant on *Rubus* at Beltsville, Maryland, May 2, 1915, when it was found in copula with others of its kind, and also with the red form. Other specimens (2.7 to 3.1 mm.) examined from the same locality, May 25, 1919; Plummer's Is-

land, Maryland, July 26, Oct. 4, 1914; Great Falls, Maryland, Aug. 18, 1917; Odenton, Maryland, July 20, 1917, on *Vitis*, July 10, 1918; Scott's Run to Ball's Hill, Virginia, August 12, 1917, in copula, (W. L. McAtee), [W. L. M.]. North East, Pennsylvania, May 20, 1912 (Quaintance Nos. 6974, 5), May 24, 1912 (Q. No. 6982), May 28, 1912 (Q. No. 6987), August 22, 1911 (Q. No. 6932), August 24, 1912 (Q. No. 9023), (F. Johnson); Mt. Airy, Pennsylvania, July 9, 1894; Kelly's Island, Ohio, July 18, 1911 (Q. No. 6938); Washington, District of Columbia, June 10, and others less definitely labelled, [U. S. N. M.].

***Erythroneura comes* var. *vitifex* Fitch**

Erythroneura vitifex. Fitch, Asa. Insects Infesting Fruit Trees, Trans. N. Y. Agr. Soc., xvi, 1856, pp. 392 to 393. [New York.]

Tegminal markings red, confluent into two zigzag vittae, each of which extends from humerus to middle of clavus, thence to posterior half of costal plaque thence to fourth cross-vein; these vittae enclose a heart-shaped pale spot, anteriorly, which involves inner bases of clavi and apex of scutellum, and a diamond-shaped pale spot, posteriorly, in the center of which is a red spot on the tips of the clavi. The head has a broad wedge-shaped vitta with a narrow median pale streak and the pronotum, two lateral simple vittae and a median Y-shaped one.

Length, 2.73 mm.; vertex: LM 7, LE 3:5, WA 12, WP 19, OA 6, OP 11, OH 16; pronotum: L 11, W 21; tegmen 13-56. Measurements from a male; Plummer's Island, Maryland, January 11, 1914, (W. L. McAtee).

Other specimens (2.64 to 2.73 mm.) examined were from same locality as measured individuals, March, April, July, August, October, November, December; Oxford Indiana, November 1, 1914, (W. L. McAtee), [W. L. M.]: Pawling, New York, (A. L. Marshall); Washington, District of Columbia, Oct. 10, (C. L. Marlatt), Oct. 1, 1895, July 21, 1885, at light; Taresdale, Virginia, April 26, 1886, on grape, (D. Rhind); Madison, Wisconsin, Sept. 17, 1880, (W. A. Henry); Michigan (1971); Iowa (129); Riley County, Kansas, July, (Marlatt); Wichita Falls, Texas, Feb. 17, (Quaintance No. 7793), (J. H. Stokes); Las Cruces, New Mexico, Oct. 12, on *Vitis vinifera*, (T. D. A. Cockerell), [U. S. N. M.].

***Erythroneura comes* var. *vitifex* Fitch, yellow form**

The shape and extent of the markings in variety *vitifex* are much the same as in variety *ziczac*, but the color bright red instead

of blood-brown; in the yellow variety of *ziczac* it is the subsidiary markings, not the principal vittae, that are yellow, but a yellow form of *vitifex* has been found in which all of the color markings are affected. Various intergrades between the red and yellow forms occur as those with color markings on head or even all in front of costal plaques yellow, the remainder red, or those with the anterior markings and tips of clavi yellow, the remainder red.

Length, 2.73 mm.; vertex: LM 7, LE 3.5, WA 12, WP 19.5, OA 6.5, OP 11, OH 16; pronotum: L 11, W 20.5; tegmen 14-55. Measurements from a female; Washington, District of Columbia, July 21, 1913, (W. L. McAtee).

Other specimens examined (2.64 to 2.72 mm.), Plummer's Island Maryland, Sept. 12, 1914, (W. L. McAtee), [W. L. M.].

Erythroneura comes var. **elegans** new variety

This variety differs from *vitifex* in having broader tegminal vittae, pale bluish-red to dusky within, brighter margined, which are in touch for a greater distance along the commissure (at middle of clavus); the posterior pale spot enclosed by them is less extensive and the tips of the clavi are not marked with red; the latter feature distinguishes this variety, also from var. *rubra*.

Length, 2.6 mm.; vertex: LM 6, LE 3, WA 11, WP 17.5, OA 5.5, OP 10.5, OH 15; pronotum: L 10, W 19; tegmen 12-55.

Type—♂; Plummer's Island, Maryland, Jan. 11, 1914, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.54 to 2.83 mm.); same locality as type, March, April, October, November, December; Oxford, Indiana, Nov. 1, 1914, (W. L. McAtee); Iowa City, Iowa, Oct. 30, 1915, (L. L. Buchanan); Denver, Colorado, Sept. 11, 1914, (E. C. Jackson), [W. L. M.]; North East, Pennsylvania, May 16, 1912 (Quaintance No. 6969), (F. Johnson), [U. S. N. M.].

Erythroneura comes var. **rubra** Gillette

Typhlocyba comes var. *rubra*. Gillette, C. P. Am. Typhlocybinae, 1898, p. 764. [Type No. 3450, U. S. N. M., which is labelled, "Mich. 1972."]

In this variety all of the color markings are broadened, the vittae on head and usually a short-armed Y-shaped vitta on pronotum being unusually heavy, and the tegminal markings occupying more than half of the tegminal surface; the apex of the clavus is red and the vitta between it, posterior part of costal plaque and cross-veins is particularly broad; the costa posterior to costal plaque also is often red. The red markings vary in shade from a pale bluish red outlined in brighter color, to a solid

vermilion-red (jasper red); all specimens have the upper surface of abdomen dark, and in those with jasper red markings this color, showing through the often yellowish tegmina, gives insects of this variety a peculiar appearance, that differentiates them from all of the other varieties except the next following.

Length, 3 mm.; vertex: LM 6.5, LE 3, WA 15, WP 21, OA 7, OP 12, OH 17; pronotum: L 11, W 22; tegmen 13-60. *Type*, a female.

Other specimens examined, (2.57 to 3 mm.); Plummer's Island, Maryland, March, June, July, November, December; Great Falls, Virginia, April 20, 1916; Odenton, Maryland, July 14, 1918, (W. L. McAtee); Iowa City, Iowa, April 6, 1915, (L. L. Buchanan), [W. L. M.].

Variants of *rubra* occur with the color markings on anterior part of dorsum yellow, those posterior red; hence it is probable that an entirely yellow-marked form will be found.

Erythroneura comes var. **rubrella** new variety

Differs from the last chiefly in the smaller extent to which the tegmina are covered by the color markings, but it may be remarked that the narrower tegminal vittae of this variety are uniform in color, while the broader vittae of the preceding variety are almost always paler within, and often a bluish red, margined by deeper color; tegminal markings in the present variety usually vermilion (jasper red) and occupying less than half of the tegminal surface.

Length, 2.3 mm.; vertex: LM 6, LE 3, WA 11, WP 17.5, OA 5.5, OP 10, OH 14; pronotum: L 10, W 18; tegmen 12-52.

Type—♂; Plummer's Island, Maryland, Nov. 30, 1913, (W. L. McAtee), [W. L. M.]. *Paratypes* (2.3 to 2.7 mm.) from same locality as type, January, March, July, November, December; Great Falls, Virginia, July 25, 1914; Maywood, Virginia, February, March; Scott's Run to Ball's Hill, Fairfax County, Virginia, Aug. 12, 1917, (W. L. McAtee), [W. L. M.]: Paris, Fauquier County, Virginia, July 29, 1898, [U. S. N. M.].

Erythroneura comes var. **nudata** new variety

Color of scutellum and anterior parts pale yellowish with irregular pellucid areas, instead of the color vittae and spots usually present in other varieties; tegmina whitish hyaline, apical cells somewhat fumose; costal plaque rather opaque white, an oblique black streak across it posteriorly, and black dots in bases of fourth apical, and apices of second apical cells. Placed as a variety of *comes* because of the presence of dark spots in apices of second apical cells, although so far as coloration goes no intergrading specimens have been seen.

Length, 2.64 mm.; vertex: LM 7.5, LE 4, WA 11.5, WP 18, OA 6.5, OP 9, OH 14; pronotum: L 10, W 19; tegmen 12-51.

Type—♀; Odenton, Maryland, July 29, 1917, on *Vitis*, (W. L. McAtee), [W. L. M.]. *Allotype*—♂; same data.

Erythroneura comes var. **delicata** new variety

Ground color opaque milky white, with red color markings of the *comes* type, the spots usually small and well separated.

Type—♀; Plummer's Island, Maryland, July 26, 1914, (W. L. McAtee), [W. L. M.].

Specimens (2.68 to 2.83 mm.) from Plummer's Island, Maryland, July 26, 1914, Oct. 4, 1914, Oct. 28, 1913; Great Falls, Maryland, Aug. 18, 1917; Odenton, Maryland, July 29, 1917, on *Vitis*, (W. L. McAtee); Anacostia, District of Columbia, April 30, 1913, (W. D. Appel), [W. L. M.].

Erythroneura comes var. **delicata**, yellow form

Like the preceding, but color markings yellow.

Length, 2.83 mm.; vertex: LM 7, LE 4, WA 12, WP 20, OA 6.5, OP 12, OH 16; pronotum: L 11, W 21; tegmen 13-59.

Erythroneura comes var. **octonotata** Walsh

Erythroneura octo-notata. Walsh, B. D. Prairie Farmer, Sept. 6, 1862, p. 149. [Illinois.]

The essential part of Walsh's description is: "Elytra whitish hyaline, with the same three spots as in the preceding [*ziczac*], and in addition one on the inner margin not far from the base." This variety, therefore, is an almost colorless form with four black dots on each tegmen; highly colored forms having these dots and those having a black vitta on scutellum should be extended. I have seen no specimen that exactly fits Walsh's description, but he notes "I have examined some dozen specimens," so that it is probable the very pale form he describes is common somewhere in Illinois.

Erythroneura comes var. **accepta** new variety

With the black tegminal spots as in variety *octonotata* Walsh, and in addition, red color markings of the *comes* or *vitifex* type.

Length, 2.83 mm.; vertex: LM 7, LE 3.5, WA 12, WP 20, OA 6, OP 10, OH 15; pronotum: L 11, W 20.5, tegmen 13-60.

Type—♀; Plummer's Island, Maryland, Dec. 14, 1913, (W. L. McAtee). Other specimens from Plummer's Island, Maryland, March 14, 1915, September 13, 1914 and December 21, 1913, (W. L. McAtee), [W. L. M.].

Erythroneura comes var. **accepta** new variety, yellow form

Similar to the preceding, but with yellow color markings.

Length, 2.9 mm.; vertex: LM 7.5, LE 4, WA 12, WP 19, OA 6.5, OP 10.5, OH 15; pronotum: L 11, W 20; tegmen 13–59. Measurements from a female; Odenton, Maryland, July 29, 1917, on *Vitis*, (W. L. McAtee), [W. L. M.]. Another specimen (2.77 mm.), same data.

Erythroneura comes var. **compta** new variety

Typhlocyba comes var. *octonotata*. Gillette, C. P. Am. Typhlocybinae, 1898, pp. 762 to 763, not of Walsh, which see.

With the black tegminal spots of variety *octonotata*, red color markings of the *comes* or *vitifex* type, and in addition a broad median black vitta on scutellum which usually, though not always leaves a round spot on apex of scutellum pale.

Length, 2.64 mm.; vertex: LM 6.5, LE 3, WA 11, WP 17.5, OA 5.5, OP 9.5, OH 14; pronotum: L 10, W 19; tegmen 12–56.

Type—♀; Plummer's Island, Maryland, March 28, 1915, (W. L. McAtee). *Paratypes* (2.3 to 2.7 mm.) from Plummer's Island, Maryland, Dec. 21, 1915; Oxford, Indiana, Nov. 1, 1914, (W. L. McAtee), [W. L. M.]; Illinois (1992); Stirling, Virginia, Oct. 9, [U. S. N. M.].

Erythroneura comes var. **compta** new variety, yellow form

Like the preceding, but color markings yellow.

Length, 2.93 mm.; vertex: LM 6.5, LE 3.5, WA 10.5, WP 16.5, OA 6, OP 9.5, OH 14; pronotum: L 10, W 18; tegmen 15–55. Measurements from a male; Anacostia, District of Columbia, April 20, 1913, (W. D. Appel), [W. L. M.].

Other specimens (2.56 to 2.7 mm.), are from Odenton, Maryland, July 29, 1917, on *Vitis*; Dyke, Virginia, May 28, 1913; Scott's Run, Fairfax County, Virginia, July 4, 1918, (W. L. McAtee, [W. L. M.]; Agricultural College, Michigan, 5–11–91; Agricultural College, Mississippi, October 8, 1894, (H. E. Weed); Florence, Alabama, Aug. 20, 1897, on grape, [U. S. N. M.].

Erythroneura comes var. **coloradoensis** Gillette

Typhlocyba vitifex var. *coloradoensis*. Gillette, C. P. Observations upon Injurious Insects, Season of 1891. Bull. 19, Colo. Agr. Exp. Sta., May, 1892, p. 16, fig 8. [Colorado.]

Typhlocyba comes var. *coloradensis*. Gillette, C. P. Am. Typhlocybinae, 1898, p. 763.

This variety has red markings of the *comes* or *vitifex* type, and in addition distinct black spots in the basal triangles of the scutellum; the black streak on costal plaque and black clouds in bases of fourth, and in apices of second apical cells seem unusually distinct; dorsum of abdomen and tip of genitalia also black.

Length, 2.87 mm.; vertex: LM 6, LE 3, WA 13, WP 21, OA 6, OP 12, OH 16; pronotum: L 10.5, W 22; tegmen 14-61. Cotypes, a female and male; Colorado, No. 1854 (Type No. 3447, U. S. N. M.)

Other specimens examined: Riley County, Kansas, July, (Marlatt); Basco, Illinois, January, 1861, (G. Marlatt); Sonoma County, California, (A. E. Bush); Bloomington, Nebraska, on grape, 1888, (J. Graf); Anthony, New Mexico, on grape, August 8, 1889, (H. H. Bailey); Denver, Colorado, on grape, July 28, 1886, (V. Devinney); California, [U. S. N. M.]: Denver, Colorado, Sept., Oct., Nov., 1914, (E. C. Jackson), [W. L. M.].

***Erythroneura comes* var. *amanda* new variety**

Apical third, or at least the sides of scutellum, apically, dusky to black; anterior two-thirds of clavus and a band between clavus and costal plaque bright red; subsidiary markings of tegmen tending to be red anteriorly and yellow posteriorly; markings of head and pronotum yellow.

Length, 2.54 mm.; vertex: LM 6.5, LE 3, WA 11, WP 17.5, OA 6, OP 9.5, OH 14; pronotum: L 10, W 19; tegmen 11-52.

Type—♂; Central Missouri, July, on grape, [U. S. N. M.]. *Paratypes* (2.37 to 2.57 mm.) include some specimens with same, and others with less significant data than type, most of them however from grape, [U. S. N. M.].

***Erythroneura comes* var. *venusta* new variety**

Vertex chiefly dusky, narrow anterior border and median streak pale yellow; thorax and basal triangles of scutellum deep ruby-red, apex black; broad dusky vitta on tegmen occupying anterior two-thirds of clavus and an oblique area on corium from clavus to black marking on costal plaque; tegmen from posterior edge of this band to cross-veins whitish-hyaline; apical cells chiefly dusky; undersurface pale yellow.

Type—♀; Odenton, Maryland, July 29, 1917, on *Vitis*, (W. L. McAtee), [W. L. M.]; in too distorted a pose for measurement.

Erythroneura comes var. **ziczac** Walsh

Erythroneura ziczac. Walsh, B. D. Fire-blight. Two new foes of the apple and pear. The Prairie Farmer, 10, No. 10, Sept. 6, 1862, p. 149. [Illinois.]

Ground color pale yellow; sides of thorax and scutellum, and angulate vittae on tegmina running from humeri over middle of clavi, thence to inner edges of costal plaques thence to cross-veins near radial margin, sanguineous to dusky. Costal plaque pale yellow, more or less overlaid by white with an oblique black streak posteriorly; costa both in front of and behind costal plaque pale yellow; apical cells chiefly dusky, paler within two and four, in effect producing an irregular oblique dusky vitta from base of fourth cell to apex of second. The vase-shaped saddle spot is marked with yellow at least at apices of clavi. Lower surface stramineous to pale yellow.

Length, 2.83 mm.; vertex: LM 7.5, LE 3.5, WA 13.5, WP 20.5, OA 6.5, OP 11, OH 16; pronotum: L 11, W 21; tegmen 13-59. Measurements from a female, Plummer's Island, Maryland, July 19, 1914, (W. L. McAtee.).

Other specimens (2.73 to 2.83 mm.) examined; from same locality as measured individual, July, August, October, (W. L. McAtee); Denver, Colorado, Sept. 11, 1914, (E. C. Jackson), [W. L. M.]; Riley County, Kansas, July, (Marlatt), [U. S. N. M.].

Erythroneura comes var. **ziczac**, red form

In this form the apex of scutellum, tips of clavi, two oblique streaks in front of costal plaque, and other traces of *comes* type of markings (some of them apparently overlaid by longitudinal dusky vittae) are red.

Length, 2.7 mm.; vertex LM 7, LE 4, WA 12, WP 19, OA 7, OP 10, OH 16; pronotum: L 10.5, W 21; tegmen 14-55. Measurements from a male; Plummer's Island, Maryland, Dec. 14, 1913, (W. L. McAtee.).

Other specimens (2.67 to 2.87) examined from same locality as measured individual, January, April, August, September, November, (W. L. McAtee, L. O. Jackson), [W. L. M.]; Michigan, No. 1970, [U. S. N. M.].

Erythroneura comes var. **cancellata** new variety

Vertex and pronotum dusky sanguineous, the usual vittae barely distinguishable by their brighter red color; scutellum sanguineous except broad median pale vitta, and bright red tip; on each tegmen a broad sanguineous vitta from humerus to costal plaque and from costal plaque to cross-veins near radial margin; these vittae enclose (with pale area on scutellum) a large pale diamond-shaped saddle-spot, extending from base of scutellum to cross-veins which is ornamented by bright red markings as follows; tip of scutellum and of clavus, a V-shaped marking on middle of each clavus, connected by a short oblique streak to longitudinal sanguineous vitta near posterior end of costal plaque. Costal plaque pale yellow, an oblique black streak posteriorly,

more or less overlaid by opaque white; costa between plaque and cross-veins pale yellow, a ramose red marking on cross-veins; apical cells dusky except extreme bases of all, and the central interior of two and four; a little blacker at base of four and at apices of two and four. Pale yellow below, face with touches of red, and genitalia more or less livid to slaty.

Length, 3.13 mm.; vertex: LM 7, LE 3.5, WA 15, WP 22, OA 6.5, OP 13, OH 17; pronotum: L 11.5, W 22; tegmen 15-62.

Type—♀; Plummer's Island, Maryland, Nov. 30, 1913, (W. L. McAtee), [W. L. M.]. *Paratype*—♀; (2.93 mm.), same locality as type, May 4, 1914, (W. L. McAtee), [W. L. M.].

A large well-marked form, which is given varietal rank because it is assumed intergrades with *comes* may exist; further evidence may indicate the advisability of considering this form a species.

EXPLANATION OF PLATES

As to Vertex

Fig. 1.—*bipunctata*, the only species of this type.

Fig. 2.—*ador*, the only species of this type.

Fig. 3.—*abolla*; *dentata*, *morgani*, *scutelleris*, *basilaris*, *maculata* and *ligata* are of about the same type.

Fig. 4.—*obliqua*; *rubroscuta*, *crevecoeur*i, *illinoiensis*, *hartii*, *vitis*, *tricincta* and *comes* are of about the same type.

Fig. 5.—*vulnerata*; *aclys* and *infuscata* are similar.

Fig. 6.—*tecta*, the only species of this type.

As to Apical Cells

Fig. 7.—*vulnerata*, the only species of this type.

Fig. 8.—*obliqua*; *rubroscuta* and *crevecoeur*i are similar.

Fig. 9.—*tecta*; *bipunctata*, *ador*, *dentata*, *abolla*, *aclys*, *morgani* and *hartii* are of about the same type.

Fig. 10.—*illinoiensis*; *scutelleris* is much the same.

Fig. 11.—*maculata*; *basilaris* and *ligata* are similar.

Fig. 12.—*comes*; *infuscata*, *vitis* and *tricincta* are of the same type.



McAtee, W. L. 1920. "Key to the Nearctic species and varieties of *Erythroneura* (Homoptera; Eupterygidae)." *Transactions of the American Entomological Society* 46, 267–321.

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