PSYCHE

VOL. 52 SEPT.–DEC., 1945 NOS. 3–4

# A REVIEW OF THE CHRYSOPIDÆ (*NOTHOCHRYSIDÆ*) OF CENTRAL AMERICA [1]

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Many years ago the writer described a few species from Central America, including Baja California. Since then Navas has published a large number of species. For some years the author has had a manuscript synopsis of the species in the Museum. In 1937 Professor Roger Smith visited the various European museums to study the types of Chrysopidæ; he has given me a copy of these notes. With this most useful help I have felt emboldened to present tables to the species known to me, with descriptions of some new forms.

Besides the specimens at the Museum of Comparative Zoölogy I have seen those belonging to the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia, and the U. S. National Museum.

As to classification, I have made an attempt to get away from dependence upon the divisory veinlet.

In the Central American forms I see, outside of the Apochrysinæ, three groups, one those represented by Nadiva and allies, in which the joints of the antennæ are very broad, the thorax broad, the venation more or less irregular, particularly in the discoidal cell; the anal area of the hind wings is large and the branches of anal veins sometimes forked. The second group is that based on Chrysopa and allies in which the stigmal area is unmarked, and the medius of fore wing slopes down evenly to its marginal fork. This genus should be divided. The third group is that of Nodita and Leucochrysa, in which there is a dark mark at the base of stigma, and the medius curves to

[1] Published with the aid of a grant from the Museum of Comparative Zoölogy at Harvard College.

join the outer gradates; if not curving it is at least bent somewhat before forking. If one has assorted many specimens of Nodita and Leucochrysa he will find specimens that arouse doubt. Specimens put in Nodita sometimes have the divisory vein ending at the upper end of cell, and Navas has described one (*notha*) with the divisory vein ending as in Leucochrysa. A specimen that has the divisory cell as typical of Leucochrysa as in *L. varia* was the last straw. For in other structures and in coloration it agrees closely with the large species of Nodita, *azvedoi*, *maronica*, *egregria*, etc., having the radial sector much curved, partly black, the costal area rather narrow, the marginal forks wholly brown, and in the hind wing the marginal vein on hind margin is brown.

I am convinced that the difference between Nodita and Leucochrysa does not reside in the divisory cell, but in the course of the radial sector.

In Nodita the costal area at broadest is rarely equal to the radial area (at broadest), and the radial sector at widest part of the radial area is at least as near to medius as to the radius.

In Leucochrysa the costal area at broadest is about equal to or broader than the radial area (at broadest), and the radial sector at broadest part of radial area is plainly nearer to radius than to the medius.

Between Nodita and Chrysopa I have depended chiefly on the dark mark in stigma for Nodita. Many species of Nodita, on drying, tend to have the pronotum collapsed transversely, a deep groove along the middle; the transverse groove being close to the hind margin; some Nodita, however, show the transverse groove near middle of length.

Those species of Nodita and of Leucochrysa perhaps in which the medius does not so plainly curve to join the outer gradates might go into another genus; but I would prefer to find for it some other character. The width of the costal stigmal area in the true Leucochrysas is usually more than those that would be split off by this division; but the width grades so much it is not dependable. It might even be suggested to unite the large and typical Leucochrysa with the large Nodita into one genus, there is much in common, but the comparative widths of the costal and radial areas appear to keep them apart.

The genera are much the same as those of northern South America, and in several cases the species; in northern Mexico

there are several species which occur in the southern part of the United States.

I have listed as "species" all forms that I could distinguish fairly definitely by color as well as by structure. The markings of the head and thorax and sometimes of abdomen are generally constant. There is always some variation, but it is often in extent or distinctness of development, rather than presence or absence. Specimens sometimes become discolored, and then it is difficult to determine face-marks. The study of male genitalia in this group will serve better to differentiate the species, but tends to neglect other structures which may be of value in defining subspecies, varieties, and races, which will surely follow more extensive studies. Taxonomy is not simply to show how species can be separated, but just as truly to show how they can be allied, — classified. Although the genitalia in many groups are the most valuable in distinguishing forms, one should remember that in Nature no species is kept separate by the structure of its genitalia.

The name Chrysopa is a pure synonym of Hemerobius, and no scrapping of rules can change that fact. But until Chrysopa can be split into a number of genera (only one small one will have to take the name Hemerobius) I shall utilize the old name. Rambur a hundred years ago provided a name for the Hemerobius of McLachlan and Hagen.

*Key to Genera*

1. Third cubital cell not divided; costal area very broad; no regular series of gradates; five or six branches of radius beyond subcosta; radials often connected by cross-veins . *Apochrysinæ*

Third cubital cell divided in some way; costal area much narrowed at stigmal area; rarely more than three branches to radius beyond subcosta; cross-veins in middle area mostly in two or three series . . . . . *Chrysopinæ* 2

2. Antennæ on basal half, at least, with the joints plainly broader than long;

a — Thorax moderately slender; antennæ with basal joints rather widely separated, and slender; in male with a process between antennæ . . . . . *Meleoma*

b — Thorax broad, basal joints of antennæ stout and little separated, no process between them; in hind wing branches of anal often forked . . . . . *Nadiva*

Joints of the antennæ, except a few toward base, are plainly longer than broad, pronotum often more slender, and in hind wings the anal branches not forked . . . . . 3

3. Medius of fore wing slopes down to its marginal fork, scarcely, if at all, bent; no dark spot at base of the stigma; antennæ but little longer than wings . . . . . 4

Medius before marginal fork usually curves up a little to run into the outer gradate series; if it does not it is at least bent at that place; nearly always a dark spot at the base of the stigma; antennæ often very long; divisory vein often oblique and straight . . . . . 8

4. Divisory vein ends on the end of third cubital cell and about parallel to both medius and cubitus . . *Chrysopodes*

Divisory vein ends on the medius, before end of the cell, and is often curved . . . . . 5

5. Inner series of gradates absent in either hind or both pairs of wings; radius usually has three or more branches to the margin beyond end of subcosta; small species with few cells and the cubital area broad . . . . . 6

Inner series present with at least one gradate in both wings 7

6. Wing veins and much of body greenish; no inner gradates in either wing . . . . . *Chrysopiella*

Wing veins and much of body brownish; inner gradates usually present in fore wing . . . . . *Eremochrysa*

7. In male a process between the antennæ, in female the basal joints of antennæ more widely separate than in Chrysopa . . . . . *Meleoma*

No process between the antennæ, which are rather close to each other at base . . . . . *Chrysopa*

8. Divisory vein parallel to each side of the third cubital cell; a series of cross-veins connecting some of the radials . . . . . *Carcarulla*

Divisory vein oblique . . . . . 9

9. A cross-vein before radial sector, usually but five cubital cross-veins beyond the divisory cell . . . . *Berkmansus*

No cross-vein before radial sector; usually six or more cubitals beyond divisory cell . . . . . 10

10. With a more or less complete third gradate series between the other two . . . . . *Neula*

No intermediate gradate series . . . . . 11

11. Some costal cross-veins above origin of radial sector strongly sinuous; divisory cell more or less of a V; costal area wider than radial; costal stigmal area four times as broad as the subcostal stigmal area . . . . . *Vieira*

No such sinuous costals, costal stigmal area usually less broad . . . . . 12

12. Radial sector more strongly curved, so that the widest part of the radial area is nearer to the medius than to the radius; costal area usually rather narrow and not as broad as radial area; divisory vein usually ends on the medius plainly before end of cell . . . . . *Nodita*

Radial sector less curved so that at the widest part of the radial area it is as near or nearer to radius than to medius; costal area usually broader than radial area; divisory vein usually ends on the end of the cell . . . . . 13

13. Stigma with a large black spot extending back to the radial sector; costal stigmal area usually twice as broad as the subcostal stigmal area . . . . . *Gonzaga*

Stigmal mark much smaller; costal stigmal area rarely twice as broad as the subcostal stigmal area . . . . *Leucochrysa*

Two genera recorded from this region by Navas I have not been able to recognize in the material studied.

Ancylochrysa 1928 from Costa Rica from the odd divisory vein it might be near Goliva; but he says nothing about short antennal joints, the radial sector is little curved and the costal area broad as in Leucochrysa; the radius has several branches to margin beyond end of the subcosta; the medius slopes evenly to its marginal fork.

Orlandsia 1914a from Chiriqui has the divisory vein as in Nodita, otherwise it is (according to figure) much like Ancylochrysa, the costal area being broad, the radial sector little curved, the medius running to its marginal fork without a bend, no mark in stigma, and the costal part of stigma much broader than the subcostal; both have a very broad post cubital area.

## Apochrysinæ

Four forms are known from Central America.

*Lainius constellatus* Navas 1913, from Guatemala.

*Domenechus sigillatus* Navas 1913, from Guatemala.

Kimmins 1940 states this is the *Apochrysa mirifica* Gerst.

*Loyola croesus* Gerst. 1893, from Chiriqui.
*Loyola mirifica* Gerst. 1888, from Chiriqui.
Kimmins 1940 puts this in Domenechus.

## Chrysopinæ

### *Table to Species of Chrysopa*

1. Face with dark marks as in *Ch. oculata*, second joint of antennæ dark, beyond pale . . . . . *mexicanus*
No such marks . . . . . 2

2. Antennæ beyond second joint black, at least for a short distance . . . . . 25
Antennæ beyond second joint wholly pale . . . . . 3

3. Basal joint of antennæ with dark spot or stripe . . 4
Basal joint unmarked . . . . . 12

4. Basal joint with two dark stripes, gradates parallel and near together . . . . . *arioles*
Basal joint with but one dark stripe . . . . . 5

5. A good-sized black spot each side on pronotum . *discolor*
No such spots . . . . . 6

6. Palpi dark . . . . . 7
Palpi pale . . . . . 10

7. Inner gradates bowed up toward radial sector; branches of radial sector much bent by inner gradates . . . *annotaria*
Inner gradates parallel to outer row; branches of radial sector scarcely bent by inner gradates . . . . . 8

8. Head, face, vertex, and basal antennal joint suffused with reddish; practically all cross-veins dark; about five inner gradates . . . . . *dampfina*
Head not suffused with reddish; inner gradates often but three; third cubital cell much narrowed at base, and often but one branch to hind margin, two from fourth cell . . . . 9

9. Abdomen pale as the thorax; pronotum narrowed from base to the front . . . . . *valida*
Abdomen darker than thorax; pronotum not narrowed, except near front . . . . . *tolteca*

10. Reddish mark on cheeks, face broadly reddish; vertex red each side; gradates not parallel; pronotum with two red spots on each side before margin . . . . . *batesi*
No reddish or other mark on cheeks . . . . . 11

11. Inner gradates not reduced, both series more or less plainly bordered, and not parallel . . . . . *infausta*
Inner gradates often reduced about half, close to and nearly parallel to outer row, not bordered; radials dark only in middle . . . . . *caligata*

12. Venation almost wholly pale greenish, gradates not dark; divisory cell usually ends before the cross-vein above . . 13
Venation with some cross-veins at least partly dark and the gradates dark . . . . . 14

13. Cubital area more than one half as wide as the post cubital; reddish on cheeks usually extends upward by side of eye, no black streak . . . . . *comanche*
Cubital area not quite one half as wide as the post cubital area; a black streak by side of the red on cheek . *californica*

14. Seven cubital cross-veins beyond the divisory cell; a dark spot on each cheek and one each side on clypeus; venation largely green . . . . . *facialis*
Six cubitals beyond divisory cell . . . . . 15

15. Some veins behind radial sector bordered with yellowish, the gradates bordered with brown; no mark on cheeks; palpi pale . . . . . *parishi*
No veins bordered with yellowish . . . . . 16

16. Palpi dark or lined; inner gradates arise before or very near the penultimate cubital cross-vein . . . . . 19
Palpi pale; inner gradates arise much beyond the penultimate cubital cross-vein . . . . . 17

17. A reddish or dark spot at each corner of the pronotum; no marks under eyes . . . . . *tetrasticta*
Not four spots on pronotum, a mark under each eye . . 18

18. Pronotum red on sides; cubital area as broad as post cubital area; usually twelve radials, and but three or four inner gradates . . . . . *brevihirta*
Pronotum not red on sides; cubital area not nearly as broad as post cubital area, all cubital cells longer than broad; usually about ten radials and five inner gradates . . . . *fairchildi*

19. Inner gradates strongly divergent from the outer ones 20
Gradates parallel or nearly so; often a red or dark mark under eye . . . . . 21

20. Gradates converge behind so their bases are near each other . . . . . *bouvieri*

Gradates have bases very far apart . . . . . *divergens*

21. Pronotum as long as broad, with an interrupted red stripe each side, not on margin . . . . . 22

Pronotum broader than long . . . . . 23

22. Pronotum much longer than broad; inner gradates nearer to radial sector than to outer, arise at or before penultimate cubital cross vein . . . . . *angusta*

Pronotum only a little if any longer than broad; inner gradates arise beyond penultimate cubital cross-vein . *yucatanensis*

23. Divisory cell ends at or before the cross-vein above; cheeks reddish . . . . . *exotera*

Divisory cell ends well beyond the cross-vein above . . 24

24. Cheeks dark; most cross-veins dark at ends; inner gradates parallel, each veinlet far from next . . . *perfecta*

Cheeks pale; cross-veins not dark at ends; inner gradates slightly divergent and each veinlet is close to next . . *forreri*

25. A dark mark in a curve across upper edge of clypeus; palpi marked with dark; gradates parallel . . . *aztecana*

No dark across on clypeus or face . . . . . 26

26. Two dark lines on each basal antennal joint . *bilineata*

But one dark line on basal antennal joint . . . . . 27

No dark line on basal antennal joint . . . . . 31

27. Black spot on cheeks; palpi pale . . . . . 28

No dark on cheeks; pronotum reddish on sides . . . . 29

28. Radial area not as wide as postcubital area; many cross-veins dark . . . . . *gradata*

Radial area about as broad as the postcubital; posterior half of wing with mostly pale veins (except gradates) . *indicata*

29. Inner gradates near to radial sector, gradates not quite parallel; many costals wholly dark . . . . . *sarta*

Inner gradates close to outer row and parallel thereto . 30

30. Some gradates and some branches of radial sector bordered; pronotum about twice as broad as long . . *berlandi*

No gradates nor other veins bordered; pronotum only a little broader behind than long, narrowed toward front . . *adoina*

31. Palpi partly dark; cubital area as broad as the costal

area; costals and radials wholly dark; pronotum not margined with reddish . . . . . 32

Palpi not marked with dark, costals and radials less dark; wings rather slender . . . . . 33

32. Pronotum with a pair of submedian dark stripe . *incerta*

Pronotum without any stripes . . . . . *leptana*

33. Margin of pronotum reddish . . . . . 34

Margin of pronotum not reddish . . . . . 35

34. Cheeks with reddish mark; basal joint of antennæ reddish . . . . . *lateralis*

Cheeks not marked . . . . . *claveri*

35. Inner and outer gradates very close to each other, and parallel . . . . . *everes*

Gradates widely separated, inner sloping upward, and not parallel . . . . . *everina*

Species that I have not recognized in the material and could not place from the descriptions and notes, some of which are probably synonyms.

*Chrysopa sanguinea* Navas 1927, near to *caligata*, but it does not agree in various points.

*Chrysopa rubricosa* Navas 1914, the figure shows marks on head that I have not seen in any species.

*Chrysopa effusa* Navas 1911, may possibly be *Ch. gradata*; the latter has some of the branches of cubitus as Navas figures for *effusa*, but the divisory cell is not dark.

*Chrysopa guatemalteca* Navas 1914 is very near *Ch. sarta* Bks. There are fewer gradates in *sarta* than stated for *guatemalteca*, and *sarta* has no dark in hind wing, and antennal stripe broad. If the same, *guatemalteca* has a month or more priority.

*Chrysopa bouvieri* Navas 1923 and *Ch. divergens* Navas 1931 according to description and Smith's notes must be very similar if not identical; those we have agree possibly a little better with *divergens*.

*Chrysopa bulbosa* Navas 1926 will run in the key to *Ch. infausta*; however, there is nothing unusual about the basal joint of antennæ in *infausta*; and *infausta* has the stripe on basal joint lateral, not dorsal, the pronotum not margined, etc.

*Chrysopa cajensis* Navas 1930 in table goes to *yucatanensis* and I consider it the same.

*Chrysopa hieronyma* Navas 1917 seems to be *tetrasticta*.

*Chrysopa obesa* Navas 1929. A broad bodied species with wholly green wings; may be a Nadiva but not *N. balboana*.

*Chrysopa senior* Navas 1927, wing 20 mm. long, is different from any I have.

*Chrysopa morrisoni* Navas 1914, veins all green, has dark dots or lines on vertex or pronotum, and thus readily separated from the all green veined species known to me.

*Chrysopa varicosa* Navas 1914 is stated to have a dark lunule below each antenna, and peculiar modifications of certain veinlets of the inner gradates; I have seen similar modifications in one species, but that species has no lunules on face, nor does it agree otherwise with the description of Navas, so it is probably also a distinct species.

*Chrysopa lafoni* Navas 1911, and *Ch. nativa* Navas 1911, both from Costa Rica and fore wings 17 mm. long, do not fit anything I have seen.

*Chrysopa sulcata*, *Ch. salleana*, *Ch. ceratica* of Navas and *Ch. explorata* Hagen belong to Nodita; *Ch. dolicharthra* Navas is a *Meleoma*.

*Chrysopa externa* var. *marginata* Navas 1927, from Guatemala, is described in one line and a half. The pronotum is marked on the anterior middle with dark red; I have not seen it.

*Chrysopa josephina* Navas 1926 is said to have twelve joints of antennæ black, and outer gradates bordered; it agrees fairly well with what I have as *berlandi*, but here the gradates are not bordered, but this is not always dependable.

*Chrysopa josephina* Navas 1930, appears to be *Ch. angusta* Navas.

*Chrysopa longicella* Navas 1914; I identify this with *Ch. bimaculata* McClendon, described from southern Texas; I have specimens from Guatemala, Nicaragua, and Canal Zone; except for minor details and size there is little to separate this from *tolteca* Bks. and so I have united them. *Ch. valida* from Baja California is closely related and with more material may prove to be the same.

*Chrysopa lateralis* Guerin 1843, I have not seen but placed in synopsis according to his description; it was from Vera Cruz, Mexico.

RECORDS

*Chrysopa nigricornis* Burm. 1839
One from Durango, Mexico, March.

*Chrysopa leptana* Bks. 1914
Type from Oaxaca, Mexico, another from Apatzingan, Mexico, 7 August.

*Chrysopa gradata* Navas 1913
From Rosaria San Juancito, Honduras.

*Chrysopa indicata* Navas 1914
From Jalapa, Vera Cruz, Mexico, La Campana, Pan., September, and Santa Ana, Costa Rica, March.

*Chrysopa everes* Bks. 1920
From Puerto Castilla, Honduras, 21 June, and Barro Colorado, Canal Zone, 10 to 13 November, 26 February, and 23 March.

*Chrysopa aztecana* Bks. 1903
Type from Tuxpan, Mexico, 9 May.

*Chrysopa berlandi* Navas 1923
From Barro Colorado, Canal Zone.

*Chrysopa claveri* Navas 1911
From Barro Colorado, Canal Zone; Cayuga, Guatemala, October.

*Chrysopa incerta* Bks. 1895
Types from El Taste, Baja California.

*Chrysopa sarta* Bks. 1914
Type from Orosi, Costa Rica.

*Chrysopa tolteca* Bks. 1901
Type from Tomellin, Oaxaca, Mexico, June; others Chavarillo, Vera Cruz, Mexico, April; Cayuga, Guatemala, May; Chinandega, Guatemala, Gualan, Guatemala, 2 December; and Barro Colorado, Canal Zone, Tuxepec, Oaxaca, Mexico, November, and Tabernilla, Canal Zone, May. Normally there is but one branch from the third cubital cell to the hind margin.

*Chrysopa valida* Bks. 1895

Types from El Taste and San Jose del Cabo, Baja California, September. The name is not preoccupied by *Hemerobius validus* Erichson as the latter belongs in the genus Berkmansus.

*Chrysopa dampfina* Navas 1927

Puerto Castilla, Honduras, 21 June.

*Chrysopa arioles* new name

From Honduras, June, and Piedras Negras, Peten, Guatemala, April–May. This is the *C. binaria* Navas 1928, but he had already used the name in 1923 for a South American species.

*Chrysopa mexicana* Bks. 1901

From Hapan, Vera Cruz, Mexico, July, and San Pedro, Coahuila, Mexico, 22 August.

*Chrysopa exotera* Navas 1914

From Tuxpan, Mexico, 9 May, Guadalajara, Mexico, 14 Sept., 25 June, Tegucigalpa, Honduras, 2 February, Rosario San Juancitio, Honduras, Panajachel, Guatemala, 20 March, and Santa Engracia, Mexico, 11 April.

*Chrysopa divergens* Navas 1931

From Barro Colorado, Canal Zone, 26 February, 13 March, 19 April.

*Chrysopa tetrasticta* Navas 1914

From Moca, Guatalon, Guatemala, March–April.

*Chrysopa angusta* Navas 1914

From Rosario Mines, Honduras, 20 March.

*Chrysopa yucatanensis* Navas 1929

From Puerto Cortez, Honduras, 18 March, and Barro Colorado, Canal Zone, 11 February, and Frijoles, Canal Zone, 18 February.

*Chrysopa perfecta* Bks. 1895

Types from El Taste, and San Lazaro, Baja California.

*Chrysopa forreri* Navas 1914

From Mazatlan, Mexico.

*Chrysopa parishi* Bks. 1913

From Barro Colorado, Canal Zone, 15 July, 13 November, and El Volcan Chiriqui, Panama, 17 February.

*Chrysopa facialis* Bks. 1905

Many from Durango, Mexico, in March, April, May, and June, also San Juan de Allende, Mexico, 15 March, Gomez Palacio, Durango, Mexico, May, San Pedro, Mexico, 14 December, and Guanajuato, Mexico.

*Chrysopa californica* Coq. 1890

From Tlahualito, Durango, Mexico, 26 August, and Guadalajara, Mexico, 14 August.

*Chrysopa comanche* Bks. 1938

From San Jose de Guaymas, Mexico, 10 April, Sierra de los Burros, Coahuila, Mexico, 8 and 18 June, Guadalajara, Mexico, 25 June, Juarez, Mexico, 3 July, Panajachel, Guatemala, 20 March, Puerto Castilla, Honduras, 4 April, and La Ceiba, Honduras.

## New Species

### **Chrysopa adoina** sp. nov.

Head pale, no marks on face; palpi unmarked; antennæ black, except basal joint pale with a reddish stripe above; pronotum with a reddish stripe along each side, rest of thorax, abdomen and legs unmarked.

Wings with very pale venation, some costals and radials, cubitals and post cubitals brown in middle, rarely all over, gradates pale brown, not bordered, intermediates dark at lower end, branches of radial sector not dark anywhere; in hind wings the gradates are faintly dark.

Pronotum a little broader behind than long, narrowed toward front. Fore wings have three or four inner, seven outer gradates, parallel and near each other; branches of radial sector scarcely bent at inner gradates; eleven radials; third cubital cell longer than second, divisory cell long, slender and narrow toward tip, base slightly oblique, six cubitals beyond; costal area not as broad as postcubital, but about as broad as cubital, radial area plainly a little broader than postcubital area, the radial sector, however, but little curved. In hind wings ten radials, seven cubitals, only one or two inner, and six outer gradates, parallel, and near each other.

Length of fore wing 12 mm., width 4 mm.

Two taken at quarantine, one at New Orleans from Mexico, 4 Febr. 1936, and the other at Charleston from Honduras,

26 June, 1931, apparently associated with bananas. Type U.S.N.M., paratype M.C.Z. 25643. Differs from *berlandi* as shown in table; it has much the appearance of *Ch. cubana*, but it is larger, the pronotum a little longer, sides more sloping forward, and the costal area is proportionally a little broader.

**Chrysopa annotaria** sp. nov.

Face pale, a red-brown stripe on cheeks, no other marks; palpi deep black; antennæ pale at first, but soon brownish, not longer than wings, basal joint with a red line on outer side and above is a short reddish line, not reaching either end (probably absent in some specimens); vertex with a red dot each side behind near eye; pronotum pale, in front each side suffused with reddish, broader than long; rest of thorax pale; abdomen mostly black above. Fore wings with gradates dark, and the inner ones bordered with brown; costals and radials rather dark at anterior ends, a few other veins toward base partly dark, last cubital dark, and the marginal forkings partly dark.

Hind wings with pale venation, almost no veins darkened, some of the gradates faintly in certain views; stigma greenish.

In fore wing six inner and outer gradates, the outer row parallel to outer margin, the inner row, arising from near penultimate cubital, curves upward toward the radial sector; the second veinlet in this gradate row has chitinous dots or lines close by in the membrane and is more broadly bordered than the others; the branches of the radial sector are much bent at the inner gradates; six cubital cross-veins beyond the divisory cell, latter ends much beyond the cross-vein above; third cubital cell hardly as long as second, and no broader; subcostal stigmal area with two or three cross-veins. Costal area at broadest as broad as postcubital area, and broader than the radial area, latter, at broadest, about twice as broad as cubital area.

In hind wings the gradates are also far apart, inner of five, outer of six, but not very divergent.

Length of fore wing 14 mm., width 5 mm.

From Boquete, Chiriqui Province, Panama, 10 May (Fairchild). Type M.C.Z. no. 25645.

*Chrysopa varicosa* Navas has, according to description and Smith's notes, a very similar wing, with the peculiarities of the inner gradates, but the face has a reddish brown lunule under each antennæ, and no dark line on basal joint of antennæ. *Ch.*

*sanguinea* Navas has a line on antennæ, but palpi pale, and a line behind the antennæ. Other species with line on basal antennal joint have been seen, and are in the synoptic key.

### **Chrysopa batesi** sp. nov.

Head pale; a broad red stripe on each side covering cheeks and extending inward and upward on inner side of eye, past the antenna, and broadly onto sides of vertex; palpi pale; antennæ pale, basal joint with a rather broad outer reddish stripe; pronotum much broader than long, sides parallel, two red spots half way from center to side margin; mesonotum with a red mark each side on anterior lobe, extending back along middle; abdomen with a row of red marks each side above.

Fore wings with the gradates wholly dark; origin of radial sector, radials almost wholly, and some costals at lower ends dark; stigma pale yellowish. In hind wings the gradates slightly dark. In fore wings four or five inner and seven outer gradates, outer row parallel to margin, inner row plainly divergent; six cubitals beyond the divisory cell, latter ends much beyond the cross-vein; third cubital cell as long as second, broader. In the subcostal stigmal area two or three cross-veins; hairs on veins rather short; branches of radial sector slightly bent at inner gradates; costal area at broadest is equal to the radial and also to postcubital area, latter about a third broader than cubital. In hind wings four inner and five outer gradates, not quite parallel, and the inner series nearer to the radial sector.

Length fore wing 12 mm., width 4.5 mm.

From Barro Colorado, Canal Zone, 9 October (M. Bates). Type M.C.Z. no. 25646.

Agrees partly with *bouvieri* and *divergens*; but neither have stripe on basal joint of antenna, and neither have extensive red marks on head.

### **Chrysopa brevihirta** sp. nov.

Head pale, a faint reddish mark between antennæ and also a faint reddish suffusion on the vertex just back of each antenna, no mark on cheeks; palpi and antennæ pale yellowish, unmarked; pronotum pale, with a red stripe each side, rest of thorax, abdomen, and legs pale, unmarked. Fore wings with the gradates brown, radials and costals, and a few other cross-

veins toward base paler brown; in hind wings the gradates only faintly brown.

Pronotum broader behind than long in middle, sides sloping forwards. In fore wing the costal area at broadest is not nearly as wide as the radial area, latter a little broader than post-cubital area, which is scarcely wider than the cubital area; three or four inner gradates, seven or eight outer ones, in parallel series, the inner row nearer to outer than outer to the margin, inner arising not far before the last cubital cross-vein; six cubitals, beyond divisory, latter ending beyond the cross-vein above; the third cubital cell a little longer than the second, and plainly broader; twelve radial cross-veins; the costal stigmal area hardly one half as broad as the subcostal area, and the latter with six or seven cross-veins. Hair on veins very short, on the broadest costal cells the hair is not one fourth the width of the cell; although several of the costal cells toward base are unusually broad; there are the usual seven cross-veins before the origin of the radial sector.

In hind wings three or four inner and seven outer gradates, parallel, and near together.

Length of fore wing 14 mm., width 5 mm.

From Tuxpan, Mexico, 9 September (McClendon coll.). Type M.C.Z. no. 25649.

**Chrysopa caligata** sp. nov.

Head pale, unmarked; palpi pale; antennæ longer than fore wings, pale, first joint with a red stripe above; pronotum broader than long in middle; narrowed near front a red stripe each side, not quite on margin; rest of thorax and abdomen pale, unmarked.

Fore wings with some costals, radial, cubitals, and branches of cubitus dark in middle, or almost wholly dark; gradates plainly dark brown; some marginal forkings dark; stigma pale; in hind wings outer gradates dark. In fore wings the radial area is much broader than the costal area and as broad as the post-cubital area, latter about as broad as the costal area; six cubitals beyond divisory cell, latter ends plainly beyond cross-vein above; three or four inner, and seven or eight outer gradates, inner close to and parallel to the outer row; third cubital cell as long as second; branches of radial sector scarcely bent at inner gradates; hair of moderate length. In hind wings two or

three inner and six or seven outer gradates, in parallel rows. Subcostal stigmal area rather broader than costal and with five cross-veins.

Length of fore wing 12 to 13 mm., width 4.2 to 4.5 mm.

From Barro Colorado, Canal Zone (Banks), and Puerto Cabello, Panama, 11 June (Englehart). Type M.C.Z. no. 25648; paratype, Barro Colorado, C. Z., 11 March (A.M.N.H.). Possibly close to *Ch. sanguinea* Navas, but nothing is said of red on pronotum, and there is a mark on cheek (not in *caligata*). One from Guatemala, August (U.S.N.M.) is probably the same.

**Chrysopa everina** sp. nov.

Similar to *Ch. everes*; black antennæ beyohd second joint, becoming paler beyond middle; cheeks, palpi, basal antennal joint, all unmarked; nor even a red dot by eyes on the vertex, pronotum, thorax, abdomen, legs all pale. Wings with the gradates in fore wings dark brown, in hind wings more faintly brown; scarcely any other veins dark in either wings, some of radials a darker green in middle; stigma only faintly darker. Antennæ shorter than wings; pronotum much broader than long, sides parallel, front margin convex, a distinct median groove in the part behind the transverse furrow.

Wings moderately broad, hind wings acute at tip. In fore wings the costal area at widest is as broad as the postcubital area, and almost equal to the radial area; the cubital area about three fourths as wide as the postcubital; inner gradates five, outer seven, inner row plainly a little divergent from the outer and arising from near the penultimate cubital cross-vein, last three of inner series nearer to radial sector than to the outer row; six cubital cross-veins beyond the divisory cell, latter ends beyond the cross-vein above; third cubital cell as long as second and broader. In hind wings the gradates are also rather far apart, three or four inner, and five or six outer ones.

Length of fore wing 11.5 mm., width 4.5 mm.

From Lancetilla, Tela, Honduras, 4 May (M. Bates). Type M.C.Z. no. 25644.

Readily separated from *everes* by the more widely separated gradates.

**Chrysopa fairchildi** sp. nov.

Head, palpi, and antennæ pale, without marks, vertex each side by eye faintly suffused with rufous; pronotum, thorax,

abdomen, and legs pale, unmarked; wings with greenish venation, in fore wings the gradates wholly dark; some of the costals in middle, some branches of cubitus, the last few cubitals, and radials more or less, dark; in hind wings the gradates less plainly dark.

The antennæ shorter than wings; pronotum broader behind than long in middle, sides sloping toward front.

Wings moderately broad, hind wings acute at tip; in fore wings five inner, seven outer gradates, in parallel rows, the inner much nearer to outer than outer row to margin, the inner row arising nearer to the last cubital cross-vein than to the penultimate. Costal area at widest not equal to radial area, the latter equal to the postcubital area, and this last about one and a half times broader than the cubital area; six cubital cross-veins beyond divisory cell, the latter ending beyond the cross-vein above; the third cubital cell as long as the second and a little broader; branches of radial sector but little bent at inner gradates; in hind wing two to three inner and five outer gradates, parallel and near each other.

Length of fore wing 12 mm., width 4.3 mm.

From Juan Mina, Rio Chagres, Canal Zone, 11 April (G. B. Fairchild). Type M.C.Z. no. 25650.

**Chrysopa infausta** sp. nov.

Body pale, no mark on face nor cheeks; palpi pale; antennæ pale, the first joint with a red stripe on outer side, and the second joint partly reddish; pronotum with a narrow red line on each side margin; rest of thorax, the abdomen and legs all pale, unmarked.

Fore wings with nearly all cross-veins wholly or partly dark, and both gradate series bordered with dark, branches from radial sector and from cubitus mostly pale, marginal forkings dark; stigma pale yellowish.

Wings rather narrow; fore wings almost and hind wings plainly acute at tips. In fore wings the costal area at broadest not nearly as broad as the radial area which is equal to the postcubital area, the latter one third broader than the cubital area; six cross-veins beyond the divisory cell, latter ends well beyond the cross-vein above; four or five inner, six outer gradates, outer parallel to outer margin, inner somewhat divergent from outer, last one or two of inner series nearer to outer than

the others; branches of radial sector not at all bent at inner gradates; third cubital cell about as long as second, the divisory cell a little more than one half its length; the subcostal area of stigma plainly broader than the costal part and with three cross-veins. In hind wings three inner and five outer gradates, not parallel.

Pronotum broader than long, sides parallel, but narrowed near front.

Fore wings 10.5 mm. long; 3.5 mm. wide.

From Hamburg Farm, Costa Rica, April (C. W. Dodge).

Type M.C.Z. no. 25647.

Of the size and general appearance of *Ch. gradata* and *Ch. longicella*; *gradata* has black antennæ, dark mark on cheeks, and gradates parallel. *Ch. longicella* has the palpi partly black, the gradates not bordered, and the rows nearer each other, and parallel. *Ch. infausta* is very similar to *bimaculata*, but differs in pale palpi and the bordered gradates.

### *Key to Species of Nodita*

1. Antennæ beyond second joint wholly black, pronotum showing transverse groove . . . . . 2

Antennæ if dark only on basal third or less, or only beneath 3

2. Outer part of hind marginal vein of hind wings plainly brown; palpi pale; basal joint of antenna with reddish stripe . . . . . *panamana*

Outer part of hind marginal vein of hind wing not brown, palpi marked with dark; basal joint of antennæ not plainly striped . . . . . *ramosa*

3. Very large species, fore wings about 20 mm. long or longer; hind margin of hind wings often with a distinct brown shade or at least the marginal vein brown . . . . . 4

Smaller; hind margin of hind wings not brown . . . . 8

4. Pronotum with a row of reddish spots or a stripe much before side margin, pronotum longer than broad . . . . 5

If red on pronotum it is close to side margin, and pronotum about as broad as long . . . . . 6

5. Pronotum with a row of red spots each side . *luctuosa*

Pronotum with a stripe each side . . . . . *egregia*

6. Radial sector dark for a space before the stigma, usually outer gradates only dark . . . . . 7

Radial sector not partly dark, both rows of gradates dark . . . . . *singularis*

7. Divisory veinlet ends on end of cell as in Leucochrysa; pronotum with a reddish spot each side near middle of length . . . . . *alloneura*

Divisory veinlet normal for Nodita; pronotum with a stripe each side . . . . . *maronica*

8. Radial sector in fore or hind wings black in part near stigma, at least branches each side black . . . . . 9

Radial sector not black in part . . . . . 15

9. Palpi partly black; often a dark or reddish band across lower part of face, or a spot on each side . . . . . 10

Palpi pale; if a band on face it is just below antennæ . . 14

10. Tip of hind wings dark; usually some outer gradates bordered with dark . . . . . 11

Tip of hind wings not dark; outer gradates not bordered 12

11. Inner gradates dark; most cross-veins dark; basal part of antennæ below with dark marks . . . . . *orthones*

Inner gradates partly pale; many cross-veins pale; basal part of antennæ not dark below, some cross-veins bordered . . . . . *askanes*

12. Antennæ black about one third way out beyond second joint; marginal forks not wholly dark . . . . . *navasi*

Antennæ at most dark for a short distance below . . . 13

13. Radial sector in both wings partly black; end of third cubital cell very oblique; marginal forks almost wholly black . . . . . *lancala*

Radial sector in hind wings only partly dark; end of third cubital cell scarcely oblique; marginal forks dark only at base; wings narrower . . . . . *caucella*

14. A red spot each side near middle of face . *pallescens*

No such spots . . . . . *mexicana*

15. Hind wings much marked with dark, the tips black . . . . . *postica*

Hind wings little if any marked with dark . . . . . 16

16. Basal joint of antennæ nearly wholly dark above, and often on outer side; usually several of the gradates bordered;

palpi pale; pronotum hardly longer than broad, and with a reddish line on side . . . . . *cortezi*

Basal joint at most with one or two stripes . . . . . 17

17. One or two dark or reddish bands across face; vertex with an angulate red line . . . . . 18

No bands across face, at most a spot each side . . . . 20

18. Two stripes on basal joint of antennæ, one inner, one above; pronotum plainly longer than broad, with two dark spots each side . . . . . *Leucochrysa duarte*

Basal joint with but one dark stripe . . . . . 19

19. One dark band across face, basal part of antennæ dark for a few joints beyond the second . . . . . *maculata*

Two reddish bands across face and upper clypeus, basal part of antennæ not black; vertex with some dark transverse marks more or less distinct . . . . . *serrei*

20. Several joints of antennæ beyond the second with a dark mark beneath; vertex with an angulate red line in front; palpi pale . . . . . *antennata*

No joints marked beneath with dark on antennæ . . . 21

21. Basal joint of antenna with a reddish or dark stripe, several of the outer gradates bordered . . . . . 22

Basal joint of antenna without a distinct stripe, but sometimes wholly pale rufous; outer gradates not so plainly bordered . . . . . *lærtes*

22. Palpi pale, unmarked . . . . . *punctata*

Palpi largely dark . . . . . *salleana*

## Species Described from this Region but not Recognized, or Perhaps Synonyms

*Nodita explorator* Hagen 1861, type appears to be lost; agrees in some ways with *N. antennata*, but said to have a large dark spot on face.

*Chrysopa sulcata* Navas 1921, according to Smith notes is a Nodita; in the synopsis it will run to *duarte* from which it differs in having the pronotum broader than long.

*Nodita campioni* Navas 1914, is related to *askanes*, but the latter has a band across lower part of face at clypeal border, inner gradates not dark, and pronotal stripes have an inward projection.

*Nodita fuscinervis* Navas 1914, a rather large species, fore wing 19 mm. long, is about size of *pallescens*, but latter has the antennæ pale at base, no veins near wing base black, face differently marked.

*Nodita nevermanni* Navas 1928, is said to have basal antennal joint dark above which would thus fit *cortezi*, but the figure shows the pronotum shorter.

*Nodita salleana* Navas 1911 (*Chrysopa*). It is put in the synopsis through description and Smith notes.

*Nodita antica* Navas 1913 will run out to *N. punctata*, but from figure is a Leucochrysa. *Nodita lateralis* Navas 1913 also goes to *N. punctata* in table, but may be different.

*Nodita superior* Navas 1913 is a rather large species, with two curved marks on vertex; I have not seen it.

*Nodita zapotina* Navas 1913 seems to agree well with *N. antennata*.

*Nodita centralis* Navas 1913 may be *luctuosa* or near it, but the description does not fully agree.

*Nodita ceratica* Navas 1911 (*Chrysopa*) is a small species with several joints of antennæ near base dark; I cannot match it with any I have here.

*Nodita alternata* Navas 1913 may be the same as *N. mexicana* Bks.

*Nodita indiga* Navas 1928. Probably related to what I described as *N. askanes*, but no mention of dark area on radial sector, and over outer gradates.

*Nodita postica* Navas 1913 seems to be close to *radiosa* Gerst. or the same; I have not seen *N. radiosa* from Central America.

## Records

*Nodita luctuosa* Bks. 1914
Type from Orosi, Costa Rica.

*Nodita egregria* Navas 1913
From El Valle, Cocle Prov., Panama, 20 May.

*Nodita maronica* Navas 1915
From Barro Colorado, Canal Zone 10–13 November and 3 January. Described from French Guiana.

*Nodita ramosa* ? Navas 1917a
From Barro Colorado, Canal Zone, 20 July, 2 August; both specimens have palpi marked with black and may be new.

*Nodita maculata* Navas 1928
From Boquete, Chiriqui, Panama, 10 May, and El Volcan Chiriqui, 30 April.

*Nodita singularis* Navas 1913
One from El Cermeno, Panama, April–May, agrees well with the description.

*Nodita caucella* Bks. 1910.
From El Cermeno, Panama, April–May, and Panama City, Panama, 4 May. Described from Colombia.

*Nodita antennata* Bks. 1915
Type from Tuxpan, Mexico, 4 May.

*Nodita mexicana* Bks. 1900
From Cavarillo, Vera Cruz, Mexico, Lancetilla, Honduras; and Taboga Island, Panama, 10 June.

*Nodita punctata* Bks. 1903
Type from Guatemala; others, Barro Colorado, Canal Zone, November; and Corozal, Panama, 12 February.

*Nodita cortezi* Navas 1913
The specimens which agree with the description and figure have a dark brown spot below the base of each antennæ, not mentioned by Navas or Smith, but they could be overlooked. *N. calverti* Bks. 1914a is the same species, published a few months later. Specimens from Pedregoso, Costa Rica, February; La Campina, Panama, September, El Cermeno, Panama, April to May, and Costa Rica. *N. nevermanni* Navas 1928 may be the same species.

*Nodita navasi* Kimmins 1940
Kimmins lately renamed the second *Nodita alternata* 1914 of Navas; specimens from Lancetilla, Honduras.

*Nodita serrei* Navas 1923
From El Cermeno, Panama, April to May.

## Descriptions of New Species

### **Nodita alloneura** sp. nov.

In general structure close to *N. maronica*, but has the divisory cell as in Leucochrysa. Markings also similar, the radial sector

is black for some distance before stigma and branches each side black for a short distance; the marginal forks are wholly brown, and the hind margin of hind wings is brown; both rows of gradates pale. Stigma yellowish, with a prominent black spot at base. There are no marks on head, and antennæ pale. The pronotum is shorter than in *maronica*, being plainly broader behind than long in middle; there is a red spot near margin at about middle of length; lateral lobes of mesonotum with a small red spot in front; abdomen with a reddish spot each side on each segment, forming a row close to the median line.

The fore wings are nearly as broad as in *maronica*; the radial sector strongly curved, the radial area at widest much broader than the costal area; the inner gradates of twelve or thirteen extending somewhat basally; the outer gradates probably of twelve or more, the more basal ones being perfectly continuous with the medius, the two rows being more divergent and further apart than in *maronica*. There are nineteen radials and eight cubital cross-veins beyond the third cubital cell. In hind wing the radial sector is also black before stigma, other veins pale; the gradates, eight to ten, are more nearly parallel than in fore wing.

Length of fore wing 20 mm., width 7.5 mm.

One from Barro Colorado, Canal Zone, 2 December (M. Bates coll.). Type M.C.Z. no. 25652.

**Nodita askanes** sp. nov.

Face with a reddish spot each side between the eye and upper corner of clypeus; maxillary palpi largely black; antennæ pale, basal joint with a rather broad reddish stripe on outer side, second joint with a dark mark, six to ten joints beyond marked with black beneath; vertex with a reddish spot each side just above outer base of antennæ; pronotum with a moderately broad red stripe each side, at about middle there is a projection inward (somewhat like *indiga*), mesonotum usually has a reddish dot each side, and sometimes one over base of fore wings; abdomen with two large black spots above, one toward base, other toward tip; legs pale, unmarked.

Fore wings with radial sector more or less plainly black near the stigma, and two or three branches each side are black, and some of them bordered near the sector; origin of radial sector, last cubital cross-vein, first one or two of outer gradates also

bordered with brown; outer gradates and some of the inner row, most of the marginal forks at base and sometimes the last two or three of the branches of cubitus are brown; some of the costals, radials, and cubitals are usually partly brown; stigma brown at base. In hind wings the cross-veins and gradates mostly pale, sometimes one or two of the marginal forks dark, the radial sector is faintly dark toward the stigma and latter brown at base; the tip of wing has a prominent brown spot.

The pronotum is broader behind than long and with a median depressed line. In the fore wings the costal area (at broadest) is about as wide as the postcubital area, not as broad as the radial area; basal side of divisory cell moderately oblique and about one half to two fifths of the outer side; seven cubitals beyond divisory, all the cells longer than high; gradates usually five or six in each row, the rows parallel, but not very near each other, the branches of radial sector much bent at inner gradates; several cross-veins in subcostal stigmal area, many in costal area.

In hind wings usually four or five inner, five or six outer gradates, nearly parallel, seven cubital cross-veins.

Length fore wing 13 mm., width 4.5 mm.

From Moca, Gautalon, Gutemala, March, April, 1000 m. (Bequaert), old specimen "Guatemala," and Subirana, Yoro, Honduras, 7 March (Stadelman). Type M.C.Z. no. 25654.

### **Nodita lærtes** sp. nov.

Face with a small reddish spot below each antenna, and not far from inner edge of eye (sometimes obscured by discoloration); palpi pale; vertex with a small spot or two short fine divergent lines of red in front, or sometimes absent; antennæ pale, basal joint without stripe, but sometimes more or less wholly rufous above; no dark dots on under side of antennæ toward base; pronotum with a short stripe or line near middle each side, sometimes reaching front; mesonotum usually brown on the lateral lobes and extending slightly over base of wing; the front of anterior lobe usually marked with reddish or dark; abdomen with two large dark spots above; legs pale.

Fore wings with gradates and last one or two cubitals wholly dark, not bordered; origin of radial sector, marginal forks at base, and many cross-veins at one or both ends dark; stigma

with a prominent dark brown spot at base. In hind wings the venation is mostly pale, the outer gradates dark.

Pronotum hardly as long as broad behind, narrowed toward front, depressed along middle. Fore wings rather broad and blunt toward tip; ten or eleven radial cross-veins, four to six inner and five to seven outer gradates, nearly parallel; the inner gradates usually arising beyond the penultimate cubital cross-vein; the branches of radial sector not much bent by the inner gradates; the costal area almost as broad as the postcubital, the radial area broader than either; in hind wings seven cubital cross-veins, about eight radials, gradates with usually four in each row, parallel, but rather widely separated.

Length of fore wing 10 to 11.5 mm., width 4 to 4.5 mm.

Several from Juan Mina, Rio Chagres, Canal Zone, 11, 12 April (Fairchild coll.). Type M.C.Z. no. 25656. *N. ceratica*, *indiga*, and *championi* have dark dots on under side of antennæ toward base, but are otherwise somewhat related.

**Nodita orthones** sp. nov.

Face with a black spot under each antenna, and another in middle below them, maxillary palpi mostly dark, the depression of vertex dark each side; antennæ pale, basal joint rather slender, with a reddish streak on outer part above, not a definite stripe, rest of antennæ wholly pale; pronotum with a reddish stripe each side, rather broad in front, middle of pronotum depressed and dark (probably discolored) meso- and metanotum mostly dark, extending out on base of wings; abdomen without definite dark spots; legs pale.

Fore wings with the radial sector dark for quite a long distance; gradates black, outer ones and base of radial sector bordered; nearly all other cross-veins and marginal forks wholly dark brown, a few of radials not wholly dark, the intermediates and branches of radial sector to the inner gradates dark, between the gradates series the branches are mostly pale; stigma with a rather pale brown spot at base. In hind wings some of the costals, the gradates, the marginal forks, and the last few radials are dark, the radial sector is plainly dark for a short distance; the tip of wing and the base of stigma are brown.

The pronotum is nearly as long as broad behind, the median depression prominent, no transverse groove.

The fore wing has the costal area rather narrow, not as broad

as the postcubital area, and the latter not nearly as broad as the radial area; base of divisory cell about two thirds of outer side, and moderately oblique, tip of third cubital cell plainly oblique, seven cubitals beyond the divisory, the cells mostly longer than broad; a few cross-veins in subcostal stigmal area, many in the costal area, five inner and six outer gradates, only silghtly divergent, branches of radial sector much bent at inner gradates. In hind wing four gradates in each series, rows slightly divergent, seven cubital cross-veins.

Length of fore wing 13 mm., width 4.7 mm.

One from Juan Mina, Rio Chagres, Canal Zone, 12 April (Fairchild). Type M.C.Z. no. 25655.

**Nodita pallescens** sp. nov.

Face with a rounded red spot on each side below antenna; palpi pale; front of vertex with an angulate red line across; antennæ pale, the basal joint with a faint reddish spot at outer tip, no distinct stripe; pronotum with a faint line each side, on the posterior part is a dark line on each side, its front end bent toward the middle; meso- and metanotum greenish, unmarked. Abdomen pale, slightly darker at ends of segments; legs pale, very slender.

In the wings the veins are very fine; in fore wings the gradates are mostly dark (not black), the marginal forks also, the radial sector at base and toward stigma a rather long stretch dark; nearly all the cross-veins are partly dark, usually only in middle. In the hind wings the radial sector and two or three radial cross-veins dark near stigma; the gradates are scarcely darkened, the outer ones more plainly so; the stigma is not plainly brown at base, but the subcostal vein there is black.

The pronotum is about as long as broad behind, near front much narrowed.

The wings are long and slender; in the fore wings the costal area is almost as wide as the post-cubital, the radial area broader than either; the third cubital cell is scarcely narrower at base than at the oblique tip; the divisory cell ends far beyond the cross-vein above, the base quite oblique and but little more than one half of the outer side, seven or eight cubitals beyond; eight inner and nine outer gradates, the rows slightly divergent, branches of radial sector strongly bent by inner gradates, and more than usual by the outer series; fifteen radial cross-veins;

subcostal stigmal area with only a few cross-veins, costal area densely veined. In hind wings four or five inner and six outer gradates, nearly parallel, but not very near each other; eight cubital cross-veins, twelve or thirteen radials.

Length of fore wing 18.5 mm., width 6 mm.

One from San Jose, Guatemala, February 1905 (Baker). Type M.C.Z. no. 25651.

**Nodita panamana** sp. nov.

Head pale, a reddish spot or line under each eye; palpi pale; first three joints of antennæ pale, beyond deep black, basal joint with a reddish stripe above. Thorax pale; pronotum with red stripe each side; lateral lobes of mesonotum often with a dark dot toward front; abdomen pale, unmarked; legs pale.

Fore wings with long yellowish brown stigma, anterior end darker; gradates and outer marginal forks wholly dark, costals dark at one or both ends, radials and some others dark in middle or at one end; radial sector toward stigma dark for some distance, and dark at origin. In hind wings the radial sector is also dark for a space, the outer gradates and the outer part of marginal vein dark brown.

Pronotum almost as long as broad behind, narrowed somewhat toward front.

In fore wings the costal area at broadest is hardly as broad as the postcubital, the radial area much broader than either; base of divisory cell but little oblique, only about one half length of outer side which is curved; usually six or seven inner and eight outer gradates, not quite parallel, branches of radial sector much bent by the inner gradates; third cubital cell nearly as broad at base as at tip which is oblique, other cubital cells longer than broad, seven cubital cross-veins beyond the divisory; in subcostal stigmal area are a few cross-veins, many in costal area.

In hind wings about five or six inner and seven outer gradates, in slightly divergent rows, and rather further apart than in fore wing; seven cubital cross-veins; the radial area is broader than the postcubital.

Length of fore wing 15 mm., width 5 mm.

Many specimens (alcoholic) from La Campana, Sept., and El Cermeno, April, May, June, both Panama (Zetek coll.). Type in U.S.N.M. Paratypes there and in M.C.Z. no. 25659.

*Key to Species of Leucochrysa*

1. Fore wings about 20 mm. long or more . . . . . 2
Fore wings about 15 to 17 mm. long . . . . . 6
Fore wings about 12 to 13 mm. long, divisory vein usually ends on medius before end of cell . . . . . 7

2. Fore wing with a dark streak or umbra behind the rhegma . . . . . *dolichocera*
No such streak . . . . . 3

3. In fore wing a cell behind third cubital cell is opaque, sometimes also opaque above it . . . . . *clara*
No such opaque cell . . . . . 4

4. Radial sector much curved and black for a space before the stigma . . . . . *Nodita alloneura*
Radial sector only slightly curved and not black toward stigma . . . . . 5

5. Pronotum plainly longer than broad behind, and tapering forwards . . . . . *varia*
Pronotum about as broad behind as long in middle, less tapering in front . . . . . *pretiosa*

6. Base of radial sector covered by a large dark spot; inner gradates not extended basally . . . . . *notha*
Base of divisory cell covered by a black mark; inner gradates extended basally . . . . . *erminea*

7. Two spots each side on margin of pronotum, one reddish, one nearly black; a reddish spot under each eye; basal joint of antennæ with reddish stripe above; outer gradates bordered . . . . . *duarte*
A marginal line on pronotum; no spot under eye; basal antennal joint reddish on outer side . . . . . *antica*

*Leucochrysa variata* Navas 1913 and *L. angradi* Navas 1911 I presume are the same as *pretiosa* Bks. 1910, at least I do not know how to separate them. *L. negata* Navas 1913 appears to be different from any I have seen, although said to be similar to *variata*. *L. delicata* Navas 1925, I think is surely *pretiosa*.

## Records

*Leucochrysa clara* McLachl. 1867

From Bugaba, Panama and El Volcan Chiriqui, 24 February.

*L. scioptera* Navas 1913 is the same species.

*Leucochrysa varia* Schneider 1851
Recorded from the region by Navas, but probably *pretiosa*.

*Leucochrysa pretiosa* Bks. 1910
From Barro Colorado, Canal Zone, January, 15, 22, 25 July, December; El Cermeno, Panama, April, May; La Campana, Panama, September, Cayuga, Guatemala, June; Volcan Sta. Marta, Guatemala, June; Limon, Costa Rica, 24 May; and Alta Vera Paz, Guatemala, 24 April. In *pretiosa* the inner gradates are more nearly parallel to the outer and do not extend up so near to the radial sector as in *varia*. Also in *pretiosa* the divisory cell has the outer side little longer than basal side; in *varia* the basal side is usually much shorter, but there is variation; the sure way to separate them is by the longer pronotum of *varia*. From the Hagen collection we have a type or cotype of *varia*.

*Leucochrysa notha* Navas 1913 is not a Nodita, but I have not seen it in my material.

*Leucochrysa dolichocera* Navas 1913 I have not seen, but is evidently related to the South American group of *longicornis* and so placed in synopsis.

*Leucochrysa vulnerata* Navas 1914 from Guatemala; probably related to *pretiosa*.

## Descriptions of New Species

### **Leucochrysa duarte** sp. nov.

Face with a reddish spot each side near eye (not below), the two connected by a faint line; last joint of maxillary palpi mostly black; a dark spot just above base of antennæ, basal joint of antennæ blotched with reddish, on the outer side nearly forming a stripe, second joint reddish, third joint black in front, beyond wholly pale; pronotum with two somewhat rounded reddish spots on each side margin, one at anterior end, very dark, other at about middle; a small reddish spot on each lateral corner of the anterior lobe of the mesonotum, a reddish and blackish mark on base of each wing, scarcely extending over the lateral lobes, rest of thorax pale yellowish; abdomen pale, with three large black spots above, one near base, the others on adjoining segments near tip; legs pale.

Fore wings with a dark spot over base of radial sector, and the outer gradates black and plainly margined with brown, also

over the last cubital, and the bases of marginal forks; inner gradates dark, one or two of them faintly margined; the stigma with a large dark spot at base, and behind are three or four dark radials, faintly margined; the cubital cross-veins are also dark and some slightly bordered; many costals wholly or partly brown. In the hind wings the outer gradates faintly dark; the stigma with a large brown spot, and behind one or two radials dark. The pronotum is plainly longer than broad, the sides parallel. In the fore wings there are eleven radials, five or six outer and five inner gradates, not parallel, rather wide apart, the inner row nearer to radial sector than to the outer row, latter rather close to outer margin; branches of radial sector much bent at inner gradates; veins only sparsely haired; divisory cell long, tip sharp-pointed and on one wing almost reaches the end of cell, base slightly oblique, hardly one half of outer side, seven cross-veins beyond; costal area nearly as wide as post-cubital, but the radial area still broader (at its broadest); cubital area not one half of postcubital. In the hind wings the postcubital area is not quite as broad as the radial; four inner, five outer gradates, nearly parallel, but well separated; six cubitals, eight radial cross-veins.

Length of fore wing 11 mm., width 3.8 mm.

One from Pedrogoso, Costa Rica, 2100 ft., February, (Rounds coll.). Type M.C.Z. no. 25658.

Differs from *Nodita cortezi* in longer pronotum, with two rounded spots each side (instead of one line); the reddish (instead of brown) spots below antennæ, and further down; in the partly black palpi; and the basal joint of antennæ not so much dark; and by the slightly curved radial sector belongs in Leucochrysa. From *Leucochrysa notha* and *antica* Navas it is separated by the spots on face and side of pronotum; the stripe on basal joint of antenna on upper (not outer) side; the palpi are marked with dark, and the inner gradates run up closer to the radial sector.

### **Leucochrysa erminea** sp. nov.

Face without definite marks, except dark spot under each eye; palpi pale, marked with dark; antennæ very long, pale, basal joint and second dark above, a faint dark mark over two more joints; pronotum broader than long, sides dark; mesonotum dark over base of fore wings, metanotum dark in front,

scutellum pale; abdomen with two segments toward tip reddish above. Fore wings with dark spot over the short vein below divisory cell, more over base of radial sector; dark spot at base of stigma, another over last cubital cross-vein, one or two cross-veins before also brown, outer gradates brown, also base of outer forks, few cross-veins dark at one end, mostly pale. In hind wings the stigma dark at base, veins mostly pale, outer gradates partly dark.

In fore wings the costal area fully equal to radial area in width; fifteen radials, eight cubitals beyond third cubital cell, eight or nine inner gradates, six outer ones, inner row extended basally, four cubital cross-veins beyond its origin, slightly divergent from outer row. In hind wing eight cubital cross-veins, seven inner and six outer gradates, inner row extended basally a little.

Fore wing 15.5 mm. long, 5.5 mm. wide.

One from Barro Colorado, Canal Zone, August (F. H. Hull). Type M.C.Z. no. 25657.

### **Neula** Navas

I consider my *Allochrysa titan* as belonging to this genus. In the genotype from Colombia Navas shows an intermediate row of gradates; in *titan* the row is broken, two in one wing, four in other; however, it agrees with Neula in many other points. The radial area is broadest toward base (not in middle as in Nodita); and at middle (half way from origin to stigma) the radial sector is much nearer to radius than to medius. The costal area is not as broad as the radial area; the antennæ are very long; it differs from Leucochrysa chiefly in having the radial sector more sinuous.

### **Neula titan** Bks. 1915

I have seen only the type.

The palpi are partly black; the pronotum broad, the transverse groove near the hind border, in front of groove there is a slight elevation. The postcubital area about twice as broad as the cubital. The third cubital cell has one branch toward the margin and it soon forks, one part running into the fork of first anal vein, the other reaching the hind margin, alike in both fore wings. There are 20 to 22 radials, 13 to 14 inner gradates,

12 to 13 outer, the rows far apart and not parallel, giving room for the middle row; seven intermediates; ten cubitals beyond the third cubital cell. In hind wing eleven gradates in each row, rows fairly parallel; about nine or ten cubitals. The legs are rather stout, the hind tibia about three and a half times the length of the hind tarsus; front tibia hardly more than twice as long as tarsus.

Leimon, Costa Rica, 24 May (Schaus).

### **Chrysopodes sallei** sp. nov.

Body and appendages pale, palpi pale; basal joint of antenna with two red brown stripes, one on outer side and one above; no mark on cheeks, pronotum with a red brown stripe each side; abdomen unmarked.

In the fore wings some of the costals, most of the radials, three intermediates, the gradates, all of the cubitals, and some of the branches of the cubitus are dark; stigma but little marked. Pronotum a little broader behind than long in middle, sides parallel to near front and then much narrowed; the transverse groove close to the hind ridge.

Wings moderately slender, tips in a point, hair of moderate length. In fore wings the costal area is not as broad as radial, the latter a little broader than the postcubital, and this much broader than the cubital area; eleven radials, five cubitals beyond the third cubital cell, all but the last one oblique; divisory veinlet parallel to the medius, latter slopes straight to its marginal fork; four inner and seven outer gradates, the rows parallel and near each other, the inner very far from radial sector. In hind wings two or three inner and four outer gradates, also parallel and near each other, seven cubital cross-veins.

Length of fore wing 14 mm., width 4.8 mm.

One labeled "Mexique Salle" from Hagen collection. Type M.C.Z. no. 25663.

Easily separated from C. *canudasi* Navas by the two stripes on basal antennal joint, fewer gradates, unmarked marginal forks.

### **Chrysopodes canudasi** Navas 1913

Described from Guatemala; I have not seen it.

## Records of Other Genera

*Berkmansus cinctipes* Bks. 1915

Type from Corozal, Panama. Described as a Leucochrysa; in structure like *B. elegans* Guerin, but without large marks. Besides the two dark bands on the tibia the tip of tarsus is black, and the outer margin of wing is dark at end of each vein. There are five or six cubitals beyond the third cubital cell; the gradates are parallel, the inner row almost as near to radial sector as to the outer row.

*Chrysopiella sabulosa* Bks. 1915

One from Tlahualilo, Durango, Mexico, 30 August, does not differ from specimens from Arizona.

*Eremochrysa punctinervis* McLachl. 1869

From Tlahualilo, Durango, Mexico, 30 August, and Sierra de los Burros, Coahuila, Mexico, 3 June. Like Texan specimens; *E. digueti* Navas 1911 may be the same species.

*Nadiva balboana* Bks. 1941

Types are from Barro Colorado, C. Z. in March and April.

*Meleoma innovata* Hag. 1861

From Contreras, Mexico, 2 July, and Amecameca, Mexico, also Cerro Tancitaro, Michoacan, Mexico, 8 July. *M. mexicana* Bks. 1899 is a synonym.

*Meleoma titschacki* Navas 1928 described from San Jose, Costa Rica, I have not seen.

*Meleoma dolicharthra* Navas 1914 (Chrysopa), I have not seen; it was described from Guatemala.

*Gonzaga torquata* Navas 1913

From Trinidad River, Panama, 2 March, and Alajuela River, Panama, 9 April.

## Bibliography

Banks, N.

1895. Proc. Calif. Acad. Sci. (2) V.
1899. Trans. Amer. Ent. Soc. XXV.
1900. Trans. Amer. Ent. Soc. XXVI.
1901. Trans. Amer. Ent. Soc. XXVII.
1903. Journ. N. Y. Ent. Soc. XI.
1905. Trans. Amer. Ent. Soc. XXXII.

1910. Proc. Ent. Soc. Wash. XII.
1913. Proc. Ent. Soc. Wash. XV.
1914. Can. Entom. XLVI.
1914a. Ent. News XXV.
1915. Proc. Acad. Nat. Sci. Phila. f. 1914.
1920. Bull. Mus. Comp. Zool. LXIV.
1938. Can. Entom. LXX.
1945. Bol. Entom. Venezolana. IV.

Burmeister, H.
1839. Handbuch der Entomologie, Neuropt. II, pt. 2.

Coquillett, D. W.
1890. Rept. Calif. State Bd. Hortic.

Gerstaecker
1888. Mitth. Natur. Ver. Neupom. u. Rügen.
1893. Mitth. Natur. Ver. Neupom. u. Rügen.

Guerin-Meneville
1843. Icon. Regne Animal, Insectes.

Hagen, H. A.
1861. Synop. Neuroptera N. Amer.

Kimmins, D.
1940. Ann. Mag. Nat. Hist. (11) V.

McLachlan, R.
1867. Journ. Linn. Soc. Lond. Zool. IX.
1869. Entom. Month. Mag. VI.

Navas, P. A. Longinos
1911. Ann. Soc. Sci. Bruxelles XXXV.
1913. Ann. Soc. Sci. Bruxelles XXXVII.
1913a. Entom. Zeitschr. (Frankfurt) XXVII.
1914. Ann. Soc. Sci. Bruxelles XXXVIII.
1915. Mem. R. Acad. Cien. Artes Barcelona XI.
1917. Mem. R. Acad. Cien. Artes Barcelone XIII.
1917a. Mem. Pont. Accad. Sci. Nuovi Lincei (2) III.
1921. Rev. Acad. Cien. Zaragoza VI.
1923. Riv. Chilena Hist. Nat. XXVII.
1925. Mem. R. Acad. Cien. Artes Barcelona XIX.
1926. Broteria XXIII.
1927. Riv. Chilena Hist. Nat. XXXI.

1928. Bol. Soc. Entom. Espagna.
1929. Mem. Pont. Accad. Sci. Nuovi Lincei (2) XII.
1929a. Mem. R. Soc. Espagna Hist. Nat. XV.
1930. Riv. Chilena Hist. Nat. XXXIV.
1931. Rev. Acad. Cien. Madrid XXV.

Schneider, G. T.
1851. Monog. generis Chrysopæ Leach.