

A REVISION of the NEARCTIC CHRYSOPIDÆ.

BY NATHAN BANKS.

Every entomologist knows *Chrysopa*; for there are few regions in the world where insects abound unrepresented by *Chrysopa*, or some allied genus. Throughout our country *Chrysopa* is represented in every locality by several species; and everywhere there is at least one species which may be reckoned among the "common insects." The delicate green color, the beautiful golden eyes, and, above all, the peculiar odor of certain species have made *Chrysopa* familiar to every collector of insects.

The family Chrysopidæ is distinguishable from the other families of Neuroptera by the following characters:

Mouth not rostrated, no anal space to the hind wings; anterior legs simple (not raptatorial); wings bare (not powdered); antennæ setiform; costal space of anterior wing is narrow at base, no recurrent vein, transverse veinlets in gradate series. The family is closely related both in structure and in larval habits with the Hemerobiidæ, but a colorational character will always separate them; the Chrysopidæ are usually mostly green, while the Hemerobiidæ are never green, but more or less brown. There are various structural characters which separate the two families. The pronotum in Chrysopidæ is usually as long or longer than broad, in the Hemerobiidæ it is plainly broader than long. The wings of the Chrysopidæ have many more cross-veins than in the Hemerobiidæ; the result is that most of the cells in a Chrysopid wing are rarely more than twice as long as broad, while in the Hemerobiid wing the cells are three times and usually four to six times as long as broad. In the Chrysopidæ there is but one radial sector which is connected back to radius by at least six cross-veins. In the Hemerobiidæ there are usually several radial sectors, and the last is connected back to the radius by only one to three cross-veins. In the Chrysopidæ the radial sector of the hind wing is united for some distance to the median vein; this does not obtain in the Hemerobiidæ.

The Chrysopidæ are insects of rather small size with comparatively large wings. At rest, the wings are held roof like over the body, and the antennæ are extended outward and forward. Their flight

is never rapid, and usually slow and somewhat irregular. They fly little during day-time, and not far even when disturbed. At twilight and in the early evening their flight is more extended, and they are then at their best. Several species are attracted to lights. The females appear to generally deposit their eggs in the afternoon or evening. Pairing, as far as I have observed, takes place in the day-time; the sexes are attached end to end. There are no secondary sexual characters, save in the genus *Meleoma*, where the male has a protuberance between the bases of the antennæ.

The odor, so characteristic of some of the commoner species of *Chrysopa*, is not (as has been noticed by several writers) found in all of the species. *C. 4-punctata* is the most common of the inodorous species, *C. oculata* the most common of the odorous ones. The cibarian structures are quite well developed; the mandibles are short and stout; the maxillæ large, and with five jointed palpi; the labial palpi three-jointed. Yet, so far as I am aware, the adult insect takes no nourishment. However, they probably live for a week or more. When they die, their frail bodies must soon disappear, as I have never found a dead specimen.

The genital organs in nearly all of our species are withdrawn in the last segments of the abdomen; they are rather soft and probably shrink in drying. They have been used in the separation of some European forms, but in the few closely allied forms that I have examined, they are not useful. The tarsi terminate in two claws, similar in character in all of our species.

Chrysopa has long been familiar to entomologists on account of its remarkable larval habits. They pass the winter usually as pupæ, but at least one species, *Chrysopa plorabunda*, hibernates in the adult state. Flies of this species have been found in hedges and heaps of dry leaves during January, February and March. The hibernating pupæ hatch, according to the species, from March to June. The flies mate as soon as possible, and then the females proceed to attach their curious eggs in favorable situations. The egg is elliptical in shape and attached at one end to a long slender pedicel, whose base is expanded and attached to the leaf or twig. Usually there is but one egg to each stalk; but I have found in July a single stalk on the bark of oak trees, which bore at its summit a cluster of ten or fifteen eggs. I did not succeed in rearing the larvæ. At least one European species has a similar habit. In some species the

eggs are laid in groups of from eight to thirty (*C. oculata*), in others the eggs occur singly (*C. rufilabris*). In the latter class the pedicel is often shorter than in the former group. In many cases the eggs are laid in proximity to colonies of plant-lice, upon which the larvæ are destined to feed. Sometimes, however, the larvæ are obliged to search for food.

At the top of each egg is a micropyle—a cup shaped piece projecting above the surface, with a minute central pore. The top of the egg is irregularly reticulate; the base is more pointed than the top. The egg in a day or so becomes darker, and cracks across the top and partly down one side. Through this slit the larva crawls out. It is very bristly, has a big head, and a tapering body. The jaws are very large, the antennæ long and curved, and the palpi broad and project out in front. The legs are slender, and each tipped with two claws and a longer median sucker. The larva of each species is characteristic, though larvæ of closely allied forms differ but little.

The larva crawls down the pedicel to the leaf, and soon moults. Fitch has recorded that in some species the first food of the larva was eggs of other insects, after which the larva attacked plant lice. In other species, however, the larvæ do attack plant-lice for their first meal, and are not as timid as Dr. Fitch records of the larva he observed. As the larva grows in size it becomes more fusiform in shape, and in many species each segment develops a lateral protuberance bearing a bunch of bristles. The color becomes darker and often spotted; the larvæ of the few species known to me being marked in a different manner. The question of the larval moults is one of peculiar interest. The new-born larva soon moults as is readily observable; but from this time till it moults within the cocoon most authors have observed no moulting. Fitch and Schneider record that they have not seen a moult, and I have watched in vain. Vine describes one moult about midway in larval life.

The larvæ of some species cover themselves with a pile of debris, made up of the skins of their victims. This scalp-carrying habit is also found in the larvæ of some Hemerobiids. It is a protection; but some species that do not have it are extremely numerous and appear moderately free from parasites. In travelling about on the leaf or bark the larva walks in a restless, interrupted way, turning

the head from side to side, and keeping the palpi in motion. The tail is often used to hold on to some spot, but when not in use is often carried turned to one side.

These voracious little larvæ are known as "aphis-lions;" their principal food being aphids. However, they will feed on almost any soft insect, and even upon each other. It seizes the aphid with a quick movement of the jaws and rapidly sucks the unfortunate victim dry, often turning it around in order to extract all the juices. In this manner they destroy a great number of plant-lice in a day. The innumerable hosts of aphids with their remarkable fecundity are no match for the ravenous appetite of these *Chrysopa* larvæ, and in a few days plants badly infested with "green fly" are clean again. Their useful habits have been commented upon by almost every economic entomologist; not only in the destruction of plant lice, but as attacking the pear-tree *Psylla*, scale insects, the chinch-bug, elm-leaf beetle and other pests.

The length of the larval life is from one to three weeks. When a proper size is reached the larva rests for a time and then proceeds to spin the cocoon. This may be placed almost anywhere, sometimes in a crevice of the bark or a fold in the leaf, but quite as often they are fully exposed to view. The larva, which is now fusiform in shape, spins around itself threads which are drawn tighter and tighter till the larva is curled upon itself as closely as is possible. The spinning continues and results in a practically spherical cocoon, white or yellow in color. Some cocoons are more elliptical than others.

The silk glands open near the end of the abdomen, and they emit a single smooth thread.

After a period of about ten days the pupa cuts off a circular lid from the cocoon and crawls almost or completely out. The mandibles of the pupa are short, stout and sharp-pointed, enabling the creature to cut through its tough cocoon. In a few minutes its back bursts along the median line and from it gradually issues the adult fly; at first pale and weak, but in the course of an hour or so assumes its full coloration and development.

Shimer has noted that in a larva that had but four legs, the adult fly from it had all six legs fully developed. Since the Chrysopid larva lives exposed it is not strange that they are attacked by various parasites. The Chalcidids, *Perilampus hyalinus*, *Chrysopopha-*

gus compressicornis, *Syntomosphyrum orgyia*, *Aphycus chrysopæ*, and all the species of *Isodromus* issue from the cocoon. Two Ichneumons, *Otacustes chrysopæ* and *O. atriceps* have also been bred from cocoons. A Proctotrypid, *Telenomus chrysopæ*, has been bred from the eggs.

HISTORICAL.

Several of our early entomologists recognized that we had more than one species of *Chrysopa*, but failed to distinguish them from the European species. Thomas Say, the first in this, as in many groups, described *Chrysopa oculata* in 1839. About the same time Burmeister issued his "Handbuch" in which five species are described from our country, one of which is considered identical with Say's species. Nothing was published for a number of years, until in quick succession appeared the works of Schneider (1851), Walker (1853), and Fitch (1855). Schneider's work is a monograph of the species of the world. He recognized all of Burmeister's species and added two new ones. Walker's "Catalogue" contained three new species from the United States. Fitch did not recognize any of the previously described species, but described all the forms known to him (twenty-three in number) as new. Probably he was unaware of Schneider's and Walker's works. About twelve of his species fall as synonyms.

Hagen in his "Synopsis of the Neuroptera of North America" (1861) added four species. Shimer in 1862 described one species, since shown to be identical with one of Fitch's. In 1869 McLachlan described a handsome species from Texas.

In 1890 Mr. Coquillett, in the Report of the State Board of Horticulture of California, described a new species—*C. californica*. In 1892 the present writer described a *Nothochrysa*, and since then has added nine other species. In 1894 Mr. Mac Gillivray described two species of *Nothochrysa*; and in 1901 Mr. McClendon described a new species from Texas. Thus up to date we have fifty-five names for the Chrysopidæ of the United States, proposed by twelve persons.

CLASSIFICATION.

For a long time the genus *Chrysopa* covered all the forms. Gradually it has been split up, and in this paper our species are distributed in six genera. Two of these are new. Most of the

genera are very well separated, but *Leucochrysa* is very close to the *nigricornis* section of *Chrysopa*. These six genera may be separated by the following table:

1. Third cubital cell divided longitudinally into two sub-equal parts..... 2.
 Third cubital cell divided obliquely into two very unequal parts..... 3.
2. Veinlets on outer and posterior margins of wings forked; color green.

Allochrysa.

Veinlets on outer and posterior margins of wings mostly simple; color dark.

Nothochrysa.

3. Gradate series in fore wings of but three or four veinlets; in hind wings but one series of gradate veinlets.....**Eremochrysa.**

Gradate series of fore wings of more than four veinlets, rarely with but one series in hind wings..... 4.

4. Basal joints of antennæ widely separated and rather slender; in male with a horn between them.....**Meleoma.**

Basal joints of antennæ quite close together; no horn in male..... 5.

5. Antennæ much longer than wings; pterostigma with a brown dot.

Leucochrysa.

Antennæ shorter, or but little longer than wings; pterostigma without brown dot.....**Chrysopa.**

NOTHOCHRYSA McLach.

Similar to *Chrysopa*; the third cubital cell divided subequally as in *Allochrysa*, but differing from both of these genera in having the veinlets on the posterior and outer margins of wings not forked. The third cubital cell has but one branch to the hind margin, while in all our other genera there are normally two. The uniform dark venation and the generally dark color also distinguish this genus from all our other species. Type *N. fulviceps*.

Nothochrysa californica Banks.—Head yellowish; antennal bases surrounded with black which extends upward on vertex in three lines, one each side near the eye, and one median, enlarged at tip on top of vertex. Antennæ wholly black. Pronotum dark brown, with a paler median stripe, and the sides narrowly yellow. Rest of thorax and the abdomen dark brown, the latter marked with yellow near the tip. Legs brownish, the tibiæ rather pale. Wings with wholly brown venation; pterostigma brown and very distinct; quite close to tip of wing. Antennæ rather short. Pronotum longer than broad, tapering in front. Abdomen quite large, especially at the tip. Wings broad, both pairs rounded at tips; only very few of the veinlets on outer and posterior margins of wings forked, and these only slightly. Length 14 mm.

The type is from Southern California. There is a specimen in the National Museum from the same State. It is one of the most remarkable and striking forms in the family as represented in this country.

ALLOCHRYSA gen. nov.

Similar to *Chrysopa*, but the third cubital cell is nearly equally divided, the divisory veinlet running into the end-veinlet of the cell instead of into the upper margin. The antennæ are quite long, their bases close together. There are two full series of gradate veinlets in each wing. Type *A. virginica*.

The two species known to me are separated as follows :

Pterostigma marked with brown ; large species ; basal part of antennæ pale.

virginica.

Pterostigma unmarked ; small species ; basal part of antennæ black. **parvula.**

Allochrysa virginica Fitch.—Green, unspotted ; but in life the abdomen is marked with reddish and yellow. Antennæ as long as wings. Pronotum as long as broad, tapering in front. Legs very slender. Wings large and long, fore pair rounded, hind pair acute at tips ; third cubital cell divided obliquely ; both series of gradate veinlets are very full. Venation green, except the outer gradate series which is brown, and sometimes the radial cross-veinlets are dark at bases ; pterostigma in both pairs with a brown spot at base, and in fore wings there is a brown dot on the last veinlet connecting the cubital and median veins. Length 19 mm.

The type came from Cartersville, Virginia. I have taken specimens in the District of Columbia from oak trees in July, and have co-types of *N. phantasma* MacGillivray from W. Chop, Mass., in August ; also from Florida. Have also seen a specimen from Staten Island, N. Y., in August. This species appears to favor the oak tree, and lives among the upper branches where its capture is most difficult.

Allochrysa annulata MacGillivray.

I have not seen this species. In coloring of head and wings it agrees exactly with *Chrysopa oculata*, and I suspect it is a sport of that species. It was described from Massachusetts.

Allochrysa parvula n. sp.—Face pale yellowish, vertex greenish, devoid of markings ; basal joint of antennæ pale yellowish, outside with a black line, second joint and about a dozen following black, beyond pale ; prothorax green, margined on the sides with red-brown most broadly in front ; rest of thorax and the abdomen pale greenish, unmarked ; wings hyaline, veins green, most of the transversals brown, pterostigma not distinct. Head rather broad, vertex with a slight depression in the middle ; antennæ about as long as wings ; pronotum short and broad, plainly narrowed near front ; wings moderately long and acute at tips, third cubital cell divided into two sub-equal parts by the divisory veinlet, radial sector connected to the median by four cross-veins, beyond which there are five branches of the sector. Length 11 mm.

One specimen from Runnymede, Florida. Bred from a white cocoon enclosed in a mass of rubbish. It is the smallest of our species of this genus, and differs from the others in that the median vein runs straight to the hind margin and not into the second series of gradate veinlets.

LEUCOCHRYSA McLach.

General characters of *Chrysopa*, but antennæ very much longer than the wings. Pterostigma very distinct, brownish. The third cubital cell is divided obliquely, but the divisory veinlet is nearly straight, and starts close to the cubitus. The first connecting veinlet from the radial sector back to the median extends basally before the origin of radial sector (not so in *Chrysopa*). The genus, with us, occurs only in the Southern States, and is more fully represented in tropical countries. Type *C. varia*.

Our two species may be distinguished as follows:

Basal joints of antennæ reddish above; anterior wings quite broad; gradate series nearly parallel, the inner of 7-8 veinlets; large species...**floridana.**

Basal joints of antennæ not reddish above, anterior wings rather narrow; gradate series converging behind, the inner of 5 veinlets; smaller species.

americana.

Leucochrysa floridana Banks.—Pale green; basal joints of antennæ reddish above; a narrow transverse red line, angulate at middle, on the front of vertex reaching from eye to eye. Pronotum narrowly reddish on margin. Wings with green veins, most of the cross-veinlets in fore wings black; pterostigma long, brownish, very distinct in both pairs. Antennæ longer than the wings, vertex somewhat elevated, but flat on top; pronotum longer than broad, much narrowed in front. Anterior wings broad, rounded at tips; hind wings rather narrow, acute at tips; gradate series nearly parallel, seven to eight veinlets in inner series. Length 17 mm.

Specimens come from Lake Worth and Biscayne Bay, Florida, and from Ocean Springs and Utica (August), Mississippi. It may be the *Chrysopa citri* Ashmead, but his description may apply to the next species, or to some species as yet unknown to me.

Leucochrysa americana Banks.—Pale green; vertex with a narrow transverse red line, angulate in middle, reaching from eye to eye; pronotum with a red mark on anterior sides. Wings with green venation, a few of the cross-veinlets wholly or in part black; pterostigma brownish, very distinct in all pairs. Antennæ much longer than the wings; vertex with two pits above; pronotum longer than broad, much narrowed in front. Wings rather narrow, the fore pair nearly acute at tips, the hind pair plainly so. The gradate series converge behind, the inner series of five veinlets. Length 15 mm.

One specimen, the type, from Auburn, Ala.

CHRYSOPA Leach.

The third cubital cell is unequally divided, the veinlet running into the upper border of the cell. There are two series of gradate veinlets in the wings, but sometimes one series is very short, especially in the hind wings. The antennæ are rarely as long as the wings. Type *C. perla*.

There are in our fauna five distinct groups, one represented by but one species. The *nigricornis* section is very distinct by many characters from the other forms. The species known to me are tabulated below:

1. Some of the longitudinal veins of wing black for some distance from their bases **schwarzi**.
 Longitudinal veins not black 2.
2. Antennæ with basal portion (except joint 1) black 5.
 Antennæ not black 3.
3. Second joint of antennæ with a red ring 10.
 Second joint not red 4.
4. Venation all green 15.
 Some of the cross-veinlets black in part 18.
5. Pronotum margined with red 6.
 Pronotum not margined with red 7.
6. Antennal sockets margined with red, basal joint of antenna without dark line **coloradensis**.
 Antennal sockets without red, basal joint of antenna reddish or with a dark stripe **lateralis**.
7. Basal joint of antenna with a black line 8.
 Basal joint without line 9.
8. At least two spots on vertex of head **sabulosa**.
 No spots on vertex **lineaticornis**.
9. A black dot each side on clypeus, radial cross-veins only partly black, pterostigma indistinct; size large **nigricornis**.
 No black dot on clypeus, radial cross-veins wholly dark, pterostigma brownish in all wings; size smaller **columbiana**.
10. Gradate veinlets green; wings broad **chlorophana**.
 Gradate veinlets more or less black 11.
11. Two black spots on clypeus, pronotum with large black spots 12.
 No black spots on clypeus 13.
12. Inter-antennal spot forming an X **chi**.
 Inter-antennal spot forming a Y **ypsilon**.
13. Divisory veinlet of third cubital cell almost wholly black; veinlets connecting median and cubitus are wholly black; but four veinlets connecting radial sector to median **assimilis**.
 Divisory veinlet black only at end; veinlets connecting median and cubitus green in middle; usually five veinlets connecting radial sector to median. 14.

14. Costal veinlets almost wholly black; vein at end of third cubital cell mostly black, smaller species **albicornis**.
 Costal veinlets less black; vein at end of third cubital cell mostly green, larger species **oculata**.
15. Cheeks suffused with red, wings acute at tip..... 16.
 Cheeks not suffused, a narrow brown line; anterior wings hardly acute at tips..... **plorabunda**.
16. Divisory veinlet of third cubital cell ends before middle of that cell and before the cross-veinlet; southwestern species..... **externa**.
 Divisory veinlet usually ends at or beyond the cross-veinlet 17.
17. Eastern specimens; anterior wings very slender and acute at tips. **harrisi**.
 Western specimens; anterior wings less slender and not so acute.
californica.
18. Basal joint of antenna with a reddish line above; pronotum margined each side with red, cross-veins nearly all black..... **bimaculata**.
 Basal joint of antennæ without line; pronotum not margined with red.. 19.
19. A red angular transverse line from eye to eye just above antennæ.
arizonensis.
 No such line 20.
20. Pronotum and abdomen with a median red stripe, no side marks.
medialis.
 No such median stripe 21.
21. Pronotum with two or three red spots each side, thorax and abdomen also spotted on sides, and often a red dot on head near eye.
quadripunctata.
 Pronotum not spotted with red 22.
22. Radial and costal cross-veins black in middle, green at bases, a large species.
erythrocephala.
 Radial and costal cross-veins black at ends, green in middle 23.
23. Size large; wings broad; cubital cross-veins and branches of radial sector not black at bases; a red spot under each eye..... **emuneta**.
 Size smaller; wings narrow; nearly all cross-veins black at bases 24.
24. Color straw yellow; wings long and narrow, red stripe on cheek; no pale median dorsal stripe..... **interrupta**.
 Color green 25.
25. Black stripe from eye to mouth; costal cross-veins of fore wings wholly black, wings rather broad..... **cockerelli**.
 Red stripe under each eye, costal cross-veins only partly black; a pale median dorsal stripe in life **rufilabris**.

Chrysopa schwarzi n. sp.—Face yellowish, with a black mark on each cheek, a transverse black mark surrounding the bases of the antennæ; vertex each side red, middle clear yellow. Antennæ pale yellowish, unmarked; palpi marked with black. Pronotum red each side, yellow in middle; meso- and meta-thorax yellow in middle, red on sides, the latter extending down on pleura. Legs and abdomen green. Wings with green venation, the pterostigma long and distinct; in fore wings the subcostal vein is black for about one-fourth its length, and the cross-veins adjoining are more or less black; the anal vein and branches are black for some distance. Of usual shape; wings rather narrow, plainly acute

at tips; the divisory veinlet of the third cubital cell ends plainly beyond the cross-vein. Length 16 mm.

One specimen from Las Vegas, Hot Springs, New Mexico, Aug. 5th (Barber and Schwarz). The type is in the National Museum collection, also from Prescott, Arizona (Osler). The black on the subcostal and anal veins is not found in any other of our species of *Chrysopa*.

Chrysopa oculata Say.—Face pale yellowish; a reddish spot on each side, a black crescent under each eye (often connected to the band), a broad blackish band under antennal sockets, emarginate in the middle, sockets above are margined by a narrow blackish line, between antennæ is a reddish spot extending upward in shape of a Y; vertex with 2 submedian dots (sometimes connected to the Y), and a spot each side near eye (sometimes absent). Palpi broadly banded with red-brown; second joint of antennæ blackish, the first joint sometimes marked with red above. Pronotum greenish, with several black spots each side, more or less distinct; rest of thorax and legs pale greenish, often a dot at tip of each lateral lobe of the metanotum. Abdomen greenish. Wings hyaline, veins green, many of the cross-veinlets marked with black; at least the gradate veinlets and the costals of hind wings usually wholly black; pterostigma often distinct. Length 15-17 mm.

Very common throughout the Eastern United States and Canada. Variable in size and breadth of wings. Some specimens with broad wings and broadly rounded tips have more black on veinlets, and may be a variety or even distinct species, but I cannot find any distinctive characters. These specimens appear to be most common in early summer. The forms described by Fitch as *illepida*, *fulvibucca* and *mississippiensis* appear to me to be only forms of this variable species. The life history has been described by Marlatt. His figure of the larva shows its characteristic markings. The eggs are laid in clusters. Adults are seen from early in July to September, being most common in July. They are chiefly found in tall grass and shrubbery, but sometimes on trees.

Chrysopa chlorophana Burm.—This species has the head marked on the same general plan as *Ch. oculata*, but the mark under each eye is usually short, and the submedian dots on vertex are often indistinct or absent; the palpi less broadly banded with brown. The basal joint of antenna sometimes has a transverse red line above, the second joint is blackish. The thorax and abdomen are dark green, the pronotum with a few dark marks each side. The wings are hyaline, the veins are green, sometimes some of the veinlets, especially the costal series of the hind wing, are marked at their ends with black; but the gradate series are always green. The pterostigma is commonly very distinct. Length 16-17 mm.

I have specimens from Hyattsville, Md.; Sherbrooke, Canada; Agric. College, Mich.; Bright Angel, Colorado Canon, Arizona, July 12th; and Las Vegas, Hot Springs, New Mexico, August 11th; Ft. Collins, Colo.; Ashland, Oreg.; Sandusky, Ohio. It has also been recorded from Axton, New York; Penna., Nova Scotia, Newfoundland and Canada. According to this distribution it would seem to be a northern form. It is distinguished from *Ch. oculata* by the green gradate and other veinlets. Fitch's *Ch. xanthocephala* and *Ch. bipunctata* belong to this species, and also, I believe, *Ch. transmarina* Hag., and *Ch. latipennis* Schn. All the specimens I have seen were taken in July and August.

Chrysopa ypsilon Fitch.—This species is extremely similar to *Chrysopa chi*, and can best be described in comparison. The head is marked as is that species, except that the median black mark forms a Y instead of an X; the black below antennal sockets is not connected above between antennæ. The Y is sometimes connected to the submedian pair of black dots on the vertex. The thorax is marked as in *Ch. chi*, as are also the wings, but the cross-veins are more heavily marked with black than in that species. The wings have the same form. Length 14-15 mm.

I have specimens from Ithaca, Axton, Adiron. Mts. (June) and Sea Cliff, N. Y.; the latter were taken in May. I have also seen specimens from New Jersey and Sherbrooke, Canada. It is very close to *Ch. chi*, but the difference in head-markings appears to be constant. Hagen records a specimen from Washington, D. C., but I have not met with it here.

Chrysopa chi Fitch.—Head green; a black spot under each eye, not connected to eye, a similar black spot each side on clypeus, lower margin of antennal sockets black, but not the outer margin, the black continued upward between antennæ and divided in a Y, often connected to the submedian dots of vertex, the entire mark forming an X, a black dot on vertex each side near eye; all the marks are shining black. Second joint of antennæ black; last joints of palpi black; pronotum green, with three black spots each side; rest of thorax, the abdomen, and legs green, each anterior lobe of the mesothorax has two black dots. Wings hyaline, veins green, gradate veinlets and some cross-veinlets near base black, many of the other cross-veinlets black at one or both ends, pterostigma not very distinct; hind wings with the costal veinlets wholly black. Wings rather broad, broadly rounded at tips. Length 14 mm.

Described by Fitch from New York.

I have specimens from Franconia, New Hampshire (Mrs. Slosson), and Axton, Adiron. Mts., N. Y., June. Several of the specimens have clinging to the wings one to three specimens of a little *Cecido-*

myiid fly; the fly doubtless uses the *Chrysopa* as a means of transportation.

Chrysopa albicornis Fitch.—Head yellowish, a red spot on each side of the clypeus, a blackish curved mark under each eye, a broad blackish band under antennal sockets extending upward between bases of antennæ and then bifid, sometimes connected to the two submedian dots on vertex; upper margin of antennal sockets narrowly margined with red-brown, and a red-brown dot each side behind eye. Palpi banded with red-brown; second joint of antennæ blackish, basal joint sometimes with a red transverse mark above. Prothorax green, each side with a few dark dots; rest of thorax, legs and abdomen green. Wings hyaline, veins green or yellowish, costal cross-veins almost wholly blackish, many other cross-veins broadly black on bases or tips, gradate series black; in hind wings the costal cross-veins only are black. Length 11-12 mm.

Specimens are from Holly Springs, Miss.; Marion, Ala. (July 2nd); Falls Church, Va.; Burlington Co., N. J., and Sea Cliff and Ithaca, N. Y. All taken in July and August. Very close to *Ch. oculata*, but on the average smaller, and the cross-veins of wings more marked with black.

Chrysopa assimilis Banks.—Face yellowish; a red-brown mark under each eye, a broad transverse band under antennal sockets and extending upward between them, above are two reddish dots, and two more on vertex, behind each eye is another red dot. Palpi banded with red-brown. Second joint of antennæ black. Pronotum greenish, with some dark spots on each side; rest of thorax, legs and abdomen greenish. Wings hyaline, veins green, gradate and cross-veinlets marked with black; the veinlets connecting the median and cubital are wholly black, as well as the divisory veinlet of the third cubital cell. Pterostigma moderately distinct. In the hind wings the costal cross-veinlets are wholly black. The fore-wings are broadly rounded at tip, the hind wings are acute at tip; but four veinlets connecting the radial sector to median before the gradate series. Length 14 mm.

Two specimens, the types, from Ashland, Oregon, Sept., 1897. Similar in markings of head to *Ch. oculata*, but differing in coloring of veinlets of wings.

Chrysopa nigricornis Burm.—Head pale green, a black spot each side at base of clypeus, sometimes another black dot each side above this and below the eye. Basal joints of antennæ pale green, beyond black for about 15 joints (1-5 of length); rest of body green; wings with green veins, gradate series and the costal cross-veinlets black, many other cross-veinlets black at one end; pterostigma quite distinct. Vertex of head elevated in a triangular area, which is depressed in the middle and the hind border an elevated ridge. Pronotum rather short, plainly narrowed in front, transverse furrow very deep. Wings moderately long, acute at tips. The inner series of gradate veinlets is often incomplete toward tip, and in the hind wings is sometimes wanting. The divisory veinlet of third cubital cell ends much beyond the cross-veinlet. Length 15-20 mm.

Specimens have been seen from Buffalo, Ithaca, Staten Island and Sea Cliff, N. Y.; Washington, D. C.; Falls Church, Va.; Columbus, Ohio; Onaga, Kans.; Ft. Collins, Colo., and Sherbrooke, Can.; also from Mass. and R. I. They appear from June till September, but apparently most common in June. Specimens vary in markings of veins; sometimes many cross-veins are black only in middle. It has been taken at electric lights.

Chrysopa lateralis Guérin.—Face pale yellowish, faint trace of red spot each side near clypeus, vertex green, bordered in front just above antennæ with reddish, basal joint of antennæ marked with reddish on outer and upper side, beyond for about one-fourth length black. Pronotum green, with a red stripe on each side, rest of thorax and abdomen green; legs paler. Wings with green venation, the gradate series, costals for about one-half the distance, and most of radial cross-veinlets black; many other cross-veinlets partly black; pterostigma not prominent. Antennæ reaching to tip of wings; pronotum much narrowed in front, transverse groove very distinct. Wings long and narrow, acute at tips; the inner gradate series more or less incomplete. Length 15 mm.

It was described from Mexico. Hagen described *Ch. pavid*a from Mexico and South Carolina. I have seen specimens from South Carolina and from Runnymede and Key West, Florida. The latter was bred from a white cocoon covered with bits of bark and debris. A specimen from Jalapa, Mexico, appears to be the same species, but the red mark on the basal antennal joint is very dark, and the cross-veinlets are more black.

Chrysopa columbiana n. sp.—Head pale yellowish, without markings, thorax and abdomen pale green, second joint of antennæ and beyond for about one-fourth length black. Wings with green venation, gradate series and radial cross-veinlets black, many other cross-veinlets black in part, very few black veinlets in hind wings; pterostigma very distinct in both wings, pale brown in color. Pronotum broad, very little narrowed in front, transverse groove not distinct. Wings quite narrow, acute at tips. Length 13 mm.

One specimen from Washington, D. C. Related to *Ch. nigricornis*, but the unmarked face and the black radial cross veinlets lead me to consider it distinct.

Chrysopa lineaticornis Fitch.—Face almost white; vertex pale green; palpi white; basal joints of antennæ whitish, with a prominent black stripe on outer upper side, basal third of antennæ beyond black. Prothorax pale green, sometimes with a little reddish on outer edge; no yellowish stripe in middle; rest of thorax and the abdomen dull green, the latter more yellowish near tip; legs whitish; wings whitish green, green venation, gradate veinlets, costals, and often the radial cross-veinlets black; many other cross-veinlets more or less black; pterostigma quite distinct. Hind wings with costals brown, the pterostigma also

distinct. Antennæ reach almost to tip of wings, the basal joints rather larger than usual; prothorax plainly narrowed in front, the transverse furrow is not very distinct. Wings quite narrow, acute at tips. Length 13-15 mm.

It was described from Central New York. I have seen specimens from Franconia, New Hampshire; Agricultural College, Michigan, July 12th; Bay Ridge, Maryland, July; Washington, D. C., July 16th, on pine; and Brookline, Mass. This may be the same as *Ch. ampla* Walk., from Georgia, but I am not certain.

Chrysopa coloradensis Banks.—Face pale green, a red-brown crescent under each antennæ, a red-brown stripe under each eye (not reaching to mouth), and vertex with a reddish mark each side adjoining the eye; palpi marked with red; basal joint of antennæ pale, second and beyond for about one-fourth the length, black. Prothorax green, with a red stripe on each side; anterior lobes of mesothorax reddish; legs pale; abdomen darker green. Wings with green venation; gradate series, the costals and the radials entirely, and the other cross-veinlets partly black; pterostigma rather distinct. Antennæ not very long; pronotum broader than long, narrowed in front; wings moderately long, scarcely acute at tip, except in the hind pair; divisory veinlet of third cubital cell ending much beyond cross-vein. Length 14-17 mm.

I have seen specimens from Denver, Colo.; Mesilla and Santa Fé, New Mexico, July; Williams, Arizona, July; Hood River, Oregon, Sept.; Gazelle, Calif., Sept., and Pullman, Washington. It is a very handsome species and not very closely related to any other form.

Chrysopa sabulosa Banks.—Face yellowish, a triangular black spot under each eye, a black spot under each antenna (but separated therefrom), and a black dot above each antenna. Basal joint of antenna broadly marked with black in front and on outer side, second joint black and the following ones also to about one-fourth the length of antenna. Palpi marked with black. Thorax, abdomen and legs green, unmarked. Wings with green venation, pterostigma rather distinct. The antennæ are rather short; the pronotum about twice as broad as long; abdomen short; wings rounded at tips, usually but one series (the outer) of gradate veins, sometimes there are traces of the inner series. There are not as many hairs on the veins as in most species. The divisory veinlet of the third cubital cell ends beyond the cross-vein. The male genitalia is quite elaborate, the lower part ends in three tufts of black bristles. Length 12-14 mm.

The type is from Colorado, and I have another specimen from Southwestern Colorado, July 12th (Oslar). There is a male in the National Museum collection from Las Cruces, N. Mex. (Cockerell). It is a very peculiar species on account of the almost complete absence of the inner series of gradate veinlets in both wings.

Chrysopa explorata Hagen.—“Yellowish; face with a large, quadrangular spot, occiput with a Y-shaped streak and spot, red; antennæ yellowish; fus-

cous at base; the first article yellow, with the apex above, red; prothorax broad, obliquely truncated in front; anterior margin black; wings hyaline, narrow, pterostigma yellow, interiorly with a red spot; transverse veins of the anterior wings almost all blackish-fuscous; gradate veins 5 and 5. Length to tip of wings 13 mill." (Hagen.)

I have not seen this species, and copy Hagen's description above. It was described from Mexico, but Hagen, in Wheeler's Report, 100 meridian, records a specimen from Arizona. I have not included it in the table; it belongs to the *Ch. nigricornis* group, and appears to be very distinct from any of our other species.

Chrysopa rufilabris Burm.—Face yellowish or greenish, a red stripe under each eye to mouth; antennæ pale yellow; thorax and abdomen green, with a pale yellow median stripe; legs yellowish. Wings with green veins; the gradate veins black, and also the ends of some other cross-veins. In some specimens nearly all of the cross-veins are more or less black. There is considerable variation in the shape of the wings, some specimens (chiefly from the North) have broader wings, and tips rounded; while southern specimens have narrow wings with acute tips. The divisory veinlet of the third cubital cell usually ends just beyond the cross-veinlet; in specimens from the extreme South (Louisiana and Florida) it ends directly in the cross-veinlet. This form may be the *C. attenuata* of Walker. Specimens occur, however, with the divisory veinlet ending before the cross-veinlet. Length 12 to 15 mm.

Specimens have been seen from Ithaca and Sea Cliff, New York; Washington, D. C.; Falls Church, Va.; New Brunswick, New Jersey; Medina, Ohio; Agricultural College, Mich.; Shreveport, La.; Kissimmee and Biscayne Bay, Fla. Hagen records it from Georgia. It is thus evidently spread throughout the entire eastern part of the country. It occurs from June till October, on various trees, shrubs and low plants. In life it is grass-green, with a pale yellow stripe from vertex to apex of abdomen. It has a distinct fetid odor. It flies freely at twilight, and has been taken at lights. The life history was described by Fitch. The eggs are laid singly, not in groups. The larvæ are white, with dark stripes on the head. They carry some debris on the body, which often conceals the insects. The cocoon is snow-white.

Chrysopa interrupta Schneider.—Pale straw yellow throughout; a reddish mark from each eye to the mouth. The gradate series wholly, and most of the other cross-veinlets of fore wings brown, in hind wings but few cross-veinlets other than the costals marked with brown; pterostigma not very distinct. Antennæ quite short; pronotum slender, longer than broad, narrowed in front. Wings slender, acute at tips, divisory veinlet of third cubital ends beyond the cross-veinlet. Length 12–13 mm.

Specimens have been before me from New Jersey; Sea Cliff, New York; and Washington, D. C., July; also from Penna.; Selma, Ala., and Aurora, Ill. Several were bred from snow-white cocoons. It is very close to *C. rufilabris*, but in life has no pale median, dorsal stripe. It does not appear to be common anywhere.

Chrysopa quadripunctata Burm.—Pale yellowish, a reddish stripe each side of face from eye to mouth, vertex rather elevated, with two submedian pits, antennæ wholly pale, reaching to pterostigma of wings, prothorax plainly longer than broad, suddenly narrowed at anterior third, beyond with parallel margins, above with one or two transverse ridges and furrows, the anterior sloping side-margins are reddish, and there are four or six reddish spots above, often fading in dried specimens, a red spot on each anterior lobe of the mesothorax, and often some smaller ones between and behind these. Abdomen in life marked with reddish and clear yellow. The wings are moderately broad, the fore pair barely acute at tip, the hind pair plainly so at tip. Venation yellowish, the gradate series black, the central cross-veins blackish at ends, some of the basal cross-veins black, and often the bases of many others black; in hind wings the costals are wholly black. The divisory veinlet of the third cubital cell ends much beyond the cross-veins above. The gradate cells are subequal in length and but little longer than those beyond. Length 14–17 mm.

It was described from Pennsylvania and Carolina; my specimens come from Sea Cliff, N. Y., August; Ft. Lee, New Jersey; Austin, Texas; Falls Church, Va., and Washington, D. C., in June on till October.

This species I have always taken on or near oak trees. It has a scarcely distinct fetid odor. The color is a rather pale green, paler than *C. rufilabris*, and the red spots are very distinct, especially those on the upper side of the first four segments of abdomen.

Chrysopa bimaiculata McClendon.—Face pale yellow, unmarked; vertex green; antennæ pale, the basal joint with a narrow red line above; palpi marked with black; prothorax green, a bright red stripe each side, rest of thorax and the abdomen green, unmarked; legs paler. Wings with green venation; the gradate series, the costals and the radials wholly black; other cross-veinlets in part black; hind wings with gradate series and radials in part only black; pterostigma quite distinct. Antennæ moderately long, vertex somewhat swollen; pronotum broader than long, narrowed in front. Wings narrow, anterior pair barely pointed, hind pair acute at tips; divisory veinlet of third cubital cell ends beyond the cross-vein. Length 11–13 mm.

Described from Laredo, Texas, August. Mr. McClendon sent me specimens also from Laredo, and I have others from Austin, June, and San Antonio, Texas; and from Biscayne Bay and Palm Beach (Jan. 25), Florida.

Chrysopa emuncta Fitch.—Pale yellowish green, abdomen darker green; a reddish spot under each eye extending toward the mouth; palpi marked with black. Wings with green veins, the gradate series black, and the ends of many other cross-veinlets also black; pterostigma quite distinct. Wings large and broad, the costal area broad, tips rounded in fore wings, in hind pair more acute; the divisory veinlet of the third cubital cell ends much beyond the cross-veinlet; there are eight to ten veinlets in the gradate series. Length 19 mm.

Fitch described this species from Central New York. I have seen but one specimen which fits his description, it is from Francoonia, N. H. (Slosson). It is evidently an uncommon northern species, and one of the largest in the genus.

Chrysopa erythrocephala Banks.—Pale yellowish green, abdomen darker green; a black spot each side near base of clypeus. Wings with green veins; gradate veinlets black; the costal and radial cross-veinlets are black in the middle, green at ends; pterostigma not distinct. Antennæ short; pronotum narrowed in front, rather short. Wings quite long and broad, barely acute at tips; gradate series of seven to nine veinlets; the divisory veinlet of third cubital cell ends just beyond the cross-veinlet; costal area not very broad. Length 18-20 mm.

Specimens come from San Bernardino, Calif., July; Mesilla, N. Mex., July 18th; and Pullman, Wash., July 3rd. It is easily distinguished by its large size, and by the costal and radial cross-veinlets being black in the middle, a peculiarity not found in any of our other species.

Chrysopa medialis n. sp.—Face pale yellow, with a red stripe from each eye to mouth, a red dot above and adjoining each eye, sometimes a transverse red mark across vertex; pronotum green, red on anterior margin, and a median red stripe from end to end; middle portions of meso- and metathorax marked with red, sides yellowish green; abdomen pale green, with a median red stripe from base to tip, widened on the posterior margin of each segment; legs pale green. Wings with green venation, considerably marked with black; the gradate series and about all of the other cross-veinlets are black at the ends. Antennæ rather short; wings plainly acute at tips; the divisory veinlet of the third cubital cell ends slightly beyond the cross-vein. Length 15 mm.

A few specimens were beaten from hickory foliage at High Island, near the District of Columbia, in the latter part of September. In life the red markings are very prominent, and the insect at once reminds one of *Ch. quadripunctata*, but the arrangement of the markings is very different.

Chrysopa cockerelli n. sp.—Face yellowish, a black stripe from each eye to the mouth, connecting with each other. Antennæ pale yellow; pronotum and thorax green, the latter with a slight reddish color on each anterior lobe; abdomen and legs green; wings with green veins, the cross-veinlets nearly all black in part; the costal cross-veinlets wholly black. Antennæ short, wings moderately broad, scarcely acute at tips; divisory veinlet of third cubital cell ends beyond cross-veinlet. Abdomen very short. Length 15 mm.

One specimen from East Las Vegas, New Mexico (Cockerell). Separated from allied forms by the black (instead of red) stripe under eyes, and the wholly black costal cross-veinlets.

Chrysopa arizonensis n. sp.—Face pale yellowish; a black dash below each eye extending toward mouth, inward of this and below each antennæ is a red dot, above base of antennæ is a transverse, angular, red line extending from eye to eye, its angle projecting between bases of antennæ; palpi mostly red-brown; antennæ pale. Pronotum pale, a narrow dark line on front of extreme side margins; rest of thorax and the legs pale. Abdomen pale, when fresh possibly marked with dark at bases of segments. Wings hyaline; veins green; the gradate veinlets, several basal veinlets, and parts of some of the other cross-veinlets are brown; in hind wings only a few veinlets brown. Pterostigma moderately distinct. Antennæ quite short; prothorax short, narrowed in front; wings of moderate width, pointed at tips, divisory veinlet of third cubital cell ending much beyond the first cross-veinlet from the radial sector. Length 12 mm.

One specimen from Yuma, Arizona (Morse, collector). Very easily separated from all our other species of the genus by the angular red line on head; a somewhat similar mark is in *Leucochrysa americana*.

Chrysopa plorabunda Fitch.—Pale greenish or yellowish, in life showing a paler median, dorsal stripe, often fading out in dry specimens. A straight brown mark under each eye, and sometimes a brown dot at each outer anterior corner of the pronotum. Venation pale green or yellowish; pterostigma rather distinct. Pronotum short and broad, as broad as long, sides parallel, not narrowed in front. Wings quite broad; anterior pair rounded at tip, hind wings slightly acute; divisory veinlet of third cubital usually ends on or just beyond the cross-veinlet. Length 14–15 mm.

Specimens have been seen from Columbus, Ohio, March; Agricultural College, Mich., Febr.; Boulder, Colo., Aug.; and Austin, Texas, March; also from Utica, Miss.; Ames, Iowa; and Luverne, Minn. Fitch records it from Northern Illinois and New York. The Michigan specimens had passed the winter in dead leaves and in hedges. Shimer, under the name of *Ch. illinoiensis*, has given a long account of its life history.

Chrysopa harrisii Fitch.—Pale green throughout in life, fading to yellow in dried specimens; a pale yellowish median, dorsal stripe. Cheeks suffused with reddish; sometimes a minute red dot on vertex near each eye. Venation green, pterostigma quite distinct. Antennæ moderately long; pronotum about as broad as long, sides parallel, not narrowed in front. Wings slender, acute at tips; divisory veinlet of third cubital usually ends beyond the cross-veinlet. Length 13–15 mm.

Specimens are before me from Washington, D. C., from pine trees in July; Manchester, New Jersey, Sept.; Staten Island, New York,

Oct.; Agricultural College, Mich., July; and Mt. Washington, N. H. Fitch described it from New York in July and August. The cocoon is yellowish, and is often seen on pine-needles; the larvæ feed on *Chermes*.

Chrysopa californica Coquillett.—Pale green or yellowish, with a pale median dorsal stripe in life. Cheeks suffused with red, and often a red dot above on vertex near each eye. Venation pale green or yellowish, pterostigma moderately distinct. Pronotum about as broad as long, sides parallel, not narrowed in front. Wings rather broader than *Ch. harrisi*, and not quite as acute at tips. The divisory veinlet of third cubital ends usually at the cross-veinlet. Length 13-15 mm.

Described from California, and I have seen specimens from many places; Los Angeles, Tehama, Wanona, San Bernardino, Palo Alto, San Mateo Co., Santa Clara Co. and Siskiyou Co.; mostly in July and August, but some in April. Also from Hood River, Oregon, September; Pullman, Wash., July and August; and King's Canon, Ormsby Co., Nevada, July. It is barely more than a variety of *Ch. harrisi*, but I understand that Hagen considered it a distinct species. It is the most abundant species on the Pacific Coast.

Chrysopa externa Hagen.—Pale green or yellowish, not showing a distinct pale median stripe; cheeks reddish. Venation green, pterostigma not distinct. The pronotum is about as broad as long, but the sides converge a little forward. The wings are slender and acute at tips; the divisory veinlet ends before the middle of the cell and before the cross-veinlet. The venation is not as dense as in the allied species. Length 11-14 mm.

Specimens have been seen from Las Cruces, June, Santa Fe, Aug., and Mesilla, New Mexico and also from Yuma, Arizona, and Palm Springs, Cal. (Feb. 14th). The variation upon which the specific name is based occurs also at times in the allied species, and one of Hagen's specimens, that from D. C., must have been a *Ch. harrisi*. Nevertheless I have retained the name for those specimens which show the variation in an extreme degree.

MELEOMA Fitch.

The genus has the venation about as in *Chrysopa*. The antennæ are more widely separate at base than in any of our other forms, and in the male there is an inter-antennal protuberance or horn. The basal joint of the antenna is more slender than in *Chrysopa*. The species appear to inhabit mountains. Type is *M. signoretti*.

Our three species are separated by the following table:

1. Horn of male as long as width of vertex; second and third joints of male antennæ simple; no line on cheek in either sex; gradate veinlets blackish **signoretti**.
Horn of male much smaller; a black line on cheek.....2.
2. Second and third joints of antennæ of male excavate on inner side; gradate veinlets green.....**slossonæ**.
Second and third joints simple; gradate veinlets blackish.....**innovata**.

Meleoma signoretti Fitch.—Pale yellowish green. Face of male projecting in front in two reddish submedian tubercles; between antennæ arises a prominent horn which is as long as width of vertex, and projects out horizontally, its end bent vertically downward and provided with a stiff bifid brush of pale reddish hair; in the female this and the tubercle are lacking; vertex elevated transversely between the eyes. The antennæ are darkened beyond the base, but not black, in length scarcely reaching to middle of wing. Prothorax a little longer than broad, plainly narrowed in front, and with a transverse ridge beyond the middle. Venation of wing green, with the gradate veins blackish, as also the bases of the cross-veins from the radius, and one or two cross-veins in the anal region, lower half of base of third cubital cell and connecting veinlet to the radial sector and end of the divisory veinlet of third cubital cell black. Length 14-16 mm.

Specimens come from Mt. Washington and Franconia, New Hampshire, and from Sea Cliff, N. Y., July; Fitch's specimen was from the Green Mts. of Vermont. The type was, according to Hagen, purchased for the Museum of Comparative Zoology, but there is a specimen in the National Museum from the old Fitch collection.

Meleoma slossonæ Banks.—Pale green or yellowish when dry, a red-brown stripe from eye to mouth; palpi marked with reddish, a dark spot on each anterior side margin of pronotum. Venation green, many of the cross-veinlets in part black; pterostigma long and distinct. In the male there is a cavity in middle of face below antennæ, between bases of antennæ is a short, broad tubercle, trifold at tip; the vertex is transversely elevated from eye to eye. Antennæ with basal joints slender and divergent, curved, concave within, second and third joints short, fourth longer and swollen at base on inner side. In ♀ there is no tubercle, but a slight conical elevation; the basal joints of antennæ are simple, as also the fourth. Pronotum broader than long, sides nearly parallel, a little narrowed at extreme front. Wings moderately long, anterior pair rounded at apex, hind pair acute at tip. Length 18-19 mm.

Specimens have been taken by Mrs. A. T. Slosson from Mt. Washington, Crawford Notch and Franconia, New Hampshire; also seen from Brookline, Maine; and Quebec and Sherbrooke, Canada. This species differs much from *M. signoretti*, in structure of antennæ and the tubercle. Mr. McLachlan in a note in Ent. News, 1894, thinks that it is a sex of *M. signoretti*; however, there is not the slightest doubt of their distinctness, and that the female *Meleoma* is without a horn.

Meleoma innovata Hagen.—Pale green; a pale yellowish dorsal, median stripe; a red-brown stripe from each eye to mouth; palpi marked with reddish. In male the lower part of face is gibbous, a cavity above it marked with pink; between bases of antennæ a small tubercle, bifid at tip and curved downward. Basal joints of antennæ divergent, and swollen near tip, especially below, beyond simple. Female without these structural modifications, but the basal joints are widely separate at base, and much more slender than in any *Chrysopa*. Wings rather long and slender, anterior pair rounded at tip, hind pair acute at tip. Venation green, some cross-veinlets marked in part with black; pterostigma quite distinct. Pronotum broader than long, not narrowed in front. Length 18–20 mm.

I have a pair; male from Amecameca, Mexico, the female from Santa Fé, New Mexico, July. At the time of my description of *M. mexicana*, which was based on the former specimen, I had not examined Hagen's description of *Ch. innovata* carefully. It is strange that Hagen did not place this species in *Meleoma*, since he states that it possesses the very character upon which this genus was based.

EREMOCHRYSA new gen.

Characters in general those of *Chrysopa*, but there is but one (the outer) series of gradate veinlets in hind wings; the branches from the radial sector being curved and sinuate. In the forewings the inner row of gradate veinlets are only three or four in number. The wings are narrower than in most species of *Chrysopa*; the longitudinal veins are usually marked with brown, and there is usually a brown dot under the tip of each femur. Type *Ch. punctinervis* McLach.

Three species can be referred to this genus, and they may be recognized from the following table:

- | | |
|---|----------------------|
| 1. Longitudinal veins marked with brown..... | 2. |
| Longitudinal veins not marked with brown, cross-veinlets almost wholly brown..... | hageni. |
| 2. Transverse veinlets wholly brown, larger species | fraterna. |
| Transverse veinlets interruptedly brown and pale, smaller species. | punctinervis. |

Eremochrysa hageni n. sp.—Head pale greenish yellow, a black stripe on each cheek reaching to mouth, second joint of antennæ blackish, first joint above red-brown, beyond pale, rather darker towards tips. A black spot between antennæ extending backward in the shape of a Y, its posterior tips enlarged. Palpi red-brown, pale on base. Pronotum pale, a median narrow line, and some spots each side dark; rest of thorax and the legs pale. Abdomen pale, evidently with various dark marks when fresh, most of the fourth and the sixth and seventh segments red-brown above. Wings hyaline, veins mostly pale, cross-veinlets mostly dark, except those of the costal area which are dark only at subcostal

ends. Vertex of head rather elevated at the dark spots; antennæ quite short; prothorax narrowed in front. Wings narrow, tips rounded, but three gradate veinlets of inner series, four or five of outer series, but one series of gradate veinlets in hind wings. Length 10 mm.

San Antonio, Texas, and Austin, Texas, May 20th; the latter from Mr. McClendon. A very handsome and distinct species, not very closely related to any other in our fauna.

Eremochrysa punctinervis McLach.—Head yellowish; a blackish mark under each eye reaching toward mouth, a spot between base of antennæ; palpi banded with red-brown; basal joint of antennæ often with a red-brown spot on inner upper side, a narrow line on outer side; second joint often with a dark spot above, but not wholly black. Pronotum marked each side with red-brown, as likewise meso- and metathorax; abdomen somewhat marked with brown; legs pale, a brown dot under tip of each femur. Wings grayish hyaline, veins and veinlets interruptedly pale and red-brown, sometimes some of the cross-veinlets are wholly dark, gradate veinlets brown; hind wings similarly marked. Wings narrow, rounded at tip, but three or four gradate veinlets in each series, in hind wings but one (the outer) series of gradate veinlets, third cubital cell about twice as long as broad. Length 9-11 mm.

I have seen specimens from Brazos Co., Victoria (March 29th), and Austin, Texas; San Augustine, Las Vegas Hot Springs and Mesilla, New Mexico; Williams and Winslow, Arizona; Los Angeles and Palm Springs, Calif.; and Colorado. Most specimens were taken in Aug., Sept. and Oct., but those from Palm Springs were captured in Feb. and March. In life it looks quite unlike *Chrysopa*, and is of a grayish color. It appears to be the most common species of the arid region of the southwest.

Eremochrysa fraterna Banks.—Similar to *E. punctinervis*, but larger, and more marked with brown. From between the antennæ two stripes run up on the vertex, and the second joint of antennæ is wholly black; the inner orbit of each eye is margined with black. The thorax has a broad stripe on each side, and a narrow median line; there is a dark dot under the tip of each femur. The cross-veinlets of the wings are all dark, the pterostigmatic ones broadly marked with brown. Length 12 mm.

The type is from Colorado, but I have recently seen a specimen taken by Mr. Baker at King's Canon, Ormsby Co., Nevada, June 6th, which agrees with the type in every particular.

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EXPLANATION OF PLATE II.

Figure 1. Egg of *Chrysopa*, with base of pedicel.

- " 2. Base of forewing of *Leucochrysa*.
 " 3. Base of forewing of *Nothochrysa*.
 " 4. Base of forewing of *Chrysopa*.
 " 5. Base of forewing of *Allochrysa*.
 " 6. Head of young larva.
 " 7. *Meleoma slossonæ*, head of ♂.
 " 8. *Meleoma innovata*, head of ♂.
 " 9. *Chrysopa oculata*, face.
 " 10. *Chrysopa coloradensis*, from above.
 " 11. *Meleoma signoretti*, head of ♂.
 " 12. *Chrysopa sabulosa*, genitalia of ♂.
 " 13. *Chrysopa ypsilon*, face.



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