

*Seventh*

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ANNUAL REPORT  
OF  
THE UNITED STATES  
GEOLOGICAL AND GEOGRAPHICAL SURVEY  
OF  
THE TERRITORIES,  
EMBRACING COLORADO,  
BEING A REPORT OF PROGRESS OF  
THE EXPLORATION FOR THE YEAR 1873,  
BY  
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CONDUCTED UNDER THE AUTHORITY OF THE SECRETARY  
OF THE INTERIOR.

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WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1874.

from the ravages of this destructive insect for a number of years; but that it would ultimately make its appearance in that region through the agency of the seed. This I believe to be the manner of their introduction to distant localities, as they are sluggish travelers, and quite incapable of spreading so rapidly by their own instinct. This belief is further sustained by their continued absence from the Salt Lake basin, occasioned by the cheapness of vegetables in the Mormon settlements excluding the importation of potatoes from Colorado. Not found at a greater altitude than 8,000 feet.

*Erotulus Boisduvalii*.—Usually found upon the *Pinus ponderosa*, and never seen at a greater altitude than 9,000 feet. Very abundant in the eastern foot-hills of the Front range, but not found on the Pacific slope in Colorado, although it has been collected in Arizona.

*Nemognatha lurida* and *Lytta Nuttalli* verify the theory of the adaptability of the color of species to their food-plant; the former being found feeding upon the pistil of the *Cirsium undulatum*, which it so nearly resembles in color as to often escape close scrutiny; the latter, found upon the *Iris tenax*, is of precisely the same color as that plant.

W. L. C.

## REPORT ON THE PSEUDO-NEUROPTERA AND NEUROPTERA COLLECTED BY LIEUT. W. L. CARPENTER IN 1873 IN COL- ORADO.

BY DR. H. A. HAGEN.

### Family TERMITINA.

#### TERMOPSIS.

*T. angusticollis*, Hagen, Synop., 3, 1.

Rufous paler beneath; mouth infusate; wings dusky hyaline; costal veins rufous; head oval flat; prothorax small, semicircular. Male and female.

Var. *Nevadensis*.—Dark reddish brown, scarcely paler beneath; wings dark, smoky; costal veins blackish-brown. Male and female.

Length to tip of wings, 23–26 millimeters; body, 11 millimeters; expansion of wings, 42–44 millimeters.

*Soldier*.—Stout, yellow; head and thorax rufous; head long, oblong, depressed, dark-brown anteriorly; labrum subquadrangular, yellow; mandibles black, long, straight, the pointed tip incurved; a tooth before the tip of the left mandible; palpi brown; eyes wanting, their place indicated; antennæ as long as the head, about 24 joints; the basis of the joints brown, darker on the basal joints; prothorax as large as the head, semicircular; mesothorax and metathorax rounded behind, with a small alar lobe each side, directed backward; abdomen ovoid; appendages four-jointed, long; last segment with two divergent, anal spines; feet strong, rufous; femora paler yellowish.

Length, 16 millimeters.

*Larva*.—Stout, elongated, flattened above, pale; head yellow, rounded; mouth darker; eyes indicated as in the soldier; antennæ 24-jointed; prothorax semicircular, small; mesothorax and metathorax larger, rounded behind, a small alar lobe on each side, directed downward; abdomen ovoid, the appendages two-jointed, but with indications of two more joints; last ventral segment with two anal spines; feet strong, yellow.

Length, 11 millimeters.

*Nympha*.—Size and color of the larva; eyes present, pale; alar lobes large, flat, triangular, horizontally covering the basal third of the abdomen; appendages four-jointed; anal spines divergent.

*Habitat*.—California, San Francisco, (Mann), San Diego, March, April (Crotch); Gulf of Georgia, Fort Steilacoom, Semialunoo (A. Agas-

siz); British Columbia, Quesnel Lake; Truckee, Sierra Nevada (Crotch); Louisiana (Pfeiffer).

The specimens are dry or preserved in alcohol. *T. angusticollis* is a real western species. I saw only one specimen from Nevada, collected on the western border of the State. An imago from Louisiana, collected by Mrs. Pfeiffer, is preserved in the museum at Vienna, Austria. So far as known, this species is not yet found in Texas or Mexico. Messrs. A. Agassiz and G. R. Crotch observed this species living beneath the bark of pine-trees.

The winged imagos differ in color, the typical specimens being rufous, though some of them are darker. The single male from Nevada is smaller and the wings not as broad, (one-fortieth inch), and throughout much darker; but among a number of alcoholic specimens from San Diego and Semialunoo there are some nearly as dark; and, moreover, it is not impossible that the Nevada specimen was darkened by carbolic acid in the collecting-bottle. The discovery of the soldiers and of the other stages is very important. *T. occidentis*, formerly supposed to belong as soldiers to *T. angusticollis*, is now to be considered as a different species, the imago of which is still unknown.

*T. occidentis*, Hagen, Synop., 3, 2.

*Soldier*.—Very stout, rufous; abdomen yellow; head large, nearly as broad as long; convex above, rounded laterally, depressed anteriorly, the anterior angles prominent, jointed, dark-brown; antennæ 19-jointed, pale, the first and third joint longer, dark-brown; labrum ovoid, yellow; eyes present, black, oval; mandibles shorter than the head, black, stout, curved, the left one with a double tooth before the tip. Prothorax broader than the head, large, flat, cordiform, the anterior margin deeply notched; mesothorax large, broad, with a short, flat, triangular, alar lobe; metathorax shorter and narrower, the alar cover smaller. Abdomen large, long, ovoid; appendages very short, conical, 2-jointed; last ventral segment with two small spines placed near together; feet stout, brown; femora rufous.

Length, 19 millimeters.

*Larva*.—Pale-yellow; head brighter yellow, rounded, flat above; antennæ pale, about 22-jointed; eyes present, black, well defined. Prothorax as broad as the head, transverse; angles rounded, the hind ones more obtuse; mesothorax of the same size, flattened, transverse, a little broader; on each side a triangular, depressed alar lobe nearly as long as the metathorax; the latter similar but larger; the abdomen broader, thick, ovoid; the appendages and spines similar to those of the soldier. Feet less stout, yellow.

Length, 14 millimeters.

*Habitat*.—California: Cape San Lucas (Xanthus de Vesey). The type of Walker from the west coast of Central America. The described specimens are preserved in alcohol. The descriptions of the previous stages of *T. angusticollis* and *T. occidentis* prove the difference of the two species. The soldier of *T. occidentis* differs by the rounded shorter head; the two-toothed mandibles; the prothorax very large, broader than the head, and nearly bilobate; the alar lobes large, flat, horizontal; the appendages very short, two-jointed; the eyes black, well developed. The larva differs by the alar lobes large, directed downward; the prothorax transversely oblong; the abdomen thick, ovoid; the appendages similar to those of the soldier; the eyes black, well developed.

The imago is still unknown; I suppose they belong to the genus *Ter-*

*mopsis*; nevertheless, the well-developed eyes of the soldier, and even of the larva, make this supposition rather doubtful.

The genus *Termopsis* was formed by Professor Heer for fossil species preserved in the amber of Prussia, and in the schists of Oeningen. *T. angusticollis* and perhaps *T. occidentis* are the only known living species of this genus; and their occurrence in North America is the more interesting, as some other remarkable species of the amber-fauna are still represented by similar living species in the fauna of North America.

### Family PERLINA.

#### PTEERONARCYS.

*Pt. californica*, Hag. Synop., 16, 5 (Proc. Bost. Soc. Nat. Hist., xv, 284.)

A full description is given in the monograph of this genus in the quoted proceedings.

*Habitat*.—California; Washington Territory, between Rock and Cascade Rivers; Lake Winnipeg (Kennicott); Ogden, Utah, from a river tributary to Great Salt Lake, in June (C. Thomas). *Nymphæ* from the San Luis Valley, Colorado. I have seen a number of specimens, dry and in alcohol, male, female, and nymphæ. According to McLachlan's statement, the wings of the California specimens are very smoky and opaque; perhaps they were darkened by the carbolic acid used by the collectors. *Pt. californica* is a decidedly western species. *Pt. biloba*, from Trenton Falls, N. Y., a species, as yet, only represented by the female type in the British Museum, is very nearly related, but according to McLachlan's, a different species.

*Pt. regularis*, sp. nov.

*Male*.—Dark-brown, paler beneath; head dark-brown; the posterior margin, two large lateral spots connected by a line behind the ocelli, two flattened, round tubercles a little before, and the anterior margin all dull-yellowish; lateral margin carinated up to the tubercles; three ocelli well developed; labrum small, brown; antennæ slender, half as long as the wings, brown; the basal joints yellowish beneath. Prothorax as broad as the head, nearly square, the anterior angles sharp, the posterior rounded, dull-brown; a very fine median yellow line only indicated, and on each side some curved elevated marks. Abdomen pale beneath; setæ (partly broken) shorter than the abdomen, dark-brown, dull-yellow at the bases, stout, the five basal joints very short. Feet brown, pale beneath; wings smoky, hyaline; veins strong, dark-brown; areolation square. The vulvar lamina as broad as the segment, rounded in front, the middle more produced, as long as the segment, notched on the tips, black; on each side at the base is a small triangular tubercle.

Length to tip of the wings, 19 millimeters; alar expansion, 33 millimeters.

*Habitat*.—Truckee, Sierra Nevada; Nevada, June 10 (Crotch). I have seen only two specimens.

*Pt. badia*, sp. nov.

Pale-brown; head dull-yellowish, with a large square black spot around the ocelli; antennæ brown, paler beneath. Prothorax square, the anterior margin rather rounded, the angles right, pale-brown, with darker shading on each on the elevated marks. Abdomen pale above, darker in the middle, pale-brown beneath; the apical margin of the penultimate ventral segment largely excised; the dark-brown middle

part of the segment somewhat produced, without reaching the last segment; setæ pale-brown; feet darker brown; wings yellowish hyaline, with a dull-yellow stigma; veins brown.

Length, 17-19 millimeters; alar expansion 31-33 millimeters.

*Habitat*.—Bridger Basin, Wyoming (Garman); Cache Valley, Utah (C. Thomas); Colorado Mountains, August (W. L. Carpenter).

I saw only three females, in a very bad condition, in alcohol. The two species above described are the dwarfs of this genus; the smallest species known, *Pt. proteus*, having twice the length of *Pt. regularis* and *Pt. badia*. The gills are well visible in the alcoholic specimens of *Pt. badia*, 26 pairs in number, to wit, 6 between the head and the prothorax; 6 between the prothorax and mesothorax; 6 between the mesothorax and metathorax; 2 between the posterior feet; and 6 on the basal segments of the abdomen. The maxillary palpi are longer than the mouth, the basal joint short, the other long, equal, thicker at the tip; the labial palpi are similar. The palpi show a similar formation as the apical joint in the phryganideous genus *Hydropsyche*. The external membrane is cut or split in a somewhat spiral manner, so as to give to every joint the appearance of a large number of small joints imperfectly soldered together. This formation of the palpi belongs to all the species of *Pteronarcys*, and is exceptional for this genus only in the whole family of *Perlina*.

These two small species agree in all characters with the larger species, at least so far as the females are concerned, as the males are still unknown. The wings are divided into quadrangular cells, perhaps a little more regular than in the larger species. The venation of *Pteronarcys* seems to resemble the most the remarkable fossil genus *Miamia*.

#### ACRONEURIA.

##### *A. abnormis*.

*Perla abnormis*, Hagen, Synop., 17, 1.

This species appears to vary in a very high degree. The late B. Walsh, after repeated observations of living specimens, confirmed variation in size and color, in the reticulation of the wings and in the number of the quadrangular areoles, which are sometimes nearly or altogether wanting; the shape of the prothorax and the vulvar lamina of the female, commonly of a constant shape in this family, offer also slight variations in this species.

The male has usually long and well-developed wings; however, two short-winged males now before me seem to belong to this species. The material in my collection of dry and alcoholic specimens, though rich in specimens from different localities, seems to be not yet sufficient to decide the question whether we have here several very closely-related species or simply varieties of *A. abnormis*.

Two females from South Montana and a male from Snake River, Southeastern Idaho, collected by Prof. C. Thomas, differ as follows: The colors are darker, the abdomen yellow beneath, on each side dark-brown. The male, in worse condition than the females, is a short-winged one; the shape of the prothorax somewhat different, perhaps only altered by the bad preservation. The vulvar lamina of the two females is more produced than usual, covering one-half of the following segment; the apical margin is nearly semicircular, notched very little in one female, and not at all in the other.

A cast nymph-skin from Eagle River, Colorado, August 30, collected by Mr. Carpenter, belongs to a very large species. Length, 33 millimeters; setæ, 26 millimeters. There is nothing known concerning the

previous stages of the North American *Perlina*; even the different larvæ and skins in my collection are not yet thoroughly studied. After a closer comparison with a nymph-skin of *A. abnormis*, communicated by B. Walsh, I believe that the nymph-skin from the Eagle River belongs to the same genus, but certainly to a different species. It is not so much spotted; the apical half of the wing-cases is pale, without the black band, so conspicuous in *A. abnormis*; the abdomen is dark-brown above, without the regular paler marks of *A. abnormis*; the basis of the blackish setæ is pale instead of the throughout dark color of the setæ of *A. abnormis*. Even the size of the skin seems too large for the known American Perlids, except for some very large specimens of *A. abnormis*, collected at the Saskatchewan River.

*Habitat*.—Assuming the above-described specimens to belong to *A. abnormis*, this species would have a very wide distribution. The northern limits known are the Saskatchewan and Peel River and Canada; the southern limits, Georgia, and perhaps Mexico; it is known from all Eastern States on the Atlantic, and from many States between the Atlantic and the Rocky Mountains.

#### DICTYOPTERYX.

##### *D. signata*, sp. nov.

Yellowish-brown, pale beneath; labrum pale-brown; head flat, with two irregular brown stripes, connected transversely before the eyes in a manner to form an anterior large yellow spot, trilobate behind; space between the stripes with an anterior rounded spot, connected with a smaller triangular one on the hind border; a large yellow spot on each side near the eyes. Antennæ pale-brown; first joint blackish-brown above; second and third pale; palpi pale. Prothorax as broad as the head, nearly square; brown, with a large yellow median band somewhat dilated at the ends; on each side three carved marks, formed by rather irregular black polished scars; lateral margin straight, dark. Abdomen dark-brown above, pale-yellowish beneath; whitish around the base of the feet; segments darker at the base. Feet pale-brown, femora with an external vitta and a ring before the knee; base of the tibiæ and tip of the tarsi dark-fuscons. Setæ pale brown, darkest at the tip of the joints. Wings with a grayish-yellow tinge, darker on the costal margin; veins brown, darker, and very irregular on the tip of the wing, five or four, or even less, antecubitals; wings of the male as long as the abdomen, or one-third or more shorter; the apical areolets very irregular.

*Male*.—The last dorsal segment yellow; the apical margin recurvate, transversely cariniform, thickened, emarginate in the middle, scabrous, and rather villous exteriorly; appendages yellow; the superiors are small recurved lobes; between them the larger inferiors, darker on the triangular tip, which is sharp and a little emarginate beneath, just before the tip; an ovoid membrane between the inferiors belongs perhaps to the penis; last ventral segment produced between the setæ with an elliptical margin.

*Female*.—Last dorsal segment obtusely produced in the middle of the apical margin, with a median longitudinal impression; vulvar lamina large, rather inflated on the antepenultimate segment, forming two free circular lobes, very near together, beneath the penultimate segment.

Length with the wings, ♂, 13-17 millimeters; ♀, 18-21 millimeters. Alar expansion, ♂, 16-26 millimeters; ♀, 30-40 millimeters. Length of the setæ, 11 millimeters.

*Habitat*.—Foot-hills, Colorado, September, and mountains on the Pacific slope, August 16 to September 6. Several specimens in alcohol.

This genus is new for the American fauna; all species known belong to Europe and Siberia. This new species is far more interesting as an exception, bearing gills in the imago-state. There are on the ventral side five pairs of gills, formed by white, fleshy, blind sacs; two pairs on the under side of the head; the first pair widely separated on the basal part of the submentum; the second pair in the articulation with the prothorax; both pairs straight, placed transversely, looking outward. The three other pairs on the thorax, always before the feet, but separated from them, being placed just in the articulation of the segments; the three thoracic pairs are incurved.

The occurrence of gills in the imago-state of *D. signata* is the more exceptional, as all the hitherto-known species are without them. At least, a close examination of dry specimens of all the species in my collection (only one of Siberia is unknown to me) did not disclose anything similar to the gills in *D. signata*; Dr. Gerstaecker, in a recently-published paper, also states the absence of gills in living specimens of *D. intricata* and *D. alpina*. Formerly, the genus *Pteronarcys* was the only known exception for its gill-bearing imagos among the class of insects; now, besides the above-described *Dictyopteryx*, there are two other gill-bearing Perlid genera mentioned by Dr. Gerstaecker, *Damphipnoa lichenalis* from Chili, a genus closely related to *Pteronarcys*, and *Nemura cinerea* and *N. nitida*, with its male *N. lateralis*, both from Europe.

The papers by Dr. Gerstaecker are published in the *Festschrift zum hundertjährigen Bestehen der Gesellschaft naturforschender Freunde*, Berlin, 1873, 4to, p. 60, with figures; and *Sitzungsbericht derselben Gesellschaft*, October 21, 1873, p. 99.

#### ISOGENUS.

##### *I. elongatus*, sp. nov.

*Female*.—Brown; head with a posterior, triangular, yellow spot, extended on each side of the occiput; two small, ill-defined, yellow spots near the antennæ and eyes; antennæ brown. Prothorax as broad as the head, quadrangular; the angles sharp, with a large, yellow, median band, narrower before. Abdomen and feet brown; setæ brown; base of the joints paler. Wings long, hyaline; veins brown, with a pale-yellow tinge around the costal apical veins; costa pale; submedian areolet larger toward the tip, with seven transversal veins; the anterior vein of the submedian areolet somewhat curved. Vulvar lamina large, the base separated from the segment by a deep furrow in form of a transversely-enlarged W; apical margin nearly straight, covering only a little of the following segment; the lateral angles rounded; a small notch in the middle.

Length, with the wings, 24–28 millimeters. Alar expansion, 40–44 millimeters.

*Habitat*.—Foot-hills, Colorado (Mr. Carpenter); Ogden, Utah (by C. Thomas). Alcoholic specimens. *I. elongatus* is very similar to *I. frontalis*, but in this species the anterior vein of the submedian areolet is straight, and the anterior margin of the vulvar lamina rather incurved.

##### *I. colubrinus*, sp. nov.

Brown; head with a posterior, triangular, yellow spot; part before the ocelli yellowish; antennæ blackish-brown; prothorax rather smaller than the head, quadrangular; angles sharp, with a yellowish median band, a little narrower before; abdomen and setæ dark-brown; feet pale-brown, tips of the femora and tibiæ darker. Wings hyaline; veins

pale-brown; costa, and its transverse veins, pale; submedian areolet less enlarged on the tip; the anterior vein less incurved; vulvar lamina similar to *I. elongatus*, but larger, subbilobed, the notch reaching nearly to the basal furrow, and the apical margin nearly circular.

Length, with the wings, 22 millimeters; alar expansion, 38 millimeters.

*Habitat*.—Snake River, Idaho (C. Thomas). I believe that some specimens from the Saskatchewan River, from the Slave and Winnipeg Lakes, all in my collection, belong here. The males are a little smaller, but long-winged. The comparison of dry and alcoholic specimens is so difficult that it seems more prudent to consider the identity of the specimens as still doubtful.

#### PERLA.

*P. sobria*, sp. nov.

*Female*.—Head dull-brown near the prothorax; the anterior part pitchy-black; three large yellow spots between the eyes, each side one near the border, and a middle rhomboidal one; three smaller spots on the clypeus between the antennæ, each side, a pale, whitish one near the border, and a middle quadrangular, yellow one just before the anterior ocellus, bordered on each side by a shining-black stripe; antennæ black, brownish beneath at the base. Prothorax as broad as the head, quadrangular, broader than long; hind angles less sharp, pale-yellow on each side, with a large, ill-defined rugulose band; a fine, impressed, median line with a spot in the middle, and a fine, transversal line just before the anterior and one before the posterior margin, all black. Mesothorax and metathorax shining-black above; abdomen brown on the under side, paler at tip; head and thorax brown beneath, with a large, black spot on each side before the second and third pairs of feet; setæ pale-yellowish. Feet dark-brown; wings hyaline, scarcely fumose; veins strong, blackish-brown, finer in the costal space; vulvar lamina large, bifid, the outer edge of the two lobes rounded; before them a small tubercle.

Length, with the wings, 14 millimeters; alar expansion, 26 millimeters.

*Habitat*.—Colorado Mountains, Pacific slope, August (Mr. Carpenter). One female, in poor condition.

*P. ebria*, sp. nov.

*Female*.—The single specimen, in bad condition, is very similar to *P. sobria* in colors and in shape. The genital parts are well preserved and the vulvar lamina is entirely different, a long oval lobe without any notching of the apex. So far as known, this important part never varies in such a manner, and it would be impossible to unite both specimens in one species, notwithstanding their great resemblance.

*Habitat*.—The same locality as *P. sobria*.

*P.* ——— (?), sp.

There is a third species from the same locality in worse condition still. It is a little smaller, the head and the prothorax somewhat different. As the abdomen is wanting, I prefer merely to indicate the occurrence of a third undescribed species.

#### CHLOROPERLA.

A small *Chloroperla*, of the size of *C. cydippe*, from the foot-hills of Colorado, belongs to a new species, but is too much damaged to be described.



## Family EPHEMERINA.

## EPHEMERA.

*E. compar*, sp. nov.

*Male imago*.—Light-brown; head blackish-brown; antennæ pale-yellow; a broad, pale-brown, dorsal band on the thorax; each side of the prothorax blackish; abdomen above on each side with two, black, longitudinal lines and two more in the middle of segments 6 to 9; last segment with two large, ill-defined, black spots; abdomen beneath on each side with one black, longitudinal line; penultimate segment with a large, quadrangular, black spot; setæ very long, pale-brown, the articulations hardly darker; appendices pale brown, long, arcuated on the tip; the two apical joints short, the last shorter; feet pale-brown; the anterior pair very long, black; the femora brown; fore-wings hyaline, with a yellowish tinge; veins dark-brown; the apical half of the two costal spaces dark-brown, and the basal half of the second costal space rather fumose; a series of four small, black spots in the middle of the wing near to the costa, another spot near the base of the wing, and one near the tip; hind-wings of the same color, with a large apical brownish band; some of the veins in the middle of the wing finely clouded with black.

Length of the body, 15 millimeters; alar expansion, 32 millimeters; length of the setæ, 30 millimeters.

*Habitat*.—Foot-hills, Colorado (Mr. Carpenter).

This species is very similar to *E. lutea*, Burm. (*E. lineata*, Eat.); as I have seen only one male, I believe it to be more prudent not to identify the American with the European species, the more so as some differences, though not important ones, are to be found. *E. lutea* has the third and fourth joints of the appendices of equal length, and together two-thirds the length of the second joint. *E. compar* has the fourth joint shorter than the third, and both together one-third the length of the second joint. But as the only male of *E. compar* is dry, and as the measures for *E. lutea* are taken from living specimens, the differences may not be certain. The discovery of *E. compar* fills a gap in the fauna of North America. There are four species of European *Ephemera* nearly related to each other. Till now only three species were known in the North American fauna representing three of the European species, and the discovery of *E. compar* imitating the fourth European species makes the parallelism of the Ephemerid fauna of both countries complete.

As the other three American species were formerly not well described, even some of them erroneously identified, I believe it is worth while to give here a more detailed description of them. It is presumed that at least two of them will be discovered within the area of country embraced in this paper.

*E. decora*, Hagen (Synop., 38, 1).

*Male imago*.—Luteous; head in the middle, prothorax on each side, dark-brown; antennæ pale; abdomen above with four large, beneath with two narrow, black lines; setæ pale, the articulations fine, brownish; appendages pale, the two last joints nearly equal in length, taken together about half of the second joint in length; anterior feet yellow; femora brown, darker at the tip; tibiæ at base and tip, tarsal joints at tip, blackish; the other feet pale; fore-wings hyaline, with a faint yellowish tinge, light-brown on the two costal spaces; transversal veins brown, faintly clouded near the costal margin and in the middle of the wing; some larger brown spots in the middle near to the costa, and one

smaller near to the base; hind-wings hyaline. This male had apparently recently cast the skin, and is identical with the fragment of the type described in the synopsis. The type of B. Walsh in my collection is smaller (alar expansion, 23 millimeters), darker in color, but otherwise not different; the hind-wings have some transversal veins clouded, and a few blackish spots. A male from British America has the size of the male above described, but the colors of the specimen from B. Walsh.

*Female imago*.—Luteous; a darker line on each side of the prothorax; abdomen above with two larger triangular black spots on each segment, beneath with two longitudinal black lines; setæ pale; feet luteous; femora of the anterior feet brownish, tip of the joints brown; wings similar to the male, but the costal margin nearly hyaline, the spots smaller; some few spots on the hind-wings. A second female from British America is similar to the first.

*Subimago, male and female*.—Grayish-luteous; setæ pilose; wings dusky; spots the same as in the imago, none on the hind-wings; costal space a little darker.

Imago: length of the body, ♂, 10 millimeters; ♀, 11 millimeters; alar expansion, ♂, 23–27 millimeters; ♀, 30 millimeters; length of the seta, ♂, 30 millimeters.

Subimago: length of the body, 13 millimeters; alar expansion, 30 millimeters; seta, ♀, 15 millimeters.

*Habitat*.—New Haven, Conn., ♂; Norway, Me., ♂, ♀; Rock Island, Ill., ♂; Chicago, Ill., ♀; Virginia, ♂; British America, ♂, ♀, imago and subimago.

The wings of the two males from Virginia have darker spots, but probably belong to this species. *E. compar* is nearly related to *E. decora*, but is a little larger, brighter-brown, the anterior feet black, with the femora brown, the seta without blackish rings on the joints, the appendages visibly longer, the wings more yellowish, the costal margin brown, the spots smaller, the hind-wings with a larger apical brownish band.

This species is the *E. decora* of my synopsis, and according to the notes made by me in 1857, in the British Museum, also Walker's *E. decora*, I do not find the antennæ blackish; in the type-specimen of my synopsis, the antennæ are now wanting. I have no doubt about the rights of this species, which imitates well the European *E. glaucops*. The type of Mr. Walsh is the smallest specimen known, but, according to his paper, another male from the same locality was larger (alar expansion, 25 millimeters), nearly as large as the specimens above described.

*E. guttulata*, Pictet, Ephem., 135, 4, Pl. 8, Fig. 4. Male Imago.

SYN.—*E.* sp. nov., Hagen, Proc. Ent. Soc. Philad., 1863, 177.—Trans. Ent. Soc. London, 1873, 393.—Eaton, Monogr., 71 (var. of *E. myops*).

*Female imago*.—Head and thorax luteous; a brown band each side on the prothorax, some darker spots on the thorax; abdomen pale-yellow, last segment brownish on the sides; setæ pale-yellow, faintly pilose, the articulations annulated with black; anterior feet yellow; femora, base, and tip of tibiæ, tip of tarsal joints, brown, the other feet yellow; fore-wings hyaline, fumose on the costal and apical margin; transversal veins except on the third part of the hind border strongly clouded with black; a larger confluent elongated black spot in the middle of the wing; hind-wings on the apical margin fumose, the transversals on the costal margin, and some apicals strongly clouded with black; a larger confluent black spot in the middle, and a small one near the base.

Length, 19 millimeters; alar expansion, 42 millimeters; setæ (broken), about 12 millimeters.

*Habitat*.—New York, by Osten Sacken.

This is the female *Eph.* sp. nov., quoted in Proceed. Ent. Soc. Philad., 1863, 177, as resembling *E. Danica* of Europe, and by Mr. Eaton in his Monograph 71 as a probable variety of *E. myops*, a statement refuted by me in Trans. Ent. Soc. Lond., 1873, 393.

I am now convinced that this female belongs to *E. guttulata*, Pict. The long anterior feet prove Pictet's specimen to be a male imago; the other feet and the abdomen are wanting. The colors and the pattern described by Pictet agree well, except the anal part of the fore-wings, nearly hyaline in the described females, faintly spotted in Pictet's type. The bright-yellow anterior feet in Pictet's description and figure (the number of joints is erroneous) represent very well this species, and are not to be seen in any other species. Pictet gives no dimensions, but the figure is without doubt of natural size, the alar expansion 36 millimeters. The locality of the type is not known; it was presented by Mr. Conlon, and may be, as many other species, communicated by this naturalist from the Western Hemisphere. In my Synopsis 38, I supposed *E. guttulata* to belong probably to *E. natata*, and Mr. Eaton, Monogr. 69, gives both species as synonymous. The type was not in Pictet's collection; at least, it is not among the species seen by Mr. Eaton in the collection (Monogr., p. 11).

The resemblance to *E. Danica* consists in the yellow-colored abdomen. The wings of *E. guttulata* are more spotted, the abdomen less so or not at all. The colors of the abdomen feet, setæ, and wings are very different from those in *E. natata*.

#### *E. natata*.

SYN.—*Palingenia natata*, Walk., Cat., 551, 13, fem. subim.

*E. simulans*, Walk., Cat., 530, 5, male subim.

*E. natata*, Hagen, Syn., 39, 4.

*E. simulans*, Hagen, Syn., 38, 2.

*E. guttulata*, Eaton, Monogr., partim.

*Male imago*.—Dark-brown; prothorax each side with a black band; abdomen brown, above with large, serrated, black spots; setæ pale brown; articulations of the basal joints faintly marked with darker rings (partly broken); anterior feet brown; tip of joints darker; femora blackish; the other feet paler brown; appendages pale-brown, joint 2d and 3d darker on tip; 2d joint arcuated, not twice as long as 3d and 4th together; 4th half the length of 3d; wings hyaline; costal margin rather smoky; most of the transversal veins, except in the hind part of the wing, clouded with black; several larger quadrangular black spots in the middle of the wing and near to the base; hind-wings with the apical margin smoky; many transversal veins clouded with black, and several small spots blackish.

*Female imago*.—Similar to the male; thorax brighter brown; wings hyaline on the costal margin, except on the base, not so strongly clouded with black.

*Male and female subimago*.—Colors more dull; wings grayish; antennæ black; setæ dark-grayish.

Length, ♂, 13 millimeters; ♀, 15 millimeters; alar expansion, ♂, 32 millimeters; ♀, 40 millimeters; setæ ♀, 15 millimeters.

*Habitat*.—Saskatchewan River, British America, by R. Kennicott; a large number, in very bad condition; both sexes imago and subimago, Saint Lawrence River and Saint Martin's Falls, Hudson's Bay, by Walk-

er; Chicago, by Osten Sacken and Woodwell; Maine, in Harris's collection.

This is the *E. natata* of my synopsis. The species imitates *E. vulgata*, of Europe, but the wings are more grayish than brownish. It differs from *E. decora* by the larger size, the darker marked wings, the less annulated setæ, the relative length of the joints of the appendages. At least, there can be no doubt about the difference of my *E. natata* and *E. decora*, brought together even with *E. guttulata*, as belonging to the same species, by Mr. Eaton.

It may be interesting to publish here a letter to the late Prof. L. Agassiz by Mr. George E. Woodwell, from the Tribune office, Chicago, Ill., July 23, 186 (?) (number not filled). The letter contained several dry specimens, imago and subimago, of *E. natata*:

I send you a number of specimens of a fly which annually visits our lake-cities, and which has the present summer appeared in larger swarms than ever known before. During the recent hot nights they have poured in from the lake in myriads, rendering it necessary in lighted buildings to close the windows and doors in order to escape their visitation. For several nights past, they have thus swarmed upon us; and the morning would witness about the posts of the street-lamps large heaps, in some instances three inches deep, and covering an area of two or three yards square.

Couriously enough, the imitating species from Europe, *E. vulgata*, swarms in a similar manner; and Scopoli tells us that the farmers in Krain are not contented unless they are able every year to bring a number of cart-loads as manure upon their fields.

#### HEPTAGENIA.

##### *H. brunnea*, sp. nov.

*Male imago*.—Brown, the thorax and the body beneath paler; head blackish; prothorax deeply notched behind, with an elongated blackish spot on each side, and a similar one on the mesothorax; metathorax bright-yellow between the wings. Abdomen brown, the segments with a darker ring on the tip; setæ long, grayish-brown, darker at the base, the articulations scarcely darker; appendages long, cylindrical, darker brown, four jointed; first joint very small; second somewhat longer than the apicals together, which are of equal length; piece between the appendages notched; penis long, bifid, divergent. Femur paler on the tip; the other legs pale-brown; femora with a darker external line; tarsi dark. Wings hyaline; veins brown; some transversal veins on the costal margin pale.

*Female imago*.—Similar to the male. Abdomen pale, on the upper portion of each side a series of triangular black spots and a longitudinal between them; beneath, on each side a series of black lines; setæ pale, articulations black; egg-valve broad-elliptical; legs similar, the four posterior with the tarsi pale; femora darker, pale at the base and tip; wings similar, the transversal veins in the costal space pale, very fine, not reaching the costa.

Length, ♂, 10 millimeters; ♀, 12 millimeters; alar expansion, ♂, 30 millimeters; ♀, 34 millimeters.

*Habitat*.—One pair from Nevada, Truckee, in Sierra Nevada range, June 10 (J. R. Crotch).

##### *H. pudica*.

SYN.—*Ephemera pudica*, Hagen, Synop., 39, 5.

*Female subimago* (dry, just casting the skin).—Grayish-brown; head large, triangular, flattened, luteous; eyes distant, black; posterior ocelli large, the anterior small; antennæ short, stout, brownish, paler at the

base; the hind border of the occiput straight. Prothorax short, hind-margin deeply notched, nearly bilobed, pale, shining; thorax thick, pale, shining on the middle denuded parts. Abdomen stout, dull-yellowish above, with black oblique spots on each side of the segments, and some finer lines on the ventral side. The described parts, except the antennæ, are out of the nymph-skin belonging to the imago. Abdomen of the subimago pale, last dorsal segment with a small median projection; setæ strong, faintly pilose, long, grayish-brown; a large mass of eggs is protruded, but the parts are not in good condition; feet pale, grayish-brown, well developed, tarsi five-jointed; anterior wings large, opaque, pale yellowish-gray; the longitudinal veins yellowish, the transversals brown, somewhat fumose; hind-wings more yellowish, the apical border larger, grayish; reticulation similar to *Ephemera*.

Length, 14 millimeters; alar expansion, 42 millimeters; setæ, about 30 millimeters.

*Habitat*.—Washington (Osten Sacken); foot-hills, Colorado, August (Carpenter). Both female subimagos, and both in very poor condition.

In the type of the species, the femur, on the (only present) anterior foot, with a dark-brown ring in the middle.

#### LEPLOPHLEBIA.

*L. pallipes*, sp. nov.

*Female imago*.—Brown, shining; head light-brown; antennæ grayish, brown at the base; around the ocelli black; prothorax notched behind; mesothorax black, shining above; abdomen dark brown, segments on tip with a darker ring; setæ broken; vulvar lamina long, broad, bifid, the lobes elliptical; legs thin, pale-whitish, the femora darker on tip; wings hyaline, transversal veins very fine, nearly invisible, except a few on the tip of the costal margin.

Length, 6 millimeters; alar expansion, 15 millimeters.

*Habitat*.—Nevada, Truckee in the Sierra Nevada (Crotch).

Tarsi, 4-jointed; the reticulation and the shape of the hind wing similar to the wing of *L. helvipes*, figured by Mr. Eaton (Monogr., Pl. iv, 26, d.).

*Nympha-skin* (perhaps belonging to *Heptagenia pudica*).—Body broad, flattened; head small, half as long as broad, visibly enlarged in front; the hind part inflated with a rounded tubercle each side; the front border cut off straight; the sides oblique; the front angles rounded; the whole border fringed with wooly hairs. Antennæ short (not complete), a little longer than the front border; two stronger basal joints, second longer; and a conical seta, the joints of which could not be ascertained. The head (for the escape of the imago) split transversely behind the antennæ, and the occiput in the middle; the part above the mouth-parts (viewed from the front) is straight, and superseded by the described flattened border, which forms a triangular projection on each side; labrum transversely oblong, yellow, blackish on each side at the base; mandibles and maxillæ strong, yellow, with blackish apical teeth; labium transversely elliptical, four-lobed, a 2-jointed large palpus each side. Thorax large, nearly twice the breadth of the head, pale-gray, with some brown spots; prothorax flat above, short, larger behind, the angles sharp; each side near the middle of the flattened border an exserted, conical, sharp spine; meso- and metathorax rounded above, with triangular wing-cases covering the basal segments of the abdomen. The wing-cases are separated by the notched hind border of the metathorax; the cases of the posterior wings are not visible, and seem to be connected with the anteriors in the manner of *Betisca*. Abdomen a little longer than the other parts of the body, broad, flat-

tened; the segments, 2 to 9, produced on each side, in a large triangular process, bent behind, very sharp at the tip; abdomen pale-gray on each side, above a series of brown spots, with some in the middle between them; the triangular processes, on the segments 4 to 9, dark-brown, with a pale ring before the extreme tip, which is again blackish; segments 4 to 7, above each side, with a large flattened orbicular gill inserted beneath the hind border of the segments, where the lateral process begins; all lateral processes covered and fringed with wooly hairs; last segment short, transversely oblong; the dorsal apical border produced in the middle; the three setæ a little shorter than the abdomen, equal, slender, pale; the fourth joint with a black, apical ring; on the apical third four segments black, also the tip; setæ fringed with long hairs; feet flattened; the femurs dilated in the dorsal middle, ending in a superior spine, pale with three brownish bands; tibiæ black at the base and the apical half; tarsal joint black on the basal half and on the tip; the single claw pointed black at tip. Genital parts of the male on the ventral side of the ninth segment, forming on tip a transversal lobe, with a triangular longer one on each side, and a little before an elongated bifid lobe; the female has the ninth segment produced in a larger elliptical lobe.

Length, without setæ, 15 millimeters; setæ, 7 millimeters; greatest breadth of the abdomen, 5 millimeters.

*Habitat*.—Colorado, mountains and plains, July 19, September 19, Mr. Carpenter. Three skins of the *nympha*.

The form of the *nympha* is a very extraordinary one; so far as I know, the next related is the *nympha* of *Heptagenia*, and considering the large size it would not be improbable that this *nympha* belongs to *H. pudica*.

#### Family ODONATA.

##### Subfamily LIBELLULINA.

The genera *Pantala*, *Tramea*, and *Plathemis* are not yet represented in the collection of the expedition; nevertheless, it is very probable that some of the widely-spread species of those genera occur in the Territories. *P. hymenæa*, *T. lacerata*, and *Pl. trimaculata* will, perhaps, be discovered there.

##### LIBELLULA.

*L. 4-maculata*, Hagen, Synop. 150, 1.

*Habitat*.—Snake River, Idaho, and Ogden, Utah, collected in 1871 by Mr. C. Thomas; Bridger Basin, Wyoming, by Mr. S. W. Garman. This species migrates in immense flocks in the Saskatchewan district, in Canada, in Wisconsin, and around Lake Michigan, just as in Europe and in Siberia. Stowe, Mass., is the most southeastern limit for the United States; it is very common in Northern and Central Europe and in Northern Asia as far as Kamtchatka.

*L. nodisticta*, Hagen, Synop., 151, 3.

*Male adult*.—Pruinose, clothed with white hairs. Labium yellow, with a large black band strongly coarctate just before the tip; labrum luteous, a blackish border on the anterior margin, not reaching the sides, and some ill-defined brownish spots in the middle and on the basal margin; rhinarium and epistoma luteous; front brassy, black above and before, with a bright-yellow spot on each side near the epistoma. Antennæ black; vertex brassy-black, inflated, narrower at the

tip, the angles not sharply pointed, the vertex roughly punctured in front; occiput brown; eyes black behind, clothed with white hairs, a large yellow inferior spot near the margin, and a smaller quadrangular one above it; thorax black, densely pruinose, on each side an inferior yellow spot after the legs, and the indication of some ill-defined paler spots above and before them; abdomen tapering to tip, black, densely pruinose; segments each side on the ventral part with a large, reniform, somewhat irregular or divided bright-yellow spot; appendages black, the superiors as long as the two last segments, cylindrical, thicker before the outwardly-bent, pointed tip, beneath with a series of about eleven small teeth; inferior appendage a little shorter, triangular, broad, recurved; genital parts in the second segment, with the anterior lamina broad, cut straight, a small notch in the middle of the margin; hooks yellow, cylindrical, stouter on tip, which is excavated, the interior part of the excavation forming a produced unguiculated process; feet black; wings hyaline, with a blackish spot on the nodus, and a larger blackish band from the base to the triangle after the subcosta, somewhat enlarged along the anal border of hind-wings half-way of the whitish membranula; wings milky-white around the basal band and to the nodes; veins black, the first antecubital yellowish; pterostigma long, oblong, black; antecubitals 12 to 14, postcubitals 9 to 10; transversal veins in triangle, 2 to 3; four discoidal areolets, beginning with 5.

*Male teneral.*—The yellow color always brighter and more produced; dorsum of the thorax brown, with an ill-defined, broad, grayish band each side; on the humeral suture dark-brown; the crista and sinns black; the sides of the thorax paler, with four bright-yellow spots, two inferiors oval, bordered with dark-brown, and two superiors triangular, one between the wings, the other near abdomen; thorax beneath pale; abdomen fulvous, the sutures and margins black; a large black dorsal band, not reaching the base; each side oval, yellow spots on the segments; the two last segments black; abdomen beneath fulvous; the sides and the tip of the segments blackish; feet black; femora brown at base; the anteriors brown beneath; wings without the milky-white tinge.

*Female adult.*—Pruinose and similar to the adult male, combining in some parts the colors and pattern of the teneral male; labium yellow, with a narrow black line on the median lobe and the interior margin of the lateral lobes; labrum yellow, the middle part of the margin brownish; head yellow; space between the eyes black, the same color produced a little on the front above and on the sides; vertex brown, black on the sides; eyes behind bright-yellow, two transversal bands and the part near the occiput black; the head is exactly as in the teneral male, except a larger black band on the labium; dorsum of the thorax pruinose as in the adult male; the sides less pruinose, with the four yellow spots well defined; abdomen not tapering, the eighth segment enlarged, pruinose, segments 1 to 9 each side above and beneath with a large, oval-yellow spot; appendages a little longer as the last segment, black, villose, cylindrical, tapering to the outward bent fine tip; lobe between them lustrous, black at base; vulvar lamina exerted, short, notched in the middle, the sides thickened; eggs protruded, small, yellowish; feet black; wings similar to the male, but without the milky-white tinge, the black band ending before the triangle; 16 antecubitals, 11 to 12 postcubitals.

*Female teneral.*—Similar to the teneral male; head similar, black band of the labium broader; body not pruinose; dorsum of the thorax brown, yellow spots on the sides larger, forming two interrupted oblique

bands; abdomen similar but not pruinose; wings similar, basal bands rudimentary, covering only the extreme base; 13 antecubitals, 9 postcubitals.

Length of the body, ♂, 47 millimeters; ♀, 46 millimeters; abdomen, ♂, 30 millimeters; ♀, 28 millimeters; alar expansion, ♂, 80 millimeters; ♀, 76–78 millimeters; appendages, ♂, 2; pterostigma, 4 millimeters.

*Habitat*.—Mexico, the colder region, by Mr. Saussure, a teneral male described in my Synopsis; an adult couple and a teneral female from Yellowstone, Hayden's expedition, 1872.

*L. forensis*, Hagen, Synop., 154, 9.

This species was first described after a male from California in the Berlin Museum. Now I have before me a pair from the Yellowstone, and a number of specimens from Victoria, Vancouver Island. This species is similar to *L. nodisticta*, but surely different.

In the adult male, the head is entirely black with the labrum; only the extreme lateral border of the labium, and an indication of the lateral spot of the front, yellowish; the thorax is much more villous, the fine hairs longer and more dense; the dorsum of the thorax pruinose, but a large, dark-brown band covered with brown hairs on the humeral suture; the sides brown beneath, two elongate yellow spots in the middle, and the part above them pale and covered with long fur-like white hairs, interrupted on the second suture by the brown color expanding upward; abdomen similar to *L. nodisticta*, pruinose, the yellow lateral spots on the dorsum more elongated, visible to the eighth segment; appendages similar, but the inferior more pointed; genital parts similar, but the anterior lamina forming an ovoid lobe, faintly notched on the tip; feet black; wings analogous, but more intensely colored; the basal band larger, exceeding the triangle; a large transverse black band beginning on the nodus and tapering to the hind margin, indented in the middle; the space between the bands and the pterostigma below the nodus largely milky white, but this color not reaching the apical or hind margin; 16 antecubitals; postcubitals.

*Female adult*.—Similar to the male; head paler in front, rhinarium, epistoma, brown; front above with two large, quadrangular, yellow spots, separated by the black middle furrow; abdomen pruinose, similar; vulvar lamina larger, opened in the middle; wings alike, the brown bands more or less developed.

One younger female from British Columbia has the thorax and abdomen not pruinose, dark-brown; the wings without milky-white tinge.

Length of the body, ♂, 51–44 millimeters; ♀, 48–44 millimeters; abdomen, ♂, 34–28 millimeters; ♀, 32–27 millimeters; alar expansion, ♂, 32–74 millimeters; ♀, 82–72 millimeters; appendages, ♂, 2; pterostigma, 4.

*Habitat*.—California, Berlin Museum; Victoria, Vancouver's Island, July, Mr. Crotch; British Columbia, Mr. Crotch; Yellowstone, Hayden's expedition, 1871. The latter ones have the smallest dimensions.

*L. forensis* imitates strongly *L. pulchella*, a species widely spread and very common everywhere east of the Rocky Mountains; the dark-brown tinge of the tip of all the wings in *L. pulchella*, the smaller size, and other differences, easily separate the two species.

A very similar case of imitation is afforded by the two known species of *Plathemis*, but *P. trinaculata* inhabits only the vast tracts of land east of the Rocky Mountains; *P. subornata*, west of them.

*L. pulchella*, Hagen, Synop., 153, 8.

Of this well-known species, one male is in the collection of the Hay-



den expedition of 1871, taken at Ogden, Utah, the only one known to have been found west of the Rocky Mountains. The species is very common in all States east of the Mississippi and in Northern Texas. The southern limit seems to be Mississippi and Georgia.

*L. saturata*, Hagen, Synop., 152, 4 (*partim*); Uhler, Proc. Acad. Nat. Sci., Phila., 1857, 88, 4.

Stout, reddish-yellow, subvillous; vertical vesicle narrower at the tip, the sides not emarginated; abdomen broad, narrower at the tip; genital parts in the second segment, with the hooks excavated transversely on the tip, both ends equally pointed, the interior end black. Body of the female brownish; sutures of the abdomen black; vulvar lamina widely emarginated; feet reddish-yellow, villose; wings of the male hyaline, the anterior margin and the basal half yellowish rufous; basal space and triangle fuscous, the second costal space of the nodus sub-fuscous; veins reddish, the transversals in the first and second costal space bright-yellow; wings of the female hyaline, the costal margin, the basal space, and the triangle colored as in the male; pterostigma narrow, long, fulvous; membranula black; 24 antecubitals, 15 post-cubitals, 5 discoidal areolets; 3 to 4 veins in the triangle.

Length of the body, 55 millimeters; alar expansion, 90 millimeters; pterostigma, 5 millimeters.

*Habitat*.—Yellowstone (Professor Hayden's expedition), males and females; Arizona, August 5. This species was first described by Mr. Uhler after a single mutilated individual from the San Diego trip by Dr. T. H. Webb, perhaps not from California. At the time when I published my Synopsis, I knew only a male from the Berlin Museum, from Mexico, and a male and female communicated by Mr. Saussure, collected at Tampico or Cordova, Mexico. The latter pair belongs, as I now perceive, to *L. croceipennis*. As both species are very similar, I give the differences of the latter.

*L. croceipennis*, De Selys, Ann. Soc. Belg., 17; Bull., 67, 1.—*Lib. saturata*, Hag., Syn. 152, 4 (*partim*).

Very near and similar in colors to *L. saturata*, but a little smaller in size; the base of the wings in the male less colored; the basal space and triangle not fuscous; the veins in the two costal spaces reddish; second hooks in the male with the interior pointed end much longer, black; apical inferior lobe of the second segment of the abdomen larger. These differences are taken by comparing the male from California, described in the Synopsis as *L. saturata*, with De Selys's description, and the males of *L. saturata* from Yellowstone. The following statements are manuscript notes on the specimens, communicated by Mr. Saussure.

The male from Tampico has only the alar expansion 80 millimeters; the head in front and the feet darker; the wings less yellowish, the yellow color on the costal margin not reaching the nodus, going hardly beyond the triangle, which is not darker than the rest. The female from Cordova is a young one, paler mesothoracic crest yellow, a yellow band between the wings; appendages yellow; the eighth segment laterally dilated; vulvar lamina short, elevated, deeply emarginated, thickened on the sides; wings hyaline, costal margin to the principal sector and triangle yellowish.

*Habitat*.—Cape San Lucas, Lower California, by Xanthus de Vesey; Tampico, Cordova, Mexico, Mr. Saussure. After De Selys's Orizaba, Vera Cruz, Mexico, Guatemala, and perhaps Colombia.

I have no doubt about the identity of the male in my collection with

De Selys's *L. croceipennis*, and the fact that Mr. Uhler at once objected to my former opinion about its identity with his *L. saturata* confirms the statement made above.

*L. flavida*, Hagen, Synop., 156, 15.

In my last report I mentioned a fragment of this species from the Yellowstone, and I find the same statement in my note-book. The fragment not being at hand, other specimens would be required to corroborate the habitat. This species is known from Pecos River, Western Texas.

*L. composita*, Hagen, Hayden's Report, 1872, 728.

I have seen a single female only, which is fully described in the report, and provisionally placed in the genus *Mesothemis*, near *M. corrupta*. Considering the large size of *L. composita*, the small, rounded lobe of the prothorax, the enlarged apical segments of the abdomen, and the form of the vulvar lamina, the species should probably be placed in *Libellula* proper.

*Habitat*.—Yellowstone.

#### MESOTHEMIS.

*M. collocata*, Hagen, Synop., 171, 3.

I named this species after a fragment in very bad condition in the Yellowstone Report. The abdomen of a female was in one bottle and the remaining parts of the insect in another; besides this, the Yellowstone collection contained some pressed specimens not fitted for scientific use. I therefore consider my identification somewhat dubious, if I had not received in the mean time two pairs from San Diego, Cal., by Mr. Crotch, which, belonging probably to the same species, confirm my opinion. A full comparison is even now not possible, as the male type of *M. collocata* is a teneral one, and the two males from San Diego very mature; but the females agree exactly with the rudiment from Yellowstone. This species is very near to *M. simplicicollis*, but different in the black superior appendages of the male; the inferior one is yellow, a character not stated in my Synopsis. In the younger female, the appendages are yellowish, but the quadrangular, black, dorsal spot on the segments 4 to 10 is wanting; only the sutures and margins of all segments are black. Though convinced of the rights of the species, more material would be needed for a full scientific description.

*M. simplicicollis*, Hagen, Synop., 170, 1.

In my last report I mentioned a single female from Ogden, Utah; at present I am more doubtful, the specimen being very imperfect. Probably it belongs to the foregoing species. *M. simplicicollis* is very common everywhere in the Western Territories east of the Rocky Mountains from the northern border to Florida, Cuba, Texas, and Mexico.

No specimen is known from parts west of the Rocky Mountains.

*M. illota*, Hagen, Synop., 172, 4.

A female in my collection from the Yellowstone, but imperfect, without the head, belongs probably to this species, which is common in California from the Gulf of Georgia to Cape Mendocino and San Diego. The *L. gilva* from Columbia is very similar, perhaps identical.

*M. corrupta*, Hagen, Synop., 171, 3.

This species is very common in Texas, California, and is discovered

in Illinois by Mr. Walsh. There are a few teneral specimens from the foot-hills of Colorado, June 25 to July 6.

*M. longipennis*, Hagen, Hayden's Report, 1872, 728.

*Habitat*.—Yellowstone (C. Thomas). A species common everywhere.

#### DIPLAX.

*D. atripes*, sp. nov.

*Male*.—Reddish-brown, subvillous; labium, labrum, and head reddish; front above near the eyes with a large, blackish, transverse band; vertex reddish, large, inflated, smaller at the tip, with the angles not well marked; occiput reddish-brown, villous; eyes behind reddish-brown, with transverse blackish spots. Prothorax reddish, black beneath, the posterior lobe with very long hairs; thorax clothed with brownish hairs, reddish-brown, the mesothoracic crest and the sutures on both sides blackish. Abdomen reddish; ventral margin of segments 7 to 9, with a large black band; appendages reddish, villous, the superiors cylindrical, straight, somewhat thicker for the tip, with about five small teeth; tip shortly-pointed; the inferior a little shorter, triangular, somewhat smaller toward the apex; the tip bent upward, with two small teeth; genital parts of the second segment with the hamule black, bifid, the branches not very widely separated, the external stouter, elongately triangular, a little decurved at the tip; the internal shorter, slender, strongly recurved, acute at the apex; genital lobe oblong, rounded at the tip, interiorly inflated; anterior lamina with a small tooth in the middle of the margin; feet black; the anterior femora pale-brown beneath; wings hyaline, with a faintly smoky tinge; the extreme base flavescent; membranula white; veins reddish-yellow; pterostigma oblong, reddish; 7-8 antecubitals; 7 postcubitals.

*Female*.—Similar to the male, paler; head yellow; dorsum of the thorax pale-brown, sides yellowish, with three wavy, blackish lines on the sutures; abdomen luteous; a large black band on the ventral margin, and another above it not reaching the apex; segments 7-9, with a black dorsal band in the middle; appendages yellowish, cylindrical; vulvar lamina short, truncated; feet as in ♂; trochanters yellowish; in teneral females all femora above in part yellowish; wings as in ♂, the base larger, flavescent; sometimes also the costal border to the pterostigma.

Length of the body, ♂, 30-38 millimeters; ♀, 31-35 millimeters; alar expansion, ♂, 43-60 millimeters; ♀, 52-58 millimeters; pterostigma 1½-2½ millimeters.

*Habitat*.—Yellowstone; some pairs in copula (Mr. Carpenter). This species is nearly related to *D. costifera*, but different by the black color of the feet.

*D. decisa*, sp. nov.

Similar in shape and colors to *D. vicina*; labium luteous; labrum and head in front yellow; front above deeply canaliculated, discolored; a large black band before the eyes; antennæ black; vertex nearly globular, the anterior angles obtuse, luteous, black around the ocelli; occiput luteous; eyes behind luteous, with two transversal brownish bands; thorax reddish-brown; on the dorsum a brownish tinge, dilated triangularly to the prothorax; abdomen reddish-brown; sutures yellowish, a black, lateral band dilated behind on the ventral margin of segments 3 to 9 and two yellow dorsal spots, nearer to the base; abdomen beneath pale-brown; margin of segments 4 to 7 black; venter black;

appendages reddish, cylindrical, the apex acute, black, recurved beneath, in the middle with a stout triangular tooth, with the apical side straight, the basal side oblique, with 6 small teeth; inferior appendage shorter, ending just after the tooth of the superiors, triangular, but the apical half of equal breadth; the tip a little excised, nearly bifid; genital parts of the second segment with the hamules long, bent at the base, straight, rounded externally, the apex bifid; the external branch stout, triangularly-pointed; the internal of equal length, slender, unguiculated; anterior lamina excised; sheath of the penis orbicular, with a longitudinal impressed furrow; apical lobe of the second segment small, triangularly-pointed; feet black, all trochanters and the anterior femora beneath reddish-yellow; wings hyaline, the extreme base flavescent, membranula whitish, a little cinereous on the margin; veins reddish, the costa and some transversals near the base yellowish; pterostigma oblong, yellow, darker in the middle; 7 antecubitals; 7 postcubitals; 3 discoidal areolets.

Female similar to the male, paler, coloring more luteous; the lateral black bands of the abdomen more enlarged to the tip, no yellow dorsal spots; appendages yellow, slender, cylindrical, the apex acute; vulvar lamina triangular, bifid, the two branches pointed at tip and a little divergent; the femora of the anterior and intermediate feet yellowish beneath.

Length of the body, ♂, 34 millimeters; ♀, 32 millimeters: alar expansion, ♂, 52 millimeters; ♀, 53 millimeters; pterostigma 2 millimeters.

*Habitat*.—Foot-hills, Colorado; Colorado Mountains, Pacific slope, August 15 to September 6 (Lieutenant Carpenter), several pairs. The species is very similar to *D. vicina*, but differing in the black feet and the genital parts of both sexes. Some fragments of the male from the Yellowstone are a little larger, but probably the same species.

*D. pallipes*, sp. nov.

*Male*.—Very similar to *D. decisa*, but larger in size and paler in color, differs in the following characters: no transverse, black band before the eyes; vertex yellow in the middle, brownish on each side; the color of the dorsum of the thorax apparently changed by the alcohol, paler (perhaps greenish), with a triangular, brownish band in the middle, and on each side an ill-defined brownish line, not reaching the sinus; sides of the thorax red in the superior half, some ill-defined paler spots above the legs. Abdomen more slender, sutures brown; no black dorsal or ventral bands, except a dorsal brownish mark on the third and base of the second segment; however, these marks could be produced by the decaying process; on the third and fourth segment an indication of two yellow spots before the apex; venter pale; appendages similar, but the inferior middle tooth of the superiors with the interior surface not oblique, more perpendicular; the apex of the tooth yellow, with the small tooth more pronounced and black; genital parts similar, but the external branch of the hamule excavated exteriorly and cut on the tip; internal branch black; the apical lobe of the second segment narrower, more jointed. Feet more slender, reddish-yellow, a fine black line outside of the femora, not reaching the base, and a finer and shorter one on the tibia near the black spines; joints of the tarsi black at the tip. Wings similar, less flavescent at the base; 8-9 antecubitals; 7-8 postcubitals.

Length of the body, 40 millimeters; alar expansion, 61 millimeters; pterostigma, 2 millimeters.

*Habitat*.—Foot-hills, Colorado (Lieutenant Carpenter).

*D. semicincta*, Hagen, Synop., 176, 5.

A fragment of a female similar to my specimens, but the fuscous color extending upon the anterior wings as far as on the posterior wings. I never saw similarly-colored specimens from the region east of the Rocky Mountains.

*Habitat*.—Foot hills, Colorado (Lieutenant Carpenter). The species is not rare in the States east of the Mississippi as far south as Maryland.

In the last report (1872, p. 728), I noticed from the Yellowstone region *D. assimilata*, *D. scotica*, and *D. vicina*. The first species is, as I now perceive, my *D. decisa*; the other two are no more at hand.

### Subfamily CORDULINA.

#### EPITHECA.

*E. semicircularis*, De Selys, Synop. des cordulines, 61, 37.

Dark brassy-green; occiput and labium black; rhinarium and labium pale-yellowish; on each side of the front a large luteous spot, connected sometimes on the lower edge of the front in a narrow luteous band, interrupted in the middle by a small black interval; eyes black behind; thorax dark brassy-green, clothed with long grayish-brown pile before the sinus, sometimes transversally fulvous, sometimes not; the sides with two ill-defined luteous spots; feet entirely black; abdomen brassy-black, a large fulvous spot on each side of the second segment, a smaller one on the third segment (often wanting in the males); segments 4 to 8 with a small fulvous basal spot on each side (always wanting in the Colorado specimens); appendages of the male black, the superiors long, subcylindrical, carinate inferiorly and exteriorly; viewed from above, the basal half is convex, straight, tapering, divergent; the apical half is bent slightly outward, then inward, subexcavated before the pointed end; viewed laterally, the appendages are curved somewhat downward, the apex laminate, the lower edge with a small external basal tooth, beyond the middle a rounded lamella, and between them the internal edge produced in form of a larger rounded lamella. Both lamellae, viewed from above, appear as lateral projections; inferior appendage more than half the length of the superiors, triangular, bluntly-pointed, concave below, recurved, the tip minutely uncinate above; appendages of the female long, stout, cylindrical, black; vulvar lamina half the length of the segment, yellowish, quadrangular, somewhat erect; apical margin rounded, split in the middle; wings hyaline, or with a yellowish tinge (Vancouver Island specimens); costa lined with yellow; extreme base of the hind-wings subfumose; membranula blackish-gray, white at the base; antecubitals, 7-8; postcubitals, 6-7; triangle in some specimens with a transversal vein in one or both hind-wings.

Length of the body, 50-46 millimeters; alar expansion, 80-60 millimeters; pterostigma,  $2\frac{1}{2}$  millimeters.

*Habitat*.—Gulf of Georgia (by Mr. A. Agassiz, the male type described by De Selys), Vancouver Island, in July (Mr. Crotch); Colorado, on Twin Lake and Arcade River, August 1 to 16; Pacific slope, August 16 to September 6 (Lieutenant Carpenter); Ogden, Utah (Mr. C. Thomas). A careful study of the male type in the collection of the museum shows the anterior femora entirely black, not "*presque noirâtre*," as in De Selys's description. This character is very important as difference from *E. forcipata*. The words of the description, "*Je crois distinguer en dessous une sorte de dent submédiane analogue à ce que l'on voit chez E.*"

*arctica*," are to be struck out, as this appearance was due to some dirt which stuck to the appendages of the typical specimen. The male type and the pair from Vancouver's Island are larger, most of the Colorado specimens show smaller dimensions, and differ as stated above by the abdomen being black, without fulvous basal spots on segments 4-8; this may be due, perhaps, to the action of the alcohol or of some substance added to the alcohol for the better preservation of the specimens. The difference of *E. forcipata* is no longer doubtful after the examination of more specimens, but this species is very nearly related, and differs by the labrum having a brownish spot on each side, by the anterior femora being partly fulvous, by the appendages of the male; the vulvar lamina of the female is the same, split on the apex. Having now carefully compared *E. arctica* of Europe with both species, I am very sure of the specific difference of this species. In *E. arctica*, the split at the apex and the appendages of the male are different.

#### Subfamily ÆSCHNINA.

##### ÆSCHNA.

*Æ. constricta*, Hagen, Synop., 123, 8 (Hayden's Report, 1872, 727).

*Habitat*.—Yellowstone, common (C. Thomas); foot-hills, Colorado, a male without head. This species is common everywhere east of the Mississippi from Canada to Maryland and west to Wisconsin and British Columbia.

*Æ. multicolor*, Hagen, Synop., 121, 4 (Hayden's Report, 1872, 727).

*Habitat*.—Yellowstone (C. Thomas); Vancouver's Island (Mr. Crotch); Upper Missouri, Pecos River, Western Texas, and Cordova, Mexico. A decidedly western species.

*Æ. propinqua*, Hayden's Report, 727.

*Habitat*.—Yellowstone, fragments of the male and female; Colorado plains, June 25 to July 5, female. The specimens are not in good condition, but I believe them to belong to the species described by Mr. Scudler from the White Mountains, New Hampshire. In the report of 1872, I did mention one female of the *Æ. eremitica* from Yellowstone; perhaps this female belongs also to *Æ. propinqua*.

#### Subfamily GOMPHINA.

##### OPHIOGOMPHUS.

*O. severus*, sp. nov.

Greenish-yellow; head and mouth parts greenish-yellow, labium and labrum paler; antennæ black; part between the eyes black, forming a transverse black band above the base of the front, excised in the middle; vertex greenish-yellow, flat, the front margin deeply notched, the sides of the vertex cariniform, curved in an exact semicircle around the lateral ocelli; occiput greenish-yellow, straight, fringed with black hairs, a small rounded inflation in the middle of the front side; eyes behind greenish-yellow, with a small, black band along the superior border, beginning near the occiput. Thorax greenish-yellow, an ill-defined, brownish spot on the dorsum each side near the wings; the crest of the sinus not exceeding the bifurcation, black, and an incomplete blackish band on the humeral suture beginning at the wings.

(Three males and two females from Colorado, in alcohol; a single male

from Yellowstone, preserved dry, shows the following pattern): dorsum with a broad black band in the middle, following the sinus above and united with a complete black band on the humeral suture. Mesothoracic crest from the bifurcation to the prothorax yellow; a large, ovoid, black spot each side of the dorsum, not confluent with the bands; a black band on the second lateral suture, nearly united by a superior line at the base of the wings with the humeral band; an inferior, incomplete black band on the first suture, ending at the stigma. Abdomen cylindrical, enlarged at the base, and on the seventh to ninth segments greenish-yellow; all the segments each side on the apical half with a large blackish band; the bands are interiorly dilated at the tip, and converging (diverging on the first segment); venter black on segments 3 to 6, orange on the following; in the Yellowstone male, the bands are broader and confluent on the tip; the yellow part between the bands forming a basal hastiform spot; appendages yellow, the superiors about as long as the last segment, short, parallel, stout, trigonal, exteriorly rounded, subincurved, pointed on tip, which is bent outward, beneath somewhat thickened before tip, with numerous small black spines; inferior appendage a little shorter, triangular, bifid to the base, contiguous, the basal half forming an obtuse elevation, the apex recurved with a small black superior tooth; genital parts in the second segment with the first hamule forming a lobe interiorly hollowed; the tip with a semicircular excision, the hind angle of the tip prolonged in a strongly-bent slender black hook; second hamule longer, the tip suddenly narrowed, a little recurved, blackish, cut straight; penis with an inferior tooth on second joint, the last one with two long spines; sheath of the penis hollowed out, four-lobed, the two inner lobes cylindrical, divergent, the outer ones large, flat, semicircular; earlets yellow, large, rounded, on the hind band a series of small, black teeth. The female has the occiput exactly similar to the male, without any posterior teeth; appendages yellow, short, pointed; vulvar lobe triangular, a little shorter than the segment, bifid to the base, contiguous, indented short before the sharply-pointed black tip; which is bent outward; feet yellow, femora an apical superior black band, beginning on the knee, divided anteriorly; beneath with numerous very short black spines; tibiae black beneath and interiorly or on both sides with a black line and long black spines; tarsi black, all or only the basal joint yellow above; wings hyaline, veins black; the costa and some transversals yellow; pterostigma oblong, a little dilated in the middle, yellowish, darker in the middle, covering nearly three areolets; 11-12 antecubitals, 7-10 postcubitals; 2 discoidal areolets; membranula whitish.

Length of the body, 51 millimeters; alar expansion, 64-68 millimeters; pterostigma,  $2\frac{1}{2}$  millimeters.

*Habitat*.—Colorado (Mr. James Ridings); foot-hills and plains of Colorado. End of September (Lieutenant Carpenter); Fort Garland, Colorado, June 27, South Montana and Yellowstone (Mr. C. Thomas). This is the species given in my last report (p. 726) doubtfully as *G. colubrinus*. This interesting species is very near *O. colubrinus* in the appendages and genital parts of the male, but different in the pattern of color on the head and abdomen and the structure of the occiput in both sexes. *O. colubrinus* is a species rarely to be found in collections; even the female is not yet described. To prevent doubts about the rights of *O. severus*, I give here a description of the female of *O. colubrinus*. I do not possess the male, and my manuscript description of it is still in Europe.

*O. colubrinus*, Hagen, Synop., 101, 7.

*Female*.—Greenish-yellow, marked with black; labium luteous, the

margins clothed with pale-brownish hairs; median lobe with a broad black band on the anterior margin; lateral lobes and the palpus dusky-brownish; labrum yellow, with a black shining band on the anterior margin and a narrower one at the base; head yellow; rhinarium with a pale, slender, transverse, black line, interrupted in the middle near the base of the labrum; epistoma with an inferior transverse band, and another between the front and the epistoma, a little dilated on the sides, and united near the eyes with the black band above on the base of the front before the antennæ; this band is produced a little in the middle and before each antenna; antennæ and part between the eyes black; vertex black in front, brownish near the occiput, cariniform, excavated above, front margin rounded, notched in the middle, with a deep, curved impression on each side near the margin; the sides of the vertex curved in a semicircle around the lateral ocelli; occiput yellow, straight, with an anterior furrow in the middle, the border with long, black cilia; each side near the furrow a long, sharp spine, yellow at the base, blackish on tip, divergent, the tip gently recurved inside near the base with a sharp tooth, a smaller one after the middle, and a very small one just near the tip; each side behind the eyes just near the occiput and not to be seen in the front view, a stouter black process, cylindrical, somewhat rough and divided by two transverse furrows, blunt at tip; eyes behind yellow, with a large, superior, black band; thorax greenish-yellow, with a large blackish-brown band in the middle, narrowed toward the sinus, and a large blackish band, not reaching the wings, narrowed above and separated only by a slender yellow line from a similar band on the humeral suture, which is narrowed beneath; sinns and mesothoracic crest blackish-brown; sides of the thorax yellow, with a blackish band on the second suture, and an incomplete inferior one on the first suture, ending near the stigma; thorax beneath yellowish; abdomen (not in good condition) yellowish, each side with a dorsal blackish-brown band, and between them yellow, hastiform, large spots, not reaching the apex in segments 5 to 6; smaller, and only basal on segments 7 to 9; segment 10 yellowish, the apical margin blackish; the sides of the segments yellowish; on segment 2 a large blackish spot; venter brownish; appendages wanting; vulvar lobe a little shorter than the segment, triangular, bifid to the base, the lobes rounded, tapering to the tip and convergent, yellowish, the tip black; feet luteous; femora above brownish; tibiæ superiorly paler; femora with shorter, tibiæ with longer black spines; wings hyaline, a little smoky; veins black; pterostigma oblong, pale, brown, covering five areolets; 13-14 anticubitals; 11 postcubitals; 2 discoidal areolets, beginning with three.

Length of the body, 42 millimeters; alar expansion, 60 millimeters; pterostigma, 3 millimeters.

*Habitat*.—Portneuf, near Quebec, Canada (Mr. Uhler's collection). This female agrees well with the description given in the monograph of the Gomphines, p. 77. I figured in the same work (Pl. 5, No. 1) the occiput of the male, with two small spines behind the eyes. The figure is the same in my original drawings now before me, but in the description the spines, indeed quite extraordinary for a male, are not mentioned. As my manuscripts are still in Europe, I am unable to say more about it. To avoid further mistakes occurring, the very closely-related species *O. rupinsulensis* and *O. mainensis*, united by the latest monographer, Baron De Selys Longchamps, in 1873 and 1874, I prefer to give a full description of both, the more so as both sexes are now before me.



*O. rupinsulensis.*

*Herpetogomphus rupinsulensis*, Walsh, Acad. Nat. Sci. Phil., 1862, p. 368, male.  
Proc. Ent. Soc. Phil., 1863, p. 253.

**Male.**—Greenish-yellow; labium pale-livid (blue, Walsh), black on the anterior margin and the fore half of the side; lateral lobes pale; labrum pale, with a fuscous basal spot, but little marked on each side; head in front greenish-yellow; antennæ black, apical border of the first joint pale; part between the eyes and front black; the extreme base of the front between the antennæ black; vertex greenish-yellow, cariniform, excavated above, scarcely emarginate, the sides rounded off at the ends, and a smaller carina in a semicircle around the ocelli; occiput straight, scarcely elevated in the middle, yellow, densely ciliated with long, black hairs; eyes livid behind, paler beneath, with a blackish superior spot near the occiput. Thorax greenish-yellow, the mesothoracic crest black just where it bifurcates, and on the end of the sinus near the wings; a brownish band only indicated on each side near the humeral suture, not reaching the wings; a small brown band on the humeral suture; thorax otherwise immaculate except some brownish spots near the feet to the stigma. The colors of the abdomen not well preserved (pale-brown, clouded with brown, Walsh); on the dorsum of the segments a lanceolate, yellowish spot, two black apical spots, and two small transversal lines in the middle; last segment yellowish, rounded; ventral margins of the segments yellowish; venter black, on the four last segments rufous; the abdomen slender, cylindrical, somewhat dilated at the base and much more on segments 7–8; appendages greenish-yellow, with long, pale, dense hairs; superiors about as long as the last segment, very robust, directed downward, approximate at base, conical, a little bent, obtuse at tip, interiorly with a small basal tooth; viewed laterally, with an inferior carina, squarely truncate on tip, and on the terminal half below three irregular rows of small, short, black teeth; inferior about as long and exactly attaining the lower angle of the truncated tips of the superiors, broad, bifid on the apical half, viewed from below and each branch very robust, rounded, divaricate, squarely truncate on tip, viewed laterally strongly incurved, incrassate at base and still more so on tip, which is truncate; genital parts on the second segment with the first hamule black, with a deep, posterior, elliptic excision on tip, the superior angle forming a long, sharp, incurved hook, nearly meeting the opposite angle; the second hamule longer, the basal half thick, pale, cylindrical, the apical half suddenly thinner, black, cylindrical, incurved, and again recurved on tip; sheath of the penis hollowed, four-lobed, the two interior lobes divergent, short, conical, the outer lobes large, rounded on the margin; penis with two small, black, short, incurved spines on tip, and with an inferior tooth on the second joint; earlets yellowish-green, rounded, some small black spines on the inner angle; feet yellowish-green, femora with a broad, brown, anterior band, only near the knee on the four posterior feet, which are more brownish beneath; tibiae black, with a superior yellow band; tarsi black, on the posterior pair yellow in part above; wings hyaline, slightly flavescent at base; veins black, the costa yellow; pterostigma brown, oblong, surmounting about five cells; membranula cinereous; antecubitals, 13–14; postcubitals, 9–12; two discoidal areolets.

**Female.**—Similar to the male. Occiput similar, but each side on the border nearer to the eye a short, small, cylindrical, yellow spine, smooth on the tip; a second female has the spine rudimentary; in a third specimen there is none; behind the eyes, each side, near the occiput, a brown,

robust, conical process, both convergent. Thorax same as in the male; the brown bands on the dorsum darker, nearly confluent with the antehumeral band in one of the specimens. Abdomen less slender, a little dilated on the tip; colors same as in the male, the dorsal yellow spot on the second segment large; earlets small; appendages yellow, as long as the last segment, conical, sharp, convergent; tubercle between them darker; vulvar lamina yellow, nearly as long as the segment, triangular, bifid a little beyond the apical half, the branches contiguous, rounded, tapering toward the tip, which is bent outward, indented just before. Feet and wings as in the ♂; pterostigma larger.

Length of the body ♂, 52–54 millimeters; ♀ 51 millimeters; alar expansion, ♂, 65–68 millimeters; ♀, 68 millimeters; pterostigma, ♂, 3 millimeters; ♀, 4 millimeters.

*Habitat*.—Rock Island, Illinois (Mr. Walsh); Upper Wisconsin (Mr. Kennicott); Maine (Dr. Packard and Mr. Uhler). Mr. Walsh saw only one male; the type burned in Chicago was examined by me in 1868, but I took no notes. The description by Mr. Walsh agrees perfectly with the two males from Wisconsin described by me; Mr. Walsh stated (p. 389) that the male has no tooth on the second joint of the penis, but it certainly exists there, and, as I know that Mr. Walsh used lenses of low power only, he may have overlooked it. In the third addition to the *Synopsis des gomphines*, De Selys describes (p. 13) a male from Maine, communicated by Dr. A. S. Packard, and erroneously unites with it *O. mainensis*, as will be seen by the description of this species.

#### O. MAINENSIS.

*O. mainensis*, Walsh, Proceed. Ent. Soc. Phil., 1863, p. 255, female.

*Male*.—Yellowish-green, marked with black; labium paler, the margin black; labrum with a narrow, black, front margin; head before yellowish-green; part between the eyes black, and a large basal black band above on the front; antennæ black, tip of the first joint pale; vertex black, pale at the base and in the middle, cariniform, excavated above, scarcely emarginate, the sides rounded off at ends, and a smaller carina in a semicircle around the ocelli; occiput greenish-yellow, straight, densely ciliated with long black hairs; eyes behind livid, with a black transverse superior spot near the occiput; prothorax black, with small yellowish spots on the middle and each side; thorax greenish-yellow, with blackish-brown bands; the middle ones narrowed to the wings, separated by the carina, yellowish to the bifurcation; the laterals large and confluent with the antehumeral, only near the wings divided by the paler suture; margin of the sinus blackish; sides of the thorax greenish-yellow, an incomplete, inferior blackish band, ending at the stigma, and a smaller complete one on the second suture; below pale; abdomen cylindrical, slender, at the base and before the apex dilated, black on all segments, with yellow dorsal spots, enlarged on 1 and 2, hastiform, not reaching the tip on 3 to 5, shorter, more triangular on 6 and 7, short basal and enlarged on tip on 8 and 9, large, transversal, separated from the base on 10; sides of all segments with large, elongated, yellow spots, divided by the suture, reaching the tip only on segments 2 and 8 to 10; ventral margins of segments 8–9 black; dorsal articulations after the sixth segment yellow; venter black, of the last three segments fulvous; appendages yellow; clothed with pale hairs; superiors as long as the last segment, robust, directed downward, approximate at base, with a basal tooth on the inner edge, conical, sharp on tip; viewed laterally very robust, with a basal inferior carina, the apical half dilated, rounded till short before the sharp pointed tip, with two series

of about seven stronger black teeth; the inferior appendage large, much broader than the superiors and of the same length, the apical half divided by a larger semicircular notch; viewed from below the two branches, large, quadrangular, obliquely truncate, the angles sharp; viewed laterally incurved, thicker before the recurved tip, the outer angles forming a large superior tooth; genital parts on the second segment with the first hamule black, a very long, flat lobe, incurved more on tip; indeed, they are similar to *O. rupinsulensis*, the base is broader, and the excision beginning at the base is so large that the superior angle alone exists; second hamule longer, brownish, broad, flat at base, the other part forming a slender, very long lobe, strongly recurved and suddenly again incurved, the apical part straight; sheath of the penis hollowed, ovoid, bifid on tip; the two branches conical, divergent; penis with two short black spines on tip, and an inferior tooth on 2d joint; earlets greenish-yellow, rounded, with a series of black spines on the posterior inner angle; feet black; femora somewhat villous, with very short spines, the four anteriors with a greenish band on the inner side; wings hyaline; veins black; costa yellow; pterostigma oblong, blackish-brown, covering 3 (or 5) cells; 2 discoidal areolets; 12-13 antecubitals; 9 postcubitals; membrana very small, whitish.

*Female* (type described by Mr. Walsh). More adult; the labium brownish-black, with a yellowish, basal spot; lateral lobes blackish on the inner border and tip; vertex blackish, with a rounded, yellow, middle spot and a yellow dot on each side; occiput inflated, ciliated above, emarginated behind, and on each side with a rounded tubercle; the superior edge rounded in the middle with two, but little separated, conical processes, ending in long, sharp, strongly incurved spines, converging so as almost to touch at their extreme black tips; eyes behind black, with a large, inferior, yellow spot, divided in the middle; thorax as in the male, the lateral bands on the dorsum separated from the antehumeral by a narrow, yellowish band, nearly confluent above; an accidental black spot on the left side near the sinus; abdomen stouter, more clavate on tip; dorsal spots as in male, none on the three last segments; appendages about as long as the tenth segment, yellow, conical, sharp; lobe between obtuse, yellow; vulvar lamina yellow, nearly as long as the segment, oblong, bifid on the apical half, a little broader before an apical exterior indentation, the tips sharpened, bent outward; feet as in ♂, the posterior femora with a greenish spot before the tip; wings as in the male; costæ black, but near the base the formerly yellow color is visible; pterostigma a little longer, covering 5-6 areoles; 14-15 antecubitals; 13 postcubitals.

Length of body, 46 millimeters; alar expansion, 56-60 millimeters; pterostigma  $2\frac{2}{3}$ -3 millimeters.

*Habitat*.—Maine, by Dr. Packard; I have seen only one pair; the female is the type of Mr. Walsh, in the collection of the Peabody Academy, in Salem, Mass.; the male, in the collection of Mr. Uhler, Baltimore, Md. Both were collected by Dr. Packard at the same locality, and there is no doubt that both belong to the same species. A translation of Walsh's description is given by De Selys's in his second addition to *Synopsis of the Gomphines* (p. 45), but the vertex and occiput were not exactly accurate in Walsh's text. In the third addition (p. 14), De Selys unites the female with *O. rupinsulensis*. As I have described now both species in both sexes, this is apparently erroneous. *O. bison*, from California, is described by De Selys in the appendix to the third addition (1874, p. 51) after an incomplete female. I have not seen the type; the only difference from *O. mainensis* consists, according to the description,

in the spines of the occiput being divergent instead of convergent. More specimens of both species are necessary to show the constancy of this character.

#### HERPETOGOMPHUS.

*H. compositus*, Hagen, Synop., 99, 1.

A teneral female, in very bad condition, quoted in my last report (p. 727) as probably belonging to *H. viperinus*, a species never seen by me, has again been carefully studied, and I am now of the opinion that it belongs to *H. compositus*, described by me after a single female from Texas. I received a male from Northern Texas, Dallas, by Mr. Boll, agreeing with De Selys's description in the third addition (p. 12), but the very abrupt and intensive yellow color at the base of the wings is not marked. The female from Yellowstone is larger; length, 54 millimeters; alar expansion, 68 millimeters; and the first lateral brown band of the thorax not well defined, ending shortly after the stigma. It will be more prudent to retain this female as *E. compositus* until the difference is better established by the comparison of more specimens, the more as the pair described by De Selys from Oregon is nearly as large as the Yellowstone one. De Selys adds: "*Je ne vois pas de renflement antérieur d'occiput chez la femelle*," but it exists not in the female type.

*Habitat*.—Western Texas, Pecos River, the female type in my collection; Dallas, Tex., Boll, one male; Yellowstone, a female from Hayden's expedition, 1872; a pair from Oregon by Lord Walsingham.

#### GOMPHUS.

*G. olivaceus*, De Selys's third addition Synop. des Gomphines, p. 22.

*Female* (in alcohol).—Pale greenish-yellow; head entirely greenish-yellow, labium paler; a transverse brownish band, interrupted in the middle above at the base of the front; antennæ blackish; the two basal joints greenish-yellow; part between the vertex and front black, with some yellowish dots; vertex flat, depressed, yellow, each side behind the ocelli somewhat inflated, carinated around the lateral ocelli; occiput yellow, straight, with short, black cilia, and with a series of fine, black teeth; eyes behind yellow, with a superior black spot near the occiput; prothorax yellow; on the disk each side with a larger brownish spot; thorax yellow; dorsum each side near the yellow crista with a brown band, narrowed above, not reaching the sinus; each side a large, incurved, brown band, separated by a smaller yellow band from the brown line on the humeral suture; sinus brownish to the bifurcation; sides and below yellow; abdomen large, cylindrical, yellowish, each side a dorsal, black, large band, indented inside, not reaching the base on segments 4-5 (the rest is lost by accident, but has been examined before; it was colored in a similar way, the appendages yellow, the vulvar lamina short, broad, notched in the middle); femora yellow, with a short, black, apical band above, and below with numerous very short, black spines; tibiae and tarsi black; wings hyaline; veins black; costa yellow; pterostigma oblong, yellow, with 4 cells below; 14-15 antecubitals, 10-11 postcubitals; 2 discoidal areolets; membranula whitish.

Length of the body, 54 millimeters; alar expansion, 72 millimeters; pterostigma, 4 millimeters.

*Habitat*.—Humboldt River, Nebraska, Mr. Garman; California, Lord Walsingham, or perhaps, as the foregoing species, from Oregon.

The described female, besides being preserved in alcohol, is a teneral one; De Selys's specimen is more adult. After a careful comparison, I find his description agreeing very well with the female before me, except the "*point huméral supérieur rond*," but such a spot is sometimes only occasional or perhaps belongs to the adult specimen. The length of the femur, 8 millimeters, is the same. In comparing the female with *G. plagiatus* male, I believe them to be different species.

Mr. Garman collected in Utah, Great Salt Lake, the nymph-skin of a *Gomphus*. The skin is 31 millimeters long, and similar to the species described by Mr. L. Cabot in his monograph (p. 3, No. 4).

#### Subfamily CALOPTERYGINA.

##### HETÆRINA.

*H. Californica*, Hagen, Syn., 59, 2.

In my last report (p. 729), I quoted some fragments of males from Yellowstone. It would be necessary to see more specimens in better condition, but the fragments belong, doubtless, to the genus *Hetærina*, and very probably to *H. Californica*. By some error in the report, the species is placed between the insects not belonging to the *Odonata*.

#### Subfamily AGRIONINA.

##### LESTES.

*L. disjuncta*, De Selys, Synop. lestes, 18, 10.

Specimens in bad condition from Yellowstone are quoted in my last report (p. 727). This is a decided northern species.

*L. congener*, Hag., Syn., 67, 5.

A male from Yellowstone is quoted in my last report (p. 727); another from foot-hill, Colorado, by Mr. Carpenter.

*L. hamata*, (*L. forcipata* Hagen, Syn., 71, 13).

Some specimens from Colorado Mountains, Pacific slope, belong probably here; but all the *Lestes*, as, in general, all *Agrionina* collected by the expedition, are in worse condition, and unfit to be determined with certainty. For this species I believe the determination sure, but males and females are present only in broken pieces.

##### ARGIA.

One species from Yellowstone and Snake River, Idaho, quoted in my last report, belonging to the group of *A. moesta*.

##### AGRION.

One species from foot-hills, Colorado, group of *A. pravarum*.

##### ISCHNURA.

One species from foot-hills, Colorado, group of *I. iners*. All the specimens being broken more or less, a scientific description would be impossible and even objectionable.

## NEUROPTERA.

## Family HEMEROBINA.

## POLYSTÆCHOTES.

*P. punctatus*, Hagen, Syn., 206, 1.

The species is very common everywhere in the United States, from the Gulf of Mexico to British America and from the Atlantic to the Pacific. Curiously enough, the previous states of this beautiful and very interesting species are still unknown. From analogy, and even from the fact that the larva of this large and everywhere common species was not yet observed by American entomologists, it is safe to presume that the larva will be aquatic, with habits similar to the larva of *Osmylus*, and must be looked for in the months of April and May, perhaps even in June, as the imago appears in the middle of July, and continues until the arrival of the cold weather. I saw a large cluster of eggs on a leaf in the collection of Mr. A. Lintner in Albany, N. Y., probably belonging to this species.

*Habitat*.—Yellowstone (Mr. C. Thomas); Colorado Mountains, August 29, foot-hills, September (Lieutenant Carpenter); Twin Lake, August.

The following *Hemerobinae* are unfit for scientific purposes, having been collected in alcohol or put together in papers with *Lepidoptera*, and covered throughout with lepidopterous scales; the last ones cannot be cleaned without being more or less spoiled.

## MICROMUS.

One specimen, related to *M. sobrius*, from foot-hills, Colorado.

## HEMEROBIUS.

One specimen, from Fair Play, July 11, related to *H. alternatus*, and two other species, Colorado Mountains, July; entirely unfit for determination, except to say that there are two different species.

## CHEYSOPA.

There are three species, one from the Snake River, Idaho (Mr. C. Thomas), belonging to the group of *C. oculata*, probably new; and two from Colorado plains, belonging to the groups of *C. nigricornis* and *C. externa*. A description of new species based upon single specimens in this very difficult genus is scientifically objectionable, especially when the single specimens are imperfect.

## MYRMELEON.

*M. diversus*, Hagen, Report for 1872, p. 729.

*Habitat*.—Yellowstone and Snake River, Idaho.

## Family SIALINA.

## CORYDALIS.

A not full-grown larva from Chiquili, Colo. (Professor Newberry). The larva differs from those of *C. cornuta* by a longer prothorax, luteous

legs, and the mark of the head. There are now six species known from Texas and Mexico; of course, it is still impossible to ascertain the species of the larva from Colorado, but probably it may belong to one of the three Texan species.

#### RAPHIDIA.

The genus *Raphidia* belongs to the interesting class of genera which are represented largely in Europe and Asia, are entirely wanting in the fauna of North America east of the Rocky Mountains, but are represented again in California, and in the other vast tracts of land west of the Rocky Mountains. I have seen only two specimens, one from Ogden, Utah (C. Thomas), the other from Rio Grande, Colorado, June 13 (Lieutenant Wheeler's expedition). Both belong to different species, and to *Raphidia* proper (not to *Inocellia*); both being preserved in alcohol, I am not able to give any better information, the more so as the genus *Raphidia* contains the most difficult species for determination.

#### Family PHRYGANINA.

##### LEMNEPHILUS.

There is a species from Colorado Mountains, August, by Mr. Carpenter, in broken alcoholic specimens. It belongs to the group of *L. rhombicus*, and has nearly its size.

##### GONIOTAULIUS.

A very imperfect female from Colorado Mountains, August; it belongs to the group of *G. griseus*.

##### STENOPIHYLAX.

*St. divergens*, Hagen, Syn., 255, 5.

Fragments only from the Colorado Mountains, August. Perhaps some of them belong to a different but related species.

##### PLATYPHYLAX.

*P. designatus*, Hagen, Syn., 269, 6.

Fragments sp. nov. from foot-hills, Colorado, September.

*P. atripes*, sp. nov.

Syn. *Stathmophorus*, spem., Hagen's Sixth Annual Report, by Professor Hayden, 1873, 729.

Pitchy-black above, orange-colored beneath; antennæ stout, the inner edge orange and serrate; head before the antennæ orange, clothed with orange hairs; palpi orange; head above clothed with black and orange hairs; ocelli very large and prominent; thorax and prothorax tightly clothed with pale hairs, and with longer black hairs, pale on tip; anterior wings large, the apex parabolic, cinereous, somewhat shining; the veins pitchy-black and very distinct; costal margin and thyridium pale; the membrane throughout, with the exception of the costal and dorsal margins, distinctly granulated, sparingly covered with very small orange hairs (perhaps the clothing is spoiled); apical cells large, the first and third longer and pointed as well as the fifth, the second and fourth cut straight; all spaces and cells paler in the middle; posterior

wings of the same color, without granulations and orange hairs; first apical cell shorter than the third, the others similar; feet strong, pitchy-black; femora bright-orange; the four anterior tibiae and tarsi brown interiorly; spurs 1, 2, 2, yellow, long; tibiae and tarsi with strong black spines; abdomen pitchy-black above, orange beneath.

*Male*.—The upper margin of the last segment is cut off straight; appendages orange; the superiors small, flattened, straight, subconvergent lobes, rounded on tip, with some small yellow hairs beneath; between them a shorter triangular penis-cover, carinated above; intermediates very small, short, cylindrical, the tip suddenly enlarged, rounded; inferiors large, much longer than the superiors, broad, separated below by a short, ovoid, ventral lobe, concave inside; the margin after a small excision produced in a long, band-shaped, narrow process, incurved, and pointed on tip; perhaps the process is moveable; the base sparingly clothed with brown hairs; tip of penis visible; two thin penis-sheaths, with some bristles on tip.

*Female*.—Abdomen blunt on tip; anal valves triangular; vulvar lobe not well visible, perhaps trilobate.

Length, with the wings, 26 millimeters; expansion of the anterior wings, 51 millimeters.

*Locality*.—One pair from Colorado Mountains, in August. Here belongs the badly-preserved male from Yellowstone, referred to in the sixth report as *Stathmophorus* related to *St. Argus*.

This interesting species is the largest known for North America, differing from all others by the very large ocelli. The species is very similar to *St. Argus* in sp. nov. size and shape, and even more to *St. gilvipes*.

*Stenophylax gilvipes*, sp. nov.

This species recalls *Pl. atripes* in size, shape, and color in the most extraordinary manner. Nevertheless, it is to be recognized by the entirely yellow legs and 1, 3, 4 spurs; orange-colored, head and thorax pitchy-black above; head before the antennae orange, clothed with orange hairs, palpi orange; antennae stout, pitchy-black, serrated beneath, and there the tip of the joints brownish; basal joint orange beneath; head and thorax above clothed with grayish and some black hairs; ocelli large, prominent; thorax beneath tightly clothed with white hairs; anterior wings large, the apex parabolic, ash-gray, somewhat shining; the veins pitchy-black and margined everywhere with black, very distinct; costal margin pale in the middle, blackish at both ends; thyridium and arculus pale; the membranes, excepting the costal and dorsal margins, distinctly granulated; from each granulation springs a small, decumbent, orange hair; apical cells of the same breadth; the first, third, and fifth pointed, somewhat longer; posterior wings of the same color, without granulations and hairs; veins less distinct; the costal margin pale throughout; apical cells similar; feet dull-yellow; spurs 1, 3, 4, yellow, long; tibiae and tarsi with long, black spines; abdomen orange.

*Male*.—The upper margin of the last abdominal segment cut off straight; appendages orange, sparingly clothed with longer yellow hairs; superiors short, flattened, straight, convergent lobes, rounded on tip, and visibly larger than in *Pl. atripes*; between them a shorter bifid penis-cover; intermediates just below the superiors, shorter, cylindrical; inferiors, large, longer than the superiors, broad, widely separated by a short, ovoid, ventral lobe, concave inside, produced externally in a long,



triangular process, incurved, and pointed on tip; the interior part incurved in the same way and pointed on tip.

Length, with the wings, 27 millimeters; expansion of the anterior wings, 52 millimeters.

*Locality*.—Quesnel Lake, British Columbia, August 27 (Mr. Crotch). The extraordinary resemblance of *St. gilvipes* with *Pl. atripes* is mentioned above; the described characters prove nevertheless the difference of the two species.

#### RHYACOPHILA.

Two specimens in very poor condition from Long Peak and Divide, June 3, Colorado, belong to this genus. The species is probably new, but the specimens are not fit for a description.

Besides the described imagos, a number of Phryganid cases, sometimes with the larvæ in alcohol, were collected. The previous stages of the *Phryganidæ* not being well enough known to determine them specifically, I will only enumerate the groups to which they belong. There are from the plains, July 1 to September 19, cases belonging to *Limnephilidæ*, probably to *Limnephilus*, *Stenophylax*, *Goniotautilus*, *Hallesus*, and some to *Phryganea* proper.

From Little and Big Thompson, Este's Park, May, cases belonging to *Phryganea*, *Limnephilus*, *Hallesus*.

From foot-hills and mountains, July 1–19, cases belonging to *Phryganea*, *Limnephilus*, *Stenophylax*.

Besides those, I have before me from Colorado, from South Park, Roaring Fork, and Fair Play, cases belonging to *Limnephilidæ*, *Mystacidæ*, and *Rhyacophilidæ*.

#### List of the described species.

The species without numbers were introduced in the present report merely for the sake of comparison with other described species. The occurrence of some of them in the territory embraced by the present report is, however, very probable.

#### PSEUDONEUROPTERA.

##### Family TERMITINA.

##### TERMOPSIS.

1. *T. angusticollis*, var. *Nevadensis*, Truckee, Nevada; the typical species from British Columbia, through California and Louisiana.
- *T. occidentis*, California; west coast of Central America.

##### Family PERLINA.

##### PTERONARCYS.

2. *Pt. californica*, Washington Territory; California; Utah; San Luis Valley, Colorado.
3. *Pt. regularis*, Truckee, Nevada.
4. *Pt. badia*, Bridger Basin, Wyoming; Cache Valley, Utah; Colorado Mountains.

##### ACRONEURIA.

5. *A. abnormis*, occurs from British America to Georgia, and perhaps Mexico; South Montana; Snake River, Idaho; Eagle River, Colorado.

DICTYOPTERYX.

6. *D. signata*, foot-hills of Colorado, and mountains on the Pacific slope.

ISOGENUS.

7. *I. elongatus*, foot-hills, Colorado; Ogden, Utah.  
8. *I. colubrinus*, Snake River, Idaho.

PERLA.

9. *P. sobria*, Colorado Mountains, Pacific slope.  
10. *P. ebria*, Colorado Mountains, Pacific slope.  
11. *P. (?)* (species not described), from the same locality.

CHLOROPEBLA.

12. *Chl. (?)* (species not recorded), foot-hills, Colorado.

Family EPHEMIRINA.

EPHEMERA.

13. *E. compar*, foot-hills, Colorado.  
— *E. decora*, west of the Mississippi down to Virginia.  
— *E. guttulata*, New York.  
— *E. natata*, Canada; Illinois; Maine.

HEPTAGENIA.

14. *H. brunnea*, Truckee, Nevada.  
15. *H. pudica*, foot-hills, Colorado; Washington, D. C.

LEPTOPHLEBIA.

16. *L. pallipes*, Truckee, Nevada.

Family ODONATA.

Subfamily Libellulina.

LIBELLULA.

17. *L. 4 4-maculata*, Snake River, Idaho; Ogden, Utah; Bridger basin, Wyoming.  
18. *L. nodisticta*, Yellowstone; Mexico.  
19. *L. forensis*, Yellowstone; California; British Columbia.  
20. *L. pulchella*, Ogden, Utah; common everywhere west of the Mississippi.  
21. *L. saturata*, Yellowstone; Mexico; Arizona.  
— *L. croceipennis*, California; Mexico.  
22. *L. flavida*, Yellowstone; Texas.  
23. *L. composita*, Yellowstone.

MESOTHEMIS.

24. *M. collocata*, Yellowstone; California.  
25. *M. simplicicollis*, Ogden, Utah; everywhere east of the Rocky Mountains.  
26. *M. corrupta*, foot-hills, Colorado; California; Texas; Illinois.  
27. *M. illota*, Yellowstone; California.

DIPLAX.

28. *D. atripes*, Yellowstone.  
29. *D. decisa*, foot-hills of the Colorado mountains, Pacific slope.  
30. *D. pallipes*, foot-hills of Colorado.  
31. *D. semicincta*, foot-hills of Colorado; east of the Mississippi, not rare.

Subfamily *Cordulina*.

## EPITHECA.

32. *E. semicircularis*, Twin Lake, Colorado; Arcade River and Pacific slope of mountains, Colorado; Ogden, Utah; Vancouver's Island and Gulf of Georgia.

Subfamily *Æschnina*.

## ÆSCHNA.

33. *Æ. constricta*, Yellowstone; foot-hills of Colorado; common everywhere east of the Mississippi.  
 34. *Æ. multicolor*, Yellowstone; Vancouver's Island; Upper Missouri; Texas; Mexico.  
 35. *Æ. propingus*, Yellowstone; Colorado plains.

Subfamily *Gomphina*.

## OPHIOGOMPHUS.

36. *O. severus*, foot-hills and plains; Fort Garland, Col.  
 —. *O. colubrinus*, Canada, Quebec.  
 —. *O. rupinsulensis*, Illinois; Upper Wisconsin; Maine.  
 —. *O. mainensis*, Maine.

## HERPETOGOMIUS.

37. *H. compositus*, Yellowstone; Oregon; Texas.

## GOMPHUS.

38. *G. olivaceus*, Humboldt River, Nebraska; California.

Subfamily *Calopterygina*.

## HETÆRINA.

39. *H. californica*, Yellowstone; California.

Subfamily *Agrionina*.

## LESTES.

40. *L. disjuncta*, Yellowstone.  
 41. *L. congener*, Yellowstone; foot-hills of Colorado.  
 42. *L. hamata*, Pacific slope of Colorado Mountains.

## ARGIA.

43. *A.*, spec. (?), (group of *A. moesta*), Yellowstone.

## AGRION.

44. *A.*, spec. (?), (group of *A. prævarum*), foot-hills of Colorado.

## ISCHNURA.

45. *I.*, spec. (?), (group of *I. iners*), foot-hills of Colorado.

## NEUROPTERA.

## Family HEMEROBINA.

## POLYSTÆCHOTES.

46. *P. punctatus*, Yellowstone; foot-hills and Twin Lakes, Colorado.

## MICROMUS.

47. *M.*, spec. (?), (group of *M. sobrius*), foot-hills of Colorado.

## HEMEROBIUS.

48. *H.*, spec. (?), (group of *H. alternatus*), Fair Play, Col.

## CHRYSOPA.

49. *Chr.*, spec. (?), (group of *Chr. oculata*), Snake River, Idaho.  
 50. *Chr.*, spec. (?), (group of *Chr. nigricornus*), Colorado plains.  
 51. *Chr.*, spec. (?), (group of *Chr. externa*), Colorado plains.

## MYRMELEON.

52. *M. diversus*, Yellowstone.  
 53. *M. nigrocinctus*, larva, Montana.

## Family SIALINA.

## CORYDALIS.

54. *C.*, spec. (?), larva, Chiquili, Col.

## RAPHIDIA.

55. *R.*, spec. (?), Ogden, Utah.  
 56. *R.*, spec. (?), Rio Grande, Colorado.

## Family PHRYGANINA.

## LIMNAPHILUS.

57. *L.* spec. (?), (group of *L. rhombicus*), Colorado mountains.

## GONIOTAULIUS.

58. *G.* spec. (?), (group of *G. griseus*), Colorado mountains.

## STENOPHYLAX.

59. *St. divergens*, Colorado mountains.  
 —. *St. gilripes*, British Columbia.

## PLATYPHYLAX.

61. *P. designatus*, foot-hills of Colorado.  
 62. *P. atripes*, Colorado mountains; Yellowstone.

## RHYAROPHILA.

63. *R.*, spec. (?), Long Peak and divide, Colorado.

## FAUNA OF COLORADO.

The fauna of Colorado is represented by 36 species.

## PERLINA.

Pteronarcys californica.	Perla sobria.
badia.	ebria.
Acroncuria abnormis.	spec.
Dictyopteryx signata.	Chloroperla, spec.
Isogenus elongatus.	

## EPHEMERINA.

Ephemera compar.	Heptagenia pudica.
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## ODONATA.

Mesothemis corrupta.	Æschna propinqua.
Diplax decisa.	Ophiogomphus severus.
pallipes.	Lestes congener.
semicincta.	hamata.
Epithea semicircularis.	Agriion, spec.
Æschna constricta.	Ischnura, spec.

## HEMEROBINA.

Polystœchotes punctatus.	Chrysopa, spec. spec. (?)
Micromus, spec.	
Hemerobius, spec.	

## SIALINA.

Corydalis, spec.	Raphidia, spec.
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## PHRYGANINA.

Limnephilus, spec.	Platyphylax atripes. designatus. Rhyacophila, spec.
Goniotaulius, spec.	
Stenophylax, divergens.	

About the geographical distribution of the 36 species from Colorado, only a few general remarks may be here given. Of the enumerated species, 13 are represented by specimens in poor condition, only fit for the determination of the genus, and even the whole number of 36 species is evidently only a small fragment of the fauna.

There are 11 species, with a decided alpine character, from the mountains, Twin Lakes, and Fair Play, viz: *Pter. badia*, *Perla sobria*, *ebria*, sp. n., *Epith. semicircularis*, *Polyst. punctatus*, *Hemerob. (spec.)*, *Limneph. (spec.)*, *Goniot. (spec.)*, *Rhyac. (spec.)*, *Stenoph. divergens*. One of them, *Polyst. punctatus*, occurs everywhere in the United States, the previous stages probably living in the water; *Epith. semicircularis* is a decided alpine species, imitating the *Epith. arctica* from Europe, occurring in Lapland and Switzerland; *Stenoph. divergens* is a northern species, and perhaps the only one to be found also east of the Rocky Mountains.

From the Pacific slope there are 8 species, viz: *P. californica*, *Dictyopt. signata*, *Dipl. decisa*, *Epith. semicircularis*, *Lest. hamata*, *Coryd. larva*, *Raphidia (spec.)*. Only *Lest. hamata* lives also east of the Rocky Mountains. The genus *Raphidia* is decidedly a western genus, reaching as eastern limit Colorado. *Epith. semicircularis* goes to Vancouver's Island, and perhaps more to the north. It is interesting to remark that this species is imitated in the northeast by *Epith. forcipata*, going not farther to the south than the White Mountains, New Hampshire.

The eastern slope foot-hills, Fort Garland, and plains give 20 species; only one of them, *Mesoth. corrupta*, is a decidedly western species, but going east of the Rocky Mountains as far as the Mississippi. Some of them, *Eschua constricta* and *propinqua*, seem to have their western limits much farther than in Colorado.

The species mentioned in my last report about the Yellowstone fauna were again examined by me, and some species better determined. So far as known, the fauna has a decidedly western character. From Utah, Wyoming, Idaho, and Nevada there are only a few species, which do not allow any general conclusions. Except some common everywhere, they seem all to belong to the western fauna.