
CHAPTER XIV.

REPORT

UPON

THE COLLECTIONS

OF

NEUROPTERA AND PSEUDO-NEUROPTERA,

MADE IN PORTIONS OF

COLORADO, NEW MEXICO, AND ARIZONA,

DURING

THE YEARS 1872, 1873, AND 1874.

BY

Dr. H. A. HAGEN.

CHAPTER XIV.

The collection made by this expedition is somewhat interesting, although small, and in a much damaged condition, partially the result of preserving the specimens in alcohol, which should never be used for this purpose for these insects.

A large portion of the collection of 1874 was unfortunately destroyed by an accident on the Baltimore and Potomac road, which is much to be regretted. Some of the species which are new were collected at the same time by the United States Geological Survey of the Territories in Colorado; and as these specimens were received before those of this expedition they were described in its report for 1873.

FAM. PERLINA.

PTERONARCYS.

PTERONARCYS BADIA, Hagen.

Pteronarcys badia, U. S. Geol. Surv. Terr., 1873, 573-574.

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.

HAB.—Bridger basin, Wyoming (Garman); Cache Valley, Utah (C. Thomas); Colorado Mountains, August (Lieut. W. L. Carpenter).

The species above described is the dwarf 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*, twenty-six pairs in number, to wit,—six between the head and the prothorax; six between the prothorax and the mesothorax; six between the mesothorax and the metathorax; two between the posterior feet; and six on the basal segments of the abdomen. The maxillary palpi are longer than the mouth, the basal joint short, the other long, 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*.

Secured at Fairplay and Twin Lakes, Colo., by Dr. J. T. Rothrock.

PTERONARCYS CALIFORNICA, Hagen.

Pteronarcys californica, HAGEN, Synop., 16, p. 5.—*Id.*, Proc. Bost. Soc. Nat. Hist., xv, 284.—*Id.*, U. S. Geol. Surv. Terr., 1873, 573.

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

HAB.—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.

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 repre-

sented by the female type in the British Museum, is very nearly related, but, according to McLachlan, a different species.

A specimen (nymph) of this species was secured by Dr. J. T. Rothrock in the San Luis Valley, Colorado.

A species of *Chloroperla* was also taken, but too much damaged to be recognizable.

ACRONEURIA.

An abnormal nymph of this genus, probably *A. abnormis*, was secured at Four-Mile Creek, Lower Park, Colo., by Dr. J. T. Rothrock. In regard to this species the following may be interesting:

ACRONEURIA ABNORMIS, Hagen.

Perla abnormis, HAGEN, Synop., 17, f. 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 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, South-eastern 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 Lieutenant Carpenter, belongs to a very large species. Length, 33 milli-

meters; 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 nympha skin of *A. abnormis*, communicated by B. Walsh, I believe that the nympha 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.

HAB.—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 Rivers 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.

DICTYOPTERYX SIGNATA, Hagen.

Dictyopteryx signata, HAGEN, U. S. Geol. Surv. Terr., 1873, 575.

Yellowish-brown, pale beneath; labrum pale brown; head flat, with two irregular brown stripes, with an anterior rounded spot, trilobate behind; space between the stripes with an anterior rounded 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; 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 fuscous. 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 fewer antecubitals; wings of the male as long as the abdomen, or one third or more shorter; the apical ariolets 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.

HAB.—Foothills, Colorado, September, and mountains on the Pacific slope, August 16 to September 6.

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 litchenalis* 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.

Taken at Roaring Fork, Colo., by Dr. J. T. Rothrock.

ISOPTERYX.

ISOPTERYX CYDIPPE, Hagen.

Some specimens, much damaged, presumably of this species, were taken in Southern New Mexico in September, 1874, by Dr. O. Loew.

FAM. ODONATA.

OPHIOGOMPHUS.

OPHIOGOMPHUS SEVERUS, Hagen.

Ophiogomphus severus, HAGEN, U. S. Geol. Surv. Terr., 1873, 591.

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, 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 a lateral 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 ariolets; 11–12 antecubitals, 7–10 postcubitals; 2 discoidal ariolets; membranula whitish.

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

HAB.—Colorado (Mr. James Ridings); foothills and plains of Colorado, end of September (Lieutenant Carpenter); Fort Garland, Colo., 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.

Taken by H. W. Henshaw in 1873, and by Dr. H. C. Yarrow at Fort Garland, Colo., in 1874.

HERPETOGOMPHUS.

HERPETOGOMPHUS COMPOSITUS, Hagen.

Herpetogomphus compositus, HAGEN, Synop., 99, 1.—*Id.*, U. S. Geol. Surv. Terr., 1873, 597.

A female of this species (No. 104 G.) was collected by Dr. H. C. Yarrow in 1874 at San Ildefonso, N. Mex., near the Rio Grande River.

HAB.—Pecos River, Western Texas, Yellowstone region, Oregon, New Mexico.

AGRION.

Some specimens (Nos. 19 and 20) of this genus were collected at Taos, N. Mex., in 1874, by Dr. H. C. Yarrow, but were in such bad condition that it was impossible to determine the species.

ÆSCHNA.

ÆSCHNA CONSTRICTA, Say.

Æschna constricta, SAY, Ent. N. A., 1859, ii, 389 (LeConte's ed.).—HAGEN, Synop., 123, f. 5.—*Id.*, U. S. Geol. Surv. Terr., 1873, 591.

Male and female specimens (No. 273 A) collected at Pagosa Hot Springs, Colo., by Dr. H. C. Yarrow, September, 1874.

HAB.—Common everywhere east of Mississippi, from Canada to Maryland, and west to Wisconsin and British Columbia.

DIPLAX.

DIPLAX COSTIFERA (?).

A number of specimens (Nos. 154 C and 273 A) of this species, both male and female, were collected in New Mexico and Colorado by W. G. Shedd and Dr. H. C. Yarrow.

PLATHEMIS.

PLATHEMIS SUB-ORNATA.

A number of specimens (all in bad condition), male and female, collected in New Mexico by H. W. Henshaw.

MESOTHEMIS.

MESOTHEMIS CORRUPTA, Hagen.

Mesothemis corrupta, HAGEN, Syn. 171, f. 3.—*Id.*, U. S. Geol. Surv. Terr., 1873, 587.

Collected in Arizona by H. W. Henshaw in 1874.

HAB.—Common in Texas, California, and Illinois; Colorado, New Mexico?, Arizona.

LIBELLULA.

LIBELLULA FORENSIS, Hagen.

Libellula forensis, HAGEN, Syn., 154, 9.—*Id.*, U. S. Geol. Surv. Terr., 1873, 585.

A few females of this species were collected in Arizona by H. W. Henshaw in 1874.

HAB.—California, Victoria, Vancouver's Island, British Columbia, Montana, Arizona.

NOTE.—*L. forensis* is very similar to *L. pulchella*, a common species everywhere east of the Rocky Mountains, but may be distinguished from it by being larger and wanting the dark-brown tip of all the wings, besides other differences.

LIBELLULA SATURATA, Uhler.

Libellula saturata, HAGEN, Syn., 152, 4 (*partim*).—UHLER, Proc. Acad. Nat. Sci. Phila., 1857, 88, 4.—HAGEN, U. S. Geol. Surv. Terr., 1873, 586.

Specimens taken at Mineral Springs, Ariz., in 1873, by H. W. Henshaw.

HAB.—Montana, Arizona.

ARGYA.

ARGYA——(?).

Specimens belonging to this genus, but too much damaged for recognition, were taken in 1873 at Camp Apache, Ariz., Fort Wingate, N. Mex., and Fort Garland, Colo., by H. W. Henshaw, and at South Park, Colorado, by Dr. J. T. Rothrock.

HEMEROBINA.

POLYSTOECHOTES PUNCTATUS, Hagen.

Sembris punctata, FABR., Ent. Syst., ii, 73, 4.

Hemerobius nebulosus, FABR., Ent. Syst., Suppl., 202, 1, 2.

Hemerobius irroratus, SAY, Long's Exped. to Rocky Mts., ii, 306.—*Id.*, Asa Fitch's Rep., i, 92.

Polystoechotes sticticus, BURM., Handb., ii, 982, 1.—WALK., Cat., 231, 1.

Osmylus validus, WALK., Cat., 233, 3.

Polystoechotes punctatus, HAGEN, Syn., 206, 1.—*Id.*, U. S. Geol. Surv. Terr., 1872, 729.—*Id.*, *ib.*, 1873, 599.

Collected in 1873 by Dr. J. T. Rothrock at Twin Lakes, Colorado; in 1874, at Tierra Amarilla, N. Mex., and Taos, N. Mex., by Dr. H. C. Yarrow.

HAB.—United States, from Gulf of Mexico to British America, and from the Atlantic to the Pacific.

CHRYSOPA.

CHRYSOPA NIGRICORNIS, Burm.

Chrysopa nigricornis, BURM., Handb., ii, 980, 6.—SCHNEID., Mon. Chrysop., 126, 37, tab. xliii.—WALK., Cat., 259, 50.—HAGEN, Syn., 214, 11.—*Ib.*, U. S. Geol. Surv. Terr., 1873, 599.

Chrysopa colon, FITCH, Rep., 1, 88.

Collected at Pagosa Hot Springs, Colo., at Taos and San Ildefonso, N. Mex., by Dr. H. C. Yarrow, and at Pueblo, Col., by C. E. Aiken.

HAB.—Carolina, New York, New Mexico, and Colorado.

CHRYSOPA EXPLORATA, Hagen.

Chrysopa explorata, HAGEN, Syn., 217, 18.

Collected in New Mexico by Dr. O. Loew in 1874.

HAB.—Mexico and New Mexico.

CHRYSOPA EXTERNA, Hagen.

Chrysopa externa, HAGEN, Syn., 221, 32.—*Ib.*, U. S. Geol. Surv. Terr., 1873, 599.

Some specimens in very bad condition collected in New Mexico by Dr. O. Loew.

HAB.—Washington Territory, New Mexico, Mexico, California.

CORYDALIS.

One larva of this genus from the Colorado Chiquito, collected in 1873 by H. W. Henshaw.

The larva differs from those of *C. cornuta* by a larger prothorax, luteous legs, and the mark of the head. There are now six species known from Texas and New 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 (U. S. Geol. Surv. Terr., 1873, 579, 600).

NOTE.—This specimen was inadvertently attributed to Professor Hayden's collection in the work quoted above.

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 (collected by this 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 (U. S. Geol. Surv. Terr., 1873, 600).

MYRMELEON.

MYRMELEON INSCRIPTUS, Hagen.

Myrmeleon inscriptus, HAGEN, Syn., 230, 11.

A number of individuals supposed to be of this species were secured at Taos, N. Mex., San Ildefonso, N. Mex., Pagosa, Colo., Pueblo, Colo., by Dr. H. C. Yarrow and C. E. Aiken. They were in such bad condition, however, as to render a positive identification impossible.

PHRYGANINA.

Some specimens belonging to this genus were secured by Dr. J. T. Rothrock at Twin Lakes, Colorado, in 1873, and may possibly be *P. atripes*. They were, however, in such bad condition as to render a careful study almost impossible.

In addition, some specimens of *Limnophilus* were obtained, also in a damaged condition.