NOTES ON THE CLASSIFICATION OF THE PERLIDÆ.

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In a recent paper on the genus *Chloroperla* I divided this genus, as it had been used, into two genera; neither of which being a true *Chloroperla*, I proposed the names *Isoperla* and *Alloperla*. The character I used in this division was one proposed by Prof. Needham to separate the *Perlini* from the *Nemourini*. This is the condition of the median vein near the base of fore wings, whether united to the radius, or running parallel to the radius. In *Isoperla* the median vein is as in *Perla*, running parallel to the radius; while in *Alloperla* the median vein is like the *Nemourini*, united at an angle to the radius. From a study of the anal region of the fore wings I find that these two genera can be more readily known by another character, and that in this respect also *Alloperla* is related to the *Nemourini*. This new character is the condition of the two lower branches or veins from the anal cell; in *Isoperla* (type *C. bilineata*, Say), these two veins arise separately, as in *Perla*, but in *Alloperla* (type *C. imbecilla*, Say), these two veins unite before the cell, or rather, there is one forked vein instead of the two simple ones. This latter condition obtains in the *Nemourini*. The application of this character places the same species in *Isoperla* and *Alloperla* as does the condition of the median vein.

In the *Nemourini* there is one forked vein from the lower part of the anal cell, the outer branch bowed up to form an elongate cell. In the *Capnini* there is but one vein from the anal cell below, and this is not forked, a character which will distinguish this tribe from other *Perlidae*. In the Trans. Amer. Ent. Soc., XXVI, p. 240, 1900, I separated the *Capnini* by the unbranched radial sector; there are, however, one or two exceptions, or rather, the apical venation is confused so that the radial sector appears branched; the character of the anal region seems to be constant, and the two characters together will readily distinguish this tribe.

The *Pteronarcini* differ from all other *Perlidae* in having a series of cross-veins in the anal region; as well as by their approximate anterior coxæ.

In the true *Perlini* there are two simple branches from the anal cell below; but in two species of *Acroneuria* (*pacifica* and *nigrita*) there are three branches, or one simple and one forked vein; in some other species of *Acroneuria* one of the branches is sometimes forked.

Several authors have divided the *Perlidae* into two sub-families, *Perlinae* and *Nemourinae*, but the structure of *Alloperla*, related to *Perla*

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by well-developed setæ, to *Nemoura* by venation, shows that the differences between these groups are not of more than tribal value. If it is desired to have two sub-families, I think that the *Pteronarcini* should be opposed to all other *Perlidae*. However, I think that four tribes better express the relationships of the groups.

These four tribes may be tabulated as follows :

1. Well-developed setæ present 2.
Setæ obscure or absent ; one branched vein from the anal cell of fore wings ; no series of cross-veins in anal region ; never greenish or yellowish species *Nemourini*.
2. A series of cross-veins in anal region of fore wings ; anterior coxæ approximate *Pteronarcini*.
Rarely a series of cross-veins in anal region ; anterior coxæ widely separate 3.
3. Anal cell with two simple or one branched vein from below ; radial sector generally forked beyond or at anastomosis ; median vein usually running parallel to radius in base of fore wings *Perlini*.
Anal cell with but one unbranched vein from below ; radial sector usually not forked beyond nor at anastomosis ; median vein running into radius much before base *Capniini*.

The genus *Perlinella*, like *Chloroperla* of authors, contains some discordant species. The type of *Perlinella*, *P. trivittata*, has some cross-veins in the anal field, a character of *Pteronarcys*. The *Perla placida*, Hag., and some allied forms, differ from *Perlinella* in lacking such cross-veins, and are more allied to *Perla*. They differ from that genus, not only in venation, which is allied to *Perlinella*, but also in having much longer setæ, with very elongate joints. Therefore I place *P. placida* as the type of a new genus, *Perlesta*, distinguished by the characters given in the table below. The *Perlinella frontalis*, Bks., differs from *Perlinella* and *Perlesta* in having a forked vein from the anal cell, instead of two simple veins ; it is therefore related to *Alloperla*. It differs from *Alloperla* by having a series of cubital cross-veins in the hind wings, and by the two-branched radial sector of fore wings. It therefore belongs to new genus *Para-perla*.

All the species originally placed in *Chloroperla* are now placed by European authorities in *Isopteryx*, a later genus ; therefore *Chloroperla* replaces *Isopteryx*.

The genera of *Perlidae*, now known to occur in the United States and Canada, may be distinguished by the following tables of the four tribes. A

few names may require explanation. *Perlodes* replaces *Dictyopteryx*, as the latter name is preoccupied in Lepidoptera; *Neoperla* replaces *Pseudoperla*, the latter having been used previously in the Orthoptera. Prof. Klapalek, who has seen the type of *Teniopteryx fasciata*, Burm., places it in the genus *Rhabdiopteryx*.

Pteronarcini.

1. In the fore wings the space between the basal part of radial sector and median vein shows some complete or incomplete cross-veins; larger species.....*Pteronarcys*.
This space is free from cross-veins; much smaller species.....*Pteronarcella*.

Perlini.

1. Many cross-veins between apical branches of the radial sector, as well as between radius and radial sector.....*Perlodes*.
Few, if any, cross-veins between apical branches of the radial sector, and rarely between radius and radial sector.....2.
2. Several cross-veins in middle part of fore wing beyond the anastomosis.....*Acroncuria*.
Few, if any, cross-veins in middle part of fore wing beyond the anastomosis.....3.
3. Ocellar triangle more than twice as broad as long; usually one cross-vein between radial sector and radius, near end of latter...*Isogenus*.
Ocellar triangle not twice as broad as long; only abnormally a cross-vein between radius and radial sector beyond anastomosis.....4.
4. But two ocelli.....5.
With three ocelli.....7.
5. Setæ but little longer than width of abdomen; the pronotum much broader than head.....*Peltoptera*.
Setæ much longer; pronotum barely broader than head.....6.
6. Ocelli about one or two diameters apart; joints of setæ only one or two times longer than broad.....*Neoperla*.
Ocelli four or five diameters apart; joints of setæ three to five times longer than broad, often a cross-vein in anal field of fore wing.....*Atoptera*.
7. A series of cross-veins in anal field of fore wing; a series of cross-veins in the cubital area of hind wings; setæ not longer than abdomen.....*Perlinella*.
No cross-veins in anal field of fore wing, except those to form the cell.....8.

8. From the anal cell there extends below one vein, which is soon forked; the median vein unites with radius near base, usually but one cross-vein beyond the end of subcosta.....9.
From the anal cell there extend below two simple veins; the median vein near base runs closely parallel to radius for some distance...11.
9. No veined anal field in hind wings; only two cross-veins in cubital area of hind wings; small greenish species.....*Chloroperla*.
A veined and folded anal field to hind wings.....10.
10. A series of cross-veins in cubital area of hind wings; radial sector of fore wings forked twice beyond anastomosis.....*Paraperla*.
No series in cubital area of hind wings, only one near base and one near tip; small greenish or yellowish species.....*Alloperla*.
11. Hind wings with but two cross-veins in cubital area, one near base, one near tip, small greenish or yellowish species.....*Isoperla*.
Hind wings with a series of cross-veins in cubital area; radial sector usually twice-forked.....12.
12. Setæ longer than abdomen, joints of middle three to five times as long as broad, first fork of radial sector much beyond anastomosis.....*Perlesta*.
Setæ shorter than abdomen, joints of middle only one or two, rarely three, times as long as broad.....*Perla*.

Nemourini.

1. Second joint of tarsus subequal to first.....2.
Second joint of tarsus much shorter than first.....4.
2. An oblique cross-vein beyond end of subcosta.....3.
No oblique cross-vein beyond end of subcosta.....*Teniopteryx*.
3. Radial sector forked twice beyond anastomosis; in fore wings the cubitus, beyond cross-veins, bends up to form an elongate cell.....*Tanionema*.
Radial sector forked but once beyond anastomosis; the cubitus not forming an elongate cell.....*Rhabdiopteryx*.
4. An oblique cross-vein beyond subcosta; wings not involute.*Nemoura*.
No cross-vein beyond subcosta; wings involute.....*Leuctra*.

Capnini.

1. Apical submarginal space with cross-veins.....*Capnura*.
No such veinlets.....2.
2. The space beyond discal cell longer than discal cell.....*Arsapnia*.
This space much shorter than discal cell.....*Capnia*.