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THE SYNONYMY OF *DIARGIA* AND *HYPONEURA* WITH THE GENUS *ARGIA* (ODONATA: COENAGRIONIDAE: ARGIIINAE)¹

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The generic distinctness of *Diargia* and *Hyponeura* has long been questioned but, because venational characters have largely formed the basis of classification of the higher taxa in the Odonata, authors have been reluctant to admit exceptions and to act contrariwise. The evidence given below leaves little or no doubt that venational differences are not adequate to separate the species of these genera from those of *Argia*. *Diargia* is represented by the dwarf *bicellulata* Calvert, and *Hyponeura* by two species, the giant type species *funckii* Selys and the slightly smaller *lugens* (Hagen).

***DIARGIA* CALVERT 1909, NEW SYNONYM OF *ARGIA* RAMBUR 1842**

The characteristics of *Diargia* which Calvert regarded as differing from those of *Argia* are "smaller number of biserial tibial hairs or spines (5-6 on outer side of third tibia), the more proximal origin, as measured by number of postnodals, of vein M_2 , and, in so far as the only known species is concerned, by possessing but *two* antenodal ultraquadrilateral cells."

His statement concerning the smaller number of biserial tibial hairs or spines needs to be corrected. An examination of the type series at the Academy of Natural Sciences of Philadelphia and at the Carnegie Museum revealed that the legs remaining on the specimens were all somewhat damaged, and in counting the spines Calvert did not notice or make allowance for those which had been broken off at their bases. In the type male, the number on the outer side of each third tibia should have been recorded as 7 and 8, and on the inner side 8 and 6 spines respectively; for the allotype female 8 spines, and for the paratype males 6 to 8. These numbers of spines are no different from those of several species of *Argia*.

All the venational differences listed seem to be those associated with smallness of size in *Argia*. A tabulation of these characters in 50 ♂♂ and 50 ♀♀ of *A. bipunctulata*, a species having the smallest individuals of any *Argia* in the United States, was made to illustrate a similar reduction in venation. For ready comparison, Calvert's data for *Diargia bicellulata* are given in brackets following the figures for *bipunctulata* as follows: Front wings with 9-14 postnodals (9, 0.5%; 10, 13%; 11, 31.5%; 12, 37.5%; 13, 16%; 14, 1.5%) [9-12 (10, 40%; 11, 35%)]; M_2 arising at or nearest to postnodal crossveins 5-7 (5, 24%; 5½*, 14.5%; 6, 55%; 6½-7, 6.5%) [5-6 (5, 80%; 6, 10%)]; antenodal ultraquadrilateral (postquadrangular) cells 2-4 (2, 3%; 3, 93.5%; 4, 3.5%) [2-3 (2, 90%; 3, 10%)]. Hind wings with 8-12 postnodals (8, 2.5%; 9, 32.5%; 10, 42%; 11, 19%; 12, 4%) [11, 55% most frequently]; M_2 arising at slightly less than 4-6 (-4 to 4½, 14.5%; 5, 57%; 5½, 20.5%; 6, 7.5%) [4, 40%; 4½, 10%; 5, 45%; 6, 5%]; antenodal ultraquadrilateral (postquadrangular) cells 2-4 (2, 60%; 3, 39%; 3 ⅔ -4, 1%) [2-3 (2, 95%; 3, 5%)]. Length of hind wing in millimeters, ♂ 12.3-16.6 [11.5-13.5]; ♀ 13.4-17.1 [14.5]. The comparison is not altogether a fair one as the data for *bipunctulata* is for 200 each of

front and hind wings of specimens from several localities and that of *bicellulata* for only 18 or 20 of each from one locality. Nevertheless, except in the length of the hind wing of the male, the figures for *bicellulata* are within the limits of those for *bipunctulata*. In the number of postnodals for the hind wing the percentage of wings having a low count is greater in *bipunctulata*, which may or may not be an indication of a greater reduction.

The only specimens known of *bicellulata* are those of the type series from Chapada, Brazil. *A. bipunctulata* is a species found for the most part in the eastern United States.

HYPONEURA SELYS 1854, NEW SYNONYM OF *ARGIA* RAMBUR 1842

The original description of *Hyponeura* (*Hyponeura* since 1890, Kirby) included in the *Monographie des Caloptérygines* as a note under "Additions et Corrections" (p. 275), embodied the following characteristics (translated and numbered in order given): 1) quadrilateral at upper side less than a third of the superior, the distal side almost equal to the inferior; 2) first and second sectors of the triangle ending at the border close to each other, level with the pterostigma; 3) the postnodal space between the 2nd sector (Cu_1) and the posterior border composed, beyond the level of the nodus, of three rows of pentagonal cells or hexagones; 4) pterostigma diamond-shaped, occupying the upper side of two cells, resembling a little that of *Amphipteryx*; 5) wings "assez larges." This was followed by a short description of *funckii*, a new species for which the genus was erected. Selys (1865, p. 381) placed *Hyponeura* as a subgenus of *Argia*. In the diagnosis he omitted the first and fifth characters listed in the original description, and put the third in first place italicizing "*de deux rangs de cellules.*" He then added (translation) "tip of wings narrow, elliptical; 6-8 discoidal cells between the triangle and the vein descending from the nodus; size very large; rear of head yellow; spines of the legs long, stout; the inner branch of the tarsal claws much shorter than the outer." He also added the species *Agrion lugens* Hagen. Munz (1919, p. 56) likewise used the extra partial row of cells as the primary characteristic but described the area as posterior to Cu_2 and two cells wide. To this he added, "the second antenodal crossvein is often slightly beyond the level of the arculus," and " M_4 becomes zigzag at the level of the fork of M_{1+2} ."

None of the above characteristics or any combination of them will distinguish the species included in *Hyponeura* from all species of *Argia*. The upper side of the quadrilateral (quadrangle) is plus or minus one-third of the lower, and the distal side almost equal to the inferior, only in the front wings in both *Argia* and *Hyponeura*. The point of termination at the wing margin of the first and second sectors of the triangle (Cu_1 and Cu_2) is of no value here for a generic character as can be demonstrated by its variation in specimens of the same species. The pterostigma surmounts two or more cells in a number of species of *Argia* irrespective of wing size, and in the wings of some individuals of *Hyponeura* it may surmount only slightly more than one cell. The number of discoidal (postquadrangular) cells is associated to a limited extent with size, some species of *Argia* having as many as 6 or 7 but the number is of limited value even at the species level. Body size and color of the rear of the head are variable species characteristics and not of generic stature in the Argiinae of the Americas. The position of

the second antenodal crossvein and the zigzagging of M_4 as stated by Munz for *Hyponeura* is also true of *Argia*.

The only characteristic which will distinguish *funckii* and *lugens* from most species included in *Argia* is the three irregular rows of cells in the middle portion of the area between Cu_1 and the wing margin. However, some specimens of *lugens* have no more pentagonal or hexagonal cells forming a partial middle row in this area than some *Argia moesta* (Hagen). A tabulation of 46 ♂♂ and 30 ♀♀ of *moesta* from Texas shows 21 ♂♂ and 17 ♀♀ with no extra cell or cells in this area, as well as 25 ♂♂ and 13 ♀♀ with the extra cells as follows: in 1 front wing, 5 ♂♂; in 1 hind wing, 4 ♂♂ and 5 ♀♀; in 1 front and 1 hind wing, 2 ♂♂ and 2 ♀♀; in 1 front and 2 hind wings, 2 ♂♂ and 1 ♀; in both hind wings, 8 ♂♂; and in all wings, 6 ♂♂ and 4 ♀♀. In one mating pair, the female had the extra cells in all four wings and the male in one front wing. Other species of *Argia* also occasionally have one or more extra cells in this area. They seem to occur more frequently in species characterized by large size.

The superior caudal appendages of the males of *funckii*, *lugens*, and *moesta* are remarkably similar in shape, an observation first mentioned by Calvert (1901, p. 55), but the slight differences are constant for each species. In dorsal and lateral views, except possibly for size, they seem to be the same but in an oblique dorsal view the tooth on the apical margin can be seen to be in a different position in the three species—at the distalmost part of the margin in *lugens*, more mesad and a little lower in *funckii*, and still lower or farther from the tip in *moesta*. Most readily recognized differences are found on the torifer (structure at apex of segment 10). No significant differences have been noted in the shape of the inferior appendages.

Another character which places the three species in the same group is the strap-shaped terminal segment of the intromittent organ (penis) on abdominal segment 2. Although Kennedy stated in his unpublished doctorate thesis (1919, p. 150), that *Hyponeura* is merely a giant *Argia*, he treated it as a separate genus and surprisingly made no mention of any similarity in the penes of its two species and those of *Argia moesta*, *putrida*, and *intruda*, which is evident from his figures 943-945 of Plate 48, and 882-887 of Plate 45, especially figures 884 and 885 of *intruda* (now regarded as a synonym of *moesta* as is *putrida*).

The females of *funckii* and *lugens*, and of an undescribed species known to me only by a single specimen, are easily associated by a similarity in thoracic color pattern. The same pattern or vestiges of it are also evident in some specimens of *moesta*. The mesostigmal laminae have a degree of similarity but are beautifully distinct in all four species.

The species *funckii* is known from Colombia to the southern half of Mexico; *lugens* from southern Mexico to southwestern United States (as far north and east as southern Colorado and western Texas); *moesta* from Mexico, the United States (as far north as Minnesota and Maine), and Ontario; and the undescribed species is from Oaxaca, Mexico.

CONCLUSIONS

A study of several thousand specimens of *Argia* and most of the species clearly indicates that some of the venational characteristics used to define *Diargia* and *Hyponeura* can be accounted for as those which are associated with extremes in

size of wings (and individuals); the others are of common occurrence in various species of *Argia*. To assign species of *Argia* having most of the same characteristics to either of these genera would result in utter chaos, even in dividing specimens and parts of specimens of the same species. Because no structural characters of generic stature have been found to separate them, there seems to be no alternative other than to consider both *Diargia* and *Hyponeura* as synonyms of *Argia*.

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LEPIDOPTERISTS' SOCIETY TO MEET IN MICHIGAN

The Michigan Entomological Society and the Department of Entomology, Michigan State University, will serve as co-hosts for the 1969 meeting of the Lepidopterists' Society. The meeting will be held at East Lansing, probably in June 1969. It will be open to members of both societies and the general public.

Complete details will be published in the *Newsletter* of the Michigan Entomological Society at a later date.

J.P.D.