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A NEW SPECIES OF ARCHAEOGOMPHUS
(ODONATA)

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In Occasional Papers of the Museum of Zoology, University of Michigan, Number 59, June 24, 1918, and Number 63, January 5, 1919, I have described a new gomphine as *Archaeogomphus hamatus*. This paper is supplementary to the two previously published papers.

In Paper Number 63 it was pointed out that species referred to *Agriogomphus* by Needham, Ris and Williamson did not belong to that genus, and the new genus *Archaeogomphus* was proposed for wings figured by Needham, species not named; for *Agriogomphus infans* Ris, known from two females; for *Agriogomphus hamatus* Williamson, known from both sexes, and for an unnamed female from Colombia described by Williamson.

The University of Michigan Expedition to Venezuela collected a single male and female of a species evidently the same as the unnamed Colombian female. The species is distinct and is therefore here described and named.

Archaeogomphus furcatus, new species

Abdomen, male 24, female 24; hind wing, male 18.5, female 19-20.

Male.—Like *A. hamatus* except as noted below. Labrum with only a trace of a diffuse median brown spot; frons above slightly brownish, no defined triangular median spot; occiput rounded off posteriorly as in *hamatus*, and at either end a small, scarcely discernible knob where the horns of the female occur.

Abdominal segment 2 slightly darker above than laterally, except at base, but no distinctly defined areas except the posterior black edge on the auricle; posterior suture black or nearly so (brown in *hamatus*); 3 as in *hamatus*, but with the apical brown not evident; likewise on 4-6 the apical dark is evident only as an ill-defined darkening on each segment, successively darker posteriorly and occupying about one-third of 6; the dark ring in the basal pale area of each of segments 4-6 is narrow as in 3, and much narrower than in *hamatus*.

Second and third femora brown above, little if any darker at apex; tarsi brown, marked yellow as described for *hamatus*. (A re-examination of *hamatus* shows that in at least one case the tarsi are largely yellow, only the joints and the apex of the last segment being brown or black.)

Second hamule with the apical hook slightly more recurved than in *hamatus* and the ventral border of the hamule, anterior to the hook, slightly elevated and rounded; not as straight as in *hamatus*.

The above description is based on a single male of *furcatus*. The body colors of these gomphines are in general not in sharp contrast and postmortem changes operate still farther to obliterate the obscure pattern lines; so color differences between

hamatus and *furcatus* at present should not be relied on in separating the species.

Female.—In the teneral Bejuma female the body markings are all obscure and ill defined. The sutures between the abdominal segments are black; there is a narrow black ring at about two-fifths the length of 3, one-third the length of 4, and one-fourth the length of 5-7; the base and apex of each of 3-7 with more or less distinct traces of darker, especially the apex and laterally; 8-10 dull, slightly darker than the segments basal to them.

In the adult Cristalina female, which has been previously described (Paper Number 59, *loc. cit.*), in lateral view abdominal segments 3-6 have each an inferior dark stripe from base to and very slightly beyond the postbasal dark ring and the apical black on 3-5 is produced anteriorly along the ventral border more than half the distance from the apex to the postbasal dark ring; on 6 the black is as extensive dorsally as laterally.

As in the case of the male, the description of body colors must be interpreted cautiously.

Male and female.—Wings similar to *hamatus*. Antenodals front wing, male 10, female 11 (75%) or 10 (25%); hind wing, both sexes, 9. Postnodals front wing, male 5, female 5 (75%) or 6 (25%); hind wing, male 5, female 5 (75%) or 6 (25%). In the front wing the number of cells on the anterior side Cu_1 which do not reach M_4 is 1, and in the hind wing it is 1 in the male and in the female 1 (25%) or 2 (75%). In the hind wings the number of cells posterior to Cu_2 and distal to the postanal cell which do not reach the posterior wing margin is none or a single very small cell in the male; in the female there are 2 cells (the Bejuma female) or 3 (the Cris-

talina female, misinterpreted as 4, due to crossvein shifting, in the original description, Paper Number 59, *loc. cit.*)* In the triangles of the front wing of the male and both females the distal part of the anterior side is equal to about two-fifths the combined lengths of the proximal and distal parts of the anterior side of the triangle; and likewise in the hind wings of all the specimens; the distal part of the anterior side equals about one-fourth the combined lengths of the two parts of the anterior side.

The following brief color notes were made of the type male at the time of capture: Eyes brilliant bright green above, sharply pale brownish green below; in front with a large light yellowish brown pseudopupilla surrounded with green. Thorax light brownish yellow, marked with black and brown. Abdomen light brownish yellow and black; 7, apical to the median transverse carina, light yellowish green; 9-10, light reddish brown.

Other descriptive notes on *A. furcatus* are included in the final part of this paper where the genus is described and the three known species are briefly discussed.

Habitat: Colombia and Venezuela. Described from the type male, Bejuma, Carabobo, Venezuela, February 18, 1920, the allotype female, February 15, 1920, and a female, Cristalina, Antioquia, Colombia, February 14, 1917, all in coll. E. B. W.

On February 15, 1920, our collecting party went west out

*In *hamatus* I find one male wing with none and one female wing with one only, thus differing from my original description (Paper Number 59, *loc. cit.*): In the male and female wings figured (Plate II, Paper Number 59, *loc. cit.*) there is one cell in the male and two in the female wing. Caution is required in interpreting this character if cross-veins posterior to the subtriangle are switched about as is sometimes the case.

the main street of Bejuma to the Bejuma River and followed down stream all day. The river is about fifteen to thirty feet wide, in a sand or gravelly bed, shallow pools alternating with gentle ripples, and the banks, immediately adjacent to the stream, are largely covered with wild cane. There are less frequent growths of small trees and occasional open spots of grass or solid spreads of convolvulus. Where we left the river in the afternoon some round, grass-covered hills lay on the left bank, and between these hills and the river was a small, poorly tended and sickly coffee planting with a few large shade trees scattered through it. At the foot of the hills at the edge of the coffee planting were a few small swampy spots.

After the day's collecting we found in Jesse Williamson's material a single slightly teneral female *Archaeogomphus* which he failed to recognize when it was captured, but which he knew he had collected somewhere on the river. On February 18 I returned to the river to search for more specimens of the species. Cutting across country, I struck the river at the coffee planting, which, in view of our observations of *A. hamatus* in Colombia, seemed to me the most likely spot along the river for specimens of the genus. A thorough search over the entire coffee planting yielded nothing, so I started up river, working carefully adjacent cane patches, dry woods, a small banana field, and the broad expanses of waist-high convolvulus leaves, but without success. About two miles of the river was thus worked and I then returned, working down stream as carefully as I had worked up, and arriving without success about 4:30 p. m. at the coffee planting. Here I found many small libellulines resting on the tips of the dead twigs of the coffee trees (really bushes). These libellulines were busily inspected for half an hour in the hope of detecting an

Archaeogomphus among them, and about 5 o'clock I gave up the search and started home. Passing from the coffee planting near the river, I looked back for the last time and saw, resting on a dead twig tip about three feet from the ground, a small dragonfly whose wings were horizontal instead of slightly drooping in the almost invariable small libelluline position. I retraced my steps, and as I approached I saw the separated eyes of a gomphine, which, after a few literally breathless seconds, was safely fluttering in my cyanide bottle. This specimen is the type of the species. I worked over the coffee planting several times in the next hour till the setting sun ended the day's collecting, but not another Archaeogomphus was seen.

THE GENUS ARCHÆOGOMPHUS AND ITS SPECIES

In view of the characters shown by the new species described above, the genus Archaeogomphus may now be defined as follows: Small, short-legged gomphines with the third femora reaching backward slightly beyond the base of abdominal segment 2. Venation simple; triangles, supratrangles and subtriangles free, crossveins between M_{1-3} and M_4 not specialized, triangle four-sided, stigma without brace-vein, basal antenodal of second series wanting, one cubito-anal crossvein in addition to the inner side of the subtriangle, one row of postrigonal cells in both front and hind wings, anal area of the front wing one cell wide, two postanal cells in the hind wing, cells posterior to Cu_2 and distal to the postanal cells in the hind wing, which do not reach the posterior wing margin, none to four in the male and one to six in the female, anal triangle wanting in the male, but posterior margin strongly angled. Male with the abdominal appendages reduced and functionless as grasping organs, the dorsum of segment 10

armed with two dorsal basal hooks and the dorsal apex of the segment produced posteriorly in a long tapering snout; female vulvar lamina with a broad, short base and two long tapering branches which reach nearly to or slightly beyond the apex of segment 9, branches apparently flexible as, in the same species, they are parallel and contiguous or the apices may be separated, the apex of each branch curved outward and away from the other branch.

With the description of *A. furcatus* in this paper three species of *Archaeogomphus* are now known. The wings of a male from Brazil have been figured but not named by Needham. It is not impossible that this male is *A. infans* Ris described from two females, the only known specimens, from Argentina. The other two species, *hamatus* and *furcatus*, are known from both sexes.

The females of the three species may be separated by the following brief key:

1. Rear of occiput armed with two posteriorly directed spines or horns; two or three cells posterior to Cu_2 in the hind wing which do not reach the posterior wing margin.....*furcatus*
- 1'. Rear of occiput not armed with posteriorly directed horns..... 2.
- 2 (1'). One to three cells posterior to Cu_2 in the hind wing which do not reach the posterior wing margin.....*hamatus*
- 2'. Six cells posterior to Cu_2 in the hind wing which do not reach the posterior wing margin.....*infans*

It is certain that the venational character of *infans* employed above and based only on Ris's figure of one wing will prove variable, but I believe the character, when the limits of variation have been determined, will prove sufficient for the separation of *infans* and *hamatus*. In the coalescence of the five veins at the posterior angle of the triangle in the hind wing of *infans* and the separation of these veins into two groups,

three anterior and two posterior, in *hamatus*, we have another venational character probably of specific value.

It is assumed in this paper that the Cristalina female previously described (Paper Number 59, *loc. cit.*) is conspecific with the allotype of *A. furcatus* from Bejuma, as no characters for separating these two females have been detected. However, the Magdalena basin in which Cristalina lies and the Orinoco basin in which Bejuma lies are widely separated, and it is not impossible, though I believe it is improbable, that when males from the Magdalena basin are available, they may be found to differ from those of the Orinoco basin. In fact, with such scanty material no prediction as to the number of species occurring in each region is possible.

In the allotype female of *furcatus* the postoccipital horns are as figured for the Cristalina female (Paper Number 59, *loc. cit.*, Plate I, figure 13), but due to the teneral condition of the allotype the horns are bent and slightly crumpled against the prothorax as the head is turned one-fourth around with its dorsal surface to the side.

The vulvar lamina is likewise identical in the two and is very similar to that of *hamatus* (figure 11, *loc. cit.*), except that in *furcatus* the branches are more slender, slightly longer, the outer edges more nearly parallel, and they come off from the base more abruptly, or, to express this last point differently, each branch at the base is narrower in *furcatus* than in *hamatus*. The vulvar lamina of *infans* has not been figured, but, as described, it is of the same general character as it is in *hamatus* and *furcatus*.

The known males of *Archaeogomphus* are beautifully separated by the outline of the first joint of the penis (seminal vesicle) in posterior view, as shown in figures 3 and 4 accom-

panying this paper. Other characters are found in the tenth segment (compare figures 3 and 4, Plate I, Paper Number 59, *loc. cit.*, with figures 1 and 2, in this paper). In *furcatus* the dorsal hooks on abdominal segment 10 are more slender and are directed posteriorly, while in *hamatus* the hooks are directed interno-posteriorly. In dorsal view the snout-like apex of 10 is broader in *furcatus* than in *hamatus*.

PLATE I

Figures 1-3, type male, *A. furcatus*; fig. 4, *A. hamatus*, male, Cristalina, Colombia, February 14, 1917. Fig. 1, segments 9 and 10 in lateral view; fig. 2, dorsal view of segment 10; fig. 3, outline of first joint of the penis of *A. furcatus* in posterior view; fig. 4, same of *A. hamatus*.



