

## On Some American Gomphinae (Odonata.)

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(With Plate VIII.)

The following paper has grown out of some preliminary studies on the Gomphinae for the *Biologia Centrali-Americana* edited by Mr. F. D. Godman, F.R.S., of London.

### I: On **DIAPHLEBIA**.

In 1858, de Selys\* compared *Epigomphus paludosus*, of his legion Gomphus, with *Diaphlebia angustipennis*, of his legion Gomphoides, as to their similarity in the "front très-déprimé, . . . la coloration du corps . . . le forme du bout des ailes," but adds, "les triangles libres et leur proportion empêchent de passer plus loin la comparaison." The discovery of a second species of *Diaphlebia*, *D. semilibera*, in which all the triangles are free except the discoidal triangle of the hind wings, again led him to a comparison with *Epigomphus*, and to point out the possibility of confusing them "si, par exception tous les triangles [of *Diaphlebia*] se trouvaient libres."† He considered that the greater length of the triangle of the hind wings and, in the males, the shape of the superior appendages and anal angle of the hind wings of *Diaphlebia* suffice to avoid such confusion.

He does not mention, however, that the same interesting possible "exception" in this genus would also constitute an exception to the primary character of the legion Gomphoides. The possibility is almost realized in *one* of two males described below as *Diaphlebia nexans* n. sp., in which all the triangles are free except the discoidal of the right hind wing (See Plate VIII, fig. 5). The significance of such conditions as exist in *D. semilibera* and *D. nexans* may perhaps be that they indicate a genealogical transition from the legion Gomphoides to the legion Gomphus via *Diaphlebia* and *Epigomphus*. This

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\* Monographie des Gomphines, p. 87.

† Bulletin, Acad. Belg. (2) xxxiii, p. 198, 1869.



suggestion must not be interpreted as implying that the former was, or is, the ancestor of the latter, but merely that these two may be survivals of a group of genera which made such a transition.

*Diaphlebia* and *Epigomphus* agree in the possession of the following generic characters: *All wings*: two rows of posttriangular cells out to at least the level of separation of subnodal and principal sectors, no supra-triangular cross-veins. *Front wings*: short sector and the first sector of the triangle diverging, only one row of postcostal cells to beyond the level of the triangle, not more than two rows between the second sector of the triangle and the hind margin of the wing.\* *Hind wings*: no anal loop. *Males* without a median inferior distal carina on the tibiae.

*The generic characters of Diaphlebia which are different from those of Epigomphus are*: *All wings*: no basal subcostal cross-vein, arculus usually at second antecubital, its sectors separated throughout by an interval considerably greater than the thickness of either sector, one submedian cross-vein (*sensu Selysii*, 1896), proximal end-vein of pterostigma prolonged to the principal sector but no thicker than the other cross-veins between the median vein and the principal sector, first and fifth or sixth antecubitals thicker than the others. *Front wings*: proximal angle of discoidal triangle as far distally from the arculus as the length of the proximal side of the internal triangle, 9-10 marginal cells between the short sector and the first sector of the triangle. *Hind wings*: not more than two rows of cells between the second sector of the triangle and the hind margin, anal triangle in the males three-celled, not reaching to the anal angle. *Head* (viewed from in front): inferior angle of the triangle formed by the ocelli about  $120^{\circ}$ ; *Abdomen* ♂: eighth segment widest of all the apical half. *Tibiae*: no differentiation in the spines.

***Diaphlebia nexans*** n. sp. (Pl. viii, figs. 5, 9, 12).

♂. Lips and face pale green marked with dark brown as follows: a

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\* 7.7 per cent. of the 52 wings of *Epigomphus* examined had three rows for a distance of 2, 3 or 4 cells.



narrow border and a large median spot on the labrum, a spot on each side of the frons anteriorly and of the nasus (or the greater part of these last two areas). Ocellar and antennal region brown, vertex and occiput green, the last brown on each side, its hind margin slightly concave. Rear of the head pale green.

Prothorax pale green or yellow, median lobe with a large brown spot each side of the dorsum.

Thoracic dorsum brown, anterior margin, median carina, and two antehumeral stripes each side, green; the last consist of an inner (more mesial) stripe, not reaching the anterior border, slightly divergent downward from its fellow of the opposite side, and an outer (more lateral), narrower stripe placed very little in front of the humeral suture, interrupted near its upper end to form an inverted **!**, or not interrupted and confluent with inner antehumeral stripe, its lower end confluent with the yellow mesinfraepisternum. Mesepimeron and metapleuron pale green, an irregular narrow brown stripe on the (obsolete) 1st and on the 2nd lateral sutures. Thoracic sterna very pale green.

Abdomen pale green or yellowish green, marked with dark brown as follows: a pair of basal dorsal spots on 1, a stripe on each side of dorsum of 2 (above the auricles which are green and have a few very minute black denticles), leaving between them a mid-dorsal trilobed stripe; a median spot on the second fifth (very indistinct in one ♂) and a pair of small anteapical spots on the dorsum of 3-6, each of the paired spots being confluent with a lateral band, which may occupy the apical half of the sides of the segments, but is not visible in dorsal view; a transverse band on 7-9 occupying the third quarter of the segments on the mid-dorsal line, but of greater extent as they pass down on the sides of the segments, especially on 9 where they attain almost the entire segmental length. 10 brown, with a median dorsal green spot.

Superior appendages twice as long as 10, pale green, almost straight, slightly tapering toward the apex, which is obtuse and slightly curved inward; in profile view the inferior margin shows an obtuse angle immediately after the base, from the distal side of which angle proceeds an inferior, minutely spinulose carina.

Inferior appendage very short, in profile view seen to begin anterior to the base of the superiors, its upcurved and acute apex not quite reaching to the inferior basal angulation thereof; viewed from below, the appendage is quite broad, with a wide but shallow apical emargination, the two tips thus formed each ending in an upwardly-directed denticle giving the appearance seen in profile.

Legs pale greenish yellow, tibiae, tarsi and anterior surfaces of the first and second femora brownish.

Wings faintly brownish, reticulation brown, costae yellow anteriorly. Pterostigma ochre, surmounting 5-6 cells. All inner triangles free. Discoidal triangles of front wings with the anterior side equal to or slightly



shorter than the proximal side, free in both front wings of one male, free (right), crossed from proximal to distal side (left) in the second male. Discoidal triangles of hind wings free (left) or crossed from anterior to distal side (right) in one male, crossed on both sides in second male. In the first mentioned male therefore only one of all the triangles is crossed, namely on the right hind wing. Front wings with 13-14 antecubitals, 11 postcubitals; hind wings with 9-11 antecubitals, 11-12 postcubitals.

♀ unknown.

*Dimensions*.—Abdomen 35, hind wings 29, pterostigma of front wings 4.5, of hind wings 5, superior appendages 2 mm.

*Hab.*—Chapada, Brazil, two males, probably by H. H. Smith, one labelled December (sup. apps. lost), in the Museum of Comparative Zoology, Cambridge, Mass.

Differs from the described species *D. angustipennis* Selys and *D. semilibera* Selys by the greater extent of pale coloring on the abdomen and fewer postcubitals on the front wings; from *semilibera* also by its smaller size and apparently the shape of the superior appendages.

## II. On **EPIGOMPHUS**.

*Epigomphus* differs from *Diaphlebia* in the following respects:

*All wings*: one basal subcostal cross-vein (98.1\*), arcus distal to the second antecubital at least of the subcostal series (98.1), its sectors for a short distance beyond their origin separated by an interval less than the thickness of either sector (100), more than one submedian cross-vein (*sensu Selysii* 1896) (96.2), proximal end-vein of pterostigma not prolonged to the principal sector † (100). *Front wings*: first and sixth, seventh or eighth antecubital thicker (92.3), proximal angle of the discoidal triangle farther distally from the arcus than the length of the proximal side of the internal triangle (80.8), 12-16 mar-

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\* The figures in parentheses indicate the percentage of 26 individuals examined in which the character existed as stated immediately preceding each parenthesis. Thus, of the 104 wings of the 26 individuals, one wing had no basal subcostal cross-vein, one wing had two such veins, leaving 102 wings or 98.1 % as stated above.

† Occasionally a cross-vein does occur immediately below the proximal posterior angle of the pterostigma, but even in such cases it is not in prolongation of the proximal end-vein, nor is it thicker than its fellows.



ginal cells between the short sector and the first sector of the triangle (92.3). *Hind wings*: first and sixth or seventh antecubitals thicker (94.2), at most four, often only three, rows of cells between the second sector of the triangle and the hind margin (96.2), no anal triangle (100). *Head* (viewed from in front): inferior angle of the triangle formed by the three ocelli about  $90^{\circ}$  (100). *Abdomen* ♂: 10th segment widest, or 8-10 of equal width in *E. llama* n. sp. *Tibiæ*: antero-inferior row of spines on the third tibiæ of the males much shorter than those of the postero-inferior row and blunt at the tip. Auricles on the second abdominal segment well developed in both sexes.

The differentiation in certain tibial spines, above stated, constitutes a secondary sexual character hitherto unnoticed. Stages in the differentiation are shown in Pl. viii, figs. 11 and 10.

#### SYNOPSIS OF SPECIES OF *Epigomphus*.

- § 1. One pale green antehumeral stripe and a more posterior superior pale green antehumeral spot, the latter representing the upper end of the second antehumeral stripe of § II.

#### *Males.*

10th abdom. seg. with a dorsal tubercle about one-third as high as the segment itself, spinulose at tip.

Dorsal tubercle of 10 somewhat elongated transversely and divided by a shallow median emargination into right and left halves. Superior appendages slightly longer than 10, outer and inner edges slightly convergent in dorsal view; in profile view the upper and lower edges diverging to two-thirds the length of the appendage at which point the lower edge slants obliquely upward to form the moderately acute apex. Inferior appendage one and one-half times as long as the superiors, widely bifid in its apical three-fourths, its branches more divaricate than the superiors, each branch with a superior tooth at three-fourths the length of the appendage (just beyond the level of the tips of the superiors), and terminating in a backwardly (caudad), inwardly (mesad) and downwardly (ventrad) truncated apex bearing a dense tuft of hairs . . . . . **paludosus.**

Dorsal tubercle of 10 not elongated transversely, nor emarginate at tip. Superior appendages about twice as long as 10, gradually tapering to the obtuse apex which is curved downward and



slightly outward. Inferior appendage as long as the superiors, widely bifid in its apical three-fourths, its branches not quite as divaricate as the superiors, slightly divergent in their basal half, slightly convergent in their apical half, the place of change of direction coinciding with the position of an acute superior tooth; tip of each branch obtusely rounded, no apical tuft of hairs; each branch has also a smaller basal superior tooth.

**llama** n. sp.

10th abd. seg. with no dorsal tubercle, a double median group of spinules taking its place.

Superior appendages somewhat longer than 10, each one in dorsal view having the inner edge concave, the outer convex and almost angulate at two-thirds' length whence the appendage is obliquely truncated backwardly and inwardly to form a rather acute apex; in profile upper and lower edges divergent to the apex which is emarginated almost in a semi-circle, thus forming two rather acute tips, only the upper of which is clearly visible in dorsal view. Inferior appendage three fourths as long as the superiors, widely bifid in its apical half, branches less divaricate than the superiors, each branch with an acute, superior, basal tooth near the outer margin and a bifid apex (seen in dorsal view), the outer part of which is the stouter and is directed laterally outward, while the inner part is directed backward; no apical tuft of hairs . . . . **quadracies** n. sp.

Superior appendages slightly longer than 10 (which is greatly swollen), similar in dorsal view to those of *quadracies*; in profile view directed downward, apex obliquely truncated upwardly (dorsad) and backwardly (caudad), the truncated margin crenulate. Inferior appendage three-fourths as long as the superiors, widely bifid in its apical half, branches much less divaricate than the superiors, each branch with a simple obtuse apex and 4-5 superior denticles in a row parallel to its inner margin . . . . . **tumefactus** n. sp.

Superior appendages hardly longer than 10 (which is swollen), subconical, thicker at the base on the inner side, divaricate as much as the width of the segment, apex obtuse, curved a little downward and inward and resting on the fork of the inferior. Inferior appendage longer than the superiors, divided as far as the base, its branches as divaricate as the superiors, curved upward, and in profile view forked at the tip, upper branchlet acute, the other with its tip enlarged in the form of a palette, emarginate in a semi-circle exteriorly, with a strong tuft of yellow hairs in the emargination. (From de Sely's description).

**obtusus.**



*Females.*

Spines of the distal half of the antero-inferior row, third femora, 7-9 in number, not markedly longer than on the basal half of the same femora.

Femora pale brown or yellowish.

Appendages and rudimentary 11th abd. segment between them one-third as long as 10, pterostigma of front wings 3.25 mm. long, occiput very low, almost straight, a little swollen on each side posteriorly. (From de Sely's description.) . . . **paludosus**.

Appendages and rudimentary 11th abd. seg. between them almost as long as 10, pterostigma of front wings 4-4.5 mm. long, occiput with a pair of low elevations in the median third and a slightly higher superior tubercle on each side . . **llama** n. sp.

Femora bordered with black, pterostigma of front wings 3.5 mm. long. (From de Sely's description) . . . . . **obtusus**.

Spines of the distal half of the antero-inferior row, third femora, 5 in number, much longer than the spines on any other part of these, or of the first or second, femora and nearly as long as the tibial spines; femora pale yellow (individual teneral, abd. segs. 6-10 lost), pterostigma of front wings 4 mm. long, median dorsal third of occiput slightly elevated, no lateral superior tubercles. **quadracies** n. sp.

§ II. Two narrow pale green or yellow antehumeral stripes, the posterior one very close to the humeral suture.

*Males.*

10th abd. seg. convex and slightly swollen dorsally, no tubercle, but with a double median group of spinules representing it. Superior appendages slightly longer than 10, each one in dorsal view having the outer and inner edges almost parallel, apex obliquely truncated backwardly (caudad) and inwardly (mesad), both the outer and inner angles of the truncation slightly produced; in profile view curved downward, especially in the apical half, terminating in an obtuse apex. Inferior appendage as long as the superiors, widely bifid in its apical three-fourths, branches less divaricate than the superiors, with no superior teeth, with simple slightly upturned apices, no apical tuft.

**subobtusus**.

*Females.*

Spines of the distal half of the antero-inferior row, third femora, about 5 in number, much longer than the spines on any other part of these, or of the first or second, femora and nearly as long as the tibial spines; femora pale brown, pterostigma of front wings 3 mm. long, occiput with no median elevation, but with a well-marked superior tubercle each side . . . **subobtusus**.



## MEASUREMENTS, ETC.

	<i>paludosus</i>		<i>llama</i>		<i>quadracies</i>		<i>tumefactus</i>		<i>obtusus</i>		<i>subobtusus</i>	
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
Abdomen (mm.)...	36-	42-	35.5	40.5	39-		42		35-	43	37.5	
	40.5	44	-40	-42	40.5				37		-41.5	
Hind wing (mm.)..	30-	34-	31-	37	33.5	34	38		31-	35	33-	35
	32	37	35.5						33		36	
Pterostigma (mm.)												
front wings.....	3	3.25	3-	4-	3.5	4	3.5		3	3.5	3.5	3.5
			3.5	4.5							-3.75	
hind wings.....	3.5	4	3.5	4.5	4	4.5	3.75				4	4
	-4		-4				-4					
Superior appenda-												
ges ♂ (mm.)...	1.5		2.5		2		2				2.5	
											-3	
Appendages ♀												
(mm.).....		.5		1								
Front wings	14-	16-	17-	17-	18-	17-			18-		18-	17-
antecubitals.....	16	17	18	19	19	18	20		19		20	18
postcubitals.....	11-12	10-12	11-	12-	14-	13-	16-		10-	14	13-	13
			14	14	15	15	18		13		14	
Hind wings	10-		12-	13-	13-	12-	13-				13-	
antecubitals.....	12	12	13	15	14	13	14				15	13
postcubitals.....	10-	10-	11-	11-	13-	12-	15				11-	11-12
	13	12	13	15	14	14					13	

## BIBLIOGRAPHY AND DISTRIBUTION.

**Epigomphus** Selys, Bull. Acad. Belg., xxi (2), p. 59 (1854), (2), xxviii, p. 188 (1869), (2) xxxv, p. 754 (1873), (2) xlvi, p. 468 (1878); Mon. Gomph., p. 84 (1858). Kirby, Cat. Odon., p. 71 (1890).

1. **E. paludosus** Selys, *ll cc.*, pp. 60 (1854), 756 (1873), 468 (1878), 85 (1858). Needham, Proc. U. S. Nat. Mus., xxvi, p. 715, f. 8 (venation), (1903).

*Hab.*—Brazil, Minas Geraes. I have studied 2 ♂, colls. Mus. Comp. Zool., Calvert.

2. **E. llama** n. sp. (pl. viii, figs. 2, 3, 7).

*Hab.*—Chulumani in Bolivia, December 1, 3, 4, 27, 31, 1898, Jan. 2, 3, 5, 1899. 9 ♂, 5 ♀, all by W. J. Gerhart, coll. Acad. Nat. Sci. Phila.



3. **E. quadracies** n. sp.

*Hab.*—San Isidro, Guatemala, 1 ♂ by Champion in coll. Godman; Chiriqui 1 ♂, 1 (broken) ♀ in coll. McLachlan.

4. **E. tumefactus** n. sp. (pl. viii, fig. 4).

*Hab.*—Cache in Costa Rica, 2 ♂ by H. Rogers in coll. Godman.

5. **E. obtusus** Selys, *ll. cc.* pp. 187 (1869), 757 (1873), 468 (1878).

*Hab.*—Santo Paulo and Pebá, Upper Amazons; Bogota. I have not seen this species.

6. **E. subobtus** Selys, *l. c.* p. 467 (1878). (Pl. viii, figs. 10, 11.)

*Hab.*—Mexico, Guatemala, Costa Rica. I have studied 4 ♂ 1 (broken) ♀ in colls. Godman, U. S. Nat. Mus.

III. On **Gomphus olivaceus** Selys.

Among the Gomphinae loaned to me by Mr. McLachlan for study in preparing the Biol. Cent. Am., I find the type of this species. As *olivaceus* is apparently unknown to us in America I give some figures from the type (see Pl. viii, figs. 1, 6, 8) and the following statement of differences from *G. plagiatus* ♀ to which it was compared by Selys.

♀. Hind margin of occiput with about 13 black denticles at irregular intervals for its whole length (absent in *plagiatus*).

Pale green antehumeral stripes wider (*i. e.* each is about as wide at its lower end as the distance from its inner edge to the mid-dorsal carina, while in *plagiatus* ♀ this stripe is hardly half as wide as the distance mentioned), the outer edge convex (concave or straight in *plagiatus*), confluent at lower (anterior) end with the green of the anterior mesothoracic border (sometimes not confluent in *plagiatus*); green humeral stripe represented by a narrow inferior streak and a superior round spot, hence interrupted (not interrupted in *plagiatus*); no distinct brown stripes on the lateral thoracic sutures as there are in *plagiatus*.

Yellow dorsal band on abdomen more abruptly broader at bases of 2-7, on 6 and 7 forming a transverse basal ring which is confluent with the yellow of the inferior lateral surfaces, dark colors of the same segments blacker than in *plagiatus*; dorsum of 8-10 chiefly black, with a basal dorsal yellow spot half as long as the segment on 8 and 10 and one-third as long as 9, sides of 8-10 yellow (8-10 reddish brown in *plagiatus*); tips of the two lobes of the vulvar lamina much less acute; pterostigma shorter, 4 mm. (4.5 mm. in *plagiatus*).



## EXPLANATION OF PLATE VIII.

- Fig. 1. *Gomphus olivaceus* Selys. Female type in coll. R. McLachlan.  
Apex of abdomen somewhat distorted.  $\times 1.3$ .
- Figs. 2, 3. *Epigomphus llama* n. sp. ♀. 2, hind margin of occiput  $\times 12$ . ;  
3, vulvar lamina.  $\times 9$ .
- Fig. 4. *Epigomphus tumefactus* n. sp. ♂.  $\times 1.08$ .
- " 5. *Diaphlebia nexans* n. sp. ♂.  $\times 1.38$ .
- " 6. *Gomphus olivaceus* Selys. ♀ type, occiput.  $\times 15$ .
- " 7. *Epigomphus llama* n. sp. ♂. Profile, left side of apex of abd.
- " 8. *Gomphus olivaceus* Selys. ♀ type, vulvar lamina.  $\times 9$
- " 9. *Diaphlebia nexans* n. sp. ♂. Profile, left side of apex of abd.  $\times 15$ .
- " 10, 11. *Epigomphus subobtus* Selys, ♂, two third tibiæ showing  
modified spines of antero-inferior row; 11 less modified, 10  
more modified.  $\times 11$ .
- " 12. *Diaphlebia nexans* n. sp. ♂, ventral view, apex of abdomen;  
bases of the superior appendages dotted.  $\times 15$ .

Figs. 1, 4 and 5 from photographs by Dr. Henry Skinner, the others from camera drawings by the author. Roman numerals indicate abdominal segments.

## Two New Parasitic Hymenoptera.

BY WILLIAM H. ASHMEAD.

Mr. Otto H. Swezey of the Ohio State University, Columbus, Ohio, has recently bred three interesting hymenopterous parasites from a homopterous insect *Ormenis septentrionalis*, two of which prove to be new and are described below at his request.

### Family BETHYLIDÆ.

#### *Dryinus ormenidis*, new species.

*Female*.—Length 4 to 4.5 mm. Black; clypeus, first five joints of the antennæ and the last joint (sometimes the last two joints) pale ferruginous, the scape beneath pale, the intermediate joints black or blackish; palpi and tarsi pale or yellowish-white; mandibles, a spot at the sides of the pronotum posteriorly and the legs, except the middle and hind tibiæ, which are black or fuscous, rufous, the tarsi pale; front wings fuscous at base to the basal nervure except at the extreme base, and a broad fuscous band from the apical half of the stigma across the wing but ending before attaining the hind margin, otherwise hyaline, the veins brownish or fuscous, the base of the stigma whitish; abdomen shining black, the apical segments especially along the venter, more or less and the sides and apex of the pygidium testaceous.

*Type*.—Cat. 6766, U. S. N. M.





Calvert, Philip Powell. 1903. "On some American Gomphinae." *Entomological news, and proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia* 14, 183–192.

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