

**OPHIOGOMPHUS WESTFALLI SPEC. NOV. FROM THE OZARK  
REGION OF ARKANSAS AND MISSOURI, WITH A KEY TO THE  
OPHIOGOMPHUS SPECIES OF EASTERN NORTH AMERICA  
(ANISOPTERA: GOMPHIDAE)**

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*O. westfalli* sp. n. (♂ holotype, ♀ allotype: Caddo River, Montgomery Co., Arkansas, USA; deposited in Florida State Coll. of Arthropods, Gainesville) is described and figured for both the adult and larval stages. It is compared with *O. rupinsulensis* (Walsh) from which it is distinguished by the reduced dark colors on the thorax, and by structural differences in the male anal appendages and the female occiput. The distribution of these two species in Arkansas and Missouri is discussed, and *O. rupinsulensis* is removed from lists of both states. A key is presented to the adults of the 12 species of *Ophiogomphus* now known from eastern North America.

## INTRODUCTION

In May of 1981 the junior author was collecting Odonata in the Ozark physiographic region of western Arkansas. On the Caddo river in Montgomery Co. several *Ophiogomphus* were taken by the members of the collecting party. Although the specimens resembled *O. rupinsulensis* (Walsh), a remarkable reduction of the thoracic dark colors normally present in that species was noted. They were sent to the senior author for identification. After critical study and comparison with a large series of *O. rupinsulensis* from throughout its geographical range, we have concluded they belong to an undescribed species.

In light of this discovery it now becomes necessary to examine critically all records of *O. rupinsulensis* from Arkansas and adjoining states. The Arkansas records (HARP & RICKETT, 1977) are based on adults from Washington Co., and larval specimens from Fulton, Marion, Saline and Sharp Counties. We have

been permitted to examine these specimens and have found they all belong to the new species described here, we therefore delete *O. rupinsulensis* from the Arkansas list. The Missouri records (WILLIAMSON, 1932) were based upon four males collected by E.B. Williamson and party from the Current River and tributaries, in Carter Co., along the east escarpment of the Ozark Plateau. Our examination of these specimens showed they are identical with the new species from Arkansas. We are therefore deleting *O. rupinsulensis* from the Missouri list as well. However, we recognize the possibility that it may occur in the eastern part of the state because of the close proximity of its known range in west central Illinois.

We take pleasure in naming this beautiful species for Professor Minter J. WESTFALL, Jr, in recognition of his outstanding contributions to the knowledge of American gomphids.

### *OPHIOGOMPHUS WESTFALLI* SPEC. NOV.

Figures 1-8

Material examined. — **Holotype** ♂: USA: Arkansas, Montgomery Co., Caddo River at road No. 177, near Norman, 22 May 1981, Jerrell J. Daigle leg. — **Allotype** ♀: Arkansas, Montgomery Co., Gap Creek at road No. 8, just S of Caddo Gap, 9 May 1983, Jerrell J. Daigle leg. — **Paratypes**: 1 ♂, same locality and date as holotype, Jerrell J. Daigle leg. — 2 ♂, same locality and date as holotype, Kenneth J. Tennessen leg. — 4 ♂, same locality as holotype, 24 May 1984, Daigle & Westfall leg. — 1 ♀, same locality as holotype, 19 June 1984, Sidney W. Dunkle leg. — 1 ♀, Arkansas, Fulton Co., South Fork of Spring River, 6 mi W of Hardy, 7 May 1981, George L. Harp leg. — 2 ♂, Missouri, Carter Co., at rapids in Current River, opposite the mouth of Pike Creek, 21 June 1930, E.B. Williamson & party leg. — 1 ♂, Missouri, Carter Co., rapids in Current River at the railroad bridge above Big Spring State Park, 18 July 1930, E.B. Williamson & party leg. — 1 larva, (Catalog No. HP 4874-12), Arkansas, Saline Co., South Fork of Saline River N of Nance, 8 April 1974, Henry W. Robison leg. — 1 larva, (No. HP 041875-9), Arkansas, Saline Co., South Fork of Saline River on county rd just off U.S. Hwy 70, 9 mi W of Benton, 18 April 1975, Henry W. Robison leg. — 1 larva (No. HP 041776-11), Arkansas, Saline Co., South Fork of Saline River, 0.5 mi N of Nance, at county rd bridge, 17 April 1976, Henry W. Robison leg. — 3 larvae (No. HP 0091981A-1), Arkansas, Carroll Co., Long Creek on unnumbered rd at Denver, Topo. Sec. 16, T20N, R22W, 19 September 1981, Henry W. Robison leg. — 1 larvae, Arkansas, Sharp Co., Strawberry River at U.S. Hwy 167 bridge, 3 mi N of Evening Shade, 21 August 1976, Phoebe A. Harp leg. — 1 larva, Arkansas, Montgomery Co., Caddo River at Caddo Gap, State Hwy 240 bridge, 23 September 1978, Roland E. McDaniel leg. — 3 larvae, Missouri, Jasper Co., Center Creek nr Joplin, 25 March 1961, S.S. Roback leg.

Holotype ♂, allotype ♀ and some paratypes are deposited in the Florida State Collection of Arthropods, Gainesville, Florida, USA. Other paratypes deposited in the Department of Biological Sciences, Arkansas State University, State University, Arkansas, USA; Williamson Collection, Museum of Zoology, University of Michigan, Ann Arbor, Michigan, USA; Collections of C. Cook, J.J. Daigle, S.W. Dunkle and K.J. Tennessen.

#### DESCRIPTION OF MALE (HOLOTYPE)

Dimensions. — Total length 50.0 mm. Forewing 30.5 mm. Hindwing 28.7 mm. Abdomen (including terminalia) 36.2 mm. Cerci 2.0 mm. Hind femur 7.0 mm.

Head. — Median lobe of labium black with a large median pale spot, the lateral lobes mostly pale with black teeth. Maxillae and mandibles pale yellow to brown at base, the teeth black tipped. Labrum, anteclypeus, postclypeus and anterior frons all yellow, covered with a sprinkling of brown hairs; frontal ridge and dorsal surface of antefrons yellow, a few black denticles laterally, and brown in the depressed area ahead of the frontal suture and mesad of the antennae. Antennae mostly dark brown, with an annulus of yellow on the scape and 3rd joint, apex of distalia also yellow. Vertex dark brown around the ocelli and postocellar ridge, yellow behind ridge. Occiput yellow, medially with twin rounded low mounds on the dorsal surface, a posterior fringe of long brown hairs laterally, and several rows of minute brown denticles just posterior of the twin mounds. Postgenae brownish above, yellowish below.

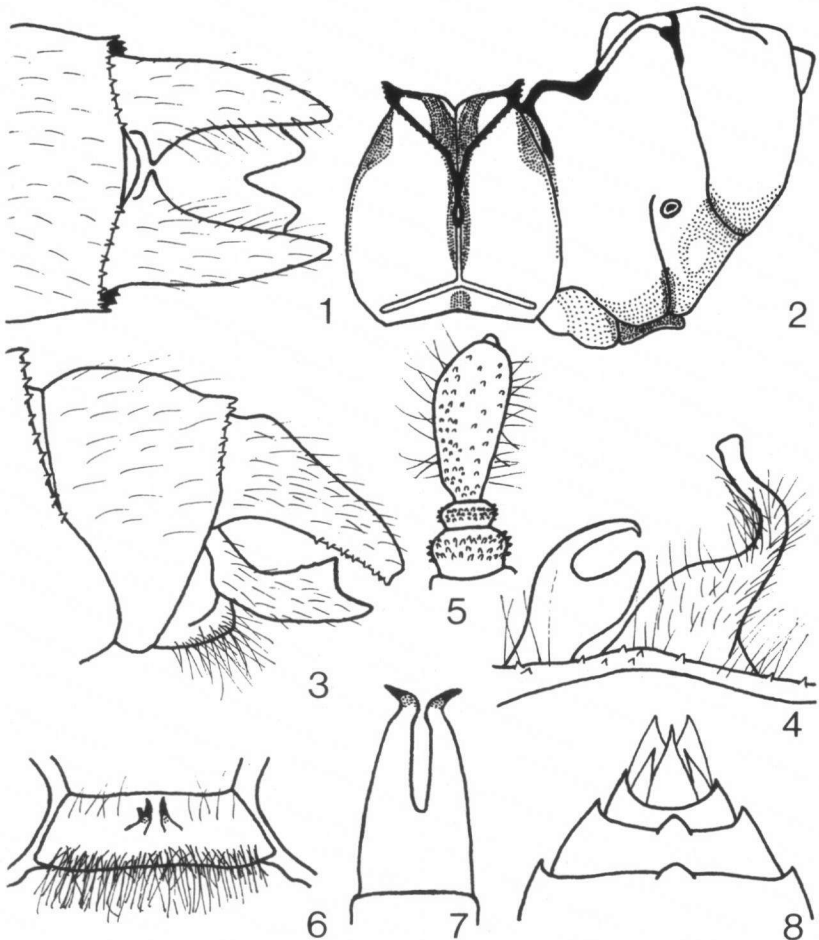
Prothorax. — Anterior and posterior lobes dark brown, median lobe reddish brown with twin yellow spots dorso-medially; coxa and trochanter yellow; femur and tibia yellow laterally, ventrally and the spines black; tarsus all black.

Pterothorax (Fig.2). — Predominantly pale (K.J. Tennessen has written on the data card for one of the paratypes "Thorax a beautiful bright green in life, with only a hint of a brown antehumeral stripe". After preservation by acetone treatment the green fades to yellow). The brown markings are as follows: Median half of ante-alar sinus; ante-alar ridge and dorsal carina to the median tooth; a faint dorsal stripe; an ovate spot on upper third of the humeral suture; dorsal carina of the mesepimeron; a very narrow line in dorsal third of second lateral suture; the mesinfraepisternum and metinfraepisternum, and ventral parts of metepimeron. Second and 3rd pairs of legs with the apical 1/3 of femur completely black, otherwise colored as in first pair.

Wings. — Basal 1/3 of membrane flavescent. Costa yellow, other veins brown. Pterostigma black, 3.4 mm long, covering ca 4 cells in all wings. Antenodal and postnodal cross veins of the first series have the following index: 10:12 — 13:9 / 9:9 — 9:10 in front and hind wings respectively. Second primary antenodal cross vein is the fifth in all wings. Basal subcostal cross vein absent in all wings. Bridge cross veins six in front wings, five in hind wings. Anal loop of 4 cells; anal triangles of 6-8 cells.

Abdomen. — Segment 1 with wide dorso-lateral dark brown stripe, yellow on dorsum and lower half laterally, the venter dark with median and lateral yellow spots. Segment 2 yellow with wide dorso-lateral dark stripe; an apical half-ring and a spot behind the auricles black; dorsum, auricles, latero-ventrally and the carinae around the genital pocket all yellow. Segments 3-6 with dorsum yellow, connected basad with a ventral pale stripe; a complete apical ring and the transverse groove at 1/3 length black; a brown lateral stripe narrowing toward the base. Segments 7-9 with dorsal yellow spots "bottle shaped", bordered with black on the apical half; a reddish-brown full length stripe dorso-laterally, an obscure sub-apical dark spot in the lower yellow stripe; the lateral lamellate expansions of

8 and 9 black their entire length. Segment 10 mostly yellow, with latero-basal area reddish-brown; mid-dorsal and mid-lateral portions of apical carina black. Lamellate expansion of segment 8 is 0.6 mm wide; the posterolateral margin is noticeably produced posteriorly. In *O. rupinsulensis* the laminae of both 7 and 8 are narrower and partially pale; the postero-lateral margin of 8 not produced beyond the posterior carina.



Figs 1-8. *Ophiogomphus westfalli* sp. n.: (1) dorsal view of male terminalia; — (2) diagram of thoracic color pattern; — (3) lateral view of male terminalia; — (4) lateral view of male accessory genitalia; — (5) dorsal view of left antennae of larvae; — (6) dorsal view of female occiput; — (7) ventral view of female vulvar lamina; — (8) dorsal view of the caudal segments of larvae.

Anal appendages (Figs 1, 3). — Cerci yellow; in dorsal view somewhat cone-shaped, very slightly incurved, the mesad edges lightly hirsute, depressed distally and the apices appearing moderately sharp-pointed in this view; in lateral view slightly decurved, the ventral margins furnished with 10-14 irregularly set black denticles, apices from this perspective obtuse-quadrate. Epiproct yellow,  $9/10$  the length of cercus, with a "V" shaped apical cleft, each ramus with a robust cone-shaped process at ca  $3/4$  length. Venter of epiproct appears tumid, not medially excavated and trough-like as in *O. rupinsulensis*.

Secondary genitalia (Fig. 4). — Anterior hamuli dark brown, each bilobed; basal branch shell-like, rounded outwardly, excavated inwardly; apical branch talon-like, abruptly decurved at apex, and rotated outward; excised gap ovoid, base of basal branch 1.5 times as wide as gap, base of apical branch 0.75 times as wide as gap. Posterior hamuli pale on widened basal portion, dark brown distally from the "shoulder"; the produced distal portion bent meso-anteriorly just above the "shoulder" and dilated at apex. Penile hood robust, upright, each bivalve-like lateral flange 1.0 mm wide, ending with the usual bifurcated process.

#### DESCRIPTION OF FEMALE (ALLOTYPE)

Dimensions. — Total length 48.5 mm. Forewing 32.5 mm. Hindwing 31.0 mm. Abdomen (including cerci) 35.0 mm. Hind femur 5.5 mm.

Head (Fig. 6). — Colors and markings similar to male except anterior vertex more pale, the dark brown limited to some narrow lines on carinae enclosing the ocelli. Occiput furnished with two moderately long black-tipped horns which are acuminate and closely approximated at median of occiput. Rear of head without postoccipital horns (except one paratype female which has vestigial postoccipital horns).

Prothorax and pterothorax. — Colored similar to male, except hind femur extensively pale distally.

Wings. — Antenodal and postnodal index as follows: 10 : 13 — 13 : 13 / 12 : 9 — 10 : 9. Pterostigma 3.5-3.7 mm long. Otherwise venation similar to male.

Abdomen. — Segment 1 yellow on dorsum, an upper lateral stripe brown, pale on lower lateral tergite; posterior transverse carina dark brown. Segments 2-6 with full length yellow lanceolate stripes on dorsum, laterally with upper dark and lower pale stripes full length, and dorsal half-rings of dark brown on posterior carinae. Segment 7 as in preceding segments except dorsal yellow covers only the basal  $3/4$  of the tergum. Segments 2-7 with dark ring at ca  $1/3$  length, incomplete dorsally; segments 3-7 with a dark spot ventro-laterally at ca  $3/4$  length. Segments 8 and 9 yellow on basal  $1/3$  and dark brown on apical  $2/3$  of dorsum; a reddish-brown stripe dorso-laterally on apical  $1/3$ , the basal  $2/3$  yellow; lamellate expansions and the denticles on anterior transverse carina dark brown. Segment 10 yellow, with twin proximal dark spots on dorsum; denticles at apex of segment

dark brown. Cerci yellow, slightly shorter than paraprocts.

Genitalia (Fig. 7). — Vulvar lamina 2.0 mm long, pale with dark brown apices; reaching to 5/6 the length of 9th abdominal sternite; cleft for 6/10 length; base tumid; lobes approximated for 3/4 their length, then incurved, apices then outcurved and acuminate.

#### DESCRIPTION OF LARVA

Dimensions (mature). — Total length 27.0 mm. Abdomen length (with anal appendages) 17.0 mm. Abdomen width (at segment 5) 9.0 mm. Forewing 8.0 mm. Hindwing 7.1 mm. Hind femur 4.5 mm. Prementum length 4.0 mm. Prementum width 3.2 mm. Ligula width 1.3 mm.

Head (Fig. 5). — Prementum parallel-edged in apical 3/5, moderately narrowed in basal 2/5 to ca 2/3 of its apical width; ligula moderately convex and about 1/3 the apical width of prementum, with a border of piliform setae and 20-26 quadrate denticles; first segment of labial palpus rounded distally, each with 10-12 irregularly shaped denticles along the curved inner margin, sub-apical tooth usually the most prominent; both segments of palpi dark brown in mature individuals. Segment 3 of antennae spatulate-shaped, outer edge convex, inner edge straight, ca 2.25 times as long as wide; segment 4 small, slightly conical with rounded apex. Dorsal surface of head profusely covered with brown granules.

Thorax. — Granular dorsally, the forewing pads reaching to 1/4 and the hindwing pads to 1/2 the length of abdominal segment 4.

Abdomen (Fig. 8). — Relatively wide, ca 1.7 times as long as wide; only slightly ovoid, widest at segments 5 and 6; the dorsal tergites granular; segments 7-9 with lateral spines. Segments 2-9 with a mid-dorsal row of rather robust tubercles which are elevated and decurved on 2-7, lower and not decurved on 8 and 9; in dorsal view, tubercle on 8 rounded and extending beyond the posterior margin of segment, on 9 triangular and extending to middle of 10. Cerci ca 2.5 times the mid-dorsal length of segment 10, apices acuminate; epiproct ca 4 times the mid-dorsal length of 10, apex not decurved, male epiproctal tubercles at 3/5 length; paraprocts slightly longer than epiproct, their apices very slightly incurved.

#### DIFFERENTIAL DIAGNOSIS

The closest relative of *O. westfalli* appears to be *O. rupinsulensis* (Walsh). However, there are abundant structural differences in both adults and larvae, as well as the strikingly different color pattern between the adults of the two species. (1) *O. westfalli* is distinguished by the reduction of brown markings on the thorax (Fig. 2), and by the more extensive dark markings on the abdomen; the humeral stripe is reduced to an ovate spot on the upper third of the humeral suture; the antehumeral stripe is usually totally obsolete, or at most there is only the slightest blush of darker color in the antehumeral region; the lateral dark coloration on the

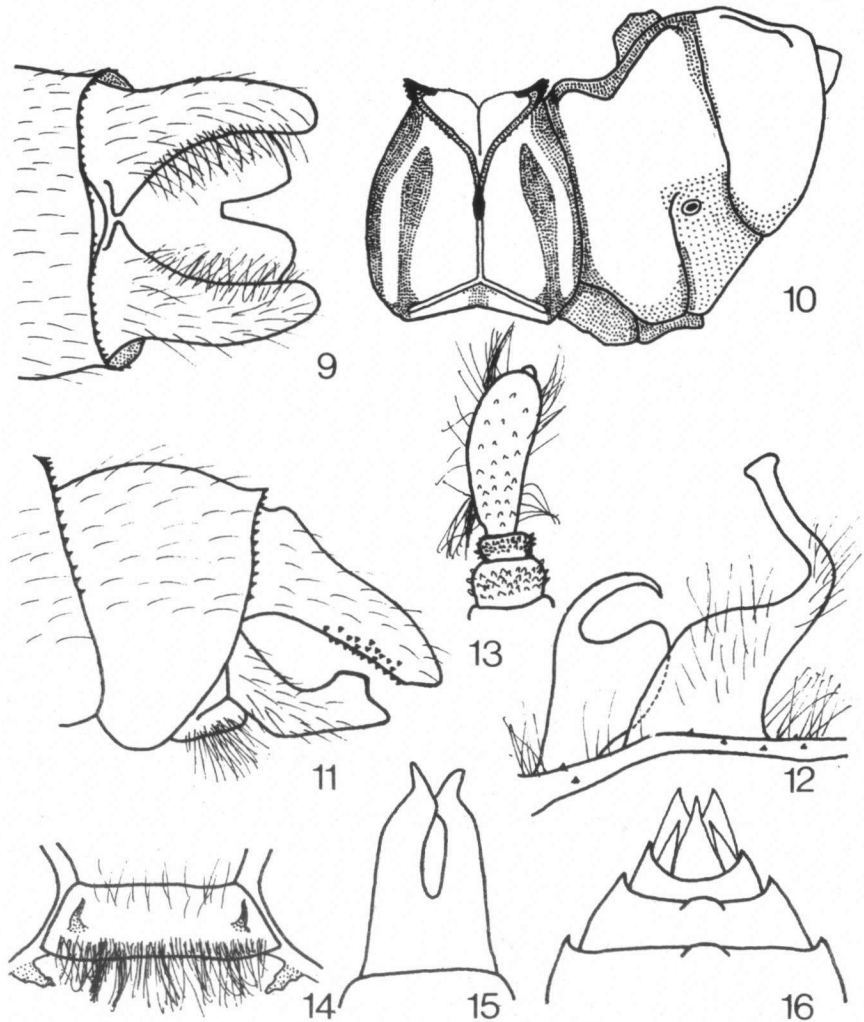
abdomen is more extensive, particularly on segments 8 and 9 which are heavily bordered with black along the entire length of the lamellate expansions; *rupinsulensis* in contrast has more extensive dark markings on its thorax (Fig. 10), and less dark colors on the abdomen; the antehumeral stripe is well developed, and the humeral stripe is full length along the humeral suture; lamellate expansions of segments 8 and 9 are pale on the basal 1/3 and the apical dark portion is narrower and brown instead of the intense black seen in *westfalli*.

— (2) The male cerci of *westfalli* in dorsal view (Fig. 1) are pointed at the apices, cone-shaped, very slightly incurvate, and only slightly hirsute along the mesal edges; the apical cleft in the epiproct is a sharp "V"; seen in lateral view (Fig. 3) the apices of the cerci are obtuse-quadrate, the denticles along the ventral margins are usually less than 15 and are set irregularly, not in even lengthwise rows; the upright process on the epiproct rami is conical and sharp pointed at the apex. For *rupinsulensis*, the cerci in dorsal view (Fig. 9) have obtuse-rounded apices, are rather strongly curved mesad, and have densely hirsute mesal edges; the apical cleft of the epiproct is "U" shaped; the cerci in lateral view (Fig. 11) are pointed at the apices and there are usually 30 or more ventral denticles that are set more or less evenly in lengthwise rows; the upright process of the epiproct rami is obtuse-quadrate at apex.

— (3) The venter of the male epiproct is tumid in *westfalli*; in *rupinsulensis* it is medially excavated by a deep channel running lengthwise from base to the apical cleft.

— (4) The male secondary genitalia of *westfalli* (Fig. 4) is similar in general appearance to those of *rupinsulensis* (Fig. 12) but they differ in the proportions of certain parts. In *westfalli* the anterior hamules are overall slightly smaller, the width of the basal branch at its base is 1.5 times the width of the excised gap, the width of the apical branch ("hook") at its base is 0.75 times the gap width; the corresponding measurements of the anterior hamuli of *rupinsulensis* are 2.0 times the gap width at base of the basal branch, and 0.50 times gap width for apical branch ("hook"). In *westfalli* the produced distal portion of the posterior hamules is relatively shorter and the expanded apical "knob" smaller than in *rupinsulensis*. Females of *westfalli* are structurally separably by having the postoccipital horns obsolete or vestigial, and by having the occipital horns (Fig. 6) closely approximated on the median of the occiput; in *rupinsulensis* robust postoccipital horns were present in all 43 females we examined; also most examples (31) had widely separated occipital horns (12 were without occipital horns). The vulvar lamina of *westfalli* (Fig. 7) has thinner lobes, with apices more acuminate and divergent than *rupinsulensis* (Fig. 15). Larvae of the two species are differentiated as follows: In *westfalli* the palpal lobe has 12 or fewer teeth, and the ligula has no more than 26; third segment of antennae has the mesal edge straight, the segment length is 2.25 times as long as wide, the middorsal tubercle on segment 9 of the abdomen extends posteriorly to at least the middle of 10th segment; the abdomen is rather wide, at least 8.5 mm at the 5th segment in mature larvae. In *rupinsulensis* the palpal lobe has at least 16 teeth, the

ligula at least 30; third segment of antennae has the mesal edge slightly concave, the segment length is 3.0 times as long as wide; the middorsal tubercle of 9 extends no more than 1/4 the length of 10; abdomen not more than 7.5 mm wide at 5th segment in mature larvae.



Figs 9-16. *Ophiogomphus rupinsulensis* (Walsh): (9) dorsal view of male terminalia; — (10) diagram of thoracic color pattern; — (11) lateral view of male terminalia; — (12) lateral view of male accessory genitalia; — (13) dorsal view of left antennae of larvae; — (14) dorsal view of female occiput; — (15) ventral view of female vulvar lamina; — (16) dorsal view of the caudal segments of larvae.

## DISTRIBUTION AND PHYSIOGRAPHY

*O. westfalli* has up to now been found only in the Ozark Plateau region of western Arkansas and southwestern Missouri and is likely an endemic of the region. This region is rich in fine, clear, cold mountain streams. The topography is diversified. Elevations are generally above 400 m, with some ridge tops reaching 800 m. The plateau is deeply bisected by two large river systems, the Arkansas and the White; drainage is to the southeast into the Mississippi River. At higher elevations and in the National Forests there is a heavy cover of deciduous and coniferous forest; the river valleys and lower hills are used for agriculture. There is no heavy industry and the tributary streams still have a low level of man-induced pollution. In addition to *O. westfalli*, at least two other odonate species are endemic to the region, *Gomphurus ozarkensis* (Westfall) and *Somatochlora ozarkensis* Bird.

## HABITAT

WILLIAMSON (1932) described the Current River, Carter County, Missouri, where his party collected a series of four males of *westfalli* thus: "The river here is a fine, large, clear, cold, rapid, rocky stream, fordable only rarely at the shallowest rapids. It swings in broad curves from one cliff to another through its valley rimmed with high hills at whose bases frequently lie deep, clear pools". The junior author and party collected four males of *westfalli* in the Ouachita mountains, Montgomery County, Arkansas. The location is the Caddo River, where it is crossed by state roads Nos 73-177, near Norman. This is a clear mountain stream, about 20 m wide and 30 cm deep, flowing over a gravel-cobblestone bottom with many ripples; some of the gravel bars have plant cover, mostly water willow (*Justicia*). The stream banks are generally forested with deciduous and coniferous trees. Overall, the site compares favorably to other habitats in the eastern USA where we have taken *Ophiogomphus*. At noon about a dozen *westfalli* appeared and began patrolling in short beats low over the ripples. The four males were collected and several others were still seen flying an hour later when we stopped collecting. Earlier in the morning adults of *Gomphurus ozarkensis* and *Basiaeschna janata* (Say), and larvae of *Gomphus graslinellus* Walsh, *Dromogomphus spinosus* (Selys) and *Macromia alleghaniensis* Williamson were collected at the same site. A teneral female of *westfalli* was taken in early morning in a pasture bordering Gap Creek, at Highway 8, just south of Caddo Gap. This stream is very similar to the Caddo River, except it is much smaller.

KEY TO THE *OPHIOGOMPHUS* SPECIES  
OF EASTERN NORTH AMERICA

In spite of the fact that the eastern species of *Ophiogomphus* were recently keyed (CARLE, 1981), that key has already become inadequate because of new species descriptions (CARLE, 1983). Furthermore it needed modification because of an error in couplet 8. For these reasons we believe the modifications and additions to the Carle key suggested below may prove useful. We have followed Carle in not including in the key species occurring only in the plains states and westward, we believe there is already adequate literature for the identification of these species in, for example, KENNEDY (1917), NEEHAM & WESTFALL (1955) and WALKER (1958). CARLE (1981) pointed out that the female of *O. edmundo* was not positively known to him, it is not known to us either, and for that reason has not been included in this key. Until females have been positively associated with the male of *edmundo* users of this key are cautioned to compare the complete descriptions of females separated by couplet 7.

SPECIES KEY TO THE ADULTS

- 1 Antefrons and postclypeus transversely striped with black ..... 2
- Antefrons and postclypeus not transversely striped with black ..... 3
- 2 Metanepisterna each with transverse brown band; male epiproctal rami widely separated apically, apex of anterior hamuli directed posteriorly; vulvar lamina with lateral flange well developed, apices directed posterolaterally ..... *anomalus* Harvey
- Metanepisterna each without transverse brown band; male epiproctal rami contiguous apically, apex of anterior hamuli directed ventrally; vulvar lamina with lateral flange vestigial, apices directed posteriorly ..... *colubrinus* Selys
- 3 Middorsal brown band of mesanepisterna vestigial or absent ..... 4
- Middorsal brown band of mesanepisterna well developed ..... 6
- 4 Tibiae with external surface predominantly black; male cerci acuminate; lateral spine of epiproct at ca 1/2 its length; vulvar lamina longer than sternum of 9 ..... *acuminatus* Carle
- Tibiae with external surface predominantly yellow; male cerci not acuminate; lateral spine of epiproct at not less than 3/4 its length; vulvar lamina shorter than sternum of 9 ..... 5
- 5 Antehumeral brown stripe well developed; male epiproct venter excavated by a deep lengthwise trough; female occipital horns wide apart or absent, the postoccipital horns well developed and robust ..... *rupinsulensis* Walsh
- Antehumeral brown stripe absent or obscure; male epiproct venter not excavated; female occipital horns approximated at median of occiput, the postoccipital horns absent or vestigial ..... *westfalli* sp. n.
- 6 Basal 2/3 of hind wings tinted with yellow; male epiproct abruptly angled dorsally near base, ca 1/2 the length of cerci; female occipital crest with small erect horns separated by ca 4/5 length of postfrontal suture, vulvar lamina ca as wide as long ..... *howei* Bromley
- Basal 2/3 of hind wings not tinted with yellow; male epiproct not abruptly angled dorsally near base, at least 4/5 as long as cerci; female occipital crest without small erect horns separated by ca 4/5 postfrontal suture; vulvar lamina longer than wide ..... 7

- 7 Male cerci inflated, each wider at midlength than at base, longer than epiproct; female with postoccipital horns ..... *aspersus* Morse  
 — Male cerci not inflated, each not wider at midlength than at base, not longer than epiproct; female without postoccipital horns ..... 8
- 8 Tibiae each with yellow streak along external carinae; basal 2/3 of femora yellow; thorax without brown bands along metapleural sulci ..... 9  
 — Tibiae each without yellow streak along external carinae; basal 2/3 of femora not yellow; thorax with brown bands along metapleural sulci ..... 10
- 9 Male lateral spine of epiproct at ca 1/2 its length, spine longer than its basal width; female occipital horns contiguous, 1.5 to 2.5 times the length of pedicel ..... *alleghaniensis* Carle  
 — Male lateral spine of epiproct at ca 2/3 of its length, spine shorter than its basal width; female occipital horns separated, ca same length as pedicel ..... *incurvatus* Carle
- 10 Dorsal mesanepisternal pale stripes parallel-sided, separated by ca 4/5 their maximum width; gap of anterior hamuli subcircular; lateral flange of penile hood ca 1/4 as wide as long ..... *edmundo* Needham  
 — Dorsal mesanepisternal pale stripes widened ventrally, separated by ca 2/5 their maximum width; gap of anterior hamuli ovoid; lateral flange of penile hood ca 1/3 as wide as long ... 11
- 11 Distal margin of labrum black; male epiproct with apical cleft more than 3 times as long as wide, anterior hamuli each with apical branch less than 2 times as long as basal branch; female occiput bilobate posteriorly, with large contiguous horns anteriorly; vulvar lamina constricted near base, apices directed posteriorly ..... *mainensis* Packard  
 — Distal margin of labrum not black; male epiproct with apical cleft ca 2 times as long as wide, anterior hamuli each with apical branch more than 3 times as long as basal branch; female occiput level posteriorly, without or with small widely separated horns anteriorly; vulvar lamina parallel-sided, apices directed posterolaterally ..... *carolus* Needham

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