

**GOMPHUS (GOMPHURUS) GONZALEZI SPEC. NOV.,
A NEW DRAGONFLY FROM TEXAS AND MEXICO
(ANISOPTERA: GOMPHIDAE)**

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It is described from southern Texas and east-central Mexico (holotype ♂: Mexico, San Luis Potosi, Nacimiento del Rio Coy, 13-V-1989; allotype ♀, in copula with holotype; both deposited in UNAM, Mexico). The new sp. is similar to *G. externus* Hag., but is smaller and paler. Males differ structurally from *externus* by: cerci less keeled ventrally, branches of epiproct less widespread, and anterior surface of penis hood V-cleft, not U-cleft. Females lack vertex spines, ♀ *externus* have lateral vertex spines.

INTRODUCTION

The *Gomphurus* species group is here considered to be a subgenus of *Gomphus* as in NEEDHAM & WESTFALL (1955), although it has been given generic rank by some authors (e.g. CARLE, 1986). The subgenus is Nearctic, and with the new species described below, contains 13 species.

GOMPHUS (GOMPHURUS) GONZALEZI SPEC. NOV.

Figures 1-7

Material. -- **Holotype** ♂: MEXICO, San Luis Potosi, Nacimiento del Rio Coy, ca 25 km S Ciudad de Valles nr Hwy 85, elevation 60 m, 13-V-1989, E. Gonzalez S., deposited UNAM. -- **Allotype** ♀: in copula with holotype, deposited UNAM. -- Other **paratypes**: 1 ♂ same data; 1 ♂ same data but 26-V-1987; 1 ♂ same but S.W. Dunkle Coll. (SWD); 1 ♂ same but 27-V-1987 (UNAM); 2 ♂ same but 24-VI-1990; 1 ♀ same but coll. J.J. Daigle, J.J. Daigle Coll. (JJD); 1 ♂ San Luis Potosi, Rio Tamuin, 6 mi W Tamuin N of Hwy 70, 25-V-1984, N. Lavers, G. Harp Coll.; 2 ♂ TEXAS, Cameron Co., Arroyo Colorado channel of Rio Grande at FM 2556, 6-V-1985, S.W. Dunkle, SWD; 1 ♂ same but UNAM; 1 ♂ same but JJD; 1 ♂ same but R.W. Garrison Coll.; 1 ♂ same but 8-V-1985, SWD; 1 ♂ 1 ♀, Starr Co., Rio Grande at Falcon Dam, 11-IV-1990, R.W. Cannings, Cannings Coll. - All

stored dry in transparent envelopes.

Etymology. -- Named for Enrique Gonzalez Soriano, in recognition of his studies on Mexican Odonata.

D i a g n o s i s. -- A medium sized, dully colored dragonfly with moderately clubbed terminal abdominal segments. Similar to *Gomphus externus* Hagen by having straight male cerci, but male cerci with ventral keel low, and epiproct extending laterally only slightly beyond cerci. Female lacks vertex spines of *externus*. Larva unknown.

MALE. -- H e a d mostly pale gray-green; vertex green or brown, antennae brown; rear of head brown to black on dorsal 1/3, dull yellow ventrally. Postocellar ridge extending to compound eyes, concave medially. Occipital ridge convex. Compound eyes pale gray-blue in life.

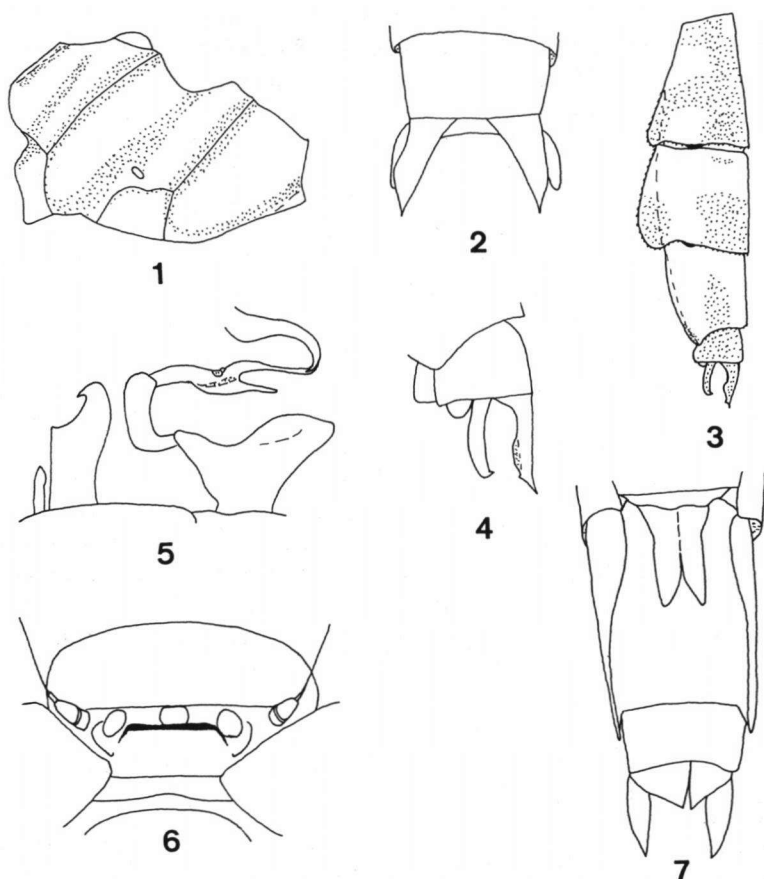
T h o r a x mostly pale gray-green; prothorax shading to dull yellow dorsally, brown laterally. Each side of pterothorax with 6 narrow brown stripes (Fig. 1) as follows: (1) middorsal stripe parallel-sided and close to middorsal carina, extending dorsally over medial half of ante-alar sinus, (2) antehumeral stripe extending from propleuron nearly to antealar crest, (3) mesopleural (humeral) suture, (4) interpleural suture, (5) metapleural suture, (6) posterior edge of metepimeron; last 4 stripes connected ventrally in a UU pattern.

L e g s brown, with gray-green coxae, trochanters, underside of profemur, and laterobasal spot of metafemur.

W i n g s with pterostigma and veins brown, except pale green costa. Venation similar to other *Gomphus* (*Gomphurus*).

A b d o m e n mostly brown, marked with pale gray-green on segments 1-6, dull yellow on 7-10. Segments 1-3 pale with brown dorsolateral stripes; segments 4-6 brown, each with pale full length dorsal hastate stripe, the apex directed posteriorly, and pale basolateral spot. Segment 7 brown with pale dorsal hastate stripe, and large diffuse anterolateral and posterolateral spots (Fig. 3). Segment 8 pale with square, brown, posterodorsal spots which almost connect middorsally, and a posteroventral brown spot. Segment 9 pale with dorsolateral distal brown spots (dorsolateral spots of 8-9 extended to lengthwise stripes in some Mexican males). Segment 10 brown with an oval dorsal yellow spot. Lateral flanges of tergites 7-9 yellow, brown on posterior halves of 7 and 8; flanges projecting posteriorly slightly beyond margins of segments; a line of black denticles on edge of flange of posterior half of 7, similar denticles full length of 8, no similar denticles on 9. Sterna of segments 1-2 gray-green, 3-7 brown, 8-10 yellow. Tergites of 8-9 poorly sclerotized, since they are somewhat shriveled in all males, all of which appear to be mature.

Cerci brown, fused to abdominal segment 10 (see also DUNKLE, 1988), divergent, each tapered and pointed, in lateral view with a low ventral keel at 2/3 length (Figs 3,4) and a minute ventral bump or tooth at 4/5 length. Epiproct



Figs 1-7. *Gomphus gonzalezi* sp.n.: (Figs 1-5) paratype male, Arroyo Colorado: (1) thorax, left lateral view, - (2) abdominal segments 7-10, left lateral view, - (3) abdominal segment 10 and appendages, dorsal view, - (4) ditto, left lateral view, - (5) secondary genitalia, right lateral view; -- (Figs 6-7) paratype female, Rio Coy: (6) head, dorsal view, - (7) subgenital plate, ventral view.

brown, yellow dorsomedially, in dorsal or ventral view with branches more divergent than cerci by about width of tip of branch on each side, posterior margin between branches straight for only a short distance medially (Fig. 2).

Anterior hamule dark brown, posterior hamule gray-green, segment 1 (hood) of penis rusty brown. Anterior hamule about 1/3 length of posterior hamule, bluntly pointed in lateral view, grooved posteriorly with 2-4 minute teeth at tip projecting into groove. Posterior hamule in lateral view with a prominent shoulder at 2/3 length and a stout recurved hook at tip directed anteromedially (Fig. 5). Penis with hood in lateral view as high as posterior hamule, nearly straight

posteriorly, convex anteriorly, in posterior view without a distal notch, anterior surface V-cleft to house flagellae. Penis segment 3 with flat tongue-like projection and 2 long flagellae distally. Penis segment 3 apparently inflatable (uninflated condition shown in Fig. 5). Penis guard bluntly pointed distally, grooved medially on anterior surface.

Measurements (mm). -- Total length including cerci 47-50, abdomen 34-37, hindwings 27-30, hindwing pterostigma 2.8-3.3.

FEMALE. -- Head colored as in male, eye color in life similar but grayer ventrally. Postocellar ridge straight-edged, ending at medial edges of lateral ocelli (Fig. 6). Each lateral ocellus bounded laterally by a C-shaped ridge between ocellus and compound eye. No vertex spines. Occipital crest straight to slightly convex.

Thorax, legs and wings as in male.

Abdomen colored as in male except: segments 4-6 each with diffuse pale lateral spot at 3/4 length of segment; segment 8 brown with round, middorsal, basal yellow spot, large square laterobasal yellow spot, and small lateroposterior yellow spot; segment 9 brown with middorsal yellow stripe and yellow lower sides. Lateral flange of segment 9 edged with line of black denticles. Epiproct yellow. Cerci brown, straight, acuminate pointed, longer than segment 10.

Subgenital plate brown, half length of sternum 9, narrowly V-cleft for half its length to form 2 parallel bluntly pointed lobes (Fig. 7); plate narrowing from base to level of lobes which are parallel-sided and bent slightly dorsad.

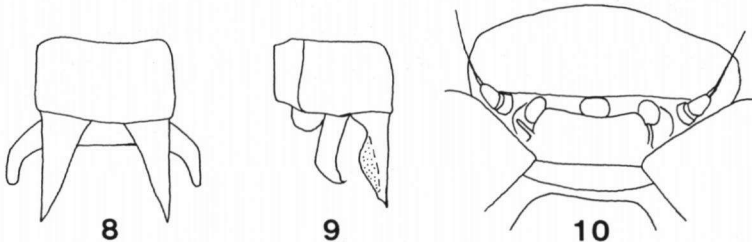
Measurements (mm). -- Total length 48-50, abdomen 36-37, hindwing 31, hindwing pterostigma 3.5-3.6

BIOLOGY

The recorded flight season is 6 May-24 June. The habitats at the Texas and Mexico localities differ. The Arroyo Colorado locale was a muddy canal-like channel of the Rio Grande River about 15 m wide. The Rio Coy was a clear, spring-fed, deep, rocky river about 20-35 m wide (J. Daigle, pers. comm). Male *G. gonzalezi* sp.n. waited during the middle part of the day for females at the Arroyo Colorado by perching on overhanging vegetation, but at the Rio Coy they perched on a rock outcrop. Away from water at the Rio Coy, they perched on the ground or on short grasses. Sympatric Gomphidae included *Stylurus plagiatus* (Selys) at the Arroyo Colorado, and *Erpetogomphus constrictor* Ris, *E. eutainia* Calvert, *Phyllogomphoides albrighti* (Needham), *P. duodentatus* Donnelly, and *Phyllocycla breviphylla* Belle at the Rio Coy. *G. gonzalezi* is apparently rare, and at least in the lower Rio Grande valley, is likely imperiled due to pesticides and other agricultural activity. Several other streams in the area of the Rio Coy were searched (E. Gonzalez S., pers. comm.), but *G. gonzalezi* was found only at the Rio Coy and Rio Tamuin.

DISCUSSION

The closest relative of *Gomphus gonzalezi* sp.n. is *G. externus* Hagen. Male *gonzalezi* differ structurally by: penis hood with anterior trough V-shaped instead of U-shaped, apex of hood entire instead of cleft, cerci divergent instead of parallel, cerci with small ventral keel at $2/3$ length instead of a large ventral keel at $1/2$ length, each branch of epiproct extending lateral to cerci by width of tip of branch instead of width of a cercus, and posterior margin of epiproct straight for a shorter distance medially (Figs 8,9). Female *gonzalezi* have a straight to convex occipital crest and lack vertex spines, female *externus* have a convex occipital crest and a slender yellow spine at each end of the postocellar ridge (Fig. 10). *G. externus* is also somewhat larger: total length 51-56 mm, abdomen 36-42, hindwing 29-33 (data from numerous specimens of both sexes from throughout range). *G. externus* also has wider thoracic stripes, and black and bright yellow markings instead of brown and pale yellow markings, including mostly black legs, and a mostly black abdomen with bright yellow spots on segments 7-10. *G. externus* has yellow extensor surfaces on the tibiae (tibiae all brown in *gonzalezi*), and the posterior brown metepimeral stripe is short or absent.



Figs 8-10, *Gomphus externus* Hagen: (Figs 8-9) male, Nueces R., Texas: (8) abdominal segment 10 and appendages, dorsal view, - (9) ditto, left lateral view; -- (Fig. 10) female, in copula with the above ♂: head, dorsal view (right vertex spine abnormally bent).

Gomphus lynnae Paulson, known only from the Yakima River, Washington, is also closely related to *G. gonzalezi*. Male *lynnae* differ structurally by their short penis flagellae, shorter penis hood, and ventral keel at $1/2$ length of cerci (PAULSON, 1983). *G. lynnae* differs from *gonzalezi* in some of the same ways as *externus*: female occipital crest convex, female vertex spines present, larger size, brighter coloration, and abdominal pattern. *G. lynnae* differs from both *gonzalezi* and *externus* by the fusion of the antehumeral and humeral brown stripes, and at maturity the thorax and abdominal segments 1-2 are covered by bluish-gray waxy pruinosity. The pale coloration of *gonzalezi* and the pruinosity of *lynnae* are probably adaptations to reduce thermal stress in hot, arid environments.

Gomphus externus ranges from Michigan, Ohio, Kentucky, Arkansas, and

Texas, west to New Mexico, Utah, and Montana, and north into southern Manitoba (NEEDHAM & WESTFALL, 1955; BICK & HORNUFF, 1974; specimens in Florida State Collection of Arthropods). In central Texas, *externus* ranges south to the Nueces River (S. Dunkle coll.), separated from the Rio Grande River by an arid gap of about 200 km. In western Texas, the Nueces River approaches to within 60 km of the Rio Grande in Dimmit Co., and *externus* does occur in the upper Rio Grande. The closest known occurrence of *externus* in the Rio Grande system to the Falcon Dam locality of *gonzalezi* is a straight line distance of 580 km northwest (Presidio Co., 32 km E Presidio, S. Dunkle coll.). The southwestern limit of the known range of *externus* is New Mexico and western Texas in the upper Rio Grande and its tributary the Pecos River, where the coloration of *externus* approaches that of *gonzalezi*, with narrow brown thoracic stripes and mostly yellow abdominal segments 8 and 9. Structurally these specimens are typical *externus*, and their paler coloration is likely an adaptation to higher average temperatures in those western watersheds.

G. externus, *G. gonzalezi*, and *G. lynnae* form a monophyletic group defined by the straight male cerci; the male cerci are arched upward in all other *Gomphus* (*Gomphurus*). I speculate that a population of *Gomphus* (*Gomphurus*) ancestral to these species became *externus* mid-continently, and that isolates formed to the west and south. The western population was separated by the Rocky Mountains and became *lynnae*; the southern isolate, separated by mostly arid country, became *gonzalezi*. It is noteworthy that *gonzalezi* and *lynnae* diverged from *externus* in some of the same ways: development of a complete posterior metepimeral dark stripe, loss of yellow on the tibiae, and in the males, more divergent cerci, less widespread epiprocts, and loss of the apical notch of the penis hood.

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REFERENCES

- BICK, G.H. & L.E. HORNUFF, 1974. New records of Odonata from Montana and Colorado. *Proc. ent. Soc. Wash.* 76:90-93.
- CARLE, F.L., 1986. The classification, phylogeny and biogeography of the Gomphidae (Anisoptera). I. Classification. *Odonatologica* 15:275-326.
- DUNKLE, S.W., 1988. Fusion between cerci and abdomen in male Gomphini dragonflies (Anisoptera: Gomphidae). *Odonatologica* 17:55-56.
- NEEDHAM, J.G. & M.J. WESTFALL, 1955. *A manual of the dragonflies of North America*. Univ. Calif. Press, Berkeley.
- PAULSON, D.R., 1983. A new species of dragonfly, *Gomphus* (*Gomphurus*) *lynnae* spec. nov., from the Yakima River, Washington, with notes on pruinosity in Gomphidae (Anisoptera). *Odonatologica* 12:59-70.