

Gomphomacromia signata sp. n. from the Andes Mountains in Ecuador (Odonata: Synthemistidae)

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Abstract. *Gomphomacromia signata* sp. n. is described and illustrated based on a single male collected in Napo Province, Ecuador. The new species is distinct from its closest congener, *G. fallax* McLachlan, 1881, by having a pair of vivid yellow spots on the postfrons, a large isolated yellow spot on the anterolateral part of the mesepimeron, forked yellow stripes on the metepisternum and metepimeron, dark spots in the wing bases, epiproct as wide distally as basally, and minute details of the posterior hamules.

Resumen. *Gomphomacromia signata* sp. n. se describe e ilustra basándose en un solo macho recolectado en la provincia de Napo, Ecuador. La nueva especie se distingue de su congénere más cercano, *G. fallax* McLachlan, 1881, por tener un par de manchas amarillas vivas en los postfrontales, una gran mancha amarilla aislada en la parte anterolateral del mesepisternum, franjas amarillas bifurcadas en el metepisternum y el metepimeron, manchas oscuras en las bases de las alas, también epiprocto rectangular y tan ancho distalmente como basalmente, y detalles diminutos de los hamules posteriores.

Key words. Anisoptera, dragonfly, Eastern Cordillera, habitat, high altitude, new species, seep, taxonomy

<https://zoobank.org/References/A6D017D7-5FE1-4CA5-8BEB-BABCEA69D33D>

Research Article



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Data Availability Statement:

All relevant data are within the paper.

Introduction

The phylogenetic affinity of the South American genus *Gomphomacromia* Brauer, 1864 has been fraught with confusion over the years as it has been placed within four different families (Carle, 1995; Fraser, 1958; Garrison et al., 2006; Theisinger & Endersby, 2009; von Ellenrieder, 2000). Recent morphological and molecular evidence indicates that *Gomphomacromia* belongs in the family Synthemistidae (Bybee et al., 2021; Carle et al., 2015). The known distribution is in the Andes mountains from Colombia south to Argentina and Chile (Bota-Sierra et al., 2010). The origin of the genus is Gondwanian, and speciation within the genus likely occurred due to orogenesis of the Andes (von Ellenrieder & Garrison, 2005). Currently, based on von Ellenrieder & Garrison (2005), four species in the genus are recognized as valid: *G. chilensis* Martin, 1921 (syn. *G. mexicana* Needham, 1933), *G. fallax* McLachlan, 1881, *G. nodisticta* Ris, 1928, and *G. paradoxa* Brauer, 1864 (syn. *G. etcheverreyi* Fraser, 1957). Garrison et al. (2006) indicated that the potential for new species to be found was likely, “especially in northern portion of distribution range.” I discovered an undescribed species in the Eastern Cordillera of Ecuador, Napo Province, the first new species to be discovered in the genus in nearly 100 years.

Materials and methods

The male of the new species was perched on a bare stem less than 1 m above ground level when I collected it with an aerial net; I photographed it handheld alive in the field and later preserved it according to the acetone method. A female was photographed by Cary Kerst but was not collected. Drawings of male morphology were made using a camera lucida mounted on a Wild stereomicroscope. The color image for Figure 1 was taken with a Nikon D700 DSLR camera equipped with a AF-S Micro Nikkor 105 mm 1.2.8G ED VR lens mounted on a CS-920 copy stand; StackShot SW Rev: 1.0.06 Apr 17 2011 and Rail by COGNISYS (Auto-Step Mode) and processed in Zerene version 1.04 ©2009–2023 build T2021-08-28-1410 professional edition. The color images in Figures 3–6 were taken with a Nikon D700 DSLR camera mounted on a Leica S8APO Stereomicroscope with Leica LED2500, manually stacked and also processed using Zerene.

Abbreviations: L = length, W = width, S1–10 = abdominal segments, FW = fore wing, HW = hind wing, Ax = antenodal crossveins; Px = postnodal crossveins, pt = pterostigma.

Taxonomy

***Gomphomacromia signata* sp. n. Tennessee**
(Figures 1–6, 9, 10)

Etymology

Name formed from the Latin '*signum*' (adj., bearing marks, signs, or flags), referring collectively to the yellow spots on the frons, the isolated oval yellow spot on the anterolateral part of the mesepimeron and the forked metepisternal and metepimeral yellow stripes, a unique combination within the genus.

Holotype ♂

Ecuador, Napo Province, hillside seep along Hwy. E20, about 5.5 km E of Papallacta in a straight line (0.37436 S, 78.07705 W, 2716 m a.s.l.), 5 November 2013, K. J. Tennessee leg. Deposited in Florida State Collection of Arthropods.



Figure 1. *Gomphomacromia signata* sp. n., holotype male.



Figure 2. *Gomphomacromia signata* sp. n., holotype male, showing living eye color and postfrons pattern in anterior view.



Figure 3. *Gomphomacromia signata* sp. n., holotype male accessory genitalia, ventral view.

Description of holotype male

A dark brown medium-sized dragonfly with yellow markings on the postfrons, thorax and abdomen (Fig. 1).

Head. Eyes in life green dorsally, brown anteriorly and laterally, pale gray ventrally (Fig. 2); labrum orange-tan, clypeus and antefrons dark brown, postfrons mostly yellow with brown medially, vertex brown; labium mostly tan, darker distally; mandibles and maxillae orange-tan; rear of head orange-brown.

Thorax. Total surface closely beset with long dark setae. Prothorax brown, middle lobe light brown. Pterothorax: middorsal carina narrowly yellow, mesepisternum dark brown but with a small, narrow anterior and posterior yellow spot (Fig. 2); mesepimeron dark brown with a large oval yellow spot on anteroventral (lower) portion; metepisternum brown with a wide yellow stripe, narrow ventrally, widening dorsally and forked at upper end, the dorsal prong short, blunt and extending upward onto mesepisternum; metepimeron brown with a yellow rectangular stripe with an upper extension (Fig. 1); mesinfraepisternum and metinfraepimeron brown; venter of pterothorax gray-brown. Legs varying shades of medium to dark brown, coxae partly yellow, femora yellow at bases, darker apically; keel on prothoracic tibia extending along distal 0.57 of tibia; metathoracic femur 4.7 mm long, metathoracic tibia 5.1 mm long.

Wings. Hyaline, venation brown; dark brown spot in basal cells between costa, subcosta and RA; yellow wash in subcostal space (Fig. 1); triangles free; hw anal loop 5-celled; fw Ax 9, hw Ax 6; fw Px 8, hw Px 9; pterostigma orange-brown, surmounting 1.6 to 1.9 cells.

Abdomen. Color pattern dark brown, paler laterally, dorsum with yellow spots: S1 with a posteromedial yellow spot; S2 with a pair of anterolateral yellow spots and another pair of submedial yellow spots just past midlength; S3–7 with a pair of submedial yellow spots divided by dark transverse carina, anterior part of yellow spot larger than posterior part, the spots largest on S3 & S4, diminished in size on S5 & S6, very small on S7; S8 with pair of large, round submedial yellow spots; S9 & 10 dark brown (Fig. 1); posteroventral corner of S1 tergum broadly curved, lacking denticulate process; auricles brown, prominent, 6–8 black denticles on posterior margin; S10 deeper than S9 in lateral view (Fig. 5). Anterior hamule laminate with a square notch; posterior hamule in ventral view slightly curved, a very short, blunt process at midlength directed medially and a longer, darker, rounded, denticulate distal lobe 0.45 mm long (Figs 3, 9). Anal appendages dark brown, with many dark setae; cercus in dorsal view nearly straight, apical fourth angled inward so that the pair converges distally, tips narrowed (Fig. 4), in lateral view slightly arched, ventrolateral margin with a minute sharply-tipped denticle at $\frac{3}{10}$ length (Fig. 5); epiproct about 0.7

times length of cerci, in dorsal view of the appendages with tips visible beyond lateral margins of cerci (Fig. 4) in normal repose, in ventral view as wide distally as basally, with lateral margins slightly incurved, distal margin sinuous, tips protruding posterolaterally (Fig. 6), in lateral view tips recurved, tooth-like (Fig. 5).

Measurements (mm). Total L 39.4, head W 5.3, hind wing L 26.3, abdomen L (excluding cercus) 26.9, cercus L 1.7, pt L 1.67–1.8.

Female

A female of the new species was photographed by Cary Kerst at the same location and on the same day that I collected the male (Fig. 7); it was not collected. The image shows that the color pattern is similar to that of the male holotype, although the eyes have only slight greenish reflections dorsally, the yellow spots on S2–7



Figure 4–6. *Gomphomacromia signata* sp. n., holotype male, anal appendages in dorsal, lateral and ventral views; arrow in Figure 5 indicates minute ventrolateral denticle on cercus.

are larger and S8 is totally brown. The yellow spots on the postfrons and large yellow spot on the lower mesepimeron are evident in the photograph (females of *G. fallax* have a completely dark postfrons and mesepimeron, and the paired yellow spots on the abdomen are smaller than in *G. signata*). The tip of the abdomen of *G. signata* as shown in dorsolateral view in the photograph (Fig. 7), does not allow a definitive view of the vulvar lamina. However, the lobes of the vulvar lamina appear to be short, possibly much shorter than in *G. fallax* (see Fig. 2i in von Ellenrieder & Garrison, 2005).

Diagnosis

Gomphomacromia fallax is a darker species than *G. signata*, lacking yellow on the postfrons and having less yellow on the thorax and abdomen. In particular, the thoracic pattern of *G. fallax* differs in lacking an oval yellow

spot on the lower part of the mesepimeron and the metepisternal and metepimeral stripes are unforked. The abdominal pattern of *G. fallax* is similar to that of *G. signata*, although the submedial yellow spots are much smaller (Fig. 8).

In *G. signata*, small dark brown spots are present in the base of all four wings and there is a yellow wash in the rows of cells between the costa and vein RA (Fig. 1); the wings bases and anterior rows of cells in males of *G. fallax* are clear (Fig. 8).

The distal lobe of the posterior hamule is longer in *G. signata* (0.45 mm) compared to *G. fallax* (0.25–0.32 mm, $n = 9$ from Ecuador and Bolivia) (Fig. 9). The anterior hamule of the *G. signata* holotype has a square notch whereas the notch in *G. fallax* is usually much less conspicuous (Fig. 10), but at least one specimen of *G. fallax* from Ecuador had a square notch. The epiproct is rectangular in *G. signata* compared to elongate and



Figure 7. *Gomphomacromia signata* sp. n., female, *in situ*. Photo: Cary Kerst.



Figure 8. *Gomphomacromia fallax*, male, Imbabura Province, Ecuador. Photo: KJT.

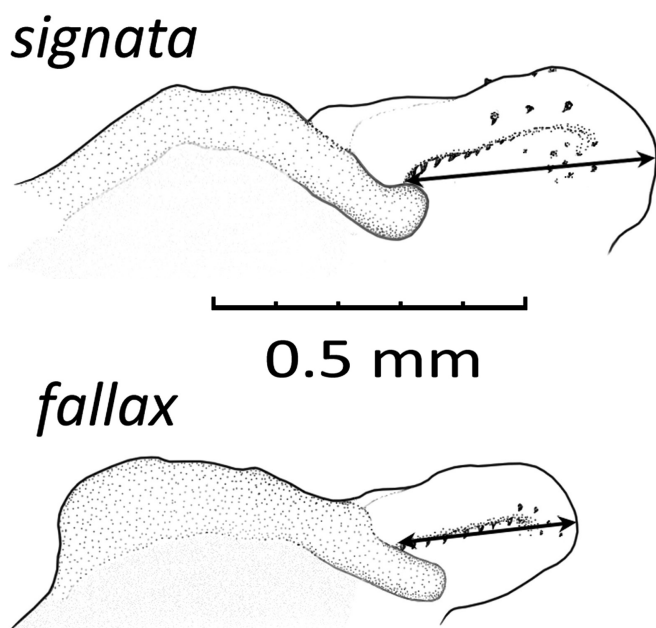


Figure 9. Left posterior hamule of *Gomphomacromia signata* sp. n. and *G. fallax*, mediolateral view.

tapered in *G. fallax* (see von Ellenrieder & Garrison, 2005). Epiproct shape in *G. signata* resembles that of *G. nodisticta*.

The length of the keel on the prothoracic tibia exceeds half the length of the tibia in *G. signata* (0.57) and *G. fallax* (0.50–0.66); the keel is shorter (0.33–0.50 length of tibia) in the southern species, *G. chilensis*, *G. nodisticta* and *G. paradoxa* (von Ellenrieder & Garrison, 2005).

Discussion

This is the species that was listed as *Gomphomacromia* sp. in Mauffray & Tennessee (2019). In that paper, the lat/long coordinates and elevation were in error.

The three species of *Gomphomacromia* that have denticulate projections on the posteroventral corners of S1 tergum (*G. chilensis*, *G. nodisticta* and *G. paradoxa*) are distributed in the southern Andes and have been recorded in only Argentina and Chile (von Ellenrieder & Garrison, 2005). *Gomphomacromia fallax* and

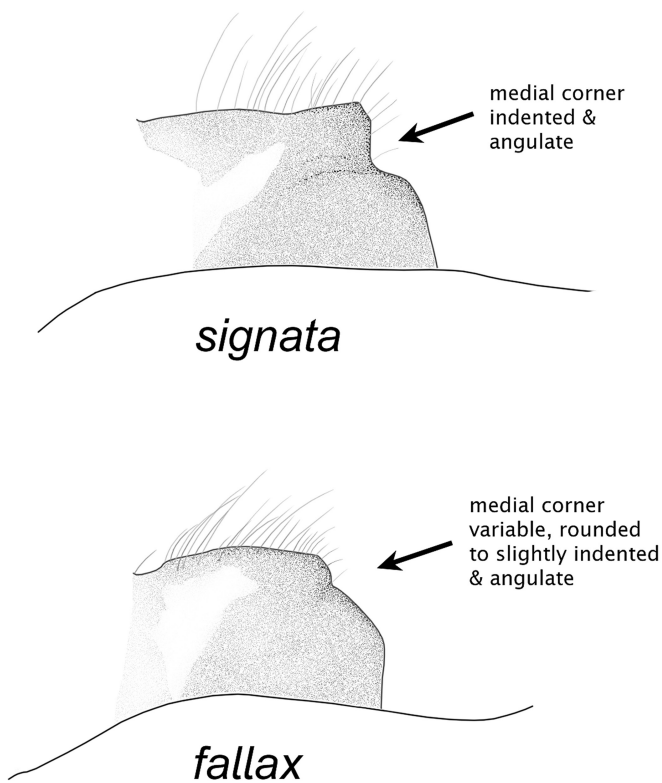


Figure 10. Lamina of anterior hamule of *Gomphomacromia signata* sp. n. and *G. fallax*, lateral view at slight anterior angle.

G. signata lack denticulate projections on the posteroventral corners of abdominal segment 1 (as in Fig. 3), and are distributed in the more northern Andes, the range extending from Ecuador to Bolivia.

The type locality is 12 km N of glacier-capped Mt. Antisana, in an area of high relief and usually heavy cloud cover; the day the new species was found was unusually sunny. The site is just below the Northern Andean páramo biome and at the upper reaches of the ecological zone known as evergreen montane forest biome (EMF). This area is now designated as the Antisana National Park (previously Antisana Ecological Reserve), an area of over 120,000 hectares. The EMF is a humid tropical region that has been assessed as one that will be most affected by climate change in the future, mainly through upslope displacement, in addition to being already highly degraded by human activities such as agriculture, cattle grazing and burning (Tovar et al., 2013). I observed agricultural and livestock activity in the immediate area surrounding the type locality. The roadside seepage area was very small, shallow and open, draining eventually into the Río Quijos. Other species of Odonata seen at the site were *Rhionaeschna marchali* (Rambur, 1842), *Sympetrum gilvum* (Selys, 1884) and *Mesamphiagrion dunklei* von Ellenrieder & Garrison, 2008. Known locations of these species, especially where *M. dunklei* has been recorded (Mauffray & Tennessee, 2019), should be searched on sunny days for presence of *Gomphomacromia*.

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