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## DISTRIBUTIONAL RANGE EXTENSION OF *Creagrutus affinis* STEINDACHNER, 1880 (CHARACIFORMES: CHARACIDAE) INTO THE RÍO SAN JORGE BASIN, SUCRE, COLOMBIA

*Ampliación de la distribución de Creagrutus affinis Steindachner, 1880 (Characiformes: Characidae) en la cuenca del río San Jorge, Sucre, Colombia*

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**Abstract.** *Creagrutus affinis* is a trans-Andean species occurring along different basins in Panamá and Colombia. The purpose of the present study is to expand its distributional range into the Río San Jorge basin, Colombia. The specimens studied were identified on the basis of a morphological comparison using descriptions, modern keys and comparative material. The present record of *C. affinis* corroborates the occurrence of the genus into the Río San Jorge. Within the trans-Andean group, *Creagrutus affinis* represents a wide-spread species whose population variation needs be further revised, and even it might be indicative of an unrevealed species complex.

**Key words.** Stevardiinae, *Creagrutus*, Cauca-Madgalena basin, Neotropical fish.

**Resumen.** *Creagrutus affinis* es una especie transandina que habita a lo largo de diferentes cuencas de Panamá y Colombia. El propósito del presente estudio es expandir su rango de distribución en la cuenca del río San Jorge, Colombia. Los especímenes estudiados fueron identificados sobre la base de una comparación morfológica usando descripciones, claves modernas y material comparativo. El presente registro de *C. affinis* confirma la presencia del género en la cuenca del Río San Jorge. Dentro del grupo transandino, *Creagrutus affinis* representa una especie de amplia distribución, cuya variación poblacional necesita ser revisada más adelante, e incluso ésta podría ser indicativa de un complejo de especies no detectado.

**Palabras clave.** Stevardiinae, *Creagrutus*, cuenca Cauca-Magdalena, pez Neotropical.

## INTRODUCTION

The Neotropical genus *Creagrutus* Günther, 1864 represents one of the most speciose groups of stevardiine fishes occurring in diverse freshwater drainages of South America. In Colombia, the genus consists of 30 valid species (DoNascimento *et al.*, 2020; Fricke *et al.*, 2021) which can be divided into two groups: trans-Andean and cis-Andean species. According to Harold and Vari (1994), Vari and Harold (2001), and Albornoz-Garzón *et al.* (2018), *Creagrutus affinis* is a relatively small fish (27.7–78.0 mm SL) that belongs to the trans-Andean group of species [*C. brevipinnis* Eigenmann, 1913; *C. caucanus* Eigenmann, 1913; *C. dulima* Albornoz-Garzón, Condesaldaña, García-Melo, Taphorn & Villa-Navarro, 2018; *C. guanes* Torres-Mejía & Vari 2005; *C. hildebrandi* Schultz, 1944; *C. leuciscus* Regan, 1913; *C. magdalenae* Eigenmann, 1913; *C. maracaiboensis* (Schultz 1944); *C. nigrostigmatus* Dagosta & Pastana 2014; and *C. paralacus* Harold & Vari 1994].

*Creagrutus affinis* was originally known from the Río Cauca, but nowadays it is treated as a wide-range distributed species, occurring from coastal drainages from Panama and the Atrato, Baudó, Magdalena, Ranchería, San Juan, and Sinú rivers in Colombia (DoNascimento *et al.*, 2020; Fricke *et al.*, 2021; Harold & Vari, 1994). Albornoz-Garzón *et al.* (2018) pointed out that the taxonomic status of *C. affinis* needs to be better studied because of its extensive distributional range. In fact, the known biogeographic data of the species might potentially include misidentified records or reports without supporting specimens.

The reexamination of several lots of specimens under our review from the Río San Jorge system revealed two adult specimens of *C. affinis*. The aim of the present contribution is to extend the distributional range of that species into the Río San Jorge basin based on these individuals using a

morphological comparison, which also corroborates the presence of the genus for that drainage. Additionally, it is presented a geographic map showing the current distribution of *C. affinis* based on Albornoz-Garzón *et al.* (2018), the specimens studied here and some additional, minor materials identified from Bolívar department in Colombia.

## MATERIAL AND METHODS

The specimens examined are deposited in the following institutions (acronyms according to Sabaj, 2020): CAS, CI-FML, CZUT-IC, IAvH-P, MHNG, MCP, MLP and USNM. Measurements were taken point to point with a digital caliper at 0.01 mm of resolution, and expressed as percentages of standard (SL) or head length (HL) for subunits of the head. Counts of the pectoral, pelvic, and dorsal-fin rays were taken according to Böhlke (1958). Premaxillary dentition are reported following Harold and Vari (1994). Measurements and other counts follow Fink and Weitzman (1974), with the addition of the anal-fin lobe length (Menezes & Weitzman, 1990), and the distance between dorsal and pectoral-fin origins (Vanegas-Ríos *et al.*, 2013). Specimens were cleared and counterstained (c&s) according to Taylor and Dyke (1985). In addition to the comparative material examined, keys and descriptions of the *Creagrutus* species were used to identify the specimens under study (Albornoz-Garzón *et al.*, 2018; Harold & Vari, 1994).

## RESULTS

*Creagrutus affinis* Figures 1, 2 Table 1

MLP 11434 (previously CZUT-IC 7885), 2, 29.0–31.2 mm SL (1 male c&s), Colombia, Sucre, San Marcos, El Pital, Río San Jorge basin, Caño Caracolí, approximately

8°34'49.5"N, 75°11'14.0"W 21 m (above sea level) (Figure 2). Feb 8, 2012. Vanegas-Ríos, J. A. and J.M Peña.

Meristic and morphometric data of the specimens studied are presented in Table 1. The specimens of *Creagrutus* from the

San Jorge basin (Figure 1) have ii,8 dorsal fin rays, as is usual in the members of Stevardiinae. In addition to the i,7 pelvic-fin rays (last one is simple but was counted as branched), the specimens examined have the typical premaxillary dentition of

**Table 1** - Morphometric and meristic data of two adult specimens of *Creagrutus affinis*. MLP 11434. In counts, values are expressed as ranges if different between specimens. S.D. = standard deviation.

Measurements and counts	Range	Mean±S.D.
SL (mm)	29.0–31.2	30.1±1.6
Percentages of SL:		
Depth at dorsal-fin origin	24.8–32.8	28.8±5.7
Snout to dorsal-fin origin	49.1–50.7	49.9±1.1
Snout to pectoral-fin origin	25.8–27.7	26.8±1.3
Snout to pelvic-fin origin	48.8–49.6	49.2±0.6
Snout to anal-fin origin	66.3–68.3	67.3±1.4
Distance between dorsal- and anal-fin origins	33.3–33.6	33.4±0.2
Distance between dorsal- and pectoral-fin origins	29.0–36.1	32.6±5
Distance between dorsal- and adipose-fin origins	35.1–35.6	35.4±0.4
Dorsal fin to caudal-fin base	53.9–56.9	55.4±2.1
Eye to dorsal-fin origin	36.0–36.5	36.3±0.4
Distance between pectoral- and pelvic-fin insertions	32.6–35.6	34.1±2.1
Distance between pelvic- and anal-fin origins	15.3–19.4	17.4±2.9
Dorsal-fin length	25.6–28.2	26.9±1.8
Dorsal-fin base length	13.7–15	14.4±0.9
Pectoral-fin length	20.0–21.9	21±1.3
Pelvic-fin length	13.4–16.1	14.8±1.9
Anal-fin lobe length	20.0–20.8	20.4±0.6
Anal-fin base length	16.7–17.2	17.0±0.4
Caudal peduncle depth	13.4–13.6	13.5±0.1
Caudal peduncle length	18.1–19.2	18.7±0.8
Head length	25.3–26.8	26.1±1.1
Percentages of HL:		
Snout length	22.0–26.6	24.3±3.3
Horizontal eye length	40.3–40.5	40.4±0.1
Postorbital head length	39.7–40.9	40.3±0.8
Least interorbital width	32.3–33.2	32.8±0.6
Upper jaw length	31.8–39.6	35.7±5.5
Lateral line scales		33–36
Scales between lateral line-dorsal origin		5
Scales between lateral line-anal origin		3–4
Predorsal scales		10
Circumpeduncular scales		13–14
Dorsal-fin rays		ii,8
Anal-fin rays		iii,11
Pelvic-fin rays		i,7
Pectoral-fin rays		i,11
Maxillary teeth		3
Gill rakers on the upper limb and lower limb		6/9
Vertebrae		34

the *Creagrutus* species that is composed of three rows of teeth on the premaxilla (a single lateral tricuspid tooth; primary tooth row with 6 medium-sized tricuspid teeth; posterior triad of larger tricuspid teeth).



**Figure 1** - *Creagrutus affinis*, MLP 11434, 29.0–31.2 mm SL, Caño Caracolí, Río San Jorge basin, Colombia.

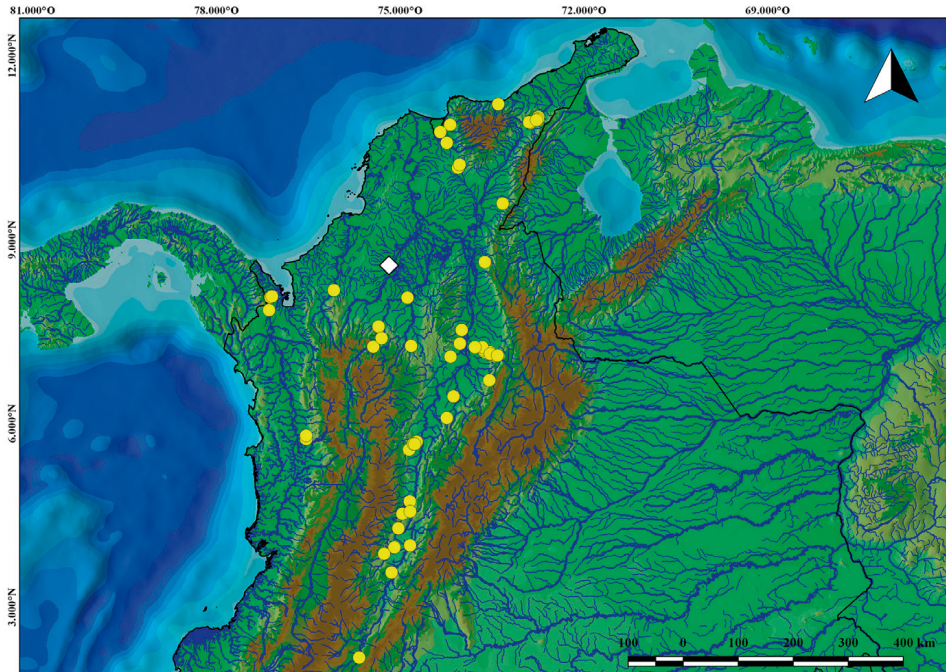
## DISCUSSION

Following the key for the trans-Andean species of *Creagrutus* by Harold and Vari (1994), we managed to reach a tentative identification as *C. affinis* but with some doubts on the parts 5 and 7, because our material has intermediate conditions and are somewhat faded. Posteriorly, based on an updated key for those species (Albornoz-Garzón *et al.*, 2018), we managed to assign more satisfactorily the specimens as *C. affinis*. Further comparisons with the descriptions and additional specimens of *C. affinis* and *C. magdalanae* (other potential assignable species based on the morphological resemblance with *C. affinis* in some external features and the partially overlapping geographic distribution) also corroborated that identification. In *C. magdalanae*, the distance between the dorsal- and anal-fin ray tends to be slightly greater (34.9–41.3 % SL) compared with *C. affinis* (29.6–37.0 % SL *vs.* 33.3–33.6 % SL in the samples analyzed) and the humeral blotch is oval shaped (*vs.* vertically elongated in *C. affinis*). The specimens from the San Jorge basin can also be assigned to *C. affinis* by sharing the presence of the following characters (see other additional details in Vari & Harold, 2001): teeth on the third pharyngobranchial (absent in *C. magdalanae*), a bony plate on the

dorsal surface of the fourth basibranchial (absent in *C. magdalanae*), the opening in the supraorbital canal communicating with the canal of the sixth infraorbital is located at junction between the posteroventral portion of frontal and the anterior process of the pterotic (such opening is contained entirely in the frontal in *C. magdalanae*), and the scapula has a ring-like process surrounding anteriorly the scapular foramen (such process is absent or almost reduced in *C. magdalanae*).

The specimens from the Río San Jorge basin can be also confirmed as *C. affinis* by the combination of the following characteristics: complete lateral line; absence of lamellar flaps over the pores of the lateral-line scales; 33–36 lateral line scales; 11 branched anal-fin rays; maxilla with three tricuspid teeth; six well-developed infraorbitals, third infraorbital is relatively well developed posteroventrally, overlapping the horizontal limb of the preopercle; presence of the epiphyseal branch of the supraorbital canal; 34 vertebrae, with 15 precaudal; presence of a slightly marked dark pigmentation on the middle caudal-fin rays (somewhat faded on our specimens); and presence of bony hooks on the anal- and pelvic-fin rays.

*Creagrutus affinis* was originally described from the Río Cauca in Colombia by Steindachner (1880). Posteriorly, the distribution of *C. affinis* was expanded to the Atrato, San Juan and Magdalena basins (Eigenmann, 1912, 1913, 1922). More than seven decades later, Harold and Vari (1994) redescribed the species as part of a complete revision of the trans-Andean species in which four junior synonyms were added to the species. These additions expanded the geographic distribution of *C. affinis* to the Caribbean drainages of Colombia from the Río Magdalena basin to different basins of Chocó Department, Pacific slope rivers of Panama from the Río Bayano to Río Tuirá, and Río Chagres drainage of Panama (Harold & Vari, 1994). Albornoz-Garzón *et*



**Figure 2** - Distribution of *Creagrutus affinis* in Colombia (white diamond: specimens studied from the Rio San Jorge basin).

*al.* (2018) updated the distributional range of the species in Colombia, including some additional localities. In a previous study focused on fish communities associated with the Ayapel swamp (Río San Jorge basin), *C. affinis* was not recorded (Jiménez-Segura *et al.*, 2010; Ríos-Pulgarín *et al.*, 2008). In generalized checklists or compilations on freshwater fishes from the Córdoba department and the Cauca-Magdalena system (Ballesteros *et al.*, 2015; Maldonado-Ocampo *et al.*, 2005; Maldonado-Ocampo *et al.*, 2008; Mojica, 1999; Mojica *et al.*, 2006), we did not detect distributional records of *C. affinis* from the Río San Jorge basin supported by specimens identified in collections. So far, the species has not been correctly registered to a locality within the lowland confluence between the Cauca and Magdalena rivers, and hence the specimens revised here expand its occurrence to this area. Additionally, these specimens also

validate the presence of the genus in the Río San Jorge basin.

Harold and Vari (1994) highlighted the relevance of performing further intraspecific comparisons within *C. affinis* because of a potential variation detected by them. Nowadays, the geographic occurrence of the species has become larger than their study (Figure 2). Thus, it seems that the species could constitute a species complex as was commented by Albornoz-Garzón *et al.* (2018).

It is worth to mentioning that the Río San Jorge is one of the main tributaries of the Río Magdalena (Ríos-Pulgarín *et al.* 2008) and it constitutes the type locality of a poorly known characid species, *Gephyrocharax martae* Dahl, 1843, which is potentially threatened or disappeared (Vanegas-Ríos, 2016). However, a better understanding of the ichthyofauna inhabiting the Río San Jorge basin is a pending task in the current

Colombian ichthyology. For many decades, several areas from the middle and upper portions of the Río San Jorge remained poorly sampled or unsampled because of the social conflicts in Colombia. Most recent available contributions on the ichthyofauna of the Río San Jorge have been conducted in the lowland areas (Jiménez-Segura *et al.*, 2010; Ríos-Pulgarín *et al.*, 2008). Although this river is expected to be composed of fish species from the Río Magdalena and partly from the Río Cauca (Dahl, 1971), a detailed list based on rigorous identifications through an altitudinal gradient should be available.

**Comparative material examined.** In addition to the material examined by Albornoz-Garzón *et al.* (2018) and Albornoz-Garzón *et al.* (2020): *Creagrutus anary* Fowler, 1913: CI-FML 3905, 1 c&s, Peru, Loreto, Maynas, Río Napo, near town of Mazan. *Creagrutus affinis*, all from Bolívar Department, Colombia: Cantagallo, Vereda Puerto Matilde, La Manigua sector, Santo Domingo stream: IAvH-P 22045, 4, 7°05'20.5"N, 74°10'57.7"W; IAvH-P 22052, 13, 7°18'12.6"N, 74°01'43.4"W. IAvH-P 25089, 3, San Pablo, Yanacué stream, IAvH-P 25155, 11, San Pablo, Taracué stream, 7°31'30.8"N, 73°59'59.3"W. *Creagrutus atrisignum* Myers, 1927, all from Brazil, Goiás: CAS 41339, holotype, 44.6 mm SL, Rio Tocantins basin, Rio Maranhão, Rio Tocantins. MCP 15929, 6 c&s, Niquelândia, Ribeirão do Engenho, on the road between Niquelândia and Codemin, 29 km S of Codemin. *Creagrutus maracaiboensis* Schultz, 1944: USNM 121532, 41 (1 c&s), paratypes, río Negro, Lago Maracaibo basin, Venezuela. *Creagrutus muelleri* (Günther, 1859): USNM 340984, 10 (2 c&s), Ecuador, Pastaza, Río Pastaza. *Creagrutus ouranonastes* Vari & Harold, 2001: USNM 340988, 4 (1 c&s), paratypes, Río Chalhuanca, Aymaraes, Apurímac, Peru. *Creagrutus peruanus* (Steindachner, 1876): USNM 340981, 7 (2 c&s), Río Mijandri, Junín, Peru. *Creagrutus taphorni* Vari & Harold,

2001: MHNG 2183.34, 2 c&s, Venezuela, Carabobo 5 km N of Guacara, Río Vigirima.

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