

First record of the invasive species *Procambarus (Scapulicambarus) clarkii* (Girard 1852) (Crustacea, Decapoda, Cambaridae) from the Colombian Eastern Cordillera

Julian Yessid Arias-Pineda¹ & William David Rodríguez²

Universidad Distrital Francisco José de Caldas, Grupo de Investigación en Artrópodos "Kumanguí". Bogotá, Colombia.
– crustaceosud@gmail.com – davidvencedor7@yahoo.es

Abstract: The presence of the invasive crayfish *Procambarus (S.) clarkii* (Girard 1852) is reported for the first time from the Colombian Eastern Cordillera, Boyacá department. This is the third record of the species from the country. We discuss the ecological and environmental issues posed by this introduced decapod. Illustrations and diagnosis of the species are presented.

Key words: Decapoda, Cambaridae, crayfish, introduced species, Chivor, Colombia.

Registro de la especie invasora *Procambarus (S.) clarkii* (Girard 1852) (Crustacea, Decapoda, Cambaridae) en la cordillera oriental colombiana

Resumen: Se reporta por primera vez la presencia de la langostilla invasora *Procambarus (S.) clarkii* (Girard 1852) en la cordillera oriental colombiana, en el departamento de Boyacá, siendo este el tercer registro de la especie en el país. Se discute acerca de las problemáticas ecológicas y ambientales que presenta este decápodo introducido. Se presentan ilustraciones y diagnóstico sobre la especie.

Palabras clave: Decapoda, Cambaridae, langostilla, especie introducida, Chivor, Colombia.

Introduction

Procambarus (Scapulicambarus) clarkii (Girard, 1852), introduced in Colombia in 1985, was accidentally released in the basin of the Palmira river, Valle del Cauca in 1988 (Albares-León & Gutiérrez-Bonilla, 2007). Subsequently, the decapod dispersed by natural means to other municipalities in the region such as Santiago de Cali, Jamundí, Yotoco, San Juan Bautista de Guacarí and Guadalajara de Buga, all of which within Cauca river's watershed (Flores-Brand & Espinoza-Beltrán, 2011). Campos (2005) reported the presence of *P. clarkii* in Briceño, Cundinamarca, and illustrated the external and genital morphology in this study, as well as the biology and color patterns of the species.

This crustacean is considered to be one of the most successful species globally when it comes to adaptability, being present in four of the five continents. It is used in aquaculture because of its high-yielding and rapid reproductive cycle (Campos, 2005; ISSG, 2011; Flores-Brand & Espinoza-Beltrán, 2011). This decapod is highly invasive, showing omnivorous habits and consuming all types of plant or animal material, both dead or alive (Romero & Von Prall, 1988). It can affect human populations directly, as a vector of Cholera, or indirectly by affecting civil structures such as buildings, roads, bridges, water mains, power poles foundations (Flores, 2002; Coll, 1998).

Material and methods

Eight specimens of *P. clarkii* were collected manually on March 8, 2012, in Boyacá Department, municipality of Macanal, La Honda brook, inflowing current of La Esmeralda reservoir, 1300 meters, 4°58'01.65"N, 73°19'59.99"W (DMS). Three mature males, four females, and a juvenile. All are deposited in the shellfish collection of the Universidad Distrital Francisco José de Caldas MUD-046. The determination was performed using the diagnosis found in Campos (2005). A ZEISS stereomicroscope was used, and the photographic record was made with a KODAK 500 camera, using a white background and a white light lamp. The specimens were preserved in 96% ethanol and settled in the collection of the Universidad Francisco Distrital in a screw-top glass jar.

Results

Procambarus (Scapulicambarus) clarkii (Girard, 1852)

DIAGNOSIS: Form of lobster, with cylindrical body. First to third pair of pereopods chelate, first more robust than the second and third. Pereopod and pigmented eyes, face concave shaped acuminate, margins thereof with lateral raises, thickened with the presence of papillae or tubercles poorly developed into cervical spine (1.90 cm x 0.25 cm), equivalent to 15.2 times the length / width ratio. Hand of cheliped moderately enlarged, with a row of papillae or tubercles along the outer margin, which the elongated. The ischiopodite of the third and fourth pairs of pereopods each with a conspicuous spine-shaped peak (Fig. 1 A-B)

COLOR CHARACTERISTICS OF LIVE SPECIMENS: *P. clarkii* has a red lipstick color on dorsal and ventral aspects; the carapace's flanges and abdominal segments have a dark red color, with red lipstick stripes. The chelae are covered with red thorns that are clearer and brighter than the background color. The surface of the integument is covered with prickles where a yellow reddish color alternates with black prickles (Smithe 1975).

Discussion

According to the results obtained in this project and in comparison with previous results, it can be said that it is unlikely that the first communities of *P. clarkii* found in Valle del Cauca are the same of those as those found in Briceño town (Cundinamarca) and Macanal Town (Boyacá). Another factor that seems relevant to support this statement is the significant distance between the two towns. Therefore it can be inferred that the presence of these crustaceans might be the result of several independent, uncontrolled releases at the studied locations (Albares-León & Gutiérrez-Bonilla, 2007). The presence of this crustacean leads to serious problems for biodiversity at the affected site because *P. clarkii* is a voracious predator that can feed on different types of food, affecting endemic crab populations present in the area, such as *Neostrengeria bataensis* (Campos & Pedraza, 2008). It can also affect other organisms that are living in these bodies of water, such as amphibians, invertebrates and fish (Fig. 3 C-E). Therefore, we recommended to conduct more detailed studies to determine populations of *P. clarkii* and the impact of these populations on the associated fauna and the aquatic ecosystems, using La Honda brook and its surroundings as a model system. There are records where the presence of *P. clarkii* has caused serious damage to civilian structures and constructions. The most dangerous time is the epoch of molt and egg laying when the animals build galleries which cause earth instability (Coll, 1998). In the studied area, the environmental conditions (warm weather and well oxygenated water), besides other characteristics of the surroundings like having plenty of food, are highly advantageous for the rapid reproduction of *P. clarkii*.

P. clarkii populations may be growing at an alarming rate which could be a serious problem in the near future due to the combination of the aforementioned factors (Coll, 1998; Campos, 2005; Albares-León & Gutiérrez-Bonilla, 2007).

Acknowledgements: To Eibar Algarra Sánchez, forester, who provided us with photos and information of the site and who helped in the collection of individuals and samples. To Jose Joaquín Castro, Professor of the Universidad Distrital, who loves and fosters decapods and contributed enriching the knowledge about this crustacean. To Alexander Garcia, Professor of the Universidad Distrital for their unconditional support and for reviewing the manuscript; and to Álvaro Machado who helped with the translation of this document.

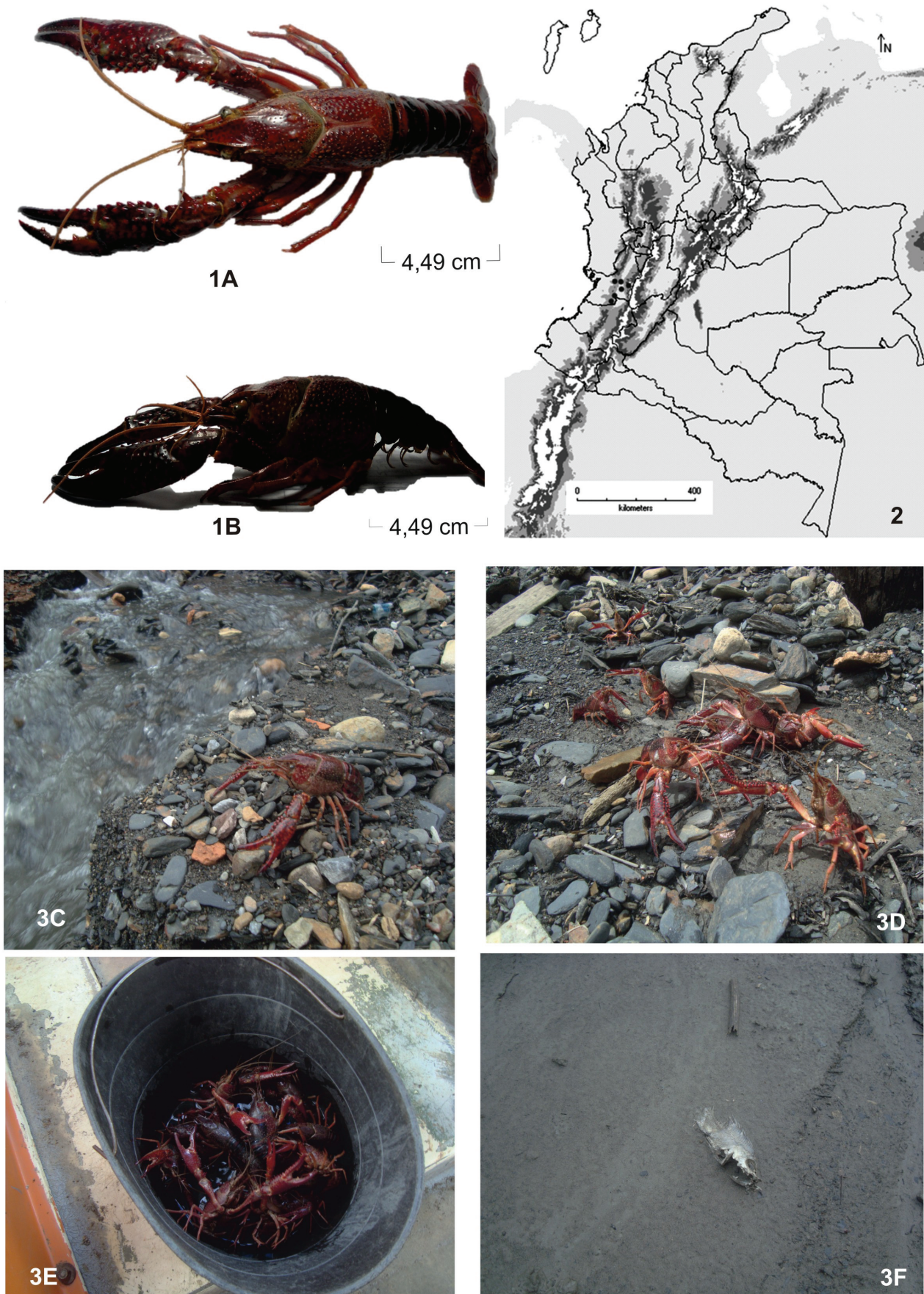


Fig. 1. *Procambarus (Scapulicambarus) clarkii* (Girard, 1852), male; **A**, Dorsal view; **B**, lateral view. **Fig. 2.** Geographical distribution of *P. (S.) clarkii* (Girard, 1852) in Colombia. The distribution presented by Campos (2005) is shown in Orange. The distribution according to Florez-Brand and Espinosa-Beltran (2011) is shown in Blue. The distribution based on this work is shown in red. **Fig. 3.** *P. clarkii* specimens collected during surveys made in the creek at Honda Macanal Municipality, Department of Boyacá; **C, D**, males and females of *P. clarkii* just after collection; **E**, Collection of individuals by hand; **F**, Dead fish found at the site where specimens of *P. clarkii* were collected.

References: ÁLVAREZ-LEÓN, R. & F.P. GUTIÉRREZ-BONILLA 2007. Situación de los invertebrados acuáticos introducidos y trasplantados en Colombia: antecedentes, efectos y perspectivas, *Revista Academia Colombiana de Ciencias*, **31**(121): 557-574. ● CAMPOS, M. & M. PEDRAZA 2008. Two new species of freshwater crab of the genus *Neostrengeria pretzmann*, 1965, from Colombia (Crustacea: Decapoda: Pseudothelphusidae), with an updated key of the species of the genus. Dos nuevas especies de cangrejos del género *Neostrengeria pretzmann*, 1965, de Colombia (Crustacea: Decapoda: Pseudothelphusidae), con actualización de la clave de las especies del género, *Caldasia*, **30**: 457-468. ● COLL-MORALES, J. 1988 El cultivo controlado de los cangrejos de río. *Revista Latinoamericana de Acuicultura*, **35**: 25-41. ● FLÓREZ-BRAND, P.E. & J.O. ESPINOSA-BELTRÁN 2011. Presencia y dispersión del cangrejo rojo americano (*Procambarus clarkii* Girard, 1852) (Decapoda: Cambaridae) en el departamento del Valle del Cauca, Colombia, *Biota Colombiana*, **12**(2): 57-62. ● CAMPOS, M. 2005. *Procambarus (Scapulicambarus) clarkii* (Girard, 1852) (Crustacea: Decapoda: Cambaridae). Una langostilla no nativa de Colombia. *Revista Academia Colombiana de Ciencias*, **29**(111): 295-302. ● FLÓREZ, P. 2002. *Informe sobre especies introducidas y trasplantadas en el Valle del Cauca*. CVC. Buga, Valle, 6 pp. ● INVASIVE SPECIES SPECIALIST GROUP - ISSG 2011. *Procambarus clarkii* (crustacean). Available from: <http://www.issg.org/database/species/ecology.asp?si=608&fr=1&sts=&lang=EN> (accessed 18 April 2012) ● ROMERO, L. E. & H. VON PRAHL 1988. *Reproducción y desarrollo post-larval del camarón rojo de río Procambarus clarkii (Girard 1852)*. BsC. Cali, Colombia: Universidad del Valle, Facultad de Ciencias, Departamento de Biología.

m3m: Monografías Tercer Milenio

Volúmenes disponibles en edición impresa:

Precio unidad: 18 euros – solicitudes: www.sea-entomologia.org

- Monografías Tercer Milenio, vol. 8, 2008.

Catalogue of the hostplants of the Neotropical butterflies./ Catálogo de las plantas huésped de las mariposas Neotropicales.

George W. Beccaloni, Angel L. Vilorio, Stephen K. Hall & Gaden S. Robinson.

Sociedad Entomológica Aragonesa (SEA, Zaragoza, España), Natural History Museum (NHM, London, U. K.), Ciencia y Tecnología para el Desarrollo (CYTED), Red Iberoamericana de Biogeografía y Entomología Sistemática (RIBES) & IVIC- Instituto Venezolano de Investigaciones Científicas (Venezuela).

I.S.S.N. 978-84-935872-2-2. Edición bilingüe inglés-español, 536 pp.

- Monografías Tercer Milenio, vol. 6, 2007.

Hacia una cultura de conservación de la diversidad biológica .

Gonzalo Halffter, Sergio Guevara & Antonio Melic (eds).

Sociedad Entomológica Aragonesa (SEA), Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO), la Comisión Nacional de Áreas Naturales Protegidas (CONANP), el Consejo Nacional de Ciencia y Tecnología (CONACYT), el Instituto de Ecología, A.C. (INECOL), UNESCO-Programa MaB y Ministerio de Medio Ambiente-Gobierno de España.

Edición técnica: Antonio Melic. ISBN: 978-84-935872-0-8. 360 pp.

- Monografías Tercer Milenio, vol. 5, 2006.

Insectos Inmaduros, Metamorfosis e Identificación

Cleide Costa, Sergio Ide & Carlos Estevão Simonka (eds. científicos)

SEA, CYTED & RIBES. ISBN: 84-932807-8-X. 233 pp.

- Monografías Tercer Milenio, vol. 4, 2005.

Sobre Diversidad Biológica: el significado de las diversidades Alfa, Beta y Gamma

Gonzalo Halffter, Jorge Soberón, Patricia Koleff & Antonio Melic

ISBN: 84-932807-7-1. X + 242 pp.

Primera edición: Zaragoza (España), 30 Noviembre 2005.

Primera reimpresión: México, 31 Enero 2007.

- Monografías Tercer Milenio, vol. 3, 2003.

Escarabeidos de Latinoamérica: Estado del conocimiento

Giovanni Onore, Pedro Reyes-Castillo & Mario Zunino (compiladores)

Editor SEA, con la colaboración de Instituto de Ecología y Biología Ambiental (IEBA), Università degli Studi di Urbino, Italia.

ISBN: 84-932807-4-7. 86 pp.

- Monografías Tercer Milenio, vol. 2, 2002.

Proyecto de Red Iberoamericana de Biogeografía y Entomología Sistemática: PRIBES 2 0 0 2.

C. Costa, S. A. Vanin, J. M. Lobo & A. Melic (eds.)

SEA & Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo (CYTED).

ISBN: 84-922495-8-7. 329 pp.

- Monografías Tercer Milenio, vol. 1, 2000.

Hacia un proyecto Cyted para el Inventario y Estimación de la Diversidad entomológica en Iberoamérica: PRIBES 2000

F. Martín Piera, J.J. Morrone & A. Melic (eds.)

SEA & Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo (CYTED).

ISBN: 84-922495-1-X. 326 pp.