

Is *Rhopalurus caribensis* Teruel & Roncallo, 2008, actually a junior synonym of *Rhopalurus laticauda* Thorell, 1876 (Scorpiones: Buthidae)? A necessary reply

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On May 17th 2013, a friend forwarded to us a paper that seems to have gone unnoticed among the scorpilogic community, or at least that has not been spread enough. Therein, Flórez (2012) declares to have demonstrated that the buthid scorpion *Rhopalurus caribensis* Teruel & Roncallo 2008 is a junior synonym of *Rhopalurus laticauda* Thorell 1876. This would not be a problem itself, because taxonomy is dynamic and evolves through the confirmation or refutation of hypotheses, just like any other science or their disciplines. But we got surprised to see that this paper is riddled with severe errors and false premises which, far from demonstrating the conclusions its author supposedly came to, in fact make the release of the present note necessary.

In short, it would be enough to point out that despite science is based upon facts and not speculations, the paper from Flórez (2012) **does not present any irrefutable clues about the supposed conspecificity of both taxa**. It is never demonstrated that there is an identity or at least a genetic continuity between the two populations (or meta-populations) regarded by Teruel & Roncallo (2008) as different species. It is not proven that the characters used as diagnostic for *R. caribensis* are invalid, nor the known distribution of both taxa is expanded to at least suggest that both constitute a geographical continuum. Let's now analyze in detail the flaws of the paper published by Flórez (2012):

A) Inadequate bibliographic revision.

Falling into a basic error for any taxonomical revision, Flórez (2012) has overlooked seven papers which were published in the period between the original description of *R. caribensis* and its attempt of synonymy, which are all crucial to the subject he dealt with (Lourenço, 2008; Rojas-Runjaic & Becerra, 2008; Teruel & Tietz, 2008; Prendini *et al.*, 2009; Ribeiro de Souza, 2009; Teruel & Roncallo, 2010; Yamaguti, 2011). By the way, the PDF versions of all these papers have been available in open-access sites for free download from its issue date on, and thus, there are no valid arguments to justify that these papers had not been found and read by Flórez.

The significance of these papers lies in the fact that they include a taxonomic revision of the entire genus (Yamaguti, 2011), another one of its South-American species (Ribeiro de Souza, 2009), plus two contributions that provide additional data on the morphological variation, ecology and distribution of *R. caribensis*, confirming its occurrence also in Venezuela (Rojas-Runjaic & Becerra, 2008; Teruel & Roncallo, 2010). And to round the things off, all seven papers have as a common factor that **the validity of *R. caribensis* is explicitly approved by 10 authors different from those who sign the present note**.

Despite this "suspicious" coincidence, we give Flórez the benefit of doubt by assuming that he did not fall into a fraudulent and deliberate omission, but instead into a careless and inadequate bibliographic revision which detracts from the credibility and soundness of his paper.

B) Grave misidentification.

As an attempt to demonstrate that the coloration of *R. caribensis* lacks any diagnostic value, Flórez (2012) presents two color plates composed by photographs of one adult male and three adult females identified by him as *R. laticauda*. Imagine our surprise when we realized that the male shown in his figures 1a–b is not even a member of the genus *Rhopalurus* Thorell, 1876, but *Tityus* C. L. Koch, 1836. According to the text, the collecting data of this specimen are: Magdalena, Sierra Nevada de Santa Marta, Hacienda La Victoria, sector Jabalí; 1,100 m; 29-April-2006; J. C. Aguirre; catalog entry ICN-AS-669).

To prove our identification, it is enough to zoom in the digital images of this paper directly on screen, either in its PDF or HTML versions. From a magnification of 150% up, three characters which are diagnostic to *Tityus* against *Rhopalurus* become clearly visible: **i)** telson vesicle oval-shaped, with the subaculear tubercle large, spiniform and equipped with two dorsal granules; **ii)** pedipalp fingers with at least 15 principal rows of denticles, which are highly imbricate and lack supernumerary denticles; **iii)** sternite III lacking the two deep, convergent grooves that surround the stridulatory areas. Furthermore, the combination of color pattern, shape of pedipalps and pectines, metasomal carination and counts of pectinal teeth and principal denticle rows of the fingers, lead us to define that it is *Tityus pachyurus* Pocock, 1897, or a very closely related species of the "*asthenes*" group.

As a result, we conclude that the identification of the specimens referred to *R. laticauda* by Flórez (2012) is at least doubtful. And the following question inevitably emerges: can anyone trust the taxonomic decisions taken at species-level by someone who is not able to identify accurately to the genus-level a perfectly preserved, adult male Neotropical buthid?

C) Contradictory, false, or erroneously interpreted data.

1. Pectinal tooth count. Flórez (2012: 365-366) literally stated: "... number of pectinal tooth [...] show overlap between the two regions, reaching the highest numbers in specimens from Caribbean region, it is in contradiction to what was observed and postulated by Teruel & Roncallo (2008)..." [sic].

Such statement is false, because such overlap had already been mentioned in the original description of *R. caribensis* by Teruel & Roncallo (2008), and in one of those papers Flórez failed to consult (Teruel & Roncallo, 2010). The following table summarizes these data:

Source	Pectinal tooth count			
	<i>R. caribensis</i>		<i>R. laticauda</i>	
	♂♂	♀♀	♂♂	♀♀
1.- Teruel & Roncallo (2008)	22-25	19-22	23-26	20-24
2.- Teruel & Roncallo (2010)	22-25	19-23	-	-
3.- Flórez (2012)*	-	19-21	-	21-22

*Note: from the data of Flórez (2012), we have excluded the counts of the Santa Marta male which does not even belong to the

genus *Rhopalurus* (see a detailed discussion above), and those from the juveniles because no sex was specified. By the way, remember that the misidentification herein demonstrated regards his data as unreliable.

This table highlights another contradiction between the data of Flórez (2012) and the conclusions he subsequently derives. If we assume that the remaining specimens were identified and sexed accurately, then the resulting overlap **is actually smaller than previously documented**: the ranges given by Flórez (2012) are completely inside those already recorded by Teruel & Roncallo (2008, 2010), without reaching the upper end of *R. caribensis* nor the lower end of *R. laticauda*.

2. Adult size. Here we find a situation too similar to the preceding: Flórez (2012: 365) states that his data show overlap between the populations from the Caribbean (*R. caribensis*) and the Llanos Orientales (*R. laticauda*), while he claims to have demonstrated this by the table 1 of his paper. Let's apply the same analysis as before:

Source	Adult size (millimeters)			
	<i>R. caribensis</i>		<i>R. laticauda</i>	
	♂♂	♀♀	♂♂	♀♀
1.- Teruel & Roncallo (2008)	38-40	48-50	50-60	55-70
2.- Teruel & Roncallo (2010)	38-40	43-55	-	-
3.- Flórez (2012)	-	40-49	43	50-53

If we remember here that the complementary paper by Teruel & Roncallo (2010) was not consulted by Flórez (2002), then **there is no overlap** between the values obtained by him for both populations, nor essentially when compared to those originally recorded by Teruel & Roncallo (2008). Another contradiction between the data exposed by Flórez (2012) and the conclusions he derived from them. To this we must add that he did not specify in his paper which measuring method he used, thus violating one of the cornerstones of science: the reproducibility of the analysis.

3. Color pattern. A situation identical to the previous ones: Flórez (2012: 365) declares that his data show overlap between both populations and that this is demonstrated in the table and figures included in his paper. If we exclude the succinct descriptions given in his table 1 (because its veracity cannot be confirmed) and we rely solely on the color photographs of his figures 1–2 (of course, excluding the misidentified male *Tityus* in figures 2a–b), then the differences described as diagnostic for *R. caribensis* against *R. laticauda* by Teruel & Roncallo (2008) stand unchallenged: the single female depicted from the Caribbean population (Flórez, 2012: fig. 2c–d), is conspicuously paler than the two from the Llanos (Flórez, 2012: fig. 1a–d).

Even if we assume that there are no further misidentifications among the other 15 specimens studied by Flórez (2012), and that the chromatic variations described in his table 1 are real, anyway there is no difference from what was already recorded by Teruel & Roncallo (2010), who described and illustrated in color some reddish specimens of *R. caribensis*, and introduced the respective emendation to its diagnosis. This is yet another example of the fatal outcomes of a poor bibliographic revision.

D) Wrong use of bibliography.

Apparently Flórez (2012) had some insecurity on his own arguments, because in the last paragraph of his paper he backs them on what was supposedly published on this subject by other authors, as he literally writes: "*The information presented is congruent with by Lourenço (1993), Flórez (2001), and Botero-Trujillo and Fagua (2007), considering these disjoint populations as belonging to the same species, and therefore synonymize R. caribensis under R. laticauda*" [sic].

First of all, quoting as support **only references published previously** to the description of *R. caribensis* is a classic example of circular reasoning, implicitly wrong: until this description was

published by Teruel & Roncallo (2008), the single species of this genus recorded from Colombia was *R. laticauda* and its taxonomic identity was never disputed. In other words, **none** of the three papers cited by Flórez (2012) actually dealt with the validity of *R. caribensis* (obviously, as it had not been described yet), nor tested whether both Colombian populations of *Rhopalurus* were conspecific or not.

Furthermore, the self-quoted paper of Flórez (2001) is merely a succinct catalog, whose single mention to *R. laticauda* is a table row with the distribution of the species in the country. And the one of Lourenço (1993) is a two-page note on the distribution of a species that belongs to another family, **which does not contain any mentions to *R. laticauda* or the genus *Rhopalurus***. Did Flórez think by any chance that none would check the literature he listed, at least to know what other authorities had supposedly commented on this subject?

The flaws, inaccuracies and fallacies herein revealed leave us no other choice than to ask ourselves: is this an unexplainable carelessness by Flórez in analyzing and contrasting his data against the information available? Or has himself demonstrated his incompetence as a taxonomist beyond any reasonable doubt?

The present criticism to the paper of Flórez (2012), in view of the scope herein analyzed, must be extensible to whom purportedly (or supposedly) peer-reviewed the manuscript before it was published in a reputed journal such as the *Revista Colombiana de Entomología*. It is well known that the editorial committees of most journals routinely disclaim all responsibility for the contents of the articles and the personal opinions expressed by the authors, **but they are fully responsible for running the pertinent peer-review and to select the specialists who will assess whether the submitted manuscript meets the publication criteria or not.**

These referees are usually mentioned by their names in the Acknowledgments section, or it is declared instead that the manuscript has been anonymously peer-reviewed, but none of these procedures was followed in the paper by Flórez (2012), either explicitly or implicitly. This leads us to question if the editorial committee of the *Revista Colombiana de Entomología* actually sent the manuscript of this paper to any specialists in scorpions (or at least in general taxonomy) for review, but judging from the amount and extent of the problems herein revealed, the answer seems obvious. We ask to this editorial committee to take this criticism not as an attack, but instead as an opportune call to avoid the occurrence of any similar situations that affect the well-earned prestige of this journal.

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