



## Description of cryptic taxa within the *Alpheus bouvieri* A. Milne-Edwards, 1878 and *A. hebes* Kim and Abele, 1988 species complexes (Crustacea: Decapoda: Alpheidae)

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### Abstract

*Alpheus bouvieri* A. Milne-Edwards, 1878 and *A. hebes* Kim and Abele, 1988 are reviewed based on morphological and genetic data. *Alpheus bouvieri*, previously believed to be distributed in the eastern Pacific and Atlantic, is restricted to the Atlantic populations; the eastern Pacific populations (*A. bouvieri sensu* Kim and Abele 1988) are assigned to *A. javieri* n. sp. A second new species, *A. agilis* n. sp., closely related to the eastern Pacific *A. hebes*, is described based on recently collected specimens from the eastern Atlantic (São Tomé, Cape Verde) and western Atlantic (Atol das Rocas off northeastern Brazil). The absence of *A. agilis* n. sp. (or any other representative of the *A. hebes* clade) in the Caribbean Sea is likely due to a relatively recent (~1–2 my) extinction. Genetic data (COI sequences) indicates that *A. bouvieri* and *A. javieri* n. sp., and *A. hebes* and *A. agilis* n. sp. diverged approximately 6 and 7.5 mya, respectively, i.e., around 3 my before the final closure of the Isthmus of Panama.

**Key words:** *Alpheus*, snapping shrimp, Alpheidae, eastern Pacific, western Atlantic, color pattern, transisthmian species, new species, extinction, Caribbean, molecular phylogeny, barcode, COI

### Introduction

The snapping shrimp genus *Alpheus* Fabricius, 1798 is notorious for its extreme diversity and numerous cryptic and pseudocryptic species that can be initially detected by comparison of color patterns or by genetic analyses (Knowlton and Keller 1985; Knowlton and Mills 1992; Knowlton *et al.* 1993; Williams *et al.* 2001; Anker 2001; Nomura and Anker 2005). Problems related to transisthmian cryptic species—species pairs or complexes present on each side of the Isthmus of Panama—were addressed by Knowlton and Mills (1992), Knowlton *et al.* (1993), and in combination with a molecular phylogeny of *Alpheus* by Williams *et al.* (2001). This last study dealt with a broad selection of species from different groups of *Alpheus*, in particular the heterogeneous *A. edwardsii* (Audouin, 1826) group defined mainly by the unarmed orbital hoods and the presence of two notches (grooves) on the major chela (Banner and Banner 1982). This group was found to be polyphyletic, more precisely containing two unrelated clades of snapping shrimps with a double-notched major claw (Williams *et al.* 2001, fig. 6).

The first clade of *Alpheus* with a double-notched major claw—here clade E (for “*edwardsii*”)—is a hyperdiverse clade that includes species in which the dorsal (= superior) groove of the major chela palm