Geothelphusa makatao sp. nov. (Crustacea: Brachyura: Potamidae), a new freshwater crab from an uplifted Pleistocene reef in Taiwan

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Abstract

A new species of potamid freshwater crab, Geothelphusa makatao, is described from southwestern Taiwan, based on morphological characters and mitochondrial DNA evidence. The new species differs from close congeners, G. pingtung Tan & Liu, 1998, G. shernshan Chen, Cheng & Shy, 2005, and G. ancylophallus Shy, Ng & Yu, 1994 and a superficially similar species, G. albogilva Shy, Ng & Yu, 1994, in the structure of its ambulatory legs, thoracic sternum, male abdomen, and male first pleopods. The unique gene sequences of 16S rRNA and cytochrome oxidase I also support the recognition of this coastal population, which is isolated from other closely related species inhabiting montane areas. Except for G. makatao, the phylogenetic analysis showed that there are three additional hill subclades within the G. pingtung clade, G. shernshan, G. pingtung and the Liangshan subclade, situated in different watersheds of rivers or streams near the Central Range in the southwestern Taiwan.

Key words: 16S rRNA, cytochrome oxidase I, Geothelphusa makatao, G. pingtung, Brachyura, Potamidae, Taiwan, taxonomy, new species

Introduction

The genus Geothelphusa Stimpson, 1858, are endemic and dominant, either in species diversity or abundance, freshwater crabs on islands of East Asia (Taiwan, the Ryukyus, and mainland Japan) (Shih et al. 2009). More than 50 Geothelphusa species have been described, making it the second largest genus of the family Potamidae after Sinopotamon Bott, 1967, which is endemic to China and has around 80 species (see Dai 1999; Ng et al. 2008). The highest diversity (36 species) of Geothelphusa is found in Taiwan (Shy et al. 1994; Shy & Ng 1998; Shy & Yu 1999; Ng et al. 2008; Shih et al. 2008), though some species have been suggested to be synonyms (Ng et al. 2001, 2008; Shih et al. 2004, 2007b). Recent molecular phylogenetic and phylogeographic studies of Taiwanese freshwater crabs (Shih et al. 2004, 2005, 2006, 2007a, b, 2008) have helped clarify the taxonomy and systematics of some problematic and cryptic species.

A population of Geothelphusa at Chaishan (= Shoushan), Kaohsiung City, southwestern Taiwan, an area isolated from the Central Range of Taiwan, was previously misidentified as G. albogilva Shy, Ng & Yu, 1994, based on morphology and coloration (Chen et al. 2001, 2003). However, based on a molecular study using two mitochondrial gene markers (haplotypes of 16S rRNA (Gp-1 and Gp-2) and cytochrome oxidase I (COI; Gp-C1 and Gp-C2)) (see Shih et al. 2007b: table 1, fig. 2), this population should instead belong to the G. pingtung clade, which includes G. pingtung Tan & Liu, 1998 (considered a senior synonym of G. neipu Chen, Cheng & Shy, 1998) and G. shernshan Chen, Cheng & Shy, 2005. As to its monophyly, basepair (bp) differences, and the disjunct geographic distributions between Chaishan and the Central Range populations led Shih et al. (2007b) to suggest that the latter is at least a geographic subspecies of G. pingtung.