



DNA barcoding of hermit crabs of genus *Clibanarius* Dana, 1852 (Anomura: Diogenidae) in the Ryukyu Islands, southwestern Japan

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Abstract

The diogenid hermit crab genus *Clibanarius* Dana, 1852 is a group of decapod crustaceans commonly found in tropical or subtropical shallow waters. The species of the genus are usually characterized by distinct color patterns in life, but the identification of colorless specimens preserved in ethanol is sometimes very difficult. DNA barcoding can facilitate species identification and recognition. In this study, we determined partial sequences of the cytochrome oxidase I (COI) gene of 11 *Clibanarius* species commonly found in the intertidal zones of the Ryukyu Archipelago, southwestern Japan. The sequences can be used as nametags to distinguish each of the 11 species, as the data differ for each species. The COI gene sequences of *Clibanarius* show an AT bias, especially in the third codon position (A+T = 76.2%), as has been reported for some other anomuran species. Phylogenetic analyses based on the sequences also offer some suggestions on the interspecific relationships of *Clibanarius*.

Key words: Decapoda, Anomura, hermit crabs, COI, barcode, shallow water, Okinawa

Introduction

Hermit crabs (Paguroidea) are one of the most common decapod crustaceans on seashores. Nearly 1100 species are currently recognized worldwide (McLaughlin *et al.* 2007), and many new species continue to be described from intertidal or subtidal shallow waters. Hermit crab species are identified mainly by the external morphology of the cephalothoracic appendages and coloration in life. Moreover, some species are discriminated primarily by color pattern, with only subtle morphological differences noted.

The genus *Clibanarius* Dana, 1852, is a group of diogenid hermit crabs commonly found in shallow waters and currently includes 59 species worldwide and 37 species from the Indo-West Pacific (Osawa & Fujita 2006; McLaughlin *et al.* 2007). Most species are distributed between tropical and temperate areas and inhabit coral and rocky shores or sandy and muddy estuaries. Thus, they play considerable roles in seashore ecosystems, and accurate identification of species is important in ecological studies. The distinct color patterns of *Clibanarius* species are usually treated as primary species-specific characters, but some species are very similar in morphology. Therefore, species identification of preserved, colorless specimens is sometimes very difficult.

The use of DNA sequences as taxonomic tags may improve our recognition of species and verify phylogenetic relationships. DNA-barcoding data provide a convenient tool for species identification, and the sequences can be analyzed to estimate phylogeny. In metazoans, partial sequences of the cytochrome oxidase I (COI) gene are often used as the DNA barcode. However, in the genus *Clibanarius*, COI gene sequences have been reported for only one species, *C. albidigitus* Nobili, 1901, from Panama (Morrison *et al.* 2002). We determined partial COI gene sequences for 11 *Clibanarius* species from the intertidal zones of Okinawa-jima and Iriomote-jima islands, Ryukyu Archipelago, southwestern Japan. These species represent most of the *Clibanarius* inhabitants of these islands. The sequences may enable identification of preserved specimens