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A new *Chthamalus* (Crustacea: Cirripedia) from the *challengeri* subgroup on Taiwan rocky intertidal shores

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Abstract

The present study describes a new barnacle, *Chthamalus williamsi* **sp. nov.**, from rocky shores in Taiwan. *Chthamalus williamsi* **sp. nov.** belongs to the *challengeri* subgroup of *Chthamalus* due to cirrus I having no conical spines and the setae on cirri II having no basal guards. Within the *challengeri* sub-group, *C. williamsi* **sp. nov.** differs from *C. challengeri* Hoek, 1883, *C. dalli* Pilsbry, 1916 and *C. montagui* Southward, 1976 by its scutum and the tergum both having straight articular margins. *Chthamalus moro* Pilsbry, 1916 differs from *C. williamsi* **sp. nov.** in having strong ribbing on the shell surface, and *C. williamsi* **sp. nov.** differs from *C. antennatus* Darwin, 1854 by having a normal form cirrus III, rather than an antenniform cirrus III as in *C. antennatus*. The external morphology and size of *C. williamsi* **sp. nov.** are similar to *C. sinensis* Ren, 1984 (C. *neglectus* Yan & Chan, 2004 is a synonym of *C. sinensis*, from molecular data presented in the present study) but the scutum of *C. williamsi* **sp. nov.** has a height similar to its width, whilst the scutum of *C. sinensis* is much depressed, being wider than high. From molecular analysis of a mitochondrial COI region, *C. williamsi* **sp. nov.** formed a distinct clade (divergence >15%) from other described species in the *challengeri* subgroup including *C. challengeri*, *C. sinensis, C. moro*, *C. montagui* and *C. dalli*, suggesting that it is a new species.

Key words: Crustacea, Cirripedia, challengeri

Introduction

Barnacles of the genus *Chthamalus* Ranzani, 1817 are common inhabitants on rocky intertidal shores worldwide. The taxonomic classification of *Chthamalus* is divided into several subgroups, based on the types of setae and conical spines on cirri I and II. The *challengeri* subgroup houses species with no conical spines on cirrus I and without basal guard setae on cirrus II. The *fissus* subgroup has species that are without conical spines on cirrus I but have basal guard setae on cirrus II. Species in the *stellatus* subgroup have conical spines on cirrus I but are without basal guard setae on cirrus II. The *malayensis* subgroup includes species possessing both conical spines on cirrus I and basal guard setae on cirrus II (Southward & Newman 2003). In the present study, we describe a new species of *Chthamalus* from the *challengeri* subgroup from Taiwan based on morphological and molecular approaches.

Material and methods

Sampling of chthamalid barnacles was conducted on rocky shores in eastern and southern Taiwan including Shih-Ti-Ping in Hualien County, Xiao Gang and Cheng Gong in Taitung County (Fig. 1). The hydrography of eastern and southern Taiwan is under the influence of the Kuroshio Current that originates from the Philippines, flowing northward, passing through Taiwan and finally reaching the Pacific coast of the Japan Honshu (Chan & Lee 2012). The arthropodal characters (Southward & Newman 2003) of the *Chthamalus* species collected were further examined by scanning electron microscopy (FEI Quanta 200). Preparation of samples for SEM studies followed

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