Wei Xu[a], Shuangshuang Guo[a], Linfeng Gong, Siti Aisyah Alias, Ka-Lai Pang and Zhu-Hua Luo*

Phylogenetic survey and antimicrobial activity of cultivable fungi associated with five scleractinian coral species in the South China Sea

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Abstract: Relative to that of sponges, the diversity of fungi associated with corals, and their ecological roles, remain largely unknown. In this study, we surveyed culturable diversity and screened antimicrobial activity of spent culture liquid of fungi associated with five scleractinian corals collected in the South China Sea. In total, 123 fungal isolates were obtained, which were identified to 31 taxa in 23 genera from two phyla (Ascomycota and Basidiomycota) by comparing their ITS rDNA sequences with the reference sequences in GenBank. Specifically, eight genera of the Ascomycota (*Periconia*, *Arthrinium*, *Engyodontium*, *Lasiodiplodia*, *Hortaea*, *Devriesia*, *Cyphellophora* and *Cadophora*) and six genera of the Basidiomycota (*Rhodosporidium*, *Panus*, *Trametes*, *Schizophyllum*, *Trichosporon* and *Cystobasidium*) are new records for corals. The fungal communities in the five scleractinian coral species, together with those from previous studies, indicate that a high level of fungal diversity is associated with scleractinian corals. The antimicrobial activities of spent culture liquid of 31 selected fungal species were tested against five marine pathogenic bacteria. This study contributes to our knowledge of scleractinian coral-associated fungi and their potential as sources of pharmaceutical drug leads for pathogenic bacteria.

Keywords: antimicrobial activity; coral associated fungi; fungal diversity; scleractinian coral.

[a]**Wei Xu and Shuangshuang Guo**: These authors contributed equally to this work.

***Corresponding author: Zhu-Hua Luo,** Key Laboratory of Marine Biogenetic Resources, Third Institute of Oceanography, State Oceanic Administration, 178 Daxue Road, Xiamen 361005, P.R. China; Fujian Collaborative Innovation Center for Exploitation and Utilization of Marine Biological Resources, 178 Daxue Road, Xiamen 361005, P.R. China; and South China Sea Bio-Resource Exploitation and Utilization Collaborative Innovation Center, Xiamen 361005, P.R. China, e-mail: luozhuhua@tio.org.cn

Wei Xu, Shuangshuang Guo and Linfeng Gong: Key Laboratory of Marine Biogenetic Resources, Third Institute of Oceanography, State Oceanic Administration, 178 Daxue Road, Xiamen 361005, P.R. China; Fujian Collaborative Innovation Center for Exploitation and Utilization of Marine Biological Resources, 178 Daxue Road, Xiamen 361005, P.R. China; and South China Sea Bio-Resource Exploitation and Utilization Collaborative Innovation Center, Xiamen 361005, P.R. China

Siti Aisyah Alias: Institute of Ocean and Earth Science (IOES), C308, Institute of Postgraduate Studies Building, University of Malaya, 50603 Kuala Lumpur, Malaysia

Ka-Lai Pang: Institute of Marine Biology and Center of Excellence for the Oceans, National Taiwan Ocean University, 2 Pei-Ning Road, Keelung 20224, Taiwan, Republic of China

Introduction

Coral reefs are important communities in tropical and subtropical marine environments, and possess an immense biodiversity comparable to that of tropical rain forests (Mulhall 2009). The microorganisms associated with corals exhibit substantial genetic and ecological diversities and are believed to contribute to the overall health of the coral hosts, and thus also to the ability of reef-building corals to adapt to and evolve under changing environmental conditions (Reshef et al. 2006, Rosenberg et al. 2007a,b).

Greater knowledge of the microbial communities associated with reef-building corals aids our understanding of this multispecies mutualism and helps to identify the species which may play a key role in maintaining coral health. Corals are complex hosts that form close associations with both external and internal microbiota. Over the last decade, significant advances have been made in the characterization of coral microbiota. Bacteria associated with corals are both diverse and abundant (Shashar et al. 1994, Ritchie and Smith 1997, Rohwer et al. 2001, 2002, Frias-Lopez et al. 2002, Bourne et al. 2008, 2009). Coral-associated bacteria may be mutualistic or pathogenic; they may also provide other important functions in the ecosystem (Kushmaro et al. 1996, Ben-Haim et al. 2003, Mouchka et al. 2010, Roder et al. 2014). The study of coral-associated microorganisms has gained more attention in recent years, partly because numerous new compounds and antibiotics have been discovered from the internal microbiota of corals, and also partly because some coral