

**GERMANY/HONG KONG JOINT RESEARCH SCHEME**  
**THE PROJECT REPORT**  
*(for Project Completion)*

**Project Number: G\_HK022/11**

**Title**

Phylogeography and cryptic diversity of coastal crabs from the tropical West Pacific: a comparative study of the influence of habitat on the potential diversification

**Particulars**

	Hong Kong team				German team	
Name of Project Co-ordinator (with title)	Ka Hou Chu (Professor)				Christoph Daniel Schubart (Associate Professor)	
Name of Co-Investigator (if any)						
Institution or Institutional affiliation	<input type="checkbox"/>	CityU	<input type="checkbox"/>	HKU	<input checked="" type="checkbox"/>	University of Regensburg <u>Department of Biology 1</u> Others: _____
	<input checked="" type="checkbox"/>	CUHK	<input type="checkbox"/>	HKUST		
	<input type="checkbox"/>	HKBU	<input type="checkbox"/>	LU		
	<input type="checkbox"/>	HKIEd	<input type="checkbox"/>	PolyU		
Other project team members (if any)	Ling Ming Tsang, Postdoctoral Research Fellow				Peter Koller, PhD candidate	

**Funding Period**

	1 <sup>st</sup> year	2 <sup>nd</sup> year (if applicable)
Start Date	01-01-2012	01-01-2013
Completion Date	31-12-2012	31-12-2013

**Objective(s) as per original application**

1. To elucidate the population genetic structure of two mangrove crabs and two rocky intertidal crabs in Asia
2. To determine the historical and contemporary factors in determining the population structuring of the crabs living in the two different habitats

## **Details of Report** [Please attach relevant document(s)]

### **i) Outline of proposed research and results obtained**

Asia has long been famous for its extraordinary marine biodiversity. Marine invertebrates have highly varied dispersal capabilities during their pelagic larval stages. The planktonic larvae can be passively drifted along with ocean currents, and their duration in the plankton may predict the degree of gene flow and genetic population structure. The latter is also affected by historical events, like plate tectonics and glaciations. Thus, various factors interact to determine the phylogeographic patterns of marine invertebrates. Yet, the phylogeographic patterns are not always concordant among taxa. In the present study, we study the population genetic structure of selected Asian crabs: one rocky shore species (*Hemigrapsus penicillatus*), one from the sandy shore (*Ocypode ceratophthalmus*) and two from the estuarine mangroves (*Mictyris brevidactylus* and *Perisesarma bidens*), in order to test the hypothesis that mangrove species exhibit higher genetic differentiation than rocky and sandy shore species since the mangrove areas are considered to be more closed and patchy ecosystems. Genetic analysis using mitochondrial COI showed genetic subdivision for all the four species.

### **ii) Significance of research results**

The preliminary results show that genetic differentiation was found in the four species in varying degrees. The rocky shore *Hemigrapsus penicillatus* showed a high genetic differentiation between Japan and South China populations. The two mangrove species showed different results that *Mictyris brevidactylus* exhibited subtle genetic differentiation between Hong Kong and Taiwan populations, while *Perisesarma bidens* showed strong genetic structuring in East Asia. The discrepancy in genetic structures of the studied taxa might be attributable to specific life-history traits. Furthermore, cryptic lineages in *Ocypode ceratophthalmus* and *Perisesarma bidens* were discovered. This shed light on the underestimated biodiversity in Asia.

### **iii) Research output**

#### Conference papers

1. Tsang, L.M.\*, Lai, J.C.Y., Au, Y.C., Ng, P.K.L., Schubart, C.D. and Chu, K.H. (2012) A rapid radiation of thoracotreme crabs (Brachyura: Eubrachyura: Thoracotremata) inferred from a multigene (nuclear and mitochondrial) phylogeny. Presented in *The Crustacean Society Summer Meeting*, 2-6 Jun., Athens, Greece. [Oral presentation]
2. Chu, K.H.\*, Tsang, L.M., Schubart, C.D., Chan, T.-Y., Ahyong, S.T., Lai, J.C.Y and Ng, P.K.L. (2012) Molecular phylogeny of the short-tailed crabs (Crustacea: Decapoda: Brachyura). Presented in the *16<sup>th</sup> Evolutionary Biology Meeting*, 18-21 Sept., Marseilles, France. [Oral presentation]
3. Ip, B.H.Y.\*, Tsang, L.M., and Chu, K.H. and Schubart, C.D. (2013) Molecular phylogeny of the family Grapsidae (Decapoda: Brachyura: Thoracotremata) using a multi-locus approach. Presented in the *Summer Meeting of The Crustacean Society*, 7-11 Jul., San José, Costa Rica. [Oral presentation]
4. Ip, B.H.Y.\*, Tsang, L.M., Chan, B.K.K., Schubart, C.D. and Chu, K.H. (2013) Comparative phylogeography of selected brachyuran crabs in the South China Sea. Presented in the *Summer Meeting of The Crustacean Society*, 7-11 Jul., San José, Costa Rica. [Oral presentation]

#### Invited book chapter in preparation:

Chu, K.H., Schubart, C.D., Shih, H.-T. and Tsang, L.M. Genetic diversity and evolution. In: Davie, P., Ng, P. and Guinot, D. (eds.) *Treatise on Zoology – The Brachyura*. Brill, Leiden, Netherlands.

**iv) Potential for or impact on further research collaboration**

The study has laid the foundation for further population genetic studies on crabs in Asia. Based on this study, we submitted a RGC GRF grant proposal which has been funded (detail shown below). The grant shall allow us to extend the study in various aspects. More sampling localities and more target taxa can be included. Collaboration between the two Project Coordinators shall be enhanced.

Research Grants Council grant (2013-16, HK\$848,712), Project number: CUHK464013

Project Title: Comparative phylogeography of East Asian crabs using a multi-locus approach: The role of adult habitat specificity in shaping genetic structure of coastal fauna (Principal investigator; Ka Hou Chu; co-investigators: Benny Kwok Kan Chan, Academia Sinica; Christoph Schubart, University of Regensburg)