Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2017-28
Project Title:	Development of environmental DNA (eDNA) protocol for detection of horseshoe crabs
Principal Investigator:	Dr HUI Ho Lam, Jerome, School of Life Sciences, The Chinese University of Hong Kong
Total Approved Grant:	$499,680
Duration:	1/8/2018 to 31/1/2020
Project Status/Remarks:	Completed
Project Scope:	Animals continuously shed their DNA into habitats via variety of ways including body fluid, exoskeleton/skin, faeces, or other secretions. Since the detection of these DNA, namely environmental DNA or eDNA, allows rapid species identification without physical capturing or visualisation of the animals, detection of eDNA provides an alternative method to monitor animal species including both threatened native species and invasive species. Hong Kong contains two of the four extant species of horseshoe crabs in the world, and yet, their populations have been shrinking since the last decade. Before imposing any large-scale conservation plan for the local horseshoe crabs, better understanding of their biology in the local environment is warranted. Efforts have been put together by different parties in monitoring the horseshoe crabs' distribution and abundance by traditional eye-surveying in the past. To further aid this good conservation action, a more sensitive method for better understanding the local horseshoe crabs in the field is needed. This project aims to develop the eDNA as another detection tool for this purpose. The successful development of this tool can then be employed in parallel with conventional survey at a bigger scale both spatially and temporally in Hong Kong, and thus formulating effective conservation plan.
Summary of the Findings/Outcomes:	Hong Kong is home of two of horseshoe crabs *Carcinoscorpius rotundicauda* and *Tachypleus tridentatus*, where the latter one is recently considered an endangered species in the IUCN Red List of Threatened Species. Biomonitoring of species is crucial to understanding the interactions between organisms and their environment both spatially and temporally, which are important in formulating effective conservation efforts. As a complementary efficient technique, the detection of eDNA offers the opportunity to carry out species biomonitoring in parallel with conventional methods. This project has successfully developed the targeted eDNA detection for the two species of horseshoe crabs that can be found in Hong Kong with details shown as follows –

	(a). For *T. tridentatus*, in addition to the establishment of its eDNA detection method, the effects of physical parameters (water temperature and pH that covered the normal ranges of temperature and pH in Hong Kong) on eDNA detection have also been tested, which in turn suggests its suitability to be used in Hong Kong waters; (b). For *C. rotundicauda*, the protocol for detecting its eDNA has also been developed; and (c). For both species, the established eDNA detection protocols have also been successfully applied to samples collected in the field.