

THE EDUCATION UNIVERSITY OF HONG KONG
FACULTY OF LIBERAL ARTS AND SOCIAL SCIENCES

Research Output/Impact/Knowledge Transfer Prize
for the Dean's Research Fund 2018-19

Brief Introduction of Awardee's
Research/KT Publication/Study/Output and Future Research/KT Development

Awardee (Dept):	<u>Dr. Lam Chung Wah James, Assistant Professor (SES)</u>
Publication Title/KT project:	<u>Temporal Changes and Stereoisomeric Compositions of 1,2,5,6,9,10-Hexabromocyclododecane and 1,2-Dibromo-4-(1,2-dibromoethyl) cyclohexane in Marine Mammals from the South China Sea</u>

- A. *Briefly introduce your research/KT publication/study/output for which you have received the prize.*

Significance and the impact of the study

Brominated flame retardants (BFRs) have emerged as global environmental contaminants. In the past several years, we have carried out a large-scale, systematic investigation on the environmental fate of BFRs in different coastal marine ecosystems. The phase-out of polybrominated diphenyl ethers (PBDEs) had been started by the manufacturers, and then global elimination was initiated in 2009. However, it has been recently reported that industrial and manufacturing have been shifting the use to other BFR replacement for PBDEs in the consumer products, after the restricted use/withdrawal of PBDEs. Interestingly, of the BFR replacements, hexabromocyclododecane (HBCD) and 1,2-Dibromo-4-(1,2-dibromoethyl)cyclohexane (TBECH) exhibit optical activities as chiral compounds. Since stereoisomers can exhibit different environmental fates and toxicities, and the stereoisomerism of these two BFRs has not yet received sufficient attention, we therefore started investigating the temporal changes of HBCD and TBECH stereoisomers and physiology-related differences in the accumulation of these chiral BFRs in the two species of marine mammals from the South China Sea, and also evaluated their potential risks to the cetaceans. The diastereomeric profiles exhibited an absolute predominance of α -HBCD (mostly > 90%) in the two species and significant racemic deviations were also observed for α -, γ -, and δ -TBECH enantiomeric pairs. Our findings also suggest that the investigated region is a possible contamination "hotspot" for HBCD, along with TBECH, which is a potential HBCD replacement. In addition, a preliminary risk assessment on these ecologically important marine species due to exposure to these chiral BFRs was also conducted in this study.

This work provides new information on the changes of chiral BFR levels in the Chinese marine environment. To our knowledge, this is the first report of systematic temporal trends of specific TBECH enantiomers in cetaceans. We believe that the results will be of high importance to the ongoing research on the fate and distribution of BFRs in the environment.

B. How you used/will use your prize and perhaps its usefulness to your research/KT development?

The funding will be used to support a research staff and to purchase consumables to continue the study on assessment of emerging halogenated compounds in the aquatic environment. Publication in international refereed journal will be arising from this study and the new finding will be used to incorporate into the teaching materials of BEd(Sci) program and other courses related to the environmental science and such information can provide the latest and useful information for updating the courses.

Results of the above publication entitled “Temporal Changes and Stereoisomeric Compositions of 1,2,5,6,9,10-Hexabromocyclododecane and 1,2-Dibromo-4-(1,2-dibromoethyl) cyclohexane in Marine Mammals from the South China Sea” have been interviewed by RTHK, and then has been broadcasted as the public education TV program in 2019. The detail is as follow:

RTHK “This Week 《視點 31》” 【阻燃劑的副作用】 (RTHK31 : 19/2/2019)

<https://www.youtube.com/watch?v=TB4Hwtyt98o>

Topic is about environmental and human health impact due to persistent and toxic flame retardants.

C. Expected research/KT outcomes/outputs/impacts arising from this prize.

Research paper will be arising from this study and the new finding will be used to update the course materials pertinent to the education and science program.