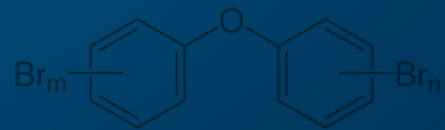
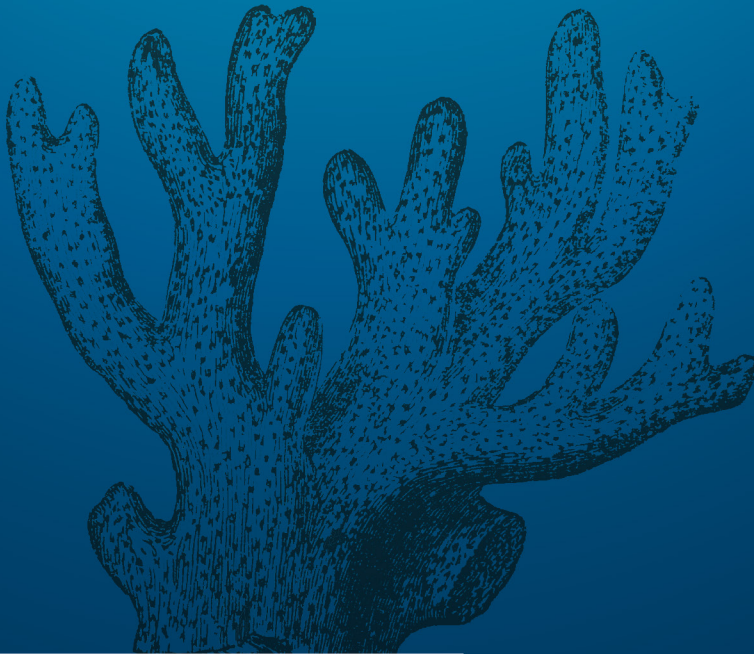


2016

年度報告 ANNUAL REPORT



海洋污染國家重點實驗室
State Key Laboratory in
Marine Pollution

The State Key Laboratory in Marine Pollution

海洋污染國家重點實驗室

Envisions a solid base where coordinated and long-term research can be conducted to tackle marine pollution problems.

希望通過堅實的長期協作研究平台以解決海洋污染問題

The mission of the SKLMP is to protect the marine environment of Hong Kong and South China by identifying major threats such as algal toxins and contaminants of emerging environmental concern, and developing tools and technologies to address and solve these problems.

海洋污染國家重點實驗室的使命為通過明確威脅海洋環境的主要問題，如藻毒素和新興環境污染物等，並發展相關設備和技術致力於這些問題的解決，以保護香港和華南地區的海洋安全。



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A Message From Director

2016 marks the seventh year of operation of the Partner State Key Laboratory in Marine Pollution (SKLMP) since its formal approval by the Ministry of Science and Technology (MOST) of the People's Republic of China in 2009. In November 2016, MOST announced the "First Round of Reassessment of Partner State Key Laboratories in The Hong Kong Special Administrative Region".

The assessment on the performance of Partner State Key Laboratories, including the SKLMP, between 2011 and 2015 will provide a valuable opportunity for the SKLMP to conduct a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis and to reflect on how the SKLMP might position itself in the coming five/ten years to scale new heights.

Over the period 2011–2015, the SKLMP received direct funding of HK\$33.56 million (HK\$14 million from the Innovation and Technology Commission of the Hong Kong Special Administrative Region and HK\$19.56 million from the City University of Hong Kong). These funds provided the necessary resources for the day-to-day operation, and a solid foundation for the future development of the SKLMP. Over 54% of the direct funding to the SKLMP has been designated as competitive research grants to support collaborative work among members. As this amount is likely to remain at this level for the coming years, we need to think carefully on how to use the funds wisely to synergize the core activities of the SKLMP or more precisely the collaborative research activities among SKLMP members. Despite the fact that the total number of publications arising from SKLMP members continues to rise, there remains one major challenge, which is to unite/engage members in major research projects that are aimed at addressing pressing environmental issues. So far, SKLMP members have secured four Collaborative Research Funds (totalling HK\$24 million) and two Theme-based Research Schemes (totalling HK\$68 million) from the Research Grants Council of Hong Kong.

The total number of SKLMP members has remained around 35, coming from seven universities in Hong Kong. The five years (2011-2015) saw the turnover of membership with a number of senior members retiring and the addition of 11 young members. Furthermore, in 2017, the SKLMP will consider the possible expansion of the current six member universities in Hong Kong to seven.

Apart from conventional international conferences and symposia, the SKLMP also organizes, on a regular basis, focused meetings, entitled "Xiangjiang Marine Forum" (XMF), which typically focus on one specific research topic and attract some 40-50 participants. The most recent XMF, the 5th in the series, was dedicated to the "Sustainable Use and Conservation of Marine Biodiversity".

Through the promotion of scientific diving, members of the SKLMP have successfully opened up new research areas in deeper waters and at the same time raised the general public's awareness of the importance of conservation and protection of marine environments. This, together with the efforts on the conservation of horseshoe crabs, have reaffirmed community outreach/education as one of the SKLMP's roles.

Naturally, being a "Partner State Key Laboratory" the SKLMP has maintained strong collaborative ties with scientists in the Mainland. Apart from this, collaboration has also been extended to other regions/countries, e.g. Taiwan, Japan, Malaysia and the USA. Hong Kong has outstanding marine scientists, and individually they have been making useful contributions to the scientific literature. Our hope and belief is that the SKLMP could be a platform which can link up most, if not all, of the scientists working in areas related to marine pollution to contribute to the development and advancement of research into the

detection/prevention/control of marine pollution in a national and international context. Furthermore, against the background of the fast and significant development in research capabilities on the Mainland, we recognize that the SKLMP must be cognisant of its role in order to remain useful and relevant. Although we undoubtedly still have a long way to go, we are confident that the SKLMP will make a difference in this important endeavour.

Professor Paul Kwan Sing LAM
Director of the State Key Laboratory in Marine Pollution
31st December 2016

主任致辭

海洋污染國家重點實驗室（SKLMP）于2009年經國家科學技術部正式批准建立，如今已經歷七年時光。2016年11月，國家科學技術部宣佈將對香港特別行政區國家重點實驗室夥伴實驗室進行第一輪評估。

此次評估給予海洋污染國家重點實驗室一次寶貴的機會，就實驗室目前的優勢和不足以及將要面臨的機遇和挑戰進行全面的分析，以反思實驗室應如何定位，使其在未來五年乃至十年可以再創高峰。

在實驗室成員的不懈努力下，實驗室在2011至2015年期間共獲得了三千三百五十六萬港幣的直接經費（一千四百萬港幣來自香港創新科技署，一千六百五十六萬港幣來自香港城市大學）。這些資金維持了實驗室的日常運作，也為未來發展奠定了堅實的基礎。其中超過54%的直接經費作為研究資助，促進實驗室成員間的合作研究。未來幾年，這部分經費額度將維持不變。因此，我們需要認真考慮如何使用這筆經費，以促進實驗室核心工作的協調運行及實驗室成員間的合作研究。儘管實驗室成員發表刊物總數不斷上升，但我們仍面臨一個嚴峻考驗，即如何聯合成員共同進行重大課題研究，解決當前緊迫的環境問題。直至目前為止，實驗室成員已獲得香港研究資助局的四項協作研究金（共計二千四百萬港幣）和兩項主題研究計劃（共計六千八百萬港幣）。

在這五年（2011-2015）期間，實驗室人員出現流動，隨著許多資深成員的退休及十一名新成員的加入，今年成員總數為35，他們分別來自香港六所大學。此外，實驗室正考慮在2017年將香港六校聯合擴大為七校聯合，進一步深化各院校間的研究合作。

除了召開常規的國際會議和研討會，實驗室還會定期舉辦“香江海洋論壇”，吸引學者們就特定研究課題進行探討，平均每次與會人數40-50人。今年實驗室舉辦了第五次香江海洋論壇，主題為“海洋生物多樣性可持續利用與保護”。

通過推廣宣傳科學潛水，實驗室成員成功拓展深海研究領域，同時提高了公眾對海洋環境保護的意識。結合實驗室在馬蹄蟹保育方面所作出的努力，再次肯定實驗室將社區外展和公眾教育作為己任。

作為“國家重點實驗室”的一員，實驗室與中國大陸科學家保持著緊密的合作關係。除此之外，我們還不斷擴展與其它地區和國家的合作，如台灣、日本、馬來西亞、美國等。香港擁有許多卓越的海洋科學家，他們各自對科學文章的發表作出了傑出的貢獻。我們希望並相信：海洋污染國家重點實驗室將成為即使不是一應俱全，但也盡可能彙集所有海洋污染領域科學家的一個平台，從而使海外學者能夠結合國內環境，共同推動海洋污染監測、預防和控制研究的發展和進步。隨著大陸科研能力的快速發展，我們也意識到實驗室必須認清自身定位，保持自己的優勢和影響力。任重道遠，我們仍有很長的道路要走，但我們堅信海洋污染國家重點實驗室在未來定能有所成就，為海洋環境科學研究做出貢獻。

林群聲
海洋污染國家重點實驗室(SKLMPP)主任
二零一六年十二月三十一日

Research Scopes In SKLMP 實驗室研究範疇



Pollution Monitoring Technology
污染檢測技術



Marine Ecosystem
海洋生態系統



Risk Assessment
風險評估



Pollution Control and Bioremediation
污染控制與生物修復

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The SKLMP Academic Committee Members 學術委員會委員

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[Prof. Rudolf Shiu Sun WU 胡紹燊 教授](#) |

Research Chair Professor (Biological Sciences) of Department of Science and Environmental Studies

科學與環境學系研究講座教授 (生物科學)

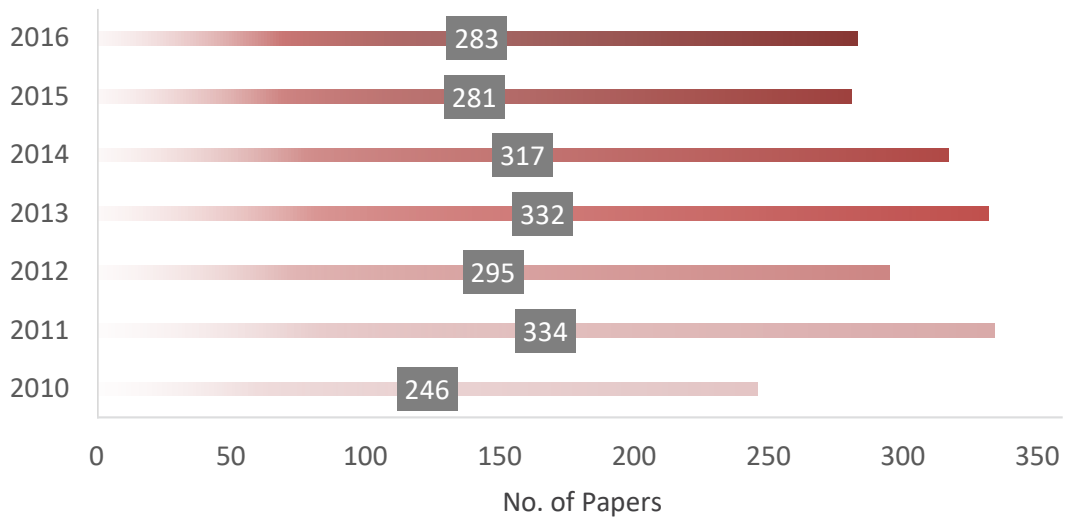
Xiamen University 廈門大學

[Prof. Minhan DAI 戴民漢 教授](#) |

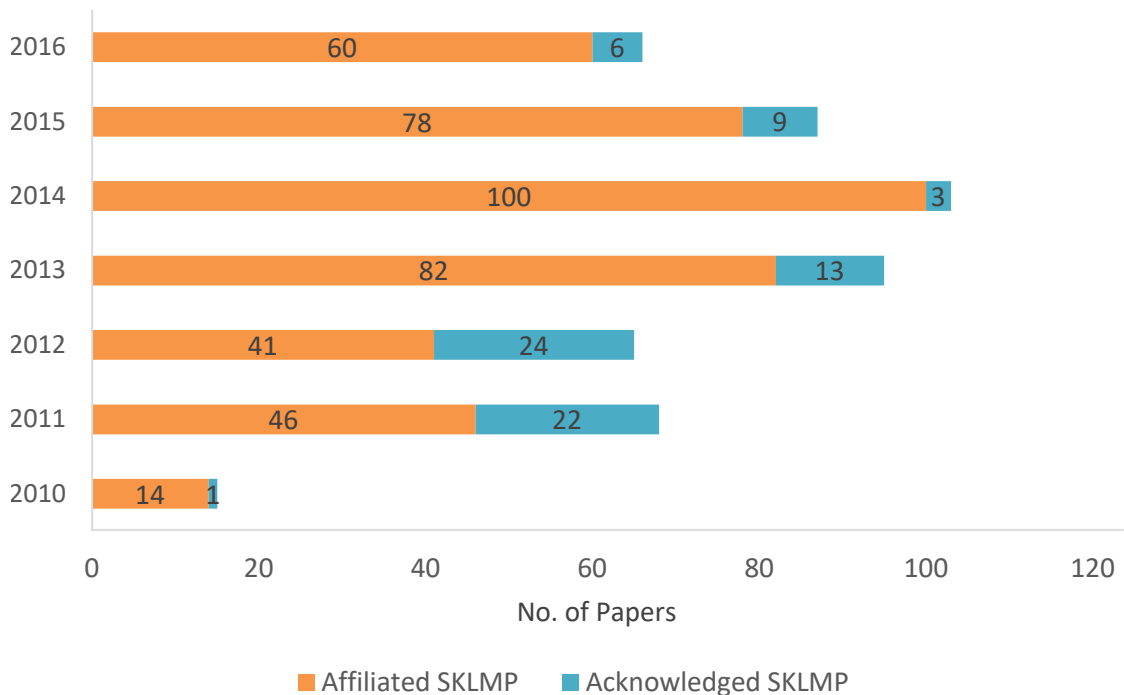
Cheung Kong Chair Professor of Marine Biogeochemistry 長江學者, 海洋生物地球化學特聘教授

Director of the State Key Laboratory of Marine Environment Science 近海海洋環境科學國家重點實驗室主任

Number of SCI publications of SKLMP members (2010-2016)
2010-2016年SKLMP成員的SCI論文數目

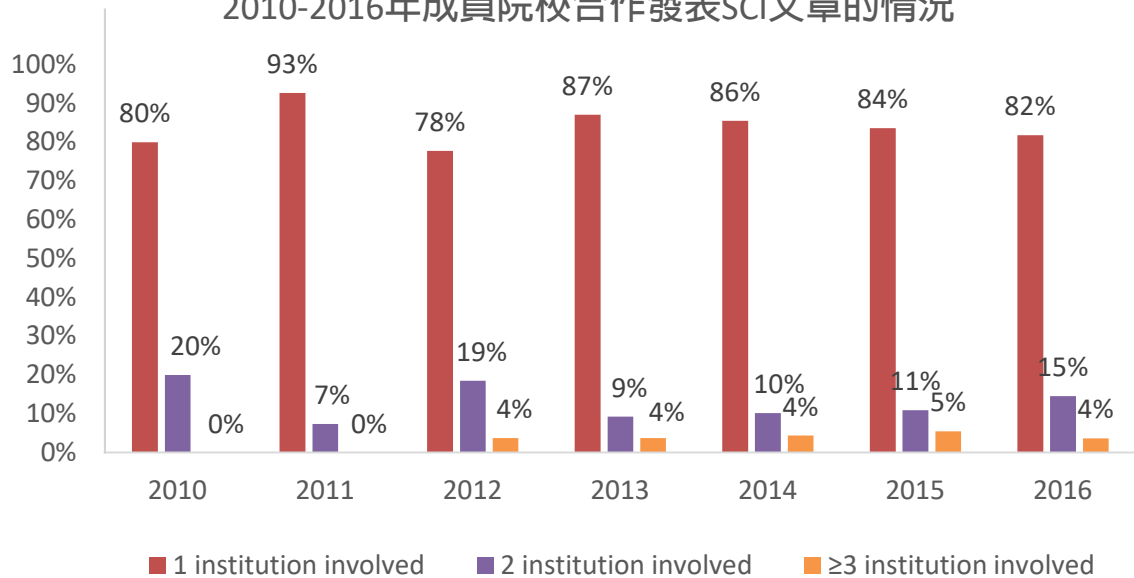


Number of SCI publications of SKLMP (2010-2016)
2010-2016年SKLMP的SCI論文數目



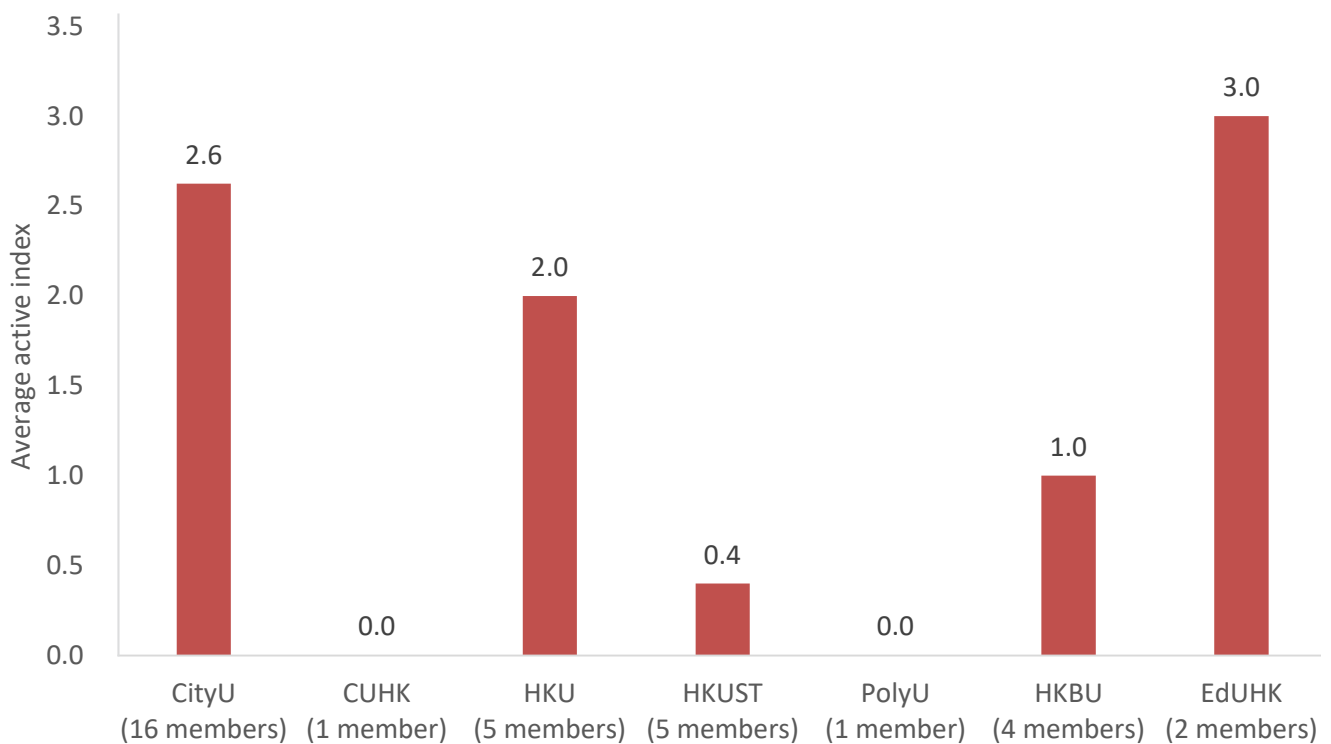
Degree of collaboration among member institutions based on SCI publications in 2010-2016

2010-2016年成員院校合作發表SCI文章的情況



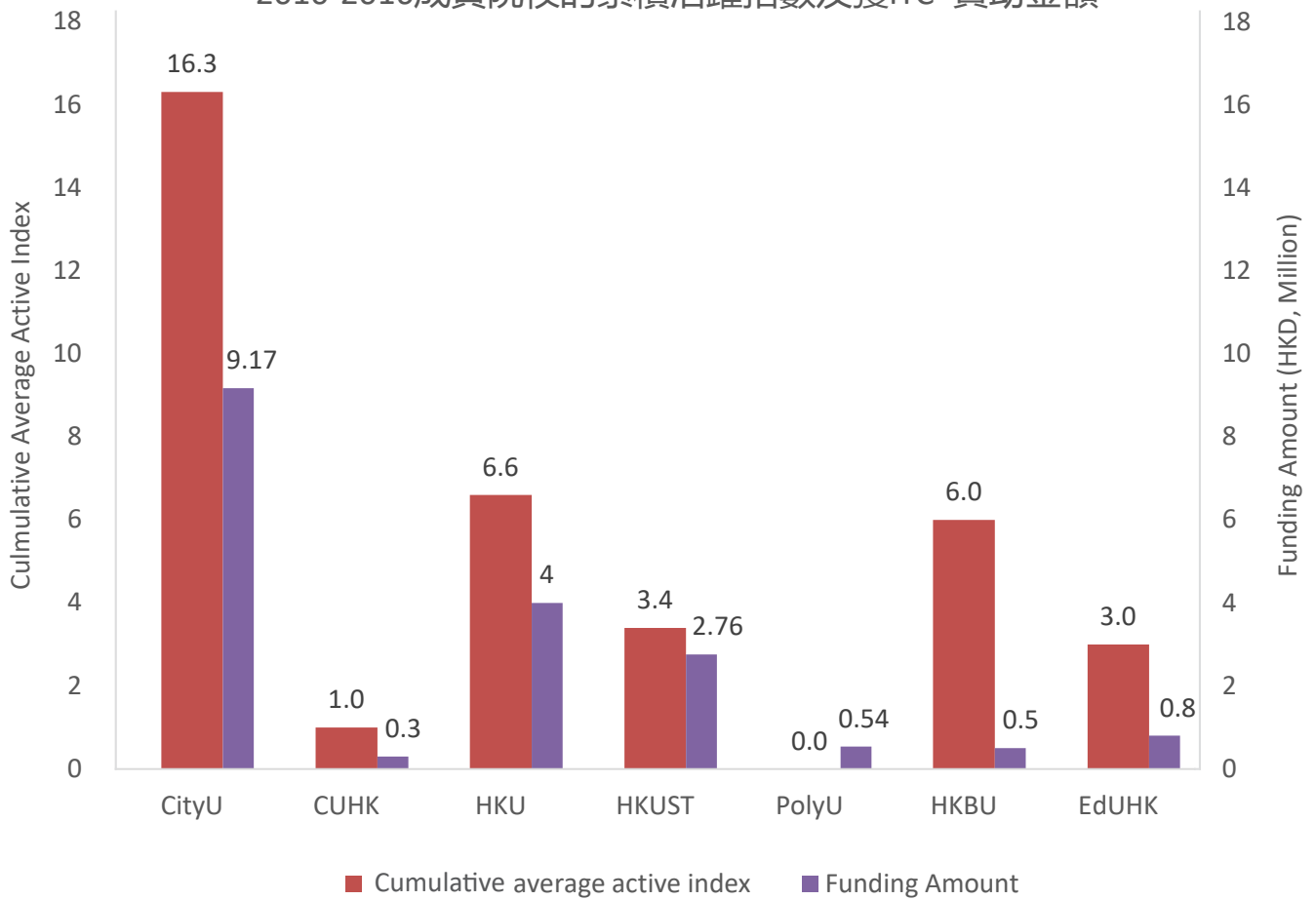
Average active index# of 7 institutions (2016)

2016年成員院校的活躍指數



Cumulative average active index & total ITC* funding amount of 7 institutions (2010-2016)

2010-2016成員院校的累積活躍指數及獲ITC*資助金額



Number of members in 2010-2012: CityU (13), CUHK (3), HKU (5), HKUST (6), PolyU (1), HKBU (2)
 Number of members in 2013: CityU (18), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (7)
 Number of members in 2014: CityU (18), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (5)
 Number of members in 2015: CityU (18), CUHK (2), HKU (6), HKUST (5), PolyU (1), HKBU (5)
 Number of members in 2016: CityU (16), CUHK (1), HKU (5), HKUST (5), PolyU (1), HKBU (4), EdUHK (2)

Average active index = SCI publications/members per institution

平均活躍指數=SCI文章數目/院校成員人數

*The Innovation and Technology Commission (ITC)

創新科技署

Part I. Papers with the SKLMP included as the first affiliation
以SKLMP為第一單位的期刊論文

- 1 Li, V.W., Tsui, M.P., Chen, X., Hui, M.N., Jin, L., Lam, R.H., Yu, R.M., **Murphy, M.B.**, Cheng, J., **Lam, P.K.S., Cheng, S.H.** (2016)
Effects of 4-methylbenzylidene camphor (4-MBC) on neuronal and muscular development in zebrafish (*Danio rerio*) embryos.
Environmental Science and Pollution Research International, 23(9):8275-8285.
- 2 Guo, Z.G., Cheng, S.W., Cometto, C., Arncolabehere-Mallart, E., Ng, S.M., Ko, C.C., Liu, G.J., Chen, L.J., Robert, M., **Lau, T.C.** (2016)
Highly efficient and selective photocatalytic CO₂ reduction by iron and cobalt quaterpyridine complexes.
Journal of the American Chemical Society, 138(30):9413-9416.
- 3 Ye, R.R., Peterson, D.R., Seemann, F., Kitamura, S.I., Lee, J.S., Lau, T.C., Tsui, S.K., **Au, D.W.T.** (2016)
Immune competence assessment in marine medaka (*Oryzias melastigma*)-a holistic approach for immunotoxicology.
Environmental Science and Pollution Research International. DOI:10.1007/s11356-016-7208-x.
- 4 Wang, J., **Wang, W.X.** (2016)
Novel insights into iron regulation and requirement in marine medaka *Oryzias melastigma*.
Scientific Reports, 6:11.
- 5 **Lam, J.C.W.**, Lyu, J., Kwok, K.Y., **Lam, P.K.S.** (2016)
Perfluoroalkyl substances (PFASs) in marine mammals from the south China sea and their temporal changes 2002-2014: Concern for alternatives of PFOS?
Environmental Science and Technology, 50(13):6728-6736.
- 6 Mak, Y.L., Li, J., Liu, C.N., **Cheng, S.H., Lam, P.K.S.**, Cheng, J., **Chan, L.L.** (2016)
Physiological and behavioural impacts of pacific ciguatoxin-1 (P-CTX-1) on marine medaka (*Oryzias melastigma*).
Journal of Hazardous Materials, 321:782-790.

Part II. Papers with the SKLMP as one of the affiliations
以SKLMP為作者單位之一的期刊論文

- 1 Wang, J., Liu, G., Zhang, J., Liu, H., Lam, P.K.S. (2016)
A 59-year sedimentary record of metal pollution in the sediment core from the Huaihe river, Huainan, Anhui, China.
Environmental Science and Pollution Research International, 23(23):23533-23545
- 2 Kumar, G., Au, N.P., Lei, E.N., Mak, Y.L., Chan, L.L., Lam, M.H.W., Chan, L.L., Lam, P.K.S., Ma, E.C.H. (2016)
Acute exposure to pacific ciguatoxin reduces electroencephalogram activity and disrupts neurotransmitter metabolic pathways in motor cortex.
Molecular Neurobiology. DOI: 10.1007/s12035-016-0093-y.
- 3 Deng, D., Tam, N.F.Y. (2016)
Adsorption-uptake-metabolism kinetic model on the removal of BDE-47 by a Chlorella isolate.
Environmental Pollution, 212:290-298.
- 4 Tam, W.Y., Au, N.P.B., Ma, E.C.H. (2016)
The association between laminin and microglial morphology *in vitro*.
Scientific Reports, 6:10.
- 5 Hu, L., Fong, C.C., Zhang, X., Chan, L.L., Lam, P.K.S., Chu, P.K., Wong, K.Y., Yang, M.M.S. (2016)
Au nanoparticles decorated TiO₂ nanotube arrays as a recyclable sensor for photoenhanced electrochemical detection of bisphenol A.
Environmental Science & Technology, 50(8):4430-4438.
- 6 Lin, X.D., Li, V.W.T., Chen, S.Y., Chan, C.Y., Cheng, S.H., Shi, P. (2016)
Autonomous system for cross-organ investigation of ethanol-induced acute response in behaving larval zebrafish.
Biomicrofluidics, 10(2):10.
- 7 Hong, S., Yim, U.H., Ha, S.Y., Shim, W.J., Jeon, S., Lee, S., Kim, C., Choi, K., Jung, J., Giesy, J.P., Khim, J.S. (2016)
Bioaccessibility of AHR-active PAHs in sediments contaminated by the Hebei Spirit oil spill: Application of Tenax extraction in effect-directed analysis.
Chemosphere, 144:706-712.
- 8 Kong, E.Y., Cheng, S.H., Yu, P.K.N. (2016)
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Journal of Radiation Research, 57(4):363-369.
- 9 Giesy, J.P., Solomon, K.R., Kacew, S., Mackay, D., Stobo, G., Kennedy, S. (2016)
The case for establishing a board of review for resolving environmental issues: The science court in Canada.
Integrated Environmental Assessment and Management, 12(3):572-579.
- 10 Shi, W., Deng, D.Y., Wang, Y.T., Hu, G.J., Guo, J., Zhang, X.W., Wang, X.R., Giesy, J.P., Yu, H.X., Wang, Z.H. (2016)
Causes of endocrine disrupting potencies in surface water in East China.
Chemosphere, 144:1435-1442.
- 11 Wang, J., Cao, B., Yang, X., Wu, J., Chan, L.L., Li, Y. (2016)
Chronic ciguatoxin poisoning causes emotional and cognitive dysfunctions in rats.
Toxicology Research, DOI: 10.1039/C5TX00475F.
- 12 Chen, L.G., Zhang, W.P., Ye, R., Hu, C.Y., Wang, Q.W., Seemann, F., Au, D.W.T., Zhou, B.S., Giesy, J.P., Qian, P.Y. (2016)
Chronic exposure of marine medaka (*Oryzias melastigma*) to 4,5-dichloro-2-N-octyl-4-isothiazolin-3-one (DCOIT) reveals its mechanism of action in endocrine disruption *via* the hypothalamus-pituitary-gonadal-liver (HPGL) axis.
Environmental Science & Technology, 50(8):4492-4501.

- 13 Au, N.P., Kumar, G., Asthana, P., Tin, C., Mak, Y.L., **Chan, L.L., Lam, P.K.S., Ma, E.C.H.** (2016)
Ciguatoxin reduces regenerative capacity of axotomized peripheral neurons and delays functional recovery in pre-exposed mice after peripheral nerve injury.
Scientific Reports, 6:26809.
- 14 Ng, C.Y.P., Pereira, S., **Cheng, S.H.**, Adam-Guillermin, C., Garnier-Laplace, J., **Yu, P.K.N.**(2016)
Combined effects of alpha particles and depleted uranium on zebrafish (*Danio rerio*) embryos.
Journal of Radiation Research, 57(4):343-355.
- 15 Shen, X.F., Liu, J.J., Chauhan, A.S., Hu, H., Ma, L.L., **Lam, P.K.S.**, Zeng, R.J. (2016)
Combining nitrogen starvation with sufficient phosphorus supply for enhanced biodiesel productivity of *Chlorella vulgaris* fed on acetate.
Algal Research, 17:261-267.
- 16 Zhang, W., **Wang, W.X.**, Zhang, L. (2016)
Comparison of bioavailability and biotransformation of inorganic and organic arsenic to two marine fish.
Environmental Science & Technology, 50(5):2413-2423.
- 17 Yang, L.H., Cheng, Q., **Tam, N.F.Y.**, Lin, L., Su, W.Q., Luan, T.G. (2016)
Contributions of abiotic and biotic processes to the aerobic removal of phenolic endocrine-disrupting chemicals in a simulated estuarine aquatic environment.
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- 19 Lai, K.P., Li, J.W., Tse, A.C.K., Wang, S.Y., Chan, T.F., **Wu, R.S.S.** (2016)
Differential responses of female and male brains to hypoxia in the marine medaka *Oryzias melastigma*.
Aquatic Toxicology, 172:36-43.
- 20 Li, J.W., Lin, X., Tse, A., Cheung, A., Chan, T.F., **Kong, R.Y.C., Lai, K.P., Wu, R.S.S.** (2016)
Discovery and functional characterization of novel mirnas in the marine medaka *Oryzias melastigma*.
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- 21 Asthana, P., Vong, J.S.L., Kumar, G., Chang, R.C.C., Zhang, G., Sheikh, K.A., **Ma, E.C.H.** (2016)
Dissecting the role of anti-ganglioside antibodies in Guillain-Barré syndrome: An animal model approach.
Molecular Neurobiology, 53(7):4981-4991.
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- 23 He, H., **Tam, N.F.Y.**, Yao, A., Qiu, R., Li, W.C., Ye, Z. (2016)
Effects of alkaline and bioorganic amendments on cadmium, lead, zinc, and nutrient accumulation in brown rice and grain yield in acidic paddy fields contaminated with a mixture of heavy metals.
Environmental Science and Pollution Research International, 23(23):23551-23560.
- 24 Sweet, L.E., Bisesi, J.H., Jr., Lei, E.N., **Lam, M.H.W.**, Klaine, S.J. (2016)
The effects of bupropion on hybrid striped bass brain chemistry and predatory behavior.
Environmental Toxicology and Chemistry, 35(8):2058-2065.
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Effects of tidal flushing regimes on mangrove roots receiving wastewater contaminated with PAHs and PBDEs.
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- 27 Chen, L., Ye, R., Zhang, W., Hu, C., Zhou, B., Peterson, D.R., **Au, D.W.T., Lam, P.K.S., Qian, P.Y.** (2016)
Endocrine disruption throughout the hypothalamus-pituitary-gonadal-liver (HPGL) axis in marine medaka (*Oryzias melastigma*) chronically exposed to the antifouling and chemopreventive agent, 3,3'-diindolylmethane (DIM).
Chemical Research in Toxicology, 29(6):1020-1028.
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Environmental evaluation of coexistence of denitrifying anaerobic methane-oxidizing archaea and bacteria in a paddy field.
Applied Microbiology and Biotechnology, 100(1):439-446.
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Exogenous nitric oxide suppresses *in vivo* X-ray-induced targeted and non-targeted effects in zebrafish embryos.
International Journal of Molecular Sciences, 17(8):12.
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Experimental evaluation of the metabolic reversibility of ANME-2d between anaerobic methane oxidation and methanogenesis.
Applied Microbiology and Biotechnology, 100(14):6481-6490.
- 31 Tse, W.K.F., Li, J.W., Tse, A.C.K., Chan, T.F., Ho, J.C.H., **Wu, R.S.S., Wong, C.K.C., Lai, K.P.** (2016)
Fatty liver disease induced by perfluorooctane sulfonate: Novel insight from transcriptome analysis.
Chemosphere, 159:166-177.
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Glutathione-ascorbate cycle is an early warning indicator of toxicity of BDE-47 in mangroves.
Journal of Environmental Quality, on-line DOI:10.2134/jeq2016.04.0141.
- 33 Degger, N., **Chiu, J.M.Y.**, Po, B.H.K., Tse, A.C.K., Zheng, G.J., Zhao, D.M., Xu, D., Cheng, Y.S., Wang, X.H., Liu, W.H., **Lau, T.C., Wu, R.S.S.** (2016)
Heavy metal contamination along the China coastline: A comprehensive study using artificial mussels and native mussels.
Journal of Environmental Management, 180:238-246.
- 34 Ng, T.P.T., Cheng, M.C.F., Ho, K.K.Y., Lui, G.C.S., **Leung, K.M.Y.**, Williams, G.A. (2016)
Hong Kong's rich marine biodiversity: The unseen wealth of South China's megalopolis.
Biodiversity & Conservation:1-14.
- 35 Ng, C.Y.P., **Cheng, S.H., Yu, P.K.N.** (2016)
Hormetic effect induced by depleted uranium in zebrafish embryos.
Aquatic Toxicology, 175:184-191.
- 36 Chen, Z.J., Liu, H.Y., Ho, K.L., Huang, H.B., Liu, Q., Man, Y.B., **Lam, M.H.W.**, Du, J., Wong, M.H., Wang, H.S. (2016)
Hydroxylated polybrominated diphenyl ethers (OH-PBDEs) in paired maternal and neonatal samples from South China: Placental transfer and potential risks.
Environmental Research, 148:72-78.
- 37 Lai, K.P., Li, J.W., Tse, A.C.K., Chan, T.F., **Wu, R.S.S.** (2016)
Hypoxia alters steroidogenesis in female marine medaka through mirnas regulation.
Aquatic Toxicology, 172:1-8.

- 38 Wang, S.Y., Lau, K., Lai, K.P., Zhang, J.W., Tse, A.C., Li, J.W., Tong, Y., Chan, T.F., **Wong, C.K.C., Chiu, J.M.Y., Au, D.W.T., Wong, A.S., Kong, R.Y.C., Wu, R.S.S.** (2016)
Hypoxia causes transgenerational impairments in reproduction of fish.
Nature Communications, 7:12114.
- 39 Kim, H.S., Hwang, D.S., Jeong, C.B., **Au, D.W.T., Lee, J.S.** (2016)
Identification and conservation of gene loss events of hox gene clusters in the marine medaka (*Oryzias melastigma*).
Journal of Experimental Zoology Part B, in press.
- 40 Steinberg, P.D., Airoidi, L., Banks, J., **Leung, K.M.Y.** (2016)
Introduction to the special issue on the World Harbour Project.
Regional Studies in Marine Science, 8(2):217-219.
- 41 Ho, K.K.Y., Zhou, G.J., Xu, E.G.B., Wang, X.H., **Leung, K.M.Y.** (2016)
Long-term spatio-temporal trends of organotin contaminations in the marine environment of Hong Kong.
PLoS One, 11(5):17.
- 42 Wang, Z., Meador, J.P., **Leung, K.M.Y.** (2016)
Metal toxicity to freshwater organisms as a function of pH: A meta-analysis.
Chemosphere, 144:1544-1552.
- 43 Ng, C.Y.P., Kong, E.Y., Kobayashi, A., Suya, N., Uchihori, Y., **Cheng, S.H., Konishi, T., Yu, P.K.N.** (2016)
Non-induction of radioadaptive response in zebrafish embryos by neutrons.
Journal of Radiation Research, 57(3):210-219.
- 44 Kim, B.M., Kim, J., Choi, I.Y., Raisuddin, S., **Au, D.W.T., Leung, K.M.Y., Wu, R.S.S., Rhee, J.S., Lee, J.S.** (2016)
Omics of the marine medaka (*Oryzias melastigma*) and its relevance to marine environmental research.
Marine Environmental Research, 113:141-152.
- 45 Yamazaki, E., Falandysz, J., Taniyasu, S., Hui, G., Jurkiewicz, G., Yamashita, N., Yang, Y.L., **Lam, P.K.S.** (2016)
Perfluorinated carboxylic and sulphonic acids in surface water media from the regions of Tibetan Plateau: Indirect evidence on photochemical degradation?
Journal of Environmental Science and Health Part A Toxic/Hazardous Substances & Environmental Engineering, 51(1):63-69.
- 46 Zhang, H.Y., **Shin, P.K.S., Cheung, S.G.** (2016)
Physiological responses and scope for growth in a marine scavenging gastropod, *nassarius festivus* (Powys, 1835), are affected by salinity and temperature but not by ocean acidification.
ICES Journal of Marine Science, 73(3):814-824.
- 47 Kwan, B.K.Y., Hsieh, H.L., **Cheung, S.G., Shin, P.K.S.** (2016)
Present population and habitat status of potentially threatened Asian horseshoe crabs *Tachypleus tridentatus* and *Carcinoscorpius rotundicauda* in Hong Kong: A proposal for marine protected areas.
Biodiversity and Conservation, 25(4):673-692.
- 48 Ng, C.Y.P., Chun, S.L., **Yu, P.K.N.** (2016)
Quality assurance of alpha-particle dosimetry using peeled-off gafchromic EBT3[®] film.
Radiation Physics and Chemistry, 125:176-179.
- 49 Xu, E.G., Ho, P.W.L., Tse, Z., Ho, S.L., **Leung, K.M.Y.** (2016)
Revealing ecological risks of priority endocrine disrupting chemicals in four marine protected areas in Hong Kong through an integrative approach.
Environmental Pollution, 215:103-112.
- 50 Chan, A.K.Y., Xu, W.Z., Liu, X.S., **Cheung, S.G., Shin, P.K.S.** (2016)
Sediment characteristics and benthic ecological status in contrasting marine environments of subtropical Hong Kong.
Marine Pollution Bulletin, 103(1-2):360-370.



- 51 **Leung, K.M.Y.**, Hui, J.H., Chan, K.K.Y., Kwok, K.W.H. (2016)
A special issue on the First International Conference on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECOME 2015).
Regional Studies in Marine Science, 8(3): 480-486.
- 52 Yeung, J.W.Y., Zhou, G.J., **Leung, K.M.Y.** (2016)
Sub-lethal effects of cadmium and copper on RNA/DNA ratio and energy reserves in the green-lipped mussel *Perna viridis*.
Ecotoxicology & Environmental Safety, 132:59-67.
- 53 Chalifour, A., **Tam, N.F.Y.** (2016)
Tolerance of cyanobacteria to the toxicity of BDE-47 and their removal ability.
Chemosphere, 164:451-461.
- 54 Lai, K.P., Li, J.W., Tse, A.C.K., Cheung, A., Wang, S., Chan, T.F., **Kong, R.Y.C., Wu, R.S.S.** (2016)
Transcriptomic responses of marine medaka's ovary to hypoxia.
Aquatic Toxicology, 177:476-483.

Part III. Papers with the SKLMP grant or support acknowledged
致謝SKLMP支持的期刊論文

- 1 Zhang, S.W., **Liu, H.B.**, Guo, C., Harrison, P.J. (2016)
Differential feeding and growth of noctiluca scintillans on monospecific and mixed diets.
Marine Ecology Progress Series, 549:27-40.
- 2 Cheng, Z., Lam, C.L., Mo, W.Y., Nie, X.P., Choi, W.M., Man, Y.B., **Wong, M.H.** (2016)
Food wastes as fish feeds for polyculture of low-trophic-level fish: Bioaccumulation and health risk assessments of heavy metals in the cultured fish.
Environmental Science and Pollution Research, 23(8):7195-7203.
- 3 Li, C.Y., Meng, Y., He, C., Chan, V.B.S., Yao, H.M., **Thiyagarajan, V.** (2016)
Mechanical robustness of the calcareous tubeworm *Hydroides elegans*: Warming mitigates the adverse effects of ocean acidification.
Biofouling, 32(2):191-204.
- 4 Dineshram, R., Chandramouli, K., Ko, G.W.K., Zhang, H.M., **Qian, P.Y.**, Ravasi, T., **Thiyagarajan, V.** (2016)
Quantitative analysis of oyster larval proteome provides new insights into the effects of multiple climate change stressors.
Global Change Biology, 22(6):2054-+.
- 5 Yin, R.S., Feng, X.B., Zhang, J.J., Pan, K., **Wang, W.X.**, **Li, X.D.** (2016)
Using mercury isotopes to understand the bioaccumulation of Hg in the subtropical pearl river estuary, South China.
Chemosphere, 147:173-179.

Attendance at International Conferences & Titles of Presentations 出席的國際會議與報告標題

Dr. Put O. ANG

New challenges faced by dominant corals in Hong Kong marginal coral communities

International Coral Reef Symposium
19-24 Jun, 2016, Honolulu, Hawaii, USA
Participant, Oral

Reduced salinity and lowered temperature as potential barriers for the dispersal of *Sargassum hemiphyllum* var. *chinense* along northern west Pacific coasts

Phycological Society of America, Annual Meeting
23-28 Jul, 2016, Cleveland, Ohio, USA
Participant, Oral

Dr. Doris Wai Ting AU

The past, present and future on marine environmental research using the marine medaka *Oryzias melastigma* model

Aquatic organisms for human disease models and toxicology research
17-19 Mar, 2016, Okazaki, Japan
Invited Plenary Lecture, Oral

Application of the marine medaka *Oryzias melastigma* for marine environmental research – A review

8th International Conference on Marine Pollution and Ecotoxicology
20-24 June, 2016, Hong Kong
Invited Speaker, Oral

A comparative approach of developmental immunotoxicity: *Oryzias melastigma* as marine fish model for immunotoxicology

The 30th Congress of the New European Society for Comparative Physiology and Biochemistry (ESCPB 2016)
4-7 Sep, 2016, Barcelona
Co-author of Invited Talk, Oral

Dr. Siu Gin CHEUNG

Two aspects of the effect of ocean acidification on marine molluscs: Habitat-related responses and predator-prey interaction

Postgraduate Seminar
14 Apr, 2016, Chinese University of Hong Kong, Hong Kong
Invited Presentation, Oral

Allelopathic effects of leaf litter leachates from *Kandelia obovata* and their purified condensed tannins on germination and growth of *Aegiceras corniculatum*

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, The University of Hong Kong, Hong Kong
Participant, Poster

Coastal avian response to the managed degraded mangrove wetland

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, The University of Hong Kong, Hong Kong
Participant, Poster

The combined effects of ocean acidification and food availability on development, reproduction and SOD activity of *Tigriopus japonicus*

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, Hong Kong
Participant, Poster

Does energetic cost for leaf construction in *Sonneratia* change from original to introduced swamps and differ from other mangrove genera in south China?

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, Hong Kong
Participant, Poster

Microplastic ingestion reduced energy intake in the clam *Atactodea striata* by food dilution effect

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, Hong Kong
Participant, Poster

Performance and bacterial community structure of mangrove constructed wetland under ten-year operation

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, The University of Hong Kong, Hong Kong
Participant, Poster

Predator-prey interaction between muricid gastropods and mussels under ocean acidification

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, Hong Kong
Participant, Oral

Toxicity and removal of phenanthrene, fluoranthene and pyrene by two *Navicula* species, a commercial species (*N. incerta*) and a local isolate

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, Hong Kong
Participant, Poster

Whole genome duplications in two Asian horseshoe crabs

6th Meeting of the European Society for Evolutionary Developmental Biology (EED)
26-29 Jul, 2016, Uppsala, Sweden
Co-author of the Presentation, Poster

Conservation of horseshoe crabs in a warming world

Science in the Public Service - Public Lecture Series 2016
10 Sep, 2016, Hong Kong Science Museum, Hong Kong
Invited Presentation,, Oral

Engineered bio-filtration systems can mitigate eutrophication problem in mariculture zones in Hong Kong

International Workshop on Eco-shoreline Designs for Sustainable Coastal Development
16 Nov, 2016, The University of Hong Kong, Hong Kong
Invited Presentation, Oral

Prof. Jianping GAN

Coupled circulation and ecosystem trends in the South China Sea: response to changing climate

The 2016 Ocean Science Meeting
21-26 Feb 2016, New Orleans, Louisiana, USA
Participant, Poster

A three-layer alternating spinning circulation in the South China Sea

The 8th International Workshop on Modeling the Ocean (IWMO)
7-10 Jun, 2016, BOLOGNA, Italy
Participant, Oral

Assessments of circulation and physics in China seas by China-Sea Multi-Scale Ocean Modeling System (CMOMS) and global circulation models

The 13th Annual Meeting Asia Oceania Geosciences Society
31 Jul - 5 Aug, 2016, Beijing, China
Participant, Oral

Circulation and ecosystem response in the Pearl River plume

International Workshop on Turbulent Mixing and Sediment Transport in the Ocean
12-14 Sep, 2016, Guangzhou, China
Invited Speaker, Oral

Dr. Richard Yuen Chong KONG

Hypoxia-induced epigenetic changes and transgenerational reproductive defects in marine medaka

SETAC-AU 2016 (Society of Environmental Toxicology and Chemistry Australasia's Conference), Industry, Science and Environment – Towards a Sustainable Future
4-7 Oct, 2016, Hobart, Tasmania, Australia
Participant, Oral

Prof. Kenneth Mei Yee LEUNG

Advances and challenges in assessing ecological risks of chemical contaminants in aquatic ecosystems

The 2nd International Symposium on Environmental Health
15-16 Feb, 2016, Graduate School of Public Health of Seoul National University, Seoul, Korea
Invited Keynote Speaker, Oral

From dose-response relationships to setting effect thresholds for protecting individual organisms and ecosystem integrity

International Workshop on Health Risk Assessment, Intervention and Collaboration
16-17 Apr, 2016, Shantou University, Shantou, China
Invited Keynote Speaker, Oral

Pollution issues, monitoring and indicators of environmental quality in harbours

EuroMarine and World Harbour Project Joint Workshop on Developing Ecosystem-based Solutions for Resilient European Harbours and Coastal Waterfronts (ECORES)
4-6 May, 2016, Bologna, Italy
Invited Speaker, Oral

Scientific derivation of environmental quality benchmarks for protecting aquatic ecosystems: Challenges and opportunities

Society of Environmental Toxicology and Chemistry (SETAC) Asia/Pacific 2016 Conference
16-19 Sep, 2016, National University of Singapore, Singapore
Invited Plenary Speaker, Oral

Dr. Hongbin LIU

Bottom-up and top-down regulation of *Noctiluca scintillans*

ICES/PICES 6th Zooplankton Production Symposium

9-13 May, 2016, Bergen, Norway

Invited Speaker, Oral

Geographical niche differentiation of *Synechococcus* communities in the western Pacific marginal seas

Japan Oceanographic Society Meeting

12-14 Sep, 2016, Kagoshima, Japan

Invited Speaker, Oral

Dr. Jianwen QIU

The 2014 summer coral bleaching in Hong Kong

8th International Conference on Marine Pollution and Ecotoxicity

20-24 Jun, 2016, Hong Kong

Participant, Oral

Phylogeny and evolution of mitochondrial genomes in Polynoidae

International Polychaete Conference

1-5 Aug, 2016, Cardiff, Wales

Participant, Oral

Prof. Nora Fung Yee TAM

Monitoring and control of pollutants in mangrove wetland

1st Forum on Conservation of Coastal Wetland in Shenzhen and Hong Kong

16 Jan, 2016, Shenzhen, China

Invited Speech, Oral

Mangrove wetland: Our green kidney

President's Lecture Series

21 Apr, 2016, City University of Hong Kong, Hong Kong

Invited Speech, Oral

Allelopathic effects of leaf litter leachates from *Kandelia obovata* and their purified condensed tannins on germination and growth of *Aegiceras corniculatum*

8th International Conference on Marine Pollution and Ecotoxicology

20-24 Jun, 2016, The University of Hong Kong, Hong Kong

Participant, Poster

Antioxidative response systems of *Kandelia obovata*, a true mangrove plant species, to polybrominated diphenyl ethers (BDE-99 and BDE-209) during germination and early growth

8th International Conference on Marine Pollution and Ecotoxicology

20-24 Jun, 2016, The University of Hong Kong, Hong Kong

Participant, Oral

Coastal avian response to the managed degraded mangrove wetland

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, The University of Hong Kong, Hong Kong
Participant, Poster

Comparison of BDE-47 degradation pathways under aerobic, anaerobic and alternating aerobic and anaerobic conditions in mangrove sediment

8th International Conference on Marine Pollution and Ecotoxicology
20-24 June, 2016, The University of Hong Kong, Hong Kong
Participant, Oral

Performance and bacterial community structure of mangrove constructed wetland under ten-year operation

8th International Conference on Marine Pollution and Ecotoxicology
20-24 Jun, 2016, The University of Hong Kong, Hong Kong
Participant, Poster

Constructed mangrove wetland and wastewater treatment

11 Jul, 2016, Inner Mongolia Agricultural University, China
Invited Lecture, Oral

Effects of polybrominated diphenyl ethers (BDE-99 and BDE-209) on germination and growth of a mangrove plant, *Kandelia obovata*

International Discussion on the Causes and Consequences of Mangrove Ecosystem Responses to an Ever-changing Climate: Mangrove & Macrobenthos Meeting MMM4
18-22 Jul, 2016, St. Augustine, FL, USA
Participant, Poster

Effects of BDE-209 and aquaculture effluents on antioxidative response systems of *Avicennia marina*, a true mangrove plant species

36th International Symposium on Halogenated Persistent Organic Pollutants (Dioxin 2016)
28 Aug - 2 Sep, 2016, Florence, Italy
Participant, Poster

Responses of microbial communities during anaerobic degradation of BDE-153 in four types of aquatic sediments

36th International Symposium on Halogenated Persistent Organic Pollutants (Dioxin 2016)
28 Aug - 2 Sep, 2016, Florence, Italy
Participant, Poster

Constructed mangrove wetland for water treatment

Research & Development Forum 2016
8 Nov, 2016, Drainage Services Department, HKSAR Government, Hong Kong
Invited Speaker, Oral

Removal of waste water-borne polybrominated diphenyl ethers by mangrove wetland microcosms

International Conference on Environment, Chemistry and Biology (ICEBC 2016)
26-28 Nov, 2016, Sydney, Australia
Participant, Oral

Prof. Michael Mengsu YANG

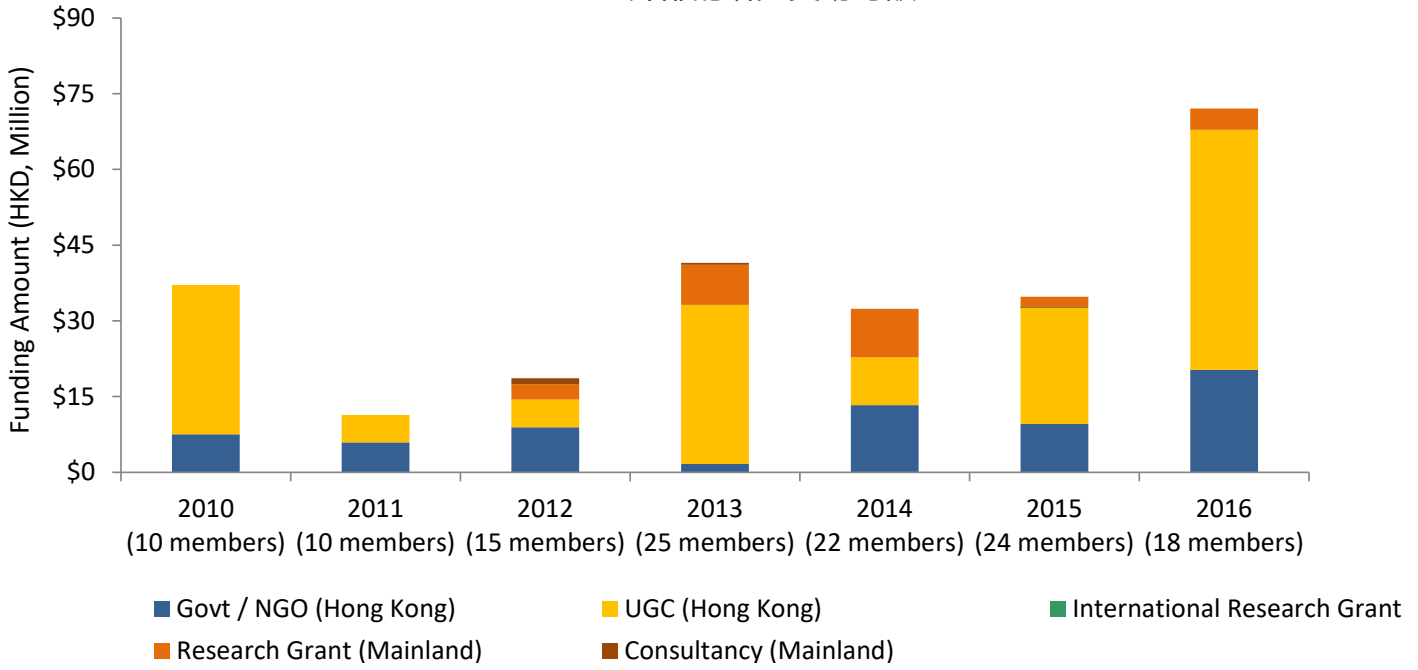
Fluorescent beads-based biosensors for multiplexed detection of waterborne pathogens (won Young Scientist Award)

The 2nd International Conference on Nanomedicine
18-21 Oct, 2016, Wuhan, China
Participant, Oral

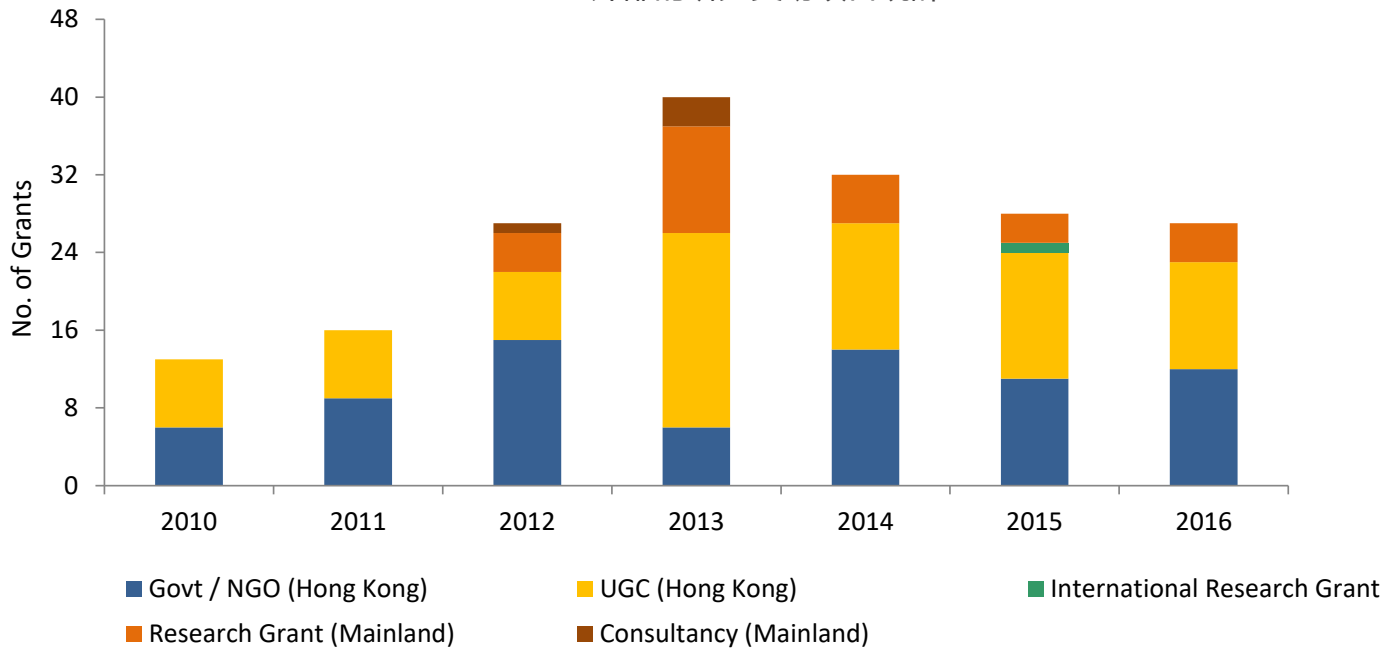
Research Grants 研究資助 *

Competitive External Research Grants 外部的研究資助

Amount of Competitive External Research Grants (2010-2016)#
2010-2016外部的研究資助總額#



Number of Competitive External Research Grants (2010-2016)
2010-2016外部的研究資助項目統計



* Research Grants information provided by members.

Number of members in 2010-2012: CityU (13), CUHK (3), HKU (5), HKUST (6), PolyU (1), HKBU (2)
 Number of members in 2013: CityU (18), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (7)
 Number of members in 2014: CityU (18), CUHK (2), HKU (5), HKUST (5), PolyU (1), HKBU (5)
 Number of members in 2015: CityU (18), CUHK (2), HKU (6), HKUST (5), PolyU (1), HKBU (5), XMU (1)
 Number of members in 2016: CityU (16), CUHK (1), HKU (5), HKUST (5), PolyU (1), HKBU (4), EduHK (2), XMU (1)

1CNY=1.2HKD (2016)

Grants from Hong Kong 香港科研資助

Government / Non-governmental Organization 政府部門 / 公益項目

	Project Title * 項目名稱	Grant Type 資助類型	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
2016				
1.	Pilot Trial of Eco-shoreline at the Taishan Receptor Site 中國台山填海區生態海岸之初步研究	Civil Engineering and Development Department 土木工程拓展署	<u>Leung, K.M.Y.</u> Lai, V.C.S.	980,000
2.	Environmental Sustainability 環境可持續發展	Faculty Strategic Grant 教育大學學院策略發展基金	<u>Wu, R.S.S.</u>	3,500,000
3.	Vertebral Deformity Induced by Ancestral Exposure to Benzo[a]pyrene Using Unique Transgenic Medaka Bone Model 利用獨特的轉基因青鱒魚骨模型研究親代苯並(a)芘暴露所引起的脊椎畸形	CityU Strategic Research Grant	<u>Au, D.W.T.</u>	100,000
4.	Fishing Surveys at (1) Hoi Ha Wan, Tung Ping Chau, Yan Chau Tong Marine Parks and Cape D'Aguiar Marine Reserve, and (2) Shar Chau & Lung Kwu Chau, Brothers, Southwest Lantau and Soko Islands Marine Parks 香港海岸保護區的漁業資源研究	Agriculture, Fisheries and Conservation Department 漁農自然護理署	<u>Lai, V.C.S.</u> <u>Leung, K.M.Y.</u>	1,350,000
5.	Wastewater-derived Energy for Smart Towns 供給於智慧城市的廢水衍生能源	Innovation and Technology Fund 創新及科技基金	<u>Li, X.D.</u> Lee, H.P.H. Leu, B.S.Y. Ni, M. Hsu, M. Tsang, D.C.W.	6,549,918
6.	Field Experiments on Coral Bioerosion 珊瑚生物侵蝕的野外實驗	Environment and Conservation Fund 環境及自然保育基金	<u>Qiu, J.W.</u>	500,000
7.	Juvenile Fish Resources and Nursery Function of Macroalgal Beds in Hong Kong Waters – a Habitat-based Study (ECF 15/2015) 香港水域大型海藻床幼魚資源及其育幼功能- 以棲息地為基礎的研究	Environment and Conservation Fund 環境及自然保育基金	<u>Lam, P.K.S.</u> Leung, P.T.Y. Liu, M. <u>Wai, T.C.</u>	500,000
8.	Contract Ref.: AFCD/SQ/175/15/C Provision of Survey Services of Ichthyoplankton, Zooplankton and Juvenile Fish and Crustacean in the Potential Fisheries Protection Areas 就擬建漁業保護區進行魚類浮游生物,浮游動物, 幼年期的魚類和甲殼類動物的調查研究	Agriculture, Fisheries and Conservation Department 漁農自然護理署	<u>Lam, P.K.S.</u> <u>Wai, T.C.</u> Leung, P.T.Y. Liu, M. Shao, K.T.	1,428,290
9.	Coral Restoration in Tolo Harbour and Channel 吐露港珊瑚群落的修復策略	Environment and Conservation Fund 環境及自然保育基金	<u>Ang, P.O.</u>	499,920
10.	The 2 nd International Conference on Deriving Environmental Quality Standards for the Protection of Aquatic Ecosystems (EQSPA-2016) 第二屆推導保護水生生態環境品質標準國際研討會 (EQSPA 2016)	Environment and Conservation Fund 環境及自然保育基金	<u>Leung, K.M.Y.</u>	386,000

Government / Non-governmental Organization 政府部門 / 公益項目

Project Title * 項目名稱	Grant Type 資助類型	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
2016			
11. Development of a DNA-based Platform for Marine Toxic Algal Species Identification 以 DNA 為基礎 建立 海洋 有毒藻類鑑定 平台	Guangdong - Hong Kong Technology Cooperation Funding Scheme (TCFS), Innovation and Technology Commission (ITC) 深港創新圈	<u>Leung, P.T.Y.</u> <u>Chan, L.L.</u>	720,000
12. Circulating Seawater Nursery Systems for Fish Fry: Industrial Applications, Demonstrations and Knowledge Transfer 漁排上建立示範及教育單位, 展示商業上可行的循環海水育苗系統	Agriculture, Fisheries and Conservation Department 漁農自然護理署	<u>Lam, P.K.S.</u> <u>Chan, L.L.</u>	3,780,000
Subtotal		HKD 20,294,128	

University Grants Committee 大學教育資助委員會

Project Title * 項目名稱	Grant Type 資助類型	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
2016			
1. Enhanced Separation and Sludge Refinery for Wastewater Treatment - Solving the Nexus of Pollution Control and Resource Recovery in Mega Cities 高效濃縮分離和污泥精煉協同新技術實現城市水污染控制和資源回收	Theme-based Research Scheme 主題研究計劃	<u>Li, X.Y.</u> <u>Leung, K.M.Y.</u> Zhang, T. Chen, J. Chui, T.F.M. <u>Gu, J.D.</u> <u>Li, X.D.</u> Lee, H.P.H. Zhang, X.R. Lo, I.M.C.	35,556,000
2. Seven-coordinate Metal Oxo and d0 Metal Nitrido Oxo Complexes as Active Species for the Oxidation of Water and Organic Substrates 以七配位金屬氧化物和d0金屬氮氧化物為活性中間體進行的水氧化和有機物氧化之研究	General Research Fund 優配研究金	<u>Lau, T.C.</u>	540,824
3. Benthic and Epiphytic Toxic Algae (BETA): An Emerging Threat to Coral Ecosystems in Hong Kong Waters 底棲及附生產毒藻類對香港珊瑚生態系統的新興威脅	Collaborative Research Fund 協作研究金	<u>Lam, P.K.S.</u> <u>Chan, L.L.</u> <u>Cheng S.H.</u> <u>Ang, P.O.</u> Cheng, J.P. Lu, C.K. Lu, D.D. Chen, Y.M. <u>Wai, T.C.</u> Mak, Y.M. Leung, P.T.Y.	5,573,636

University Grants Committee 大學教育資助委員會

	Project Title * 項目名稱	Grant Type 資助類型	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
2016				
4.	Accumulation and Toxicity of Metals in Hong Kong Oysters under Intermittent Exposure and Turbid Estuarine Environments 香港牡蠣在間斷性暴露和變化河口環境中的金屬累積和毒性	General Research Fund 優配研究金	<u>Wang, W.X.</u>	985,392
5.	Bisphenol A Analogues: Mechanistic Actions on Embryo Implantation and Endometrial Receptivity 雙酚A類似物：在胚胎種植和子宮內膜容受性中的機制	General Research Fund 優配研究金	<u>Lee, C.K.F.</u> Ng, E.H.Y. <u>Wong, C.K.C.</u> Yeung, W.S.B.	920,395
6.	Investigation of Concentration Polarization during Crossflow Membrane Filtration Using Laser-based Detection (LIF and LDA) Techniques 基於鐳射檢測技術(LIF和LDA)對錯流式膜分離過程中濃差極化的研究	General Research Fund 優配研究金	<u>Li, X.Y.</u> Lam, K.M.	695,788
7.	Targeting Vagal Afferent in Learning and Memory Impairments Associated with Chronic Visceral Pain: The Role of Cholecystokinin 膽囊收縮素靶向迷走傳入神經在慢性內臟痛相關的學習記憶障礙中的作用	General Research Fund 優配研究金	<u>Li, Y.</u> Chan, H.M.	670,155
8.	Ablation of Lhx1/5 Gene Expression in Cerebellar Purkinje Cells Delay Peripheral Nervous System Regeneration 敲除小腦浦肯野細胞中的 Lhx1/5 表達基因可致外周神經系統再生延遲	General Research Fund 優配研究金	<u>Ma, E.C.H.</u> Kwan, K.M. Tin, C.	1,112,470
9.	Will Hypoxia and Ocean Acidification Alter Biofilms and Hence Disrupt Their Role as a Signpost for Marine Larval Settlement? 海水缺氧狀態和酸化會影響生物膜，而進而影響浮游幼體附著和變態模式嗎？	General Research Fund Early Career Scheme 優配研究金傑出青年學者計劃	<u>Chiu, J.M.Y.</u> <u>Thiyagarajan, V.</u> <u>Wu, R.S.S.</u>	715,836
10.	Divergence of Perivitelline Fluid Proteins in Association with the Change in Egg Deposition Environment in Apple Snails: A Transcriptomic and Proteomic Approach 使用轉錄組以及蛋白組研究福壽螺卵週液蛋白分化與產卵環境的關係	General Research Fund 優配研究金	<u>Qiu, J.W.</u> Chu, K.H. Heras, H.	706,972
11.	Potentially Harmful Trace Metals in the Hong Kong and South China Region: Baseline, Sources, and Recommendations (PEAT-MET) 潛在有害微量金屬元素在香港和華南地區的分佈：基準、來源和修復方案 (PEAT-MET)	PROCORE-France/Hong Kong Joint Research Scheme 法國與香港合作研究計劃	<u>Li, X.D.</u>	51,840
Subtotal				HKD 47,529,308

Grants from Mainland China
內地科研資助

Research Grant 科研項目

	Project Title 項目名稱	Grant Type 資助類型	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (CNY)
2016				
1.	Study on the Ecological Threshold under the Urbanization 城市化條件下海灣的生態閾值	Science and Technology Innovation Commission of Shenzhen Municipality 深圳市科技計劃學科佈局項目	<u>Lam, P.K.S.</u> <u>Chan, L.L.</u>	2,000,000
2.	Identification and Molecular Studies of Environmental Obesogens that Cause Overeating 引發飲食過量的環境性肥胖原的鑒別及分子研究	NSFC 國家自然科學基金	<u>Kong, R.Y.C.</u>	680,000
3.	The role of rhizosphere and nitrogen addition on bioremediation of polybrominated biphenyl ethers (PBDEs) in mangrove wetlands 紅樹林濕地生物修復多溴聯苯醚PBDEs的根際功能及氮效應研究	NSFC 國家自然科學基金	<u>Tam, N.F.Y.</u>	800,000
4.	Comparative Study on Transcriptome and Toxicity of <i>Gambierdiscus</i> spp. to Ocean Acidification and Temperature Effect 海洋酸化與溫度變化對網比甲藻轉錄組與毒性的比較研究	NSFC 國家自然科學基金	<u>Leung, P.T.Y.</u> <u>Chan, L.L.</u>	740,000
Subtotal				CNY 4,220,000

Funding support from CityU
城大內部撥款資助項目

CityU Internal Research Fund (IRF) 城大內部研究經費

IRF is a seed grant allocated to SKLMP CityU members of SKLMP for attracting large outside grants and bringing members together within CityU

Project Title * 項目名稱	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
Feb 2015 – Jan 2017		
1. Bone miRNAs deregulation and skeletal impairment in offspring induced by parental exposure to benzo[a]pyrene 青鱒魚苯並(a)芘暴露導致後代骨細胞小RNA表達異常以及骨質損害/損傷的研究	<u>Au, D.W.T. (CityU)</u> Winkler, C. (NUS) Zhang, G. (BU)	150,000
2. Pilot baseline study of marine biodiversity and aquaculture environment at O Pui Tong mariculture zone and its surrounding area 澳背塘及其周邊地區之海洋生物多樣性及水產養殖環境的基線調查	<u>Chan, L.L. (CityU)</u> Qiu, J.W. (BU) Lam, J.C.W. (EdUHK) Wai, T.C. (CityU) Mak, M.Y.L. (CityU) Wu, J.J. (CityU) Leung, P.T.Y. (CityU)	150,000
3. Trophic interactions of the rocky shore community under ocean acidification 岩岸群落在海洋酸化下的營養互動	<u>Cheung, S.G. (CityU)</u> Shin, P.K.S. (CityU)	150,000
4. Effect of alternating aerobic-anaerobic conditions on microbial transformation of polybrominated diphenylethers (PBDEs) in mangrove sediments 紅樹林沉積物好氧-厭氧交替環境下多溴聯苯醚 (PBDEs) 的微生物轉化作用及機理研究	<u>Tam, N.F.Y. (CityU)</u> Luan, T.G. (SYSU)	150,000
Apr 2015 – Mar 2017		
5. Design and development of microbead-based biosensors for multiplexed detection of waterborne pathogens in mariculture zone 設計開發新型微球生物傳感器及微流體陣列檢測平臺用於海水養殖區中病原體的多重檢測	<u>Yang, M.M.S. (CityU)</u> Kong, R.Y.C. (CityU) Chan, L.L. (CityU) Leung, P.T.Y. (CityU) Wu, J.J. (CityU) Mak, M.Y.L. (CityU) Huang, L.F. (CityU) Yao, X. (CityU) Yue, W.Q. (CityU)	150,000
Feb 2015 – Dec 2016		
6. Functional monitoring the toxicity of water borne chemical pollutants on neuronal activities using whole-brain-wide imaging 基於全腦成像技術的水性化學污染物對神經活動的毒性檢測	<u>Cheng, S.H. (CityU)</u> Peng, S. (CityU) Lam, M.H.W. (CityU)	150,000
Nov 2012 – Dec 2016		
7. Studies on multiple stressor effect of ionizing radiation and heavy metals on marine fish using marine medaka (<i>Oryzias melastigma</i>): Towards a realistic risk assessment 利用海洋青(<i>Oryzias melastigma</i>)研究電離輻射和重金屬在海洋魚類中的多重應激源效應: 邁向實際的風險評估	<u>Yu, P.K.N. (CityU)</u>	600,000 (From SKLMP: \$400,000) (From CSE: \$200,000)

Shenzhen Key Laboratory for the Sustainable Use of Marine Biodiversity Internal Grants (SUMB)

深圳海洋生物多樣性可持續利用重點實驗室內部基金

The fund aims to encourage, facilitate and support excellent, collaborative and interdisciplinary research projects among members and non-members in the field of marine biodiversity

Project Title * 項目名稱	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額
May 2015 – Apr 2016		
1. Trans-generational effects of estrogenic EDCs in fish survival and fecundity 雌激素活性物質對魚類生存和繁殖的隔代影響	<u>Au, D.W.T. (CityU)</u>	HKD 35,000 + CNY 80,000
Nov 2015 – Oct 2016		
2. Effect of ocean acidification on multiple generations of marine benthic copepod, <i>Tigriopus japonicas</i> 海洋酸化對多世代海洋底棲橈足動物日本虎斑猛水蚤 (<i>Tigriopus japonicas</i>) 的影響	<u>Cheung, S.G. (CityU)</u> <u>Shin, P.K.S. (CityU)</u> Mu, F.H. (OUC) Liu, X.S. (OUC)	HKD 35,000 + CNY 80,000

Director Discretionary Fund (DDF) 主任資助基金

The fund is allocated by the SKLMP Director to support exploratory projects for encouraging innovation and new initiatives

Project Title * 項目名稱	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
Jun 2016 – Jun 2018		
1. Identification and assessment of emerging trace organic pollutants in marine ecosystem 海洋生態系統中新興痕量有機污染物的識別與評估	<u>Lam, J.C.W. (EdUHK)</u>	400,000
Jun 2016 – Dec 2017		
2. Functional responses of marine ecosystem to hypoxia 海洋生態系統對缺氧的功能性響應	<u>Wu, R.S.S. (EdUHK)</u> <u>Tam, N.F.Y. (CityU)</u> <u>Shin, P.K.S. (CityU)</u> <u>Cheung, S.G. (CityU)</u> <u>Au, D.W.T. (CityU)</u> <u>Ang, P.O. (CUHK)</u> <u>Chiu, J.M.Y. (BU)</u>	400,000
May 2016 – Apr 2017		
3. Studies on copepod feeding on microphytobenthos in coral reef ecosystem 珊瑚礁區橈足類對底棲微藻的攝食研究	<u>Liu, S. (CAS)</u> <u>Chan, L.L. (CityU)</u> <u>Xu, C.L. (CAS)</u>	100,000

Funding support from the Innovation and Technology Commission
創新科技署國家重點實驗室專項基金資助的項目

SKLMP Seed Collaborative Research Fund (SCRF) SKLMP 種子協助研究基金

The fund aims to promote excellent, collaborative and interdisciplinary research programs among members from the six collaborating universities

Project Title * 項目名稱	Investigators # 項目負責人 (PI or PC/ Co-PI or Co-I)	Amount 金額 (HKD)
Apr 2014 – Mar 2017		
1. Transgenerational effects of hypoxia in fish and underlying mechanisms 缺氧對魚類的跨代影響及其內在機制	<u>Kong, R.Y.C. (CityU)</u> Wong, C.K.C. (BU) Chiu, J.M.Y. (BU) Au, D.W.T. (CityU) Wu, R.S.S. (EdUHK)	2,200,000
2. Development of electrochemical sensing platform based on AuNPs modified TiO ₂ nanotubes for emerging chemicals of concern and pharmaceutical residues detection 開發基於金納米粒子修飾的二氧化鈦納米管的電化學傳感平臺用於環境污染的檢測	<u>Yang, M.M.S. (CityU)</u> Wu, R.S.S. (EdUHK) Lam, P.K.S. (CityU) Lam, M.H.W. (CityU) Chan, L.L. (CityU)	900,000
3. Investigation of coupled circulation and ecosystem process in Mirs Bay-Tolo Harbour (Hong Kong) during summer time 香港大鵬灣-吐露港夏天海流-生態耦合系統過程的研究	<u>Gan, J.P. (HKUST)</u> Lam, P.K.S. (CityU) Chan, L.L. (CityU) Liu, H.B. (HKUST) Chan, R.K.Y. (BU) Ang, P.O. (CUHK)	1,500,000
Apr 2014 – May 2016		
4. Identification and assessment of emerging persistent organic pollutants (POPs) in Hong Kong coral communities 香港的珊瑚群落中新興持久性有機污染物 (POPs) 的評估	<u>Lam, J.C.W. (EdUHK)</u> <u>Ang, P.O. (CUHK)</u>	500,000
5. Functional responses of marine ecosystem to hypoxia 海洋生態系統對缺氧的功能性響應	<u>Wu, R.S.S. (EdUHK)</u> Tam, N.F.Y. (CityU) Shin, P.K.S. (CityU) <u>Cheung, S.G. (CityU)</u> Au, D.W.T. (CityU) Ang, P.O. (CUHK) Chiu, J.M.Y. (BU) Liang, Y. (HKBU)	1,600,000

Summary of the Internal Research Fund (IRF) Projects
IRF項目概要

Studies on multiple stressor effect of ionizing radiation and heavy metals on marine fish using marine medaka (*Oryzias melastigma*): Towards a realistic risk assessment

利用海洋青鱒(*Oryzias melastigma*)研究電離輻射和重金屬在海洋魚類中的多重應激源效應：邁向實際的風險評估

Prof. Peter K.N. YU

Funding Amount: HKD600,000

Under realistic situations, living organisms are exposed to a mixture of environmental stressors, and the resultant effects due to such exposures are referred to as “multiple stressor effects”. The resultant effects are not necessarily simple sums of the effects caused by individual stressors, i.e., showing additive characteristics. Instead, they can also show synergistic or antagonistic characteristics. However, due to a lack of information on multiple stressor effects, most biological risks on organisms (including marine organisms) can only be speculated by assuming additive characteristics among different environmental stressors.

Hong Kong will be in a region with the highest density of nuclear reactors in China in about 10 years, as 15 to 20 new nuclear reactors in Guangdong province alone will become operational. The routine or accidental fallout from these nuclear reactors will expose living organisms to ionizing radiations. Nuclear accidents at Chernobyl in Ukraine, Three Mile Island in USA, and most recently at Fukushima in Japan remind us that safety issue of nuclear power, including the associated contingency planning and risk assessment, is still a major concern. Nevertheless, the multiple stressor effects of heavy metals and ionizing radiation have not been extensively studied.

The present proposal aims to investigate the multiple stressor effect of ionizing radiation and heavy metals on marine fish using marine medaka (*Oryzias melastigma*) as a model. Apoptotic signals induced in the marine medaka will be used as the biological end point, which will be revealed through Acridine Orange staining or TUNEL assays. Realistic doses of ionizing radiation and heavy metals will first be separately applied to the fish model to obtain dose-response relationships for each individual stressor. The multiple stressor effect can then be identified by exposing the fish model to combinations of stressors, and by comparing the dose-response relationships for combined exposures to those for individual stressors. The results will significantly contribute to the goal of realistic risk assessment for combined exposure of marine fish to ionizing radiation and heavy metals.

Research Output

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11. Ng, C.Y.P., Kong, E.Y., Konishi, T., Kobayashi, A., Suya, N., Cheng, S.H., Yu, P.K.N. (2015)
Low-dose neutron dose response of zebrafish embryos obtained from the neutron exposure accelerator system for biological effect experiments (NASBEE) facility.
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Combined effects of depleted uranium and ionising radiation on zebrafish embryos.
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Exogenous nitric oxide suppresses *in vivo* X-ray-induced targeted and non-targeted effects in zebrafish embryos.
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15. Ng, C.Y.P., Cheng, S.H., Yu, P.K.N. (2016)
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16. Ng, C.Y.P., Kong, E.Y., Kobayashi, A., Suya, N., Uchihori, Y., Cheng, S.H., Konishi, T., Yu, P.K.N. (2016)
Non-induction of radioadaptive response in zebrafish embryos by neutrons.
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Combined effects of alpha particles and depleted uranium on zebrafish (*Danio rerio*) embryos.
Journal of Radiation Research, 57(4):343-355.



Bone miRNAs deregulation and skeletal impairment in offspring induced by parental exposure to benzo[a]pyrene

青鱒魚苯並(a)芘暴露導致後代骨細胞小RNA表達異常以及骨質損害/損傷的研究

Dr. Doris W.T. AU, Dr. Christoph WINKLER, Dr. G. ZHANG

Funding Amount: HKD150,000

IRF

High incidences of skeletal defects have been reported in feral fish from waters polluted by polycyclic aromatic hydrocarbons (PAHs) and crude oils. Recent studies using medaka have shown that sublethal exposure to waterborne benzo[a]pyrene (BaP, a ubiquitous PAH in the environment) not only increased the incidence of bone deformities in the exposed parents, but also significantly induced tail deformities in their early larva that had not been prior exposed to BaP. Increasing evidence from mammalian studies indicate that many adverse cross-generational effects caused by chemicals involve the activation or silencing of genes via microRNAs. It has been shown that BaP intake and tobacco smoking (a major source of BaP/PAH intake) can deregulate the miRNAs associated with osteogenesis in the lungs or in embryos from exposed fathers. Many osteogenesis-related miRNAs were on the list of the dysregulated pulmonary miRNAs in lung cancer patients with a history of smoking.

From an ecotoxicological perspective, abnormal skeletal phenotypes (including spinal curvature, tail defects and reduced body length) will directly affect swimming as well as impair mating behavior and food captivity of the fish, which are likely to amplify into adverse outcomes associated with reduced growth and reproductive fitness. Impairments of these Darwinian's fitness traits in fish will likely impede the sustainability of the fish population, particularly when such adverse outcomes, induced by BaP, persist across generations. The ecological consequence of BaP contamination in the environment is likely to be worse than we expect. There is an urgent need to re-assess the risk of BaP/PAHs in the environment.

To be meaningful and useful for risk assessment, it is essential to understand the molecular action and the toxicity pathways of BaP in regards to cross-generational skeletal deformities, which however remains virtually unknown. Using the medaka as a model fish, the present study is set to identify the key miRNAs regulating bone homeostasis in medaka. Their involvement in BaP induced cross-generational bone deformities will be further tested. BaP is ubiquitously found in water and air. The results of this study will also be relevant and essential for human health risk assessment.

Research Output

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Aquatic Toxicology, accepted.



Pilot baseline study of marine biodiversity and aquaculture environment at O Pui Tong mariculture zone and its surrounding area

澳背塘及其周邊地區之海洋生物多樣性及水產養殖環境的基線調查

Dr. Leo L. CHAN, Dr. J.W. QIU, Dr. James C.W. LAM, Dr. T.C. WAI, Dr. Maggie Y.L. MAK, Dr. J.J. WU, Dr. Priscilla T.Y. LEUNG

Funding Amount: HKD150,000

IRF

The recent establishment of SKLMP fish raft in O Pui Tong at Kat O is an experimental based mariculture platform to support *in situ* scientific research and facilitate development of culture fisheries with enhanced efficiency and ecological sustainability in Hong Kong. In line with this, the potentials of the development and implementation of the Integrated Multi-Trophic Aquaculture (IMTA) are of particular interest; and an experimental IMTA design will be setup at O Pui Tong SKLMP fish raft to investigate the mechanisms with regard to sustainability, system dynamics and bioremediation. Therefore, baseline information on the marine biodiversity and aquaculture environment prior to the commencement of IMTA experiment is essential for future assessment and monitoring plan of its functions. In this study, a pilot baseline survey will be performed in O Pui Tong and its surrounding area including Kat O Wan as an impacted control and Camp Cove as a control of non-mariculture zone, for both dry and wet seasons of 2015. The baseline data collected under this Before-After Control-Impact (BACI) design will advance our understanding on the application potentials of IMTA by the fish raft, and can also provide valuable information to the future mariculture development projects.

Functional monitoring the toxicity of water borne chemical pollutants on neuronal activities using whole-brain-wide imaging

基於全腦成像技術的水性化學污染物對神經活動的毒性檢測

Prof. S.H. CHENG, Dr. S. PENG, Prof. Michael H.W. LAM

Funding Amount: HKD150,000

In the proposed project we intend to utilize our platform to study four major categories of toxic chemicals commonly found in the aquatic environment, (polybrominated diphenyl ethers, endocrine disrupting chemicals, organic solvents and metals) which might have an effect on the neural development of brain and the brain-wide neuronal dynamics linking the processing of senses and the motor movements. Until date there has been no systematic study that provides direct insight into the instantaneous effects of these pollutants on the brain activity patterns of developing vertebrate. The reconstruction of neural activity across complete neural circuits, or brain activity mapping, has great potential in both fundamental and translational neuroscience research. Larval zebrafish, a vertebrate model, has recently been validated to be amenable to whole brain activity mapping. We recently demonstrated a microfluidic array system (“Fish-Trap”) that enables high-throughput mapping of brain-wide activity in awake larval zebrafish. Unlike the commonly practiced larva-processing methods using a rigid gel or a capillary tube, which are laborious and time-consuming, the hydrodynamic design of our microfluidic chip allows automatic, gel-free, and anesthetic-free processing of tens of larvae for microscopic imaging with single-cell resolution. Notably, this system provides the capability to directly couple chemical stimuli with real-time recording of neural activity in a large number of animals, and the local and global effects of pharmacoactive drugs or neurotoxic chemicals on the nervous system can be directly visualized and evaluated by analyzing the toxic molecule induced functional perturbation within or across different brain regions. Using this technology, we recently tested a set of neurotoxin peptides and obtained new insights into how to exploit neurotoxin derivatives as therapeutic agents. This novel and versatile “Fish-Trap” technology coupled with similar experimental strategy can be readily utilized to study the effect of toxic waterborne chemical pollutants on functional brain circuits. In the proposed project we intend to utilize our platform to study an array of toxic chemicals that have been identified to be found commonly in the aquatic environment. Until date there has been no systematic study that provides direct insight into the instantaneous effects of these pollutants on the brain activity patterns of developing vertebrate.

Research Output

Papers with the SKLMP as one of the affiliations 以SKLMP為作者單位之一的期刊論文

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Radiation Protection Dosimetry, 167(1-3):311-315.
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Journal of Radiation Research, 57(4):363-369.
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Exogenous nitric oxide suppresses in vivo X-ray-induced targeted and non-targeted effects in zebrafish embryos.
International Journal of Molecular Sciences, 17(8):12.
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Aquatic Toxicology, 175:184-191.
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Combined effects of alpha particles and depleted uranium on zebrafish (*Danio rerio*) embryos.
Journal of Radiation Research, 57(4):343-355.

Trophic interactions of the rocky shore community under ocean acidification

岩岸群落在海洋酸化下的營養互動

Dr. S.G. CHEUNG, Dr. Paul K.S. SHIN

Funding Amount: HKD150,000

In addition to global warming, an increase in anthropogenic CO₂ production reduces pH of the ocean, termed “ocean acidification” (OA), as the ocean is the sink of CO₂. According to the Intergovernmental Panel on Climate Change (IPCC), it is predicted that by the year 2100, the pH of the surface ocean will decrease by 0.3–0.5 units.

A decrease in pH has a great impact on marine organisms particularly the shelled animals as dissolution of shell may be faster than shell formation under low pH. OA also disturbs physiology of marine organisms and results in reduction in survival and growth. Although studies on the effect of OA on individual species and life stages increase dramatically in the past few years, the results provide little clues to predict long-term consequences of OA at population and community levels. This is because population abundance and community structure are determined not only by individual species tolerance to OA, but also through biological interactions such as predation and inter-specific competition. For example, when the prey is more sensitive to OA than the predator, the predator will enjoy a weakened prey. In contrast, if the predator is more affected by OA, the prey will enjoy a lower predation risk. The situation is even more complicated when more than one prey species is preferred by a predator as the two prey species may have different tolerance to OA. Very few studies, however, have addressed these problems and most of them were on fish ecology.

The rocky shore community is one of the most biologically diverse and productive communities throughout the world with dominant rocky shore occupiers including barnacles and mussels. Most of the animals on the rocky shore possess an external hard shell as an adaptation against wave action and water lost. Therefore, they are highly susceptible to OA. The proposed study will investigate the effect of OA on predator-prey interactions between a predatory muricid gastropod and its preferred prey which are barnacles and mussels. The results will help us predict possible consequences of OA on the population structures of the prey species and the structure and functioning of the rocky shore community.

Research Output

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Effect of alternating aerobic-anaerobic conditions on microbial transformation of polybrominated diphenylethers (PBDEs) in mangrove sediments

紅樹林沉積物好氧-厭氧交替環境下多溴聯苯醚 (PBDEs) 的微生物轉化作用及機理研究

Prof. Nora F.Y. TAM, Prof. T.G. LUAN

Funding Amount: HKD150,000

IRF

Polybrominated biphenylethers (PBDEs), the widely used flame-retardant additives, are ubiquitous, persistent and toxic contaminants. They have a structure in which 1-10 bromines are substituted on two benzene rings connected by an ether bond. The three major commercial PBDEs mixtures are penta-, octa- and deca-BDEs, having 5, 8 and 10 bromines, respectively. Due to their hydrophobicity, PBDEs released to environments accumulate in sediments, particularly in estuaries, the special coastal zones strongly influenced by human impacts. Extremely high concentrations of PBDEs have been recorded in estuarine sediments in South China. Although penta- and octa-BDEs have been banned since 2000s due to their toxicities, deca-BDEs are still produced and applied around the world. Some researchers suggested that under anaerobic conditions, deca- and octa-BDEs in bioreactors and sludge treatment processes could be reduced to lower brominated PBDEs, such as hexa- and penta-BDEs, which are more stable and toxic. Previous studies on polychlorinated biphenyls (PCBs), having similar chemical structures as PBDEs, reported that PCBs were dechlorinated in sediments under anaerobic conditions and the lower chlorinated PCBs were completely metabolized with ring cleavage under aerobic conditions. Whether the highly brominated PBDEs could be debrominated by microorganisms in anaerobic estuarine sediments is still debatable, and knowledge on the aerobic degradation is even scarcer. The effects of alternating aerobic and anaerobic conditions on the microbial transformation of PBDEs in sediments have never been reported. Mangrove wetlands representing an important intertidal ecosystem in tropical and subtropical regions occupy 75% of the coastal areas worldwide with a global area of around 160,000 km². Mangroves are significant ecological interfaces between land and sea, and are subject to frequent tidal flushing with alternating aerobic and anaerobic environments. The proposed study therefore aims to investigate the debromination and metabolism of PBDEs by indigenous microorganisms in mangrove sediments subject to different aerobic and anaerobic conditions. The metabolic products will be identified and the relationships between PBDE biotransformation and microbial abundance in sediments will also be evaluated. The results from the proposed work will not only fill the knowledge gap on the fate of PBDEs and the roles of microorganisms in estuarine sediments, it will also provide very useful scientific information for developing bioremediation strategies to clean-up contaminated sediments.

Research Output

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- 3 Wang, X., Tam, N.F.Y., He, H.D., Ye, Z.H. (2015)
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- 10 Yang, L.H., Cheng, Q., Tam, N.F.Y., Lin, L., Su, W.Q., Luan, T.G. (2016)
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Journal of Environmental Quality, on-line doi:10.2134/jeq2016.04.0141

Design and development of microbead-based biosensors for multiplexed detection of waterborne pathogens in mariculture zone

設計開發新型微球生物傳感器及微流體陣列檢測平臺用於海水養殖區中病原體的多重檢測

Prof. Michael M.S. YANG, Dr. Richard Y.C. KONG, Dr. Leo L. CHAN, Dr. Priscilla T.Y. LEUNG, Dr. J.J. WU, Dr. Maggie Y.L. MAK, Dr. L.F. HUANG, Dr. X. YAO, Dr. W.Q. YUE

Funding Amount: HKD150,000

IRF

The recent establishment of SKLMP fish raft in O Pui Tong at Kat O is an experimental based mariculture platform to support in situ scientific research and facilitate development of culture fisheries with enhanced efficiency and ecological sustainability in Hong Kong. In line with this, the potentials of the development and implementation of the Integrated Multi-Trophic Aquaculture (IMTA) are of particular interest; and an experimental IMTA design will be setup at O Pui Tong SKLMP fish raft to investigate the mechanisms with regard to sustainability, system dynamics and bioremediation. Therefore, baseline information on the marine biodiversity and aquaculture environment prior to the commencement of IMTA experiment is essential for future assessment and monitoring plan of its functions. In this study, a pilot baseline survey will be performed in O Pui Tong and its surrounding area including Kat O Wan as an impacted control and Camp Cove as a control of non-mariculture zone, for both dry and wet seasons of 2015. The baseline data collected under this Before-After Control-Impact (BACI) design will advance our understanding on the application potentials of IMTA by the fish raft, and can also provide valuable information to the future mariculture development projects.

Summary of the Shenzhen Key Laboratory for the Sustainable Use of Marine Biodiversity (SUMB)
Internal Grant
SUMB內部基金概要

Trans-generational effects of estrogenic EDCs in fish survival and fecundity

雌激素活性物質對魚類生存和繁殖的隔代影響

Dr. Doris W.T. AU

Funding Amount: HKD35,000 + CNY80,000

Endocrine disrupting chemicals (EDCs) are compounds that can interfere with endocrine functions in animals. Unequivocal experimental and epidemiological evidence in the last two decades has shown that EDCs in the environment has caused reproductive impairments including abnormal sexual development, alternation of sex and infertility, developmental disorders and birth defects in wildlife and human populations worldwide. The Pearl River Delta (PRD) is amongst the world's fastest developing urban and industrial region. Ample data showed that many EDCs (e.g. perfluorooctane sulfonate (PFOS), polybrominated diethyl ether (PBDEs) and dioxins) widely occurred in aquatic habitats of HK, SZ and the PRD, and elevated concentrations in some locations have raised environmental concerns. In human, consumption of contaminated seafood is a major source of intake of EDCs and has been consistently related to fetal developmental defects. Notably, seafood consumption per capita in HK and the South China region is amongst the highest in the world (HK alone ranked No. 4). Indeed, polychlorinated dibenzo-para-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs) in breast milk of HK population were also found to be amongst the highest, and were attributed to seafood consumption. Our recent studies showed that fish harvested from the PRD is a significant intake source of perfluorinated compounds (PFCs) and dioxin like compounds, and levels of which are sufficient to pose a public health concern. Levels and intakes of many emerging EDCs (e.g. bisphenol A and phthalates) in the local environment remain completely unknown, albeit they can be accumulated in human through seafood consumption.

Recent mammalian studies revealed that some EDCs have trans-generational effects and adversely affect future generations (e.g., offspring with deformities, decreased reproductive capacity and infertility), even if the offspring are never exposed to EDCs. Studies in mammals further revealed that some of these trans-generational effects are not caused by alternations in the underlying DNA sequence, but through epigenetic changes including activation or silencing of genes (e.g. by DNA methylation, covalent modification of histone, or chromatin folding). For instance, environmental contamination by EDCs (vinclozolin and methoxychlor) could induce epigenetic effects (by DNA methylation) on the germ line and promote disease across subsequent generations in rats. *In vitro* studies using human cell lines further suggested that epigenetic programming of certain genes can be altered by EDCs. On the other hand, increasing evidence from mammalian studies indicate that many adverse transgenerational effects caused by chemicals involve the activation or silencing of genes via microRNAs (miRNAs). Perinatal exposure of ewe to bisphenol A (BPA, an estrogenic EDC) disrupted steroidogenesis specific miRNA expressions in the developing ovary and decreased fertility in adulthood, suggesting that miRNA alteration may be a potential mechanism of EDC action during development.

A recent study in fathead minnows *Pimephales promelas* reported that F2 larval survival, exposed only as germ cells in their parents exposed to 3 ng/L of 17 α -ethynylestradiol (EE2), was reduced over 50% compared to controls. The indirect effect of EE2 on F2 survival suggests the possibility of transgenerational effects of EE2 on fish survival and fecundity. This lends support to our hypothesis

that estrogenic EDCs cause transgenerational effects in fish, which can be mediated through epigenetic/genetic alterations. Such effects would potentially result in serious long-term impact on natural aquatic populations. Overall, it is hypothesized that estrogenic EDC can alter global RNA profiles and cause trans-generational effects in fish survival and fecundity. If EDCs can cause trans-generational effects in fish as in mammals, implying that the risks of EDCs on aquatic organisms and human health might have been grossly underestimated, and a proper reassessment is therefore urgently required.

Research Output

Papers with the SKLMP included as the first affiliation 以SKLMP為第一單位的期刊論文

1. Peterson, D.R., Mok, H.O.L., Au, D.W.T. (2015)
Modulation of telomerase activity in fish muscle by biological and environmental factors.
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology, 178:51-59.
2. Seemann, F., Peterson, D.R., Witten, P.E., Guo, B.S., Shanthanagouda, A.H., Ye, R.R., Zhang, G., Au, D.W.T. (2015)
Insight into the transgenerational effect of benzo a pyrene on bone formation in a teleost fish (*Oryzias latipes*).
Comparative Biochemistry and Physiology C-Toxicology & Pharmacology, 178:60-67.
3. Ye, R.R., Peterson, D.R., Seemann, F., Kitamura, S.I., Lee, J.S., Lau, T.C., Tsui, S.K., Au, D.W.T. (2016)
Immune competence assessment in marine medaka (*Oryzias melastigma*)-a holistic approach for immunotoxicology.
Environmental Science and Pollution Research International, 1-15.

Papers with the SKLMP as one of the affiliations 以SKLMP為作者單位之一的期刊論文

1. Chen, L., Ye, R., Zhang, W., Hu, C., Zhou, B., Peterson, D.R., Au, D.W.T., Lam, P.K.S., Qian, P.Y. (2016)
Endocrine disruption throughout the hypothalamus-pituitary-gonadal-liver (HPGL) axis in marine medaka (*Oryzias melastigma*) chronically exposed to the antifouling and chemopreventive agent, 3,3'-diindolylmethane (DIM).
Chemical Research in Toxicology, 29(6):1020-1028.
2. Kim, B.M., Kim, J., Choi, I.Y., Raisuddin, S., Au, D.W.T., Leung, K.M.Y., Wu, R.S.S., Rhee, J.S., Lee, J.S. (2016)
Omics of the marine medaka (*Oryzias melastigma*) and its relevance to marine environmental research.
Marine Environmental Research, 113:141-152.
3. Wang, S.Y., Lau, K., Lai, K.P., Zhang, J.W., Tse, A.C., Li, J.W., Tong, Y., Chan, T.F., Wong, C.K.C., Chiu, J.M.Y., Au, D.W.T., Wong, A.S., Kong, R.Y.C., Wu, R.S.S. (2016)
Hypoxia causes transgenerational impairments in reproduction of fish.
Nature Communications, 7:12114.

Effect of ocean acidification on multiple generations of marine benthic copepod, *Tigriopus japonicus*

海洋酸化對多世代海洋底棲橈足動物日本虎斑猛水蚤 (*Tigriopus japonicus*) 的影響

Dr. S.G. CHEUNG, Dr. Paul K.S. SHIN, F.H. MU, X.S. LIU

Funding Amount: HKD35,000 + CNY80,000

Ocean acidification is a result of an increase in the dissolution rate of CO₂ in the ocean. The current average pH value of the ocean is 8.1, 0.1 unit lower than that before the industrial revolution. According to the prediction of the Intergovernmental Panel on Climate Change (IPCC), the pH of the ocean will decrease to 7.7 in the year 2100 and to 7.3 in 2300.

Studies on ocean acidification have been increasing dramatically in recent years with most of them involving single species and single generation. However, recent studies have demonstrated the significance of transgenerational effect in alleviating environmental stresses such as ocean acidification. A calanoid copepod *Pseudocalanus acuspes* was exposed to three CO₂ partial pressures (400, 900 and 1550 μatm) and grown for two generations at these conditions. The results showed evidence of alleviation of ocean acidification effects on fecundity and metabolic stress as a result of transgenerational effects at 1550 μatm. In contrast, various life stages of the copepod *Acartia tsuensis* were exposed to the control (380 μatm) and high CO₂ exposure (2380 μatm) for two generations. Compared to the control, high CO₂ exposure did not significantly affect survival, body size or developmental speed. Results were similar for the second generation, indicating high tolerance of *A. tsuensis* to ocean acidification. Studies on such transgenerational effect over two or more generations, however, are very limited, and it is of interest to ascertain if adaptation to ocean acidification by marine species can be enhanced in further generations.

Copepods belong to Phylum Arthropoda, Class Crustacea, Subclass Copepoda. They are biologically diverse and occur in huge numbers in both freshwater and marine ecosystems with different modes of life: pelagic, benthic and parasitic. Harpacticoid copepods are benthic copepods which form the major diet of fishes, molluscs and shrimps. Benthic copepods are living in a relatively stable environment, so they are more sensitive to environmental disturbance. That is why they are commonly used as biomonitors of environmental stresses. The copepod *Tigriopus japonicus* is a benthic harpacticoid species distributed widely along the west coast of Pacific Ocean including China, Korea and Japan, and has high tolerance to temperature and salinity. In Qingdao, China, *T. japonicus* is commonly found in rock pools at higher intertidals where pH varies between 8 and 10 in summer and 7 and 8 in winter. It is omnivorous and can be reared using diatoms, yeast, fish meal, bacteria or macroalgae. The usual conditions for rearing *T. japonicus* are: temperature 20-25°C; salinity 30-35 psu; light dark cycle 16:8. The time to complete the whole life cycle at 23-25°C is 8 days. There are six naupliar stages and six copepodid stages before metamorphosing to adult which has a life span of 50 days.

Previous studies have shown that after prolonged exposure to ocean acidification, *T. japonicus* has a capacity to adapt to the stress and we suspect that such capacity is mediated through increasing metabolism which can be indicated by an increase in ATPase activity. Heat shock protein is a group of proteins commonly induced in living organisms for preventing coagulation of protein and cell death upon exposure to stress. The expression level of these genes has provided a sensitive molecular biomarker for aquatic monitoring of environmental contaminants and probably ocean acidification.

Summary of the Director Discretionary Fund (DDF) Projects
DDF項目概要

Studies on copepod feeding on microphytobenthos in coral reef ecosystem

珊瑚礁區橈足類對底棲微藻的攝食研究

Dr. S. LIU, Dr. Leo L. CHAN, Miss C.L. XU

Funding Amount: HKD10,000

Coral reef ecosystem provides an excellent habitat for more than 25% of marine species which make the complex food web structure. The primary productivity is estimated to be 1500~5000gC/(m²·a), thereinto, microphytobenthos are the important contributors which significantly affect the level of productivity of coral reef ecosystem. Copepods, the key group of zooplankton to link between primary producer and high-trophic-level organisms, are also abundant. They often harbor in coral reefs during the daytime, therefore, their selective feeding could affect the fate of microphytobenthos and other particle organic matters at the bottom of this ecosystem. Furthermore, copepods are high-quality biological bait for high-trophic-level organisms, such as, coral reef fishes. Studies on their feeding ecology will help to understand the transfer efficiency of substance and energy along the food chain in coral reef ecosystem, even to evaluate the health status of coral reef ecosystem. Although microphytobenthos and copepods play such important roles in coral reef ecosystem, there are still unclear about their biodiversity, abundance, copepod feeding selectivity and rhythm and so on because of the limitation of research methods. In this study, diving sampling and laboratory experiments combined with a molecular technique will be employed to detect the diversity of microphytobenthos and copepods, copepod feeding and the effects of the microphytobenthos on growth and reproduction copepods. The basal production process will be analyzed to further demonstrate their ecological functions in coral ecosystem.

Identification and assessment of emerging trace organic pollutants in marine ecosystem

海洋生態系統中新興痕量有機污染物的識別與評估

Dr. James C.W. LAM

Funding Amount: HKD400,000

Over the past decades, coral communities have become some of the most threatened marine ecosystems in the world. Degradation of coral communities can be associated with a wide range of environmental stressors such as global climate change, pollution, increased sedimentation, overfishing, eutrophication and coral disease. Studies have indicated the adverse effects of environmental contaminants to the coral species. These contaminants may significantly cause the decline of coral communities worldwide. While the presence of major contaminants like heavy metals in corals has been well studied, the presence of persistent organic pollutants (POPs) and their possible effects on corals are less understood. Hong Kong is located at the mouth of the Pearl River Delta (PRD) which has experienced a rapid rate of development over the past decades. Fast economic development, along with the large number of manufacturing industries in the area, makes the PRD a potentially significant source of various new and emerging toxic chemicals such as organic UV filters (OUFs). In this study, we investigated the occurrence, seasonal variation, fate and accumulation pathway of seven commonly used OUFs in the target coral species and seawater and sediment samples from their habitats. Five compounds including, BP-1, -3 and -8, octocrylene (OC) and ODPABA, were detected in the coral tissues with the highest detection frequencies found for BP-3 and BP-8. Season- and species-patterns were found in the accumulation of UV filters in corals. By application of bioconcentration factors estimated from the present results, a preliminary risk assessment was conducted, and the results indicate that organic UV filter may pose risks to coral larvae (planulae). This study provides new information on the environmental fate of organic UV filters in an important marine ecosystem and is the first report of the distribution and bioaccumulative potential of these compounds in wild coral communities.

Research Output

Papers with the SKLMP included as the first affiliation 以SKLMP為第一單位的期刊論文

1. Lam, J.C.W., Lyu, J., Kwok, K.Y., Lam, P.K.S. (2016)
Perfluoroalkyl substances (PFASs) in marine mammals from the south china sea and their temporal changes 2002-2014: Concern for alternatives of PFOS?
Environmental Science & Technology, 50(13):6728-6736.

Papers with the SKLMP as one of the affiliations 以SKLMP為作者單位之一的期刊論文

1. Man, Y.B., Chow, K.L., Man, M., Lam, J.C.W., Lau, F.T., Fung, W.C., Wong, M.H. (2015)
Profiles and removal efficiency of polybrominated diphenyl ethers by two different types of sewage treatment work in Hong Kong.
Science of the Total Environment, 505:261-268.



Functional responses of marine ecosystem to hypoxia

海洋生態系統對缺氧的功能性響應

Prof. Rudolf S.S. WU, Prof. Nora F.Y. TAM, Dr. Paul K.S. SHIN, Dr. S.G. CHEUNG, Dr. Doris W.T. AU, Dr. Put O. ANG, Dr. Jill M.Y. CHIU

Funding Amount: HKD400,000

DDF

The primary objective of environmental management is to maintain the sustainability of ecosystem services. Traditional approach widely adopted is to maintain biodiversity, based on the assumption that different species in the ecosystem perform different roles and functions, and decrease in biodiversity would impair ecosystem function and hence ecosystem services. Emerging evidence shows that this assumption may not necessarily be true, since the function of the species eliminated may be covered by other species performing the same function. Indeed, it has been shown that ecosystem function does not necessarily have a strong and direct dependence on species diversity. Thus, from an environmental management perspective, protecting ecosystem function would be much more important than protecting ecosystem structure, since the former is directly related, while the latter is only indirectly related, to ecosystem services. Nevertheless, the effects of pollution on ecological function of marine ecosystem remain virtually unknown.

Hypoxia poses a significant threat to marine ecosystem over very large areas worldwide. The problem of hypoxia is particularly pronounced in China, and two out of the three major estuaries have been designated as “Dead Zones” by the United Nations. In this proposal, both laboratory and field experiments are proposed to test the hypothesis that hypoxia will alter important ecological functions of microbial community (i.e. nutrient recycling, decomposition and aerobic/anaerobic activities) and benthic community (trophodynamics, functional groups, metabolism, secondary productivity, carbon sequestration and energy status), thereby affecting ecosystem services.

This pioneer study will enable us to understand the functional roles of microbial and benthic species in marine ecosystem, and how these important functions may be affected by hypoxia. This completely novel research will also provide extremely useful information for marine environmental management, and enable us to build our core capability in this new area and capitalize the enormous funding opportunities presented to us in the coming years.

Summary of the Seed Collaborative Research Fund (SCRF) Projects SCRF項目概要

Transgenerational effects of hypoxia in fish and underlying mechanisms

缺氧對魚類的跨代影響及其內在機制

Dr. Richard Y.C. KONG, Prof. Chris K.C. WONG, Dr. Jill M.Y. CHIU, Dr. Doris W.T. AU, Prof. Rudolf S.S. WU

Funding Amount: HKD2,200,000

Globally, hypoxia is one of the most widespread and pressing problem in aquatic environments. More than 400 “Dead Zones” have been identified by the United Nations around the world, including two out of the three major estuaries in China (the Pearl River and Yangtze River estuaries). Extensive studies have shown that hypoxia causes major changes in community structure as well as declines in species diversity and fishery production over large areas. These changes have led to severe economic and habitat losses, both in Hong Kong and worldwide. Our earlier studies revealed, for the first time, that hypoxia is an endocrine disruptor as well as a teratogen, causing reproductive dysfunction, deformities and a male-biased F1 generation in fish. In mammals, recent studies have revealed that some endocrine-disrupting chemicals (EDCs) can cause adverse effects in offspring (including decreased reproductive capacity, deformities and infertility) through epigenetic alterations (including DNA methylation, histone modification and microRNA regulation) without any change in the DNA sequence, despite the offspring never being exposed to EDCs. A recent mammalian study further provided evidence that the exposure of parents to hypoxia can result in sexual retardation, mortality, abnormal development and behavioural changes in the second generation. Whether hypoxia alters epigenetic regulation and causes adverse transgenerational effects in fish remains unknown. Also, whether or not the altered epigenome may be restored to the original state, and how long this takes remain unknown. This novel proposal aims to provide answers to these two important questions. Clearly, the risk posed by hypoxia on the sustainability of natural populations might have been grossly underestimated should transgenerational effects occur and persist.

Research Output

Papers with the SKLMP as one of the affiliations 以SKLMP為作者單位之一的期刊論文

- Lai, K.P., Li, J.W., Wang, S.Y., Chiu, J.M., Tse, A., Lau, K., Lok, S., Au, D.W.T., Tse, W.K., Wong, C.K.C., Chan, T.F., Kong, R.Y.C., Wu, R.S.S. (2015)
Tissue-specific transcriptome assemblies of the marine medaka *Oryzias melastigma* and comparative analysis with the freshwater medaka *Oryzias latipes*.
BMC Genomics, 16:135.
- Lai, K.P., Li, J.W., Tse, A.C.K., Cheung, A., Wang, S., Chan, T.F., Kong, R.Y.C., Wu, R.S.S. (2016)
Transcriptomic responses of marine medaka's ovary to hypoxia.
Aquatic Toxicology, 177:476-483.
- Li, J.W., Lin, X., Tse, A., Cheung, A., Chan, T.F., Kong, R.Y.C., Lai, K.P., Wu, R.S.S. (2016)
Discovery and functional characterization of novel mirnas in the marine medaka *Oryzias melastigma*.
Aquatic Toxicology, 175:106-116.
- Wang, S.Y., Lau, K., Lai, K.P., Zhang, J.W., Tse, A.C., Li, J.W., Tong, Y., Chan, T.F., Wong, C.K.C., Chiu, J.M.Y., Au, D.W.T., Wong, A.S., Kong, R.Y.C., Wu, R.S.S. (2016)
Hypoxia causes transgenerational impairments in reproduction of fish.
Nature Communications, 7:12114.

Development of electrochemical sensing platform based on AuNPs modified TiO₂ nanotubes for detection of emerging chemicals of concern and pharmaceutical residues

開發基於金納米粒子修飾的二氧化鈦納米管的電化學傳感平台用於環境污染物的檢測

Prof. Michael M.S. YANG, Prof. Rudolf S.S. WU, Prof. Paul K.S. LAM, Prof. Michael H.W. LAM, Dr. Leo L. CHAN

Funding Amount: HKD900,000

The current methods for the determination of environment pollution involve time-consuming detection processes and complex pre-treatment steps, which are not suitable for in-situ monitoring of samples and rapid processing of multiple samples.

Electrochemical sensors are expected to play an increasing role in environmental monitoring. Significant technological advances facilitate the environmental applications of electrochemical devices. They are inherently sensitive and selective towards electroactive species, fast and accurate, compact, portable and inexpensive. However, many current used electrodes are prone to surface fouling and passivation by radical intermediates or polymerization products generated by the electrochemical reactions between the analytes and electrode surface, which can lead to significant signal attenuation as well as reduced sensitivity and selectivity over time.

Recently, a refreshable electrode composed of AuNPs modified carbon-doped TiO₂ nanotube arrays (C-doped TiO₂-NTAs) was proposed and fabricated in our lab by quick annealing of the as-anodized TiO₂-NTAs in argon and electrodeposition. The electrode not only has excellent electrochemical activity, but also can be easily photocatalytically refreshed to maintain the high selectivity and sensitivity because they combine the merits of high electrocatalytic properties of AuNPs and photochemical properties of C-doped TiO₂-NTAs.

By taking these advantages, we plan to develop high-sensitivity and recyclable electrochemical sensing platforms for environment pollutants monitoring, e.g. emerging chemicals of concern (ECCs) (Alkylphenol, phenol, bis-phenol A, Benzo(a)pyrene, etc.), pharmaceutical residues (PRs) (sulfonamides, erythromycin, azithromycin, etc.) and microcystin. The outstanding and promising electrochemical analysis may have immense potential in high-sensitivity and high-selectivity sensor devices for environmental pollutants monitoring.

Research Output

Papers with the SKLMP as one of the affiliations 以SKLMP為作者單位之一的期刊論文

1. Hu, L., Fong, C.C., Zhang, X., Chan, L.L., Lam, P.K.S., Chu, P.K., Wong, K.Y., Yang, M.M.S. (2016) **Au nanoparticles decorated TiO₂ nanotube arrays as a recyclable sensor for photoenhanced electrochemical detection of bisphenol A.** *Environmental Science & Technology*, 50(8):4430-4438.

Investigation of coupled circulation and ecosystem process in Mirs Bay-Tolo Harbour (Hong Kong) during summer time

香港大鵬灣-吐露港夏天海流-生態耦合系統過程的研究

Prof. J.P. GAN, Prof. Paul K.S. LAM, Dr. Leo L. CHAN, Dr. H.B. LIU, Dr. Robert K.Y. CHAN, Dr. Put O. ANG

Funding Amount: HKD1,500,000

In 1998, Hong Kong suffered a devastating red tide attack that resulted in the worst loss of fish culture zone and damage of marine environment. The red tide was neither originated from the nutrient rich but likely light-limited Pearl River waters in the western part of Hong Kong waters, nor from offshore surface waters. The origin of the red tide was from Mirs Bay, which is located in the eastern part of Hong Kong Island and occupies about 50% of total sea area of Hong Kong. More than 10 year after the episode, the source of available nutrient that formed the red tide remains unclear. Lack of understanding about the role of the eastern part of Hong Kong waters has hindered us from obtaining holistic understanding on marine environment of the entire Hong Kong as well as solving the 1998 puzzle. With a deep central channel, unique shelf and coastline topography in the adjacent coastal waters, Mirs Bay is closely linked with the intrusions of nutrient rich deep waters from adjacent shelf, as a result of amplified cross-isobath shoreward transport at the lee of Hong Kong Island during southwesterly monsoon and from the Tolo Harbor to the north. Based on evidences derived from HKW and from the other parts of the world's oceans, it is hypothesized that: (H1) circulation and biogeochemical substance transports are largely controlled by the shelf-bay circulation associated with wind and tidally forced hydrodynamic response to the unique topography in Mirs Bay and (H2) the nutrient enrichments from adjacent shelf and from the inland harbor lead to an enhanced biological production in the bay. Study of this coupled harbor-bay-shelf circulation is crucial to scientifically understand the interactive dynamics in a harbor-bay-shelf system, and to complete the picture for the oceanic circulation and associated biogeochemical condition in Hong Kong waters. We propose to conduct field measurements, laboratory analysis and coupled physical-ecosystem numerical modeling to investigate hypotheses H1 and H2. Ultimate goal of the project is to identify the process and mechanism that the eastern part of Hong Kong waters play on the water ecosystem in the entire Hong Kong waters.

Seminars and Conferences 會議與講座

The SKLMP 2015 Annual and Academic Committee Meeting was successfully held 海洋污染國家重點實驗室2015年度會議及學術委員會會議成功召開



On 31st March and 1st April 2016, the State Key Laboratory in Marine Pollution (SKLMP) 2015 Annual and Academic Committee Meeting was successfully held in the City University of Hong Kong. Several Academic Committee Members and International Advisory Committee Members including Prof. Jilan SU, Dr. Don M. ANDERSON, Prof. Arthur Chen-Tung CHEN and Prof. Minhan DAI, attended the meeting, together with several invited guests from overseas and Mainland China, and delegates from SKLMP member institutions.

Prof. Paul Kwan Sing LAM, Director of the SKLMP, delivered a speech to welcome the guests and expressed sincere gratitude to them for their support on the establishment and development of the SKLMP.

This meeting consisted of two parts; the first part involved reports on SKLMP research projects. The SKLMP members presented their latest research developments and achievements and discussed them in depth with the guests. Prof. Paul Kwan Sing LAM delivered the SKLMP director's report, covering research progress, laboratory platform construction,

2016年3月31日-4月1日，海洋污染國家重點實驗室2015年年度會議在香港城市大學成功召開。出席本次會議的嘉賓有蘇紀蘭院士、Don M. ANDERSON博士、陳鎮東教授、戴民漢教授等多位學術委員會及國際顧問委員會委員和來自海內外特邀嘉賓和實驗室成員。

實驗室主任林群聲教授的歡迎及開幕致辭拉開了本次會議的序幕。林教授對各位嘉賓的到來表示了熱烈的歡迎，並對各位專家長期以來對重點實驗室的建設和發展所給予的支持和幫助表達了由衷的感謝。

此次會議共有兩大議程，首先為SKLMP研究項目報告，SKLMP成員分別將各自研究領域的最新研究進展和成果向蒞臨嘉賓作了精彩的匯報展示，並與參會嘉賓進行了深入的探討交流。在此議程的最後，林群聲教授對SKLMP 2015年的各項研究進展和成果、實驗室的平台建設與經費、研究隊伍建設及人才培養、國際合作與交流、公眾教育等方面進行了詳盡的主任工作匯報。在本次會議的第二大議程-學術委員會閉門會議中，學術委員們認真審議了SKLMP 2015年工作進展及2016年的工作規劃，充分肯定了實驗室過去一年取得的成果，並對實驗室建設內容、定位、特色、隊伍建設等方面提出了寶貴建議。同

funding utilization, research talent cultivation, international communication and cooperation and public education. The second part of the meeting was the Academic Committee Meeting. Academic Committee Members evaluated progress of work in the SKLMP in 2015 and formulated the SKLMP development plan for 2016. At the same time, they fully affirmed the achievements made in the laboratory in the past year and made valuable recommendations on laboratory construction, positioning, characteristics, team building etc. Moreover, Academic Committee Members also made comments and proposals for the upcoming five-year review. Prof. Jilan SU thought that we should present high-impact research achievements and choose contributory and functional topic names. Prof. Arthur Chen-Tung CHEN suggested that highlighting the relevance of accomplishments was important, emphasizing that the SKLMP has created a platform of universities and international cooperation. However, Prof. Rudolf Shiu Sun WU suggested that it is also important to acknowledge the weaknesses and to actively provide solutions when we face the 5-year review.

Finally, Prof. Paul Kwan Sing LAM on behalf of the SKLMP expressed sincere thanks to guests for their recommendations and promised to accept the views of members so as to further enhance and improve laboratory construction and development, and actively respond to the upcoming five-year review of laboratory work.

時,對於即將到來的SKLMP五年評估工作也提出了切實可行的意見和建議。其中,蘇紀蘭院士認為,面對五年評估,我們要著重展示SKLMP具有影響力的研究成果,同時要選擇具有貢獻性和功能性的課題名稱。陳鎮東教授則認為我們要重點強調研究成果的關聯性和SKLMP作為高校和國際合作的平台的顯著貢獻性。胡紹燦教授也提到在面對評估時應該主動承認SKLMP的弱勢,並積極的尋找解決方法。

最後,林群聲教授代表SKLMP對學術委員們給予的中肯意見和建議表達了誠摯的感謝,並表示會參考委員們的意見從而進一步提升和完善實驗室的建設與發展,同時積極應對即將到來的實驗室五年評估工作。

Training Workshop on the Culturing and Identification of Benthic Harmful Marine Dinoflagellates

海洋有害底棲甲藻培養與鑒定工作坊

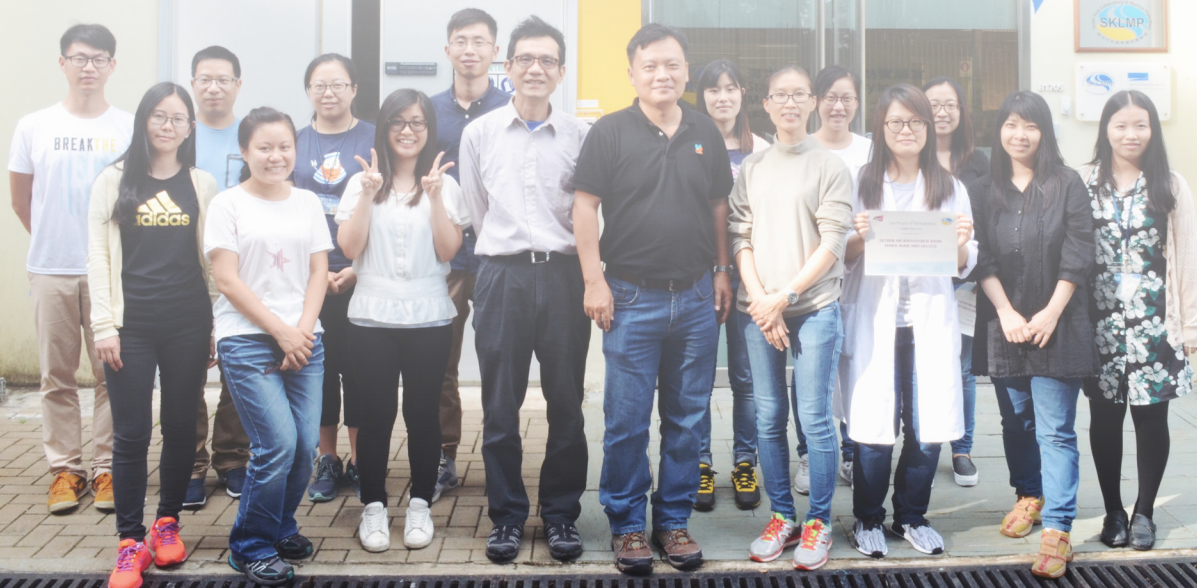
A Training Workshop on the Culturing and Identification of Benthic Harmful Marine Dinoflagellates was held in the State Key Laboratory in Marine Pollution (SKLMP), City University of Hong Kong between 14th and 21st June, 2016. This training workshop was sponsored by the Collaborative Research Fund (CRF), of the Hong Kong Research Grant Council. It aimed to train young scientists and government authorities in Hong Kong and Mainland China in the standard protocols for sampling, isolation, culturing and identification of benthic harmful algal bloom (BHAB) species in the coastal coral ecosystems in the South China Sea, where the occurrence and distribution of these dinoflagellates are not well known.

The workshop drew over 16 participants, including representatives from the Agriculture, Fisheries and Conservation Department (AFCD) of Hong Kong, together with research staff and postgraduate students of the SKLMP. A series of lectures on the existing BHAB sampling methods by collecting natural substrates and deploying artificial substrates, as well as the most up-to-date knowledge about morphology-

2016年6月14日-21日，海洋有害底棲甲藻培養與鑒定工作坊在香港城市大學海洋污染國家重點實驗室 (SKLMP) 成功舉辦。本次工作坊由香港研究資助局合作研究基金資助。鑒於中國南海沿海珊瑚礁生態系統底棲赤潮 (BHAB) 藻種的形成及分佈尚不確定，本次工作坊主要面向中國大陸和香港的年輕科學家以及政府部門人員，針對甲藻採樣、分離、培養和鑒定等方面的標準操作進行培訓。

本次工作坊吸引了超過16名的參與者，包括來自香港漁農自然護理署的代表及SKLMP研究生和研究人員。會議期間舉辦了一系列講座，主講人為馬來亞大學副教授LIM Po Teen 博士、台灣中醫藥研究所副研究員盧重光博士以及馬來亞大學高級研究員LEAW Chui Pin 博士，講座包括通過收集自然基質和部署人工基質的現有的BHAB採樣方法以及BHAB物種的形態分類學與分子系統分類學的最新知識。在培訓中，參與者對於基礎及高階的微藻培養技術以及BHAB物種鑒定技術，如螢光顯微鏡技術進行實操訓練。

在香港政府的支持下，一個關於研究香港水域和中國南部、台灣和馬來西亞沿岸的BHABs對海洋生態系統的影響以及探討BHAB物種在分佈、生長和毒性的主要影響因素的合作研究項目已經全面展開BHABs產生的毒素可致魚類死亡並破壞珊瑚生態系統食物網的結構和功能。此合作專案的成果之一，將是繪製與BHAB相關的風險水準圖，該圖將有利於海洋生態學家、珊瑚和魚類保護主義者與政府設計BHABs監控策略，制定保護當地珊瑚區域和漁業資源的計劃，以及保護消費者免受BHAB相關疾病困擾。



based taxonomy and molecular phylogenetic classification of BHAB species was delivered in the workshop by Dr. Po Teen LIM (Associate Professor of the University of Malaya), Dr. Chung-Kuang LU (Associate Research Fellow of the National Research Institute of Chinese Medicine) and Dr. Chui Pin LEAW (Senior Research Fellow of the University of Malaya). In the workshop, the participants were also given hands-on training of basic and advanced techniques in microalgal culturing and BHAB species identification, including the fluorescence microscopy technique.

With the support of the Hong Kong Government, a collaborative research project has been initiated to study the effect of BHABs on marine ecosystems and to investigate the primary factors that regulate the distribution, growth and toxicity of BHAB species in Hong Kong waters and along the coast of South China, Taiwan and Malaysia. Toxins produced by BHABs can kill fish and disrupt food web structures and the functioning of coral ecosystems. One of the outcomes of the project will be a map that shows levels of BHAB-associated risks. The map should enable marine ecologists, coral and fish conservationists and governments to design strategies to monitor BHABs, to develop plans to conserve local coral communities and fisheries resources, and to protect consumers against BHAB-associated illness.

The International Conference on Underwater Science, Technology and Education 2016 was Successfully Held in the City University of Hong Kong 2016水下科學、技術與教育國際會議成功舉辦



In order to better understand, manage, and protect the oceans, one has to thoroughly know the oceans. To widen the scope of their research, scientists should move from studying the oceans from above to exploring beneath them. On this basis, the International Conference on Underwater Science, Technology and Education 2016 (ICUSTE-2016) was successfully held in the City University of Hong Kong between 7th and 12th August, 2016. The meeting was hosted by the State Key Laboratory of Marine Pollution of the City University of Hong Kong and the Shenzhen Key Laboratory of Marine Biodiversity Conservation and the Center for Marine and Human Health Research, Shenzhen Research Institute, City University of Hong Kong..

The objectives of this conference were to introduce to land based marine scientists the skills of scuba diving and operating advanced scientific equipment beneath the ocean - an experience which will be inspirational in new research directions.

The conference consisted of diving skills training, demonstration of new types of underwater scientific equipment and lectures by scientists who are expert divers themselves. Conference attendees ranged from scholars to students from Mainland China, Hong Kong

要更好的“認識海洋、經略海洋、保護海洋”，其基礎就是認識海洋，海洋科學家們應完成“看海-探海-下海-潛海”的轉變，才能更好的研究海洋，才能有更寬領域的研究突破。在這樣的科學認知和研究背景下，2016水下科學、技術與教育國際會議 (ICUSTE 2016)於2016年8月7-12日在香港城市大學順利召開。會議由香港城市大學海洋污染國家重點實驗室和香港城市大學深圳研究院深圳海洋生物多樣性可持續利用重點實驗室，海洋與人類健康研究中心主辦。本次會議的目的是讓陸上的海洋科學家學會潛水，瞭解並且使用新型的科學潛水設備潛入海底，達到親身實地感知海洋的本質從而激發研究靈感。

本次會議由潛水技能培訓、新型科學潛水設備操作示範、科學潛水專家講座等活動組成。參與會議的成員來自中國內地、中國香港、美國、馬來西亞等地的學者及學生。在專業的教練團隊帶領下，學員們享受著海洋潛水帶來的樂趣，感受著香港海洋的魅力，深刻認識到先進的水下設備無法取代人類的感知與空間意識，通過潛海可增強對海洋複雜環境認知與探索的興趣，進一步借助水下設備分析、提取海洋資料。以最大可能保證海洋研究資料的及時性、準確性、科學性。

潛水技術培訓後，海洋先進技術與科學研討會於12日上午9點在香港城市大學學術樓成功召開。香港城市大學海洋污染國家重點實驗室吳佳俊博士主持開幕式。出席研討會的

SAR, the United States, and Malaysia. Under the supervision of a team of professional diving instructors, the attendees were introduced to the allure of diving, especially in the waters around Hong Kong. Through diving, the participants experienced the complexity of the underwater ocean environment which should stimulate further research utilizing advanced underwater scientific equipment. Extraction and analysis of these data will provide the most timely and accurate material for all marine researchers.

After diving training, a seminar on Advanced Marine Technology and Science was held at 9 am on the 12th. Dr. Jiajun WU of the State Key Laboratory in Marine Pollution presided over the opening ceremony. Guests attending the seminar were: Mr. Wing Kuen CHOW, Agriculture, Fisheries and Conservation Department (AFCD) of the Hong Kong Special Administrative Region; Prof. Alina M. SZMANT, University of North Carolina Wilmington & American Academy of Under-water Science; Mr. Jouni LEINIKKI, European Scientific Diving Committee; Mr. Bing WANG, Guangdong Ocean University Shenzhen Research Institute; Mr. Stan SHEA, Bloom Association; and Prof. Dongxing YUAN, State Key Laboratory of Marine Environmental Science, Xiamen University.

Topics presented in the seminar:

1. Photosynthesis and Calcification Using a Diver Deployed In Situ Respirometer: CISME (Coral In Situ Metabolism)
2. Demonstration of the Use of the Alltab Tablet Computer together with the GPS and Internet Buoy
3. Coral Reef Fauna in Shenzhen and Hong Kong



嘉賓有：香港特別行政區漁農自然護理署高級保育主任周永權先生、北卡羅萊納大學威明頓學院及美國水下科學研究院 Alina M. SZMANT 教授、歐洲科學潛水委員會工程師 Jouni LEINIKKI 先生、廣東海洋大學深圳研究院客座教授王炳先生、Bloom 協會的佘國豪先生、廈門大學近海海洋環境科學國家重點實驗室袁東星教授等。其中科學潛水專題報告主要有「採用珊瑚原位代謝儀測定珊瑚的呼吸作用，光合作用及鈣化情況」，「Alltab 平板電腦與 GPS，互聯網浮標聯繫使用示範」，「深港珊瑚礁動物」，「尋找珊瑚魚的故事」。

研討會上，對在不破壞海洋環境的前提下，如何更好的提高水下研究、海洋調查和勘探能力方面學者們各抒己見、熱烈討論，共同為香港海洋創新科技及未來產業的發展出謀劃策。期間更有水下設備試用，現場氣氛熱烈。

通過這次會議，參會的學員們不僅學會了潛水技能，結交了許多志同道合的朋友，更是擴寬了海洋科學研究與技術開發的視野，壯大了科研團隊隊伍，為保護海洋事業貢獻了一份自己的力量。此次潛水培訓活動也評選出了兩位優秀學員李煒軒先生與鍾貽森先生，周永權先生為兩位優秀學員頒發獎狀以表祝賀。

最後，香港城市大學海洋污染國家重點實驗室副主任陳荔博士對會議進行了總結，希望以潛水拓展科學為研究方向，在開展水下科學研究的同時不忘發展系統化的科學教育，以進一步推動水下科學、技術與教育的發展。

通過這次會議，參會的學員們都受到了很大的啟發並結合自身專業素養對如何運用潛水技術有效進行水下科學研究方面有了較深的感觸，學員在感言中提到“在潛水過程中我們會發現真正有用的學識需要人的感悟才能獲得，這樣才能成為我們生活與生命的一部分”，“在這次活動中讓我們這些研究海洋的對海水有了切身體驗並發現在潛水過程中需要自身勇於克服困難並迎難而上，進而慢慢體會潛者的鎮定、無所畏懼、坦然面對的精神；不僅學會了潛水技能，結交了許多志同道合的朋友，更是擴寬了海洋科學研究的視野，壯大了科研團隊隊伍，為保護海洋事業貢獻了一份自己的力量”。



4. Story of Finding Coral Fish

During the seminar, there were hands-on demonstrations on the use of underwater research equipment. Under the premise of not harming the marine environment, lively discussion resulted in innovative ideas on how to improve the level of underwater research, survey and exploration with technology in waters around Hong Kong and all other marine environments. Mr. Wing Kuen CHOW, of the AFCD, presented awards to two students, Mr. Thomas Wai Him LEE and Mr. Yisen ZHONG, for their outstanding performance during diving training.

At the conclusion of the conference, Dr. Leo Lai CHAN, Associate Director of the State Key Laboratory in Marine Pollution, City University of Hong Kong summarized that the objective of the conference was to promote diving as a means to advance scientific research while not forgetting the development of systematic scientific education in order to further the development of underwater science, technology and education. Through this conference, participants were inspired to combine diving with expertise in their own field to create new ideas in applying diving to underwater scientific research. Attendees commented that, through diving, they perceived the true meaning of applicable knowledge and that this understanding will be pertinent throughout their lives. During this conference, some of our ocean researchers experienced what it was like to be underwater and found that in the course of diving, one needed the courage to overcome obstacles and difficulties to really appreciate the spirit of diving. Not only diving skills were acquired during this event, many new friends with similar goals were also made. This new found friendship will broaden the scope of marine research and further the protection of the oceans.



The Fifth XiangJiang Marine Forum - The Sustainable Use and Conservation of Marine Biodiversity

香江海洋論壇第五講—海洋生物多樣性可持續利用與保護

On 26-27th November 2016, The Sustainable Use and Conservation of Marine Biodiversity seminar was successfully hosted by the State Key Laboratory in Marine Pollution (SKLMP), City University of Hong Kong. This seminar was the fifth in the series of seminars of the XiangJiang Marine Forum. The seminar was divided into two sessions: conference discussion and field trip.

A wide range of studies were covered in the conference part, which included 1) Large scale culture of several microalgae which are capable of producing neurotoxins or other metabolites; 2) Bioassay and chemical guiding fractionation and purification of pure compounds for structural characterization; 3) Structure-activity relationship analyses; 4) Signaling pathway of compounds; and 5) Discovery of marine natural products, biomimetic drugs, pharmaceutical and nutraceutical products from marine micro-algae, marine invertebrates, soft coral, sponge and related host-endophytic microorganisms.

A field trip to Tai Tau Chau Fish Raft and Kat O was arranged on the second day to allow the attending scientists to gain a deeper understanding of microalgae cultivation and the marine environment in Hong Kong.

In light of the diversity of the participants' knowledge and experience, this seminar inspired different and new ideas and sparked excitement, and this will, we believe, strongly promote comprehensive scientific development and cooperation. The on-site trip stimulated the interest of participants in marine research and conservation.



海洋生物多樣性可持續利用與保護研討會于2016年11月26-27日香港城市大學成功舉辦，這也是香江海洋論壇自2012年以來成功舉辦的第五次系列研討會。本次研討會分會議討論和實地考察兩大部份。

會議涵蓋內容豐富，與會學者就1)可產生神經毒素或其他代謝物的微藻的大規模培養；2)用於結構表徵的純化合物生物檢測、化學引導分離及純化；3)構效關係分析；4)化合物的信號通路；5)海洋天然產物、仿生藥及源自海洋微藻、海洋無脊椎動物、軟珊瑚、海綿及相關宿主內生微生物的醫藥保健產物研發等主題展開了激勵的討論。


此外，這次香江論壇爲了加深海洋科學家對微藻培養及香港海洋環境的認識，安排了到大頭洲漁排和吉澳島進行實地考察。

我們有理由相信，通過此次會議各位學者不同領域主題的相互碰撞，激發出璀璨的科學火花推動各項研究的全面發展與合作，爲海洋多樣性可持續利用、保護及研究做出貢獻。




SKLMP Departmental Seminar— Dinoflagellate Genome and Coral Symbiosis

SKLMP 部門研討會—甲藻基因
組學及珊瑚共生



Date: 28 December 2016
Time: 10:30 - 11:30 am
Venue: B4302
Contact: Dr. CHAN Lai Leo (leo@cityu.edu.hk)



香港城市大學
City University of Hong Kong
專業 創新 國際全球
Professional-Creative
For The World

DINOFLAGELLATE GENOME AND CORAL SYMBIOSIS

Prof. LIN Senjie
Professor, University of Connecticut, Marine Sciences;
Guest Professor, Xiamen University;
South China Sea Institution of Oceanology, Chinese Academy of Sciences;
Shanghai Ocean University;
"1000Plan" Award of China (2010)

Dinoflagellate (*Symbiodinium*) symbiosis is essential to the growth and health of coral reefs. Despite morphologically homogeneity, the diversity of the endosymbiotic *Symbiodinium* and the specificity of coral-*Symbiodinium* pairing have increasingly been recognized. With accelerated environmental disturbances by human activities, coral reefs have undergone devastating degradation at global scale, among which coral bleaching is directly linked to the breakdown of coral-*Symbiodinium* the symbiosis. Although extensive and intensive research has been conducted to understand the causes, our knowledge of how the health, or the lack thereof, coral reef is regulated within the symbiosis partners is still limited, largely due to the lack of in-depth understanding of corals as well as dinoflagellates. Recent improved accessibility of high throughput DNA sequencing has provided unprecedented opportunities to address the gap of knowledge, particularly in obtaining insights into the mechanisms underpinning symbiosis establishment and susceptibility to environmental stress. In this talk, I will present a *Symbiodinium* genome in hope to provide insights into 1) what determines host-*Symbiodinium* pairing specificity, 2) how symbiosis function is regulated, 3) and how the symbiosis has evolved. I will also introduce genetic diversity of *Symbiodinium* in the Chinese coral reef systems with the goal to discuss genotype distribution geographically and host species-wise and future direction of research needed to boost coral reef research and conservation technology.

Major Publications

- Lin, S., Cheng, S., Song, B., Zhong, X., Lin, X., Li, W., Li, L., Zhang, Y., Zhang, H., Ji, Z., Cai, M., Zhuang, Y., Shi, X., Lin, L.-X., Wang, L., Wang, Z., Liu, X., Yu, S., Zeng, P., Hao, H., Zou, Q., Chen, C., Li, Y., Wang, Y., Xu, C., Meng, S., Xu, X., Wang, J., Yang, H., Campbell, D. A., Sturm, N. R., Dagenais-Bellefeuille, S. and Moresse, D. 2015. The genome of *Symbiodinium kawagutii* illuminates dinoflagellate gene expression and coral symbiosis. *Science* 350: 693-694.
- Yang, F., Xu, D., Zhuang, Y., Yi, X., Huang, S., Chen, H., Li, S., Campbell, D., Sturm, N., Liu, G. and Zhang, H. 2015. Spliced leader RNA trans-splicing discovered in copepods. *Sci. Rep.* 5: 17421. DOI: 10.1038/srep17421
- Lin, X., Shi, X., Wang, L. and Lin, S. 2015. Rapidly diverging evolution of an atypical alkaline phosphatase (PhoAaty) in marine phytoplankton: insights from dinoflagellate alkaline phosphatases. *Front. Microbiol.* 6: article 868. doi: 10.3389/fmicb.2015.00868
- Mungpakdee, S., Shinzato, C., Takeuchi, T., Kawashima, T., Koyanagi, K., Kisata, K., Tanaka, M., Goto, H., Fujie, M., Lin, S., Satoh, N. and Shoguchi, E. 2014. Massive gene transfer and extensive RNA editing of a symbiotic dinoflagellate plastid genome. *Genome Biol. Evol.* 6(6): 1408-1422.



Professor Senjie Lin, from University of Connecticut, was invited to give a lecture entitled Dinoflagellate Genome and Coral Symbiosis in State Key Laboratory in Marine Pollution on 28th December, 2016. In this seminar, Prof. Lin presented a *Symbiodinium* genome in hope to provide insights into 1) what determines host-*Symbiodinium* pairing specificity, 2) how symbiosis function is regulated, 3) and how the symbiosis has evolved. Genetic diversity of *Symbiodinium* in the Chinese coral reef systems was also introduced in the seminar, with the goal to discuss genotype distribution geographically and host species-wise and future direction of research needed to boost coral reef research and conservation technology.

2016年12月28日,康乃狄克大學海洋科學教授林森傑受邀到海洋污染國家重點實驗室作關於甲藻基因組及珊瑚共生的報告。研討會上,林教授為我們介紹了共生藻基因組學相關的內容,主要包括 1) 宿主共生藻配對特異性的決定因素;2) 共生功能的調節;3) 共生的進化過程。除此以外,林教授還進一步講述中國珊瑚礁系統共生藻的遺傳多樣性,以此探討基因型的地域分佈,探索可促進珊瑚礁研究及保護技術發展的未來研究方向。

Visits and Collaborations 訪問與合作

01/2016 廣州 Guangzhou

A Visit to the State Key Laboratory of Tropical Oceanography, South China Sea Institute of Oceanology and the Chinese Academy of Sciences
訪問中國科學院南海海洋研究所熱帶海洋環境國家重點實驗室

Dr. Leo Lai CHAN was invited to visit the State Key Laboratory of Tropical Oceanography, South China Sea Institute of Oceanology and the Chinese Academy of Sciences in Guangzhou to deliver a seminar on his research field. He also had discussions with their research scientists and graduate students in order to enhance scientific interaction during his visit.

陳荔博士受邀到廣州中國科學院南海海洋研究所熱帶海洋環境國家重點實驗室作報告，報告後與所內研究學者及研究生進行了討論交流。

04/2016 杭州 Hangzhou

A Visit to the Second Institute of Oceanography, State Oceanic Administration
訪問國家海洋局第二海洋研究所

From 10-11th April, Associate Director Dr. Leo Lai CHAN visited the Second Institute of Oceanography, State Oceanic Administration. He had discussions on research collaboration in marine harmful algal blooms, marine toxic benthic algae and marine sampling technology. Collaboration between the Key Laboratory of Marine Bio-diversity Sustainable Utilization of the City University Shenzhen and the Key Laboratory of Marine Ecosystems and Geochemistry of the State Oceanic Administration was also discussed.

為推進海洋污染國家重點實驗室和國家海洋局第二海洋研究所在海洋有害藻華，海洋有毒底棲藻類對珊瑚礁生態系統及人類健康的威脅，海洋採樣技術的研發應用等方面的合作，確立國家海洋局海洋生態系統與地球化學重點實驗室與城大深圳海洋生物多樣性可持續利用重點實驗室的合作機制，陳荔博士受邀前往國家海洋局第二海洋研究所訪問並商討具體合作事宜，共同推進中國海洋科學的進步。

04/2016 東莞 珠海 Dongguan Zhuhai

A Visit to Dongguan and Zhuhai for Discussions Regarding the Marine Science Unmanned Surface Vehicles Project

就海洋科學無人機項目事宜前往東莞、珠海參觀考察

To promote underwater science research technology and to create the Autonomous Marine Environmental Observatory, Associate Director Dr. Leo Lai CHAN, together with Dr. Jiajun WU and Miss Yuanli ZOU went to Dongguan and Zhuhai to visit the relevant enterprises on 19-20th April 2016. They discussed potential research collaboration on research and development of unmanned surface vehicles with the Billion Technology Co., Ltd, and defined the specific requirements of marine science unmanned surface vehicles with the Yun Zhou Intelligent Technology Co., Ltd.

為提升水下科學研究技術，打造智慧海洋觀察系統，2016年4月19-20日，海洋污染國家重點實驗室陳荔副主任、吳佳俊博士、鄒遠麗小姐等前往東莞、珠海兩地就無人機的研發製作參觀考察了相關企業，與東莞彼聯五金機械有限公司初步落實了共同研發無人機的合作意向，與珠海雲洲智能科技有限公司商討確定了科學海洋無人船製作的具體要求。



04/2016 廣州 Guangzhou

Lecture on Scientific Diving Safety Training at the South China Sea Institute of Oceanology, CAS

受邀在中國科學院南海海洋研究所作科學潛水安全培訓報告

On 22nd April, 2016, the Associate Director Dr. Leo Lai CHAN was invited to the South China Sea Institute of Oceanology (SCSIO), CAS to give a lecture entitled "Chinese Scientific Diving Safety System: Global Pass of Underwater Scientific Research". Scientific diving training, a scientific diving certification system, professional scientific diving equipment and underwater scientific instrument development were introduced in the lecture. Moreover, Dr. Chan discussed the development and promotion of a Chinese Scientific Diving Safety System with the participants.

2016年4月22日，實驗室副主任陳荔博士受邀前往中國科學院南海海洋研究所做關於科學潛水安全培訓講座。報告名為“中國科學潛水安全體系：水下科學研究的全球通行證”，詳細介紹了科學潛水培訓、科學潛水認證體系、科學潛水專業設備、水下科學研究儀器研發等方面內容。雙方還就推動和發展中國科學潛水安全體系事宜進行了探討。

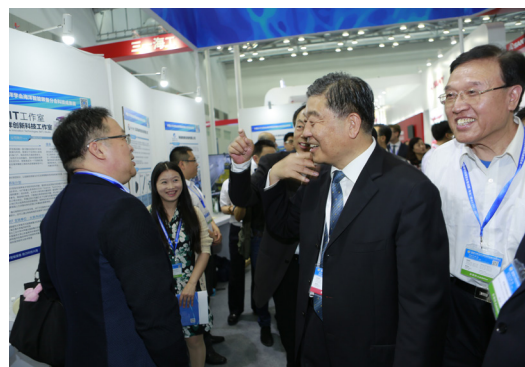


04/2016 珠海 Zhuhai

Attendance at the China (Zhuhai) International Marine High-Tech Expo
珠海海洋高科技展覽會參展

The Associate Director Dr. Leo Lai CHAN, together with Dr. Jiajun WU and Dr. Limin FENG, attended the 2016 China (Zhuhai) International Marine High-Tech EXPO, on 28th April, 2016. The "Marine Innovation and Technology (MIT) Studio", an "underwater automatic micro-fouling organisms sampled separator" and a "benthic microalgae photo-bioreactor" were introduced at the exhibition. Dr. Leo CHAN also delivered a report entitled "The development and opportunities of the marine industry - Let marine intelligent equipment applications enter popular markets in the forum of advanced marine wisdom equipment and technology". The exhibition laid the foundation for promoting the MIT Studio, attendees learned much about advanced experience on the development of scientific research and technological innovation.

2016年4月28日，2016中國（珠海）國際海洋高新科技展覽會在珠海國際會展中心拉開帷幕。陳荔副主任、吳佳俊博士、馮麗敏博士代表海洋污染國家重點實驗室受邀參展。在展會上介紹了“海洋創新科技工作室（MIT）”、“水下自動微型附著生物採樣分離器”和“底棲甲藻光生物反應器”。展會期間，陳荔副主任還在“先進海洋智慧裝備與技術論壇”上作了“一帶一路：藍色產業的發展與機遇-讓海洋智能裝備應用走向大眾化市場”專題報告。通過參加此次參展，我室與相關參展單位進行了有效的技術交流，並開展了合作意向洽談，為推進MIT工作室奠定了基礎。

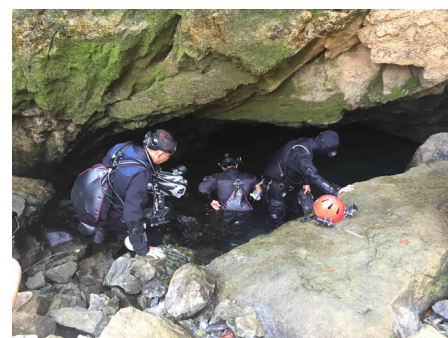


08-09/2016 河池 Hechi

Visit to the Du'an Yao Autonomous County
探訪都安瑤族自治縣

Du'an has a unique and rich karst landscape, distinctive resources of underground rivers and skylights, including 25 underground rivers with more than 300 skylights. This is the largest number and the highest density of underground river-skylight groups in the world. In order to expand the field of underwater research, promote the development and application of underwater scientific diving technology, we accepted an invitation of Du'an Yao Autonomous County to investigate the aquatic life of Du'an underground rivers and the cave-diving resources of Du'an for the selection of a Chinese scientific diving training base and underwater site innovative technology testing base.

都安擁有獨特而豐富的岩溶景觀，地下河和天窗的獨特資源，包括25條地下河和300多個天窗。這是世界上迄今為止發現的數量最多密度最高的地下河天窗群體。為了拓展水下研究領域，推動水下科學潛水技術的發展與應用，接受都安瑤族自治縣的邀請，前往都安考察地下河水生生物情況和都安洞穴潛水資源，為中國科學潛水訓練基地和水下創新科技試驗基地選址。

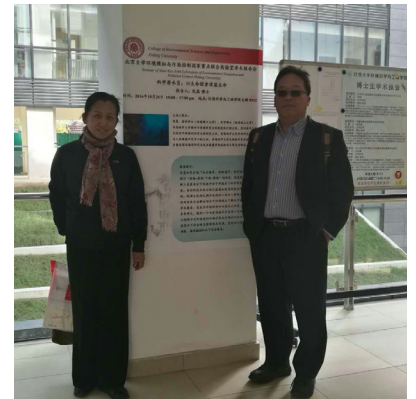


10/2016 青島 北京 Qingdao Beijing

Academic Visit to Qingdao and Beijing
青島、北京兩地學術訪問

Dr. Leo Lai CHAN was invited to provide a presentation in The First International Symposium on Marine Engineering Geology, the Ocean University of China and the State Key Laboratory of Natural and Biomimetic Drugs of Beijing University to promote Scientific Diving and Marine Conversation. Dr. Chan discussed collaboration with Dr. Hongbing LIU (Ocean University of China) and Prof. Wenhan LIN (Peking University) on investigating the biodiversity of marine benthic organisms (coral, sponge, bacteria and fungi) in the South China Sea, marine genetic resources and the discovery of natural products from mesophotic coral environments.

陳荔博士受邀在“第一屆海洋地質工程研討會”、中國海洋大學及北京大學自然與生物製藥國家重點實驗室做演講。就南海底棲生物（珊瑚、海綿、細菌和真菌）生物多樣性調查、珊瑚環境中海洋基因資源和天然產物發現等方面的研究合作展開討論。

05-10/2016 歐洲 美國 菲律賓 印尼
Europe Unite States Philippines IndonesiaScientific Diving Training and International Conferences
科學潛水培訓和國際會議

The object was to ensure that all scientific diving is conducted in a manner that will maximize protection of scientific divers from accidental injury and/or illness, and to protect the employing organization from excess liability exposure. From June to October, Dr. Leo Lai CHAN and his research team has continuously attended various specialized scientific diving training programs in Sweden, the United Kingdom, the Philippines and Indonesia to acquire specialized diving skills which helped to elevate their understanding, awareness and capabilities for the advancement and practice of scientific diving.

Dr. Chan also attended several conferences in Europe and the US to take the opportunity to meet diving scientists, diving safety officers, students and diving equipment developers to improve his knowledge concerning the application of advanced diving technologies, diving standards and certification programs; and to explore research collaboration.

為確保科學潛水以最大限度保護潛水員免受意外傷害或疾病，保護僱傭組織免受額外責任風險的方式進行，陳荔博士及其科研團隊在2016年5-10月間先後參加了瑞典、英國、菲律賓和印尼的各種專業科學潛水培訓，幫助他們更深入理解科學潛水，提高安全意識和潛水能力。陳荔博士期間還參加了在歐洲和美國的幾次國際會議，借此機會會見潛水科學家，潛水安全官員，學生和潛水設備開發商，以瞭解先進的潛水技術，潛水標準，認證程序，並尋求相互間的研究合作。

11/2016

深圳 Shenzhen

The 18th China High-Tech Fair in Shenzhen
第十八屆深圳高交會

On 16th November 2016, members of the State Key Laboratory in Marine Pollution (SKLMP) attended the 18th China High-Tech Fair (CHTF) in Shenzhen where they exhibited an automatic recirculating aquaculture system for preventing marine mass mortality in fish rafts from red tide and water pollution. The system, which involves advanced technology but simple operation, can not only effectively combat the effects of red tide on fish, but also realize remote operation. At the same time, it can record the whole process of fish breeding data and help to establish a food safety traceability system. The project won the 18th Fair's excellent product award.

2016年11月16日，海洋污染國家重點實驗室參加了在深圳舉辦的中國國際高新技術成果交易會（簡稱高交會），展出了用於漁排預防赤潮導致大規模魚類死亡的自動化循環水產養殖系統。該自動化循環水產養殖系統技術先進且操作簡單，不僅能有效地對抗赤潮對魚類造成的影響，還可實現遠程操作。同時，自動化系統還可記錄魚類養殖全過程的數據，有助於食品安全追溯系統的建立。該科研項目獲第十八屆高交會優秀產品獎。

用于鱼排预防赤潮导致大规模鱼类死亡的自动化循环水产养殖系统的开发
Development of automatic recirculating aquaculture system for preventing marine mass mortality in fish raft from red tide and water pollution

项目简介

- 随着社会经济高速发展，人类活动以及全球变暖的影响，水体污染和赤潮事件频发。
- 水体污染和赤潮可引发鱼类大规模死亡，造成巨大的经济损失；已成为开放水域水产养殖的主要威胁。
- 赤潮造成开放水域鱼类死亡的原因包括：生产毒素或堵塞鳃瓣1-4。
- 为应对这一挑战，本实验室正在开发一种新型的自动开合式切换的鱼类养殖系统。该系统利用简单而有效的循环水产养殖技术，可防止赤潮对养殖鱼类的影响。



自动化水产养殖系统



可切换式鱼笼

应用前景

自动化循环水产养殖系统技术先进且操作简单；不仅能有效地对抗赤潮对鱼类造成的影响，还可实现远程操作。同时，自动化系统记录了鱼类养殖全过程的数据，有助于食品安全追溯系统的建立。

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Environmental release activities of 2016 | 2016年環保放生活動



Some members of the public and the media had expressed dissatisfaction with the activities of release. They thought that some of the release activities had caused damage to the marine ecology and even threatened the life of the marine aquariums. This may lead to “let it die” but not “let it go”. In this view, Buddhism groups and Ecological Education and Resource Center co-organized an environmental release activity on 19th June, 2016. At 8:00 a.m. of that day, the staff arrived at O Pui Tong fish culture zone of the City University to collect fish and transport them to destination. In this activity, 1800 Orange-spotted Grouper were released, and around 330 people participated, with an average of 4-5 Orange-spotted Grouper released by each person.

In order to monitor the progress of the fish, the Orange-spotted Grouper were marked before release, so that it would be possible to recognize these fish when conducting regular maritime research in the future. In addition, we also planned to cooperate with the Underwater Association, and invite divers to help us record data of the location and condition when they find the marked fish. Through this activity, the Ecological education and resource center hopes to explore ways to reduce

the impact of release activities on the local marine ecology and to achieve genuine compassion for all living beings under the appropriate conditions.

因過去有社會人士及傳媒對於放生活動有不少意見，認為部分放生活動對海洋生態造成破壞，甚至令海洋水族的生命受到威脅，以致出現「放生」可能造成「放死」的情況。有見及此，佛教團體與生態教育及資源中心於 2016 年 6 月 19 日合作舉辦了一個環保放生活動。在活動當日早上 8 時，工作人員抵達城市大學位於吉澳澳背塘的漁排取魚，並使用運魚船把魚送往位於塔門的放生地點。此次放生活動共放生了 1800 條青斑，參加者約有 330 人，每位參加者大概可放生 4 至 5 條青斑。

為監察魚隻在放生後的情況，我們在放生活動前為 300 條青斑打上了標織，以便日後定期出海研究時辨認放生的魚隻，此外，我們未來亦計劃與潛水總會合作，邀請潛水人士在發現有標記的魚時協助我們記錄魚隻的狀況及出沒地點等資料。生態教育及資源中心希望透過舉辦此次活動，探討如何在適當的因緣條件配合下，減低放生活動對本地海洋生態的影響，達至真正的慈悲眾生。





漁農自然護理署
Agriculture, Fisheries and
Conservation Department

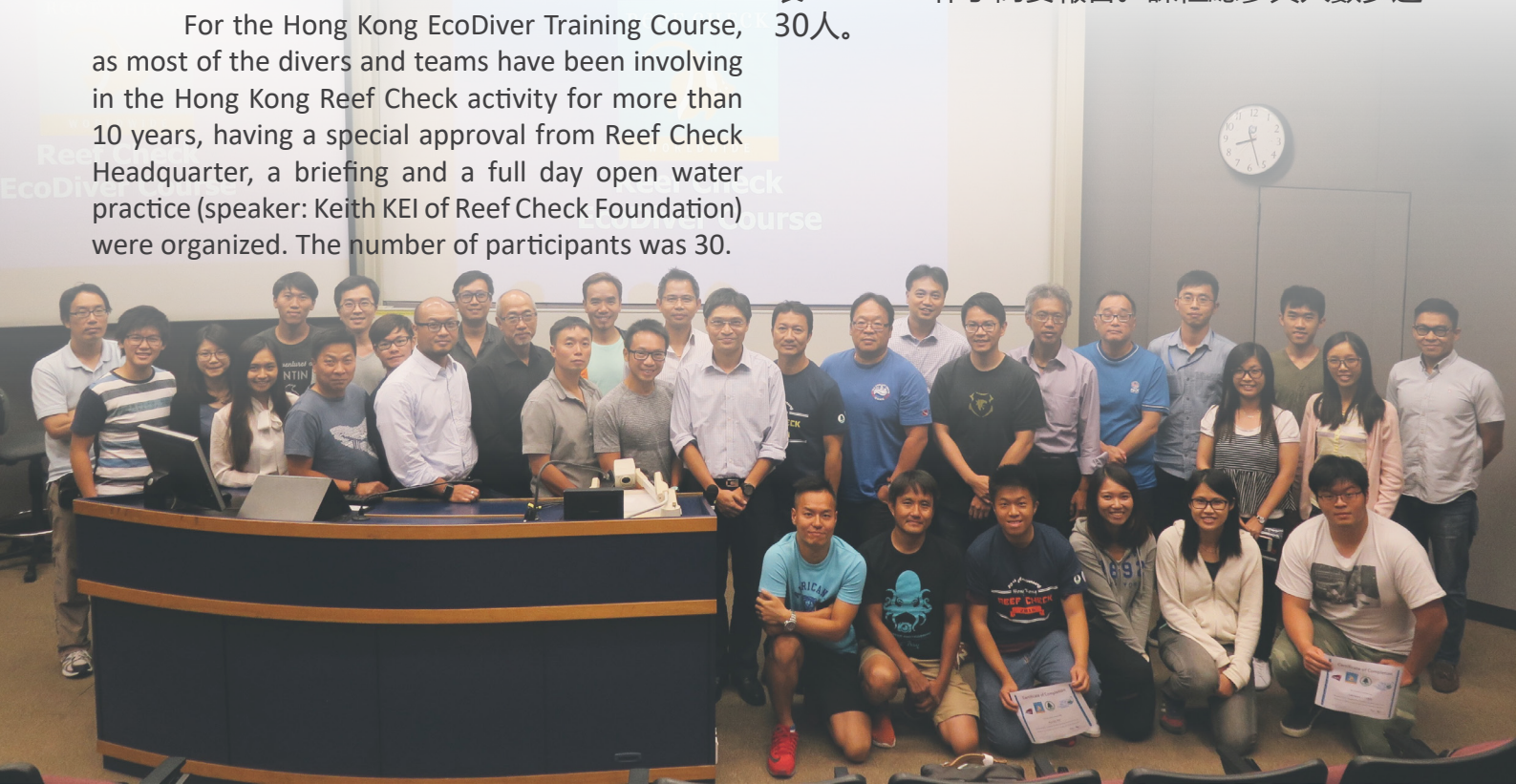
**Reef Check EcoDiver Course co-organized by SKLMP and AFCD was successfully held
海洋污染國家重點實驗室聯合漁農自然護理署成功開設珊瑚礁普查生態潛水員課程**

Reef Check EcoDiver Course was jointly organized by State Key Laboratory in Marine Pollution (City University of Hong Kong) and Agriculture, Fisheries and Conservation Department (AFCD) on 9th and 14th September 2016. Reef Check EcoDiver Course is a certificated course offered by Reef Check Foundation Worldwide. It was launched in 2013 in order to have a better quality of Reef Check data. Diver who has taken the EcoDiver Course can be a Citizen Scientist to conduct Reef Check by their own at any reef around the world. The full course including overview of the whole methodology of reef check, identification of the indicator species such as fish, invertebrates and corals (substrate) as well as open water practice.

For the Hong Kong EcoDiver Training Course, as most of the divers and teams have been involving in the Hong Kong Reef Check activity for more than 10 years, having a special approval from Reef Check Headquarter, a briefing and a full day open water practice (speaker: Keith KEI of Reef Check Foundation) were organized. The number of participants was 30.

2016年9月9日和14日，香港城市大學海洋污染重點實驗室聯合香港漁農自然護理署成功開設了香港珊瑚礁普查生態潛水員課程。珊瑚礁普查生態潛水員課程是由珊瑚礁普查全球基金授權的認證課程，于2013年創設，旨在為珊瑚礁普查提供更可靠的數據。通過該課程，潛水員可成為公民科學家，在世界任一珊瑚礁進行獨立的珊瑚礁普查。課程內容包括：珊瑚礁普查方法概述，魚類、無脊椎動物、珊瑚等指徵物種鑒定，開放水域實踐。

因參與課程的大部份潛水員及團隊均有10年以上的香港珊瑚礁普查經歷，經珊瑚礁普查總部許可，本次課程簡化為兩部份：背景情況介紹會和全天開放水域實踐。介紹會上珊瑚礁基金代表Keith KEI作了簡要報告。課程總參與人數多達30人。

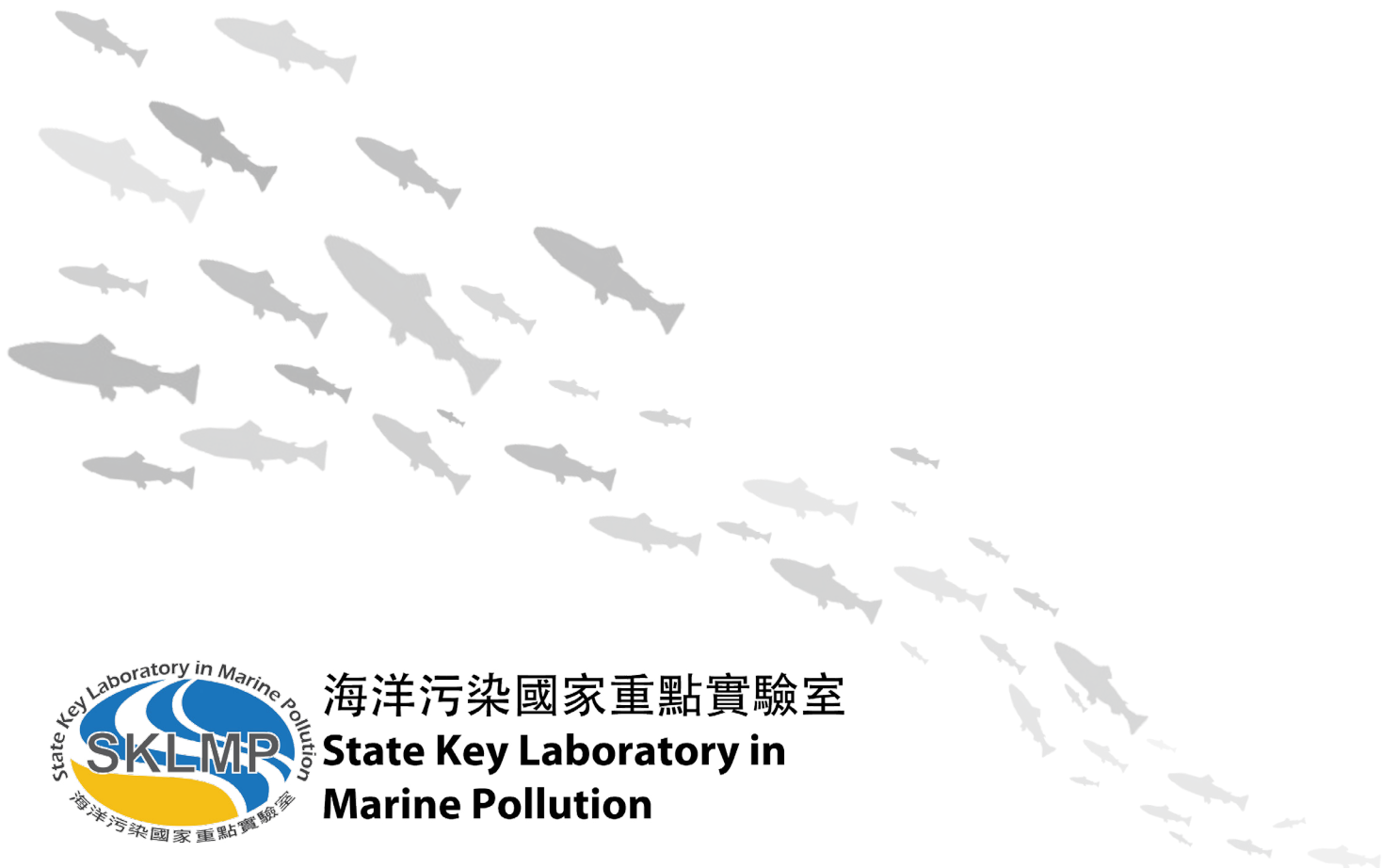


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