Pen-Yuan Hsing (邢本元)

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EDUCATION

Master of Science (M.S.) in Biology, The Pennsylvania State University   2010-2013

Thesis title: Temporal Progression of Oil Spill Impact on a Cold-Water Coral Community
Advisor: Dr. Charles R. Fisher

Bachelor of Science (B.S.) in Environmental Sciences and Biology, Duke University   2006-2010

Cumulative grade point average (GPA): 3.562

Key courses taken:

Ecological and Environmental Problem Solving	Conservation & Management of Protected Areas in South Africa	Physiology of Marine Animals
Genetics & Molecular Biology	Field Research in Savanna Ecology	Marine Invertebrate Zoology
Ecology & Evolution	South African Ecosystems & Diversity	Biology & Conservation of Sea Turtles
Chemistry Outreach	Urban Tropical Ecology	Fundamentals of Tropical Biology

WORK AND TEACHING EXPERIENCE

Diplomatic Civilian Service, **Ministry of Foreign Affairs, Taipei, Taiwan   August 2013   August 2014**

• Developed solutions for and maintained the Ministry's information technology infrastructure at the Information and Communications Security Section, work included:

  •Mass deployment of 100s of systems and volume activation of Microsoft Windows XP and Windows 7 in heterogenous networked environment

  •Development and deployment of Windows XP and Windows 7 system images with Windows Automated Installation Kit

• Assisted diplomatic document and data archival efforts at the Archives Management Division

Graduate Teaching assistant (TA), **Biology 406 Symbioses   January - May 2013**

• Lectured class of 40 students on symbioses in termites and marine invertebrates

• Facilitated learning through group review sessions and individual tutoring on critical evaluation of scientific literature

Graduate Teaching assistant (TA), **Biology 220W Population and Communities   January - May 2012**

• Lectured two labs of 20 students each on concepts of molecular ecology, population dynamics, and scientific writing

• Introduced biology lab techniques including polymerase chain reaction (PCR), DNA sequencing, microsatellite analyses, and greenhouse work

• Designed quizzes and evaluated student work through lab reports

SCHOLARSHIPS & AWARDS

• Durham Doctoral Scholarship, Durham University (2014-2017)

• Best Talk award at the Student Conference on Conservation Science (SCCS-NY) in October 2012 for the talk "Tracking and modelling Deepwater Horizon disaster impact on deep coral communities"

• 2011 Excellence in Partnering Award from the National Oceanographic Partnership Program as a contributing researcher to the "Exploration and Research of Northern Gulf of Mexico Deepwater Natural and Artificial Hard Bottom Habitats with Emphasis on Coral Communities: Reefs, Rigs, and Wrecks" project

• Braddock Scholarship for graduate students, The Pennsylvania State University (2010-2011)

• University Graduate Fellowship, The Pennsylvania State University (2010-2011)

- Rachel Carson Research Scholar, Duke University (2009)

- Partial tuition scholarship from college through graduate school, from Ministry of Education, Taiwan, R.O.C (2006-2013)

- Awarded with a named Main-belt asteroid "*21633 Hsingpenyuan (1999 NW11)*" by the Massachusetts Institute of Technology Lincoln Laboratory (2005)

- Best of Category Award for Top First Place Winner and Team Category First Award, 2005 Intel International Science and Engineering Fair, Phoenix, Arizona, U.S.A. (2005)

- Taipei City Government Excellence Award ("Mayor Prize") for graduating high school students (2005)

- Chinese Youth Corps Model Youth Award (2004)

RESEARCH AND FIELD EXPERIENCE

Co-scientist, **Research cruise to the Gulf of Mexico**   March 2012

Improved basic understanding of deep Gulf of Mexico habitats in West Florida Escarpment, DeSoto Canyon, and Mississippi Canyon. On board the U.S. National Oceanic and Atmospheric Administration (NOAA) research vessel *Okeanos Explorer*, with the remote operated vehicle (ROV) *Little* Hercules and the *Seirios* deep-sea camera platform.

- Coordinated dive operations in realtime with scientists on shore in Exploration Command Centers (ECCs) via live telepresence technology

- Explored and documented never-visited deep-sea communities, including habitats such as cold seeps and shipwrecks

- Revisited and imaged 150+ coral colonies in Mississippi Canyon lease blocks 294, 297, 388, and 36 potentially affected by the 2010 British Petroleum (BP) Deepwater Horizon oil spill

Research cruise to the Gulf of Mexico   October 2011

Explored sites near the BP Deepwater Horizon oil spill for potentially impacted coral communities. On board vessel *Chouest Holiday*. Methods:

- Directed ROV operations for high resolution imaging of 250+ potentially impacted coral communities, and biological sample collection

- Performed downlooking image acquisition with ROV for constructing photomosaics of deep-sea coral communities

Survey cruise to the Gulf of Mexico   May 2011

Cruise to identify deep-sea coral communities near the BP Deepwater Horizon oil spill for future visits. On board research vessel *McArthur II*. Methods:

- Mapping and identification of potential coral sites via geographical information systems (GIS)

- Bathymetry mapping and photo surveys of seafloor with the autonomous underwater vehicle (AUV) *Sentry*

- Photo surveys the tethered TowCam underwater camera system

West African Cold Seeps (WACS) research cruise to the Angola Basin   February 2011

Collaboration with French oceanography institution IFREMER to explore and sample deep-sea cold seeps off the coast of Gabon on the research vessel *Pourquoi Pas?*. Methods:

- Directed quantitative collections of deep-sea siboglinid tubeworm communities with the device Bushmaster Jr. carried by ROV *Victor 6000*

- Quantitative analyses, including counts and mass measurements, of all associated fauna at the tubeworm community

- Prepared tissue samples of tubeworm vestimentum for population genetics

Oil spill response cruise to Gulf of Mexico deep-sea coral communities   December 2010

Assessed potential impact from the BP Deepwater Horizon oil spill on deep-sea coral communities, one week abroad the research vessel *Atlantis*. Methods:

- Sampled and imaged deep-sea corals with the manned submersible DSV *Alvin* at a depth of 1370 metres

- Developed qualitative rankings for 43 impacted corals based on high resolution imagery

• Collected tissue samples from impacted corals for genetics and hydrocarbon chemical fingerprinting

Lophelia II project research cruise to the Gulf of Mexico   October 2010

Studied deep-sea coral communities on board the research vessel *Ron Brown* from 14 October to 4 November, and discovered corals possibly impacted by the BP Deepwater Horizon oil spill. Methods:

• Directed down looking sea floor imaging of deep-sea coral communities with the ROV *Jason II*

• Constructed high resolution photo mosaics of deep-sea coral communities for spatial and temporal analyses

• Prepared tissue samples from collected fauna for genetics and stable isotope food web studies, including the use of the Motion Calibrated Seaboard Balance (MCSB)

Rachel Carson Research Scholar, Duke University Marine Laboratory Marine Conservation Molecular Facility, with Cindy Lee van Dover, Ph. D., Thomas Schultz, Ph. D., and Jens Carlsson, Ph. D.   2008, 2009

Sequenced 28S and COI genes in deep-sea mussels *Bathymodiolus heckarae* and *B. manusensis* for gene flow and population genetics analysis. Methods:

• Performed DNA extraction, Polymerase Chain Reaction (PCR), gel electrophoresis, and sequencing

• Operated Eppendorf epMotion automated pipetting system

• Analysed gene sequences and reconstructed phylogenies with CondonCode Aligner, VectorNTI, Geneious Pro, PHYLIP, PAUP*, DnaSP, MEGA, and Arlequin3 software

Research assistant, Research cruise to the Manus Basin hydrothermal vents near Papua New Guinea   2008

On board the M/V Nor Sky for 30+ days with a 5 person science team from Duke University. Methods:

• Planned and directed remote operated vehicle (ROV) deep-sea specimen collection

• Dissected and prepared 8000+ fauna samples for molecular biology studies

Organization for Tropical Studies semester abroad in South Africa   2009

Conducted field studies and research with group of 19 students in major South African biomes, including Kruger National Park, Mapungubwe National Park, and De Hoop Nature Reserve. Major research themes and methods include:

• Foraging and diet preference of Spotted eagle-owls (*Bubo africanus*)

• Elephant movement patterns in response to road development

• Biogeography of tide pool invertebrates

• Developed and piloted field biology curriculum in a rural South African high school

• Applied practical ecological statistics (parametric and non-parametric tests, 1 and 2-way ANOVAs, and regression)

• Prepared 100+ specimen insect collection representing 15+ orders for the Kruger National Park permanent collection

Biology and Conservation of Sea Turtles field course in Trinidad   2008

Studied biology of leatherback sea turtles (*Dermochelys coriacea*) and sustainable management of nesting beaches. Methods:

• Tagged nesting leatherback sea turtles

• Observed and recorded nesting behaviour

• Analysed nest 3-D thermal profile

• Workshopped with turtle conservation non-governmental organizations (NGOs)

Urban Tropical Ecology field course in Singapore and Malaysia   2008

Studied sustainable management of coastal marine ecosystems in Singapore's urban setting, green building design, and management of tropical rainforest reserves near urban areas in Johor Bahru, Malaysia.

Research cruise to the Gulf of Mexico   2008

Cruise abroad the research vessel *Crowith Cramer* for 7 days.

- Steered and managed day to day operations of the 41 m long sailing vessel

- Analysed water column salinity profile

- Sampled sea floor fauna by dredging

Organization for Tropical Studies summer abroad in Costa Rica   2007

Conducted field research at major Costa Rica research bases, including La Selva, Las Cruces, Palo Verde, and Cuerici field stations. Methods:

- Performed transect studies on vegetation and insect diversity

- Studied alluvial soil microbiology

- Practiced identification of major tropical plants

Independent study student, National Taiwan University Institute of Applied Mechanics, with Chih-Kung Lee, Ph. D.   2004-2006

Patented energy efficient passive thermoacoustic cooling scheme for microelectronic systems. Methods:

- Operated Agilent 4395 network/spectrum/impedance analyser

- Studied gas flow field under acoustic resonance and thermal profile variations

- Performed infrared thermography and thermocouple measurements

- Analysed acoustic fields

- Operated oscilloscope and function generator

PATENTS

Hsing, P.-Y., Huang, W.K., Shu-Tseng, Y., Wu, M.T., Chang, L.C., Sheng, P.J., Lee, C.K., Cheng, C.C., Hsiao, W.H. (2005). Passive thermoacoustic cooling apparatus. *U.S. Patent Application No. 11/418,469*. Washington, D.C., U.S.A.: U.S. Patent and Trademark Office.

Hsing, P.-Y., Huang, W.K., Shu-Tseng, Y., Wu, M.T., Chang, L.C., Sheng, P.J., Lee, C.K., Cheng, C.C., Hsiao, W.H. (2007). Passive thermoacoustic cooling apparatus. *R.O.C. Patent No. I285630*. Taipei, Taiwan R.O.C.: Intellectual Property Office, Ministry of Economic Affairs.

PEER REVIEWED PUBLICATIONS

Fisher, C. R., **Hsing, P.-Y.**, Kaiser, C. L., Yoerger, D. R., Roberts, H. H., Shedd, W. W., … Brooks, J. M. (2014). Footprint of Deepwater Horizon blowout impact to deep-water coral communities. *Proceedings of the National Academy of Sciences*, 111(32), 11744 11749. doi:10.1073/pnas.1403492111

Hsing, P.-Y., Fu, B., Larcom, E. A., Berlet, S. P., Shank, T. M., Govindarajan, A. F., Lukasiewicz, A. J., Dixon, P. M., Fisher, C. R. (2013). Evidence of lasting impact of the Deepwater Horizon oil spill on a deep Gulf of Mexico coral community. *Elementa: Science of the Anthropocene*, 1, 0000012. doi:10.12952/journal.elementa.0000012

White, H. K., **Hsing, P.-Y.**, Cho, W., Shank, T. M., Cordes, E. E., Quattrini, A. M., Nelson, R. K., et al. (2012). Impact of the Deepwater Horizon oil spill on a deep-water coral community in the Gulf of Mexico. *Proceedings of the National Academy of Sciences*, 109(50), 20303 20308. doi:10.1073/pnas.1118029109

Schultz, T. F., **Hsing, P.-Y.**, Eng, A., Zelnio, K. A., Thaler, A. D., Carlsson, J., & Dover, C. L. (2010). Characterization of 18 polymorphic microsatellite loci from *Bathymodiolus manusensis* (Bivalvia, Mytilidae) from deep-sea hydrothermal vents. *Conservation Genetics Resources*, 2. doi:10.1007/s12686-010-9272-8

CONFERENCES AND INVITED TALKS

Hsing, P.-Y. "Deep corals in the Gulf of Mexico and the use of high resolution imaging to track oil spill impact". Invited talk at the Department of Biology, Long Island University Post, Long Island, New York, United States. (27 March 2013)

Hsing, P.-Y., Fu, B., Larcom, E., Lukasiewicz, A., Shea, K., & Fisher, C. R. "Tracking and modelling Deepwater Horizon disaster impact on deep coral communities". Talk presented at the Student Conference on Conservation Science, New York, New York, United States. (10 October 2012)

Hsing, P.-Y. "Before and after the spill... Use of high resolution imaging and mosaics at deep Gulf of Mexico coral communities". Invited talk at the Saturday Science Workshop for K-12 teachers, Center for Science and the Schools, The Pennsylvania State University, University Park, Pennsylvania, United States. (10 December 2011)

Hsing, P.-Y., Carlsson, J., Jones, R., Sobel, A., Thaler, A., van Dover, C.L., Schultz, T., "Evolution of the *Metallothionein* gene family in bathymodiolin mussels". Poster presented at the 4th International Symposium on Chemosynthesis-based Ecosystems, Okinawa, Japan. (29 June ~ 3 July 2009)

Forrester, K., Hall, E., **Hsing, P-Y.**, Williams, S., "Teaching Sustainable Management of Mopane Trees to Grade 10 Learners through the Scientific Method". Talk presented at the 2009 Annual SAEON Teachers' Conference, Blyde River Canyon, South Africa. (21 February 2009)

Hsing, P.-Y., Huang, W.K., "Enhanced Cooling of Microelectronic Devices by Using the Thermoacoustic Effect". Presented at the 2005 Intel International Science and Engineering Fair, Phoenix, AZ, U.S.A. (12~16 May 2005)

Chen, K.Y., **Hsing, P-Y.**, Zhong, Z.S., "Environmental Service Learning: Experience of Taipei WetNet". Talk presented at the 2003 R.O.C. Environmental Education Conference, National Dong Hwa University, Hualian, Taiwan. (18 October, 2003)

SERVICE AND EDUCATION/OUTREACH

Volunteer, **Biology booth, Exploration-U Family Science Night**   2012

Explained deep-sea chemosynthesis-based ecosystems to K-12 students and the general public at Bellefonte High School, Pennsylvania.

Volunteer, **Biology booth, Bellefonte Family Science Night**   2010

Explained deep-sea chemosynthesis-based ecosystems to K-12 students and the general public at Bellefonte High School, Pennsylvania.

Volunteer, **American Chemistry Society booth, 2009 North Carolina State Fair**   2009

Performed chemistry demonstrations for K-12 students and the general public.

Performer, **Duke University 5th Annual Evening of Chemistry**   2009

Performed chemistry demonstration, "underwater fire with thermite ignition sticks" for faculty/students and local residents.

Assistant, **Year of Physics Exhibition, Taipei, Taiwan**   2005

Designed and fabricated physics education exhibits for K-12 students and the general public.

Consecutive interpreter (*English-Mandarin*), **British Digital Education Conference, Taipei, Taiwan**   2004

Two-way translation for British conference speakers and facilitated discussions with audience.

Coordinator, **Taipei WetNet wetland protection organization, Taipei, Taiwan**   2003-2004

Directed seasonal academic conferences on wetland conservation issues in northern Taiwan, with representatives from up to 10 different high schools in the region. Developed and implemented environmental education and outreach strategies.

Duke University Environmental Alliance   2006-2010

Implemented campus environmental outreach activities, such as the annual campus-wide Eco-Olympics competition.

Duke University Students for Sustainable Living   2007

Developed social marketing strategies for implementation of campus environmental sustainability initiatives, such as the phasing-out of disposable cups at campus eateries.

Duke University Transportation Advisory Committee   2007

Reviewed and advised on transportation system development at Duke University, such as buses, parking, bicycle, and zip car programs. Emphasis on environmental sustainability.

Secretary, **Duke University Arts Theme House selective living group**   2007-2010

Created and distributed meeting minutes of House and House Council weekly meetings, and kept attendance at House Council meetings.

Ambassador, **Duke University Marine Laboratory**   2008-present

Promote and recruit new students for the Duke Marine Lab.

OTHER RESEARCH

Hsing, P.-Y. (2009). Mitochondrial COI variability in *Bathymodiolus manusensis* from two hydrothermal vent sites in the Manus Basin. Biology 297 course *Independent Study* research paper. Beaufort, North Carolina, United States: Duke University Marine Laboratory.

Breed, E., **Hsing, P-Y.**, Jones, S., Williams, S., and Lancaster, J. (2009). *Bubo africanus* preference for small mammal species as a guide for management in Mapungubwe National Park. OTS South Africa semester abroad *Independent Project* research paper. Mapungubwe National Park, Limpopo Province: South Africa.

Forrester, K., **Hsing, P-Y.**, Jones, S., and Kuhn, E. (2009). Elephant highways in Kruger National Park? - Assessing large tree damage near and far from roads. OTS South Africa semester abroad *Independent Project* research paper. Skukuza, Kruger National Park, Mpumalanga Province: South Africa.

Hsing, P-Y. (2008). Gene flow between deep sea *B. heckerae* separated by geographical barrier. Environ 191 course *Independent Study* research paper. Beaufort, North Carolina, United States: Duke University Marine Laboratory.

Hsing, P-Y. (2006). Evaluation of Aral Sea desiccation, its impacts and current restoration efforts. Fall 2006 Writing 20 course *Households: Past and Present* research paper. Durham, North Carolina, United States: Duke University.

Hsing, P-Y., "The Study of Periodic Vibrations using a Phase Modulating Stroboscope", 2004 Taipei City Middle School Research Grant Project, Taipei, Taiwan. (June 19, 2004)

Hsing, P-Y., "Coral Killing Algae", Taipei WetNet 24th Conference, Taipei, Taiwan. (May 23, 2004)

Hsing, P-Y., "Ocean Currents and Wetland Pollution", Taipei WetNet 21st Conference, Taipei, Taiwan. (August 8, 2003)

Hsing, P-Y., Huang, W.K., Shu-Tseng, Y. (2003). The Application of Thermoelectric Semiconductors. In (Wu, et al,, eds.) *2003 Physics Project Course Anthology*, I-B-47. Taipei, Taiwan: Taipei Lishan High School.

CERTIFICATIONS/TRAINING

Presenter, **The Climate Project**   2007-present

Personally trained by former United States Vice President Al Gore to present the informational slideshow on global warming to large audiences, as seen in the award-winning documentary film An Inconvenient Truth.

Water Survival/Helicopter Underwater Egress   2008

Trained in emergency procedures and survival techniques for shipwreck and helicopter crash events.

American Red Cross regular platelet donor   2006-present

American Red Cross Adult CPR/AED and Standard First Aid   2008-present

Trained in Adult (12+ yrs. old) Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillator (AED) operation and emergency first aid techniques.

Beginner Level astronomical telescope operator, National Central University, Taiwan   2006

Trained in operation of professional astronomical reflecting telescope domes and stellar object digital image acquisition.

SKILLS

Technical skills

• Mapping and analyses of spatial data with Quantum GIS (QGIS) 2.0 and ArcGIS 10.1 geographical information system (GIS) software

• Assembling and georeferencing of sea floor photo mosaics with custom scripts in the numerical computing software MatLab 2011a

• Managed/maintained high resolution image dataset 100s of deep-sea coral colonies and associated geospatial data taken over two years on 16 terabyte lab server

• Digitising image dataset with open source, cost-saving software including Inkscape 0.48.4 and Fiji 1.47

• Statistical analyses with software Minitab 16 and JMP 9

• Reference/bibliography management with Zotero 4.0, and also with RefWorks or EndNote.

• Phylogeny analysis with software CondonCode Aligner, VectorNTI, PHYLIP, PAUP*, DnaSP, MEGA, and Arlequin3

• Carbon and nitrogen stable isotope sample preparation from organic tissue for food web studies

• Shell scripting and command line fluency in UNIX/Linux systems including Mac OS X, Ubuntu, and Fedora

• Server deployment for molecular biology lab and personal use, including web, FTP, wiki-server, groupware, file, and cloud services (operating systems used: Linux kernel 2.6.36, Mac OS X Server 10.5 Leopard, and Windows 2003 Server)

• Website development with Nikola 7 static site generator with Bootstrap 3 front-end framework

• Basic programming with Python 2.7 in Linux and Mac OS X environments

Presentation skills

• Mastery of mainstream presentation software Apple Keynote and Microsoft Powerpoint (demonstrations and examples available upon request)

• More than 6 years experience presenting to audiences ranging from 2 to 100 people on science topics

• Given talks from conferences, lectures, to public events

• Designed and delivered chemistry demonstrations to wide-ranging audience, from K-12 students to senior citizens

Linguistic skills

• Simultaneous translation between English and Mandarin Chinese for academic conference

• Translation of scholarly material from English to Chinese

Classical piano

• Have been playing the piano for 20+ years