Personnel information for Anderson B. Mayfield, Ph.D.

**- Titre / Qualité: Dr. (doctor)**

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**- Organisation scientifique: Living Oceans Foundation**

**- Laboratoire ou département d’affectation au sein de l’organisation: National Museum of Marine Biology and Aquarium (Pingtung, Taiwan)**

**- Site internet de l’organisation et/ou du labo:** [**www.livingoceansfoundation.org**](http://www.livingoceansfoundation.org) **and www.nmmba.gov.tw**

**- nom, qualité et contact du superviseur: Dr. Andrew Bruckner, Living Oceans Foundation (chief scientist), email: bruckner@living oceansfoundation.org**

**Anderson B. Mayfield, Ph.D.**

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# Education

**University of Hawaii, Manoa**, **Ph.D**., ***Zoology***. Fall 2009. Supervisor: Dr. Ruth D. Gates

**University of Hawaii, Manoa**, **M.S**., ***Zoology***. Fall 2007. Supervisor: Dr. Ruth D. Gates

**Duke University**, **B.S**., ***Biology***. Fall 2003. GPA: 3.8/4.0 (*magna cum laude*)

# Postdoctoral research experience

**Living Oceans Foundation**, ***National Museum of Marine Biology and Aquarium*, *Checheng, Taiwan*,** *postdoctoral researcher,* Jan. 2013-current. Conducting research aboard the *Golden Shadow* as part of the Global Reef Expedition to understand the genetic basis of coral stress.

**National Museum of Marine Biology and Aquarium (NMMBA), *Checheng, Taiwan*,** Feb. 2010-

Feb. 2012. Investigating the physiological and sub-cellular impacts of climate change on reef-

building corals. Supervisor: Dr. Chii-Shiarng Chen, NMMBA/National Sun Yat-Sen University

**Publications**

**Mayfield AB**, Wang YB, Chen CS, Chen SH, Lin CY (in prep.) The transcriptome-level response of the reef-building coral *Pocillopora damicornis* to experimentally elevated seawater temperatures. Target journal = *Molecular Ecology*

Putnam HM, Pochon X, Stat M, Yost DM, **Mayfield AB**, Gates RD (in prep.) Challenges and future direction for genetic delineation of *Symbiodinium* using molecular tools and analyses. ***Invited review*** in *Coral Reefs*

**(18) Mayfield AB,** Chen YH, Dai CF, Chen CS (in review) The complex, sub-cellular response of the Indo-Pacific reef coral *Seriatopora hystrix* to changes in temperature. *PLoS ONE*

**(17) Mayfield AB,** Hsiao YY, Chen HK, Chen CS (accepted) Rubisco expression in the dinoflagellate

*Symbiodinium* sp. is influenced by both photoperiod and endosymbiotic lifestyle. *Marine Biotechnology*

**(16) Mayfield AB**, Fan TY, Chen CS (accepted) The physiological impact of *ex situ* transplantation on the Taiwanese reef-building coral *Seriatopora hystrix*. *Journal of Marine Biology*

**(15) Mayfield AB,** Fan TY, Chen CS (accepted) Real-time PCR-based gene expression analysis in the model reef-building coral *Pocillopora damicornis*: insight from a salinity stress study. *Platax*

**(14)** Wang LH, LeeHH, FangLS, **MayfieldAB**, Chen CS (accepted) Normal fatty acid and phospholipid syntheses are prerequisites for the cell cycle of *Symbiodinium* and their endosymbiosis with sea anemones. *PLoS ONE*

**(13) Mayfield AB**, Fan TY, Chen CS (accepted) Physiological acclimation to elevated temperature in a reef-building coral from an upwelling environment. *Coral Reefs* doi: 10.1007/s00338-013- 1067-4

**(12)** Doo SS, **Mayfield AB**, Nguyen HD, Chen HK (accepted) Protein analysis in large benthic foraminifera. Invited book chapter in: *Experimental Approaches in Foraminifera: Collection, Maintenance and Experiments*. Editors: Hiroshi Kitazato and Joan Bernhard.

* **(11)** Putnam HP, **Mayfield AB**, Fan TY, Chen CS, Gates RD (2013) The physiological and molecular responses of larvae from the reef-building coral *Pocillopora damicornis* exposed to near-future increases in temperature and *p*CO2. *Marine Biology* 160: 2157-2173
* **(10)** **Mayfield AB**, Chen M, Meng PJ, Lin HJ, Chen CS, Liu PJ (2013) The physiological response of the reef coral *Pocillopora damicornis* to elevated temperature: results from coral reef mesocosm experiments in Southern Taiwan. *Marine Environmental Research* 86: 1-11

**(9) Mayfield AB**, Hsiao, YY, Fan TY, Chen CS (2012) Temporal variation in RNA/DNA and

protein/DNA ratios in four anthozoan-dinoflagellate endosymbioses of the Indo-Pacific:

implications for molecular diagnostics. *Platax* 9: 1-24

**(8) Mayfield AB**, Chan PH, Putnam HP, Chen CS, Fan TY (2012) The effects of a variable

temperature regime on the physiology of the reef-building coral *Seriatopora hystrix*: results from a laboratory-based reciprocal transplant. *The* *Journal of Experimental Biology* 215: 4183-4195

**(7)** Doo SS, **Mayfield AB**, Byrne M, Chen HK, Nguyen H, Fan TY (2012)Reduced expression of the

rate-limiting carbon fixation enzyme RuBisCO in the benthic foraminifer *Baculogypsina sphaerulata* holobiont in response to heat shock. *Journal of Experimental Marine Biology and Ecology* 430-431: 63-67

**(6)** Chen WNU, Kang HJ, Weis VM, **Mayfield AB**, Fang LS Chen CS (2012) Diel rhythmicity of lipid

body formation in a coral-*Symbiodinium* endosymbiosis. *Coral Reefs* 31: 521-534

**(5) Mayfield AB**, Wang LH, Tang PC, Hsiao YY, Fan TY, Tsai CL, Chen CS (2011) Assessing the

impacts of experimentally elevated temperature on the biological composition and molecular chaperone gene expression of a reef coral. *PLoS ONE* e26529

**(4)** Peng SE, Chen WNU, Chen HK, Lu CY, **Mayfield AB**, Fang LS, Chen CS (2011) Lipid bodies in coral-dinoflagellate endosymbiosis: ultrastructural and proteomic analyses. *Proteomics* 17: 3540-3455

**(3) Mayfield AB**, Hsiao YY, Fan TY, Chen CS, Gates RD (2010) Evaluating the temporal stability of

stress-activated protein kinase and cytoskeleton gene expression in the Pacific corals *Pocillopora damicornis* and *Seriatopora hystrix*. *Journal of Experimental Marine Biology and Ecology* 395: 215-222

**(2) Mayfield AB**, Hirst MB, Gates RD (2009) Gene expression normalization in a dual-compartment

system: a real-time PCR protocol for symbiotic anthozoans. *Molecular Ecology Resources* 9: 462-470

**(1) Mayfield AB**, Gates RD (2007) Osmoregulation in anthozoan-dinoflagellate symbiosis. *Comparative Biochemistry and Physiology A: Molecular and Integrative Physiology* 147: 1-10

# Research awards

**NSF MCR-LTER**-Feb. 2010. $14,000 to study the impacts of ocean acidification on coral health.

**PADI Project Aware**-Jun. 2009. $1,200 for Taiwan-based research on the coral heat stress response.

**NSF International Postdoctoral Fellowship-** Jun. 2009. $126,500 for Taiwan-based coral research.

**Company of Biologists travel fellowship-** Sept. 2008. $1,800 for Taiwan-based coral research.

**NSF EAPSI Fellowship**- May 2008. $7,500 for Taiwan-based coral reef research.

**Edmondson Fund**- Apr. 2008. $900 for coral osmoregulation research.

**PADI Project Aware**- Mar. 2008. $1,000 for coral gene expression normalization study.

**PADI Foundation*-*** Apr. 2007. $4,000 for coral gene expression normalization study.

**Edmondson Fund*-*** Dec. 2006. $800 for coral stress gene transcription experiments.

**PADI Project Aware**- Nov. 2006. $1,400 for gene expression experiments on corals.

**NSF small travel grant**- Sept. 2006. $1,000 for collaborative visit.

**NSF Graduate Research Fellowship*-*** Spring 2004. $121,500 for graduate research.

**Total research awards: $281,600 USD**

**Professional references**

**Dr. Chii-Shiarng Chen**, cchen@nmmba.gov.tw**,** National Museum of Marine Biology and Aquarium

and National Sun Yat-Sen University (***postdoctoral research supervisor***)

**Dr. Tung-Yung Fan,** tyfan@nmmba.gov.tw, National Museum of Marine Biology and Aquarium

**Dr. Pi-Jen Liu**, pijenliu@nmmba.gov.tw, National Museum of Marine Biology and Aquarium

**Dr. Pei-Jie Meng**, pjmeng@nmmba.gov.tw, National Museum of Marine Biology and Aquarium

**Dr. Ruth Gates**, rgates@hawaii.edu, University of Hawaii, Manoa (***Ph.D. supervisor***)

**Dr. Henry Trapido-Rosenthal**, rosenthl@hawaii.edu, University of Hawaii

**Dr. E. Gordon Grau**, grau@hawaii.edu, University of Hawaii

**Dr. Virginia Weis**, weisv@science.oregonstate.edu, Oregon State University

For a full list of presentations, research experiences, and other experiences/awards, please see the unabbreviated C.V.

**2)** **Expected publications to emerge from work stemming from coral (*Pocillopora damicornis*) sampling conducted in New Caledonia**

**Mayfield AB**, Bruckner AW, Chen CS (in prep.) Mapping molecular biomarker gene expression of the reef-building coral *Pocillopora damicornis* across the South Pacific.

**Mayfield AB**, Bruckner AW, Chen CS (in prep.) Light-driven variability in gene expression *in situ* in the reef-building coral *Pocillopora damicornis*.

**3) Collection regime**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Family | Genus | Species | Number of samples to be collected | Mass per sample (g) | Total sampling mass (g) |
| Pocilloporidae | Pocillopora | *Pocillopora damicornis* | 150 | 0.05 | 8 |
| Pocilloporidae | Pocillopora | *Pocillopora damicornis* | 30 | 0.1 | 3 = 11 g total |

**4) Sampling strategy**

I will collect approximately 50 mg from each of 150 colonies collected across our study sites in New Caledonia. I will preserve these 150 samples in a commercial fixative (RNALater®, Ambion, USA) and homogenize them while onboard the ship. I will transport the crushed coral tissues and skeleton in ~1-ml fixative in 2-ml microcentrifuge tubes from New Caledonia to the United States. In January, 2014, they will then be transported from the US to Taiwan to be analyzed at Taiwan’s National Museum of Marine Biology and Aquarium (NMMBA). Briefly, I will extract RNA, DNA, and protein from every sample. From the RNA phase, I will assess the expression (i.e., concentration) of stress-sensitive biomarkers in order to know whether or not the sampled corals were stressed. From the DNA phase, I will assess the genotype of both the coral host, *Pocillopora damicornis*, and the resident dinoflagellate algal populations (genus *Symbiodinium*). From the protein phase, I will measure expression of stress-sensitive protein biomarkers determined from my prior research projects.

From 30 colonies, I will collect 100 mg. These samples will be analyzed by microscopy. They will first be fixed in 4% paraformaldehyde in artificial seawater (ASW) for several hours, then washed and decalcified prior to their transport from New Caledonia to the US. In January 2014, they will be taken to NMMBA while stored in ASW, embedded, sectioned, and potentially stained in order to assess the tissue structure. RNA and protein probes may also be used with these samples in order to assess gene and protein localization, respectively.

Upon a collective assessment of both cellular (microscopy) and sub-cellular parameters (gene and protein expression, as well as genotyping) to be assessed with the samples proposed to be collected in New Caledonia, it is our hope that we may be able to gauge the health of the sampled colonies. If a significant number of the sampled colonies are found to be exhibiting stress-indicative patterns of, for instance, gene expression, then we would recommend local managers to attempt to reduce local-scale pressures, such as water pollution, to the reef in question, such that the resident, potentially stressed corals may have a chance to recover and avoid later stage manifestations of health decline, such as bleaching or succumbing to bacterial infection.