

# 琉球大学学術リポジトリ

## アジア太平洋域における大学院学生の国際連携教育プログラムーダブルディグリープログラムなどの推進ー最終報告書

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# 大学院学生短期研修派遣と受入レポート

## ・平成22年度 短期研修 ..... 46

### 派遣 7名

伊良皆 千里	岩本 健輔
小枝 圭太	栗田 隆気
荒武 里衣	
Famararz Asharif	
Muhamad Fadry Abdullah	

### 受入 7名

Shin-Wei Su	Gemma Mangente Corral
姜亮澈	Diah Permata Wijayanti
Ali Mashar	
Hadi Yeganehfar	
Maya Vizel	

## ・平成23年度 短期研修 ..... 67

### 派遣 12名

伊礼 由佳	Famararz Asharif
上原 一太	Muhamad Fadry Abdullah
豊崎 孟史	藤井 琢磨
戸村 友彦	三村 泉美
伊良皆 千里	矢野 優佳
Oktiyas Muzaky Luthfi	Noelle Wenty Oldiais

### 受入 7名

Aliati Iswantari	Pham Thi Bich Dao
Mardiansyah	Boonlee Panphot
黄玉馨	Teekawat Veerasettakul
(Huang Yu-sin)	
Tran Thi Le Quyen	

## ・平成24年度 短期研修 ..... 98

### 派遣 11名

Fabienne Gabriela Kuenzli	Yang Sung-Yin
小枝 圭太	Abdullah Muhamad Fadry
Adrianus Bannepadang	Noelle Wenty Oldiais
豊崎 孟史	式場 はるか
Tonmitr Nayatat	小林 峻
志村 友衣	

### 受入 12名

Steve Doo	Sapto Pamungkas
Noar Muda Satyawan	Muliawati Handayani
Christian Cabiles	Forcep Rio Indaryanto
Nguyen Thi Huyen Trang	Supinya Punyapaso
Nguyen Thi Hoa	Enkhjargal Boldbaatar
Arik Wijayanti	Reza Deevsalar

ダブルテイクリ  
プログラムについて

国際合同実習

平成22年  
平成23年  
平成24年  
大学院学生短期研修派遣・受入

1. 研修先および研修受け入れ責任者:

College of Electrical and Computer Engineering, Chungbuk National University, Prof. Heung-Gyoon Ryu.

2. 研修期間:平成22年9月1日~2010年11月26日

3. 研究内容:

OFDM(直交周波数分割多重)は、高密度にデジタルデータを伝送することができる無線通信変調方式です。このOFDM方式がベースとなっている、無線LAN(IEEE802.11a)中継における回りこみ波キャンセルと、位相雑音抑圧に関する研究を行いました。

中継局での無線通信において、受信周波数と送信周波数に同一の周波数を利用する中継局では、再送信された信号が送信アンテナから受信アンテナへ回りこみ、発振を引き起こします。また、送受信機中でアップ-ダウンコンバージョンする際に使用する局部発振器からは位相雑音が発生します。位相雑音からの影響は、コンスタレーションに一定の回転を与えるCPE(common phase error)と、ICI(Inter carrier interference)に分類できます。これらの干渉やエラーは、受信信号の特性劣化につながり、信号の伝送を困難にしてしまいます。

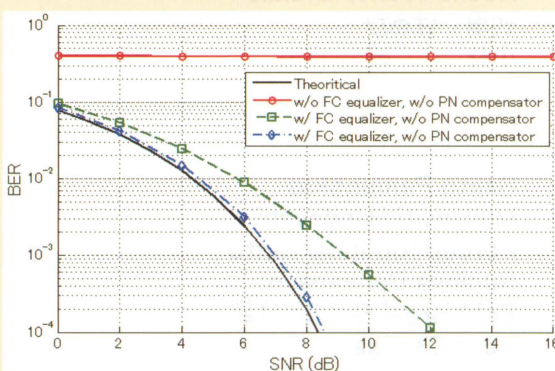
そこで、回り込み波干渉には、適応信号処理を用いて回りこみ経路同定を行い、回り込み波を打ち消す技術を検討しました。また、位相雑音は、Ryu研究室にて提案したPNS(Phase Noise Suppression)アルゴリズムを用いて低減します。今回は、位相雑音のみを解析するために、回り込み波の推定・キャンセルが理想的に行われたことを前提として、キャリア変調にQPSK、16QAMを用いたプログラムのシミュレーションをそれぞれ行いました。その結果、QPSKでは4dB、16QAMでは7dB程度の改善が見られ、PNSアルゴリズムが有効であることが確認できました。

以上の研究成果を、研修期間中の11月4日に、大邱大学にて開催された、The 11th International Conference on Computers, Communications and Systems(ICCCS 2010)にて、"PNS Algorithm and Simulink Design of Wireless OFDM ICS Repeater with Phase Noise."というタイトルで発表し、多くの学生や研究者と意見交換を行いました。

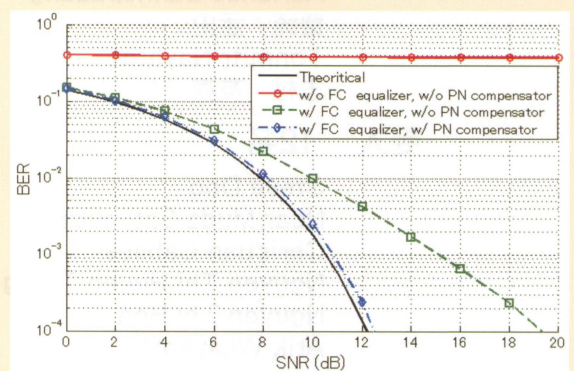
また、2011年2月13日~16日に行われる、The 13th International Conference on Advanced Communication Technology(ICAICT2011)にて、"PNS Algorithm and FPGA Design of Wireless OFDM System."というタイトルで、発表を行う予定です。



▲図3:ICCCS2010発表準備の様子



▲図1:QPSK変調におけるBER



▲図2:16QAMにおけるBER



理工学研究科 海洋自然科学専攻 修士2年 小枝 圭太

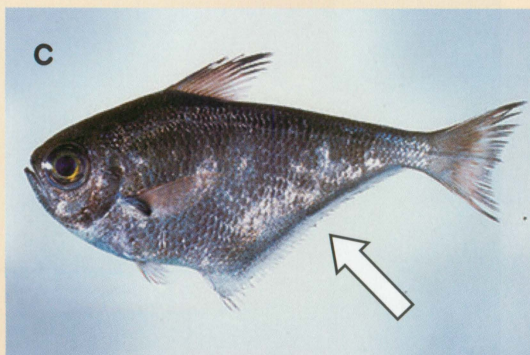
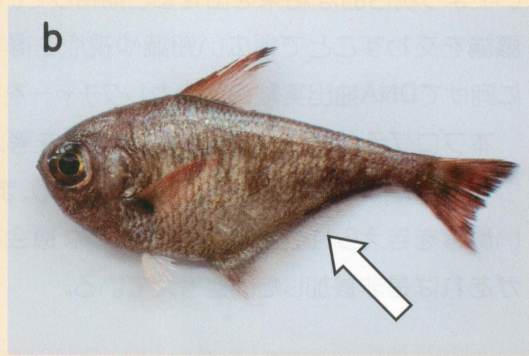
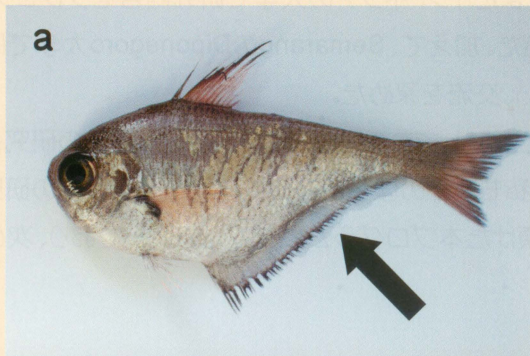
推薦教員:立原 一憲

1. 研修先および研修受け入れ責任者:Phuket Marine Biological Center (Ukkrit Satapoomin)

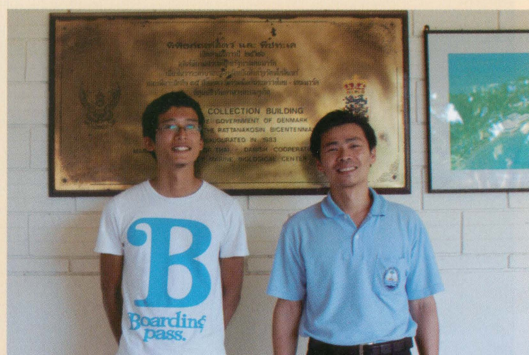
2. 研修期間:平成22年10月15日~31日

3. 研究内容:

これまで、タイのハタンポ属魚類の分類は非常に混乱しており、Phuket Marine Biological Centerの博物館に貯蔵されていたハタンポ属の標本も、全て誤同定されている状態でした。そこでインド洋アンダマン海に面するプーケット島および、太平洋シャム湾に面するタオ島でハタンポ属魚類の採集を行ったところ、琉球列島に生息しており、近年の研究で私たちが日本初記録、あるいは未記載種として報告した3種がタイにも分布していることが明らかになりました。ただし、シャム湾側では、これらの形態学的特徴は殆ど共通であったのに対し、アンダマン海側では、琉球列島産ではみられない明瞭な黒色帯が臀鰭にみられ、今後は、遺伝的な解析などを用いて、これらが別種となるのか、あるいは同種内の地域変異となるのかを判断する必要があります。加えて、これまでに採集したことのないハタンポ属を採集し、属全体の遺伝的多様性について研究している自身の研究に非常に重要な標本となりました。また、本プログラムを通じて、海外の研究者との共同研究、交流、情報交換の重要性を改めて感じました。また、自身のこれまでの経験や知恵が、海外に存在する問題を解決するために、重要な役割を果たせたという経験は、今後の研究の大きな自信とモチベーションとなっています。さらに、将来的に、海外での研究活動を考えていたため、そういった環境を短い期間ながら体験できたことは、より広い国際的な視野を持つという意味で非常に大きな意味を持つ研修でした。次の機会があれば、是非また参加したいと考えています。



▲図. ハタンポ属の1種  
(a. プーケット;b. タオ島;c. 沖縄島)



▲Phuket Marine Biological Centerにて。  
(右)Ukkrit Satapoominさん。

ダブルティグリー  
プログラムについて

国際合同実習

平成22年  
平成23年  
平成24年  
大学院学生短期研修派遣・受入



### 1. 研修先および研修受け入れ責任者:

Indonesia: Sorong / Semarang (Diponegoro University) /  
Lampung (Lampung University) Dr. Andi Setiawan

### 2. 研修期間:平成23年1月2日~1月19日

### 3. 研究内容:

これまで沖縄に生息するSarcophyton属を中心としたソフトコーラルにおける遺伝的、化学的多様性について研究を行ってきた。ソフトコーラルは古くから生理活性物質の研究が行われている。しかし生理活性物質を生物多様性の視点から捉えた研究はあまり報告されていない。このことから私は沖縄沿岸に生息するソフトコーラルの形態分類、遺伝的多様性、含有化合物の調査を行った。ソフトコーラルの遺伝的多様性、化学的多様性を見ることによってサンゴの正確な分類、また含有生理活性物質のサンゴにおける機能を探り、サンゴの進化、環境への適応をより深く理解しようと試みている。琉球列島に生息するソフトコーラルについてはこれまで研究を進めてきた。その結果として沖縄本島と与那国島に生息する同種の個体から異なった生理活性物質が得られたため、生理活性物質産生には環境要因が関与していると考えられた。今回のインドネシアでの研修では、環境の違いという観点から世界的に生物多様性が高いことで有名なRAJA AMPATにてソフトコーラルの採集を行うことを目的とした。RAJA AMPATは沖縄沿岸に生息するサンゴに比べても大きな個体が数多く生息していた。他の生物も沖縄では見られない多様な生物種を数多く見られることができた。今回採集した試料を含めてソフトコーラルの環境の差による生理活性物質生産への影響についてより統合的な結果を出せると期待している。またインドネシアの大学で研究内容をプレゼン、また議論を交わすことで幅広い知識や視点を得てきた。加えて、SemarangのDiponegoro大学では学生に向けてDNA抽出実験の簡単なレクチャーを行い、交流を深めた。

本プログラムは、これからの研究活動を考えた上でとても貴重な体験となった。海外の研究者とのつながりを持てたことはとても重要であり、また私も海外の学生と交流できたことが今後の研究に良い影響を与えられたと思う。このような機会を頂けた本プログラムにとっても感謝しており、次の機会があれば是非参加したいと考えている。



▲ Sorong RAJA AMPATでの採集





**1.Acceptance information:**

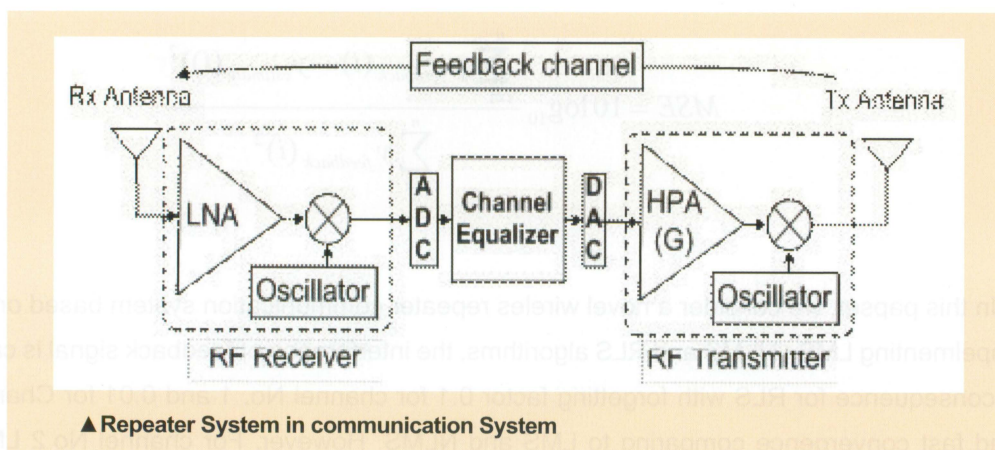
Professor Heung Gyoon Ryu, University of Chungbuk National University, College of Electrical and Computer Engineering, Department of Electronic System, Electronic Communication System Laboratory.

**2.Research term:**2010/12/3-2010/12/28**3.Research title, the detail and the results:**

A Fast and Efficient Adaptive Channel Equalizer for OFDM-Based Wireless Relay System

**Detail:**

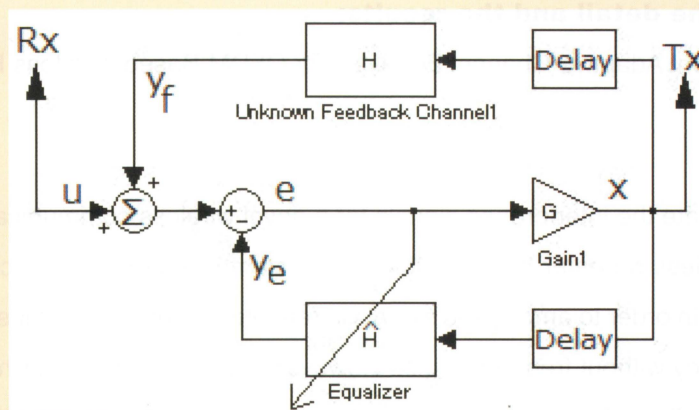
In order to eliminate the interference signals for a novel wireless communication repeater based on OFDM. The wireless repeater in communication system is important especially for mobile system. Now these days, in order to amplify the signal via repeater, receiver and transmitter of repeater using only one frequency without frequency shift. However, in this case repeater has problem that, amplified signal will feedback to receiver sides and this may cause the internal instability and distortion of repeater system. Therefore, by estimating the feedback signal by adaptive filter, we can eliminate the effects of feedback signal. In this paper we consider LMS, NLMS and RLS algorithms in order to estimate the feedback signal. Furthermore, by these adaptive filters we identify the unknown channel and evaluate the performance of each algorithm by MSE. Here, the LMS does not work and RLS has the best performance comparing to NLMS for identification of the unknown multi path channel.



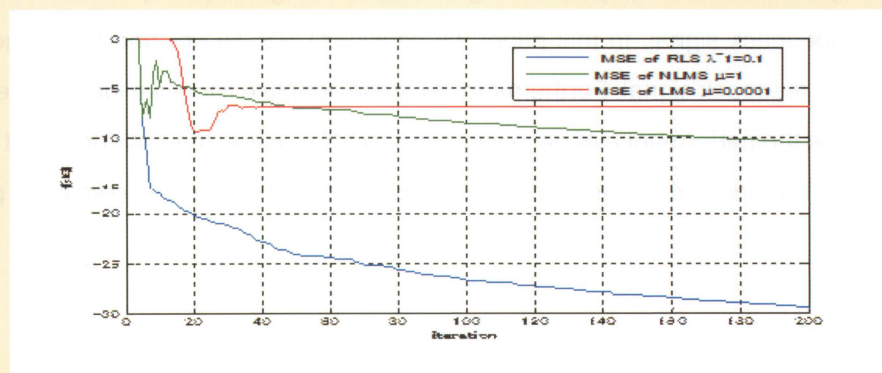


**Results:**

The interference effects of feedback signal may cause the distortion in repeater system due to existence of multi path channel. Therefore, in this paper interference cancellation system is implemented by adaptive filter. There are many schemes and algorithms for adaptive filter. But in this paper, we consider the channel identifier algorithm in order to realize the unknown channel inside repeater and by identifying the unknown channel we can produce the feedback signal. Consequently, by producing the feedback signal we can eliminate the interference effects in receiver sides of repeater.



Interference Cancellation in Repeater System



$$MSE = 10 \log_{10} \frac{\sum_{i=1}^n (y_{feedback}(i) - y_{estimate}(i))^2}{\sum_{i=1}^n y_{feedback}(i)^2}$$

In this paper, we consider a novel wireless repeater communication system based on OFDM. By implementing LMS, NLMS and RLS algorithms, the interference of feedback signal is cancelled. As a consequence for RLS with forgetting factor 0.1 for channel No. 1 and 0.01 for Channel No.2, it had fast convergence comparing to LMS and NLMS. However, For channel No.2 LMS became unstable. As a future works we are going to implement a new and fast algorithm in order to identify more complicated feedback multi path channel.



理工学研究科 海洋自然科学専攻 修士2年 Muhamad Fadry Abdullah

推薦教員: 今井 秀行

**1. Acceptance information:**

Dr. Serge PLANES

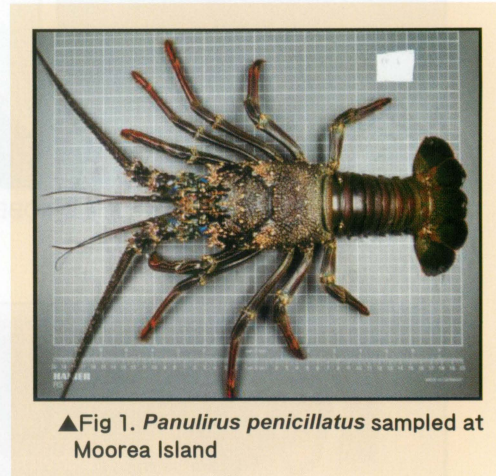
Director of the CRIOBE (Centre de Recherches Insulaires et Observatoire de l'Environnement)

CRIOBE, BP 1013 - Papetoai, 98729 Moorea, French Polynesia

**2. Research term:** January 31, 2011 . February 21, 2011

**3. Research title, the detail and the results:**

Title of the research is Genetic Variation and Population Structure of Pronghorn Spiny Lobster *Panulirus penicillatus* in Pacific Region. I am currently working with *P. penicillatus* to investigate Genetic diversity and gene flow of *P. penicillatus* distributed in the Pacific regions by analysis of the mitochondrial DNA control region. I already finished analyzes of adult specimens of *P. penicillatus* with 6 localities of Western Pacific region: Japan; Hachijojima Island, Amamiohshima-Okinawajima Islands, Ishigakijima Island, Taiwan; Taitung and Indonesia; Java Sea and Gebe Islands near Papua. For Eastern Pacific region, analyzes were finished with 2 localities; Ecuador; Isabela Island and Phyllosoma larvae specimens collected from west coast of Galapagos Islands.



▲Fig 1. *Panulirus penicillatus* sampled at Moorea Island

In order to complete the comprehensive study, it is necessary to extend sampling locality of middle of Pacific region. I was going to French Polynesia in order to collect *P. penicillatus* due to the important location as distribution areas of the species. *P. penicillatus* were collected by cooperation with Moorea Island fisherman. Besides, that I also had opportunity visit Tahiti fish market to understand common fish that caught by French Polynesia fisherman.

The results will indicate whether there are gene flow and mutual larval transportation between the western and eastern regions of *P. penicillatus* populations, also to find out existence of isolation by distance between localities and where the gene flow boundary between regions.



▲Fig 2. Collected samples at Moorea Island (left), picture with Moorea fisherman (middle), and fish at Tahiti fish Market (right)

ダブルティグリー  
プログラムについて

国際合同実習

平成22年 大学院学生短期研修派遣・受入  
平成23年  
平成24年

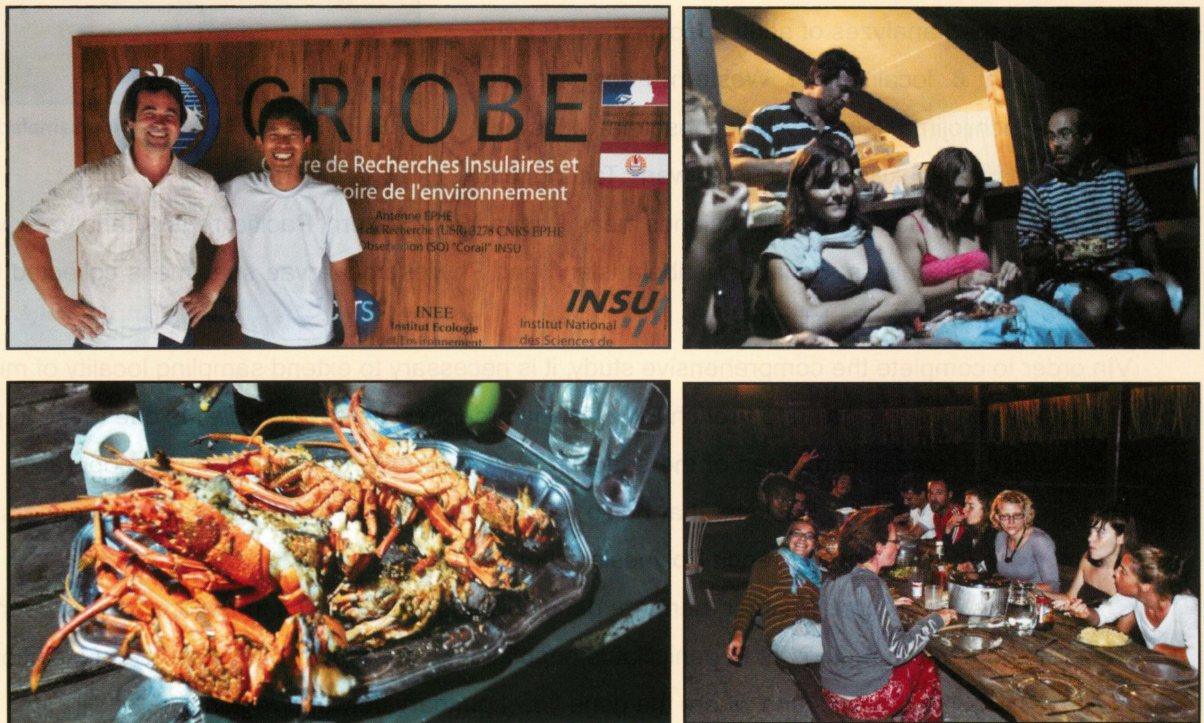


#### 4.Achievements

In this sampling trip I had successfully collected the *P. penicillatus* samples from Moorea Island, French Polynesia. Besides sampling trip, I also got the opportunity to know some researchers that were conducting their research in CRIOBE marine station and also I was able to joined them on their field research at Moorea lagoon.



▲Fig 3. Opportunity to join some CRIOBE researcher field activities at Moorea lagoon.



▲Fig 4. Family atmosphere at CRIOBE, Moorea, French Polynesia; Picture with Dr. Serge Planes, Director of CRIOBE (upper left) and dinner with CRIOBE member including student and staff.



理工学研究科 海洋環境学専攻 博士2年 岩本 健輔

推薦教員: 今井 秀行

1. 研修先および研修受け入れ責任者:

- i) 南太平洋大学島嶼海洋学部海洋学科 Mr. Johnson Seeto, Curator
- ii) ミクロネシア連邦コスラエ州政府資源経済局 Mr. Steven George, Director
- iii) グラム大学海洋研究所 Dr. Jennifer Maclwain, Assistant Professor

2. 研修期間:

- i) 平成22年11月15日から平成22年11月27日
- ii) 平成22年11月29日から平成22年12月7日
- iii) 平成22年12月8日から平成22年12月13日

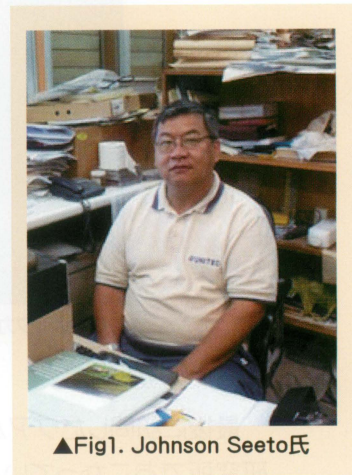
3. 研究内容:

<課題名>

『アジア太平洋域における海洋生物の集団遺伝学的研究』

<研修内容>

私はこれまで、サンゴ礁性魚類を中心に海洋生物の分子遺伝学的解析をおこない、黒潮流域における遺伝的多様性や集団構造、系統地理に関する研究をおこなってきた。今後は黒潮の起源である北赤道海流流域をはじめ、南太平洋やインド洋まで対象海域を広げ、広域にわたって生息する海洋生物種の分布を包括的に分析し、海洋生物相形成史と地史ならびに地史とともに変遷を遂げてきた海流との関連性を明らかにしたい。本研修ではその一環として、南半球に位置するフィジー諸島共和国ならびに北赤道海流流域のミクロネシア連邦・コスラエ州および米領グアムにおいて集団標本を収集するとともに、現地研究者の指導のもと分類学や水産学について学ぶこと、また共同研究について協議することを目的とした。



▲Fig1. Johnson Seeto氏

最初の研修先である南太平洋大学の Johnson Seeto氏は、南太平洋域における魚類相調査などに積極的に取り組んでおり、研究室に隣接する標本庫において分類学に関する指導を受けた(Fig. 1)。今後、魚類の分類学的研究を試みようとする私にとって、非常に貴重な経験となった。滞在中には所属学生と共に魚市場に頻繁に出向き、標本の収集に努めた(Figs. 2, 3)。また、スバ市内にある(財)海外漁業協力財団(OFCF)の事務所を訪問させていただき、世界の水産業における日本の立場や役割についてのお話を伺った(Fig. 4)。これらは近年の世界的な水産需要の高まりに伴う非常に重要な課題であると共に、私が将来関わりたい仕事にも直結するテーマであり、大変興味深く拝聴した。



▲Fig2. Young Scientists



▲Fig3. Suva Fish Market

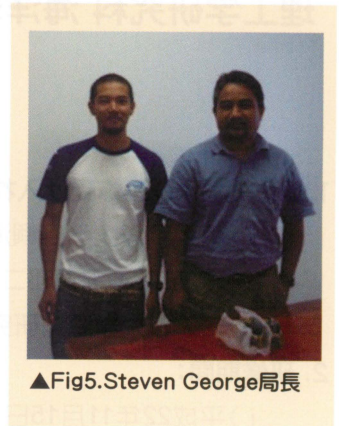


▲Fig4. OFCFフィジー事務所にて



## 大学院学生短期研修派遣(平成22年)

南太平洋大学に次いで訪問したミクロネシア連邦コスラエ州政府資源経済局では、受け入れ責任者であるSteven George局長と実質的な受け入れ先である資源経済局水産部のMaxwell Salik部長、ミクロネシア連邦政府資源開発省のJack Sigrah氏と、ミクロネシア連邦およびコスラエ州の水産業と日本との関係について議論させていただいた(Fig. 5)。連邦政府、州政府は共に、特に水産資源管理に関する日本の知識と技術に非常に高い関心を持ち、日本による活動に感謝と期待をしていた。また、大学などの研究・教育機関とも積極的に協力関係を築いていきたいとのことであり、今回の研修についても大変歓迎していただいた。滞在中には、水産部職員のサポートにより標本採集をおこなうと共に、水産資源調査やノコギリガザミ種苗生産の現場、現地零細漁業にも同行し、水産学に関する幅広い研修をさせていただいた(Figs. 6, 7)。



▲Fig5.Steven George局長



▲Fig6. タカセガイ生息数調査



▲Fig7. 零細漁業漁獲物

最後に訪問したグアム大学海洋研究所では、Jennifer MacIlwain博士に施設を案内していただき、研究所でおこなっている研究について紹介していただいた。また、共同研究についても協議し、サンプルの提供を受けた(Fig. 8, 9)。



▲Fig8. Fin Clip Samples



▲Fig9. UOG Marine LAB.



## 理工学研究科 海洋自然科学専攻 修士1年 栗田 隆気

推薦教員:戸田 守

## 1. 研修先および研修受け入れ責任者:

台湾北部(桃園・南岸・基隆・礁溪)/ Yu Hon-Tsen教授(国立台湾大学生命科学院動物学研究所)

## 2. 研修期間:

平成23年2月19日-2月23日(計5日間)

## 3. 研究内容:

ナキヤモリ属*Hemidactylus*のホオグロヤモリ(*H. frenatus*)は、東南アジアを中心に、オセアニア、ハワイなどを含む太平洋の島々、中米の一部などでも棲息が確認されている広域分布種です。これらの分布域の中には、物資の輸送などを通じた人為的な移入によって集団が形成されたと考えられる地域があり、琉球列島集団についても、琉球列島内での分布や遺伝的解析の結果から、外来性である可能性が強く示唆されていました。外来性ヤモリ類の移入経路や移入年代、また在来種への影響などは不明な点が多く、本種の琉球列島集団は外来種の移入に関する知見を蓄積するためのよい題材になると考え、私はこれまで琉球列島集団の起源を特定することを目的として研究を進めてきました。



▲図1. ホオグロヤモリが観察された環境。市街地の薄暗い路地(右側)などでは多数の個体が観察された。

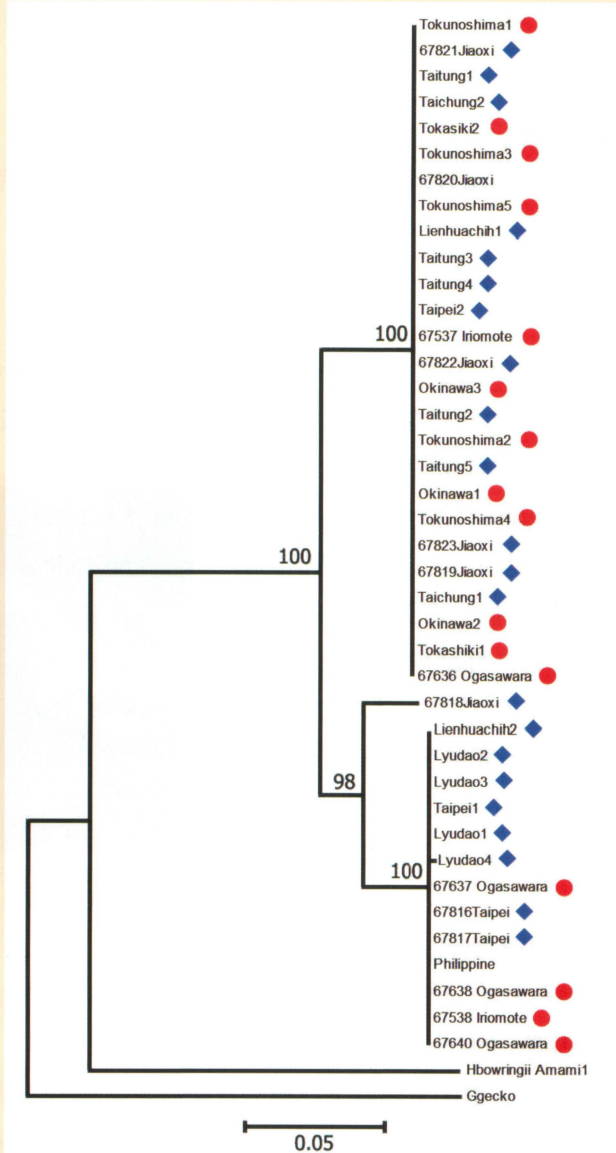
今回は、琉球列島との位置関係から本集団の起源の有力な候補のひとつと考えられる台湾で本種を採集し、ミトコンドリアDNAの部分塩基配列を決定して、琉球列島集団と台湾集団の遺伝的な比較を行いました。

本種の台湾内の分布範囲は冬季の気温低下が穏やかな台湾中南部に限られると考えられてきましたが、近年北部からも記録されるようになったため、その棲息状況が注目されてきました(図 1)。台湾北部における本種の棲息が一時的であるのか、もしくは繁殖集団を形成しており安定的であるのかという情報は、その集団が琉球列島集団の起源として適切と考えられるか否かを判断する際に重要ですが、この点を明らかにするためにはもっとも気温の低下する冬季に棲息が確認できるかどうかを確かめる必要があるため、今回は台湾北東部の4地域を対象に分布調査を行いました。

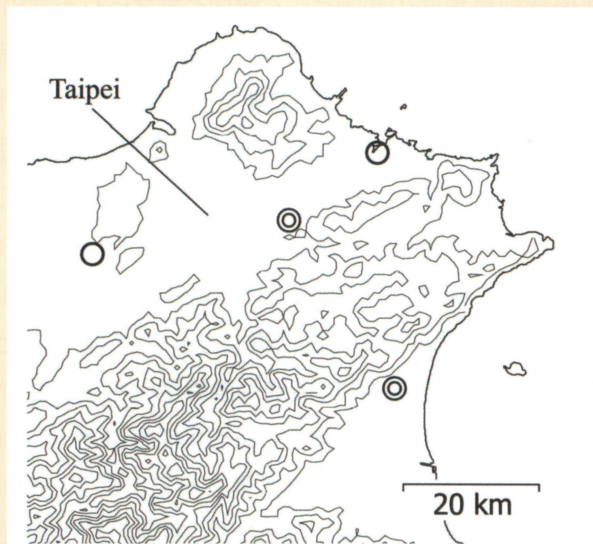
今回採集した個体とこれまでに得た標本の遺伝的解析の結果、台湾集団内には4つの遺伝子型が存在することが明らかになりました(図2)。これらのうち2つの遺伝子型は、これまでに琉球列島から確認されている2つの遺伝子型と共通したものであり、琉球列島集団の起源が台湾である可能性は否定されませんでした。また、分布調査の結果、今回調査を行った4地点のうち2地点で本種の棲息が確認され(図3)、冬季においても本種が台湾北部で安定的に集団を形成していることが予想されました。

今回の調査と遺伝的解析で得られた結果は、琉球列島集団と台湾集団が同一の集団に由来していることを示唆していますが、台湾集団自体が外来性である可能性など、本種の琉球列島集団の起源を特定するために考慮しなければならない点が多々残されています。今後は本種の分布の中心と考えられる東南アジアの集団を含めた解析が必要になるため、今回のような機会があればぜひ参加したいと考えています。





▲図2. ミトコンドリアDNAのcytb遺伝子領域(約750 bp)から推定された樹形。赤丸は琉球列島および小笠原産の個体、青菱形は台湾産の個体を示す。



▲図3. 本調査における調査地点(台湾北東部)。丸は本調査でホオグロヤモリを確認できなかった地点、二重丸は確認した地点を示す。



台湾／國立中山大學 海洋学部 博士4年 Shin-Wei Su

受入教員: 広瀬 裕一

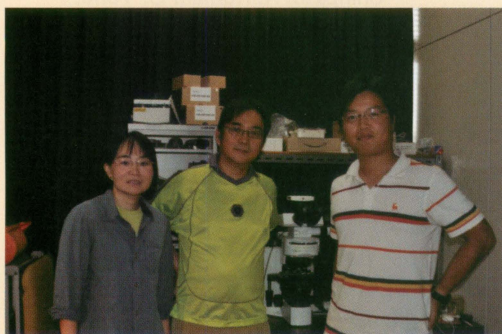
**1. Research term:** From 27th September to 30th October, 2010.**2. Research title, the detail and the results:**

Title: The biodiversity of ascidians: taxonomy and distribution

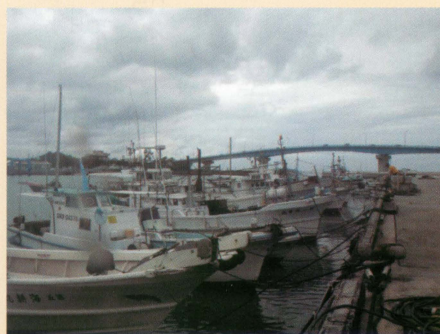
The purposes of going to Okinawa are (1) to collect more tunicate specimens for my study on biodiversity and in zoogeographic of these animals in the Kuroshio region and, (2) to learn more knowledge of tunicate with Professor Euichi Hirose (fig.1) who studies marine invertebrates at the Department of Biology and Marine sciences, the university of Ryukyu.

This research plan is for collection tunicate specimen in Okinawa which is located on the axis of Kuroshio current. My focus is on the tunicate species composition and community structure of benthic invertebrate. Comparisons made on with the tunicate in Taiwan and Okinawa will provide information on the biodiversity and biogeography of tunicates in the important Kuroshio region.

While in Okinawa, I aimed at the collect data for the taxonomy, ecology and distribution of tunicate in coastal coral reef, sea grass beds and fish port (fig.2) . These data are valuable to science and conservation. The results can also enhance cooperation between Taiwanese and Japanese marine biologist and also expand my scientific view and research scope. This international cooperation program is a perfect chance and extremely important to my study and research.



▲Figure1. Photo of Prof. Euichi (Luigi) Hirose (middle), Mamiko Hirose (left) and Shih-Wei Su (right).

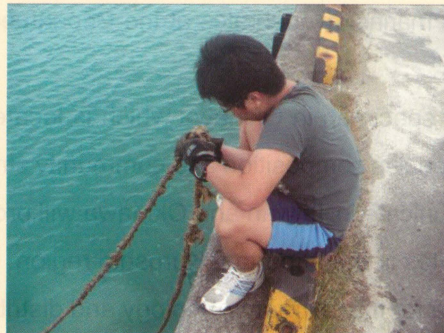


▲Figure2. The tunicates were collected at the fish port in Okinawa.

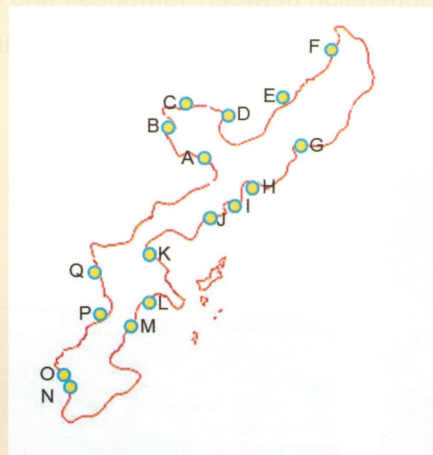
Equipment operation (Scanning electron microscope, SEM) and types of tunicate identification are the main training in the laboratory. The spicules of tunicate was observed by SEM because many didemnid ascidians have calcareous spicules in the tunic. Since the spicules of each species have a specific shape and size-range, they are often regarded as an important character for taxonomy. In addition, I learned some dissection of *Diplosoma* species in Okinawa that have been thoroughly studied by Prof. Hirose. I can be more rapid and accurate to identify the *Diplosoma* species.



Tunicates were collected in different habitats that contain coral reefs, sea grass beds and fish ports. We used SCUBA diving on the coral reefs and snorkeling on the sea grass beds. A total of 21 species of tunicate were recorded. The float and the anchor rope (fig.3) are the best place where tunicate like to attach and live at the fish port. Tunicates were collected at 17 fish ports (fig.4). There are more than 20 species at fish port in Okinawa and each site have different species numbers (Tab.1). The data of tunicate will be the basic research information and can be compared with Taiwan to study the biodiversity and zoogeographic of tunicates.



▲Figure3. The float and the anchor rope are the best place where tunicate like to attach and live at the fish port.



◀ Figure4. Sampling sites of fish port in Okinawa. A. Nago; B. Toguchi; C. Shinzato; D. Unten; E. Hentona; F. Ginama; G. Higashi; H. Gesashi; I. Henoko; J. Teima; K. Ishikawa; L. Awase; M. Shinzato; N. Itoman; O. Yone; P. Ginowan; Q. Toya.

▼Table1. The species numbers of tunicate at each fish port.

Fish port	Species num	Fish port	Species num
Nago	6	Teima	6
Toguchi	5	Ishikawa	5
Shinzato	3	Awase	5
Unten	5	Shinzato	7
Hentona	5	Itoman	6
Ginama	11	Yone	12
Higashi	4	Ginowan	10
Gesashi	4	Toya	11
Henoko	4		

### 3. Achievements

As described above, I collected many tunicates from Okinawa by means of various ways. These records will contribute to the better understanding of the ascidian fauna in Okinawa and the biogeography in Taiwan–Ryukyus. I had a chance to learn some techniques for specimen observation and species identification. These are applicable to my study in Taiwan.



韓国／済州大学校大学院 海洋生命科学専攻 修士2年 姜亮澈

氏名 姜亮澈

受入教員:竹村 明洋

**1.Research term:**From 9 November 2010 to 30 January 2011**2.Research title, the detail and the results:****Research title:** Differential gene expression analysis in whole brain; impact of melatonin and AVT**Research result**

**Background:** Arginine vasotocin (AVT) has been reported that this neuropeptide hormone is expressed with daily variations in the hypothalamus and closely related to oscillation of circadian system in fish. Melatonin is a neurohormone that was first isolated from the bovine pineal gland. Melatonin is also involved in many biological and neuronal functions. Base on this finding, we investigated the DEGs between normal and melatonin and AVT treatment in the threespot wrasse brain; the results could be used as preliminary data for further study of the molecular mechanism underlying melatonin and AVT roles in the fish brain. In this study, we performed a differential gene expression analysis in whole brain by melatonin and AVT treatment.

**Materials and methods:** Threespot wrasse were using in this study. After acclimatization, melatonin (1 mg kg.1 in saline; Sigma, St. Louis, MO) and AVT (1 mg kg.1 in saline; Sigma) were injected i.p. into the fish (n = 7) in one aquarium at 11:00 h. The vehicle only was injected i.p. to fish (n = 7) in the other aquarium (control group). At 0, 1, and 2 h post-injection, the brain was harvested and immediately frozen at -80°C until use. To study differential gene expression between melatonin treatment and vehicle group, AVT treatment and vehicle group the DEG GeneFishing Kit (SeeGene, Seoul) was used, following the manufacturer's protocol. DNA fragments were cloned into the pGEM T-easy vector (Promega) following the manufacturer's protocol. For identification of inserted DNA, isolated plasmids were sequenced (Promega). BLAST searches were conducted on a local server using the National Center for Biotechnology Information (NCBI) BlastalW program and best hits were recorded.

**Results:** We were able to identify 10 and 7 differentially expressed genes in melatonin and AVT treatment, respectively. Up regulation genes treatment by melatonin; 40: BRF 7-H7, BRF 39-D6, afim-evh-012-074 C-type natriuretic peptide 1 precursor putative mRNA, glutamine synthetase mRNA, heat shock protein 90 beta mRNA, Ictalurus furcatus Contig19751.lcfu mRNA, one of unknown gene. Down regulation genes treatment by melatonin; Ki-ras gene, tyrosine 3-monooxygenase/tryptophan 5-monooxygenase activation protein, epsilon polypeptide, mRNA, ssal-rgf-541-251 Visinin-like protein 1 putative mRNA. Up regulation genes treatment by AVT; ribosomal protein S26 mRNA, Hippoglossus hippoglossus all\_haiibut.724.C2 mRNA, glutamine synthetase mRNA, Oncorhynchus mykiss 1794.Onmycontig mRNA, afim-evh-005-022 40S ribosomal protein S17 putative mRNA, one of unknown gene. Down regulation genes treatment by AVT; NADH dehydrogenase 1 beta subcomplex subunit 10 putative mRNA, one of unknown gene.



### 1.Research term:

The research was conducted for three months from September 27th 2010 until December 26th 2010.

### 2.Research title, the detail and the results:

#### Title

Potentially food sources analysis of mantis shrimp with stable isotope analysis (SIA) and DNA Analysis of three species mantis shrimp.

#### Detail of the Research

For potentially food sources analysis with stable isotope analysis, I only use one species of mantis shrimp, which is *Harpisquilla raphidea* Fabricius, 1798 with a total 122 samples, consists of 61 samples of muscle/meat and gut, respectively. As for DNA analysis, I use three species of mantis shrimp, namely *H. raphidea*, *H. harpax*, and *Oratosquillina gravieri* with a total 123 samples consists of 81, 12 and 30 samples, respectively. And for DNA analysis, I am just done the Crude DNA Analysis and the PCR Analysis.

#### The Results

For Stable Isotope Analysis, generally it showed that all samples have the same food source. It can be seen from the value of  $.13C$  and  $.15N$  on the graph (in appendix), which focused on one spot. There was no significant difference between the value of  $.13C$  and  $.15N$  in gut and muscle. The C/N ratio of mantis shrimp in general is low compared to the C/N ratio in bacteria, sea grass or mangrove.

For DNA analysis, generally, after PCR analysis, only 6 of 123 samples showed DNA bands, where one of them has been sequenced and the result is quite good. This condition occurred because of the samples DNA are broken, the samples too long kept in the freezer and too long after catching, about three months.

### 3.Achievements:

I am very lucky and glad because I have got opportunity to follow this program. Particularly, I am the first foreigner researcher that uses the machine for stable isotope analysis. That is the best and valuable experience for me. I also can learn many things from many professors in this program, especially about how to design the good scientific research to get the perfect results and satisfy. I believed that this program is very useful for my scientific development and for my next research and to increase my. This research is beginning research, so it is very interesting to continue because there are still many "homework" of this research that unresolved and many aspects and other animals that need to be investigated.





▲Weigh and Roll/Curl up Samples in Tin Cup



▲Running of Stable Isotope Analysis

ダブル  
プログラマー  
について

国際  
合同実習

大学院学生短期研修派遣・受入  
平成22年  
平成23年  
平成24年



**1. Research term:** From 24 October 2010 to 9 July 2011.

**2. Research title, the detail and the results:**

**Research title:** The origin and evolution of basic volcanism in W Nain.

**Research questions:**

In the present study we try answer to the following questions;

1. What are the features of basic rocks in the volcanic sequence of western Nain, Iran?

Some of the features are: the mode of emplacement, thickness, associated rocks, textural and mineralogical characteristic, these may help to understand the mode of eruptions environment and the magmatic process involved.

2. What are the characters of the source (mantel or crust) and which kind of magmatic evolution has created the volcanic rocks?

Through studying of major elements and specifically trace elements and isotopic composition ( $^{143}\text{Nd}/^{144}\text{Nd}$  and  $^{87}\text{Sr}/^{86}\text{Sr}$ ), we can get useful information on the type of mantle, (it's chemical and mineralogical compositional range), the crustal effect (upper crust, lower crust and subducting slab), and role of fractional crystallization in magma evolution.

3. What "age range" the basic rocks demonstrate?

Current methods for determination of the age of Tertiary basaltic rocks are  $^{40}\text{Ar}/^{39}\text{Ar}$  and U-Pb.  $^{40}\text{Ar}/^{39}\text{Ar}$  is an useable method for either whole rock and separated minerals such as plagioclase and amphibole. U-Pb method (SHRIMP) is suitable for dating zircon grain.

4. What are the geodynamic implications of the basic volcanism in UDMB, Iran?

Based on the field survey, petrography, geochemical and isotopic composition data for volcanic rocks, the geodynamic model of the proposal study area is to be presented.

**Martial's and methods:**

Firstly ~50 basic samples are selected based on microscopic study, which show lowest alteration. Selected samples were crushed, washed several time with distilled water. Rock chips were pulverized using an agate mill. The Abundances of major elements and some of trace elements (Co, Cr, V, Ni, Sr, Zr, Nb, Y, Rb, Ba) were determined on fused glass beads, using X-ray fluorescence spectrometry (Shimadzu XRF-1800). Loss of ignition (LOI) was measured by routine procedures. Based on XRF and LOI data 30 representative samples were selected for measurement of trace and rare earth elements (REEs) by Inductively Coupled Plasma-Mass Spectrometer ICP-MS., Yokogawa Analytical Systems HP4500. The samples were digested with mixed acids ( $\text{HF}+\text{HNO}_3+\text{HClO}_4$ ), the obtained Solutions were measured by ICP-MS.



トスライバルマシナ工学博士 幸三 博士

報告 高日 員修入受

It is worth noting that for calibration and ensuring of accuracy and precision we used repeatedly JA-1 and JB-1 (standard sample of Japanese Geological Survey), BHVO-2 (standard sample of U.S. G.S).



▲Observation of thin sections of rock samples by polarizing petrographic microscope.



▲Analyses of bulk-rock chemical compositions for major and some trace elements by using the XRF spectrometer.



▲Preparing solution of acid-digested rock samples in the clean room for analyses of trace element and rare earth elements (REEs).



▲Measurement of trace and rare earth elements (REEs) by Inductively Coupled Plasma-Mass Spectrometer (ICP-MS).

ダブルティグリー  
プログラムについて

国際合同実習

大学院学生短期研修派遣・受入  
平成22年 平成23年 平成24年



**1.Research term:**From September 1st to November 29th, 2010

**2.Research title, the detail and the results:**

**Research questions:**

- 1.How does telomerase activity change throughout coral explant development?
- 2.Does telomere length in developing explant differ from developing planulae?
- 3.What are the effects of the addition of antioxidants (i.e. ascorbic acid) on the telomerase activity and the survivorship of the explanted polyps?

**Methodology:**

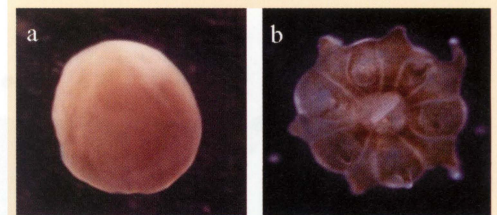
- 1.Comparison of telomerase activity and telomere length in adult coral tissue, sperm, explant, settled explant (appearance of a mouth), explant with septae, and fully developed polyp (bearing tentacles) using stretch PCR and STELA, respectively.
- 2.Comparison of the results from the above section to the telomerase activity of a planula, a settled planula, planula with septae, and with tentacles.
3. a) Telomerase activity and telomere length on explants and fully developed polyps with the addition of ascorbic acid.  
b) Survivorship curves of explants with or without ascorbic acid.

**Results:**

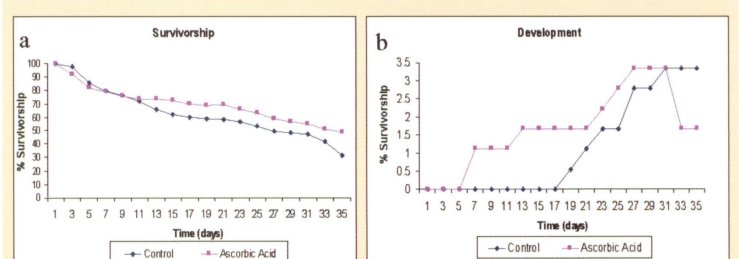
Samples of 6 *Fungia Fungites* coral were extracted for adult coral tissue, sperm, explant, settled explant (appearance of a mouth), explant with septae, fully developed polyp (bearing tentacles) and planulae in different developmental stages. These samples were frozen in -80°C and were divided to samples for telomerase activity assay and telomere length assay. Due to technical difficulties, no telomerase activity was visible in any of the samples; however a positive control band was visible on the gels.

This suggests that the assay was performed correctly, but due to RNase contamination no products of telomerase was visible (Telomerase is an RNase sensitive enzyme).

Telomere length assay was not performed, however DNA was extracted from all the samples and it will be used in the near future. In addition, coral explant development with the addition of ascorbic acid was monitored for 35 days (Fig.1). Survivorship curves using Kaplan-Meier were created for the parameters 'survivorship' and 'development' (Fig. 2), and log rank test was performed. Survivorship was significantly higher with the addition of ascorbic acid; however there was no significant difference in the development (Fig. 2). In the end of the experiment, tissues were collected and DNA was extracted for telomere length analysis.



▲Figure 1. *Fungia Fungites* explant development. a) Undeveloped coral tissue explant. b) a developed polyp.



▲Figure 2. Kaplan-Meier survivorship curves of *Fungia Fungites* explants. a) percent survivorship of the explants with and without the addition of ascorbic acid.  $p < 0.05$ . b) percent development of the explants with and without the addition of ascorbic acid.  $p > 0.05$ .



フィリピン/ビコール大学 修士2年 Gemma Mangente Corral

受入教員: 竹村 明洋

I am Ms. Gemma Mangente Corral from Philippines, 23 years old, and currently employed at Bicol University Tabaco Campus, Tabaco City and at the same time taking Master of Science in Fisheries Major in Aquaculture.

I was very grateful to become a participant in the International Graduate Program for Asia- Pacific Region last November 8-24, 2010 here in University of the Ryukyus. Prof. Akihiro Takemura was my adviser for my fifteen days training on his laboratory. I was trained on doing histological analysis including its proper procedures and identification of the different stages of maturity.

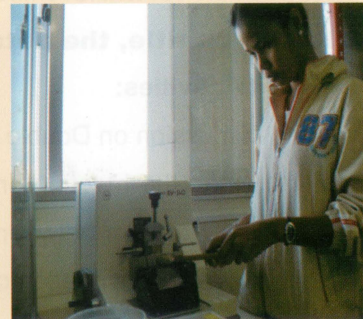
I work on the histological analysis of the gonad of Damsselfish (*Chrysiptera cyanea*). The aim was to determine the different maturity level of the sapphire devil damselfish. The sample was collected from the coral reefs of Okinawa Island near the research station in Motobu. It was collected in their reproductive season from April to August and also some were collected in the month of September or October. In the wild they feed on algae but under experimental condition they were fed with commercial pellets.

Based on my laboratory work, I identified the five different stages of maturity level in sapphire devil damselfish. In figure C shows the two stages maturity level of the sapphire damselfish PYS and PNS. Primary yolk stage (PYS) the yolk globules densely stained with eosin and Peri-nucleolus stage (PNS) the ratio of nucleolus to cytoplasm decreased and oocyte volume increased. In figure D shows the three stages maturity level of the sapphire damselfish TYS, SYS, and ODS. Tertiary yolk stage (TYS) the yolk globule increase. The Secondary yolk stage (SYS) the yolk globules increased rapidly and the bully filled the cytoplasm. Oil-droplet (ODS) the cytoplasm very basophilic. According to (Mohammad A.B. et al, 2009), the pre-spawning season of the damselfish was February to March, the spawning period (April to August) and the post-spawning (September to January). These results are the histological analysis of sapphire devil damselfish from the immature stage to mature stages of the oocytes.

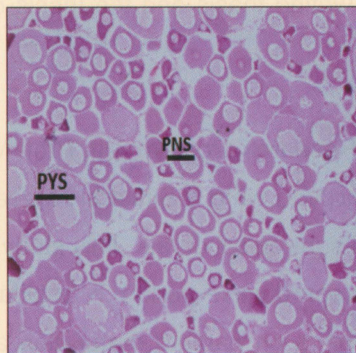
Through this laboratory work I enhanced my skills in doing histological analysis. I learned the procedure and the technique on how to do histological analysis and also the materials that are needed for histology.



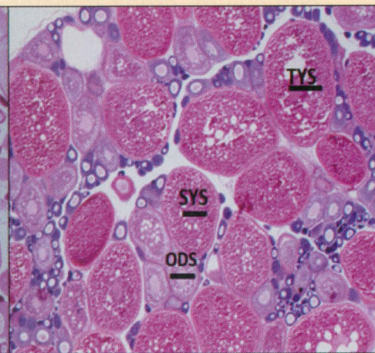
▲Fig. A. Fixation of the sample in glass slide



▲Fig. B. Cutting the sample in microtome.



▲Fig.C. Shows the (PYS) Primary yolk stage and (PNS) Peri-nucleolus stage



▲Fig D. Shows the (TYS) Tertiary yolk stage and (SYS) Secondary yolk stage and (ODS) Oil-droplet



**1.Research term:**November 13 to December 1, 2010

**2.Research title, the detail and the results:**

**Visit Activities:**

(1) Discussion on Double Degree Program between UNDIP and UR

I joined the meeting on 'Discussion on Double Degree Program (DDP) to establish a Double Degree Program between University of the Ryukyus and Diponegoro University'. The discussion itself was a continuation of previous meeting on the same topic on 14-15 March, 2009 at UR. The topic of discussion was mostly about the establishment of a system to develop a DDP between the two universities based on the present regulations. For examples the rule of students admission, the curriculum, credit transfer, writing thesis and the thesis committee, travel expenses, scholarship, tuition fee, etc.

(2) Discussion on Bilateral Research program with Prof. Michio Hidaka

We discussed the possibility to write a Bilateral Research Program on comparative studies on reproduction of tropical and subtropical corals. This study will aim to understand the environmental cues that determine coral reproductive period in tropical and subtropical regions. We will study effects of environmental factors on gamete maturation and spawning behavior both at field and laboratory from organism to cellular or molecular levels. Final goal is to establish education and research platform for coral reproduction studies and we plan to submit a proposal for AA Science Platform in future.

(3) Revision of manuscript on contact reactions of corals

I tried to revise our manuscripts on contact reactions of corals. First one is about the contact reaction between parent colony and their offspring and between siblings of the coral *Pocillopora damicornis*. Second one is about determinant of histoincompatibility reactions in the coral *Pocillopora damicornis*. Since both studies were done several years ago when I was a PhD student at UR, I had to incorporate new references since that time to rebuild our manuscripts.