

Overseas Summer Undergraduate Research Opportunities Programme in Science (UROPS) at Chang Gung University (CGU) 2024 (in-person)

Programme Overview

Chang Gung University (CGU) is offering Overseas Summer Undergraduate Research Opportunities Programme in Science (UROPS) in the Biomedical Sciences to NUS Faculty of Science students.

Students will get an opportunity to conduct research in the area of Biomedical Sciences on topics such as molecular biology, cancer biology and immunology.

Please refer to the list of projects below for possible placements. **Please do not contact the research supervisor at CGU for a placement before receiving an offer from NUS.**

Location

The programme takes place in Taoyuan, Taiwan.

Dates

The programme takes place from **13 May 2024 to 02 August 2024**. (Special Term Part 1 & 2, 12 weeks)

Credit Transfer

Students will be assessed according to CGU's assessment criteria and receive a transcript issued by the institution.

This programme can be mapped to a 4 units Science dummy exchange course code counting towards unrestricted elective.

For mapping to the UROPS course code, Life Sciences and Physics majors can map to LSM3288 and PC3288 respectively. For all other majors, please do check with the respective departments' UROPS Coordinators.

Do note that additional assessment may be required from the student by the NUS department for transferring of credits to a UROPS course. Not all UROPS course code can be counted towards major requirements. Please check what requirements the UROPS will count towards and if you are unsure, please check with your department.

Students can transfer a total of 12 units from a maximum of 2 overseas summer/winter programmes without having to pay tuition at NUS during their course of study. Any additional units mapped will be subjected to NUS Special Term fees.

Course mapping and credit transfer for online summer programmes is not allowed.

Eligibility Criteria

NUS students must:

- Be a full-time Faculty of Science student.
- Have a clean disciplinary record.
- All Year 2 and Year 3 students may apply
- Minimum GPA of 3.0

- Be fully vaccinated
- Not intending to graduate at the end of AY23/24 Semester 2
- Not be National Servicemen who are called up for In-Camp Training (ICT). Deferment letter will not be provided.

Shortlisted candidates may be required to attend an interview at the Science Dean's Office. Interview details will be provided at a later date. After accepting the internal offer, you will be informed further on subsequent steps and project requirements.

An internal offer does not guarantee your placement in the programme. Your admission outcome is up to the discretion of the partner institution.

Number of Places

There are 3 places available.

Programme Cost

Students do not need to pay NUS Special Term fees or tuition fees to CGU if they do not exceed the credits transfer limit stated under the section "Credit Transfer" above. However, students are responsible for their own airfare, accommodation, meals, personal expenses, etc.

Estimated cost (*Please note that the figures provided are only estimates*)

Item	Cost
Return Airfare	SGD500
Accommodation	SGD150/month (sharing basis)
Food and Transport	SGD700/month

Financial Assistance

Click [here](#) to find out more about the various financial assistance schemes offered by NUS.

Programme Application Procedure and Deadline

Login to [Education Records System \(EduRec\)](#) and submit your application under External Study Type "Research Attachment/Internship/Industrial Attachment", External Study Setup ID: **02629**. Please refer to [Guide for Student Programme Application](#) BEFORE your application. You will need to log on to [NUS WebVPN](#) before accessing the Guide and EduRec.

Application Deadline: **21 December 2023, 11:59pm Singapore Time**

Documents required (upload into your online application in EduRec):

1. Latest NUS unofficial transcript (downloadable from EduRec).
2. Curriculum Vitae. Highlight any prior research experience that you may have to support your application.
3. 1 page personal statement, including your area of research interest/project, why you are interested in the mentioned area/project, name of supervisor you wish to work with, etc. Please indicate clearly the project you are interested in. Please do not contact the research

supervisor at Chang Gung University for a placement before receiving an internal offer from NUS.

Note:

- Admission into the programme is at the discretion of Chang Gung University
- Allocation of project is done by CGU

If you face difficulties uploading the documents, email the required documents to SCI SAP Team (scisap@nus.edu.sg) instead by **21 December 2023, 11:59pm Singapore Time.**

Applications would be deemed incomplete even after submission if the required documents are not received by the stipulated deadline, and therefore disqualified from the application.

To be fair to students who abide by the deadline, incomplete or late application will strictly not be considered.

Insurance

All students travelling overseas for activities or purposes approved, endorsed, organised, sponsored or authorised by NUS will be covered by the NUS Student Travel Insurance Policy. Click [here](#) for more information.

Exclusions to the NUS Student Travel Insurance may apply. Students are to ensure that they have sufficient travel insurance coverage, and may consider purchasing additional travel insurance if required.

Contact Details

If you have any questions, please submit your enquiry via the MS Form [here](#).

List of available projects (details in the bookmarks below)

PI name	Title of project
Robert YL Wang	Dissecting the mechanism of flavonoid carbon nanomaterials against RNA viruses
Bertrand Tan	Identification and functional characterization of tumor-associated non-coding RNAs.
Shu Yuan Yang	Biodegradation of bioplastics
Sebastian D. Fugmann	Conserved immune mediators in <i>Exaiptasia pallida</i> , a sea anemone
Yi-Ting Chen	Clinical utility of urinary sediment examination for the disease diagnosis and management of bladder cancer

STUDENT RESEARCH EXCHANGE PROJECT FORM
(Project Form 2024)

General Information

Name of the research project (highly specific):

Dissecting the mechanism of flavonoid carbon nanomaterials against RNA viruses

Name and address of the department:

Department of Biomedical Sciences

Research Advisor(s): Robert YL Wang

E-mail: yuwang@gap.cgu.edu.tw

Phone: 00-2118800 ext 3691

Description of the project

Please, provide project background information for the interested students:

We will evaluate the biocompatibility and in vitro biosafety of various flavonoid carbon quantum dots (Quercetin, Hesperetin, Hesperidin, Naringenin, Naringin) and also evaluate the efficacy of these flavonoid carbon quantum dots in the treatment of dengue virus (DENV) infection in mice. The project will have three specific aims: (1) identification of anti-DENV (RNA viruses) properties of the flavonoid-derived carbon quantum dots; (2) inhibition of DENV infection by flavonoid-derived carbon quantum dots; and (3) identification of the anti-DENV mechanism of flavonoid-derived carbon quantum dots in mice. The results of this project will demonstrate that a variety of flavonoid-derived carbon quantum dots have a wide range of therapeutic effects against flaviviruses with different mechanisms of action, and these results will lead to significant scientific breakthroughs. Due to the high biocompatibility and low cost of the self-assembled flavonoid-derived carbon quantum dots molecules, we expect that they will have a high commercial value. The research results will identify several highly biocompatible flavonoid-derived carbon quantum dots molecules that will provide self-assembled flavonoid-derived carbon quantum dots drugs with different efficacy on the various flaviviruses infection.

What is the aim of the project?

To characterize the antiviral activities of flavonoid carbon quantum dots in the treatment of dengue virus (DENV) infection.

What techniques and methods will be used?

The work will rely the cells infected by RNA viruses and the usage of flavonoid-derived carbon quantum dots drugs. It will involve the purification of RNA, reverse transcription, PCR, cloning, and the culture and transfection of mammalian (and potentially primary) cells.

Type of the project (check only one option)

Basic Science Clinical Research without lab work Clinical Research with lab work

Will there be any theoretical teaching provided (preliminary readings, lectures, courses, seminars etc)?

There will be weekly lab meetings and frequent discussions with the PI in charge of the laboratory.

What is the role of the student and what is expected from him/her during the research exchange?

The student will be part of a research team working on understanding the antiviral mechanisms of carbon quantum dots against in RNA viruses.

What should be the outcome of the student's participation on the research exchange project (paper, poster etc)?

What are the practical skills and the knowledge the student will acquire during the exchange program?

Basic molecular biology and biochemistry lab techniques, sequence data analysis, and a fundamental knowledge in innate responses and inflammation.

Requirements

What skills are required? Is there any special knowledge or certain level of studies needed? Are there any legal limitatons in the student's involvement in the project?

Preferably students who finished their 3rd year and hence have a solid theoretical foundation in biochemistry, molecular biology, cell biology, and (hopefully) immunology.

For the use of students considering participating in the project, further information can be found from the following articles:

Language(s): Which languages are required or accepted? (Include English)

Required: English

Accepted: Chinese

STUDENT RESEARCH EXCHANGE PROJECT FORM
(Project Form 2024)

General Information

Name of the research project (highly specific):

Identification and functional characterization of tumor-associated non-coding RNAs.

Name and address of the department:

Department of Biomedical Sciences, Chang Gung University

Tutor(s): Professor B. Tan & Dr. Chung-Pei Ma

E-mail: btan@mail.cgu.edu.tw

Phone: 886-939596043

Description of the project

Please, provide project background information for the interested students:

My laboratory has devoted extensive efforts to the mechanistic understanding of various aspects of mammalian gene regulation, particularly focusing on roles of RNA editing and regulatory RNAs:

Decoding the hidden message of RNA editome. We are one of the earliest groups that exploit the high-throughput sequencing approach in demarcating the widespread A-to-I RNA editing events, which constitute an integral step in generating primate transcriptome diversity. We established a computational pipeline to extensively archive transcriptome-wide RNA editing events (Nat. Biotechnol. 2012, 30:253), which paved the way for large-scale studies and for advancing our understanding of this gene regulatory process in human. As a proof of principle, we reported quantitative tissue-specific RNA editome profiles for rhesus macaque, a close relative of human (PLoS Genet. 2014, 10:e1004274), and more recently a new mechanism for the functionality of RNA editing – a crosstalk with piRNA biogenesis – by deciphering RNA editome across the piRNA species (Mol Biol Evol. 2015, 32:3143). The expression of these editing-bearing piRNA variants (epiRNAs) illustrates the contribution of primate RNA editing to the diversification of the piRNA repertoire. In a more functional context, ADAR1 was found to mediate 3' UTR editing and expression control of antiapoptosis genes, thus fine-tuning cellular apoptosis response (Cell Death and Disease 2017, 8:e2833). More recently, we reported a functional coordination between ADAR1 and an antisense non-coding RNA in the regulation of HIF-1 α expression, with significant implications in maintaining robust hypoxia signaling and controlling tumor progression (EMBO Reports 2019, 20:e47107).

“Non-coding” RNAs with big impact in cell biology. Regulatory RNAs such as microRNAs and lncRNAs are known to impart post-transcriptional regulation to critical factors in various cellular signaling and functional networks. Our recent works have broadened the realm of ncRNA biology by functionally delineating several microRNA-centric regulatory axes: 1) Our studies uncovered two distinct circuitries that underlie proper progression of skeletal myogenesis – the miR-546-Mybbp1a (EMBO J. 2012, 31:1739) and miR-1/206-ADAR1 (Cell Death Differ. 2014, 21:707), both of which contribute to the scheduled gene program transitions. 2) We also discovered that nucleolar size and rRNA pool in *Caenorhabditis elegans* is under the tight control of a novel genetic cascade, let-7-ncl-1-fib-1 (PLoS Genet. 2015, 11:e1005580). 3) A miR-31-5p-ACOX1-PGE2 pathway was delineated that underpins overall cellular lipidome profiles as well as the migratory and invasive abilities of oral cancer cells (Theranostics 2018, 8:486).

What is the aim of the project?

To mechanistic dissect the functional relevance of non-coding RNAs in tumor progression.

What techniques and methods will be used?

General molecular biology techniques (cloning, PCR, RT-PCR, Western blot assay, etc.), cell culture (including proliferation and cell death assays).

Type of the project (check only one option)

Basic Science Clinical Research without lab work Clinical Research with lab work

Will there be any theoretical teaching provided (preliminary readings, lectures, courses, seminars etc)?

Students will participate in laboratory seminar/journal club, and summer courses if available.

What is the role of the student and what is expected from him/her during the research exchange?

Student will be part of a team with a particular research focus. He/she will learn the basic techniques at the beginning, and upon becoming familiar, will independently design and carry out experiments under the supervision of the team leader. He/she will be assigned with certain tasks that are related to the overall research direction, and will be responsible to carry out experiments and/or generate the necessary reagents.

What should be the outcome of the student’s participation on the research exchange project (paper, poster etc)?

Student will write a research report summarizing the background and rationale of the study, as well as the data and discussion of the results. There will also be opportunity to give oral presentation of the report.

What are the practical skills and the knowledge the student will acquire during the exchange program?

Student will learn hands-on skills in the molecular and cell biology experiments and become knowledgeable in the field of non-coding RNAs. Student will also learn how to present and communicate scientifically, and become familiar with working in a laboratory.

Requirements

What skills are required? Is there any special knowledge or certain level of studies needed? Are there any legal limitations in the student's involvement in the project?

The student should have already taken courses in general biology and molecular biology. Experiences in laboratory techniques are preferred, but not required. There are no legal limitations in the student's involvement in the project.

For the use of students considering participating in the project, further information can be found from the following articles:

1. Chen YT, Kan CH, Liu H, Liu YH, Wu CC, Kuo YP, Chang IY, Chang KP, Yu JS, Tan BC*. Modular scaffolding by lncRNA HOXA10-AS promotes oral cancer progression. **Cell Death Dis.** 2022 Jul 20;13(7):629. doi: 10.1038/s41419-022-05071-6.
2. Chen YT, Chang IY, Kan CH, Liu YH, Kuo YP, Tseng HH, Chen HC, Liu H, Chang YS, Yu JS, Chang KP, Tan BC*. circRNAome Profiling in Oral Carcinoma Unveils a Novel circFLNB that Mediates Tumour Growth-Regulating Transcriptional Response. **Cells.** 2020 Aug 10;9(8):1868. doi: 10.3390/cells9081868.

Language(s): Which languages are required or accepted? (Include English)

Required: English

Accepted: Mandarin Chinese

DBS Committee On Research Exchange

STUDENT RESEARCH EXCHANGE PROJECT FORM

(Project Form 2024)

General Information

Name of the research project (highly specific):

Biodegradation of bioplastics

Name and address of the department:

Department of Biomedical Sciences

Tutor(s): Shu Wei Hsueh, Arya Ravindran, Prof Shu Yuan Yang

E-mail: yangsy@mail.cgu.edu.tw

Phone: 03-2118800 ext 3836

Description of the project

Please, provide project background information for the interested students:

Biodegradation is a great vision for the management of plastic waste that is still under development. We are collaborating with chemists and industrial partners to accelerate the development of new tools.

What is the aim of the project?

The goal of the project is to isolate and optimize microbes for the biodegradation of common bioplastics.

What techniques and methods will be used?

Isolation and culture of microbes, analysis of biodegradation activity, and molecular characterization of microbes.

Type of the project (check only one option)

Basic Science Clinical Research without lab work Clinical Research with lab work

Will there be any theoretical teaching provided (preliminary readings, lectures, courses, seminars etc)?

Readings will be assigned as needed.

What is the role of the student and what is expected from him/her during the research exchange?

To learn one or two techniques important for a small project and execute that portion of the project.

What should be the outcome of the student's participation on the research exchange project (paper, poster etc)?

The student's work will be a part of our collective effort to develop new biodegradation tools.

What are the practical skills and the knowledge the student will acquire during the exchange program?

The student will learn 1-2 lab techniques such as bacterial culturing, DNA extraction, and PCR, and also understand the experimental design and considerations around the project.

Requirements

What skills are required? Is there any special knowledge or certain level of studies needed? Are there any legal limitations in the student's involvement in the project?

Prior lab experience on molecular biology would be preferred but not required. The lab will provide sufficient training and guidance.

For the use of students considering participating in the project, further information can be found from the following articles:

<https://www.theguardian.com/environment/2023/sep/28/plastic-eating-bacteria-enzyme-recycling-waste>

<https://www.embopress.org/doi/full/10.15252/embr.201949365>

Language(s): Which languages are required or accepted? (Include English)

Required: English

Accepted: Mandarin

DBS Committee On Research Exchange

STUDENT RESEARCH EXCHANGE PROJECT FORM

(Project Form 2024)

General Information

Name of the research project (highly specific):

Conserved immune mediators in *Exaiptasia pallida*, a sea anemone

Name and address of the department:

Department of Biomedical Sciences

Research Advisor(s): Sebastian D. Fugmann

E-mail: sdfugmann@mail.cgu.edu.tw

Phone: 0920606432

Description of the project

Please, provide project background information for the interested students:

Cnidarians are a phylum of invertebrates that carry obligate endosymbiotic dinoflagellates in the cytoplasm of their cells. This poses a particular challenge to their immune system: it has to be able to recognize and respond to abundant pathogenic microbes in the sea water, but at the same time tolerate and not react against their endosymbiotic microbes. How this is accomplished remains elusive. Thus we are characterising the immune system of *Exaiptasia pallida*, our cnidarian model species, with a focus on family of evolutionarily conserved cytokines that induced during immune responses and orchestrate cell-cell communication. Why is this topic important? Coral bleaching is a world-wide phenomenon in the increasingly warmer and more polluted oceans that endangers food supplies and biodiversity. The loss of the colorful endosymbionts is likely driven by an undesired loss of immune tolerance but the mechanism (and hence strategies for treatments) remains unknown.

What is the aim of the project?

To characterize the sequences and expression patterns and of *E. pallida* cytokines under normal and stress conditions.

What techniques and methods will be used?

The work will rely on *E. pallida* tissues in normal or immune challenged condition. It will involve the purification of RNA, reverse transcription, PCR, cloning, and potentially the culture and transfection of mammalian cells.

Type of the project (check only one option)

Basic Science Clinical Research without lab work Clinical Research with lab work

Will there be any theoretical teaching provided (preliminary readings, lectures, courses, seminars etc)?

There will be weekly lab meetings and frequent discussions with the PI in charge of the laboratory.

What is the role of the student and what is expected from him/her during the research exchange?

The student will be part of a research team working on understanding immune responses in marine invertebrate model systems.

What should be the outcome of the student's participation on the research exchange project (paper, poster etc)?

What are the practical skills and the knowledge the student will acquire during the exchange program?

Basic molecular biology and biochemistry lab techniques, sequence data analysis, and a fundamental knowledge in innate immunity.

Requirements

What skills are required? Is there any special knowledge or certain level of studies needed? Are there any legal limitations in the student's involvement in the project?

Preferably students who are at the end of their 3rd year and hence have a solid theoretical foundation in biochemistry, molecular biology, cell biology, and possibly immunology.

For the use of students considering participating in the project, further information can be found from the following articles:

<https://www.frontiersin.org/articles/10.3389/fmicb.2016.00519/full>

<https://www.sciencedirect.com/science/article/pii/S0145305X18303811>

Language(s): Which languages are required or accepted? (Include English)

Required: English

Accepted:

STUDENT RESEARCH EXCHANGE PROJECT FORM

(Project Form 2024)

General Information

Name of the research project (highly specific):

Clinical utility of urinary sediment examination for the disease diagnosis and management of bladder cancer

Tutor(s): Yi-Ting Chen, Ph.D.

E-mail: ytchen@mail.cgu.edu.tw

Phone: +886-32118800 ext.3558

Description of the project

Please, provide project background information for the interested students:

A non-invasive method allows for painless patient diagnosis and monitoring with a low risk of infection and with the immediate clinical response to the collected data. Current medical health examinations by non-invasive procedure for urinary tract-related diseases are limited in clinics which is worth of further explorations. The similar methods are image and pathological examinations which are less convenient. Biomarkers have been used in precision medicine because it benefits the classification of disease risk, prognosis or therapeutic response. Histological specimens reveal molecular information directly, and liquid biopsy provides noninvasive and inexpensive detection relatively to tissue biopsy. Our laboratory has used proteomic and metabolomic platforms to discover, verified and filed several biomarkers patents for the management of benign and malignant urological diseases. To accomplish the goal of precision medicine, this study aims to improve the speed in urinary biomarker assay which plan to explore the biomarker detection in urinary cell debris, and eventually to improve the stability and sensitivity of the biomarker assay.

What is the aim of the project?

The primary goal is to develop a non-invasive biomarker assay using as the urinary sediment as material. Since the concentration of protein in urine is not high, mass-spectrometry (MS) and immune-assay based technologies with good sensitivity and high specificity will be also performed as the reference data in biomarker development workflow. We hope the simple and fast non-invasive health examinations can be used to early detection of urological disease or/and monitoring of high-risk urological cancer patients in the future.

What techniques and methods will be used?

Western blot, LC-MS/MS, mass spectrometry, ELISA. SDS-Page.

Type of the project (check only one option)

Basic Science Clinical Research without lab work Clinical Research with lab work

Will there be any theoretical teaching provided (preliminary readings, lectures, courses, seminars etc)?

Yes, my lab will arrange an experienced research assistant(s) or students to guide the theory and lab work for the exchange student.

What is the role of the student and what is expected from him/her during the research exchange?

To read the paper and try to confirm the existence of target proteins in urinary sediment by at least one of the Western blot, mass spectrometry and/or ELISA techniques.

What should be the outcome of the student's participation on the research exchange project (paper, poster etc)?

The results of the summer exchange students should be able to present as a poster or oral presentation in a scientific conference.

What are the practical skills and the knowledge the student will acquire during the exchange program?

Detection systems of disease biomarkers. The student will be able to understand the biomarker discovery pipeline, mass spectrometry instrumentation, and biostatistics analysis.

Requirements

What skills are required? Is there any special knowledge or certain level of studies needed? Are there any legal limitations in the student's involvement in the project?

The student will need the basic knowledge about the General chemistry and possibly Analytical proteomics, and/or Proteomics.

For the use of students considering participating in the project, further information can be found from the following articles:

Targeted Protein Quantitation in Human Body Fluids by Mass Spectrometry. *Mass Spectrometry Reviews*. 2022. <https://doi.org/10.1002/mas.21788>.

Lab website: <https://sites.google.com/site/cguytc/home>

Language(s): Which languages are required or accepted? (Include English)

Required: English

Accepted: Mandarin