

## Field Science Course and Genome Science Course in 2016

### 1.1 Outline

“Field Science Course” aims to train students to do fieldwork on the UNESCO World Natural Heritage Site on Yakushima Island, Japan. Young scientists from abroad and graduate students in Kyoto University attend the course together, using English as an official language.

“Genome Science Course” aims to train students in the molecular biology, using DNA sequencing techniques. In this course, various samples collected in the preceding “Field Science Course” will be analyzed. Students can choose a topic which is suitable for their interest and prior experience in molecular biological experiments. Through the two courses, students will experience the whole process of scientific research, sampling in the field, analyzing in the laboratory, conducting data analysis and presentation of the results.

No previous experience is required to take these courses and we welcome both students who engage in fieldwork and those who engage in laboratory work. We also welcome students who have few chances to communicate in English. Please communicate with foreign students of the same generation.

In the Field Science Course, students will learn the fundamental methods to study the ecology and behavior of various wild animals. We stay in a small village, having local food. We hope you enjoy the nature and culture of Yakushima Island.



## 1.2 Application

A graduate student of Biological Science, Graduate School of Science, Kyoto University (as of October 2016) can apply for the courses. Please note that we accept a limited number of participants due to safety for fieldwork and limited capacity of accommodation and transportation.

We will hold the course twice this year, in spring and fall. The contents of spring and fall courses are different, and students may take only one of them. If an applicant was unaccepted for the spring course, he/she may apply again for the fall course.

In both seasons, the Field Science Course will be held in Yakushima Island. We hold the Genome Science Course either at Yoshida Campus of Kyoto University in Kyoto City or at the Primate Research Institute in Inuyama City (depends on the group).

Students may apply to either the Field Science Course or Genome Science Course, though we encourage to take both of the courses.

Application form is available at the following site

<http://www.wildlife-science.org/ja/curriculum/yakushima-field-science-course.html>

(Japanese)

<http://www.wildlife-science.org/en/curriculum/yakushima-field-science-course.html>

(English)

## 1.3 Fee

Typically, no fee is required. During the Field Science Course in Yakushima, please pay by yourself the cost of optional activities such as entrance fee of sightseeing sites, public bath and snacks and meals other than those provided in our field station.

## 2. Schedule

### **Field and Genome Science Courses in fall**

September 9	Deadline for application (both for the Field Science Course and Genome Science Course)
October 7	Guidance for the Field Science Course and Genome Science Course

### Field Science Course (Yakushima Island, Kagoshima Prefecture)

October 15	Field Science Course starts (Move to Yakushima on this date)
October 16-19	Fieldwork in Yakushima
October 20	Data analysis, presentation in the afternoon
October 21	Leave Yakushima

Genome Science Course at Kyoto University (Primate Research Institute, Inuyama City)

- October 24-28      Genome experiments, at several laboratories in Inuyama (animal) and Yoshida (plant) Campus of Kyoto Univ.
- November 4        Presentation of the result of the courses at Primate Research Institute and Yoshida Campus of Kyoto Univ.

### 3. Reports on the past program

Global COE website (in English)

[http://gcoe.biol.sci.kyoto-u.ac.jp/gcoe/eng/report/2011/01/report\\_of\\_fieldworkgenome\\_trai.php](http://gcoe.biol.sci.kyoto-u.ac.jp/gcoe/eng/report/2011/01/report_of_fieldworkgenome_trai.php)

CCTBio HP (in Japanese)

[http://www.wrc.kyoto-u.ac.jp/core-to-core/training\\_old.html](http://www.wrc.kyoto-u.ac.jp/core-to-core/training_old.html)

Leading Graduate Program of Primatology and Wildlife Sciences (in English)

<http://www.wildlife-science.org/ja/reports.html>

(2014 fall: [http://www.wildlife-science.org/pdf/reports/YakushimaReport\\_FINAL.pdf](http://www.wildlife-science.org/pdf/reports/YakushimaReport_FINAL.pdf))

(2015 fall: <http://www.wildlife-science.org/pdf/reports/Report-2015-10-18-plantteam.pdf>,

<http://www.wildlife-science.org/pdf/reports/Report-2015-10-18-deerteam.pdf>)

### 4. Field Science Course in fall (October 15-21)

#### 4.1 Participants

About 12 graduate students of Biological Science, Kyoto University

About 5 teaching staff, including professors, post-docs and graduate students who study in Yakushima and/or the subject species

#### 4.2 Groups

We form into two groups, monkey and plant groups, and each group engages in different tasks. Choose your first and second preferences for group assignment. Please note that we cannot ensure your first preference due to capacity limitations.

#### A) Monkey group

##### Title

Testing the trade-off between parasite resistance and the immunosuppressive hormones cortisol and testosterone

##### Lecturers

Andrew MACINTOSH (Primate Research Institute, Kyoto Univ.) (京都大・霊長研)

Liesbeth FRIAS VILLARROEL (Primate Research Institute, Kyoto Univ.) (京都大・霊長研)

Hideki SUGIURA (Wildlife Research Center, Kyoto Univ.) 杉浦秀樹 (京都大・野生研)

Takakazu YUMOTO (Primate Research Institute, Kyoto Univ.) 湯本貴和 (京都大・霊長研)

### Abstract

Parasites are ubiquitous in nature and are known to affect the health and fitness of both wild and domestic animals worldwide. Recently, research into primate parasitism has increased, partly because roughly half of all species are now threatened with extinction, and partly because primates are an important source of zoonotic infection in humans, especially in areas where humans continue to encroach into primate habitat. Yet, we still know very little about the dynamics of infection for the majority of infectious organisms and the majority of wild primate species.

This course will attempt to test for a trade-off between resistance to gastrointestinal parasites and the production of immunosuppressive hormones: cortisol, a critical component of the stress response, and testosterone, a critical component of male reproduction. The monkey group will locate and collect fecal samples from Yakushima macaques along the Western coastal road. Samples will then be processed and analyzed at the field laboratory, during which all parasites (helminths and protozoa) will be identified and quantified to estimate infection size in each sampled macaque. Students will thus assess the prevalence and abundance of each parasite infecting Yakushima macaques, and determine the diversity (richness) of macaque parasites in the area. These parasitological data will be used for comparison with the endocrinological data produced during the subsequent laboratory course at the Primate Research Institute.

## **B) Plant group**

### Title

Species composition in fern gametophyte

シダ植物の配偶体における種構成

### Lectures

Wataru SHINOHARA (Kagawa Univ.) 篠原渉(香川大学)

Hiroshi KUDOH (Center for Ecological Research, Kyoto Univ.) 工藤洋(京都大・生態研)

### Abstract

Ferns that we usually observe in forests are in their sporophyte stages. Compared with sporophyte, fern gametophyte is very small and about 1 cm at most in size and has no sufficient morphological character using for species identification so far, as well as other tiny characterless kind of organisms. However, recently, developing molecular analysis shed light on the species identification for these small organisms. This year, plant team focuses on

studying phenology of fern gametophytes in Yakushima. We plan to collect gametophytes from several places and compare the species constitution across the collection sites.

## 5. Genome Science Course in fall (October 24-28)

Following the Field Science Course, we will have the Genome Science Course, which uses samples collected during the Field Science Course on Yakushima Island. We also recommend taking the following course that corresponds to that which you took during the Field Science course. These combinations enable you to analyze the samples you yourself have collected. Prior knowledge in molecular biology is not necessary for the Genome Science Course in fall. This course is open either at the Primate Research Institute, Kyoto University in Inuyama City (monkey group) or at the Graduate School of Science, Kyoto University in Yoshida Campus (plant group).

Genome Science Course	Field Science Course
A) Monkey group	A) Monkey group (at Primate Research Institute)
B) Plant group	B) Plant group (at Yoshida Campus, Kyoto Univ.)

### A) Monkey group

#### Title

Testing the trade-off between parasite resistance and the immunosuppressive hormones cortisol and testosterone

#### Lectures

Kodzue KINOSHITA (Primate Research Institute, Kyoto Univ.) 木下こづえ(京都大・霊長研)

Takashi HAYAKAWA (Primate Research Institute, Kyoto Univ.) 早川卓志(京都大・霊長研)

Andrew MACINTOSH (Wildlife Research Center, Kyoto Univ.) (京都大・霊長研)

#### Abstract

Participants will apply two molecular methods (DNA and hormonal analyses) to analyze macaque feces collected during the Field Science Course to determine the sex, reproductive status and stress levels of each host macaque. First, macaque genomic DNA will be extracted from feces to determine host sex by amplifying genes located on the sex chromosomes. Second, participants will also analyze cortisol from the same set of monkey feces, and testosterone from the samples identified as coming from males. Reproductive status and stress levels will be estimated by measuring the concentration of each hormone in the feces. Because fall is the breeding season for Yakushima macaques, male testosterone is expected to show high concentrations, and since stress may also be high, we expect relatively high concentrations of cortisol as well. We will test the hypothesis that these hormones may affect immune function

by comparing hormonal data with parasitological data across samples, and then discuss the possible trade-off between resistance to gastrointestinal parasites and the production of immunosuppressive hormones, which are essential for survival and reproduction. Finally, if possible, a quantitative PCR will be performed on extracted feces to measure copy numbers of parasite DNA as an index of parasite intensity for comparison with microscopic and hormonal data.

## **B) Plant group**

### Title

Species composition in fern gametophyte

### Lecturers

Hiroshi AZUMA (Faculty of Science, Kyoto Univ.) 東 浩司(京都大・理学研究科)

Takenori YAMAMOTO (Faculty of Science, Kyoto Univ.) 山本武能(京都大・理学研究科)

Wataru SHINOHARA (Kagawa Univ.) 篠原渉(香川大学)

Hiroshi KUDOH (Center for Ecological Research, Kyoto Univ.) 工藤洋(京都大・生態研)

### Abstract

For the gametophyte samples collected from Yakushima, we will try to identify the species or the genera to which they belong using molecular analysis. We will extract DNA from the samples and determine rbcL gene sequences from them. Subsequently, we will compare these sequences with registered DNA sequences in the gene bank.

## 6. Information on fieldwork and life in Yakushima Island

### 6.1. Fieldwork

#### **Research in lowland forest**

The main study site is located in the western lowland forest in Yakushima. In the forest, the canopy is closed and the forest floor is dark. Undergrowth is sparse and not bushy. There are no trails in the forest, but we can walk through most parts of the forest easily. We sometimes walk on steep slope and cross streams. Please wear long trousers and shoes to protect your legs and feet in case you lose your balance.

During the month of October, you may get bug bites (mostly mosquitoes). A long-sleeved shirt is good for protection from insect bites. Wear a long-sleeved shirt, if you have sensitive skin. We also walk on the road to search for animals and their feces. Sunlight is strong on the road so you will need a hat.

In the forest, visibility is poor and you need to confirm your location using a map and compass.

### **Weather**

Air temperature is about 18-26 °C in May and 19-25 °C in October in lowland. Note that air temperature is much lower in high-altitude mountainous areas.

Yakushima Island is famous for rainy climate. Early June is the beginning of rainy season and it is likely to rain in late May.

### **What to wear on the field**

#### • Long-sleeved shirt, long trousers, hat or cap

In general, it is better to wear a long-sleeved shirt and long trousers to cover your skin on the field. They will protect you from insect bites, scratches and strong sunlight. Sunlight is very strong in May. Long trousers should be soft and loose enough to walk on steep slopes. Avoid tight jeans, because they become heavy and hard when they are wet.

#### • Shoes

Avoid slippery shoes or those that do not cover your foot, such as sandals.

Mountaineering shoes are the best, if you have. We recommend them, if you do not have enough experience in walking in hilly forests.

Jogging shoes or sneakers are good in lowland forest, though they are not water proof. They should be tough enough to walk on the rocky slope.

If you have old mountaineering shoes, jogging shoes or sneakers (more than 3 years), check their soles. Old bond may become weak and the soles can fall apart. Almost every year, one or two participants have had their soles fall apart.

Long boots are also good, if you are experienced in walking in the mountain with long boots.

#### • Gloves

You may wear gloves if you like. Thin gloves are good for manipulation, such as taking notes.

## **6.2. Accommodation and meals**

In Yakushima, we stay in the field station (PWS House Yakushima) of Kyoto University in Nagata Village. All meals are provided during our stay in the field station. For dinner, you can enjoy local foods cooked by local people. Students and staffs will not cook except for the BBQ on the last night. We wash dishes and clothes and clean the rooms by ourselves.

### **Do it yourself in the field station**

We have no housekeeper in the station. You will be responsible for maintaining the station and doing daily chores such as cleaning, washing clothes, packing lunch, washing dishes,

taking out the garbage, etc. Please do these things actively and cooperatively.

### **Meals**

Meals are cooked by residents in Yakushima. Please help them cook when necessary. If you have food allergy or food(s) to avoid (e.g., meat for vegetarian), please let us know.

We pack lunch by ourselves. Bring a lunchbox of your preference and utensils necessary (spoon, fork, chopsticks, etc.).

### **Room and bedding**

In the Field Station, there is a dining hall, kitchen, 3 shower rooms and 3 restrooms. You will share one of 5 bedrooms with other students (4 people/room). Each bedroom has two bunk beds with mattresses. Please bring your own sleeping bag and/or warm clothes, as the temperature may drop to 15 degrees at night. Expensive, high-quality sleeping bag is not necessary as we stay inside the house at night.

### **Bath**

There are three shower rooms. We prepare shampoo and soap, which you can use freely for bathing. If you prefer your own shampoo or soap, please bring them. Have your own towel for bathing.

As it takes a long time for everyone to take a shower, some of us may go to public bath. You can try Japanese public bath, if you like. When you go to a public bath, have soap and a towel with you.

### **Washing clothes**

Two washing machines are available. We will provide the laundry detergent. Please wash your clothes together with those of other station members, to save time. We prepare mesh bags for washing, for which you can put your clothes in. Do not start washing after 10 p.m., to avoid making noise and inconveniencing others.

### **Others**

You may bring sandals, which may be useful for walking around the station.

### **Shopping**

In Nagata Village, you can buy snacks, drinks and daily necessities at a small shop. There are no supermarkets or convenience stores in the village. There is a supermarket in Miyanoura (20 km from the field station), the largest town in Yakushima Island, but you will not have time to go shopping there. You will have some time for shopping, on the last day.

### 6.3. List of personal equipment

#### **Equipment for field research (common to all groups)**

In addition to below, some other equipment will be necessary depending on your activity. Special equipment in each group will be announced later.

- backpack (20-30 liters is enough)
- notebook (pocket size is good)
- pen / pencil
- marker (with which you can write on plastic sample bags and plastic tubes)
- canteen (you may use a PET bottle)
- lunch box and spoon, fork, chopstick (bring a plastic container to pack your lunch to Yakushima)
- flashlight (and batteries)
- whistle (we can lend some whistles. Please let us know if you do not have it)
- sampling bag, tube, etc. (they are given to participants at Yakushima)
- maps (they are given to participants at Yakushima or Kyoto)
- poison remover (they are given to participants at Yakushima)
- backpack cover, or plastic bag inside the backpack (optional, when it is rainy)
  
- long trousers (and a belt, must)
- socks (must)
- rainwear / umbrella (when it is rainy)
  
- insect repellent (optional)
- antipruritic (optional)
- sunscreen (optional)
- snack, candy, etc. (optional)
- adhesive tape (optional, each lecturer has a first-aid kit)
- towel (optional)
- tissue (optional)
  
- vest (optional)
- waist pouch (optional)
- spats optional)
- gloves (optional)
  
- camera (optional)

#### **Other equipments for stay at the field station**

- sleeping bag (must) Please ask the PWS office, if you do not have it.

- underwear
- clothes (which you can wear in the house)
- sandals
- towel
- soap (for public bath)
- toilet kit
- laptop (optional; a personal laptop computer is useful for data analysis and presentation of the results)