

October 2020

April 2021

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# For reference

**School of Life Science**

**The Graduate University for Advanced Studies, SOKENDAI**

**Application Guidelines**

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The following Application Guidelines in English are provided for the purpose of non-Japanese Applicants' convenience only. In the event of any inconsistency between the Japanese Application Guidelines and the English version, the Japanese version shall prevail.

## I . Admission Policy

### **School of Life Science**

[School's basic policy]

Graduate programs offered in the School of Life Science advance frontiers of life science through exploring biological phenomena and their mechanisms at molecular, organismal, and population levels. In the superb environment of affiliated research Institutions, flexible graduate programs are provided to cater to a diverse range of academic backgrounds and experience. The School aims to nurture internationally competitive researchers with broad perspectives.

[Ideal students being sought]

Applicants should possess strong interest in biological phenomena and their mechanisms. We seek students who have the potential and drive to become independent, internationally active researchers.

### **Department of Genetics**

[Department's basic policy]

The Department of Genetics aims to nurture independent, creative scientists who can conduct research activities around the globe. The primary objective is to educate students with rich background knowledge and to train them with highly advanced research skills.

[Students]

The Department of Genetics seeks students who have a strong interest and desire to pursue research in Life Sciences, have the potential to become independent researchers, and strive to do so through the academic experience at the Department of Genetics.

[Basic approach to selecting applicants]

1) Knowledge is important, but the Department of Genetics also emphasizes high motivation, creativity, and logical thinking.

In addition, English ability for scientific research is evaluated.

2) In order to measure the potential of each prospective student as a researcher, interviews and written tests are evaluated by the entire faculty.

3) Admissions process is designed to provide opportunities to various people, including international students, transfer students and students entering from the working force.

### **Department of Basic Biology**

[Department's basic policy]

We study the basic principles common to all living organisms, and the mechanisms that enable diversity and allow life to adapt to changing environments. We educate students to discover essential questions in the field of biology, and solve them.

[Students]

We seek individuals with interests in biological phenomena and the investigation of the mechanisms behind them.

[Basic approach to selecting applicants]

Based on application forms and interviews with our faculty members, we learn about the student's motivation and potential for studying. In addition, for prospective five-year students, we examine the student's ability to think logically, as well as their skills in English language through short essays and a written examination.

## **Department of Physiological Sciences**

[Department's basic policy]

The Department of Physiological Sciences conducts education and supervision aimed to nurture researchers who can explore function of living organism and its mechanism from various perspectives (from the molecular and cellular level, which is a basic unit of the living organism, to the individual level, which is an integrative system of the unit). In this way, the Department nurtures outstanding researchers who have broad perspectives on medicine, neuroscience and a whole range of life science, and the foresight to forge new fields of knowledge.

[Students]

The Department seeks students who understand and sympathize with the basic policy of the Department, and who have the potential to develop into outstanding researchers with keen intellect, abundant sensibilities, and broad perspectives.

[Basic approach to selecting applicants]

- 1) In selecting applicants, the Department determines whether the applicant is suitable in light of the Department's basic policy.
- 2) The Department adopts a multifaceted selection process. Accordingly, in addition to the results of a scholastic ability test, the Department also considers the applicant's personality, temperament, motivation, and various other latent qualities.
- 3) The scholastic ability test assesses comprehensively criteria, such as the applicant's comprehension, expressive ability, logical thinking ability, and English language proficiency.

## II. Outline: School of Life Science

The Graduate University for advanced Studies, SOKENDAI is a national university that has a five-year doctoral program and accepts only the students who aim to pursue a doctoral degree. Those who hold a Master's degree may be enrolled in the third year of the five-year doctoral program (which can be considered as "three-year doctoral program").

The School of Life Science includes three departments: Department of Genetics, Department of Basic Biology, and Department of Physiological Sciences. We investigate biological phenomena at multiple levels, ranging from molecules to individual organisms. Additionally, we conduct advanced education and research that contribute to the development of the life sciences.

We take full advantage of the research environments available at our affiliate inter-university research institutes (IURIs) to provide flexible doctoral courses for students with a variety of educational backgrounds and experiences. Our aim is to cultivate first-class researchers with a broad international perspective.

The School of Life Science offers two doctoral courses; qualifications, educational background, and experience requirements vary for each one. Applicants for the **Five-year doctoral program** must have completed a Bachelor's course or the equivalent. Applicants for the **Three-year doctoral program** must have completed a Master's course or the equivalent.

Admission for both courses is offered twice each year in April and October. Additionally, an entrance examination for April admission is held twice per year; first round in summer and second round in winter. The admission details for the five-year doctoral program are described on pages 6-22. Admission details for the three-year doctoral program are described on pages 23-38.

### Department of Genetics

The Department of Genetics offers educational and research opportunities in a variety of cutting-edge disciplines with the goal of investigating biological phenomena in the context of genetics. Study and research fields include both basic and applied fields of molecular, cellular, individual, and population genetics; students can take advantage of an extensive DNA database and a wide range of experimental organisms. Our educational philosophy is to encourage graduate students to become competent and self-motivated scientists; additionally, the entire teaching staff is involved in the academic guidance of each individual student. For example, graduate students present their individual progress reports twice each year before a panel of academic advisors. This invaluable opportunity allows students to discuss their research with and receive advice from a number of faculty members other than their theses advisors. The department also offers an English language program designed specifically for scientists, and it provides ample financial assistance opportunities, such as our research assistant program.

## **Department of Basic Biology**

Advanced training and research are conducted in the field of basic biology with emphasis on cell biology, developmental biology, neurobiology, evolutionary biology, environmental biology, and theoretical biology. Fundamental biological phenomena are studied by using a variety of model organisms and approaches, such as techniques in cell biology, molecular biology, physiology, biochemistry, and mathematics.

## **Department of Physiological Sciences**

Physiology clarifies the mechanisms of living bodies from elements (cells and molecules) and systems; therefore, it provides important basic knowledge necessary for understanding pathological conditions. The importance of physiology has increased with the clarification of genome structures. In this course, students can learn the function of intact organisms at multiple levels from molecular and cellular levels as basic units of living organisms to whole body levels as systems which integrate the basic units. Moreover, students are expected to become pioneering researchers in medicine and bioscience.

## **Degree Requirements**

Doctor of Philosophy shall be conferred to students who have satisfied the requirements of their respective program as prescribed below.

### **Five-year doctoral program**

Students must be enrolled in SOKENDAI for at least five years; additionally, they must earn the necessary credits, receive necessary research guidance, and pass the examination for a doctoral thesis. Students who are recognized as having achieved significant progress may be able to graduate within a shorter time frame.

### **Three-year doctoral program**

Students must be enrolled in SOKENDAI for at least three years; additionally, they must earn the necessary credits, receive necessary research guidance, and pass the examination for a doctoral thesis. Students who are recognized as having achieved significant progress may be able to graduate within a shorter time frame.

### III. Five-year Doctoral Program: Application Procedures and Important Notes

#### 1 Number of Students Accepted

Department	Division	Number of Students Accepted	
		October Admission	April Admission
Genetics	Molecular/Cell Genetics, Development Genetics, Evolutionary Informative Genetics, Genome Genetics	A few	3
Basic Biology	Cell Biology, Developmental Biology, Environmental Biology, Neurobiology, Evolutionary Biology and Biodiversity, Reproductive Biology	A few	3
Physiological Sciences	Molecular and Cellular Physiology, Homeostatic Regulation, Fundamental Neuroscience, System Neuroscience	A few	3
Total		—	9

#### 2 Qualifications for Application

Applicants must fulfill one of the following conditions

##### Applicants who are not required to have qualification screening;

- (1) Applicants who have graduated or are expected to graduate from a Japanese university specified in Article 83 of the School Education Law by the preceding month of enrollment.
- (2) Applicants on whom a Bachelor's degree has been conferred or is expected to be conferred by the preceding month of enrollment in accordance with Article 104, Paragraph 4 of the School Educational Law. \*1
- (3) Applicants who have completed or are expected to complete 16-year course of school education in a foreign country by the preceding month of enrollment.
- (4) Applicants who have completed or are expected to complete 16-year course of school education in a foreign country by taking the correspondence courses provided by a school in said foreign country while residing in Japan by the preceding month of enrollment.
- (5) Applicants who have completed or are expected to complete a program in an educational institute in Japan designated separately by the Minister of Education, Culture, Sports, Science and Technology, that provides courses of a foreign university within the 16-year school education of said foreign country, by the preceding month of the enrollment. This applies solely to those who have completed 16-year course of school education in said foreign country.
- (6) Applicants who have been conferred or are expected to be conferred a degree equivalent to a Bachelor's degree by the preceding month of enrollment by completing an educational course of three or more years in a foreign university or in a foreign educational institute; which shall be evaluated by an organization approved by a relevant official institution in the country for their education and research activities, or recognized as so by the Minister of Education, Culture, Sports, Science and Technology. The course shall include a correspondence course which enables students to study in Japan by a university or an educational institute which is approved by the educational system of the country and satisfy the above requirements.
- (7) Applicants who have completed or are expected to complete the specialized course of a vocational school designated

separately by the Minister of Education, Culture, Sports, Science and Technology in accordance with Enforcement Regulation of the School Education Law, Article 155, paragraph 1, item 5 (limited to courses for which the term of study is four years or more, and which satisfies the standards determined by the Minister of Education, Culture, Sports, Science and Technology) on or after the date determined by the Minister of Education, Culture, Sports, Science and Technology, or by the preceding month of enrollment.

- (8) Applicants who are designated by the Minister of Education, Culture, Sports, Science and Technology in accordance with Enforcement Regulation of the School Education Law, Article 155, paragraph 1, item 6 (i.e., Ministry of Education Notification number 5, 1953) \*2

**Applicants who are required to have qualification screening before the general application can be submitted;**

- (9) Applicants who fulfill any of the following provisions (1) to (3) below, and have been recognized by SOKENDAI as having acquired the specified credits with excellent results; (Note)
- (a) Applicants who have completed 15-year course of school education in a foreign country by the end of preceding month of enrollment,
  - (b) Applicants who have completed 15-year course of school education in a foreign country by taking the correspondence courses provided by a school in said foreign country while residing in Japan,
  - (c) Applicants who have completed or are expected to complete a program in an educational institute in Japan designated separately by the Minister of Education, Culture, Sports, Science and Technology, that provides courses of a foreign university within the 15-year school education of said foreign country, by the preceding month of the enrollment. This applies solely to those who have completed 15-year course of school education in said foreign country.
- (10) Applicants who have been or will have been enrolled in a Japanese university specified in Article 83 of the School Education Law for at least three years by the end of preceding month of enrollment, and have been recognized by SOKENDAI as having acquired the specified credits of said university with excellent results.
- (11) Applicants who have entered a graduate school other than SOKENDAI in accordance with the Article 102, paragraph 2 of the School Education Law, and have been recognized by SOKENDAI as having the appropriate academic ability to follow the content of graduate coursework.
- (12) Applicants who have been recognized as having academic ability equivalent to a university graduate or higher by the individual screening of Admission Qualifications of SOKENDAI, and attain the age of 22 by the end of preceding month of enrollment. \*3

\*1 Applicants to whom the provision (2) above apply are those on whom a Bachelor's degree has been conferred or are expected to be conferred by National Institute for Academic Degrees and Quality Enhancement of Higher Education(formerly, National Institution for Academic Degrees and University Evaluation).

\*2 Applicants to whom the provision (8) above apply are those who have graduated or are expected to graduate from a university under Old University Ordinances, or Daigakko under orders for organization and acts of establishment of government ministries or agencies.

\*3 Applicants to whom the provision (12) above apply are those who have graduated or are expected to graduate from

junior college, technical college, vocational school, other schools, Japan campus of foreign university, foreigners' school in Japan and other educational institutes, and who have been recognized by SOKENDAI as having academic ability equivalent to a university graduate or higher by individual screening.

If you have any questions regarding the qualification for admission, please contact the Student Affairs Section (E-mail: [gakusei@ml.soken.ac.jp](mailto:gakusei@ml.soken.ac.jp) or telephone no.: +81-46-858-1525/1526) in advance.

### 3 Qualification Screening for Application

Applicants who intend to apply under the provisions (9), (10), (11) or (12) in section 2 are required to submit the following documents to the Student Affairs Section by the designated deadline. Application documents shall be withheld until the qualification screening is completed.

(1) Documents required for screening

(a) Application for Certifying Applicant's Qualification (Attached **Form 7-1**)

(b) Application documents (as described in section 5 below)

Application fee, however, should be paid after application qualification is approved.

(c) Other documents required by each Department. For details, please refer to each Department.

(a), (b) and (c) above must be submitted all together.

(2) Application Period for Qualification Screening

(Only for the applicants who intend to apply under the provisions (9) to (12) in section 2 (Qualification for Application))

Department	Application Period	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 Admission (first round)
Genetics	June 1 (Monday) to June 4 (Thursday), 2020	November 16 (Monday) to November 19 (Thursday), 2020
Basic Biology	June 1 (Monday) to June 4 (Thursday), 2020	November 16 (Monday) to November 19 (Thursday), 2020
Physiological Sciences	June 1 (Monday) to June 4 (Thursday), 2020	November 9 (Monday) to November 12 (Thursday), 2020

The application must arrive within the application period described in subsection 2

It must be received during 09 : 00~12 : 00, 13 : 00~17 : 00 on weekdays of the application period.

(3) Procedure for Qualification Screening

The complete set of application documents should be enclosed in the designated envelope and submitted by registered express mail. Applicants should write "Application Documents and Application for Certifying Applicant's Qualification Enclosed" in red ink on the face of the envelope.

(4) Result of Qualification Screening for Application

The result of Qualification Screening for Application shall be notified prior to the application period. Applicants who have been approved by the screening should send in the payment for the examination fee in accordance with **Form 10**. After remittance is completed, **Form 10** on which the remittance receipt is attached should be submitted.

### 4 Application Procedure

(1) Application Period

Department	Application Period	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 Admission (first round)
Genetics	June 25 (Thursday) to July 1 (Wednesday), 2020	December 10 (Thursday) to December 16 (Wednesday), 2020
Basic Biology	June 25 (Thursday) to July 1 (Wednesday), 2020	December 10 (Thursday) to December 16 (Wednesday), 2020
Physiological Sciences	June 25 (Thursday) to July 1 (Wednesday), 2020	December 3 (Thursday) to December 9 (Wednesday), 2020

The application must arrive no later than the last day of the application period without fail.

It must be received during 09 : 00~12 : 00, 13 : 00~17 : 00 on weekdays of the application period.

## (2) Application Method

**The complete set of application documents should be enclosed in the designated envelop and generally should be submitted by registered express mail.** The application must reach SOKENDAI no later than the last day of the application period. Please note that application documents will NOT be accepted by any Parent Institute or Department Office.

(Note)

Before submitting, please be sure to fill in and enclose all the necessary documents.

Please allow enough time to send the application documents, giving consideration to mail delivery conditions and the case of insufficient documents.

Mailing address:

Student Affairs Section, Academic and Student Affairs Division  
The Graduate University for Advanced Studies, SOKENDAI  
Shonan Village, Hayama, Miura, Kanagawa 240-0193 JAPAN  
Telephone number +81-46-858-1525/1526

## 5 Application Documents

Please read through the "Important Notes for Applicants" beforehand. Also, the application documents must fill in the application forms with black or blue pen without erasable pen.

### (1) Application form and admission ticket for the examination (**Form 1**)

Please attach two identical photographs (4.5cm by 3.5cm taken within the past three months, upper body, full-faced with no hat) on Form 1. Please read through the application guidelines. Your signature is required on Form 1.

### (2) Curriculum Vitae (**Form 1-2**, only for international applicants and Japanese applicants who received their education outside Japan)

### (3) Examination fee of 30,000 yen

For payment details, please refer to **Form 10**. MEXT scholarship students do not have to bear the examination fee, however, they need to submit a certificate of MEXT scholarship student status.

### (4) Academic transcripts (original)

(a) Applicants who intend to apply under the provision (1) in section 2 should submit academic transcripts from the undergraduate school. In case any of the credits was approved after transferred to the undergraduate

school, academic transcripts from the technical college or other college are also required.

- (b) Applicants who intend to apply under the provision (2) in section 2 should submit all the academic transcripts concerning the Bachelor's degree.
  - (c) Applicants who intend to apply under the provisions (3) to (9) in section 2 should submit the academic transcripts from the foreign undergraduate school.
  - (d) Applicants who intend to apply under the provisions (10) to (12) in section 2 should submit the academic transcript from their final academic background.
- (5) Certificate of (expected) graduation (original)
- (a) Applicants who intend to apply under the provision (1) in section 2, should submit the certificate of graduation from the university which a Bachelor's degree has been conferred from.
  - (b) Applicants who intend to apply under the provision (2) in section 2, should submit the certificate from National Institute for Academic Degrees and Quality Enhancement of Higher Education (formerly, National Institute for Academic Degrees and University Evaluation).
  - (c) Applicants who intend to apply under the provisions (3) to (9) in section 2, should submit the certificate of (expected) graduation from the foreign university.
  - (d) Applicants who intend to apply under the provision (10) in section 2, should submit the school-certificate, and applicants who intend to apply under the provisions (11) and (12) in section 2, should submit the certificate of graduation of their final academic background.
- (6) Statement of Purpose (**Form 2**)
- Applicants who apply to a second-choice department should copy **Form 2** and prepare "Statement of Purpose" for the second-choice department separately.
- (7) Documents certifying the applicant's research abilities, such as thesis, research report and other materials in which research capabilities are indicated.
- Applicants who apply to a second-choice department should submit another set of copy of the documents for the second-choice department separately.
- (8) Envelope for Admission ticket for the examination
- Applicant's name, address and zip code (postal code) should appear on the envelope (attached to the Application Guidelines), and 704 yen of postage stamp should be affixed.
- (9) Recipient's address label (**Form 11**)
- (10) Books, papers, or lectures that were particularly interesting to you (**Form 8-1**)
- (Applicants to Department of Genetics only) Please refer to "Important Notes" on page 15.
- (11) Letter of Recommendation
- Applicants to Department of Genetics are not required to submit the Letter of Recommendation.
- Applicants to Department of Basic Biology may submit the Letter of Recommendation, if any, from those who are appropriate to evaluate the applicant's academic ability. The letter must be sealed up by the writer. Applicants who intend to apply under the provision (9) in section 2 are recommended to submit the Letter of Recommendation for the qualification screening.
- Applicants to Department of Physiological Sciences who intend to apply under the provision (1) to (8) in section 2

are not required the Letter of Recommendation, and who intend to apply under the provision (9) to (12) in section 2 shall refer to “Important Notes” on page 20.

(12) Permission for Studying While in Employment (**Form 6**)

Applicants who are currently employed full-time are required to submit Permission for Studying While in Employment (Form 6). In case the permission cannot be obtained or the applicant intends to resign before enrollment, s/he may instead submit a statement of reason with her/his signature.

(13) TOEFL/TOEIC/IELTS score

Applicants to Department of Genetics shall refer to “How to submit TOEFL/TOEIC/IELTS score” on page 17.

Applicants to Department of Basic Biology are not required to submit TOEFL/TOEIC/IELTS score.

Applicants to Department of Physiological Sciences shall refer to “Important Notes for Applicants” on page 20.

(14) A copy of Residence Card (international applicants residing in Japan) or

A copy of passport (international applicants residing outside Japan at the time of application)

(15) List of enclosed Documents for five-year doctoral program (as attached hereto)

Notes:

- i. Incomplete documents shall not be accepted. No documents shall be returned.
- ii. In case the applicant's name has changed after marriage, etc., a copy of family register should be attached.
- iii. **Form 2** is also available at our website.  
([https://www.soken.ac.jp/en/admission/general\\_admission/guideline/seimeil/](https://www.soken.ac.jp/en/admission/general_admission/guideline/seimeil/)).
- iv. Application documents should be written in Japanese or English. If you submit the certificate neither in Japanese nor English, please also attach the certificate in Japanese or English.

## 6 Screening Procedures

Screening will be conducted based on submitted application documents and results of academic tests.

Please see “Important Notes” for details of screening.

If you apply to more than one department, screenings are conducted individually. For the details of the screening methods for each department, please refer to “Important Notes for Applicants” for each Department.

Department	Examination Date	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 (first round)
Genetics	August 2 (Sunday) and August 3 (Monday), 2020 Spare date: August 4 (Tuesday), 2020	January 27 (Wednesday) and January 28 (Thursday), 2021 Spare date: January 29 (Friday), 2021
Basic Biology	August 4 (Tuesday) and August 5 (Wednesday), 2020	January 21 (Thursday) and January 22 (Friday), 2021
Physiological Sciences	August 18 (Tuesday) and August 19 (Wednesday), 2020	January 19 (Tuesday) and January 20 (Wednesday), 2021

(Note) Detailed information about the time and venue of the examination will be issued with the admission ticket for the exam. In case the ticket shall not be delivered one week prior to the date of examination, please contact the Student Affairs Section. Please see our website([https://www.soken.ac.jp/en/admission/general\\_admission/guideline/seimeil/](https://www.soken.ac.jp/en/admission/general_admission/guideline/seimeil/)) for the delivery status of admission ticket.

## Venue of the examination

Department	Location and Directions
Genetics	National Institute of Genetics (NIG) 1111 Yata, Mishima, Shizuoka 411-8540 From the bus rotary on the South Exit of Mishima Station (JR Tokaido line), take a bus bound for "Yanagigochoil" at No.5 bus stop and get off at "Idenken mae" (in front of NIG), or take a taxi (10 minutes) from Mishima Station. The NIG free shuttle bus runs between NIG and the North Exit of Mishima Station on weekdays.
Basic Biology	National Institute for Basic Biology 38 Nishigonaka, Myodaiji, Okazaki, Aichi 444-8585 Seven-minute walk from Higashi-Okazaki Station (Nagoya Railway, Meitetsu).
Physiological Sciences	National Institute for Physiological Sciences 38 Nishigonaka, Myodaiji, Okazaki, 444-8585 Seven-minute walk from Higashi-Okazaki Station (Nagoya Railway, Meitetsu).

## 7 Announcement of Results

Admission	Notification
October 2020 (second round)	Early September 2020
April 2021 (first round)	Early September 2020
April 2021 (second round)	Middle of February 2021
October 2021 (first round)	Middle of February 2021

Further details will be sent to applicants.

Results will be posted on the notice board both in each research institute and Hayama Campus, as well as notification to be mailed to all applicants (but not including applicants who have withdrawn from examination). Announcement of results will be made on SOKENDAI website ([https://www.soken.ac.jp/en/admission/general\\_admission/result/](https://www.soken.ac.jp/en/admission/general_admission/result/)), however, results shall be confirmed by the notice sent to the applicants by mail. Inquiries regarding the results by telephone or any other means will not be responded.

## 8 Admission Procedures

(1) Admission period is scheduled as below:

Late September 2020 for the enrollment of October 2020

Early to mid-March 2021 for the enrollment of April 2021

Late September 2021 for the enrollment of October 2021

Successful applicants must complete the admission procedures during the prescribed period. Further details will be notified to successful applicants separately.

(2) Fees required for admission are as follows.

Entrance Fee: JPY282, 000

Tuition Fee for six months: JPY267, 900

Student Insurance Fee for five years: JPY5,750

(Personal Accident Insurance for Students Pursuing Education and Research)

Note:

- (a) In case the entrance or tuition fees are revised at the time of or during enrollment, the revised fees shall be applied from the date of revision.

- (b) Entrance fees shall not be refunded under any circumstances once the payment is made. Premium for the student insurance, however, may be refunded only if applicants decline the admission by the cut-off dates as blow:

September 30, 2020 for the enrollment of October 2020

March 31, 2021 for the enrollment of April 2021

September 30, 2021 for the enrollment of October 2021

- (3) Applicants who are currently employed full-time must submit the "Letter of Approval" issued by the employer that acknowledges the enrollment while employed. Resignation certificate must be submitted if you resign before you enroll at SOKENDAI.
- (4) Applicants who are enrolled at a school other than SOKENDAI at the time of application (not including applicants who will have graduated/completed the school before you enroll at SOKENDAI) must submit the certificate of withdrawal from said school.
- (5) Foreign nationals are strongly advised to obtain a College Student visa unless a particular reason would prohibit them from doing so. Detailed information on how to obtain this type of visa is available on the SOKENDAI's website: <http://www.soken.ac.jp/en/admissions/immigration/certificate.html>

## **9 General Notes**

- (1) Before applying and taking the entrance examination, applicants should read through "Important Notes for Applicants".
- (2) Submitted documents shall not be returned. No changes or alternations to the submitted documents shall be accepted after filing.
- (3) Admission might be revoked in case of any false entry or act of dishonesty on application documents and other documents.
- (4) Applicants who wish to transfer to SOKENDAI from other graduate school must contact Student Affairs Section before the last day of the application period.
- (5) Physically challenged applicants who require special consideration at the examination and after enrollment are advised to inform SOKENDAI three months prior to the application period.
- (6) Applicants should inform the Student Affairs Section if they wish to withdraw their application.
- (7) In case the applicant has changed the mailing address after submitting the application documents, please inform the Student Affairs Section of the change.  
E-mail: [gakusei@ml.soken.ac.jp](mailto:gakusei@ml.soken.ac.jp), or Fax: +81-46-858-1632
- (8) Students are not allowed to simultaneously register at other universities while studying at SOKENDAI.

## **10 Extended Study Program**

Extended Study Program is for students who have extenuating circumstances, such as being employed, so that they can study for a longer period instead of the 5-year standard program term. For further information, please contact the Educational Affairs Section.

E-mail: [kyomu@ml.soken.ac.jp](mailto:kyomu@ml.soken.ac.jp), or Fax: +81-46-858-1632

## **11 Security Export Control**

Depending on the specifics of the education and research instructions they wish to receive upon entering the program, applicants may be subject to regulations on the export/transfer of controlled technologies based on the Foreign Exchange and Foreign Trade Law. Please consult each department office for further details.

## **12 Privacy Policy**

- (1) Any personal information including applicant's name and address submitted to SOKENDAI as part of the application documents shall be used during the application process such as applicant/examination procedures, notification of results and admission procedures. After enrollment, personal information shall also be used for student affairs (school register and course registration), student services (health care, tuition exemption and scholarship application, and career support) and administrative purposes of processing payments for entrance and tuition fees.
- (2) Personal information obtained in the screening process such as examination results, shall be used for aggregate analyses of examination results and research for use in the screening process.

## **Important Notes for Applicants to Department of Genetics (Five-year Doctoral Program)**

- (1) When you apply to the Department of Genetics, please contact the PI of the lab you wish to belong to in order to discuss the research with them. As for each lab's research, please read "Majors and Research Subjects of the Faculty in the School of Life Science" on pages 39 - 44 or see the faculty introduction on the Department of Genetics website. (<https://www.nig.ac.jp/nig/phd-program/faculty>)
- (2) Fill your prospective supervisor's name in "1st Choice of Supervisor" of "Application Form (**Form 1**)". You may appoint another supervisor at the Department of Genetics as "2nd Choice of Supervisor".  
If your prospective supervisor will retire within the standard-graduate program period, please consult with your prospective supervisor in advance regarding a substitute supervisor who will act as a substitute for the subsequent period after the prospective supervisor's retirement, and enter the name of the substitute supervisor in "2nd Choice of Supervisor" column. For faculty members who are about to retire, please refer to the faculty introduction on the Department of Genetics website. (<https://www.nig.ac.jp/nig/phd-program/faculty/>)
- (3) In **Form 2** "Statement of Purpose", state "The reason why you would like to research at Department of Genetics" in approximately 800 words in English.
- (4) In **Form 8-1** "Books, papers, or lectures that were particularly interesting to you", specify three titles and describe briefly what made you interested in them.
- (5) A score of TOEFL-iBT, TOEIC or IELTS test which was taken within 2 years prior to the entrance examination day is used to evaluate English ability. Please submit your score record/official certificate in accordance with "How to submit TOEFL/TOEIC/IELTS score" on page 17.
- (6) The examination will be held in 2 days, and you will take a written examination in the afternoon of the first day and an interview on the second day. The written examination will last 3 hours, and essay-type questions will be given to judge the abilities necessary for a researcher, such as thinking ability and logic. The interview will last up to 30 minutes per applicant. In the first five minutes, you will be asked to give a presentation about an appropriate theme such as your research activities, paper/lecture which has impressed you recently, future aspiration or the reason why you wish to study at the Department of Genetics. A whiteboard is available for use. You will be asked about your presentation, answer of the written examination and the application documents in the rest of time.  
Please refer to the notice mailed before the examination for detailed schedule.
- (7) This entrance examination can be taken either in Japanese or in English. You may write a short essay in English. Applicants may take the interview in English, if you wish to do so.
- (8) In page 11 "II-6 Screening Procedures", three dates are stated as examination dates. The third day is spare. Usually the examination will be carried out within the first two days.
- (9) Criteria for evaluation and judgment  
<Criteria for evaluation>  
The result of the written examination, interview and submitted documents shall be evaluated comprehensively.  
<Criteria for acceptance>  
Applicants who are considered to be competent to write a doctoral dissertation in five years and to obtain enough research abilities as PhD.

(10) Due to circumstances, in case that you need to register pre-planned courses which take longer than the standard period required for graduation, you might be allowed to take "extension of study". See the link for the details:  
<https://www.nig.ac.jp/nig/phd-program/courses-top/stretched-graduate-program>

When you apply for the plan at the time of an entrance examination, consult with your prospective supervisor beforehand.

(11) SOKENDAI students may be granted 710,000 JPY as an annual income by taking Research Assistant System.

(12) Please contact Academic Services Division, National Institute of Genetics for any enquiries about the Department of Genetics.

Tel: +81-55-981-6720 Fax: +81-55-981-6715 E-mail: [info-soken@nig.ac.jp](mailto:info-soken@nig.ac.jp)

For further information about the Department of Genetics and NIG, see

<https://www.nig.ac.jp/nig/phd-program/main-page-top/main-page>

## How to submit TOEFL/TOEIC/IELTS score

The Department of Genetics uses TOEFL/TOEIC/IELTS score to evaluate an applicant's English proficiency. When you submit your score record, please note the following points.

### (1) Eligible Tests

TOEFL-iBT Test, TOEIC Listening & Reading Test, or IELTS (Academic Module) must be taken within two years prior to the entrance examination day.

### (2) How to Submit Score Record

When you apply to the Department of Genetics, enclose one photocopy of your score from any of the following tests: Official Score Report for TOEFL-iBT, Official Score Certificate for TOEIC Listening & Reading Test, or Test Report Form for IELTS (Academic Module)

Do not forget to bring the original document on the day of the entrance examination.

If it is impossible for you to obtain the score record by the application period, please submit **Form 9** at the time of application, and bring the score record with you to the testing location on the examination date.

TOEFL-iBT Test: You can make an arrangement with ETS to send your Official Score Report directly to SOKENDAI. If you do so, you don't need to bring the original on the examination day.

Institution Code: 7564

Institution Name: SOKENDAI (The Graduate University for Advanced Studies)

### Note:

Dates and venues for these English tests are limited. If you intend to apply to Department of Genetics, we recommend that you take one of the English tests ahead of time. Check the official websites for the details of TOEFL-iBT Test, TOEIC Listening & Reading Test, or IELTS (Academic Module).

(TOEFL-iBT) <https://www.toefl-ibt.jp/index.html>

(TOEIC)

<https://www.iibc-global.org/english.html>

(IELTS) <https://www.eiken.or.jp/ielts/en>

## **Important Notes for Applicants to Department of Basic Biology**

### **(Five-year Doctoral Program)**

(1) It is highly recommended that before the submission of a formal application, applicants contact an appropriate supervisor to inform him or her of their interest in submitting a research plan. Please refer to "Main research of supervising professors of Department of Basic Biology on pages 45-50 of this brochure for information regarding which laboratories and professors are affiliated with this department. Applicants may also select a second-choice laboratory in addition to their first-choice laboratory.

(2) Applicants may submit a letter of recommendation from someone who can give an appropriate opinion regarding their research capabilities.

(3) Selection Method

Document screening, written examinations (English and short essay), and an interview will be conducted. Each written examination will take an hour. For the English examination, applicants are allowed to use as many as three dictionaries among the following: their native language-to-English dictionary, English-to-their native language dictionary, and English dictionary (Electronic dictionaries will not be allowed).

\* Applicants who write a short essay in English are exempted from the English written examination. If you wish to do so, you will need to inform us in advance.

The interview will take up to 30 minutes. The first 15 minutes will be spent exploring the applicant's reasons for applying, previous research (or details of his or her studies), future research aspirations, and any other such applicable topics. During the interview, a whiteboard is available for use; however, slides, projectors, and posters cannot be used. The other 15 minutes will be used to conduct a question-and-answer session covering the applicant's presentation, submitted documents, and the results of written examination.

\*Written examination and the interview will take place at National Institute for Basic Biology in Aichi, Japan. Please note that the department office will NOT make an arrangement for applicants to obtain a short-term stay visa for entrance examination, air tickets and/or accommodation.

(4) Criteria for grading, evaluation and admission decision

<Criteria for grading and evaluation>

Applicants will be graded on a scale from A (the highest grade) to D (the lowest grade) based on the submitted documents, interview and written examination results.

<Criteria for admission decision>

Acceptance will be determined by overall performance, which will be assessed based on the submitted documents, interview and written examination results.

(5) For individuals who require a period of study that exceeds the pre-determined length, a long-term course of study may be permitted after admission. Those who desire to pursue this course must contact an appropriate supervisor before submitting their application documents.

(6) Financial Support for Students

Graduate students may apply for the Research Assistance program after discussion with their supervising professor. Those employed as Research Assistants are each granted an annual salary of approximately 1,000,000 yen.

(7) Questions regarding this section may be addressed to:

Graduate Student Affairs Section

International Relations & Research Cooperation Division

National Institutes of Natural Sciences (NINS)

Nishigonaka 38, Myodaiji, Okazaki 444-8585, Japan

Phone: +81 564 55 7139

Fax: +81 564 55 7119

Web site: <http://www.nibb.ac.jp/en/univ/>

## **Important Notes for Applicants to Department of Physiological Sciences (Five-year Doctoral Program)**

- (1) Applicants are advised to have a close discussion with a prospective professor regarding the contents of their research before submitting their application documents.
- (2) Applicants should fill in the name of their desired professor in the “1st-choice of supervisor” column of the Application Form (**Form 1**). Only a first-choice professor may be selected for Department of Physiological Sciences. (Filling in a second-choice professor is invalid).
- (3) Applicants may include information on the content of their research to date in the “Statement of Purpose” (**Form 2**).
- (4) For applicants who intend to apply under (9), (10), (11), and (12) of section III-2, “Qualifications for application” on pages 6-8:
  - (a) Those who intend to apply under (10) are advised to submit a letter of recommendation from their current or most recent supervising professor or the head of their department.
  - (b) Those intend to apply under (9), (11), or (12) are advised to submit a letter of recommendation from persons who can give an appropriate opinion on applicants’ research capabilities, if possible. Applicants who intend to apply under (1) through (8) do not need to submit a letter of recommendation.
- (5) Selection Method:
  - (a) Document screening
  - (b) Written examination (essay: 90 minutes)
  - (c) Interview (refer to (7) on the next page)
  - (d) English ability

\*Written examination and the interview will take place at National Institute for Physiological Sciences in Aichi, Japan. Please note that the department office will NOT make an arrangement for applicants to obtain a short-term stay visa for entrance examination, air tickets and/or accommodation.
- (6) English ability will be assessed as follows:
  - (a) Japanese applicants

On the day of the exam, applicants should ensure to bring the original of their TOEIC Official Score Certificate or TOEIC Institutional Program (IP) Score Report. Please note that the tests must be taken within two years before the date of the examination.
  - (b) Non-Japanese applicants

Applicants are required to have obtained the following score(s) by the time of application. The original score sheet must be submitted on the date of the examination.

    - TOEFL PBT: 550 or higher
    - TOEFL iBT: 80 or higher
    - TOEIC: 730 or higher
    - IELTS: 6.0 or higher

English test scores are not necessary for applicants who have graduated from universities in the countries where English is a native language and education is conducted in English.

(7) Important notes for the interview:

- The interview will last up to 20 minutes.
- For ten minutes, the applicant will explain the content of previous research (or, for applicants with no previous research experience, the content of his or her program(s) of study), reason for applying, and research ambitions. If necessary, the applicant may bring and use his or her own computer (e.g., to use software such as PowerPoint). Note that applicants will not be allowed to use devices other than their own computers or to distribute supplemental materials for presentations.
- In the remaining time, the committee members will ask questions about the content of the applicant's submitted documents and of his or her presentation.

(8) Criteria for grading, evaluation and admission decision:

<Criteria for grading and evaluation>

Applicants will be graded on a scale of A to C on their overall performance, which will be determined on the basis of the content of their submitted documents, written-test results, and interviews.

<Criteria for admission decision>

Acceptance will be determined in terms of overall performance, which will be determined on the basis on the each letter-graded content of the submitted documents, written tests, and interviews.

(9) Financial support for newly enrolled students:

(a) Japanese students

Department of Physiological Sciences has been employing all Japanese graduate students (except for those receiving Research Fellowship for Doctoral Course Students (DC) provided by Japan Society for the Promotion Science) as Research Assistants (RAs) (at an annual salary of 1 million yen). Department of Physiological Sciences has been employing an extremely high-score student as RA at an annual salary of 1.7 million yen, and a high-score student at an annual salary of 1.4 million yen. Additionally, for new students (except those who have received an enrollment-fee waiver), funds equivalent to the amount of their enrollment fees will be paid by the Scholarship Fund of National Institute for Physiological Sciences.

(b) Non-Japanese students

Excellent students who wish to enter the 5-year Doctoral Program at National Institute for Physiological Sciences (NIPS) are eligible to apply for two types of NIPS Scholarship. The first type covers the same as described for MEXT scholarship.

The second one covers the following:

- Admission fee (282,000 yen, only once at the time of admission)
- A half of annual tuition fee
- Salary for Research Assistant job (1,400,000 yen per year, about 116,600 yen per month)

All other students are supported as follows.

- Admission fee (282,000 yen, only once at the time of admission)

• Salary for Research Assistant job (1,000,000 to 1,400,000 yen per year, about 83,300 to 116,000 yen per month)

(10) Questions regarding the items in this section may be addressed to:

Graduate Student Affairs Section

International Relations & Research Cooperation Division

National Institutes of Natural Sciences (NINS)

Nishigonaka 38, Myodaiji, Okazaki 444-8585

Phone: +81 564 55 7139

Fax: +81 564 55 7119

Web site: <http://www.nips.ac.jp/eng/graduate/>

## IV. Three-year Doctoral Program and Important Notes

### 1 Number of Students Accepted

Department	Division	Number of Students Accepted	
		October Admission	April Admission
Genetics	Molecular/Cell Genetics, Development Genetics, Evolutionary Informative Genetics, Genome Genetics	A few	6
Basic Biology	Cell Biology, Developmental Biology, Environmental Biology, Neurobiology, Evolutionary Biodiversity, and Reproductive Biology	A few	6
Physiological Sciences	Molecular and Cellular Physiology, Homeostatic Regulation, Fundamental Neuroscience, System Neuroscience	A few	6
Total		—	18

### 2 Qualifications for Application

Applicants must fulfill one of the following conditions

**Applicants who are not required to have qualification screening;**

- (1) Applicants who hold or are expected to take a Master's degree or a Professional degree by the preceding month of enrollment.
- (2) Applicants on whom a Master's degree or a degree equivalent to a Professional degree has been conferred or is expected to be conferred in a foreign country by the preceding month of enrollment.
- (3) Applicants who have completed the correspondence courses provided by a school in a foreign country while residing in Japan, and have been conferred or are expected to be conferred a Master's degree or a degree equivalent to a Professional degree by the preceding month of enrollment.
- (4) Applicants who have completed or are expected to complete a program in an educational institute in Japan that provides courses from a foreign graduate school within the school education system of said foreign country, and that is designated separately by the Minister of Education, Culture, Sports, Science and Technology, and have been conferred or are expected to be conferred a Master's degree or a degree equivalent to a Professional degree by the preceding month of enrollment.
- (5) Applicants who have completed a course at the United Nations University and have been conferred or are expected to be conferred a degree equivalent to a Master's degree by the preceding month of enrollment, in accordance with the Enforcement Regulation of the School Education Law, Article 156, Item 4.

**Applicants who are required to have qualification screening before the general application can be submitted;**

- (6) Applicants who have completed a course of study at a school in a foreign country or an educational institute that has graduate school in a foreign country or the United Nations University, and have passed or will have passed the examinations and screening equivalent to those specified in Article 16-2 of the Standards for Establishment of Graduate Schools (1974 Ministry of Education, Science and Culture Ordinance Number 28), and who have been or will have been recognized by SOKENDAI as having academic abilities equivalent to those who have a Master's

degree. \*1

- (7) Applicants who have graduated from a university and have been or will have been engaged in research at a university or a research institute for at least two years by the preceding month of the enrollment, and have been recognized by SOKENDAI as having academic ability equivalent to or superior to those who have a Master's degree or a Professional degree based on said research achievement.
- (8) Applicants who have completed 16-year course of school education in a foreign country or 16-year course of school education by taking the correspondence courses provided by a school in a foreign country while residing in Japan, and thereafter, have been or will have been engaged in research at a university or a research institute for at least two years by the preceding month of the enrollment, and have been recognized by SOKENDAI as having academic ability equivalent to or superior to those who have a Master's degree or a Professional degree based on said research achievement.
- (9) Applicants who have been recognized by SOKENDAI as having academic ability equivalent to or superior to those who have a Master's degree or a Professional degree by the individual screening of Admission Qualifications of SOKENDAI, and attain the age of 24 by the end of preceding month of enrollment. \*1

\*1 Applicants who have completed a six-year course of medical, dental, pharmaceutical or veterinary schools are required to be recognized by SOKENDAI as having academic ability equivalent to or superior to those who have a Master's degree or a Professional degree by the individual screening of Admission Qualifications of SOKENDAI. For details, please refer to '3. Qualification Screening for Application'.

If you have any question regarding the qualification for admission, please contact the Student Affairs Section (E-mail: [gakusei@ml.soken.ac.jp](mailto:gakusei@ml.soken.ac.jp) or telephone no.: +81-46-858-1525/1526) in advance.

### 3 Qualification Screening for Application

- (1) Applicants who intend to apply under the provisions (6), (7), (8) and (9) in section 2 are required to submit the following documents to Student Affairs Section by the designated deadline. Application documents shall be withheld until the qualification screening is completed.
- (2) Applicants who wish to apply under the provisions (6) through (8) in section 2 are required to submit the following documents for screening to be recognized as "having academic ability equivalent to those who have a Master's degree or a Professional degree". An interview will also be conducted, if necessary.
- (3) Applicants who wish to apply under the provision (9) in section 2 above shall be screened as follows:

Department	Procedure
Genetics	Screening will be conducted based on the submitted documents. An interview may be added, if necessary.
Basic Biology	
Physiological Sciences	Screening will be conducted based on the submitted documents. An interview and written examination (English) may be added, if necessary.

(Note) Please consult each department for further details.

(a) Documents required for Qualification Screening for Application are as follows;

- i. Application for Certifying Applicant’s Qualification (**Form 7-2**)
- ii. Application Documents as specified in Section 5

Application Fee, however, should be paid after the application is approved.

(i.) and (ii.) above should be submitted all together. Please note that applicants might be asked to submit other documents by each department.

(b) Application Period regarding Qualification Screening

Department	Application Period	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 Admission (first round)
Genetics	June 1 (Monday) to June 4 (Thursday), 2020	November 16 (Monday) to November 19 (Thursday), 2020
Basic Biology	June 1 (Monday) to June 4 (Thursday), 2020	November 16 (Monday) to November 19 (Thursday), 2020
Physiological Sciences	June 1 (Monday) to June 4 (Thursday), 2020	November 9 (Monday) to November 12 (Thursday), 2020

Application must arrive no later than the last day of the application period without fail.

It must be received during 09 : 00~12 : 00, 13 : 00~17 : 00 on weekdays of the application period.

(c) Procedure for Qualification Screening

The complete set of application documents should be enclosed in the designated envelope and submitted by registered express mail. Applicants should write “Application Documents and Application for Certifying Applicant’s Qualification Enclosed” in red ink on the face of the envelope.

(d) Result of Qualification Screening for Application

The result of Qualification Screening for Application shall be notified prior to the application period. Applicants who have been approved by the screening should complete payment for the examination fee accordance with **Form 10**. After the remittance is completed, **Form 10** on which the remittance receipt is attached should be submitted to Student Affairs Section.

## 4 Application Procedure

### (1) Application Period

Department	Application Period	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 Admission (first round)
Genetics	June 25 (Thursday) to July 1 (Wednesday), 2020	December 10 (Thursday) to December 16 (Wednesday), 2020
Basic Biology	June 25 (Thursday) to July 1 (Wednesday), 2020	December 10 (Thursday) to December 16 (Wednesday), 2020
Physiological Sciences	June 25 (Thursday) to July 1 (Wednesday), 2020	December 3 (Thursday) to December 9 (Wednesday), 2020

The application must arrive no later than the last day of the application period without fail.

It must be received during 09 : 00~12 : 00, 13 : 00~17 : 00 on weekdays of the application period.

### (2) Application Method

**The complete set of application documents should be enclosed in the designated envelop and should be submitted by registered express mail.** The application must reach SOKENDAI no later than the last day of the application period. Please note that application documents will not be accepted by any Parent Institute or Department office.

(Note)

Before submitting, please be sure to fill in and enclose all the necessary documents.

Please allow enough time to send the application documents, giving consideration to mail delivery conditions and the case of insufficient documents.

Mailing address:

Student Affairs Section, Academic and Student Affairs Division  
The Graduate University for Advanced Studies, SOKENDAI  
Shonan Village, Hayama, Miura, Kanagawa 240-0193 JAPAN

## 5 Application Documents

Applicants must consult their prospective supervisors prior to the application. Please read through the “Important Notes for Applicants” beforehand. Also, the application documents must fill in the application forms with black or blue pen without erasable pen.

### (1) Application form and admission ticket for the examination (**Form 1**)

Please attach two identical photographs (4.5cm by 3.5cm taken within the past three months, upper-body, full-faced with no hat) on Form 1. Please read through the application guidelines. Your signature is required on Form 1.

### (2) Curriculum Vitae (**Form 1-2**, only for international applicants and Japanese applicants who received their education outside Japan)

### (3) Examination fee of 30,000yen

For payment details, please refer to **Form 10**. MEXT scholarship students do not have to bear the examination fee, however, they need to submit a certificate of MEXT scholarship student status.

### (4) Academic transcripts (original)

- (a) Applicants who intend to apply under the provision (1) in section 2 should submit the academic transcript from the graduate school or the Professional graduate school, and that from the undergraduate school. In case any of the credits was approved after transferred to the undergraduate school, academic transcripts from the technical college or other college are also required.
  - (b) Applicants who intend to apply under the provisions (2) to (6) in section 2 should submit the academic transcript from the graduate school in said foreign country (a Master's degree or a Professional degree) and that from the undergraduate school concerning the Bachelor's degree.
  - (c) Applicants who intend to apply under the provisions (7) to (9) in section 2 should submit the academic transcript from their final academic background.
- (5) Certificate of (expected) graduation (original)
- The certificate should state conferment of the Master's degree or the Professional degree.
- (a) Applicants who intend to apply under the provision (1) in section 2 should submit a certificate of (expected) graduation from the graduate school which a Master's degree or a Professional degree has been conferred from.
  - (b) Applicants who intend to apply under the provision (2) to (5) in section 2 should submit the certificate from the National Institute for Academic Degrees and University Evaluation.
  - (c) Applicants who intend to apply under the provisions (6), (7), (8) or (9) in section 2 should submit a certificate of graduation of their final academic background.
- (6) Summary of Previous Research Experience (**Form 3**)
- (7) List of Research Presentations and Publications (**Form 4**)
- Applicants who do not have any, please specify "None" on Form 4 and submit the form.
- (8) Applicants who have a Master's degree or who have submitted the Master's thesis should submit two copies of Master's thesis. Please specify "Master's thesis" on the upper-right corner of the front page in red ink.
- Applicants who apply to a second-choice department should submit another set of copy of the Master's thesis for the second-choice department separately.
- (9) Applicants who have any publication of scientific paper or treatise should submit two copies of the publication.
- Applicants who apply to a second-choice department should submit another set of copy of the publication for the second-choice department separately.
- (10) Research Proposal (**Form 5**)
- Applicants shall prepare Research Proposal (**Form 5**) specifying the outline of the research plan after enrollment. Those who apply to a second-choice department should copy the form and prepare the outline for the second-choice department separately.
- (11) Envelope for Admission ticket for the examination
- Applicant's name, address and zip code (postal code) should appear on the envelope (attached to the application guidelines), and 704 yen of postage stamp should be affixed.
- (12) Recipient's address label (**Form 11**)
- (13) Books, papers or lectures that were particularly interesting to you (**Form 8-2**)
- Applicants to the Department of Genetics only. Please refer to the "Important Notes" on page 32.
- (14) Letter of Recommendation

Applicants to Department of Genetics are not required to submit the Letter of Recommendation.

Applicants to Department of Basic Biology and Physiological Sciences may submit the Letter of Recommendation from persons who are appropriate to evaluate the applicant's academic ability. The letter must be sealed up by the writer.

(15) Permission for Studying While in Employment (**Form 6**)

Applicants who are currently employed full-time are required to submit Permission for Taking the Entrance Examination (**Form 6**). In case the permission cannot be obtained or the applicant intends to resign before enrollment, s/he may instead submit a statement of reason sealed by her/himself. In this case, "Letter of Permission to be enrolled while employed" or "Certificate of Resign" must be submitted at the time of admission.

(16) TOEFL/TOEIC/IELTS score (Applicants to Department of Genetics only) Please refer to page 34.

(17) A copy of Residence Card (International applicants residing in Japan) or  
a copy of passport (international applicants residing outside Japan at the time of application)

(18) List of Enclosed Documents for three-year doctoral program

(Notes)

- i. Incomplete documents shall not be accepted. No documents shall be returned.
- ii. In case the applicant's name has changed after marriage, etc., a copy of family register should be attached.
- iii. **Form 3, 4 and 5** are also available at our website.  
([https://www.soken.ac.jp/en/admission/general\\_admission/guideline/seimei/](https://www.soken.ac.jp/en/admission/general_admission/guideline/seimei/))
- iv. Application documents should be written in Japanese or English. If you submit the certificate neither in Japanese nor English, please also attach the certificate in Japanese or English.

## 6 Screening Procedures

Screening will be conducted based on submitted documents and interview.

If you apply to more than one department, screenings are conducted individually. Please take notice of each examination date. For the details of the screening methods for each department, please refer to "Important Notes" for each department on pages 32-38.

Department	Examination Date	
	October 2020 Admission (second round) April 2021 Admission (first round)	April 2021 Admission (second round) October 2021 Admission (first round)
Genetics	August 2 (Sunday) and August 3 (Monday), 2020 Spare date: August 4 (Tuesday), 2020	January 27 (Wednesday) and January 28 (Thursday), 2021 Spare date: January 29 (Friday), 2021
Basic Biology	August 4 (Tuesday) and August 5 (Wednesday), 2020	January 21 (Thursday) and January 22 (Friday), 2021
Physiological Sciences	August 18 (Tuesday) and August 19 (Wednesday), 2020	January 19 (Tuesday) and January 20 (Wednesday), 2021

(Note) Detailed information about the time and place of the examination will be issued with the admission ticket for the exam. In case the ticket shall not be delivered one week prior to the date of examination, please contact the Student Affairs Section. Please see following website for the delivery status of admission ticket.

[https://www.soken.ac.jp/en/admission/general\\_admission/guideline/seimei/](https://www.soken.ac.jp/en/admission/general_admission/guideline/seimei/)

## Venue of the examination

Department	Location and Directions
Genetic	National Institute of Genetics (NIG) 1111 Yata, Mishima, Shizuoka 411-8540 From the bus rotary on the South Exit of Mishima Station (JR Tokaido line), take a bus bound for "Yanagigochi" at No.5 bus stop and get off at "Idenken mae" (in front of NIG), or take a taxi (10 minutes) from Mishima Station. The NIG free shuttle bus runs between NIG and the North Exit of Mishima Station on weekdays.
Basic Biology	National Institute for Basic Biology 38 Nishigonaka, Myodaiji, Okazaki, Aichi 444-8585 Seven-minute walk from Higashi-Okazaki Station (Nagoya Railway, Meitetsu).
Physiological Sciences	National Institute for Physiological Sciences 38 Nishigonaka, Myodaiji, Okazaki, Aichi 444-8585 Seven-minute walk from Higashi-Okazaki Station (Nagoya Railway, Meitetsu).

## 7 Announcement of Results

Admission	Notification
October 2020 (second round)	Early September, 2020
April 2021 (first round)	Early September, 2020
April 2021 (second round)	Middle of February, 2021
October 2021 (first round)	Middle of February, 2021

Further details will be sent to applicants.

Results will be posted on the notice board both in each research institute and Hayama Headquarter, as well as notification to be mailed to all applicants (not including those who have withdrawn from examination). Announcement of results will be made on the SOKENDAI website ([https://www.soken.ac.jp/en/admission/general\\_admission/result/](https://www.soken.ac.jp/en/admission/general_admission/result/)), however, results shall be confirmed by the notice sent to the successful applicants by mail. Inquiries regarding the results by telephone or other means will not be responded.

## 8 Admission Procedures

(1) Admission period is scheduled as below:

Late September 2020 for the enrollment of October 2020

Early to mid-March 2021 for the enrollment of April 2021

Late September 2021 for the enrollment of October 2021

Successful applicants must complete the admission procedures during the prescribed period. Further details will be notified to successful applicants separately.

(2) Fees required for admission are as follows.

Entrance Fee: JPY 282,000

Tuition Fee for six months: JPY 267,900

Student Insurance Fee for three years: JPY 3,620

(Personal Accident Insurance for Students Pursuing Education and Research)

Note:

(a) In case the entrance or tuition fees are revised at the time of or during enrollment, the revised fees shall be applied from the date of revision.

- (b) Entrance fees shall not be refunded under any circumstances once the payment is made. Premium for the student insurance, however, may be refunded only if applicants decline the admission by the cut-off dates as blow:

September 30, 2020 for the enrollment of October 2020

March 31, 2021 for the enrollment of April 2021

September 30, 2021 for the enrollment of October 2021

- (3) Applicants who are currently employed full-time should submit the "Letter of Approval" issued by the employer that acknowledges the enrollment while employed. Resignation certificate must be submitted if you resign before you enroll at SOKENDAI.
- (4) Applicants who are enrolled at a school other than SOKENDAI at the time of application (not including those who will have graduated from/completed the school before you enroll at SOKENDAI) must submit the certificate of withdrawal from said school.

Foreign nationals are strongly advised to obtain a College Student visa unless a particular reason would prohibit them from doing so. Detailed information on how to obtain this type of visa is available on the SOKENDAI's website: <https://www.soken.ac.jp/en/campuslife/international/immigration/>

## 9 General Notes

- (1) Before applying and taking the entrance examination, applicants should read through "Important Notes for Applicants" on pages 32-38.
- (2) Submitted documents shall not be returned. No changes or alternations to the submitted documents will be accepted after filing.
- (3) Admission might be revoked in case of any false entry or act of dishonesty on application documents and other documents.
- (4) Applicants who wish to transfer to SOKENDAI from other graduate school must contact Student Affairs Section before the last day of the application period.
- (5) Physically challenged applicants who need special consideration at the examination and after enrollment are advised to inform SOKENDAI three months prior to the application period.
- (6) Applicants should inform the Student Affairs Section if they wish to withdraw their application.
- (7) In case the applicant has changed the mailing address after submitting the application documents, please inform the Student Affairs Section of the change.  
E-mail: [gakusei@ml.soken.ac.jp](mailto:gakusei@ml.soken.ac.jp), or Fax: +81-46-858-1632
- (8) Students are not allowed to simultaneously register at other universities while studying at SOKENDAI.

## 10 Extended Study Program

Extended Study Program is for students who have extenuating circumstances, such as being employed, so that they can study for a longer period instead of the 5-year standard program term. For further information, please contact the Educational Affairs Section.

E-mail: [kyomu@ml.soken.ac.jp](mailto:kyomu@ml.soken.ac.jp), or Fax: +81-46-858-1632

## **11 Security Export Controls**

Depending on the specifics of the education and research instructions they wish to receive upon entering the program, applicants may be subject to regulations on the export/transfer of controlled technologies based on the Foreign Exchange and Foreign Trade Law. Please consult each department office for further details.

## **12 Privacy Policy**

- (1) Any personal information including applicant's name and address submitted to SOKENDAI as part of the application documents shall be used during the application process such as applicant/examination procedures, notification of results and admission procedures. After enrollment, personal information shall also be used for student affairs (school register and course registration), student services (health care, tuition exemption and scholarship application, and career support) and administrative purposes of processing payments for entrance and tuition fees.
- (2) Personal information obtained in the screening process such as examination results, shall be used for aggregate analyses of examination results and research for use in the screening process.

## **Important Notes for Applicants to Department of Genetics (Three-year Doctoral Program)**

- (1) When you apply to the Department of Genetics, please contact the PI of the lab you wish to belong to in order to discuss the research with them. As for each lab's research, please read "Majors and Research subjects of the Faculty in the School of Life Science" from page 39 to 44 or see the faculty introduction on the Department of Genetics website. (<https://www.nig.ac.jp/nig/phd-program/faculty>)
- (2) Fill your prospective supervisor's name in "1st Choice of Supervisor" of "Application Form (Form 1)". You may appoint another supervisor at the Department of Genetics as "2nd Choice of Supervisor".  
If your prospective supervisor will retire within the standard-graduate program period, please consult with your prospective supervisor in advance regarding a substitute supervisor who will act as a substitute for the subsequent period after the prospective supervisor's retirement, and enter the name of the substitute supervisor in "2nd Choice of Supervisor" column. For faculty members who are about to retire, please refer to the faculty introduction on the Department of Genetics website. (<https://www.nig.ac.jp/nig/phd-program/faculty/>)
- (3) State your previous laboratory (and supervisor) where you did research in the reverse side "Personal History" of **Form 1** (State all if there are more than two).
- (4) You can add charts/figures/tables to explain your research activities in **Form 3**(Summary of Previous Research Experience) and **Form 5** (Summary of Prospective Research). All charts and figures must fit within the forms. Extra pages are not allowed.
- (5) Specify five papers you have recently read and describe what made you interested in each of them, following the example of **Form 8-2**.
- (6) A score of TOEFL-iBT, TOEIC, or IELTS which was taken within 2 years prior to the examination day is used to evaluate the applicant's English ability. Please submit your score record/ official certificate in accordance with "How to submit TOEFL/TOEIC score" on page 34.
- (7) The examination will be held in 2 days, and you will take a written examination in the afternoon of the first day and an interview on the second day. The written examination will last 3 hours, and essay-type questions will be given to judge the abilities necessary for a researcher, such as thinking ability and logicity. The interview will last up to 30 minutes per applicant. In the first five minutes, give a presentation about your current and prospective research activities. A whiteboard is available for use. You will be asked about your presentation, answer of the written examination and the application documents in the rest of time.  
Please refer to the notice mailed before the examination for detailed schedule.
- (8) This entrance examination can be taken in Japanese or English. You may write a short essay in English. If you wish, you can take an interview in English, as well.
- (9) In page 28 "III-6 Screening Procedures", although three days are designated for examination dates, the third day is spare. Usually the examination will be carried out within the first two days.
- (10) Criteria for evaluation and judgment  
Criteria for evaluation: The suitability of the applicant as a scientist will be evaluated based on the result of the

written examination, interview and submitted documents.

Criteria for acceptance: Applicants who are considered to be competent to write a dissertation in three years and to obtain enough research abilities as PhD.

(11) Due to circumstances, in case that you need to register a pre-planned course which takes longer than the standard period required for graduation, you might be allowed to take "extension of study". See the link for the details.

<https://www.nig.ac.jp/nig/phd-program/courses-top/stretched-graduate-program>

When you apply to the course at an entrance examination, discuss with your prospective supervisor beforehand.

(12) SOKENDAI students may be granted 780,000 JPY as an annual income by taking Research Assistant System.

Students for the three-year PhD course may be granted 1,060,000 JPY in the first year by adding up 280,000 JPY for the registration fee.

(13) Please contact Academic Services Division, National Institute of Genetics for any enquiries about the Department of Genetics.

Tel: +81-55-981-6720 Fax: +81-55-981-6715 E-mail: [info-soken@nig.ac.jp](mailto:info-soken@nig.ac.jp)

For further information about the Department of Genetics and NIG, please refer to the website below.

<https://www.nig.ac.jp/nig/phd-program/main-page-top/main-page>

## How to submit TOEFL/TOEIC/IELTS score

The Department of Genetics uses TOEFL, TOEIC, or IELTS score to evaluate the applicant's English proficiency. When you submit your score record, please note the following points.

### (1) Eligible Tests

TOEFL-iBT Test, TOEIC Listening & Reading Test or IELTS (Academic Module) must be taken within two years prior to the entrance examination day.

### (2) How to Submit Score Record

When you apply to the Department of Genetics, enclose one photocopy of your score from any of the following tests: Official Score Report for TOEFL-iBT, Official Score Certificate for TOEIC Listening & Reading Test, or Test Report Form for IELTS (Academic Module)

Please do not forget to bring the original document on the day of the entrance examination.

If it is impossible for you to obtain the score record by the application period, please submit **Form 9** at the time of application, and bring the score record with you to the testing location on the examination date.

TOEFL-iBT: You can make an arrangement with ETS to send your Official Score Report directly to SOKENDAI. If you do so, you don't have to bring the original on the examination day.

Institution Code: 7564

Institution Name: SOKENDAI (The Graduate School of Advanced Studies)

### Note:

The number of dates and venues for these English tests are limited. If you intend to apply to Department of Genetics, we recommend that you take one of English tests ahead of time. Check the official websites for the details of TOEFL-iBT Test, TOEIC Listening & Reading Test, or IELTS (Academic Module).

(TOEFL-iBT) <https://www.toefl-ibt.jp/index.html>

(TOEIC) <https://www.iibc-global.org/english.html>

(IELTS) <https://www.eiken.or.jp/ielts/en/>

## **Important Notes for Applicants to Department of Basic Biology (Three-year Doctoral Program)**

- (1) It is highly recommended that before the submission of a formal application, applicants contact the appropriate supervisor to inform him or her of their interest in submitting a research plan. Please refer to "Main research of supervising professors of Department of Basic Biology on pages 45 - 50 of this brochure for information regarding which laboratories and professors are affiliated with this department. Applicants may also select a second-choice laboratory in addition to their first-choice laboratory.
- (2) Applicants may submit a letter of recommendation from a person who can give an appropriate opinion about their research capabilities.
- (3) Selection Method  
Document screening and an interview will be conducted.
  - (a) Document screening: Screening will be conducted regarding the contents of the application, including academic transcripts, and associated materials.
  - (b) Interview: An interview will take 30 minutes. The first 15 minutes will be spent exploring the applicant's previous research and future research aspirations. During the interview, a whiteboard is available for use, however, slides, projectors, and posters cannot be used. The remaining 15 minutes will be used to conduct a question-and-answer session covering the content of the applicant's presentation and submitted documents.  
  
\*The interview will take place at National Institute for Basic Biology in Aichi, Japan. Please note that the department office will NOT make an arrangement for you to obtain a short-term stay visa for entrance examination, air tickets and/or accommodation.
- (4) Criteria for grading, evaluation and admission decision  
Criteria for grading and evaluation  
Applicants will be graded on a scale from A (the highest) to D (the lowest grade) based on the content of their research to date, interview, and academic transcripts.  
Criteria for admission decision  
Acceptance will be determined in terms of overall performance, which will be determined on the basis on the each letter-graded content of the submitted documents, written tests, and interviews.
- (5) For individuals who require a period of study that exceeds the pre-determined length, a long-term course of study may be permitted after admission. Those who desire to pursue this course must contact an appropriate supervisor before submitting their application documents.
- (6) Financial Support for Students  
Graduate students may, after discussion with their supervising professor, apply for the Research Assistance program. Those employed as Research Assistants are each granted an annual salary of approximately 1,000,000 yen.
- (7) Questions regarding this section may be addressed to:  
Graduate Student Affairs Section  
International Relations & Research Cooperation Division  
National Institutes of Natural Sciences (NINS)

Nishigonaka 38, Myodaiji, Okazaki 444-8585, Japan

Phone: +81 564 55 7139 Fax: +81 564 55 7119

Web site: <http://www.nibb.ac.jp/en/univ/>

## **Important Notes for Applicants to Department of Physiological Sciences (Three-year Doctoral Program)**

- (1) Applicants are advised to have a close discussion with their desired professor regarding the contents of their research before submitting their application documents.
- (2) A letter of recommendation is not necessarily required in applying for this department. Applicants may submit a letter of recommendation if a person can give an appropriate opinion on their research capabilities.
- (3) Those who have graduated from a six-year course of medical, dental, pharmaceutical or veterinary schools are also eligible; however, applicants should be aware that the documents to be submitted and the period of submission for applications are different from those of other applicants (see page 24).
- (4) Those who complete their course of study in this department is awarded a Doctor of Philosophy degree.
- (5) Selection Method:

Document screening and interview will be conducted.

- (a) Document screening: Screening will be conducted regarding the content of each applicant's transcript and associated materials.
- (b) Interview: A 30 minutes interview will be conducted, mainly regarding the research performed by the applicant to date and the content of his or her anticipated future research.

\*The interview will take place at National Institute for Physiological Sciences in Aichi, Japan. Please note that the department office will NOT make an arrangement for you to obtain a short-term stay visa for entrance examination, air tickets and/or accommodation.

- (6) Important notes for the interview:
  - (a) An interview will last 30 minutes.
  - (b) For the first 15 minutes, applicants will be asked to present mainly the results of their research, as well as to discuss their ambitions. In this presentation, the applicant may bring and use a computer (to use software such as PowerPoint). Note that the applicant will not be allowed to use devices other than their computers or to distribute materials to assist with their explanations.
  - (c) In the remaining 15 minutes, the committee members will ask questions.
- (7) Criteria for grading, evaluation and admission decision:

Criteria for grading and evaluation: All committee members will grade applicants on a scale of A to C based on the contents of their research to date, interviews, and transcripts.

Criteria for admission decision: Acceptance will be determined by overall performance, which will be assessed based on the submitted documents, interview and written examination results.

Financial support for newly enrolled students:

- (a) Japanese students

Department of Physiological Sciences has been employing all Japanese graduate students (except for those receiving Research Fellowship for Doctoral Course Students (DC) provided by Japan Society for the Promotion Science) as Research Assistants (RAs) (at an annual salary of 1,000,000 yen). Department of Physiological Sciences has been employing an extremely high-score student as RA at an annual salary of 1.7 million yen, and

a high-score student at an annual salary of 1.4 million yen. Additionally, for new students (except those who have received an enrollment-fee waiver), funds equivalent to the amount of their enrollment fees will be paid by the Scholarship Fund of National Institute for Physiological Sciences.

(b) Non-Japanese students

Excellent students who wish to enter the 3-year Doctoral Course at NIPS are eligible to apply for two types of NIPS Scholarship. The first type covers the same as described for MEXT scholarship.

The second one covers the following:

- Admission fee (282,000 yen, only once at the time of admission)
- A half of annual tuition fee
- Salary for Research Assistant job (1,400,000 yen per year, about 116,600 yen per month)

All other students are supported as follows.

- Admission fee (282,000 yen, only once at the time of admission)
- Salary for Research Assistant job (1,000,000 to 1,400,000 yen per year, about 83,300 to 116,000 yen per month)

(8) Questions regarding the items in this section may be addressed to:

Graduate Student Affairs Section

International Relations & Research Cooperation Division

National Institutes of Natural Sciences (NINS)

Nishigonaka 38, Myodaiji, Okazaki 444-8585

Phone: +81 564 55 7139

Fax: +81 564 55 7119

Web site: <http://www.nips.ac.jp/eng/graduate/>

## IV. Majors and Research Subjects of the Faculty in the School of Life Science

### Department of Genetics

#### **AKASHI, Hiroshi Laboratory**

##### **Population genetics and genome evolution**

Our research focuses on identifying mechanisms of genome evolution in microbes as well as multicellular eukaryotes. Our work often combines theoretical/computational population genetics and large scale data analyses (bioinformatics) to test evolutionary ideas. Current topics of interest include: weak selection in genome evolution (e. g. related to chromatin structure, codon usage), global constraints that act on proteomes, and methods to infer ancestral states and to estimate adaptive evolution.

(+81-55-981-6793, hiakashi@nig.ac.jp, <https://www.nig.ac.jp/labs/EvoGen/index.html>)

#### **ARITA, Masanori Laboratory**

##### **Evolutionary network study based on genome and metabolome**

Our research theme is metabolomics, genomics and network biology. We do not perform biological experiments: computational analysis of genome and metabolome is our expertise. The target species range from bacteria, fungi, to higher animals, to investigate how genome evolves in general. We look forward to accepting students with a broader vision and higher motivation.

(+81-55-981-9449, arita@nig.ac.jp)

#### **IKEO, Kazuho Laboratory**

##### **Study for molecular basis of organismal evolution based on genomic sequence and gene expression profile**

We study the molecular basis and evolutionary history for the acquisition of novel characters based on comparative genomics and gene expression profiles. In particular, we are currently focusing more on elucidation of (1) Biodiversity of marine ecosystem using metagenome data, (2) Evolution of central nervous system and sensory organs from the view point of gene expression change, (3) Molecular evolutionary process of dosage compensation, and (4) Evolutionary basis of symbiosis between Cnidarians and algae. We also work on (5) Method development for large scale sequence data, (6) Comparative study of large scale sequence data sets for the study of bioinformatics field.

(+81-55-981-6851, kikeo@nig.ac.jp, <https://www.nig.ac.jp/labs/DnaData/>)

#### **INOUE, Ituro Laboratory**

##### **Multi-dimensional phenotype and genome relationship to promote system medicine**

Massively parallel sequencing of target regions, exomes, and complete genomes has begun to dramatically increase the opportunities for identifying genetic variants underlying rare and common diseases. Our research interest has been focused on personal genome analysis to elucidate disease causalities which leads to development of therapeutic tool. We have started a long-standing project that investigates genome-phenome relationship by integrating the personal genome information and clinical information. We initially focus on the exome and target re-sequencing, before we initiate to determine the whole personal genome.

The research projects are as follow:

- Exome sequencing to identify the causality of genetic diseases
- Re-sequencing of the entire HLA region for informative polymorphism detection
- Application of statistical model for the understanding of genome-phenome relationships.
- Construction of genetic risk prediction model of complex human disease.

(+81-55-981-6795, itinoue@nig.ac.jp, <http://humgen.lab.nig.ac.jp>)

#### **IWASATO, Takuji Laboratory**

##### **Neuronal Circuit Development in the Mouse Brain**

To understand development of complex yet sophisticated neuronal circuits underlying higher brain function of mammals, integrative studies which cover from molecules to whole animals are indispensable. By taking advantage of mouse genetic technologies and resources which have been tremendously improved in the past decades, we are studying mechanisms of development and function of mammalian neuronal circuits. Specific Aims:

- In the somatosensory system of the mouse, formation and refinement of neuronal circuits which connect the peripheral sensory organ and cortex can be detected morphologically as "barrel" patterning. We are studying molecular and cellular mechanisms of barrel patterning as a model of activity-dependent circuit maturation, by developing and using our original mouse genetic and imaging systems.
- In a wide range of neuronal circuit development and function, signaling from cell surface receptors to actin cytoskeleton

plays important roles. However, these mechanisms are poorly understood. We recently identified  $\alpha$ -chimaerin as an unexpected key signaling molecule in axon guidance of motor-circuits. We are currently studying roles of  $\alpha$ -chimaerin in various aspects of development and function of neuronal circuits in the central nervous system.  
(+81-55-981-6773, tiwasato@nig.ac.jp, <http://www.iwasato-lab.sakuraweb.com>)

### **OKUBO, Kousaku Laboratory**

#### **Knowledge discovery through genome-wide measurements**

##### 1. Sharing and Integration of Data and Knowledge in Life Science

Science of 21 century is a discovery from digital observatory data of complex phenomena. Digital literature is also one of such data. For the fair competition of new knowledge from such data, data integration is inevitable. For data integration, we have to overcome semantic, syntactic, and pragmatic problems in science data. Being Involved in data sharing center for DNA sequence (DDBJ) and for literature and observatory data (DBCLS), we engineer technologies and resources which is necessary for sharing and integration of knowledge and data.

##### 2. Theoretical studies of gene expression evolution

Gene expression evolution has long been hypothesized to serve as a bridge from molecular to phenotypic evolution. The advent of genomewide gene expression profiling techniques have prompted the studies of this field, but some conflicts have arisen in the interpretation of the observations.

Those are caused by the lack of definite theoretical models, and instead the use of inadequate analogies of molecular evolution. Therefore, we are constructing a theoretical model of gene expression evolution which provides consistent explanations of the pattern in the observations.

URL

<http://lifesciencedb.jp/ddbj/>

<http://lifesciencedb.jp/cc/>

<http://lifesciencedb.jp/ag/>

(+81-55-981-5838, kokubo@nig.ac.jp)

### **ODA, Yoshihisa Laboratory**

#### **Molecular basis of cellular organization in plants**

Cell shaping is essential for the development of multicellular organisms. In plants, a specifically patterned cell wall is a determinant of plant cell shape. The main purpose of our study is to reveal how plant cells establish proper cell wall patterns.

We focus on xylem vessel cells that deposit secondary cell walls in various patterns. By using our xylogenic cell culture system and pattern reconstruction assay, we have revealed that cortical cytoskeletons and Rho GTPases play a central role in the cell wall patterning.

- Dynamics of cortical microtubules and cortical actin microfilaments
- Spatial interaction between cortical cytoskeleton and plasma membrane domains.
- Spontaneous pattern formation by Rho GTPases
- Modeling of cell wall pattern establishment.

(+81-55-981-6800, oda@nig.ac.jp)

### **KAKUTANI, Tetsuji Laboratory**

#### **Epigenetic controls of plant development and genome structure**

To understand control and function of DNA methylation, we are taking genetic approaches using mutants of Arabidopsis. An Arabidopsis protein DDM1 (decrease in DNA methylation) is necessary for methylating transposons and repeats. On the other hand, IBM1 (increase in BONSAI methylation) is necessary for not methylating genes. In mutants of genes encoding these proteins, several types of developmental abnormalities were induced. Characterization of these abnormalities is revealing impact of DNA methylation on genome evolution and appropriate gene expression. In addition, using these and other mutants, we are studying controlling mechanisms of differential DNA methylation between genes and transposons within the genome.

(+81-55-981-6801, tkakutan@nig.ac.jp)

### **KANEMAKI, Masato Laboratory**

#### **DNA transactions at DNA replication fork in human cells**

The goal of our research is to understand the mechanisms contributing stability of the human genome, which prevent cancer predisposition and genetic disorders. We are particularly interested in DNA transactions occurring at DNA replication fork. For this purpose, we use new genetic technologies such as the CRISPR-CAS based genome editing and the auxin-inducible degron (AID) system, latter of which was developed in our lab. These technologies allow us to generate conventional- or conditional-knockout of human cells. We also aim to develop and improve genetic technologies for studies of human cells. Our current projects are as follows.

- Genetic characterization of proteins involved in human genome stability.
- Biochemical and structural studies of protein complexes involved in human genome stability.
- Improvement of the AID system and development of other degron technologies
- Development of new genetic tools for the construction of human mutant cells

(+81-55-981-5830, mkanemak@nig.ac.jp)

### **KAWAKAMI, Koichi Laboratory**

#### **The genetic basis of development and behaviors in zebrafish**

Zebrafish is an excellent model vertebrate because of high fecundity, rapid embryonic development, transparency at the embryonic stages and inexpensive and easy breeding procedures. Transgenesis is an important genetic method to analyze genes and genome in model organisms. We developed a highly efficient transgenesis method in zebrafish by using the medaka fish Tol2 transposable element, and now it is widely used as a standard protocol. Furthermore, we successfully developed important functional genomics methods, including the gene trap and enhancer trap methods and the Gal4-UAS system, based on the transposon technology. By using these methods, we have performed a large-scale genetic screen, and created a large number of transgenic fish that express the GFP reporter gene or the yeast Gal4 transcription activator in specific cells, tissues and organs. These transgenic fish are valuable tools for the study of developmental biology and neuroscience, and we are collaborating researchers worldwide. We are interested in studying neural functions through genetic approaches. We are creating transgenic fish that express Gal4 in specific neural circuits, and applying those to visualize structures of specific neural circuits, inhibit their functions and detect their activities by calcium imaging. Thus, studies to understand molecular and cellular mechanisms underlying complex behaviors of a vertebrate are currently major projects in our laboratory.

(+81-55-981-6740, kokawaka@nig.ac.jp, <http://kawakami.lab.nig.ac.jp/>)

### **KAWAMOTO, Shoko Laboratory**

#### **Research on utilization of biological resource and database**

Our laboratory has been working in research and development of databases and information system for the national bio-resource project (NBRP) and genetic resource center in NIG. We are continuing to improve the quality of databases for resource user. We are also developing genome databases of wide variety of model organisms. Recently we are building a research registry for making use of model animals for medical research.

(+81-55-981-6885, skawamot@nig.ac.jp, <http://www.nbrp.jp>)

### **KITANO, Jun Laboratory**

#### **Genetic mechanisms of adaptation and speciation**

How are new species formed? How do animals adapt to novel environments? We investigate the genetic mechanisms underlying adaptation and speciation using stickleback fishes as a model. Stickleback fishes have achieved tremendous diversification during the last few million years, resulting in the evolution of divergent morphs. We use integrative approaches to investigate the following topics.

- Genetic mechanisms of speciation

We are investigating the molecular mechanisms of reproductive isolation between sympatric morphs of sticklebacks.

- Genetic mechanisms of adaptation and phenotypic plasticity

Both genetic changes and phenotypic plasticity contribute to phenotypic changes that occur after colonization of novel environments. We are investigating the molecular mechanisms underlying adaptive evolution and plastic changes.

- Mechanisms of anthropogenic evolution

Our third project is aimed at applying the knowledge of evolutionary genetics to animal conservation and ecological management. We are investigating the genetic and ecological mechanisms by which invasive stickleback populations adapt to novel environments.

(+81-55-981-9415, jkitano@nig.ac.jp, <https://www.nig.ac.jp/labs/EcoGene/index-e.html>)

### **KIMURA, Akatsuki Laboratory**

#### **Understanding Cell Architecture through quantification and modeling**

Cells are the minimal unit of life, and are beautiful architecture in nature. One of the biggest mysteries in Cell Biology is 'how a huge number of tiny macromolecules assemble into a cell with organized and dynamic structure that performs a harmonized function.' To tackle this question, we are constructing quantitative 4-dimensional models of cells that explain and predict the structure and function of Cell Architecture. These models serve as compilation of our current understanding of the cell and, more importantly, clarify future questions to be addressed. We are using the nematode *Caenorhabditis elegans* embryo as a model system. The ongoing research projects are followings:

- Modeling the forces determining the intracellular positioning of the centrosomes.
- Modeling the dynamics of intracellular organelles during oocyte-to-embryo transition
- Modeling the cell positioning during embryogenesis
- Prediction and measurement of the forces inside the cells

(+81-55-981-5854, akkimura@nig.ac.jp, <http://cellarchlab.galaxy.bindcloud.jp>)

### **KUBO, Fumi Laboratory**

#### **Neural circuit mechanisms for visual processing and behavior**

Animals generate a range of behavior depending on visual information that they receive from the outside world. Using zebrafish as a model, our lab investigates the neural circuit mechanisms by which visual inputs produce goal-directed behavioral outputs. In particular, we aim to understand the roles of genetically defined neuron types and their circuit connectivity underlying the visually guided behaviors. Our lab uses a combination of different approaches, such as behavioral, genetic and optical techniques, as well as quantitative data analyses. Our ongoing projects include:

- Genetic basis of the motion processing neural circuit
- Roles of excitatory and inhibitory circuits in the motion processing circuit
- Neural basis for lateralized behavior

(+81-55-981-5828, fumikubo@nig.ac.jp)

**KUROKAWA, Ken Laboratory**  
**Unveiling microbial community dynamics**

We are interested in understanding about microbial genome evolution and microbial community dynamics, and we are currently reaching out in the following two major research directions;

- I. Facilitate the development of an integrated database "MicrobeDB.jp"
- II. Microbial community dynamics.

Our research interests blend a background in microbial genomics and metagenomics with bioinformatics and integrated database developments that are just now allowing the prospect of illuminating microbial community dynamics. We are trying to gain a better understanding of how microbial diversity maintain as well as how it emerged.

(+81-55-981-9437, kkurokawa@nig.ac.jp, <http://microbedb.jp/>)

**KOIDE, Tsuyoshi Laboratory**  
**Behavioral genetics using wild-derived mouse strains**

For understanding the genetic basis of inheritance and evolution of behavior, we studied behavioral phenotype, such as spontaneous activity, anxiety-like behavior, pain sensitivity, itch sensitivity, and social behavior, by using inbred strains established from wild mice. A variety of mouse inbred strains exhibited diversity in their behavioral phenotype. In order to elucidate a genetic mechanism underlying the behavioral difference, we are currently conducting genetic analyses using new mouse resource. Further analyses of candidate genes for each behavioral phenotype are conducted using the genome editing method.

- Comparative studies of behavioral patterns among wild-derived strains
- Genetic studies of tameness in mice
- Genetic studies of anxiety-related behavior
- Genetic studies of social/aggressive behavior
- Domestication of African rodents, grasscutter
- Neuroanatomical analysis of itch neural circuits

(+81-55-981-5843, tkoide@nig.ac.jp, [http://www.mgrl-lab.jp/eMGRL\\_toppage.html](http://www.mgrl-lab.jp/eMGRL_toppage.html))

**SAITO, Kuniaki Laboratory**  
**RNA biology and epigenetics in *Drosophila***

Germ cells are the only type of cell that can transmit all genetic information to the next generation. Recent studies revealed that epigenetic codes, including histone modifications and small RNA-mediated regulatory events, are critical for the inheritance of genomic information from parents to progeny. However, it still remains obscure what molecules are involved in and how epigenetic codes are established and inherited. In order to uncover these issues, we are currently engaged in studying RNA-mediated regulatory pathways in *Drosophila* by genetic, biochemical and bioinformatic techniques.

(+81-55-981-6823, saitok@nig.ac.jp, <http://ksaitolab.org/>)

**SAITOU, Naruya Laboratory**  
**Evolution of organisms at genetic/genomic level**

We study evolution of organisms at the genomic levels through computer analyses and wet experiments. We are particularly interested in evolution of modern human.

DNA analysis of human populations: We study genetic affinities of modern humans with special reference to those in Asia. We also proceed ancient DNA analysis.

Analysis of genome evolution: We study lineage-specific evolutionary changes at different levels of organism groups, such as vertebrates, mammals, primates, and human.

Development of methods useful for evolutionary genomic studies.

Analysis of gene duplication during evolution.

(+81-55-981-6790, saitounr@nig.ac.jp, <http://www.saitou-naruya-laboratory.org/english/index.html>)

**SAGA, Yumiko Laboratory**  
**Molecular mechanism of mouse gametogenesis and embryogenesis**

During mouse development, primordial germ cells are separated from somatic cell lineages and produce either sperm or oocyte depending on the somatic sex. We are interested in the mechanism of germ cell development, especially focusing on the function of Nanos proteins. Recent study reveals that Nanos-mediated RNA regulation plays important roles during early PGC specification, sexual differentiation of germ cells and the maintenance of spermatogonial stem cells. In addition, we are interested in the mesodermal cell lineages which are involved in the heart development and somitogenesis. We use ES cell technology and several transgenic strategies to manipulate gene functions in vivo to understand the molecular mechanism underling gametogenesis and morphogenesis.

(+81-55-981-6829, ysaga@nig.ac.jp, <https://www.mmd-lab.net/>)

**SAKAI, Noriyoshi Laboratory**  
**Analyses of regulatory mechanisms in zebrafish germ cells**

Spermatogenesis is characterized by sequential transitions of multiple processes: self-renewal of spermatogonial stem cells, mitotic growth of differentiating spermatogonia, and meiosis leading to the production of sperm. We are interested in molecular mechanism of these complex processes and transitions. We have developed techniques to recapitulate the entire spermatogenesis process, from stem cell propagation to differentiation of functional sperm, solely in culture. In addition, we

have already isolated several ENU-induced zebrafish mutants that have a defect in spermatogenesis. We are working on molecular dissection to regulate spermatogenesis of vertebrates by using the *in vitro* culture method and the mutants. (+81-55-981-5848, nosakai@nig.ac.jp, <https://www.nig.ac.jp/labs/FishDev/index.html>)

#### **SATO, Yutaka Laboratory**

##### **Molecular genetics of plant embryogenesis**

The goal of our research is to elucidate the mechanism of plant embryogenesis. We are focusing on processes of the patterning of apical-basal or dorsal-ventral axis formation, and the organogenesis during early stages of rice embryogenesis. We are taking a molecular genetic approach using a series of rice embryogenesis defective mutants as well as comparative embryology and genomics approaches in grass species. We are also responsible for managing, preservation, propagation, and distribution of rice genetic resources of wild rice species collected in the NIG under the NBRP.

(+81-55-981-688, yusato@nig.ac.jp, <https://www.nig.ac.jp/nig/research/organization-top/organization/sato>)

#### **SAWA, Hitoshi Laboratory**

##### **Mechanisms of asymmetric division in *C. elegans***

For normal development and homeostasis of animals, behavior (division, differentiation, migration and death) of cells must be tightly controlled. We are studying cell behaviors using the nematode *C. elegans* in which individual cells can be easily observed in living animals. We are particularly focusing on cell polarization, asymmetric division and dynamics of epigenetic status.

(+81-55-981-6845, hisawa@nig.ac.jp, <http://square.umin.ac.jp/Nemalab/index-e.html>)

#### **SHIMAMOTO, Yuta Laboratory**

##### **Physical and molecular mechanisms of cell division**

Our laboratory studies how replicated chromosomes are equally partitioned into the daughter cells in cell division. Errors in this process are linked to aneuploidy – the hallmark of cancer and several developmental disorders in humans. We use a combination of biophysics, biochemistry, and cell biology to study the physical and molecular basis underlying the faithful cell division, with a particular focus on the dynamics of microtubule cytoskeletons and microtubule-based motor proteins. We also use our expertise to study the nucleus, the essential organelle that packages DNA and controls genome function.

(+81-55-981-6784, yuta.shimamoto@nig.ac.jp)

#### **NAKAMURA, Yasukazu Laboratory**

##### **Promotion of DDBJ as an infrastructure database for life science**

Ultra high-throughput sequencing technologies allow biologists to obtain larger amounts of nucleotide sequence data. Reliable database operation and high-quality annotation supply are essential. Nakamura laboratory attempts 1) to develop advanced database management systems, and 2) to improve quality of the content of DDBJ.

· Automatic analysis of next-generation sequencing data

To establish automatic analysis of NGS data is significant for efficient processing of large amount of sequences. We are constructing automatic analytical systems on the NIG supercomputer.

· Evaluation measures of genomic annotations

Manual annotations and curations of genomic sequence is time consuming. Structural and functional annotations by automatic and manual processing are evaluated by using proposed statistical methods.

(+81-55-981-6859, yanakamu@nig.ac.jp)

#### **NIKI, Hironori Laboratory**

##### **Genetic dissection of the cell division mechanism using single-cellular model organisms**

Bacteria and yeasts are suitable model organisms to understand the fundamental mechanisms on cell proliferation. Our laboratory studies the mechanisms behind chromosome or plasmid DNA dynamics in the cell or the mechanism underlies cell shape formation. Genetical methods as well as cell-biological methods were used to observe those intracellular events. We have made several novel observation in cell proliferation mechanism by using fluorescent-based protein or DNA imaging. Especially *Sz. japonicus* yeast suits for those cell biological analysis, and hyphal growth and hyphal cell cycle add special value on this organisms.

Our ongoing project is as follows;

- Analysis of RodZ, the rod-shape determinant in *E.coli* cells.
- Chromosome and plasmid DNA transmission mechanism in *E.coli* cells.
- The function and behavior of DnaA, DNA replication initiation factor in *E.coli* cells.
- Genetic analysis on *Sz. japonicus* chromosome segregation mechanisms.
- Hyphal induction and hyphal cell cycle in *Sz. japonicus* yeast.

(+81-55-981-6870, hniki@nig.ac.jp, <https://www.nig.ac.jp/labs/MicroGen/index.html>)

#### **NONOMURA, Ken-ichi Laboratory**

##### **Molecular cytogenetics of plant germ-cell development**

Primordial germ cell is differentiated from hypodermis of stamen (male) and pistil (female) primordia in angiosperm species. Primordial germ cells are divided mitotically several times, and produce into meiocytes and nursery cells. Meiosis is one of the essential events of genetics, because it generates a new gene combination different from that of parents.

It has remained to be largely unknown how flowering plants generate and maintain germ cells, and how they undergo meiosis. To answer these questions, we have analyzed molecular functions of genes and proteins relating to early steps of

plant germ-cell initiation, development and/or meiosis, mainly by using mutant lines of rice, a monocotyledonous model plant.

We have also conducted the germplasm center of wild relatives and local varieties of rice in collaboration with the Plant Genetics Lab., under the funding support of the National Bioresource Project, Japan (NBRP).  
(+81-55-981-6872, [knonomur@nig.ac.jp](mailto:knonomur@nig.ac.jp), [http://nonomuralab-nig.sakura.ne.jp/top\\_e.html](http://nonomuralab-nig.sakura.ne.jp/top_e.html))

#### **HIRATA, Tatsumi Laboratory**

##### **Vertebrate neural network formation**

Precise neuronal connections are the basis for the complex brain function. The fully functional brain is constructed through a series of carefully controlled developmental processes including neuronal differentiation, migration, axon outgrowth, and target recognition. We are exploring genetic mechanisms governing the developmental processes in vertebrate nervous systems.

- Central Olfactory Projection Olfactory information is transferred and processed in the olfactory bulb of the brain. Development of afferent projections from this first-order center has been studied, using knockout mice for axon guidance molecules.

- Neuronal Migration During development, the guidepost neurons, "lot cells", for olfactory bulb axons show a dynamic ventral migration over the telencephalon. We are investigating mechanisms of this unique neuronal migration.

- Axon Outgrowth and Pausing Axon tip-enriched protein M6a is implicated in axon outgrowth and pausing. We are analyzing physiological functions of this protein.

- Evolution of the neocortical layer structure The layer structure in the neocortex is unique to mammals. The evolutionary scenarios are explored through comparisons of developmental processes in the brain structures of different vertebrate species.

(+81-55-981-6721, [tathirat@nig.ac.jp](mailto:tathirat@nig.ac.jp), [https://www.nig.ac.jp/labs/Brain/hirata\\_lab/TOP.html](https://www.nig.ac.jp/labs/Brain/hirata_lab/TOP.html))

#### **MAESHIMA, Kazuhiro Laboratory**

##### **3D-organization and dynamics of human genome chromatin**

Our research interest lies in understanding how a long string of genomic DNA is three-dimensionally organized in the cell, and how the organized genome functions during cellular proliferation, differentiation, and development. We are using a novel combination of molecular cell biology and biophysics to elucidate 3D-organization and dynamics of genome chromatin. Current on-going projects are as follows:

- Single nucleosome imaging in live cells

- Structural study of chromatin organization by X-ray scattering analysis

- Super-resolution imaging of higher-order chromatin structures in ES cell differentiation

- Development of a novel chromatin purification procedure

(+81-55-981-6864, [kmaeshim@nig.ac.jp](mailto:kmaeshim@nig.ac.jp), <http://maeshima-lab.sakuraweb.com>)

#### **MIYAGISHIMA, Shin-ya Laboratory**

##### **Coordinating mechanisms of eukaryotic cell and organelle/endosymbiont proliferation**

Mitochondria and chloroplasts are energy-converting organelles in eukaryotic cells. Both originated more than one billion years ago when bacterial cells were engulfed by primitive eukaryotic cells. Besides these organelles, there are many examples of endosymbioses which have integrated new functions into host cells. In order to maintain a permanent endosymbiotic relationship, endosymbionts/organelles must be replicated and inherited into each daughter cell during host cell division. We have shown that chloroplasts and mitochondria use similar division systems, both of which are derived from the ancestral bacterial endosymbionts and the eukaryotic host.

The major goal of our study is to understand how two different cells are integrated into a new cell by coordinated proliferation of a host and an endosymbiotic cell. To this end, we are investigating (1) how eukaryotic host cells regulate proliferation of organelles/endosymbionts, (2) how activities of organelles/endosymbionts affect proliferation of the host cells, and (3) how these systems have evolved and contributed to eukaryotic evolution.

(+81-55-981-9411, [smiyagis@nig.ac.jp](mailto:smiyagis@nig.ac.jp), <http://miyagishima.sakura.ne.jp>)

#### **MURAYAMA, Yasuto Laboratory**

##### **Molecular mechanism of chromosome organization and segregation**

Spatiotemporal chromosome organization is fundamental for gene expression, DNA replication, repair and chromosome segregation. SMC proteins are one of central chromosomal organizers. We study the molecular mechanism of SMC proteins by reconstituting their DNA loading reaction in test tube. We are now combining our reconstitution system with single molecule approaches.

(+81-55-981-6810, [ystmurayama@nig.ac.jp](mailto:ystmurayama@nig.ac.jp))

## Department of Basic Biology

Professors and Associate Professors marked with an asterisk(✱) cannot be a supervisor.

### CELL BIOLOGY

#### DIVISION OF CELLULAR DYNAMICS

**Prof. UEDA, Takashi** (+81-564-55-7530) [tueda@nibb.ac.jp](mailto:tueda@nibb.ac.jp)  
(<https://www.nibb.ac.jp/cellular/en/>)

Membrane trafficking among single membrane-bounded organelles plays pivotal roles in various cell activities in eukaryotic cells, which are also critical in multiple layers of higher-ordered functions of multicellular organisms. Although the basic framework of membrane trafficking is well conserved among eukaryotic lineages, recent studies have also suggested that each lineage has acquired a unique membrane trafficking system during evolution. Our research focuses on mechanisms of diversification of membrane trafficking in plants, and we are currently studying plant-unique organelle functions and membrane trafficking pathways using *Arabidopsis thaliana* and the liverwort *Marchantia polymorpha*.

#### DIVISION OF QUANTITATIVE BIOLOGY

**Prof. AOKI, Kazuhiro** (+81-564-59-5235) [k-aoki@nibb.ac.jp](mailto:k-aoki@nibb.ac.jp)  
(<https://www.nibb.ac.jp/qbio/en/>)

A living cell acts as an input-output (I/O) unit, which senses environment and internal states, processes information, and responds appropriately to adapt the changes. Our laboratory is interested in such a system for the information processing controlled by intracellular signaling devices and networks. Especially, we focus on several signal transduction pathways related to cell proliferation, differentiation, and cell death in mammalian cells, and aim to quantitatively decipher the mechanisms of signaling networks governing cellular decision-making. To this end, we are attempting to visualize, manipulate, and simulate intracellular signaling with fluorescence imaging techniques and computational approaches.

#### DIVISION OF CHROMATIN REGULATION

**Prof. NAKAYAMA, Jun-ichi** (+81-564-55-7680) [jnakayam@nibb.ac.jp](mailto:jnakayam@nibb.ac.jp)  
([https://www.nibb.ac.jp/chroma/index\\_eng](https://www.nibb.ac.jp/chroma/index_eng))

Multicellular organisms are made up of diverse populations of many different types of cells, each of which contains an identical set of genetic information coded in its DNA. Cell differentiation and the process of development itself depend on the ability of individual cells to maintain the expression of different genes, and for their progeny to do so through multiple cycles of cell division. In recent years, we have begun to understand that the maintenance of specific patterns of gene expression does not rely on the DNA sequence, but rather takes place in a heritable, "epigenetic" manner. DNA methylation, chromatin modifications, and RNA silencing are some of the best known epigenetic phenomena. Our division investigates how modifications to the structure and configuration of chromatin (complexes of nuclear DNA and proteins) contribute to epigenetic gene regulation by studying events at the molecular scale in the model organism, fission yeast, ciliate *Tetrahymena*, and in cultured mammalian cells.

#### LABORATORY OF NEURONAL CELL BIOLOGY

**Assoc. Prof. SHIINA, Nobuyuki** (+81-564-55-7620) [nshiina@nibb.ac.jp](mailto:nshiina@nibb.ac.jp)  
(<https://www.nibb.ac.jp/neurocel/English/>)

Translation is a fundamental process of life. In neurons, an important part of translation is regulated locally: a subset of mRNA is transported to dendrites and translated upon synaptic stimulation near the stimulated synapses. mRNA transport and subsequent local translation make it possible to supply the stimulated synapses with newly synthesized proteins and potentiate neural networks connected through the stimulated synapses, which is required for long-term memory formation. It is known that RNA granules, which are macromolecular complexes containing the dendritically transported mRNA, play central roles in the regulation of mRNA transport and local translation in dendrites. In our laboratory, we are identifying mRNA and RNA-binding proteins localized to RNA granules and analyzing the mechanism of mRNA transport and local translation in mouse neurons. We are further studying the role of dendritic mRNA transport and local translation in the formation of synapses and neural networks as well as in learning, memory and behavior using mice as model animals.

## LABORATORY OF STEM CELL BIOLOGY

**Assoc. Prof. TSUBOUCHI, Tomomi** (+81-564-55-7693) [tsubo@nibb.ac.jp](mailto:tsubo@nibb.ac.jp)  
(<https://www.nibb.ac.jp/stemcell/>)

Embryonic stem (ES) cells are unique in that they are capable of producing all cell types that make up our bodies (i.e., they are pluripotent). For this property, ES cells and other types of pluripotent stem cells (such as iPS cells) have received tremendous amount of attention with the expectation for their use in medicine. However, despite the knowledge that pluripotent cells appear fundamentally different in various cellular aspects, the detailed mechanisms underlying such differences are not well-understood. In particular, understanding the mechanism by which ES cells maintain their genetic information and how their genome may be affected by differentiation and de-differentiation processes is biologically important. My laboratory is aiming to understand how mechanisms that govern pluripotency intersect with genome maintenance mechanisms and cell cycle regulation in ES cells.

## LABORATORY OF ORGANELLE REGULATION

**Assoc. Prof. MANO, Shoji** (+81-564-55-7500) [mano@nibb.ac.jp](mailto:mano@nibb.ac.jp)  
(<https://www.nibb.ac.jp/plantorganelles/>)

Organelles are subcellular compartments in eukaryotic cells, and their functions, morphology, and the number dramatically change in response to cell types, developmental stages and environmental stimuli. This flexibility of organelles supports various biological processes. We have been tackling research of plant peroxisomes and oil bodies, which are present as single-membrane organelles. Peroxisomes and oil bodies have various crucial functions such as lipid metabolism and accumulation of storage oils, respectively. The defects of their functions cause normal cell functions and plant growth, showing the significance of both organelles in plant life cycle. However, the detailed mechanisms of dynamics of both organelles remain to be understood. The aim in our laboratory is to understand the regulatory mechanisms of functions and biogenesis of peroxisomes and oil bodies at the molecular level. We are taking a comprehensive approach by a variety of strategies in cell biology, physiology, molecular biology, imaging technique etc. to achieve this purpose.

## DEVELOPMENTAL BIOLOGY

### DIVISION OF MORPHOGENESIS

\* **Prof. UENO, Naoto** (+81-564-55-7570) [nueno@nibb.ac.jp](mailto:nueno@nibb.ac.jp)  
**Assoc. Prof. KINOSHITA, Noriyuki** (+81-564-55-7573) [nkinoshi@nibb.ac.jp](mailto:nkinoshi@nibb.ac.jp)  
(<https://www.nibb.ac.jp/morphgen/English/>)

The complex morphogenesis of organisms is achieved by dynamic rearrangements of tissues during embryogenesis, in which change in cellular morphology as well as orchestrated cell movements are involved. For cells to know how they should change their shape and where they should move, information called "cell polarity" is essential. How then is the cell polarity established within cells? Is it intrinsically formed within the cells or triggered by extracellular cues? Furthermore, little is known as to how coordinated and complex cell movements are controlled in time and space. We attempt to understand the mechanisms underlying these events using several model animals, including frogs, fish, mice and ascidians, taking physical parameters such as force in consideration, in addition to conventional molecular and cellular biology.

### DIVISION OF MOLECULAR AND DEVELOPMENTAL BIOLOGY

**Prof. TAKADA, Shinji** (+81-564-59-5241) [stakada@nibb.ac.jp](mailto:stakada@nibb.ac.jp)  
(<https://www.nibb.ac.jp/~cib2/english>)

Secreted signaling molecules play essential roles in many dynamic and well-organized phenomena during animal development. We are trying to understand the coordinative regulation in animal development by focusing on the characteristics and dynamics of secreted signaling molecules. We are also concerning the mechanism of somitogenesis, which is accomplished by coordinated interaction between extracellular signals and transcription factors. In these studies, we utilize mouse and zebrafish systems, both of which are available for genetic analysis, as model systems. The followings are some of our current projects:

- (1) Study on the mechanism of somite development
- (2) Study on the mechanism of the development of the pharyngeal arches
- (3) Study on the secretion and extracellular dynamics of Wnt proteins

## **DIVISION OF EMBRYOLOGY**

**Prof. FUJIMORI, Toshihiko** (+81-564-59-5860) fujimori@nibb.ac.jp  
(<https://www.nibb.ac.jp/embryo/>)

The aim of our research is to understand the events underlying early mammalian development during the period from the pre-implantation to establishment of the body axes.

Mammalian embryo is characteristic for their ways of development occurring in the uterus of the mother. The other characteristic is their highly regulative potential. The pattern of cell division and allocation of cells within an embryo during the early stages vary between embryos. The timing of the earliest specification events that control the future body axes is still under discussion. Functional proteins or other cellular components have not been found that localize asymmetrically in the fertilized egg. We would like to provide basic and fundamental information about the specification of embryonic axes, behaviors of cells and the regulation of body shape in early mammalian development through visualization and live imaging of cells and molecules in addition to the classical methods commonly used in embryology.

## **DIVISION OF GERM CELL BIOLOGY**

**Prof. YOSHIDA, Shosei** (+81-564-59-5865) shosei@nibb.ac.jp  
([https://www.nibb.ac.jp/germcell/index\\_E](https://www.nibb.ac.jp/germcell/index_E))

Generation of gametes-eggs and sperm- is one of the most fundamental function of living organisms. Division of Germ Cell Biology focuses on mammalian spermatogenesis, which represents a highly potent and robust stem cell system. Decades of research, including detailed morphological examinations, post-transplantation repopulation, and in vitro culture, have made it one of the most intensively studied mammalian stem cell systems.

However, the cellular nature and regulation of the stem cells remain largely unknown. We aims to fully understand the mammalian sperm stem cell system using mice.

Our current interests include 1) the cellular nature of the stem cell compartment and their behaviors in the in steady-state spermatogenesis, and 2) the anatomical basis and function of the sperm stem cell niche.

## **LABORATORY OF REGENERATION BIOLOGY**

**Prof. AGATA, Kiyokazu** (+81-564-55-7650) agata@nibb.ac.jp  
([https://www.nibb.ac.jp/en/sections/developmental\\_biology/agata/](https://www.nibb.ac.jp/en/sections/developmental_biology/agata/))

Why regeneration-competent animals such as newts can restore their missing body parts, but mice and humans can not?" In the past decade, great advances in regeneration studies have revealed many of the molecular mechanisms underlying regeneration. Thus, we now aim to develop strategies to induce regenerative response in humans for replenishing missing tissues and organs by understanding the molecular basis of regeneration from regeneration-competent animals.

## **NEUROBIOLOGY**

### **DIVISION OF BEHAVIORAL NEUROBIOLOGY**

**Prof. HIGASHIJIMA, Shinichi** (+81-564-59-5875) shigashi@nibb.ac.jp  
(<https://www.nibb.ac.jp/behavior/>)

Neuroscientists have long wanted to understand neuronal mechanisms how locomotion and behaviors are generated. We are trying to address this issue by using small fish (zebrafish and medaka) whose central nervous systems are simpler, and thus easier to analyze. We have been generating a large number of transgenic zebrafish strains, each of which express fluorescent protein in a particular class of neurons. By using these transgenic fish, we are investigating behavioral roles of each class of neurons. Techniques we use include electrophysiology, calcium imaging, optogenetics, and genetic ablation of neurons. Currently, we are focusing on the following topics: (i) how rhythms are generated, (ii) how animals change the speed of locomotion, and (iii) how flexor/extensor and left/right movements are coordinated during rhythmic pectoral fin movements.

## LABORATORY OF NEUROPHYSIOLOGY

**Assoc. Prof. WATANABE, Eiji** (+81-564-59-5595) [eiji@nibb.ac.jp](mailto:eiji@nibb.ac.jp)  
(<http://www.nibb.ac.jp/neurophys/>)

In order to interact successfully with the environment, animals must deduce their surroundings based on sensory information. The visual system plays a particularly critical role in such interactions with the environment. "Why can we see?" This question is fundamental for a thorough understanding of vision-dependent animals, including human beings. One of our major subjects is the psychophysical and computational studies of medaka (*Oryzias latipes*). Another of our major subjects is the psychophysical and theoretical studies of the visual system of human beings (*Homo sapiens*).

## EVOLUTIONARY BIOLOGY AND BIODIVERSITY

### DIVISION OF EVOLUTIONARY BIOLOGY

**Prof. HASEBE, Mitsuyasu** (+81-564-55-7546) [mhasebe@nibb.ac.jp](mailto:mhasebe@nibb.ac.jp)  
([https://www.nibb.ac.jp/evodevo/index\\_EN](https://www.nibb.ac.jp/evodevo/index_EN))

Our group is working to solve basic and general questions in developmental and cellular evolutionary biology especially focusing on:

- (1) Why are plant cells more plastic than animal cells and easy to become pluripotent stem cells?
- (2) How does self-organization function in development and evolution?
- (3) What did genetic changes cause the evolution of carnivorous plants?
- (4) How did the sensitive plant *Mimosa pudica* acquire the mechanisms for movement?
- (5) What did cytoskeletal changes cause the evolution of plant cells?

### DIVISION OF SYMBIOTIC SYSTEMS

**Prof. KAWAGUCHI, Masayoshi** (+81-564-55-7564) [masayosi@nibb.ac.jp](mailto:masayosi@nibb.ac.jp)  
**Assoc. Prof. SOYANO, Takashi** (+81-564-55-7563) [soyano@nibb.ac.jp](mailto:soyano@nibb.ac.jp)  
(<https://www.nibb.ac.jp/miyakohp/>)

Symbiosis refers to close and sympatric interactions between species. The interactions involve dynamic changes of genomes, metabolisms, and signaling networks of symbiotic partners, and a unified understanding of these interactions is required when studying symbiotic organisms. Using a model legume *Lotus japonicus*, we are studying the molecular mechanisms of nodulation and mycorrhization to elucidate their evolutionary origin. In addition, we use mathematical and computational approaches to understand biological phenomena involving complex interactions, for example, pattern formation and evolution of the symbiotic systems.

### DIVISION OF EVOLUTIONARY DEVELOPMENTAL BIOLOGY

**Prof. NIIMI, Teruyuki** (+81-564-55-7606) [niimi@nibb.ac.jp](mailto:niimi@nibb.ac.jp)

(<https://www.nibb.ac.jp/niimilab/>)

Insects can boast of an overwhelming wealth of species. With a history of evolution spanning over 400 million years, insects have adapted to every environment on earth, diversifying into an extraordinary range of forms along the way. With over a million species, insects are a treasure trove of diversity, and represent infinite possibilities as research tools for unlocking the evolutionary mechanisms responsible for the evolution of animal form. We focus on the evolutionary novelties acquired by insects through evolution, in order to elucidate the molecular and evolutionary mechanisms leading to the large variety of traits that they display. From this wealth of exciting traits, our lab currently focuses on promoting research into (1) the origin and diversification of insect wings, (2) wing color patterns and mimicry of ladybird beetles, and (3) acquisition and diversification of beetle horns.

## LABORATORY OF EVOLUTIONARY GENOMICS

**Prof. SHIGENOBU, Shuji** (+81-564-55-7670) shige@nibb.ac.jp  
([https://www.nibb.ac.jp/en/sections/evolutionary\\_biology\\_and\\_biodiversity/shigenobu/](https://www.nibb.ac.jp/en/sections/evolutionary_biology_and_biodiversity/shigenobu/))

Every creature on the earth exists among a network of various biological interactions. For example, many multicellular organisms, including humans, harbor symbiotic bacteria in their bodies: some of them provide their hosts with essential nutrients deficient in the host's diet and others digest foods indigestible by the host alone. The goal of our group is to establish a new interdisciplinary science "Symbiosis Genomics", where we aim to understand the network of biological interactions at the molecular and genetic level. To this end, we take advantage of state-of-the-art genomics such as next-generation sequencing technologies. Grad students in our lab are expected to be trained to be familiar with both of experimental biology and bioinformatics.

## LABORATORY OF BIORESOURCES

**Specially Appointed Prof. NARUSE, Kiyoshi** (+81-564-55-7580) naruse@nibb.ac.jp  
(<https://www.nibb.ac.jp/bioresources/>)

Medaka is a small egg-laying "secondary" fresh water fish found in brooks and rice paddies in Eastern Asia. This species has a long history as an experimental animal, especially in Japan. Our laboratory has conducted the study on evolution of sex determination system using medaka and relatives, identification of the causal gene of body color mutants to analyze the pigment cell development in fish. We are focusing on development of novel cre driver lines which can visualize neural activities. In addition to these activities, our laboratory is stepping forward to lead the National BioResource Project Medaka (NBRP Medaka: <http://www.shigen.nig.ac.jp/medaka/>).

## LABORATORY OF MORPHODIVERSITY

**\* Assoc. Prof. KODAMA, Ryuji** (+81-564-55-7578) kodama@nibb.ac.jp  
([https://www.nibb.ac.jp/en/sections/evolutionary\\_biology\\_and\\_biodiversity/kodama/](https://www.nibb.ac.jp/en/sections/evolutionary_biology_and_biodiversity/kodama/))

We are studying the morphogenic process of the multicellular organisms mainly using morphological methods. One of the main target is the morphogenic processes of the lepidopteran wing, focusing on the programmed cell death and the cellular interactions.

## LABORATORY OF BIOLOGICAL DIVERSITY

**Assoc. Prof. YAMASHITA, Akira** (+81-564-55-7512) ymst@nibb.ac.jp  
(<https://www.nibb.ac.jp/pombe/indexE>)

Germ cells, which produce sperm and eggs, begin halving their number of chromosomes during a special kind of cell division called meiosis, in response to the ambient conditions. In our laboratory we use the fission yeast *Schizosaccharomyces pombe*, the simplest organism that performs meiosis, to research the mechanism by which cells switch from mitosis, the kind of cell division that divides cells equally to create two identical cells, to meiosis, which is essential for bringing forth genetically diverse progeny.

**Assoc. Prof. TAKIZAWA, Kenji** (+81-564-55-7520) kenji-t@nibb.ac.jp  
(<https://www.nibb.ac.jp/en/sections/concurrent/abc1/>)

Presence of green plants on Earth can be detected from outer space since their photosynthesis interact with global environment. If 'alien plants' exist on extrasolar planets, oxygen in the atmosphere and light reflection by vegetation could be detected via astronomical observation. In the next decade, direct imaging of habitable exoplanet will be implemented. We are studying to characterize phototrophs on exoplanets and to predicting detectable biosignatures.

## ENVIRONMENTAL BIOLOGY

### DIVISION OF ENVIRONMENTAL PHOTOBIOLOGY

**Prof. MINAGAWA, Jun** (+81-564-55-7515) minagawa@nibb.ac.jp  
**Assoc. Prof. Takahashi, Shunichi** (+81-564-55-7517) shun@nibb.ac.jp  
(<https://www.nibb.ac.jp/photo/>)

Plants and algae have a large capacity to acclimate themselves to changing environments. We are interested in these acclimation processes, in particular, how efficiently yet safely they harness sunlight for photosynthesis under the changing light environment. Using a model green alga, we are studying the mechanisms underlying such photoacclimation events at the molecular level. We have applied the knowledge and techniques obtained through the study of the model green alga to coral's symbiotic algae (Symbiodinium) in order to examine how coral's symbiotic algae acclimatize to global warming, and how coral bleaching, occurring when acclimatization fails, happens using the model sea anemone (Aiptasia)-Symbiodinium symbiotic system.

### DIVISION OF PLANT ENVIRONMENTAL RESPONSES

**Prof. MORITA, Miyo T.** (+81-564-55-7556) mimorita@nibb.ac.jp  
(<https://www.nibb.ac.jp/perhp/en/>)

Plants have the ability to sense various environmental stimuli such as light, humidity, gravity, etc. To enhance their chance of survival, plants reorient growth direction of their organs in response to such stimuli. These physiological responses are referred as tropisms and the gravitropism is one of major determinant for organ growth direction. The direction of gravity is recognized in specific cells called as statocytes in which amyloplasts are displaced toward the direction of gravity. We are interested in the gravity sensing and signaling in gravitropism, in particular, how displacement of amyloplast is converted to biochemical signal transduction. We aim to understand the detailed molecular mechanism of gravity sensing and signaling by applying a genetical, molecular biological, and cell biological approaches using model plant *Arabidopsis thaliana*.

## IMAGING SCIENCE

### LABORATORY FOR SPATIOTEMPORAL REGULATIONS

**Assoc. Prof. NONAKA, Shigenori** (+81-564-55-7590) snonaka@nibb.ac.jp  
(<http://www.nibb.ac.jp/~bioimg2/en/>)

Live imaging technique of the whole organisms without dissecting and slicing are increasingly important to capture vital phenomena. We pursue left-right determination mechanism and cell migration during gastrulation of developing mouse embryos, using light-sheet microscopy and two-photon microscopy, which enable imaging of thick living organism with good penetration depth and least photodamages. We are also working for the development of imaging techniques based on light-sheet microscopy.

### LABORATORY OF BIOTHERMOLOGY (SPECTROGRAPHY AND BIOIMAGING FACILITY)

**Assoc. Prof. KAMEI, Yasuhiro** (+81-564-55-7535) ykamei@nibb.ac.jp  
([https://www.nibb.ac.jp/lspectro/kamei\\_lab](https://www.nibb.ac.jp/lspectro/kamei_lab))

A microscope is a tool for "observation" of micro-world, while, recently, new technologies enable "manipulation" of living cells via microscope. We developed single-cell gene induction microscope which utilized infrared laser for heating cells and utilized heat shock response to induce a target gene. The system can be applied to many model organisms, such as medaka, nematode and higher plant *Arabidopsis*. On the other hand, we developed reverse-genetical technique for medaka, called TILLING, and then we can make KO mutants for target genes. We combine the technique for laser gene induction and the mutant production system for the fine gene analysis in vivo to explore how the biological mechanism of gene expression net-work builds up the body or controls differentiation.

## Department of Physiological Sciences

### Division of Biophysics and Neurobiology

**【Prof. KUBO, Yoshihiro】【Assoc. Prof. TATEYAMA, Michihiro】 Dynamic aspects of structure-function relationship and regulation mechanisms of ion channels and receptors**

Membrane proteins such as ion channels and receptors are sophisticated elements which play critical roles in the brain function. To elucidate the functioning mechanisms we approach their dynamic structural rearrangements and the regulation mechanisms by combined techniques of molecular biology, electrophysiology and optophysiology. We also conduct research using genetically modified mice towards the functional significance of ion channels and receptors in the brain function.

KUBO, Yoshihiro TEL : +81-564-55-7831 / E-mail : ykubo@nips.ac.jp

TATEYAMA, Michihiro TEL : +81-564-55-7832 / E-mail : tateyama@nips.ac.jp

### Division of Membrane Physiology

**【Prof. FUKATA, Masaki】【Assoc. Prof. FUKATA, Yuko】 Mechanisms for synaptic transmission and synaptic disorders**

We will elucidate the regulatory mechanisms for synaptic transmission and clarify the etiology of neuropsychiatric disorders such as epilepsy and dementia. Our final goal is to address the fundamental question "How does our brain physiologically function and how is the system disrupted in brain diseases?"

#### **1. Identification and functional analysis of synaptic protein network**

Synaptic membrane proteins, such as neurotransmitter receptors, ion channels and adhesion molecules, form protein complexes and thereby performing their physiological functions. Using our highly original biochemical techniques, we are purifying and identifying novel synaptic protein complexes from brain tissues and clarifying their synaptic functions by integrative approaches.

#### **2. Molecular mechanisms for protein palmitoylation**

Many synaptic proteins undergo protein palmitoylation, and the localization on those synaptic proteins is dynamically regulated by protein palmitoylation upon neuronal activity. Taking advantage of palmitoylating enzymes we discovered, we are elucidating the molecular mechanism for controlling synaptic transmission.

FUKATA, Masaki TEL : +81-564-59-5873 / E-mail : mfukata@nips.ac.jp

FUKATA, Yuko TEL : +81-564-59-5873 / E-mail : yfukata@nips.ac.jp

### Division of CELL Structure

**【Prof. FURUSE, Mikio】【Assoc. Prof. IZUMI, Yasushi】 Molecular mechanism of epithelial barrier function and paracellular transport**

We seek to clarify the molecular basis of epithelial barrier function and paracellular epithelial transport, both of which are required for homeostasis of the body fluid compartments. Our research focuses especially on tight junctions, on mode of epithelial cell-cell junctions. We characterize the roles of tight junction-associated proteins in the regulation of paracellular transport by a combination of morphological, molecular biological and physiological techniques in cultured epithelial cells and mice.

FURUSE, Mikio TEL : +81-564-59-5277 / E-mail : furuse@nips.ac.jp

IZUMI, Yasushi TEL : +81-564-59-5279

### Division of Cell Signaling (Exploratory Research Center on Life and Living Systems)

**【Prof. TOMINAGA, Makoto】【Assoc. Prof. SOKABE, Takaaki】 Molecular mechanisms of sensing**

We are clarifying molecular mechanisms of sensing such as thermosensation, nociception and taste sensation by focusing on TRP channels mainly with electrophysiological and molecular biological techniques. We are also doing analyses at a whole animal level using genetically-modified mice. We are also working on fruit flies to seek novel mechanisms of temperature and taste/repellent sensations. In addition, we are analyzing functional evolution of thermosensitive TRP channels since animals are expected to have changed their thermosensitivity dynamically depending on the changes in ambient temperature in the evolutionary process.

TOMINAGA, Makoto TEL : +81-564-59-5286 / E-mail : tominaga@nips.ac.jp

SOKABE, Takaaki TEL : +81-564-59-5287 / E-mail : sokabe@nips.ac.jp

## **Division of Cardiocirculatory Signaling (Exploratory Research Center on Life and Living Systems)**

### **【Prof. NISHIDA, Motohiro】 Elucidation of the molecular mechanism underlying maintenance and transfiguration of cardiovascular homeostasis**

We are studying the mechanism underlying adaptation and maladaptation of the cardiovascular system against hemodynamic load through focusing on TRP Ca<sup>2+</sup>-permeable channels as a regulator of excitation-transcription coupling and GTP-binding proteins as senescence-inducible redox sensors, using *in vivo* and *ex vivo* cardiovascular analyzing systems and chemical principles-based biological techniques.

NISHIDA, Motohiro TEL : +81-564-59-5560 / E-mail : nishida@nips.ac.jp

## **Division of Endocrinology and Metabolism**

### **【Prof. MINOKOSHI, Yasuhiko】 Regulatory mechanism of the brain and hypothalamus in body energy metabolism**

Whole body energy metabolism, which is composed of food intake and energy expenditure, is strictly regulated by the multiple organ networks with autonomic nervous system as well as hormones such as leptin, adiponectin and insulin. Our division is investigating the integrative and regulatory roles of the hypothalamus in whole body energy metabolism, nutrient sensing and multiple organ networks in mammals. These studies are now important for better understanding the molecular mechanisms behind pathophysiology of obesity, diabetes mellitus and aging.

MINOKOSHI, Yasuhiko TEL : +81-564-55-7741/ E-mail: minokosh@nips.ac.jp  
NAKAJIMA, Ken-ichiro TEL : +81-564-55-7742/ E-mail: knakaj@nips.ac.jp

## **Division of Homeostatic Development**

### **【Prof. NABEKURA, Junichi】 【Assoc.Prof. NARUSHIMA, Madoka】 Reorganization of neural circuits in development and recovery after neural injury**

Neuronal networks are dynamically reshaped by experiences during early postnatal life. The similar neural reorganization is observed after neural injury. What happens at the level of neural networks including synaptic formation and function during postnatal development and recovery after neurological damage? To address these questions, we study the rodent central nervous system. Major research techniques applied in our laboratory include *in vivo* two-photon microscopy, immunohistochemistry, and a number of electrophysiological and molecular biological techniques. In order to explore the possibility that immature features of neural circuits reemerge during the recovery period following neural injury, we study on the mechanisms underlying the reorganization of neural circuits using various animal models.

NABEKURA, Junichi TEL : +81-564-55-7851 / E-mail : nabekura@nips.ac.jp  
NARUSHIMA, Madoka TEL : +81-564-55-7854 / E-mail : narumado@nips.ac.jp

## **Division of Visual Information Processing**

### **【Prof. YOSHIMURA, Yumiko】 Circuit mechanisms underlying information processing and functional development in visual cortex**

We are studying the properties of neuronal circuits underlying visual information processing in visual cortex, and the development of the circuits based on experience-dependent and synaptic target recognition mechanisms. To this end, we are conducting electrophysiological analyses combined with optogenetics and laser photolysis of caged glutamate in rodent slice preparations and morphological analyses using transsynaptic viral tracers. In order to relate the properties of neuronal circuits to visual functions, we are also investigating the visual responses of cortical neurons in rodents with electrophysiological techniques and 2-photon Ca<sup>2+</sup> imaging.

YOSHIMURA, Yumiko TEL: +81-564-55-7731 / E-mail: yumikoy@nips.ac.jp

## **Division of Biophotonics**

### **【Prof. NEMOTO, Tomomi】 【Assoc. Prof. ENOKI, Ryosuke】 Quantitative analysis of neural functions and biological rhythm by cutting-edge optical technologies**

We explore innovative bioimaging methodologies and applications for life- and medical sciences by utilizing cutting-edge technologies of laser, optical, and materials. We are developing novel optical microscopy for realizing invasive-less, fast, and super-resolution observations and manipulations in living biospecimens. We hope that cutting-edge visualization technologies clarify principles of the emergence of physiological functions of the brain, exocytosis/secretion, and biological rhythms. We are also promoting the application of such various animal models like cancer and diabetes models, as well as plant cell ones.

NEMOTO, Tomomi TEL : +81-564-59-5257 / E-mail : tn@nips.ac.jp  
ENOKI, Ryosuke TEL : +81-564-59-5258 / E-mail : enoki@nips.ac.jp

## **Division of Behavioral Development**

### **【Prof. ISODA, Masaki】 Neural mechanisms of social cognition and behavior**

The goal of this laboratory is to clarify the neural mechanisms underlying social cognition and behavior using macaques. In particular, we focus on self-other distinction, monitoring of others' actions, observational learning, and self-other comparison. For this purpose, we employ various experimental approaches, such as behavioral testing, electrophysiological recording, neuropharmacological intervention, pathway-selective blockade of neural activity using viral vectors, and cognitive genomics.

ISODA, Masaki TEL : +81-564-55-7761 / E-mail : isodam@nips.ac.jp

## **Division of System Neurophysiology**

### **【Prof. NAMBU, Atsushi】 Physiology and pathophysiology of voluntary movements**

Living animals, including human beings, obtain many pieces of information from the external and internal environments, integrate them to make a decision for appropriate behavioral activity, and finally take action based on self-intension. The brain areas, such as the cerebral cortex, basal ganglia and cerebellum, play a major role in the voluntary movements. On the other hand, malfunctions of these structures result in movement disorders, such as Parkinson's disease. The major goal of our research programs is to elucidate the mechanisms underlying higher motor functions and the pathophysiology of movement disorders. To explore such intricate brain functions, we apply a wide range of neurophysiological and neuroanatomical techniques including optogenetics and chemogenetics to subhuman primates and rodents.

NAMBU, Atsushi TEL : +81-564-55-7771 / E-mail : nambu@nips.ac.jp

## **Division of Neural Dynamics**

### **【Prof. KITAJO, Keiichi】 Functional roles of neural dynamics**

The neural activities of humans and other animals show a variety of nonlinear dynamics. We deal with EEG, ECoG, MEG, and fMRI data in humans. We promote computational studies by data analysis and mathematical modeling based on the nonlinear dynamical systems theory, information theory, complex network analysis, and statistical machine learning theory thereby trying to understand functional roles of neural dynamics in perception, cognition, motor, and social functions in relation to individual differences and pathological conditions. We also develop novel techniques for brain-machine interfaces based on neural dynamics.

KITAJO, Keiichi TEL : +81-564-55-7751 / E-mail : kkitajo@nips.ac.jp

## **Division of Cerebral Circuitry**

### **【Assoc. Prof. KUBOTA, Yoshiyuki】 Integrative analysis of cortical microcircuits and their input-output networks**

Neocortical neuronal microcircuits play important roles in higher brain functions. While internally very complex in their connectivity, these microcircuits are, in turn, integrated into more global cortical and subcortical networks. Our research goal is to clarify the functional architecture of cortical microcircuits and associated neural systems. We investigate the principles of connectivity between different cortical neuron subtypes, input and output selectivity, and rewiring of neuronal connections induced by learning, using a multidisciplinary approach including in vivo imaging, laser confocal microscopy, 3D reconstructions of serial electron micrographs, genetic tools, simulation and bioinformatic analyses.

KUBOTA, Yoshiyuki TEL : +81-564-59-5282 / E-mail : yoshiy@nips.ac.jp

## **SUPPORTIVE CENTER FOR BRAIN RESEARCH, Section of Brain Structure Information**

### **【Assoc. Prof. MURATA, Kazuyoshi】 Three-dimensional structural analysis of biological specimens using electron microscopy**

We investigate three-dimensional (3D) structures of biological specimens, which include cells, bacteria, viruses, chromosomes, organelles, membrane proteins, and macromolecular protein complexes, using single particle electron cryomicroscopy and electron cryotomography. We have the high-voltage electron microscope H-1250M (Hitachi) and the phase-plate cryo-electron microscope JEM2200FS (JEOL) to collect image data. In addition, we study methods of image analysis to computationally reconstruct 3D structures of biological specimens from projection images. We employ sample preparation techniques of ice-embedding, negative staining, high-pressure freezing, resin-embedding, and immunolabeling for our study. We also develop methods of automated data collection, correlative light and electron microscopy (CLEM), and environmental cells for biological specimens. URL: [www.nips.ac.jp/struct](http://www.nips.ac.jp/struct)

MURATA, Kazuyoshi TEL: +81-564-55-7872 / E-mail:kazum@nips.ac.jp

### **SUPPORTIVE CENTER FOR BRAIN RESEARCH, Section of Multiphoton Neuroimaging**

**【Prof. NABEKURA, Junichi】 【Assoc. Prof. MURAKOSHI, Hideji】 Imaging signal transduction in subcellular structures of living cells by 2-photon fluorescence microscopy.**

We are working on imaging signal transduction in subcellular structure such as dendritic spine of hippocampal neurons using 2-photon fluorescence microscopy and fluorescence resonance energy transfer (FRET) techniques. By combining these techniques with optical manipulation techniques such as caged-compound uncaging and optogenetic tools, we are trying to understand the mechanism of physiological system such as memory system of brain at the level of single synapse.

NABEKURA, Junichi Tel: +81-564-55-7851 / E-mail:nabekura@nips.ac.jp

MURAKOSHI, Hideji Tel: +81-564-55-7857 / E-mail: murakosh@nips.ac.jp

### **CENTER FOR GENETIC ANALYSIS OF BEHAVIOR, Section of Viral Vector Development**

**【Prof. NAMBU, Atsushi】 【Assoc. Prof. KOBAYASHI, Kenta】 Analysis of brain function using newly developed gene transfer system.**

To understand the mechanisms underlying higher brain functions, we need to analyze the roles of specific neuronal pathways forming the complex neural networks. We succeeded in developing a new gene transfer system to induce transgene expression in the specific neural pathway by using a novel type of lentiviral vector and an adeno-associated viral vector. We analyze the physiological functions of specific neural pathways forming cortico-basal ganglia circuits by using our newly developed gene transfer approach.

NAMBU, Atsushi TEL : +81-564-55-7771 / E-mail : nambu@nips.ac.jp

KOBAYASHI, Kenta TEL : +81-564-55-7827 / E-mail : kobaya@nips.ac.jp

### **CENTER FOR GENETIC ANALYSIS OF BEHAVIOR, Section of Mammalian Transgenesis**

**【Assoc. Prof. HIRABAYASHI, Masumi】 Development of transgenic technologies in laboratory animals**

Gene-modified animals are useful tool for analysis of gene function, and can serve as human disease model in life science and biomedical studies. We offer collaborative services to generate the transgenic rodents by pronuclear DNA microinjection and the knocked-out/knocked-in rodents by new genome-editing tools such as TALEN or CRISPR/Cas9 system. Our recent challenges include organ regeneration by blastocyst complementation with pluripotent stem cells and animal cloning by somatic cell nuclear transplantation in laboratory rats.

HIRABAYASHI, Masumi TEL : +81-564-59-5265 / E-mail:mhirarin@nips.ac.jp

Also, you can participate in visiting research divisions.  
For the details of research activities, please contact the following  
or visit our website. [<http://www.nips.ac.jp>]

National Institute for Physiological Sciences  
Division of Neural Dynamics, KITAJO, Keiichi  
TEL : +81-564-55-7751 / E-mail : kkitajo@nips.ac.jp

## School of Life Science

### Department of Genetics

[National Institute of Genetics (NIG), Research Organization of Information and Systems]

Address: 1111 Yata, Mishima-city, Shizuoka

Tel: +81-55-981-6720

Established: June, 1949

NIG was established in order to guide and to promote basic research related to genetics in 1949, and reorganized as the Inter-University Research Institute in 1984. Today about 40 research groups are dedicated to advanced research in many fields of life phenomena based on genetics and are also leaders in processing and analysis in the field of Bioinformatics. Housing extensive resources such as the well-established DNA database (DDBJ), NIG features a unique management system and environment such as adopting a system where associate professors are PI (Principal Investigator)s, appointing young team leaders in the "Center for Frontier Research" and offers a collegial atmosphere through lively debate and frank discussion. Internationally competitive experts are performing cutting-edge research in NIG. In 2004, NIG was reorganized as part of the Research Organization of Information and Systems together with three other national institutes, enabling us to benefit greatly from understanding life science as a system.

### Department of Basic Biology

[National Institute for Basic Biology (NIBB), National Institutes of Natural Sciences (NINS)]

Address: 38 Nishigonaka, Myodaiji, Okazaki, Aichi 444-8585, Japan

Tel: +81-564-55-7139

Established: May, 1977

NIBB promotes biological sciences by conducting first-rate research on its own as well as in cooperation with other universities and research organizations. Research at NIBB covers a wide variety of biological fields, such as cell biology, developmental biology, neurobiology, evolutionary biology, environmental biology, and theoretical biology, and is conducted to elucidate general and fundamental mechanisms underlying various biological phenomena.

### Department of Physiological Sciences

[National Institute for Physiological Sciences (NIPS), National Institutes of Natural Sciences (NINS)]

Address: 38 Nishigonaka, Myodaiji, Okazaki, Aichi 444-8585, Japan

Tel: +81-564-55-7139

Established: May, 1977

NIPS' goals are to uncover the mechanisms by which the human body functions. This is the basis of medical science and links to clarifying the pathophysiology of various diseases. Presently our focus is on brain science as the main part of "body and mind" research. Furthermore, as a national center of physiological research, the institute provides facilities and research staff for collaborative studies to scientists from universities and research institutes.