

Newton's law of motion established the basic concepts of physics. Mendeleev's periodic table allows us to classify the elements. Similarly, the discovery of the genome is one of the most important achievements in biological research. The genome has genetic instructions to construct all essential components in living organisms, and contains all the information used in development and functioning.

Associate Professor Kouji Nakamura at the University of Tsukuba is an expert researcher engaged in

genome studies, and he is fascinated by his work. He uses a tiny single-cell bacterium, *Bacillus subtilis*, to research special RNAs that are not translated into proteins. Those RNAs are called "non-coding RNAs (ncRNAs)". They are considered to have significant roles in cells such as transient gene expression. Dr. Nakamura has identified the structure of several ncRNAs in *B. subtilis*, and now he is about to analyze their function in cells. He also seeks to discover a new mechanism of gene expression regulated by ncRNA,

which has never been reported before.

Dr. Nakamura is also studying the expression of ncRNAs in another bacterium, *Clostridium perfringens*. This bacterium produces poisonous substances under certain conditions, which can cause sickness in humans. A specific ncRNA is involved in this system, so inhibiting the function of the ncRNA may be a key for designing new drugs to control the toxicity of *C. perfringens*.

Dr. Nakamura's message to all Olympiad participants is that



learning and studying biology will help you widen your perspectives, and enlighten your views of life and the world. Broadening your interests will help you to deal with any circumstances. Remember "Be almighty!"

Trembling with Nerves and Excitement

With a mixture of expectation and anxiety, the practical exams were finally held on the third day of IBO2009. The participants, in groups of different-colored lab jackets (white, blue, green and yellow) moved to the University of Tsukuba, guided by volunteer team guides.

On the way to the exam venue, contrasting expressions could be seen on the faces of the students. Some seemed to be terribly nervous, and some to be enjoying the moment of peace before the big battle by chatting with team members and new friends from other countries. As participants must take each exam individually, they looked a little uneasy when they were separated from their teammates.

The practical exams were divided into four sections; biochemistry, cell physiology, genetics, and animal and plant anatomy. Each exam took 90 minutes—six hours in total. The exams required knowledge which is taught from high school to university. However, there were sufficient

explanations for questions requiring advanced knowledge or skills, which were thought to be above high school level. In clean, newly-renovated, laboratories with new instruments and supporting volunteer staff, everything had been prepared for competitors to exhibit their full abilities.

The four groups, with different-colored lab jackets, took the same exam at different times, so a tremendous amount of work was carried out behind the scenes to avoid the four groups encountering each other. Detailed meetings were held beforehand to coordinate routes within the limited number of corridors, and intense communication between staff members made everything run according to plan. Swiftly moving around large panels with "keep out" signs played a big roll in this. During the ten minutes between exams, strict checks of the rooms for signs of cheating had to be carried out, as well as simultaneously setting up the apparatus for the next group.



Students were called into their exam rooms one by one, and volunteer team guides could be seen patting their backs and encouraging them. All of this was to make sure the exam was carried out fairly and smoothly.

Students entered the laboratories and took their seats, which they had seen during the laboratory tour the day before. The atmosphere in the

exam rooms was tense, with hints of excitement here and there. Before the test began, participants earnestly checked the apparatus and handouts laid out on the benches to which their flags were attached. The spirit in their eyes seemed to suggest the brilliant results we can expect during this long, long fight.

This is Japan

Bonsai, a Living Art

Bonsai is an art by which a larger natural landscape is expressed and suggested within a small flowerpot. The bonsai enthusiast plants a miniature tree in a pot, trims its branches, and ties it with wires to slowly and purposefully bend it into a shape imitating a larger tree in the wild. For added effect, a stone may be set with the tree as a rock feature. Art works, such as paintings, generally remain permanent creations, but bonsai are works that change throughout the four seasons and constantly delight the viewer in new ways. As living art, bonsai are never completed works. They may grow for over 100 years, nurtured by many generations of artist and caretaker.

You may be wondering why bonsai art developed in the first place. In the Edo era (1603–1868), ordinary city-dwellers only had small gardens, if any land at all. They could not plan large garden arrangements similar to English gardens, so instead they created bonsai miniatures. This way, they could still enjoy the magnificence of natural scenery, even in confined garden spaces.

LOCAL LIFE



Tsukuba

Tsukuba's Fukuro

Fukuro is the Japanese name for the Ural Owl of the species *Strix uralensis*. In Japan, the owl is known as "the forest's philosopher" and recognized as a symbol of intelligence. This makes it an appropriate symbolic bird for Tsukuba city.

In Japanese, "fu" means "not" and "kuro" means "suffering". So together, the name means "free from suffering"—a very auspicious name! *Fukuro* owls belong at the top of the forest food chain and need to hunt large volumes of prey. As such, they make good indicators of forest biodiversity. Let's be smart like the *fukuro* and conserve their forests and environment.

Satori is the name of a mutant fruit fly and also the name of its mutant gene. The mutation was named *Satori* (meaning "enlightenment" in Japanese) because of the unusual behavioral characteristic it causes. What is that behavior?

Today's Quiz



- A. Fasting
The fly believes food is not necessary.
- B. No interest in females.
The male fly will not copulate with females.
- C. Gathering in lines
The fly feels it is safe in a group.

Answer to yesterday's quiz: C

The carvings are an analogy for a peaceful time in human history. The cat is fast asleep and harmless, so the cheerful sparrows can fly around freely.

Jury Early Birds Head to Nikko

The jury members were at an all-night meeting on Monday night, and then had to join an excursion leaving for Nikko very early the next morning. So, on the coach, only the lady tour guide had the energy to speak. Some of the jury probably didn't even have the energy to listen to her explanations.

First the coach party arrived at Lake Chuzenji (中禅寺湖). The early birds now seemed more awake and were strolling around freely. They were having a lot of fun taking photos of the lake and Mt. Nantai (男体山) behind. Obviously it is not only Japanese people who love to take lots of photos!

Next, the participants went to Kegon no taki (華嚴の滝) one of the

biggest and most beautiful waterfalls in Japan. But the jury from Belgium wasn't satisfied "It's a pity the waterfall isn't beer!" he joked.

Next was the famous World Heritage site known as Toshogu Shrine (東照宮). Because it is a popular destination for school trips, many elementary school students were visiting at the same time. They treated one member of the jury as if he were a superstar. About ten of them excitedly took pictures with him, and happily shook his hand. Perhaps foreigners are still a very rare sight for them.

On the coach back to Tsukuba, some passengers were clearly exhausted. Some were asleep with their mouths wide open, which



amused the others. So a few embarrassing photos were secretly taken!

Hopefully the jury was refreshed by the break after the all night meeting.

Mostly Sunny

The rainy season ended yesterday!



Weather & Clothes

Today's Schedule

Students Schedule

- 6:30 - 8:00 Breakfast
- 8:30 - 17:30 Excursion
(Tsukuba Science Tour)
- Lunch at museum
- 18:00 - 19:00 Dinner

Jury & Observers Schedule

- 7:30 - 8:00 Breakfast
- 8:30 → Jury Session
Lunch
- 18:30 - 20:00 Dinner

High 32°C
Low 23°C
Humidity 60%
Chance 30% of rain

One Down, One to Go

The exams, of course, are the main reason why everyone is at IBO2009, and the first one was held yesterday. Despite exam anxiety, the intense ten-hour session seems to have brought existing friendships closer, especially between members from different countries. Separating teammates into four groups was actually a splendid opportunity for all the nations to mix together.

The exam itself may be a lonely battle, but lunch was a time to gather and make new friends. Although all contestants were from different countries they were all in the same boat, and that common challenge united them. Some seemed

very tense, even down to their stomachs. However, just being back in a classroom – a place familiar to all school students – let them unwind a little.

Afterwards, voices of relief were heard everywhere around the cafeteria. There was twice as much conversation as the day before and so much more to talk about.

Team Thailand: During the exam I was nervous and sweating, but maybe it was because the lab jacket was long-sleeved. It's comfortable to wear, but I've taken it off because I want to relax while eating.

Team Indonesia: I loved the exam! I enjoyed it because this is a special chance in my life. I'll take a good break during tomorrow's excursion. My teammate says he's lucky to get the white lab jacket, but I think my green one is the best. It's a pity not to have sushi or sashimi for dinner, but anyway, *itadakimasu!*

Origami Night: a Big Success

After the practical exams, a special event awaited participants at Ninomiya House – the Origami Night.

It was an independent event suggested by a student at the University of Tsukuba, Misaki Makino. She had enjoyed exchanging pin-badges at a previous event and was inspired to plan a similar event using origami – a symbol of Japanese culture and easy to learn.

Origami Night started with a quiz contest about origami folding methods, and moved on to an 'origami class'. The atmosphere was enthusiastic throughout. Participants' eyes were set on origami folding instructions and completed examples. For most participants,

such as Mr. Edidiong Victor Udoyen from Team Nigeria, it was the first time to try. He enjoyed learning origami, and wished to take some back to show his family. Some were experienced at origami like Team Pakistan's Ms. Tayyaba Maqbool Malik. She learned origami on the Internet, and had been looking forward to Origami Night.

The participants were so fascinated that many remained until the room was locked up. They certainly enjoyed origami, along with the Japanese *tenugui* cloths, which were given away as prizes, and most of all, getting to know people from other countries. A chance like this is another prize of IBO2009.



Background Picture: Tokugawa Jugodai-ki by Oiso Honen

This is a print made in the Edo era by Oiso Honen, and shows a scene from a match of *sumo* wrestling. *Sumo* is the Japanese national sport. It was originally a religious event and held at shrines, but in the Edo era it became a kind of show business, which is similar to what we can see today.



A moment of peace

Having lunch with contestants from different countries. Most of them seemed to enjoy their sushi lunch.

Sight of origami night

Even though participants did a hard exam, all of them joined in.

Sanzaru

They imitated "Sanzaru", which were carved on the building behind them.



Nejirihachimaki

Nejirihachimaki is Japanese festival style.



lab jacket with message

Korean participant's lab coat carried messages from friends. This must be a good memory of IBO.

Team Turkmenistan

Relaxing over dinner after the exam.



Marching into battle!!

Team Kyrgyzstan reunited

Relieved to be finished.



Team Ireland



At the foot of Mt. Nantai

It was very clear on July 14, 2009. So the view from Lake Chuzenji was very nice. Mt. Nantai received us.



Features of the Science Tour

While in Tsukuba, all the IBO2009 participants will be taking a "science tour". Here are some of the centers they will visit. We wish you a great time.

1. JAXA (Japan Aerospace Exploration Agency)

As you pass through the main gate, you can see an actual H-II Launch Vehicle and feel the energy of this 50-meter long space-bound rocket. One exhibit, a full-scale model of the Japanese Experiment Module (known as KIBO), is part of the International Space Station project and was developed at JAXA.

2. Ibaraki Nature Museum
First, the mammoth, *Mammuthus sungari*, welcomes you to the museum.

Then, from visitor you become an explorer, following your curiosity from the evolution of the universe to the wonder of life. There are many interesting exhibits at the museum, but especially recommended is the "Room of the Cell", where you can feel what it is like to be inside a cell.

3. AIST (National Institute of Advanced Industrial Science and Technology)

• Science Square Tsukuba: This museum is based on the concept "Come and feel the future". There are many wonderful displays such as the extraordinary "Humanoid Robot" - shaped like a human being – which can walk upright all by itself!
• Geological Museum: This Museum is one of the world's most unique facilities on the

subject of geology. There are moving models to show the history of the earth and other technologies.

The "Science Tour" has many surprises and excitements in store for you. Be sure to come back with your head full of new scientific discoveries and inspirations!



What is SCIBO?

Have you noticed that there are many the people wearing pink or orange T-shirts? They are the volunteers who are working devotedly to make IBO2009 much more enjoyable.

They belong to a group called SCIBO. SCIBO is formed entirely of students of the Department of Biology at the University of Tsukuba, and about 100 students are involved. SCIBO has been working since last year when the first Seibutsu Challenge (the selection for Team Japan) was held at the university. It was a member of SCIBO, Ms. Michika Fukushi, who created this elegant name.

She was thinking of a name for the student volunteer group, when she suddenly came up with an idea to combine "Science" and "IBO". The sound of SCIBO is similar to "saibou", meaning "cell" in Japanese, and since it also stands for Students' Community of IBO, SCIBO became the official name for the group.

SCIBO is composed of Team-G, the guides in pink T-shirts, Team-J, the journalists in orange T-shirts and Team-R, the radio broadcasting staff. Please don't forget that they are also participants of IBO2009.