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## Study Nature

Kohji Hotta

The first step for learning biology is to familiarize yourself with nature. Step out into the world of nature and observe or touch living things. Then you will feel an interest in and questions about them welling up. Once you have curiosity in natural phenomena, you will become inclined to investigate into the mechanism of such phenomena; this is the beginning of your enthusiasm for biology. Indeed, the study of biology begins with learning from nature. By putting yourself in the world of nature and interacting with living things, you will notice “the inherent beauty in living things.”

Exquisite patterns of tropical fish... Emperor angelfish striped patterns are known to complicatedly change as it grows. The biologist Shigeru Kondo explains that such patterns are produced by “reaction diffusion waves” as predicted

by Alan Turing, a British mathematician. The difference in striped patterns between full-grown fish and young fish is for the sake of “existence.” It is said to be because by acquiring its distinctive pattern the young fish can survive itself even when it has entered another fish’s territory.

In the United States, “periodic cicadas” are known – those cicadas that emerge on periodic cycles of 13 years and 17 years, the figures 13 and 17 being considered to be prime numbers. Why are these figures prime numbers? A theory goes like this: one there were more cicada varieties with various periodic cycles, but as the result of natural selection, only the cicadas with these periodic cycles have survived.

Turning to plants, flower heads of the broccoli variety “Romanesco” are arranged in a fractal pattern. Also, if you observe various plants for the leafing order (phyllotaxis) paying attention to the second leaf onward, the leaves come out in accordance with the Fibonacci sequence. Of course, the

leaves themselves never intend to become Fibonacci numbers. Fibonacci numbers happen to be the result of what the plant is doing in the process of photosynthesis so that its leaves can efficiently receive sunlight.

The development of living things requires extremely complicated processes, so the resultant forms are widely diverse. However, whatever the species, organisms take very similar forms in a certain developmental stage (organogenesis period). The reason is not yet known.

When you feel like solving mysteries of the “beauty of living things,” it is advisable to approach life phenomena with a simple logic – they have struggled for existence over a period of countless years – or approach the question from the “evolution” or “natural selection” perspective. Then you will be able to find clues to the structure and physiological phenomena of the organism in question. And in the course of time, you will notice “striving to live” leads to “beauty.”

## Science and Technology Information

### 14th Annual Keio Science and Technology Exhibition

Date: December 13 (Fri.), 2013 10:00 ~ 18:00

Tokyo International Forum (Exhibition Hall 2, Basement 2)

Contents: Demonstration-oriented exhibit booths along with Technology Partnership Seminars and Round-table Sessions by researchers

Featured event:

A panel discussion in commemoration of the 75th anniversary of the Faculty of Science and Technology

Theme: “Emerging challenges in global tech leaders education”

Main panelists:

Mr. Koichiro Tsujino (Founder & CEO, ALEX Corp.)

Mr. Michimasa Naka (CEO, StormHarbour Japan Ltd.)

Mr. Ken Endo (Associate Researcher, Sony Computer Science Laboratories, Inc.)

Admission free. \*No prior registration required.



### Keio-Kanagawa Manufacturing Technology Center opened

Keio-Kanagawa Manufacturing Technology Center, located on the 1st floor of the Technology Center Bldg in Yagami Campus, opened on September 25. The center was launched as part of the Ministry of Economy, Trade, and Industry’s project to promote local industries in Kanagawa area. The center is equipped with cutting-edge instruments specialized in film deposition, surface processing, and nanoprocessing technologies to evaluate prospective trial products for commercial application. All facilities in the center are widely open to public researchers and engineers as well as on-campus users.



### Editor’s postscript

We worry ourselves about what composition we should use for the cover photo of each issue. For the photo for this issue, we adopted a composition of a lying subject, the first attempt ever. Saying that he did not mind lying to pose for photo at all, Dr. Hotta appeared wearing a shirt with a checkered green pattern. We asked him to take various poses to highlight the multicolored 3D model of a sea squirt he held in his hand. This process led to our discovery of unexpectedly new compositions.

Deeply suntanned as a result of collecting organisms outdoors and cycling, Dr. Hotta is a frank person typically wearing a T-shirt and short pants. But he devotes himself not only to research and education but also to hobbies.

(Yuko Nakano)

## 新版 窮理図解

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