

2014 OCHANOMIZU SUMMER PROGRAMME IN ENGLISH

Theme II: Forms in Natural World

テーマⅡ： 科学の中の形

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	Rumi KONDO	(Associate Professor, <i>ditto</i>)
	Masayuki HATTA	(Associate Professor, <i>ditto</i>)
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	Masahiro MORIKAWA	(Professor, <i>ditto</i>)
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[Outline]

Nature is filled with structurally diverse substances and living creatures. The physical nature of form (structure or assembly) is figured out by the sciences, especially mathematics, physics, chemistry, biology and information science. The lectures examine and explain the science on forms, and are given in English by teaching staff in the Faculty of Science. Each lecturer will present, in simple terms, the latest areas of interest in their own field of expertise. This will ensure an overall comprehensive approach.

[Lecture Summaries]

Masayuki HATTA

(Monday 4 August, 9:00-12:10)

Axes and Symmetries in Animal Body Plans

[Evolutionary Developmental Biology]

(動物のボディプランにおける軸と対称性)

Diverse animals are derived from a single ancestor in evolution. This fact suggests that various animal forms are all derivative and that a common ancestral body plan should be hidden in their morphological diversity. What is the principle of animal form, the body plan? Animals are moving organisms in the planet Earth. This condition has given the axis and symmetry to animal forms. We try to extract the simple principle of animal body plan from diverse animal morphogenesis by focusing on the axis and symmetry.

Takayuki ITO

(Tuesday 5 August, 9:00-12:10)

Shapes Rendered by Computers

[Computer graphics]

(コンピュータが描く形)

Computer graphics is a technology that calculates and displays shapes of objects and scenes. The former part of this lecture briefly introduces fundamental techniques of computer graphics which has been applied to computer games and animation, and industrial designs. The latter part of this lecture introduces "information visualization" which represents daily information by extended techniques of computer graphics.

Yoshihito MORI

(Tuesday 5 August, 13:20-16:30)

Time Evolution

[Nonequilibrium chemistry]

(時間変化の形)

Many types of time evolutions appear around us. For example, spread of an ink droplet, development of micro-organism population, progress of a chemical reaction and so on. Let us talk about those depicted by graphical representation.

Rumi KONDO

(Wednesday 6 August, 9:00-12:10)

How does our shape change?

[Molecular evolution]

(生物の形とゲノム)

Organisms on earth possess various morphological traits. Our own face has its individual characteristics. What is behind this remarkable diversity of organism morphology? We will look into genomic variation and evolution and discuss how it may link to changes in morphological traits.

Masahiro MORIKAWA

(Thursday 7 August, 9:00-12:10)

Structures in Our Universe:

Where do they come from? What are they? Where are they going?

[Astrophysics]

(宇宙の形)

Our Universe is full of structures; shining stars, spiraling galaxies, monster black holes, lives in cycles, and even the elementary particles change their form in the long history of the Universe. After the explanation on the basics of the cosmology, in this lecture, we would like to have informal discussions on those structures; how do they form, what is the basic principle behind the structure, and how will they evolve.

Toshihiro KONDO

(Friday 8 August, 9:00-12:10)

Nanoworld: Shape of Atom

[Nano electrochemistry]

(ナノの世界：原子の形)

"Nano" world means very very small one, namely world of atoms and/or molecules. How do you think that atoms and molecules have shape? In this lecture, "nanoworld" is briefly explained as a first, simple experiments about atoms and molecules are carried out by several groups, and then, those results and shapes of atoms and/or molecules are discussed.

Tetsuyuki KOBAYASHI & Kei YURA

(Saturday 9 August, 9:00-12:10)

General Discussion

(統括ディスカッション)

FIELD STUDY

instructed by Toshihiro KONDO & Tetsuyuki KONDO

(Friday 8 August, 13:00-17:30)

Tour of High Energy Accelerator Research Organization (KEK) in Tsukuba City