Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

HCG035-01 Room:104 Time:May 22 10:45-11:00

Systems of life in closed-ecology

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Living creatures on the earth have been evolved since its origin a long time ago. They equip several important functions affecting each other. Knowledge on those functions and interaction of the ecology is essential for secure design of a closed-ecosystem with limited number of living species under the harsh environments, such as space and deep sea or desert. Organic substances can produce the ground on the surface of our earth. The mechanisms of soil production are very important matter in all the cases of bio-ecosystems. After the production of many species of creatures, the interactive functions among their organisms have important mechanisms during the evolution. It thinks that the establishment of the ecosystem to have been equipped with the higher feature in providing the place of the advanced specialized field research information about each biological system and its functions detailed feature when the human being tried artificial ecosystem becomes possible. In this time, as the first step, I will discuss about several research field, soils, microorganisms, plants, mammal, human and several creatures interactions.

Keywords: biological systemes, closed-ecology, biological function

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HCG035-02 Room:104 Time:May 22 11:00-11:15

Initial soil formation derived from volcaniclastic materials

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We report on the initial soil formation derived from volcanic ash and scoria in volcanic Islands, such as Miyake Island and Izu-Oshima, connecting with an artificial closed ecosystem.

Keywords: pedogenesis, initial soil formation, volcaniclastic materials

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HCG035-03 Room:104 Time:May 22 11:15-11:35

Use of cyanobacteria in terraforming of Mars

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Cyanobacteria, the photosynthetic, oxygen-evolving proarchconservate, grow in diverse habitats ranging from tropical to polar regions and from sea to desert.They are considered to be useful in terraforming of Mars, keeping clean atmosphere in a space station, and serving as a food for astronauts. Since cyanobacteria are desiccation tolerant, they are easily transported under severe flight conditions. They can revive soon after rewetting. Molecular bases of these properties will be discussed.

Keywords: cyanobacteria, Mars, terraforming

Japan Geoscience Union Meeting 2011
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HCG035-04 Room:104 Time:May 22 11:35-11:55

Assessment of allelopathic activity in closed ecosystems

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We have developed a new bioassay for allelopathy in closed ecosystems. We named this new method as Life cycle assesent (LCA). This method is also valuable to evaluate the allelopathic activity in the closed ecosystems in space and also contribute for the future agricultural interaction in grass house or agriculture on earth. LCA Method was established using agar medium, and Arabidopsis or Rapid Plants (Brassica sp.). DNA microarray analysis using plant material with LCA method could analyze the gene expression to specific allelochemicals. Fagopyrum esculenthum is one of the several crop species possessing strong allelopathic properties. In our previous study we had identified eight allelochemicals in buckwheat and analyzed by microarray analysis two important compounds such as rutin and gallic acid. The gene expressions of 20 days old A. thaliana plants were analyzed using Affymetrix GeneChips ATH1. The results showed 168 and 55 genes with higher expression after 6 hours of exposure to gallic acid and rutin, respectively. However, only 14 genes were found common for both compounds. The study revealed some genes which are important in regulating plant responses to stress. Induced genes fell into different functional categories mainly, metabolism; cell rescue, defense and virulence; cellular communication/signal transduction mechanism and transcription. This study may lead to a better understanding of the allelochemicals mode of action which in the future could be used in biological control of weeds..

Keywords: allelopathy, allelochemical, closed eco-system, life cycle assessment

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HCG035-05 Room:104 Time:May 22 11:55-12:10

Insect tolerance to severe environments

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Insecta is the most diverse group of animals on the planet, which represents more than 75% of all known living organisms, and includes 850,000 to 1,000,000 described species. Likewise, you can find numerous insects in most terrestrial environments. Insects can be found in grasslands, forests, freshwater streams, lakes, the Arctic and deserts.

In this presentation, I'd like to introduce the examples of insect tolerance to severe environments such as harsh temperature (heat, cold), dryness (desiccation), less oxygen and so on.

Keywords: insects, severe environments, tolerance

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HCG035-06 Room:104 Time:May 22 12:10-12:25

Neuronal response in evolution of biological organism on Earth

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Neuronal response has been conserved from lower to higher animals in the long years evolution process of biological organism on Earth. Adaptation to gravity change can be observed in wide range of animals as a kind of stress response. Well-organized animal model would provide good estimation of stress response in humans.

Keywords: neuron, gravity, stress response

Japan Geoscience Union Meeting 2011
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HCG035-07 Room:104 Time:May 22 12:25-12:45

Human dualism: human biology as a solution for unite ”I as a thinking being” and ”body as closed-ecology”

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Closed-ecology system is useful to understand rules of not only own system of individual biological organism but also a possibility and problems of the mutual interaction. Through consideration of closed-ecology system, common rules of biological organism from a unit to multi-system or different species will be elucidated. We human beings belong to animals, a heterotroph, which is an organism that cannot fix carbon and uses organic carbon for growth. In order to get foods to survive, animals have special system, brain-neuro-muscular system to move in the living environment. Human beings have discovered special method to move on land in the evolution with bipedal waling and running keeping standing posture. However, we have been lived longer with small activities due to utilization of man-made transportation system, and almost forgotten how to walk and run, resulting in happening of fall, osteoarthritis, dementia, especially in aged perple. Recent progress of brain and life sciences has shown our biological system is intrinsically organized to survive as in ”activity-dependent rule”, which governs at various levels of gene expressions, translation, living cell organization, and tissue-communication in our body of multi-cellular biological system. In this presentation, I would like to understand human system from biology ? human biology, considering into both closed-ecology system and self-control. Usually normal and healthy human being as one of animals is excluded in scientific research field, especially aspect of life science of individual human being. Activities are basically essential for our existence individually and also socially and cannot be forced by others. Therefore, dual autonomous ideas of autonomous system obtained in evolution and human spontaneity/emergence including free will are essential for our human living. We should think about how does hierarchical soft structure create spontaneous activity by working with smart dynamics from single macromolecule to human body. Human body is a typical closed-ecology system, only works in a small range of environmental conditions, such as temperature, pH, blood glucose level, mechanical strength like stretch, compression, etc. In addition, human body is controlled by human brain, which not only control our body system but also had created completely different world of nature, virtual world. We should start to study a principle of our life system, the spontaneity/emergence of human body including human brain/mind system. As Professor Fumio Oosawa was inspired by the tracking motions produced by Protista several decades ago, spontaneity is a characteristic aspect of life. A protisis can behave with spontaneity resulting in selecting and deciding the comfortable environment for the survival after rushing back and forth. Such characteristics of Protista suggests that a cell exhibits spontaneity as well as individual organisms. Since human beings belong to a multicellular organism, we have at least two levels of spontaneity, both at cells and an individual. In this presentation, we would like to focus on ”a real living body” itself and its biological material system, which generates soft and loose structures and changeable shapes, and produces a directional activity, and to extend to both limits of a body, from micro to macro systems. We will start the discussion from the cytoskeleton, which is considered intrinsically to produce cell’s spontaneity in our body against the environment, water, and connect to the brain, which has been evolved to control actions in spontaneity in the society where the brain communicates. We have the intention to create a new concept of philosophy of spontaneity and initiative from the basis of principle of biological material science.