

Biological systems in closed-ecosystem-creature and its environment

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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, I will discuss about several research field, microorganisms, plants, mammal, human food, and several creatures interactions and technology.

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Space Experiment of Space Inflatable Terrarium

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We propose space inflatable structures which internal pressure is kept 1atm at space environment. Space experiment on the ISS is scheduled in FY2012.

Keywords: Inflatable Structure, Terarium, Space Experiment

Evaluation of foods in Nostoc sp. HK-01

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We have been studying future space agriculture in Mars. A cyanobacteria, Nostoc sp. HK-01, has several outer space environmental tolerance. Space environment is very a severe closed ecosystem for us. It has a possibility that this species of cyanobacteria is able to use as some foods under the emergency or severe environment. We will study the proposal of utilization of cyanobacteria, Nostoc sp HK-01, for the variation of meal under the serious environment.

Keywords: Cyanobacteria,, Nostoc sp. HK-01, food

Importance of the microbe management in Space foods

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[Background]

The long-term space stay era is coming. A space station and future moon base, the life-support system in Mars station become very important. It is important that we fix the living environment. The accumulation of data will be carried out by more and more researchers from now on. We build the mini-earth in the space, and the human needs fundamental researches to become able to live on other planets. Furthermore, I will advance to the applied study to perform a real experiment in space. The meal is very important so that an astronaut accomplishes a duty lively well. It is clear from the impression of the astronaut the meal "is pleasure in space duty", and "to be time for rest". However, like this important meal may be going to take the life of the astronaut in space. In other words it is the food poisoning outbreak due to the microbe. It is required in the long-term space stay era to think about food safety, relief.

[Purpose]

Therefore this study think about the microbe crisis control in the cooking process. For example, in a spaceship, on the moon base, a plant factory in Mars station, we thought about the microbe crisis control performed in the future.

[Method]

We examine the past food poisoning example that happened on the earth and clarify what kind of situation food poisoning was caused in. We will do check about crisis control effect. We think about the measurement of crisis control important point of the plant factory and/or cooking process in the space.

[Result and Discussion]

As for the food poisoning caused on the earth, for example in Tokyo, there was the really most outbreak number in July, in the past 10 years. The number of the food poisoning patients had most in May, the cases were 12.6 cases and 332 people on the average. Noro-virus was most high number (995) of the species of food-poisoning bacteria in the H21, in Tokyo. We need to check about compound food which was many food processing. Many people's hand and finger touch the food. The pollution of the bacteria from a human finger is becoming the problem because of the food poisoning. Because of the sterilization about the indigenous bacteria in the fingers of the astronaut is need of space food manuals.

[Example]

Staphylococcus aureus

Man's respiratory pages, skin and superficial wounds are common sources of *S. aureus*. *S. aureus* is allowed to grow in foods, it can produce a toxin which is heat stable and may not be destroyed. Good personal hygiene while handing foods will help keep *S. aureus* out of foods.

<Control measures of Staphylococcus aureus>

- 1) Keep hot food hot and cold food cold (below 5 centigrade and above 60 centigrade)
- 2) reheat food to steaming hot before serving (at least 75 centigrade)
- 3) cook food heat to at least 75centigrade
- 4) wash and dry the hands properly
- 5) avoid handling food without gloves

Clostridium botulinum

It has caused death in approximately 30 percent of the case; and it occurs mostly in home-canned foods. Cl. Botulinum can exist as a heat-resistant spore, and can grow and produce a neurotoxin in under processed, home-canned foods. The botulinum toxin is destroyed by boiling the food for 10 minutes.

<Control measures of Clostridium botulinum>

- 1) keep hot food hot and cold food cold (below 5 centigrade and above 60 centigrade)
- 2) bottle only high acid fruits at home
- 3) add citric acid
- 4) When making vegetable in oil or flavoured oils to use only acidified or dried vegetables

Keywords: Space foods, microbe, food poisoning, HACCP, Crisis control manual

Development in Large Scale Image Program about Carbon Circulation

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A family animation program featuring our relationship with life and our planet.

Strange things start to happen around our main character Naoko, as aliens come to Earth in pursuit of the C-atom created in outer space. Naoko is shown some peculiar images a number of times, and she begins to realize the intrinsic link between her and other living beings. Through immersive dome imagery and music, "Encounter with Earth" offers the experience of looking at ourselves and our planet from a different perspective.

Experiencing this program, you may notice that humans are a part of the "cycling" system that links life forms and the Earth. And yet the program not only presents science to understand the Earth system but also gives you an opportunity to encounter new perspectives on yourself by looking the Earth from the space.

One of the most noteworthy features of this program is that it provides a special experience of watching the Earth from an atomic-microscopic perspective to a macroscopic perspective (as seen by the naked eye), and a global perspective of the Earth overall from outer space. These three perspectives provide the opportunity to cultivate a scientific perspective to understand the relationship between humans and the Earth. Moreover, the dome theater environment and the animation imagery popular to family audiences provides unique discoveries and surprises for children as well as adults.

Keywords: Carbon Circulation, Space, Earth, Science Communication, Animation, Large Scale Image Program