

Concept and Studies of Aquaculture in Space -In the Past and Future-

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Aquaculture as a food production subsystem of closed ecological human habitat in space was advocated to provide animal protein especially, various examinations related with it have been proceeded by our studies for 20 years. In actual, the scientific knowledge of response in aquatic animals under gravity changing in space environment and fish production with material circulation has been accumulated. These results show the possibility of aquaculture in space, that will be the necessary basic data to realize a human life under space environment in the future. The concept and the studies of aquaculture in space have been focused on the production technology so far. Regarding improvement of the productivity, the introduction of automatic fish rearing and plankton culture system that has been developed at the ground level will be required. Apart from that, the consideration of material flow in the whole space habitat, and post-harvest technology will be needed. The comprehensive deliberations including other subsystem about the material and energy flows will be required, the study will be needed to conduct the various simulations with mathematical models made from the accumulated basic data of modules and subsystems constituting human space habitat. The preservation of products will be also required as the buffer of material circulation, therefore the applications of freezer storage, canned food and retort food production are necessary. Diversity of food consumption and artificial ecosystem considering the demands and limitations should be eventually investigated for good human life of space habitation. Various requirements and limitations occur to the construction of material flows in the artificial ecosystem, chose of produced species, and selection of the cooking methods. The preparation of their options is essential in consideration of the requirements and limitations for the whole facility of human space habitat.

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