

NEW BIOLOGICAL HABITATS IN THE BIOSPHERE AND IN SPACE

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Recent developments in genetics, molecular biology and biochemistry have made possible the deciphering of DNA and permitted the first astonishing insights into the secrets of life. The principles of biological transformations of energy into form will be the main topic of this century. My works examine new, soft technologies and biological materials to enable the development of a new kind of biological habitat in the biosphere and in space.

Spatium Gelatum

Spatium Gelatum (Congealed Space) (Fig. 3) examines dynamic systems that transfer information and energy through a liquid medium. This project represents a crossover of architecture, art and biological sciences.

The project uses and combines experiments performed in outer space, studies of the phenomenon of weightlessness in earth-like conditions (neutral buoyancy) and research on the genetic basics of life's origins.

At present, *Spatium Gelatum* involves research into new methods of creating polymorphous, multiple forms and dynamic spaces, with its main focus on physical phenomena in liquids, particularly the surface tension of liquids and the transition from liquid to solid states.

The technology behind *Spatium Gelatum* is based on the following principles:

1. Isopycnic Systems (*iso* = equal, *pykne* = density): the creation of amorphous spatial forms under water, using the phenomenon of relative weightlessness (neutral buoyancy).
2. *Götter Speise* (Dish of Gods): the use of biological polymers (gelatin, agar) as construction material.
3. *Lane Kluski* (Polish poached dumpling) technology: generation of hollow forms under water in liquid or gel bubbles.
4. Bending Energy: the processes of self-organization and internal tensions in the polymer surfaces during the drying process as a source of amorphous shape formations.

Breeding Spaces

Breeding Spaces investigates the possibilities of designing biological spatial structures. In this project, I use polymers not as target products but as breeding grounds and constructs for the growth of three-dimensional plant cells and tissue cultures. The intent of the project is experimentation beyond the biological codes of co-relation, differentiation and determination. I examine the phenomena of undifferentiated, unordered cellular growth to create possibilities for biological spatial arrangements in vitro. Using *Lane Kluski* technology, I envision the creation of liquid gel-like hollow spheres using agar, to which different nutrients (minerals and hormones) are added to stimulate cell growth. Cells and isolated parts of plants (explants) will be grown in a laboratory outside the organism, inside the hollow biopolymer spheres. These cultures will overgrow the host 3D spheres to create tissue, in the process consuming the host as their source of nutrients, and eventually turn into living spaces themselves.

Space Garden

This project (Color Plate G No. 2) envisions the use of low energy and soft

technology for research in space. It is a study of possibilities in the use of magnetic fields to launch microorganisms into the universe.

The essence of the project is to employ particular properties of space (weightlessness and cosmic rays) to create forms, objects and tools that would be made directly in space. Liquids, gels and biological polymers would be the materials used in this process.

Transgenic Habitat

Transgenic Habitat is an experiment into the possibilities of designing living spatial structures using DNA code. It is to be an open, autonomous system, in a steady state and self-generating. This project, after theoretical studies, has progressed to initial laboratory experiments.

This living structure should be a spatial, autotrophic plant unit (a self-alimentary vegetable form) that takes in, synthesizes and transforms matter and energy from the environment and controls all functions and processes on the basis of internal genetic information. This creature is conceivable in various sizes: e.g. that of a cell, a globule, a house, a universe.

Fig. 3. Zbigniew Oksiuta, *Spatium Gelatum*, Form 0291102, 2.4 m in diameter, thickness of sphere 0.3–1.0 cm. (© Zbigniew Oksiuta, VG Bild Kunst, Bonn) Material: gelatin with viscosity of 350 degrees Bloom. Color: neutral. Taste: neutral. Smell: neutral. Physical properties: viscosity 31.8 mP, transparency 93.4%, conductivity 248 μ S. Chemical properties: pH 5.65, ash content \leq 0.5%, water content before drying up 70%, metals \leq 40 ppm. Bacteriological properties: aerobic germs \leq 1000/g. Technical cooperation by Wolf-Peter Walter, Foodstuff and Biotechnology, Meddersheim. Made by Monzingen Gelatine, Germany 2002.

