

Architectural Geonics Subject and Tasks

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Abstract

At present, the development of our civilization has entered a unique stage where environmental, geopolitical and social problems are significantly aggravated. Today all the countries of the world are characterized by aggressive and concentrated compaction of cities. Living in metropolitan areas (man-made anomalies) is a source of moral and physical discomfort and factor of the individual's degradation. Statistics shows a direct relationship between the number of storeys of the living area and diseases, stresses, etc. One of the ways out of this situation is to use the provisions of a new scientific field of architectural geonics. In contrast to the architectural bionics that uses objects to emulate the organic world, architectural geonics follows objects that have arisen as a result of the impact of geological and cosmochemical processes on the inorganic world. Nature is a beautiful architect. As a result of geological and cosmochemical processes objects of the inorganic world are unique in beauty, color and shaping. The objects of the inorganic world, which may be the subject of imitation, include the structure of chemical elements and compounds, some of characteristics of minerals, rocks, weathering forms and elements of space subjects. The provisions of architectural geonics can be used to create small architectural forms, interior designs, architecture, buildings and others. Thus, architectural geonics allows experts to develop a new architectural ensembles tectonics use to achieve the inorganic world, to design structures organically fit into the environment in accordance with the geomorphology, climate, and cultural traditions.

Keywords: architectural geonics, cybernetics, geonics (geomimetics), bionics, geological processes

Currently, the development of our civilization has entered a peculiar stage where environmental, geopolitical and social problems are considerably aggravated. Today all the countries of the world are characterized by aggressive and concentrated compaction of cities. Living in megalopolises (man-made anomalies) is a source of moral and physical discomfort and factor of the individual's degradation. Statistics shows a direct relationship between the number of storeys of the living area and diseases, stresses, etc. One of the ways out of this situation is to use the provisions of a new scientific field of architectural geonics. [3-5].

Geonics (geomimetics) is an interdisciplinary science, solving engineering problems with knowledge obtained in the research of geological and cosmochemical processes [6, 7]. Production, operation, demolition and recycling of materials; in general, the evolution of the inorganic world is considered as a constant motion, change and transformation (Fig. 1).

Where there is movement, there must be control. The science of control is cybernetics (Norbert Wiener, 1948) [8] One of the directions of cybernetics is bionics (Jack Steel, 1960), closely connected with biology, physics, chemistry, electronics, navigation, communication, seamanship and others [9]

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Unlike bionics, the idea of which consists in the application of knowledge about nature for solving engineering problems, the goal of geonics (geomimetics) is the development of basic management principles of the development of inorganic world objects. Implementation of a new scientific direction will allow not only expanding the raw materials base and developing new technologies of materials production, but also improving the comfort of the species Homo Sapiens in the system «man - material - habitat » etc (Fig. 1).

Fig. 1: Directions of Cybernetics

The main directions of geonics (geomimetics), which are discussed now, is optimization of the system «man-material-habitat», architectural geonics, development and construction of underground spaces, problems of development (existence) of organic and inorganic world, development of algorithms and models of creating and managing the objects of inorganic world, the use of energy of geological and cosmic processes, development of new technologies of minerals and composites production (Fig. 2).

Fig. 2: Areas of Geonics (Geomimetics)

One of the important areas of optimization of the system «man – material - habitat» is the architecture. It may be the cure for many diseases. The body, as they say, is the house of our soul, and the house is like clothes for the subtle physical body. There is proposed the direction «Architectural geonics». This is creating architectural ensembles based on results and impacts of geological and cosmochemical processes on the inorganic world. It is known that nature is a great architect, and as a result of geological and cosmochemical processes there are created unique in beauty, color and shaping objects of inorganic world, which can be an example to follow for architects in creating architectural ensembles.

There is known the direction «Architectural bionics». Architectural bionics « ... considers the possibilities, contained in nature, which can be used in solving the problems of formation, technical support, beauty and harmony of architectural forms» [10].

At the dawn of their development people copied the results of the organic world. Thus, the hut of African Indians reminds of termite nest, and the nest of a weaver bird – of adobe African houses. Later, from the principle of imitation the experts came to the development and improvement of the «creativity» of nature, which was reflected in the functional-structural, constructive and decorative solutions [10].

Architectural bionics not only develops the artistic imagination of an architect, but also leads to the creation of new structural forms, more accurate and clear expression of them, development of the logical systems of designs. Architectural-bionic models are implemented at creating unique ensembles. For example, pine-cone and skyscraper in the shape of pine-cone, shellfish and theatre in Australia, resembling this creation of the organic world (Fig. 3).

Fig. 3: Architectural Bionics

And the objects of inorganic world, as an example to follow when creating architectural ensembles, are more numerous, including geological objects and elements of space exploration.

Among geological objects, as a prototype for creating small architectural forms and architectural ensembles as a whole, there can serve the structure of chemical compounds and elements, the structure of the crystal lattice of minerals, crystal shape and so on (Fig. 4).

Fig. 4: Objects of Inorganic World - Subjects for Imitation when Creating a Architectural Ensembles

The elements of space exploration are satellites of planets, star systems, shapes of space objects, color scale and so on. For example, the landmark of Brussels is the famous Atomium. This architectural form is of shape of 64 billion times enlarged structure of iron. The druse of quartz is prototype for creating an architectural ensemble in the USA. The project "Asian pyramids" is shaped like a pebble. The skyscraper in Dubai (the highest building in the world) resembles a stalagmite in caves.

As I have said, a lot can be learned from the space them - small architectural forms, colors, etc (Fig. 5).

Fig. 5: Small Architecture Forms - Analogues of Cosmic Bodies

A wide scope for creativity of architects is represented by the world of minerals. Currently there are about 4900 mineral species, more than 4660 of which are approved by the International Mineralogical Association (IMA). In total, according to the specialists' research, there are about 100 thousand minerals (Fig. 6).

Fig. 6: The Structure of Chemical Elements as Prototype for Architectural Forms

The absolute majority of minerals form granular aggregates and are included in the composition of rocks. And only some of them, under certain conditions, grow free and become a unique creation of inorganic world, able to give inspiration to an artist or architect and become the prototype of an outstanding architectural ensemble, which will bring positive emotions to millions of people, stimulate creativity of poets and artists and improve the mood of a common man.

Fig. 7: Architectural Solutions

Fig. 8: Forms of Placation and Eolation

Thus, the creations of inorganic world (crystals of various minerals, textures of rocks, etc. can be a prototype of architectural geonic models.

One of the examples of architectural geonics is the Royal Ontario Museum (Canada). The idea of the architect Daniel Libeskind, is to increase the area of the old Museum by building a crystal-shaped extension of glass and metal. One has the impression that a giant ultramodern crystal, created by high technologies, crushes an ancient building of Museum, or vice versa - grows out of it (Fig. 9).

Fig. 9: The Reconstructed Building of the Royal Ontario Museum, Canada

This idea is implemented in other countries as well. For example, one of the houses built under the project of the architectural bureau «David Jameson Architect» (USA), not only repeats the form of halite with high accuracy, but is called «NaCl Residence».

Thus, architectural geonics allows experts to develop a new tectonics of architectural ensembles using achievements of inorganic world, design buildings, organically fit into the environment in accordance with geomorphology, climate, cultural traditions, create jewelry, interior designs and so on (Fig. 10)

Fig. 10: Ways of Using Architectural Geonics

For example, the structure of the crystal lattice of some minerals may be an object to follow during construction in seismic regions of the world; shape of certain minerals can be a prototype for creating architectural ensembles depending on the climatic conditions of this or that country. Elements of space subject (Fig. 5) can significantly diversify the interior of playgrounds for children of different age. Similar examples can be continued.

The new scientific direction solves not only practical problems of arranging habitats, creating constructive elements, forms, space and so on, but also helps to improve the emotional state of a person, to encourage creativity, harmonize functions, sensual associations and in general optimize the triad «man-material-habitat».

Architectural geonics will allow finding a niche to follow innovative representatives of many architecture schools, in accordance with their scientific interests and national traditions.

Literatures

- Beller, S. "Information Overload and Health Decision-Making Part 1", Saturday September 11, 2006: <http://curinghealthcare.blogspot.com> (accessed on 14/02/2009).
- McCuen, Gary E. Population & Human Survival. Hudson, Wisconsin: Gary E McCuen Publications, Inc., 1993.
- Lesovik V.S. Small architectural forms in architectural geonic/V.S.Lesovik,Y.V. Degtev// Science and Education:materials of the international research and practice conference,Vol. |,Munich, Desember 18-19, 2012/publishing office Vela Verlag Waldkraiburg-Munich-Germany,2012-639-643 p.
- Jiang Dongqing, Bionic building material and its applications. Building Material Development Guide. 2003.
- Lebedev, J.S.: Architecture and Bionics (In Russian). Alfa, Bratislava 1982.
- Lesovik, W.S. Zum Problem der Forchung des System Mensch-Stoff-Umwelt / W.S. Lesovik, A.M. Gridchin. – 12. Ibaus. Internationale Baustofftagung. □ Weimar, 1994.
- Geonics. Subject and objectives / V.S. Lesovik. – БЕЛГОРОД: ИЗДА-ВО БГТУ, 2012. – 100 p.
- Norbert Wiener, Cybernetics or Control and Communication in the Animal and the Machine, (Hermann & Cie Editeurs, Paris, The Technology Press, Cambridge, Mass., John Wiley & Sons Inc., New York, 1948).
- Williams, Hugh Aldersey. Zoomorphic: New Animal Architecture. — Collins Design, 2003. — P.176. — ISBN 1856693406.
- Lebedew, J. S. Architektur und Bionik. Varlag MIR, Moskau; VEB Verlag fur Bauwesen, Berlin, 1983.