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## A didactic method for transposing natural forms in architecture

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### Abstract

The present paper represents a research on a possible didactic method for architecture students regarding the study of the transposition of natural role models into the built environment and the generation of alternative forms in architecture. The objectives of this study are the acknowledgement of the formal diversity offered by nature, enunciation of possible methods of formal analysis of the natural examples, and eventually the transformation of those characteristics into parameters capable of meeting the architectural requirements. The materialization of this proposed theoretical approach is achieved through the exercise entitled “Ecotecture” conducted at the Faculty of Architecture in Timisoara.

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### 1. Introduction

Nature exhibits our sight an infinite variety of forms adapted to different functions which interact with the environment in a harmonious manner. Thus, the natural universe represents a world from which the architect expects, seeks and receives suggestions for the design process.

When questioning whether a natural role-model is suited for the architectural creation, one should bear in mind that nature solves the following aspects:

- The economy of constructive materials;
- Original structures, perfectly adapted to their environment;
- Aesthetic quality;
- Principles of nature provide verified information through the natural selection process (Ch. Darwin);
- Nature is timeproof.

Architecture can be looked at as a circumstance of life and so we can consider it as an integrated part of nature – the man-built nature (Gruber P.). Even though architecture is a component part of the society and is subordinated to its rules, natural form laws can be applied to some extent in architecture. The principles of nature provide verified information, as nature is timeproof, that can be used in solving construction structures, issues regarding building physics and aesthetics in architecture (Lebedev I.).

In the field of architecture, the didactics practice plays an important role in the formation process of the future architects. Most of the subjects offered by a School of Architecture are based on practical exercises that aim to stimulate and develop students’ different skills and competences required in this multidisciplinary profession.

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In this case, at the Faculty of Architecture in Timisoara, in the second semester of the second year of the Bachelors' programme, the architecture student is asked to design a building using a natural role model as inspirational source.

## 2. Natures' role models

In order to facilitate the choice of the role model, the student must be aware of the diversity of natural forms. Nature, by definition, reunites animate and inanimate systems (Gruber P.), such as: living organisms, landforms, climate, physical phenomena, vegetation, etc. In this case, the paper focuses on the formal aspect of its components and will consider the following main categories:

- Cosmic forms: are represented by spiral systems or rotation forms, spherical or elliptical, more or less flattened, where the apparent contour is a circle. Thus, the main formal feature of these shapes is the curved line..
- Forms of the terrestrial relief: the aspect of "mass" is the main characteristic of this type of shapes;
- Mineral forms: the exterior shape of a mineral form is determined firstly by its internal configuration and secondly by the action of exterior factors – certain energies that can deform the mineral, a process that can be reversible or not. The mineral forms usually have a polyhedral aspect due to the inner structure of the rock. These evolved shapes give the impression of randomness, but, in fact, behind these irregularities, one can discover a balanced organisation (Bahamon A., Perez P.);
- Vegetal forms: more or less visible, any vegetal form is composed out of two types of elements: the structure which is often a modular one and the envelope which delivers the unification of the modular structure. The plants have a certain linearity and slenderness or/and can develop interesting volumetric mixture due to the spatial position of its ramification (Bahamon A., Perez P.);
- Organic forms: all living organisms without taking into consideration their evolution stage. The curved line is specific for these types of forms. In this category, the architecture student can draw inspiration from anatomical structures, animal constructive systems, social animal constructive structures and temporary constructive structures (Bahamon A., Perez P.).

## 3. "Ecotecture" exercise – the study of the natural role-model from an architectural perspective

At the Faculty of Architecture in Timisoara, in the second semester of the second year, the last seven weeks are dedicated to a research exercise called "Ecotecture" which focuses on the investigation of natural role-models as inspiration source for architectural creation.

The purpose of this exercise is to:

- increase the quality of architectural design and stimulate the creativity of architecture students;
- highlight the variety of natural role models for architecture: through study and analysis, the student can discover his formal preferences, sensibilities and widen his formal knowledge;
- raise the awareness of the permanent evolution in space and time of natural forms;
- accentuate the idea of formal causality in the natural and built environment;
- underline the interdependent relationship between man and nature.

The exercise reunites two main components: drawing and text. Thus, the visual information offered via drawings is supported by written data and vice versa. The narrative structure consists of five chapters and is based on certain operations of thinking: perception, analysis, selection, comparison and transformation. The student depicts the creation process step-by-step using textual means, motivating his/ her choice and actions.

### 3.1. Perception

- Objective perception: represents a rigorous way to observe the role-model, and it doesn't allow any personal interpretations. The text will highlight the geometrical aspects of the global form and its

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