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EACH GAME OF LINES, SOLIDS AND FORMS IS BASED  
ON THE SAME PRINCIPLES AND IT STARTS WITH A  
CONCEPT. THE BIOMORPHIC VISION OF THE WORLD  
CREATED BY VINCENT CALLEBAUT

KAŻDA GRA LINII, BRYŁ I FORM BAZUJE NA TYCH  
SAMYCH ZASADACH A ZACZYNA SIĘ OD POMYSŁU.  
BIOMORFICZNA WIZJA ŚWIATA VINCENTA CALLEBAUT

Abstract

Architecture as a discipline tends to be understood differently in different environments. Le Corbusier "lines, solids and surfaces are elements through which architecture manifests itself. A thought through, flawless, wonderful game of solids in the light". The architecture of the 21st century has become a compilation of developed exemplars, from the simple to the organic. The value comes from the idea, the concept of combining all the elements in such a way that the resultant game is both aesthetic and original. Such a game can be seen in the projects of Vincent Callebaut.

*Keywords: game of lines, form, biomorphism, idea, originality*

Streszczenie

Architektura jako dziedzina bywa różnie rozumiana w różnych środowiskach. Dla Le Corbusiera „linie, bryły i powierzchnie to elementy, przez które przejawia się architektura. Przemyślana, bezbłędna, wspaniała gra brył w świetle”. Architektura XXI wieku stała się kompilacją wypracowanych wzorców, od prostych do organicznych. Wartość stanowi idea, pomysł na połączenie wszystkich komponentów, tak by powstała gra była zarówno estetyczna jak i oryginalna. Taką grę możemy dostrzec w projektach Vincenta Callebaut.

*Słowa kluczowe: gra linii, forma, biomorfizm, idea, oryginalność*

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## 1. Introduction

Architecture as a discipline tends to be understood differently in different environments. For some, it is an art inseparably bound with civil engineering, but also most related to fine arts. For others, it is above all a technical field. Yet other people would categorize it as a social discipline given its tasks in which technology and art play only an instrumental role. Finally, there are those who would be glad to see architecture as one of the ways of shaping the geographical environment [3, p. 3 – 6]. For Le Corbusier “architecture had nothing to do with styles”. He described its destination as loftier, showing human instincts. Given its abstractness – requiring knowledge involving many sciences and various skills [9]. “Lines, solids and surfaces are elements through which architecture manifests itself. A thought through, flawless, wonderful game of solids in the light” [4].

*Perceiving a shape, we always consciously or unconsciously assume that the shape presents something and hence that it is a form of some content.*

Rudolf Arnheim [1]

Architecture is shaped by elements of geometry which create a possibility for space and the architectural form. A point constitutes the basic designation of the form indicating at the same time its position in space. As an element of architecture it has been deprived of dimensions. Lines, forming due to movements of points, allow determination of the direction and basic dimensions. A plane, formed as an effect of extending a line, has already such qualities as: length, width, shape, area and direction. Another sequence of movements of a plane leads to the formation of a solid which may make use of the qualities of the form, space, orientation and position. Solids may be composed of points (places in which a few planes intersect), lines (places in which two planes intersect) and planes (areas). A solid in the architectural nomenclature is a three-dimensional element and the form constitutes the basic spatial dimension. According to Le Corbusier, the basic forms whose image is clear and readable are cubes, cones, spheres, cylinders and prisms. Each form may be subject to transformations based on subtracting, adding and intersecting components [6, p. 9–14]. Thanks to the rapid development of modern technologies, architects and engineers have gained unlimited possibilities of shaping space. Space which is no longer made up only by simple and transparent forms, but also elements having smooth and soft lines resembling those existing in nature.

“In architecture there is an element of life. It has been carrying it inside since its birth, since humans left caves and started building their first Palaeolithic constructions (...). This early addiction to natural materials, and hence biology and its laws, has undergone a great metamorphosis, moving sometimes to the world of symbols and signs. Henceforth the two forms of architectural biologism still last and complement each other [8, p. 44–45]”.

The rule of creative imitation of other forms of life, phenomena, and laws of nature (mimesis) has played an important role in the social, cultural and technological development of humans. Thanks to mimesis, complementary but very distinct disciplines have emerged: biomimetics, biotechnology and biomorphism. Biomimetics is a field of science involving

research on and practical application of the behaviour and operations of nature in order to use it in engineering, electronics, chemistry, design etc. [5]. Biotechnology covers technological applications using biological systems, living organisms or their components to produce and modify products and processes within a specific application [10]. Biomorphism is characterised by a use of forms inspired by nature in connection with modern materials. This has led to its applications in both articles of daily use and architecturally complicated buildings [2].

## **2. The biomorphic vision of the world by Vincent Callebaut**

Dependencies between technology and nature have become an interesting phenomenon. We find inspiration in the water, air, flora and fauna, earth. We use proven exemplars, games of lines and forms. We adapt them to the human world – the world created by the human mind. By this they become close to a masterpiece. We match objects with living beings as we need metaphors to describe something, express our delight in a building [14]. Biomorphic architecture with its ideas relates to floral ornamentation in art at the turn of the 20th century, as expressed for instance in Gaudi's projects. Using forms present in nature has also become an inspiration and afflation for many contemporary designers. An example of such is the Belgian architect Vincent Callebaut. The characteristic features are the use of soft, smooth and abstract forms resembling the structure of flora (Ill. 1) and fauna (Ill. 2), free compositional arrangements (Ill. 3), and asymmetry. The essence of such architecture is also the fact that it should fit very well in the natural landscape [7, p. 42 – 43]. One of the more inspirational projects by Vincent Callebaut is The Perfumed Jungle, realized for the city of Hong Kong in 2007. To address the population problem, the architect proposed that they tame nature again and enrich the area of the ultramodern city. Within a long-term development, the idea behind the project is to increase access to the area by creating an “ecological trace”. This means that newly-formed spaces will be self-sustainable, and in fact produce more energy than they use. The defined afresh Central Waterfront (Ill. 6) offers an occasion to understand the water world and copy it by creating liquid rooms. Grids of irregular cells enable infiltration into the deepest tissues of the city. That new, multilayer topography, without walls or any other limits, is not only to be inhabited by people, but also adjusted to the needs of many species in the local fauna and flora, or species which by migration will settle there. Organic towers are meant to resemble trees emerging from the water into the sky (Ill. 5). And just like them, the towers would grow, forming networks of proliferating rhizomes. Regularly formed cells would be closed randomly thanks to “pillows” with bedding and plant manure allowing the development of rich plant life. The spatial arrangement of these ecological towers offers a double functionality. The inner spaces, “the arborescence”, would be dedicated to private compartments – housing, whereas the outer spaces, “the branches”, would be occupied by offices, services and leisure. Such a division of functions would guarantee permanent use of the district and breathe new life into it. Connected by a network of roads and pedestrian paths, the towers in winter would constitute vertical gardens with a strong feeling of local identity. There is a clear reference to the art of Chinese faience or canvas woven using green fibre (a reference to biology and botany) [11;15].

In the projects of Vincent Callebaut there is a striking variability and liquidity of the form. The buildings he creates are unique. Each time the idea is the natural environment



- III. 1. Dragonfly – concept of the urban agricultural farms inspired by the form and structure of the dragonfly wings, New York, Roosevelt Island, USA, 2009 [15].
- III. 2. Agora Garden – Covered by plants, sustainable residential tower inspired by the shape and form of DNA strands, Tajpej, Taiwan, 2010–2016 [15].
- III. 3. Kings Forest – Rest house complex inspired by the shape and structure of the leaves, flowers and birds’ nests; Fes, Marocco, 2012 [11,12]
- III. 4. Landsript – the hills (the habitat) located over the highway and connected by lagoons inspired by the construction of the cells, Geneva, Switzerland, 2020 [13,15]
- III. 5. The Perfumed Jungle – the view on the green towers, Hong Kong, China, 2007 [11,15]
- III. 6. The Perfumed Jungle – the concept of the new spaces in the business district, Hong Kong, China, 2007 [11,15]

gaining an architectural form dressed in construction, materials and colours. Incident light brings a building to life. For many, Callebaut's concepts seem to be abstractness, based on a detailed analysis of current energy production technologies, organic matter processing, and waste utilization. A project worth noticing is Landscript (Ill. 4) – the concept depicted within the course of rebuilding and concentrating the quarters of the buildings of Praille – Vernets – Acacias in Geneva. Landscript proposes a fifteen-year-long scenario for the evolution of the assumption which is based on the phenomenon of auto-cloning of a landscape (in this case the housing structure has not been incorporated into the existing city landscape but it defines it itself). The idea of the assumption was an attempt to bring back the balanced ecosystem between the buildings and a rediscovery of biodiversity. Landscript is supposed to constitute another stage in the development of urban areas. After the former development of the city against the landscape, now the landscape is being rebuilt in the city. From this point of view, all buildings are perceived as geographical abstractions and elements disturbing the ecosystem. Each element of the artificial landscape exhibits a degree of variable duality to ensure maximum biodiversity. At the central point of the project, above a motorway, habitats in the form of hillocks have been designed. At the feet of the buildings a network of lagoons has been formed, the purpose of which is to connect with a river. The new, geographically modified space of water and mountains is to unite all public institutions included in the project – schools, universities, theatres, etc. This architecture, with its very limited silhouette and connecting with the natural landscape, has become a milestone in the light of previous studies on long-term development [13;15].

The uniqueness and popularity of Callebaut is probably a result of the fact that the projects drawn up by his bureau have been deprived of the tags of rigid, heavy solids. The new form is free, amorphous, and goes beyond mainstream patterns and schemes. Thanks to such activity the creative process of shaping lines and solids is also perceptible in the objects and spaces realized. This unconstrained approach to a project brings objects to life. The proposed solutions are no longer only inferior to the function, but are in harmony with it.

In every game of creating a new space one should remember how important to the whole process people are; people who, thanks to perceptive processes, can pay attention to the values included in architectural aesthetics. Not to play down the essence of the current regulations and norms in architecture and its features as an art of spatial complex and context, the architect, by building order and playing with the form and aesthetic values, changes simple civil engineering into architecture. In this case, universal features typical of humans emerge – known places, structures and forms [6].

*If one looks at our surroundings and sees the importance of architecture in the human-made environment, it is immediately striking that its quality has a fundamental meaning to the lives of people and the influence some architects have on that created environment is huge. Architecture affects the quality of every aspect of human life greatly. Yet most buildings are not designed by great architects. The bulk of the building development is just routine...*

Santiago Calatrava [14]



### 3. Summary

Searching for the ideal form has been an aspiration for architects and artists of all times. We perceive the buildings created at a given time as cultural, religious, political symbols – sometimes even masterpieces. The idea was to make them reflect divinity, the power of a country, the natural landscape, to evolve out of municipal ideas. Every epoch made an individual contribution. In each epoch architecture was a game of lines, solids, colours and light. The architecture of the 21st century has become a compilation of the developed exemplars, from the simple to the deconstructive to the organic. Adding a complexity to architectural forms which was not achievable in earlier epochs. But, the fact is that regardless of the shape of solids, contours, light or materials, the essence lies in expression and the influence on humans. The value comes from the idea or conception to combine all elements in such a way that the resultant game is both aesthetic and original. Such a game can be seen in the projects of Vincent Callebaut.

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