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ORGANIC AND ECOLOGICAL: AN ASSESSMENT OF THE TRANSFORMATION OF 'ORGANIC' ARCHITECTURE INTO MECHANICALLY CONTROLLED ENVIRONMENT

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ABSTRACT

Towards the end of the Nineteenth Century, the discourse about the relationship between architecture and nature was dominated by the influence of functionalism derived from natural sciences. Despite functionalism, the romantic idealism embedded in the organicist theory called for the poetic construction of the built-environment, which remained a strong impulse for the architectural avant-garde during the first half of the Twentieth Century. Architects like Frank Lloyd Wright and Richard Neutra shifted the focus of organic architecture from functionality to architectural site, whereby it became and 'environmental' issue. However, the more the artistically motivated organicism was replaced by the scientifically motivated environmentalism, the more modern architecture lost its romantic impulse. Reyner Banham was one of the main advocates for the concept of organic architecture to transform into mechanically controlled environment, but his mission found the real justification in contemporary ecological discourse that imposes on buildings ethical techniques for controlling architecture's effect on the environment.

Keywords: Organic Architecture, Ecological Architecture, Built-Environment, F. L. Wright, R. Neutra, R. Banham.

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ORGANİK VE MEKANİK: ‘ORGANİK’ MİMARLIĞIN MEKANİK OLARAK DENETLENEN YAPISAL ÇEVREYE DÖNÜŞÜMÜ ÜZERİNE BİR DEĞERLENDİRME

ÖZET

Yirminci Yüzyılın sonlarına doğru, tabiat bilimlerinden devşirilen işlevselcilik meselesi mimarlığın tabiatla ilişkisine değin söylemlere hâkim oldu. Buna rağmen, yapısal çevrenin şiirsel biçimde inşasını talep eden organikçi kurama içkin romantik idealizm, Yirminci Yüzyılın ilk kısmında mimari avangart için güçlü bir itki olmaya devam etti. Ama Frank Lloyd Wright, Richard Neutra gibi mimarlar organik mimarlığın odağını işlevsellikten mimarinin içinde bulunduğu yere kaydırdılar ve böylece mesele bir ‘çevre’ meselesine dönüşmeye başladı. Sanatla güdülenen organikçilik yerini bilimle güdülenen çevreciliğe bıraktıkça, modern mimarlık romantik itkisini kaybetti. Reyner Banham, organik mimarlığın mekanik olarak denetlenen bir çevreye dönüşmesi fikrinin başlıca savunucularındandı. Lâkin, onun misyonu gerçek meşruluğunu binalarda mimarlığın çevreye etkisini denetleyen etik teknikleri zorunlu kılmayı amaçlayan çağdaş ekolojik söylemde bulacaktı.

Anahtar Kelimeler: Organik Mimari, Ekolojik Mimari, Yapısal Çevre, F. L. Wright, R. Neutra, R. Banham.

INTRODUCTION

Architectural practice today is very much about the creative handling of form, space and materials. A growing concern that demands objectivity in design issues is about to bring a considerable change: ecology. But, because the ecological approach in architecture is considered a contemporary phenomenon, it is rarely seen in historical perspective and therefore not often inquired by architectural theory. Although presently subordinated to ‘architectural’ appearances, ecological attitudes may soon be associated with mechanical solutions of engineers. Therefore, the so-called ‘ecological architecture’ has the potential to evolve into mass-produced ecological living machines.

In ecological attitudes in architecture, the conception of nature is rather a machine working on the principles of science, such as energy, transformation, conduction, pollution and so forth. Therefore, ecological buildings conceived as mechanical environments have the potential to erode the precious boundaries that architects had ardently defended against engineers since the Nineteenth Century. Therefore,

the mechanical imitation of nature through architecture is to be questioned especially from the perspective of the history of organic theory, which is in fact a process that started with the representation of nature, only to transform gradually into its regulation and finally to arrive at its mechanical reproduction.

Rykwert stated that the word 'organic' is from *organon*, the Greek word for 'instrument', or 'tool'.[2] He argued that *macinae* and *organa* gained very similar meanings in Latin as *mechanicus* and *organicus*, and these two words 'that are now taken to be opposed were almost synonymous for such a long time', until when organic was used for living beings. Rykwert underlined the significance of the advent of chemistry and biology in the Nineteenth Century for the alteration of the meaning of 'organic', which started to be used 'as an analogy of things in the vegetable and animal world'. The arrival of organic chemistry led to a change in the interpretation of the notion of the 'vital force', and made it understood mechanistically. With George Cuvier's classification of organisms by the topology of functions, function became the determinant of form within an organism. Horatio Greenough, who coined the dictum 'form follows function' in 1851, also declared that 'the men who have reduced locomotion to its simplest elements' would achieve the logic and beauty of the Greek temple. The proliferation of the functional understanding of beauty made the 'machine' analogous to 'organism' once again, parallel to the conviction that 'the organism is shaped when its function is adapted to environment.' But for Rykwert, that analogy was used in quite a different sense from that of the ancient times, sensing that it became a trope for the identification of natural with artificial.[3]

The architectural theory and practice today, which tries to respond to the conflicting demands of both the growing global consumer society and ecological science, is in a crucial moment to question if the modern analogy between organic and mechanical has started an essential transformation in the art of building. If so, the question is where is that transformation supposed to be found and how does it relate to the future of architecture?

Architecture and Nature: Organicism in Europe

In the last quarter of the Eighteenth Century, the rationalism of Enlightenment had found a reassuring core in the affinity between nature and history, also fuelling the romanticism which sought correlation between the proximity to nature

[2] J. Rykwert, 'Organic and Mechanical', *RES*, 22 (1992), pp. 10-18.
[3] *Ibid*., p. 13-17.

and pure artistic genius. Goethe's search for the source of life (*urphlanze*)[4] was a journey in time, so was his contemporaries in their quest for the mystical times of the Greco-Roman ruins. Viel de Saint-Maux, in demystifying Vitruvian orders, declared the Greek column as symbolic of the vegetal growth devised by some long forgotten people, and highlighted the unspoiled link between nature and architecture in the olden times.[5] Although biology and chemistry in the next century started to dissolve the mysticism and lyricism of nature into explicable mechanical processes, romanticism in architecture did not yield completely to scientism. On the contrary, it formed into organic creation and continued to balance the rationalism well into the Twentieth Century.

Many things which are considered essential to the Twentieth Century architecture undeniably stemmed from the developments in the Nineteenth Century, whose main legacy was the passionate search for the style of its own. The objective criteria of science appeared to offer a possible solution for the problem of style that was then embroiled with conflicting approaches to history. Initially, basing a 'rational' architectural theory on permanent, trans-historical rules justified the prominence of one historical style among others, such as Gothic[6]; but then the rationality of natural sciences became a tool to surpass the historicity of the concept of 'style' itself, which would soon be associated with the spirit of the present, and even, the future. Modern Architecture invested much of its justification in this kind of rationality that aimed to unite science, art and the phenomena of modern life. Organicism filled the gap occurred from the discarding of historicism and became the binder for new architectural compositions.

Van Eck argued that organicism owed a lot to the Classical idea of the all-encompassing rules of beauty that govern the unity of a composition in which 'nothing can be added or extracted but for the worse'. She underlined the importance of that rhetoric in the architectural discourse throughout history of architecture, but saw in the Nineteenth Century a particularity in which she explained organicism

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[4] C. Van Eck, Van Eck, C. (1995-6). Goethe and Alberti: Organic Unity in Nature and Architecture. *The Structurist*, 35-36, pp. 20-26.

[5] Viel de Saint-Maux, J. L. (1974). *Lettres sur l'Architecture des Anciens et celle des Modernes* [1787]. Geneva: Minkoff.

[6] Van Eck claimed that style emerged as a rhetorical concept in the Eighteenth Century and as it became associated with historical change, it undermined Vitruvianism. Van Eck, C. (1995). Par le Style On Attaint au Sublime: The Meaning of the Term 'Style' in French Architectural Theory of the Late Eighteenth Century, in C. Van Eck et al. (Eds.), *The Question of Style in Philosophy and the Arts*. Cambridge: Cambridge University Press, 89-107.

as a 'strategy of invention and interpretation.'[7] As a result of rational interpretation of nature and history, the religious and metaphysical connotations of nature began to be replaced by the tectonic or biological interpretations, which would lead to inventions in the midst of the enthusiastic search for style. Van Eck saw this dissolution in the difference between Friedrich Schlegel and Karl Bötticher, the former being a representative of German romantic idealism, and the latter a student of the *Bauakademie* founded by Schinkel who laid the foundations for the tectonic interpretation of architecture.[8] Bötticher took the notion of the beauty of construction in Schinkel's theory and used it not only to interpret historical architecture, but also 'to solve the problem of *formerfindung* (finding forms).'[9] Bötticher's conception of style as both historical and natural phenomenon is visible in his famous statement that stylistic possibilities of arcuated and trabeated structures have been exhausted because physical qualities of stone and brick that had shaped both systems could not be developed further.[10] This is the most important aspect of Bötticher's thinking, that form is the outcome of the interaction between certain exterior forces and the intrinsic quality of given materials, such as stone or iron, which determined both the architectural style and the tectonic beauty. In France, Viollet-le-Duc took that kind of thinking further by making an organistic connection between the structures of complex organisms and elements of construction.

Viollet-le-Duc saw history of medieval France as the history of rational use of materials for possible structures invented for a given function. History was a source of specimens, so to speak, to study and detect the timeless principles of structures. Like Bötticher, he considered iron very suitable for modern structures and wanted to derive a structural logic that could be applied to iron from organic nature. The structure of a prehistoric flying reptile as well as the human and animal skeletons were among his examples, and he developed details for metal structures derived from the joints of human skeleton, imitating the mechanism with which

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[7] Van Eck, C. (1994). *Organicism in Nineteenth Century Architecture: An Inquiry into Its Theoretical and Philosophical Background*. Amsterdam: Architectura & Natura Press., p. 85.

[8] *Ibid*., p. 101.

[9] *Ibid*., p. 99.

[10] Bötticher, C. G. W. (1992). The Principles of the Hellenic and Germanic Ways of Building with Regard to Their Application to Our Present Way of Building (1852), in J. Bloomfield et al. (Eds.), *In What Style Should We Build? The German Debate on Architectural Style* (trans. W. Herrmann). Santa Monica: Getty Center for the History of the Arts and the Humanities, pp. 147-167.

nature produced a form in response to a necessity. This was Viollet-le-Duc's understanding of the organic. Building was a structural organism and architectural style should be the natural result of its constructional logic, just like the beauty itself:

> A column, a pillar, shaped with due regard to the resisting power of the material in relation to what surmounts it and the function it performs, always assumes a beautiful form.[11]

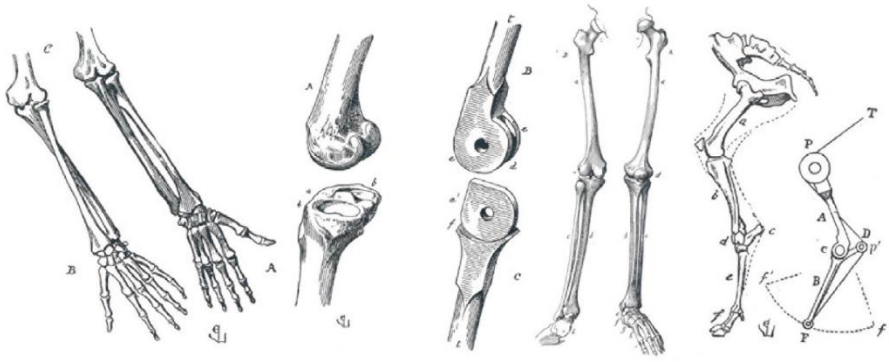

Figure 1. Natural (bone) and artificial (metal) joints illustrated in Viollet-le-Duc's *Histoire d'un dessinateur*, 1879. (Casonato, 2020, 65)

Viollet-le-Duc's organicism forced the structural elements to come forward so that they could be distinguished according to their functions. Yet, despite its scientific overtones, his method followed laws of organic nature as clearly concrete, visual phenomena. Although he 'sometimes used terms reminiscent of the biologists Cuvier and Geoffroy', such as the term 'conditions of life', 'which recalls Cuvier's key notion of the 'conditions of existence,''[12] Viollet-le-Duc did not merely seek for deducing structural rules from matter. Nature was, more than anything, a beautiful external appearance of life:

> Since every part of an edifice or construction should have its raison d'être, we are, in spite of ourselves, attracted by every form that indicates its object, as we are interested by the sight of a beautiful tree, all whose parts, from its root clinging to the soil, up to its remotest

[11] Viollet-le-Duc, E. E. (1987). *Lectures On Architecture* [1863-1872], Vol. 2 (trans. B. Bucknall). New York: Dover Publications, p. 463.

[12] Van Eck, *Organicism in Nineteenth Century Architecture*, p. 143.

> branches that seem to seek air and the light – so clearly indicate the conditions of life and duration of these great vegetable growths.[13]

Eighteenth and Nineteenth Centuries was a time when 'beginnings' were questioned in every field. From archaeological excavations to the search for fossils, the beginning and development of both cultural and organic life on earth was under focus. Such was also the vision of the architect who was determined to project the future by finding an answer to what is essential in architectural development. Hence came the analogy of development between architecture and nature, which helped to derive principles of development from historical samples for conjecturing further progress. For example, Bötticher saw an ontological core in the difference of the two styles he questioned, Germanic and Hellenic, with which he wanted to show that stylistic development depended on structure rather than representation.[14] For Semper, however, the tectonic core was authentic only in the mythological beginnings and the symbolic appearance of earlier tectonic forms became the main content of style.[15] Semper's formulation of architectural ornament as an ontological issue might have echoed in the anti-ornament campaign of Modern Architecture: that architecture should be freed from the residue of its past.[16]

The significance of Semper's theory in relation to the problem of style lays in the temporal status of materials and construction tecniques vis-a-vis the timeless representational character of ontological elements. Having in mind Cuvier's ideas about the causality between function and form and combining it with Wilhelm von Humboldt's theory about the links between the verbs and nouns,[17] he believed to have discovered the preliminary motives (*urmotiven*) for building, and then the

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[13] Quoted in Van Eck, *Organicism in Nineteenth Century Architecture*, p. 143.

[14] See K. Frampton, Frampton, K. (1996). *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*. Cambridge, Mass.: MIT Press, p. 82.

[15] Schwarzer claims that the covering of reality (core-form) with an ideal mask (art-form) conforms to German romantic idealism which tried to unite the real with the ideal. Schwarzer, M. (1995). *German Architectural Theory and the Search for Modern Identity*. Cambridge, Mass.: Cambridge University Press, pp. 167-214.

[16] Herrmann demonstrated that Semper exaggerated the subordination of art-form to core-form by Bötticher, for in many occasions Böttciher clearly showed that he understood art-form and core-form to be born simultaneously. Herrmann, W. (1984). *Gottfried Semper: In Search of Architecture*. Cambridge, Mass.: MIT Press, pp. 139-152.

[17] On Semper's play between the German words *Naht* (need) and *Knoten* (knot) see Rykwert, J. (1982). Semper and the Conception of Style, in *The Necessity of Artifice: Ideas in Architecture*. New York: Rizzoli, pp. 123-130.

preliminary crafts and the corresponding architectural elements. Although his theory owed much to the scientific discourse of his age, Semper remained romantically attached to the idea of artistic soul that overlapped centuries, which belonged to man as creator who in 'all his relations and connections to the world' is 'the material and subject matter of all artistic endeavours'.[18] Semper's idealism becomes very clear in his statement that form and character come before the material conditions in man's perpetual recreations of the same idea:

> Architecture, like its great teacher, nature, should choose and apply its material according to the laws conditioned by nature, yet should it not also make the form and character of its creations dependent on the ideas embodied in them, and not on the material?[19]

The idea of biological development 'from within' was the key concept of scientists and natural philosophers whose attempts to explain the phenomena of life had early reflections in the organic theories of German romantic philosophers, who questioned the aesthetic conditions of the formation (*Bildung*) of the individual and the state.[20] However, Semper considered architectural style much more complicated than the organic relationship between part and whole. Semper understood organic in a larger sense that involved place, time and culture. His statements like 'the Greek temples and furnishings are not constructed […] they have grown', and that 'their forms are like those that organic forces call forth when striving against mass and weight'[21] are related less to Bötticher's rationalism than to the organic link he saw between the arts and democracy in Greek society[22], which also explained for him the material change (*stoffwechsel*) in the lively artistic transformation of an archaic timber structure into stone. Yet, the concept of 'development from within' would be taken by Wright as a guiding principle to

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[18] Semper, G. (1989). Zurich lecture of 1869: On Architectural Styles, in H. F. Mallgrave and W. Herrmann (Eds. and trans.), *Gottfried Semper: The Four Elements of Architecture and Other Writings*. Cambridge: Cambridge University Press, p. 269.

[19] Semper, G. (1989). The Four Elements of Architecture [1851], in H. F. Mallgrave and W. Herrmann (Eds. and trans.), *Gottfried Semper: The Four Elements of Architecture and Other Writings*. Cambridge: Cambridge University Press, p. 102.

[20] See Gigante, D. (2009). *Life: Organic Form and Romanticism*. New Haven and London: Yale University Press.

[21] *Ibid*., p. 142.

[22] Kruft, H. W. (1994). *A History of Architectural Theory: From Vitruvius to the Present* (Trans. R. Taylor et al). Princeton Architectural Press, p. 311.

oppose to 'style-architecture'[23], although he shared with Semper a similar tectonic understanding of architecture in relation to place and people.[24] The effects of the natural philosophy on the organic aesthetic theory, which are visible in famous romantics like Goethe, Schiller, F. Schlegel and Fichte, had also supported the poetic conception of life in English language. Thus, the romantic poet, critic and philosopher Coleridge, in making a distinction between the mechanical and the organic, would claim that while the former has a 'pre-determined form', the latter 'develops itself from within, and the fullness of its development is one and the same with the perfection of its outward form.'[25]

The distaste for the mechanical and the penchant for the vitality of nature in British artistic milieu during the Nineteenth Century was also a dominant issue in Ruskin, who used the pseudonym 'Kata Phusin' (i.e. 'According to Nature') in his first articles entitled 'The Poetry of Architecture', published in 1837-38 in the *Architectural Magazine*.[26] Ruskin's architectural criticism was based on artistic exploits to judge against a set of complementary values such as good and beautiful. Angèlil interpreted a paragraph from Ruskin in *The Nature of the Gothic* on the definition of the 'mineral' and claimed that he analogically 'equated the search for internal structures by the chemist and the internal (essentially intangible) motives underlying the artist's work'.[27] Yet, it was the nature known without the help of the microscope that really mattered for Ruskin. From the structural elements to the minute decoration, architecture, Ruskin believed, had to imitate the vitality of

[23] Style as applied aesthetics was also criticised in Europe in the very beginning of the century. Hermann Muthesius' critique entitled *Style Architecture and Building Art* (*Stilarchitektur und Baukunst*) of 1902 was just about it, so was Karl Scheffler's *Moderne Baukunst* of 1907. Otto Wagner's changing the title for the fourth edition of his *Moderne Architektur* into *Die Baukunst unserer Zeit* in 1914 is also telling about the effects of new tectonic formulation of style. See Neumeyer, F. (1993). *Iron and Stone. The Architecture of the Großstadt, in H. F. Mallgrave (Ed.), Otto Wagner. Reflections on the Raiment of Modernity*. Santa Monica: Getty Center for the History of the Arts and the Humanities, 1993, pp. 115-151.

[24] Kruft points out the use of modular grid for a cell-theory-inspired design method by early Twentieth Century modernists in Europe like L. M. Lauweriks and H. P. Berlage, which may have influenced Le Corbusier in his conception of the Modulor. Kruft, *A History of Architectural Theory,* pp. 377-8.

[25] Gigante, *Life: Organic Form and Romanticism*, p. 5.

[26] Kruft, *A History of Architectural Theory*, p. 331.

[27] Angèlil, M. (1993). The Concepts of Truth and Utility at the Outset of the Modern Movement: The Construction of a Metaphysical Structure. *Modulus*, 22, pp. 26-39.

nature, the growth of her organic forms. If this were achieved, every single architectural element would be bound to one another as the forms in the Mother Nature.

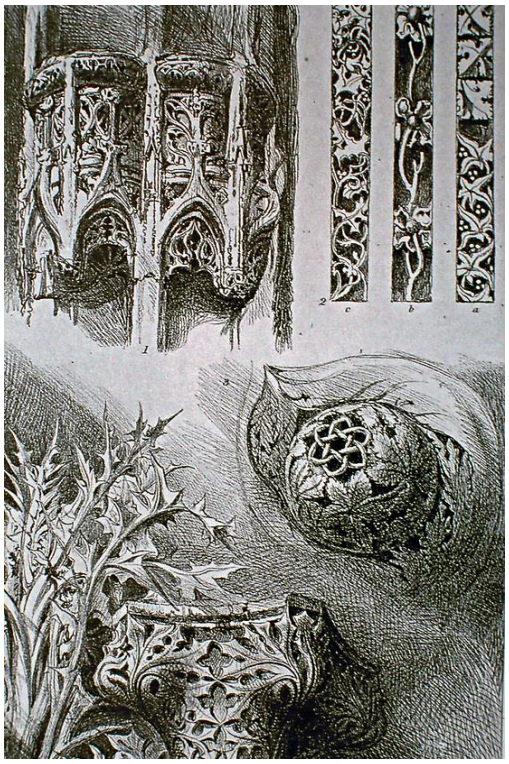

Figure 2. Ornaments from Rouen, St. Lô, and Venice illustrated in Ruskin's *The Seven Lamps of Architecture* (1855). (Ruskin, 1989, 26)

For Ruskin, whose 'writings on organicism in architecture made Gothic Revival acceptable to a protestant public',[28] nature gained meaning through man's observation of the truth in it. Of the three main 'deceits' mentioned and explained by Ruskin, the lessons of the first two were going to be adopted by the discourse of Modern Architecture as 'structural sincerity' and 'respect to the nature of materials'.[29] As for the third, 'operative deceits', Ruskin opposed the machine work. To him all cast and machine work was bad because it did away with the handcraft, which was a virtue of religious significance. Although the work of nature in even a simple cluster of weeds growing around a ruin was much more rich, delicate and admirable than its carved ornaments, 'being the work of poor, clumsy, toilsome man', the representation of nature was more valuable as means rather than ends.[30]

[28] Van Eck, *Organicism in Nineteenth Century Architecture*, p.113.
[29] J. Ruskin, J. (1989). *The Seven Lamps of Architecture* [1849]. New York: Dover Publications, pp. 29ff.
[30] *Ibid*., pp. 53-54. Italics belong to the author.

In Van Eck's words, his investigations in nature was based on 'the romantic notion of 'science of aspects', in which the emotional knowledge of the object, based on loving observation… is preferred to the dissecting analysis of the scientist'.[31] Ruskin's thoughts were too idealistic to persist but apart from his influence on Modern architecture through his follower William Morris, the moralistic correlations he constituted between nature and architecture left a powerful impression on the organicist discourse in the English-speaking world.

The American Context

Organic theory had gained a firm foothold in the United States at the time when firms like Adler & Sullivan were shaping modern American architecture and Art Nouveau was spreading all over the world. The Anglo-German architect Leopold Eidliz wrote a treatise on organic architecture, entitled *The Nature and Function of Art, more especially of Architecture*, published in 1881, in which he demonstrated a rationalistic thinking like Viollet-le-Duc and defined Gothic architecture 'not as a historical style but as a set of principles for design.'[32] John Wellborn Root, who was a friend of Sullivan and familiar with ideas of Eidliz and Greenough, published passages from Semper's *Der Stil* (1860-62) in English for the first time. Sullivan himself was an employee of Frank Furness, 'perhaps the most idiosyncratic Gothic revivalist'.[33] The privileged role of ornament, the love for natural objects, the sense of the Grotesque and sublime, the 'active rigidity' 'analogous to that of the bones of a limb, or fibres of a tree', the emphasis on irregularity with 'different parts fitting themselves to different purposes'[34]; all these essentials constituting the 'nature of Gothic' (1853) for Ruskin were also present somewhat exaggeratedly in the work of Furness. However, Sullivan had to find his own way into the organic architecture in an environment where buildings were being quickly erected on steel frames. His solution was similar to that of Wagner in Vienna, which was dressing up the frame with a symmetrical, well balanced and partially ornamented skin in terra cota, stone, metal and glass. Thus, the metallic structure started to transform the historicism in organicism in line with tectonic and functionalist theories.

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[31] Van Eck, *Organicism in Nineteenth Century Architecture*, p.113.

[32] *Ibid*.,p. 146.

[33] Rykwert, Organic and Mechanical, p.17.

[34] Pevsner, N. (1980). Ruskin and Viollet-le-Duc: Englishness and Frenchness in the Appreciation of Gothic Architecture. *AD Profile*, pp. 49-50.

Figure 3. Louis Sullivan and Dankmar Adler's Guaranty Building (Prudential Building), built in Buffalo, New York in 1896. (URL-5)

The famous dictum 'form follows function', which Sullivan inherited from Greenough as part of the organicist rhetoric, did not in fact assume a unilateral relationship between function and form; like he said, 'functions are born of functions, and in turn, give birth and death to others. Forms emerge from forms, and others arise or descend from these. All are related, interwoven, intermeshed, interconnected, interblended…'[35] Vagueness, an element of romantic taste, appears in the *Kindergarten Chats* as the deferment of knowing. In a fictitious dialogue, Sullivan says that 'if the work is to be organic the function of the part must have the same *quality* as the function of the whole', but answers the question 'what do you mean by organic?' by 'I will tell you, later on', with an aura of mystery.[36] Wright, however, was going to be very outspoken in his writings about what is organic, and that clearly shows the break with the past that Sullivan was far from admitting. For Wright, Modern architecture was an anti-Classical, organic creation which accentuated the tenacious bond of man with earth, the spirit of the place and the organic relationship between site and architectural setting.

Wright was exposed to both the American and European experience of organic architecture in Sullivan's office, where he became 'the pencil in the hand of the

[35] Sullivan, L. H. (1979). *Kindergarten Chats and Other Writings* [1901-1902]. New York: Dover Publications. p. 45.

[36] *Ibid*., p. 47.

master' in his own words.[37] With the publication of his *Studies and Executed Works* in Germany in 1910, he influenced a generation of young German-speaking architects. Both Rudolph Schindler and Richard Neutra, who were students of Adolf Loos in Vienna, left their homes to work with Wright in America in 1914 and 1923 respectively. At the same time, the aesthetics of Modern architecture was forming in Europe, which in turn influenced Wright's architecture to a certain degree. However, his organic architecture always remained an erratic mixture of tectonic and formal expressionism shaped by a personal organicist philosophy, which passed to his Austrian followers. His notion of organic was also dominated by the biological growth as the most phenomenal aspect of nature. 'In the secret charm of the blossom', Wright said,

> we discover a strange sympathy between the form of the flower and the system upon which the leaves are arranged around the stalk. From this we are led to observe a characteristic habit of growth.[38]

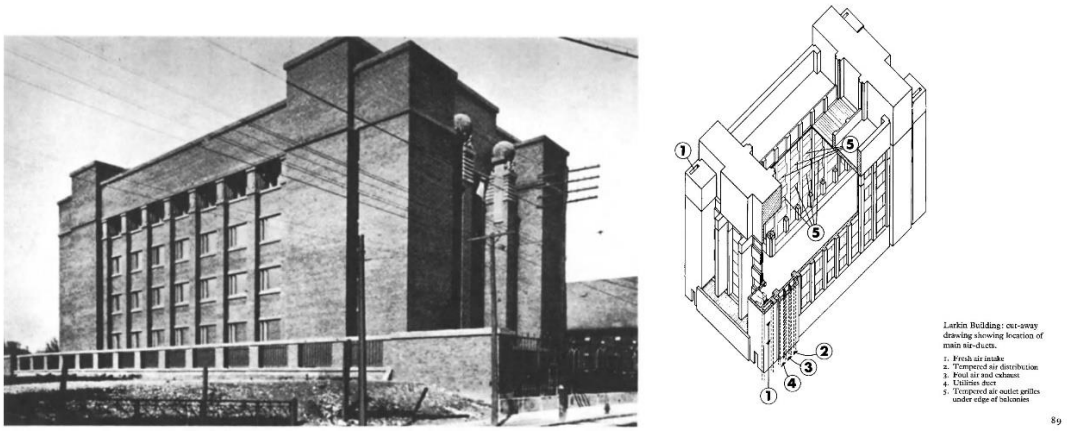

Figure 4. The Larkin Building built in Buffalo by Wright in 1904 with 'organic' expression of the mechanical and functional systems at the outside. (Banham, 1969, 87-89)

For Wright, laws of nature had historically shaped the true art of the world as can be observed in primitive cultures, and from this departure he suggested 'a revival of the Gothic spirit', which was for him nothing more than the organic architecture, believing that it would fit very well to the American spirit as the dream of

[37] Wright also shows his love for Gothic art and architecture in the introduction of this book in a similar way to Ruskin and therefore his affinity with the Arts and Crafts ideas. See the introduction Wright, F. L. (1998). *Studies and Executed Buildings by Frank Lloyd Wright* [1910]. New York: Rizzoli, pp. 33-40.

[38] *Ibid*., p. 33.

freedom and the ideal of democracy. America was also primitive, unspoiled; unlike the Europeans with their traditional forms 'which they are in duty bound to preserve', claimed Wright, 'an American is in duty bound to establish traditions in harmony with his ideals, his still unspoiled sites, his industry, his industrial opportunities, and industrially he is more completely committed to machine than any living man.'[39]

Wright considered the materiality of architecture just like the biological materiality of nature. Life was the indivisible, eternal element in the world that repeatedly formed that biological matter. Accordingly, while his design developed like the blossom he described above, from the seed in the soil to the foliage in the air, he referred to an 'eternal living force, a spiritual force taking forms in time and place appropriate to man.' His precept 'architecture from within' stemmed from that conviction which initially led him to design everything from ornaments, lamps, chairs, doors handles to the building itself, all of which seemingly developed from the same life source. 'I know that architecture is life', he said, 'or at least it is life itself taking form…'[40] Wright was a romantic and a rationalist who favoured the appropriation of technology by organic architecture, so much so that even heating and ventilation 'was to become part of a 'complete work of art' together with sculpture and furniture'.[41] Thus, even the tree form itself, which has been emblematic in the organic discourse since Goethe's analogy between the forest and the Gothic structures, became in the Research Tower for S. C. Johnson and Son Inc. (1950) the equivalent of a man-made, mechanical nature:

> So we went up in the air around a giant central stack with floors branching from it, having clear light and space around each floor […] Cantilevered from the giant stack, the floor slabs spread out like tree branches, providing sufficient segregation of departments vertically [...] All utilities and the many intake and exhaust pipes run in their own central utility grooves, arranged like the cellular pattern of the tree trunk.[42]

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[39] *Ibid*., pp. 34-35.

[40] Wright, F. L. (1998). *An American Architecture* [1955] (Ed. E. Kaufmann). New York: Barnes & Noble Books, p. 18.

[41] Rykwert, Organic and Mechanical, p.18.

[42] *Ibid*., p. 124.

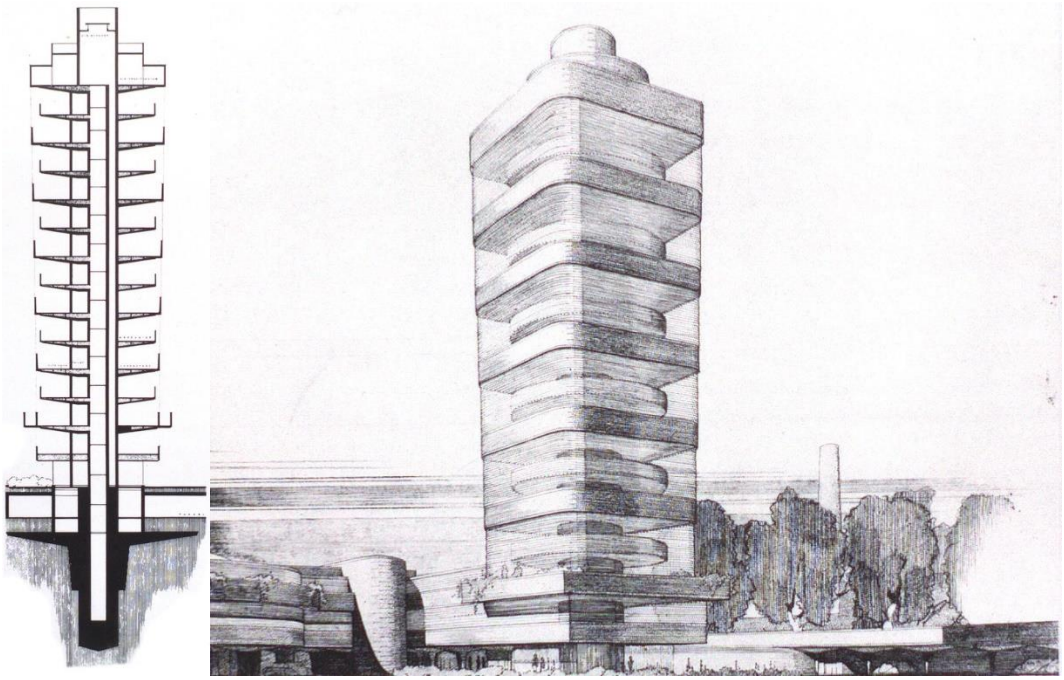

Figure 4, Figure 5. F. L. Wright; S. C. Johnson and Son Inc. Research Tower, Racine, 1939.

It can be seen that the building is rooted like a plant, and the central shaft imitates a plant's nourishing sap by circulating all the necessary systems feeding the laboratories in each floor. (URL-4)

Naturally, Wright was one of the first to consider that the building must grow from the site. The European organic theory took nature as the primary and omnipresent teacher for architecture but largely ignored the location of that supposedly organic artefact within nature. In an organic approach that was growingly becoming identical with the mechanical-scientific conception of the world, albeit in a somewhat spiritual and artistic way, architectural styles derived solely from historical forms or modern aesthetics were problematic. Therefore, the anti-stylistic and anti-historicist organicism of Wright called for the coalition of two contradictory elements: appropriation of the American industry (time) and site-specific design (place): 'we must believe architecture to be the living spirit that made buildings what they were. It is a spirit by and for man, a spirit of time and place.'[43] Neutra literally inherited those two elements and combined them with his philosophy of survival, which is roughly based on the fact that just like every organism in the world, human kind could survive as long as his habitat was harmonious with nature:

[43] *Wright, An American Architecture*, p.19.

> All of our magnificently complex but harmonic sensorial equipment, our original organic character and anatomical structure, and our most biological necessities and traits had evolved out of environmental conditions... And all this had transpired long before the human race had dispersed from its salubrious African incubator into terrestrial, ethnological, and cultural diversity.[44]

Neutra was probably one of the first to consider organic architecture not as a matter of imitation of any organic form or function, but as a response to the conditions of human existence on earth. So he declared that 'the best schooling for our cities' builder and planner is to learn to fathom the biology of being human with our new and current means.'[45] Technology was the 'current means' and that appeared in his thinking as an essential part of the continuous evolution of man. He pointed out the necessity 'to domesticate the machine, seeing it as a potential amplifier of our sensorial, psychological and spiritual vitality'.[46] In *Mystery and Realities of the Site*, Neutra interpreted dwelling not as a need for protection from nature but as a will to shape it into a human environment. He thereby wanted to show that the beginning of architecture was not in the Vitruvian primitive hut that inevitably recalled the evils of nature, but in his will to landscape the nature to achieve poetical as well as physical control over it. Thus, architecture was an extended field for man's poetic and biological existence on earth. But Neutra admitted, like Saint-Maux or Semper long before him, that the primitive man's conception of nature as animated powers had been destructed by the civilisation. His reaction to this fact can be likened to Friedrich Schlegel's lamentation for the loss of the powerful mythology of the ancients that made their poetry superior to that of his age, which took him to claim that a new mythology could only be recreated by the poetic reunification of the arts, science and philosophy.[47] Similarly, Neutra saw in the harmonized use of science and technology an opportunity to compensate for the mythological world that was lost, which could also regenerate a fresh

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[44] Neutra, R. (1989). *Nature Near: Late Essays of Richard Neutra* (Ed. W. Marlin). Santa Barbara, Calif.: Capra Press, p. 30.

[45] Neutra, R. (1951). *Residences*. Sao Paulo: Todtmann & Cia., p. 20.

[46] Drexler, A.; Hines, T. S. (1982). *The Architecture of Richard Neutra: From International Style to California Modern*. New York: Museum of Modern Art, p. 31.

[47] Schlegel, F. (1997). Speech on Mythology [1799], in J. Schulte-Sasse et al. (Eds. and trans.), *Theory as Practice. A Critical Anthology of Early German Romantic Writings* (Minneapolis, University of Minnesota Press, 1997), pp. 182-192.

and deeper contact with nature as psychophysical environment. His scientific theory was therefore still romantic in the sense that it demanded the reharmonising of life through art and science together with a modern sense of the spirit of the site (*genius loci*).[48]

Wright had also underlined that 'Art, Science, Religion – these three will unite and be one, unity achieved with organic architecture as centre'.[49] But Neutra's architectural discourse was moving away from a mere analogy between organic and mechanical.[50] In his thinking, architecture was like the living body that controlled any kind of communication between inside and outside,[51] for which he used terms like 'applied biology' and 'applied physiology'.[52] The environment created by man was the result of his physical, sensory and sentimental responses to the poetic ('mystery') and prosaic ('realities') elements of the world. Thus, in a way more similar to Riegl's *kunstwollen* than Semper's artistic idealism[53], he advocated uniting the objective scientific world, represented by the facts of man's animal nature and technology, with the subjective world represented by man's artistic will, which would lead to the harmonious recreation of the world through architecture. His 'biological realism' also included 'physiopsychological stimulation' - corresponding more or less to what Sullivan had called 'exalted animalism'[54] - as the key to explain human response to the environment.

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[48] In his article introducing the Early-Twentieth Century Austrian critic and supporter of conservative modernism, J. A. Lux, Jarzombek claimed that his 'interest in the Romantic-era concept of genius loci' was a result of 'the strong attachments among German bourgeois intellectuals to the age of romanticism'. Jarzombek, M. (2004). *Joseph August Lux: Werkbund Promoter, Historian of a Lost Modernity. The Journal of the Society of Architectural Historians, 63, pp. 202-219.*

[49] F. L. Wright, An Organic Architecture. Four Lectures at the Royal Institute of British Architects, London (1939); quoted in Zevi, B. (1950). *Towards an Organic Architecture*. London: Faber & Faber, p. 66.

[50] Dodds, G. (2002). Richard Neutra's Venetian Lecture. *ARQ*, (6)3, 257-267. In the lecture published in Domus 233 (1949), Neutra rejected the 'Romantic' conviction that architecture should grow out of the soil.

[51] 'We have to learn to estimate that constant effective interflow of outside and inside: it's our very life.' Neutra, *Residences*, p. 21.

[52] *Ibid*., pp. 25-29.

[53] Mallgrave, H. F. (2005). *Modern Architectural Theory. A Historical Survey 1673-1968*. Cambridge: University Press, pp. 232-233.

[54] Sullivan, *Kindergarten Chats*, p. 45.


Figure 6, Figure 7. Richard Neutra; Tremaine House. Montecito, California, 1948. (Hines, 213-215)

For example, one of Neutra's famous built-works, the Tremain House (1948) was fronted by a large tree like in many of Wright's houses as if to point out the hierarchical arrangement of reinforced concrete structural elements: 'so nature too goes from the rough bark to the thin-veined leaf'.[55] However, the relationship of the house with its site is much more complicated than what the general organicist tectonic rhetoric suggests. Here, architecture and nature (landscape) mutually extends and blurs the limits of interiors and exteriors. While the heating coils underneath the patio of the west terrace makes the exterior climate mechanically controllable, the sliding glass walls of the living room does the same for the interiors naturally by letting wind and light to penetrate when needed. The horizontal extension of the ground plane outside the walls of the house acknowledges the physical comfort of the human body attained by the cultivation of a piece of land taken from nature. Even the peaceful views from inside and outside were arranged to fulfil the psychological needs of man in relation to perception, which had been evolved from the need of self-protection and spatial control. After all, Tremain House gives the impression that the apparent opposition in Schindler's Kings Road House (1922) between the needs of protection and nourishment from nature which formed cave-like interiors in contrast to open-air spaces like a garden with fireplaces and a roof terrace with beds, has been completely resolved to eliminate the primordial anxiety of man in a controlled environment.[56]

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[55] Neutra, R. (1951). *Mystery and Realities of the Site*. New York: Morgan & Morgan, p. 28.

[56] Gebhard likened the adobe-like concrete slabs of Schindler to the works of Irving Gill. Gebhard, D. (1980). *Schindler*. Santa Barbara: Peregrine Smith, pp. 50-51. The inspiration of the 'sleeping baskets' can perhaps be seen in a work of another representative of the 'California Style', the Gamble House built by Charles & Henry Greene in Pasadena,

Assimilation of the Organic by the Mechanical

The expansion of the traditional architectural setting into a controlled environment with interpenetrating open spaces and enclosures is, in Leatherbarrow's words, 'a decisive turning point in the art of spatial definition.'[57] However, Neutra's theory may have promised more than what his practice did for the future of architecture. Although he never wanted to be radically innovative as, for example, Wright and Le Corbusier who built hermetic machines for living in such buildings as the S. C. Johnson Headquarters in Racine and Salvation Army in Paris, his writings signalled a more consistent scientific conception of architecture than these masters of invention. Until Neutra, the organic theory of architecture could assimilate the objectifying effects of scientific rationalism through the revolutionary activities of the artist. Neutra also belonged to that tradition, but he was probably one of the first to consider architecture as a built environment that transforms and controls nature to fulfill the physio-pyschological needs of man.

Neutra's romantic attempt to combine scientism with artistic creation remained an active but unfulfilled desire for the rest of the Twentieth Century, although incorporating environmental systems in buildings became the main challenge in American architecture as E. Saarinen, L. Kahn, the SOM and many others tried to hide machinery behind façades, suspended ceilings or organically shaped structures.[58] On the other hand, international movements deserving to be called 'futurist'[59], such as the New Brutalism, Archigram or Japanese Metabolism, were all for the abolition of the artistic 'rhetoric' altogether. The ideas about world planning and ecology disseminated by Buckminster Fuller and his entourage also supported the futuristic scientific approach.[60] Meanwhile, the public awareness of ecological problems increased pessimism, bringing up the issue of man's growing dependence on technology for survival, which may have facilitated what was once organic to be reformulated as 'environmental' and 'ecological'. For example, the Willis, Faber & Dumas Offices designed by Foster Associates in 1977, which

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1908. See Banham, R. (1969). *Architecture of the Well-Tempered Environment*. London: The Architectural Press, p. 103-4.

[57] Letherbarrow, D. (2000). *Uncommon Ground: Architecture*, Technology, and Topography. Cambridge, Mass.: MIT Press, p. 28.

[58] Banham, *Architecture of the Well-Tempered Environment*. See chapter 10.

[59] Mallgrave, H. F.; Goodman, D. (2011). *An Introduction to Architectural Theory: 1968 to the Present*. West Sussex: Wiley & Blackwell, pp. 3 ff.

[60] *Ibid*., p. 5.

appeared in the second edition of the *Architecture of the Well-Tempered Environment*, incorporated reflecting glass walls and a lawn on the roof for the 'economy in environmental power control'.[61]

Figure 8. Willis, Faber & Dumas Offices designed by Foster Associates. Ipswich, 1977. (URL-3)

Following the emphasis on the ever-growing influence of the machine on man's recreation of his world in Giedion's *Mechanization Takes Command* (1948), Banham's *Architecture of the Well-Tempered Environment* (1969) may be the first to present architectural developments with the urge to create artificial environments for physical comfort. He advocated an architecture which would not merely imitate scientific rationality as did the International Style, but one which would embrace it – a case which he believed Giedion took first, albeit without elaboration. Banham demanded a new definition of architecture, one which hinged on the building as built environment that changed the conditions imposed on it by nature, instead of on a structural system that symbolically imitated nature.[62] This was no doubt the negation of the organic theory of architecture, which had evolved from its Classical origins into a biological analogy that favoured structure and function before representation.

A significant formulation of organic architecture by Bruno Zevi (*Towards and Organic Architecture*) in 1945 had overlooked the crucial change brought by the continuous transformation of organic into its mechanical other. For Zevi, organic meant 'to make architecture more human'; it is an architecture that freely develops from within in space and as space to meet human needs both inside and outside, unlike the 'theoretic' architecture of the Europeans in the '20s and '30s, which

[61] Banham, *Architecture of the Well-Tempered Environment,* p. 290.
[62] *Ibid*., p. 12.

imitated the appearance of machines for aesthetic reasons.[63] For the same reason, Zevi promoted the architecture of Wright despite its apparent formalism. In fact, as Banham would point out, modern power systems could easily obviate the conflict between stylistic and organistic motivations for form-giving.[64] This is why Banham also ignored Wright's formalism and underlined how he, as the most talented heir of a long tradition of American innovation in domestic structures, treated a building like a machine to ameliorate the conditions of comfort. Similarly, Banham showed that the hermetic glass box could become efficient thanks to power systems, as SOM's and Mies' skyscrapers from the 1950s on proved, where 'function follows form' to quote Mies.

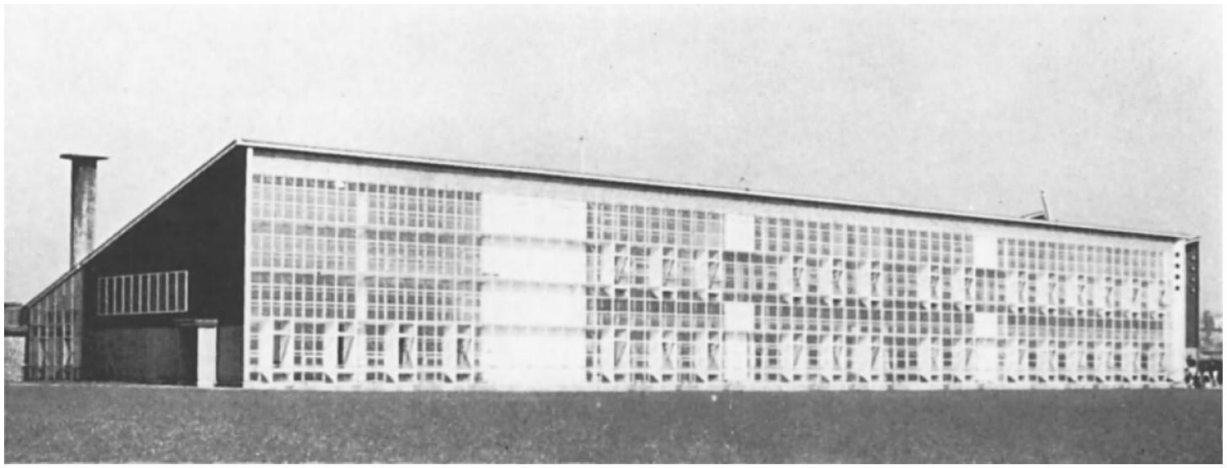

Figure 9. The 'solar wall' of Emslie Morgan's St. George's School. Wallasey, Cheshire, 1961. (Banham, 1969, 280)

Banham's text did not directly deal with the ecological architecture; instead, he occasionally used such words as 'power-operated environment', 'consuming power' and 'environmental power' while referring to mechanical systems in buildings. However, the 'energy budget' he brought up in the additional chapter of the 1984 edition signals that ecological environmentalism is to be the natural outcome of an architecture conceived as a power-consuming machine. In fact, Banham did not present the environmental control to depend solely on either the machine, or natural ventilation and solar heating. He seems to have approved a harmonious mixture of both as in Wright's prairie houses before 1910, or in a school by Elmslie Morgan from 1961 with a 'solar wall', but he could be as radical as to

[63] Zevi, *Towards An Organic Architecture*, p. 65.

[64] Banham claimed that the air conditioning system freed 'the performance from form'. *Architecture of the Well-Tempered Environment*, p. 310.

point out the space capsule for a fully controlled environment,[65] implying that the future is there. The image of astronauts in space suits gives that theme very well, which sets doubts on the future of architecture because the more the environmental technology becomes the specialists' expertise, the more it tends to slip away from the grasp of the architect.

CONCLUSION

Organic architecture was born from the contradictory interaction between scientific and romantic interpretations of nature. In their efforts to unite functionalism as expertise with the seemingly natural inception of an artistic style, the Modernists continued the contradictory nature of organicism during the Twentieth Century. With the ecological trend of today, however, nature is exclusively understood as a system of transformations to be analyzed and manipulated as much as possible.

Therefore 'organic architecture', which has been but an analogical rhetoric so far, is about to assume a literal application with the help of innovative technology.[66] Roughly speaking, an ecological building is based on the goal of achieving maximum comfort with minimum damage to the environment. So, an ecological building 'survives' as it transforms elements just like a biological organism, whether solar heat into electricity or waste into cooking gas. As technology provides opportunity for architects to free the form from the tradition, the ecological trend may prioritize the recreation rather than the regulation of the environment, thus making nature identical with its mechanical aspects simulated by the building. In a short film by the firm Foster & Partners presenting the Masdar City project of Abu Dhabi, which was intended to be the world's first carbon-neutral, zero-waste city, the term organic is used to define the mechanism of a 'system' related to the production and consumption of energy, ventilation and recycling of water.[67]

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[65] *Ibid*., pp. 280 -289.

[66] See for example Galloway, A. (2014). When Biology Inspires Architecture: An Interview with Doris Kim Sung. (URL-1)

[67] 'Organically-based systems combined with solar and wind collectors balance carbon emissions and reduce the inhabitants' footprint'. Abu Dhabi Future Energy Company, 'Masdar City'. (URL-2).

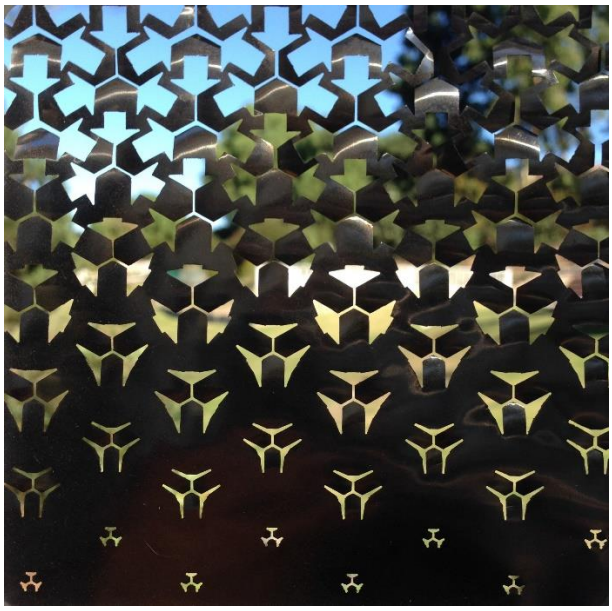

Figure 10. Doris Kim Sung's self-shading, self-ventilating, and self-operating "smart" skin. (URL-1)

The faith in architecture as artistic creation still holds among contemporary architects who build with high-tech materials and equipment in such a manner that the result is supposed to be ecological and artistic at the same time. But the prolonged romantic status of the architect as 'artistic creator' is already changing as s/he is becoming an expert for the application of techniques of ecological habitation. There is no doubt that this process will bring organic and mechanical even closer; but it is the very loss of that distance between the two concepts that threatens the poetic content of the relationship between nature and artefact. The problem with the growing identification of organic with mechanical in architecture may be explained as the conversely growing rupture between *poiesis* and *praxis*, which has already surfaced in different episodes of the romantic thinking as the loss of the mythological world.

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