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Various Approaches of Study in Biomimicry

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Abstract - *Biomimicry is the knowledge that focuses its study on nature's time tested patterns and life processes in order to pull out ideas and thereby mimicking those thoughts in order to solve complex human engineering tribulations. The nature has always been a major source of motivation since the life forms appeared on this very planet. The engineers as well as designers always looked into the nature when their problems become more intricate and hence they viewed nature as a guaranteed innovation obtaining source due to its gigantic experience and years of survival. The new technologies such as bullet train, diving suits etc. emerged as a result of study in molecular as well as atomic levels of examination. Computers have been a much classy tool for humans since its contraption. Without the aid of this tool, the analyzing and way of mimicking will be very thorny. It's true that way of mimicking is very complex, but still the use of computers has well reduced this intricacy of mimicking through replication and computing.*

Key Words: Biomimicry, Computation, Simulation, *Mimicking,* Anatomy

1. INTRODUCTION

As, the twentieth century was an age of physics, predictions says that the forthcoming twenty first century will be an age of biology. Biology has now conquered physics due to the participation of biology in several foremost inventions." Biology has dominated physics when measured by its economic consequences, by its ethical allusion or its effects on human welfare [1]. The ancient Greece have referred the organisms at macro as well as micro stage in order to have a precise percentage of their models which they painstaking as the secret code of their beauty and harmony of that period. Hence biomimicry has also patent its importance in the pasture of architecture since that time. The inventions such as Velcro band fasteners, robotic joints etc. in the ground of engineering was also the yield of brainwave from the same old biomimicry. These examples point towards the end result of biomimicry. Even though biomimicry can be regarded as a source of boundless ideas in nearly every field where it finds its appliance, people are not focusing much on this field due to the reason that this advance seeking method is very time consuming. The engineers as well as designers and architects must comprehend the fact that the scheme even though time consuming, is a fail-safe pioneering technique that has its roots laid in promoting sustainable development. The biologists along with these groups of engineers, architects and designers must work collectively in order to hit upon the unseen novel ideas as well as to zip the rate of development.

2. BIOMIMICRY- A DETAILED REVIEW

Biomimicry is also recognized as Biomimetics or occasionally Bionics even though sense is all the same. For the last ten years, this field has captured curiosity of many individuals like biological sciences writer Janine Benyus, professor of biology Steven Vogeland professor of biomimetics, Julian Vincent, who have all written comprehensively in this subject. Julian Vincent defines it as 'good design abstracted from nature', whereas Janine Benyus defines it as 'the conscious emulation of nature's genius'." (Micheal [2]). Even though the words 'Biomimicry' and 'Biomimetics' are all the same, the former is connected to nature motivated sustainable development whereas the latter is used in field of function for military purposes.

3. BIOMIMICRY- A FRAME WORK

3.1 various approaches

There are basically 2 types of approaches, namely Top down approach and Bottom up approach. Top down approach is prepared in such a mode that the definition of human problems are done first; then only after that the engineers along with biologists and architectures look for the organisms that contribute to analogous taste of the process. Bottom up approaches the process of identifying the life processes of a range of organisms and studying their process of problem solving thereby administrating these peculiarities in human problems. (Biomimicry Guild, 2007). Top down approach (Jean [4]) as mentioned prior in the process of unfolding human problems and judgment solutions by mimicking the nature's time tested patterns and processes

The different steps in Top down approach are as listed below:

1. Design problem.
2. Search for biological analogies.
3. Identification of appropriate principles.
4. Abstraction, detachment from biological model.
5. Testing, analysis and feedback.
6. Design solution.

Similarly, the different steps in bottom up approach include:

1. Biological research.
2. Biomechanics, functional morphology and anatomy.
3. Understanding the principles.
4. Abstraction, detachment from biological model.
5. Technical implementation.
6. Design solution.

3.2. Biological research

Biological investigation involves research on diverse biological organisms or life processes at both micro as well as macro levels. Whether it is a top down or bottoms up approach, the biological research is the heart of a biomimicry. Meticulous learning of organisms is awfully indispensable for obtaining insight from them so that we can impersonator their fashion of solving problems.

3.3 Biomechanics, functional morphology and anatomy

Biomechanics is the study of the structure and function of biological systems such as humans, animals, plants, fungi, and cells by means of mechanics. Biomechanics is closely correlated to engineering since it uses conventional sciences of engineering to scrutinize biological systems. Biological systems are a lot more multifaceted than man built systems. Hence numerical methods are applied in nearly every aspects of biomechanical study. Investigation is done in an iterative process of proposition and corroboration, including a number of steps in modeling, computer simulation and investigational measurements. Fig 1 shows the structure and function of biological systems known as the biomechanics. Fig 2 shows the functional morphology of different organisms. Fig 3 shows the anatomy of human body.

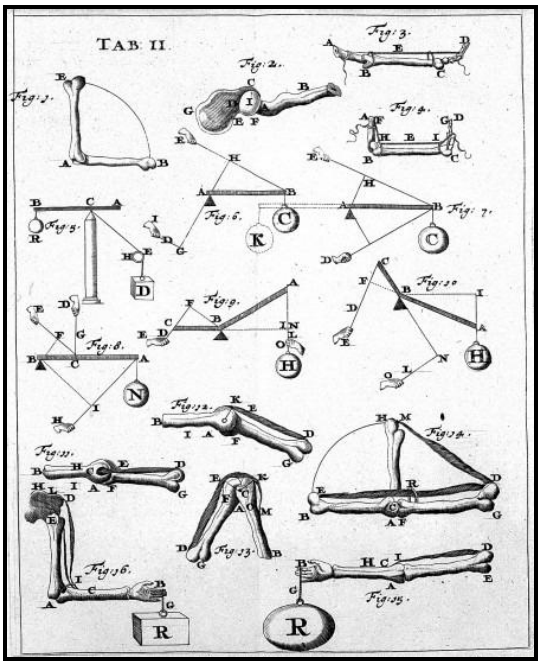

Fig.1. Biomechanics [Ref. from internet source]

Functional morphology involves the learning of associations connecting the construction of an organism and task of various parts of an organism. The old adage “form follows function” is a guiding standard of functional morphology. The task of an organ appendage, tissue, or other body part dictates its form.

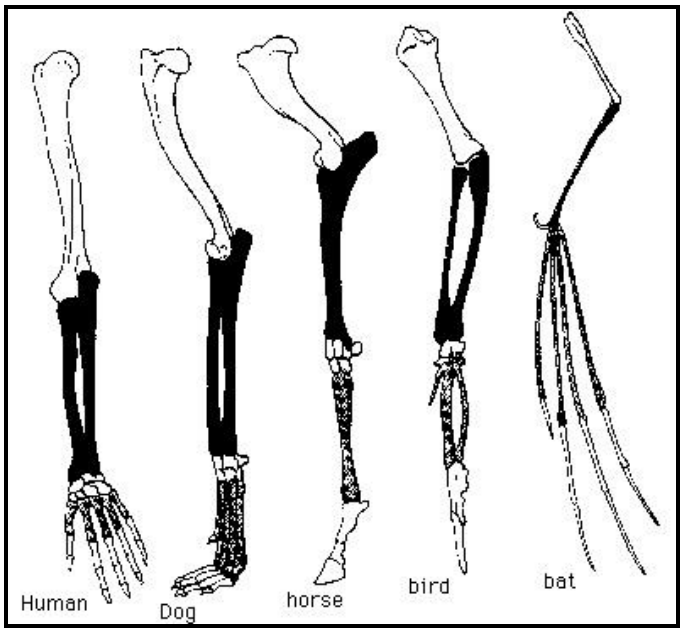

Fig.2. Functional Morphology [Ref. from internet source]

Anatomy is the dissection of science fretful with the bodily structure of humans, animals, and supplementary living

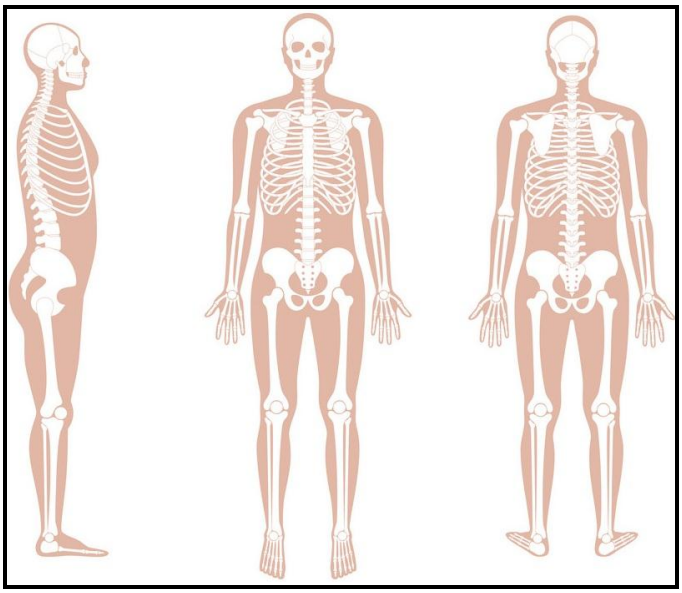

Fig.3. Anatomy of human body [Ref. from internet source]

organisms, in particular as exposed by itemization and the partition of parts.

3.4 Understanding the principles

The lively morality of nature and organisms should be evidently being implicit in order to wholly understand the true denotation and life of biomimicry. As this field has its pedigree in the nature itself, indulgent the principles are also of enormous importance.

3.5 Abstraction, detachment from biological model

This step involves abstracting and flaking of ideas from biological models that demonstrate the eminence to get muse in order to add those qualities in to accessible technologies for improving competence and for solving existing problems. This step is finished only after conducting a thorough learning of the biological sculpt that took into concern for obtaining inspiration.

4. CONCLUSIONS

This paper demonstrates how a way of loom must be chosen while dealing with biomimicry. The paper mainly points out the liberty of an engineer, biologist, architect or a designer in choosing of top down or bottom up approach for encouragement and pronouncement solution for the problem an engineer, biologist, architect or a designer encounters.

The most recent research conducted in this field helped to comprehend a lot about natural forces, structures etc. that shows the potential for taking inspiration in order to crack problems. Through this paper, it is concluded that biomimicry is not just mimicking the natural processes as it is but, it is a process that ought to be completed in such a way that the ideas extracted through inspiration is clubbed along with the engineering as well as architectural principles for better accomplishment of that idea in to live out. Hence the true meaning of biomimicry should never be misinterpreted.

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