

ART 2650, Introduction to Design Process and Programming
Fall Semester 2020

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Concepts In Design: Nature As A Model: "Bio Mimicry" (For Human Designing)

What is 'Bio Mimicry'?

- **Biomimicry** or **biomimetics** is the examination of nature, its models, systems, processes, and elements to emulate or take inspiration from in order to solve human problems.
- The term *biomimicry* and *biomimetics* come from the Greek words bios, meaning life, and mimesis, meaning to imitate. Similar terms include **bionics**.

(From Wikipedia)

What is a 'Concept' in Designing?

A concept is a statement, usually written, that expresses what it is that the designer is aiming for, in an overall sense, in a project.

A 'holiday' is a concept.

A 'seaside holiday' is more specific.

There can be yet more detail: a beach holiday, a yachting holiday, a bird-watching holiday, an adventure holiday, etc.

The value of concepts is that we can use them to 'breed' ideas.

Concepts can be categories of functions or an assembly of things or activities.

An 'activity' is a concept. A 'game' is a more specific concept. 'Football' is yet more specific. The match between two specified teams is the actuality.

Concepts in design may be very broad, or very specific

An architectural concept for a project could be:

- Transparency
- Horizontal & Vertical Forms and their visual effects
- Integration With Nature
- Pathways; designing spaces as sequential experiences
- Inside & Outside Relationship

A Design Philosophy

- A philosophy is a bigger, grander, statement of a designer's professional world view.
- Design philosophies are fundamental guiding principles that dictate how a designer approaches his/her practice.

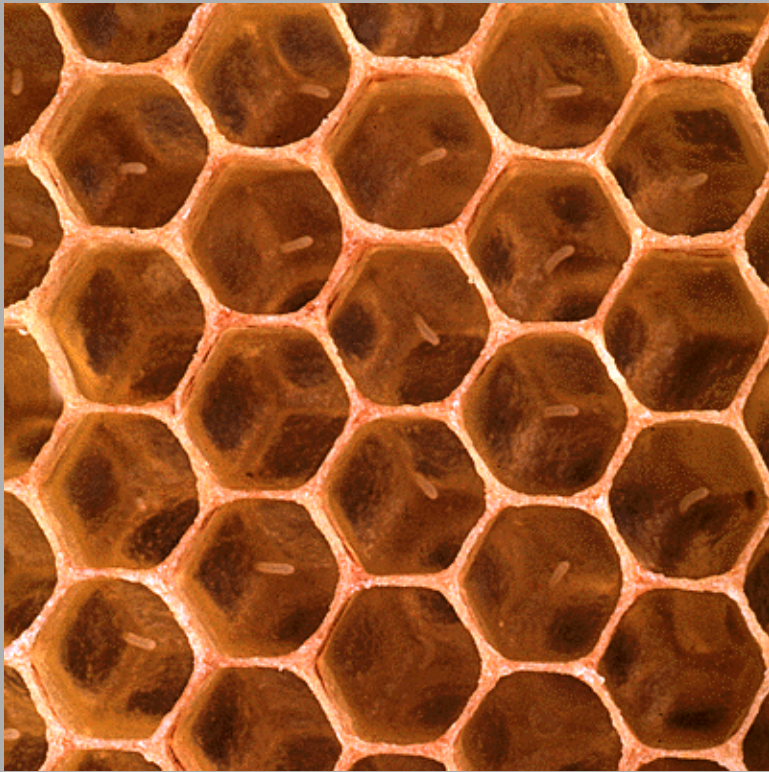
Contemporary Approaches to Design Reflecting a Design Philosophy

- Site Specific Contextual Design
- Bio Mimicry
- Parametric Design
- Environmental Design
- Social and Behavioral Design
- Deconstructivism

Nature & Design

- Using biological form and functionality as the basis for man made works of design is referred to as 'biomimicry.'
- The natural world is one of inter-related systems; eco systems, support systems, survival systems.
- There is a popular move in current design to look at the natural world and to try to mimic the ways it works in the human built world.
- Forms in nature are sometimes geometric, and sometimes not.

Product & designer/fabricator
a precise geometry





A wasp's nest
not an obvious geometry



A Fabricator & Designer



A water barrier and a residence constructed by beavers



Section through a beaver's dam

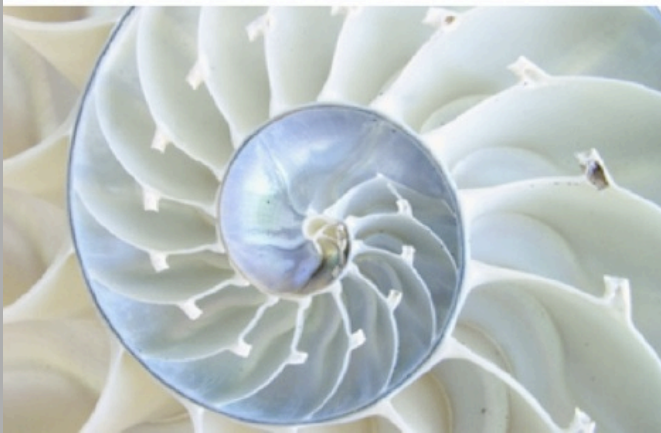
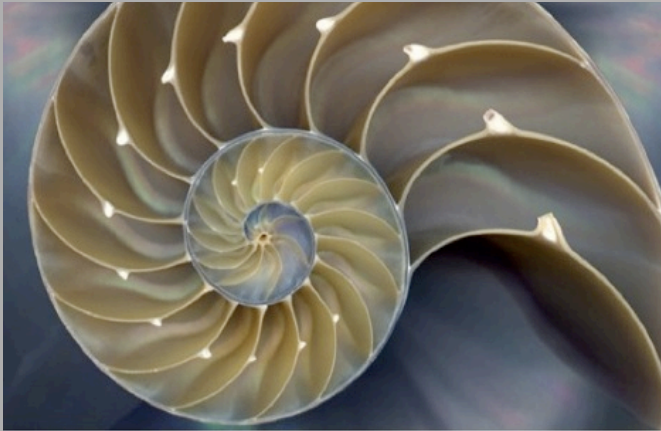
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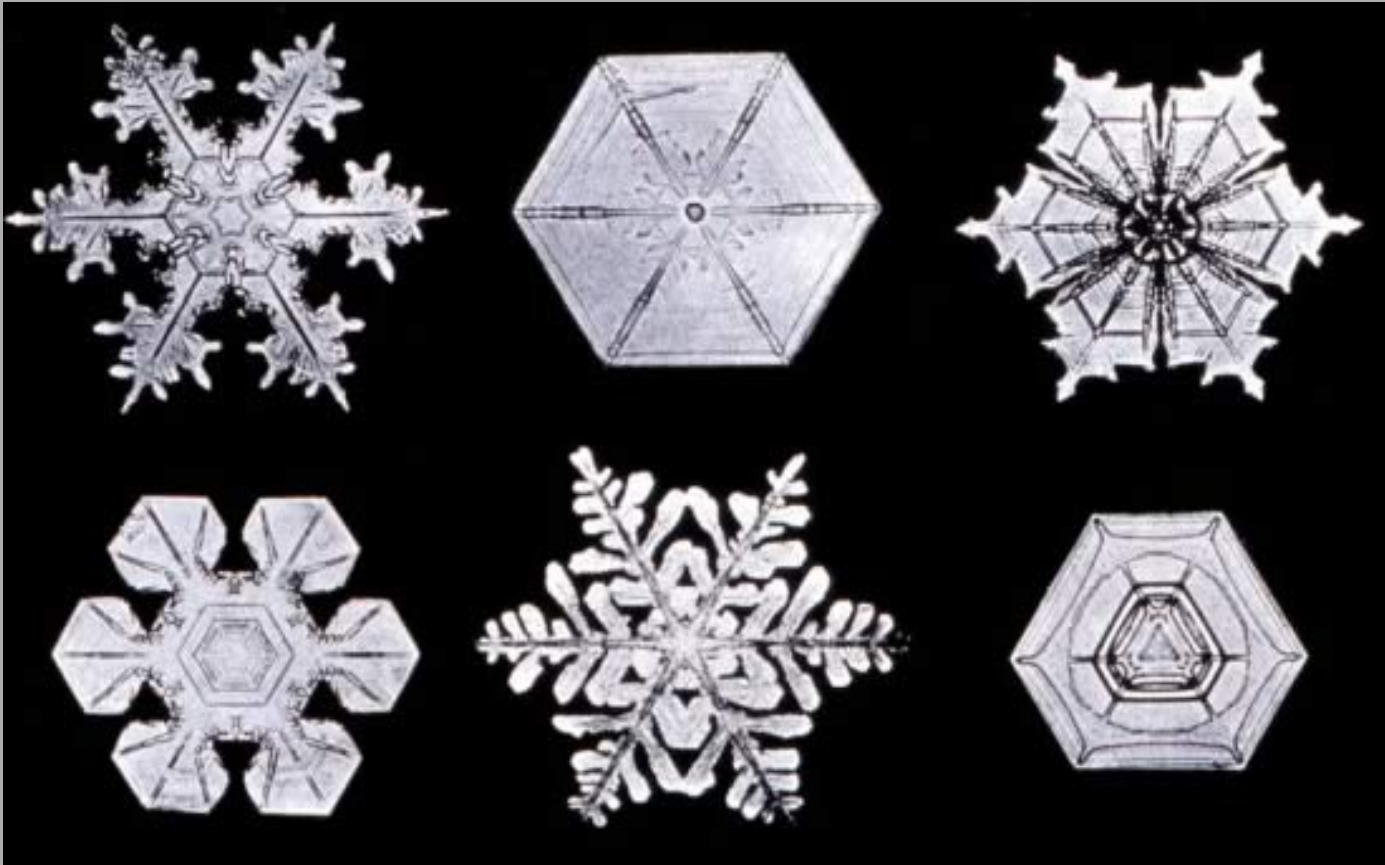
Bird's nests



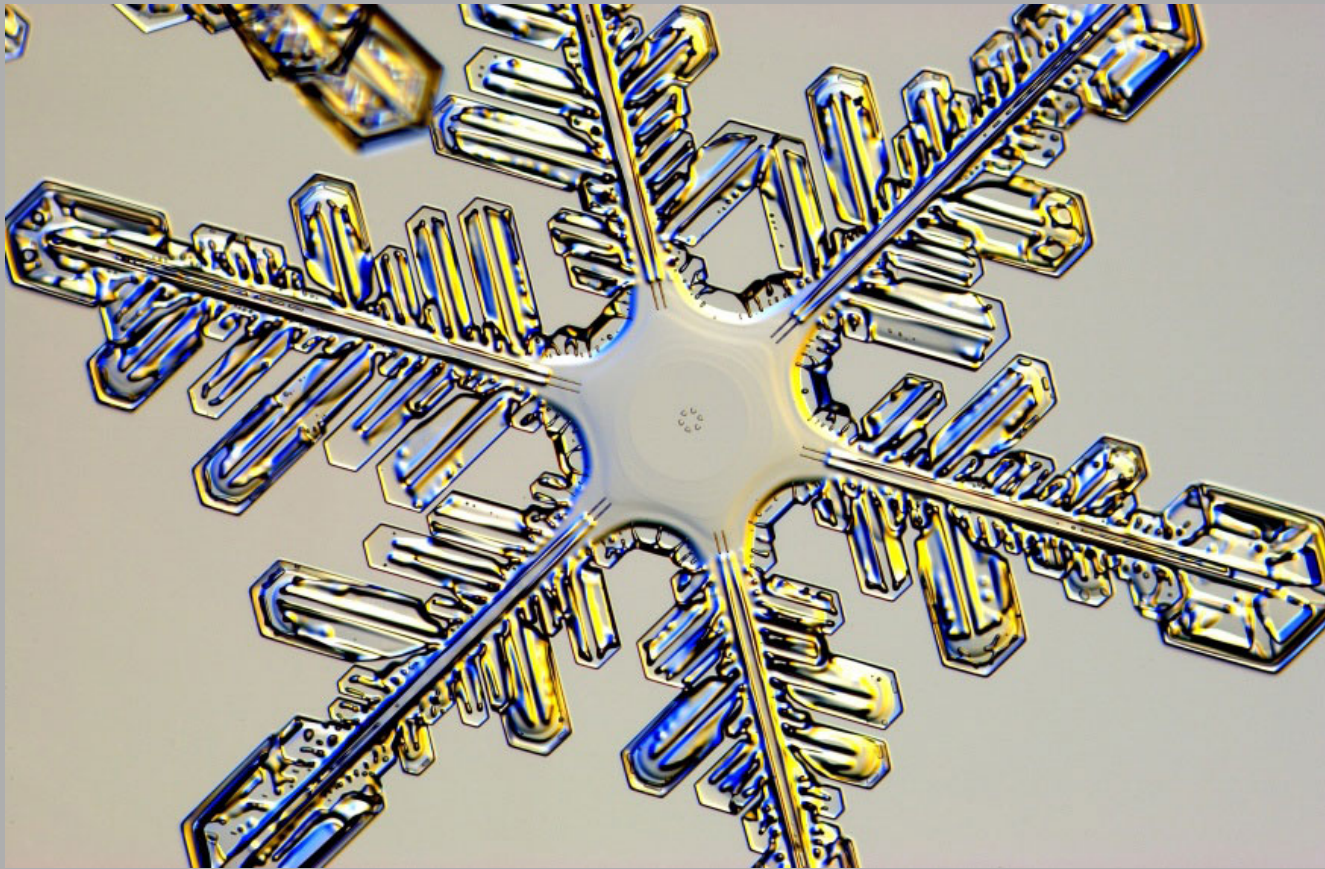
The chambered Nautilus shell



Wilson Bentley, a Vermont farmer, took photographs of snowflakes under a microscope as a hobby. These photographs were published in the “Monthly Weather Review” in 1902.



Snowflake



Snowflakes



Flowers exhibit pattern
not to mention color and form





Elevation & Vertical Section
through a pine cone





A chestnut exists within a system of components and processes that tie together the cosmic and the molecular; sunlight, atmosphere of water and gases, nutrients, and a relationship to other creatures and plants all of whom are partly or fully dependent upon one another for survival.





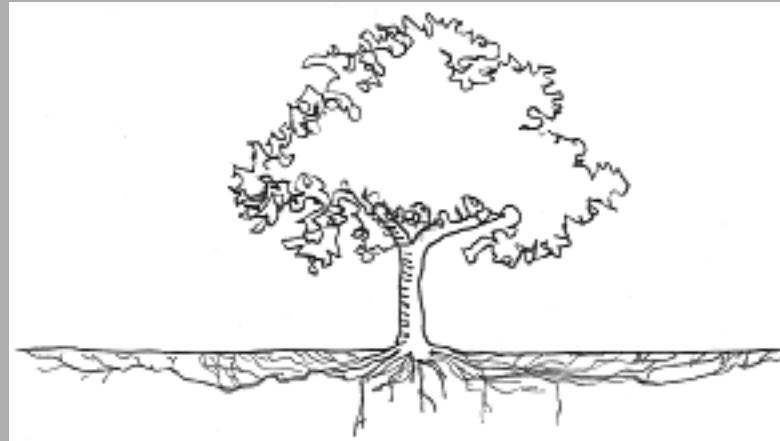
Live Oak trees in Georgia



An Angel Oak tree in South Carolina



Most roots are relatively shallow (three feet or less deep) with most roots within 12 inches of the surface. Roots extend well past the canopy drip line. Taken from University of Minnesota Sustainable Urban Landscape Information Series



Roots are like building foundations: they support the physical parts above them and anchor the tree to the ground. Roots draw in water and nutrients.

A temple in Angkor, Cambodia (left)



African Baobab tree



Fast-growing and robust, bamboo is a popular alternative to hardwood. Should you believe the hype? *Slate* recently performed a *bamboo audit*. *The carbon sequestering grass has a lot going for it, but buyer beware: that bamboo floor doesn't seem so green if it was planted at the expense of native forests, grown with pesticides, and sealed with formaldehyde..*





Structure, order, form, hierarchy, line, plane, volume.



Sparrow feathers



Peacock feathers





Peacock with feathers





A Great Horned Owl



A masked weaver and a Spoonbill



Penguins



Toucan, of Central and South America



Oystercatcher

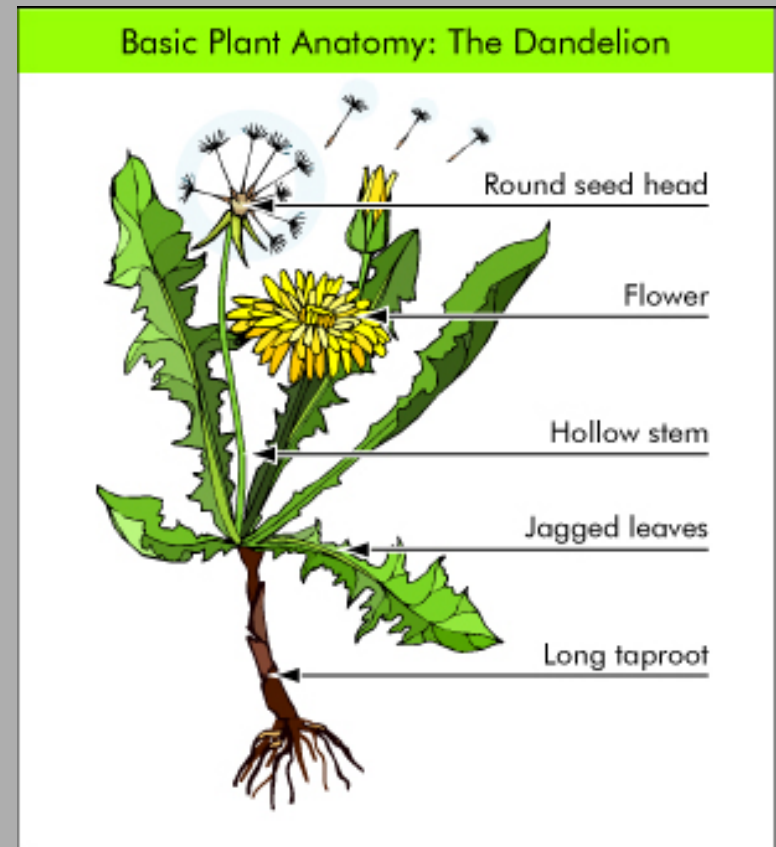


A blue jay and a rock bird





Part of the system shown in a holistic image



Bio Mimicry

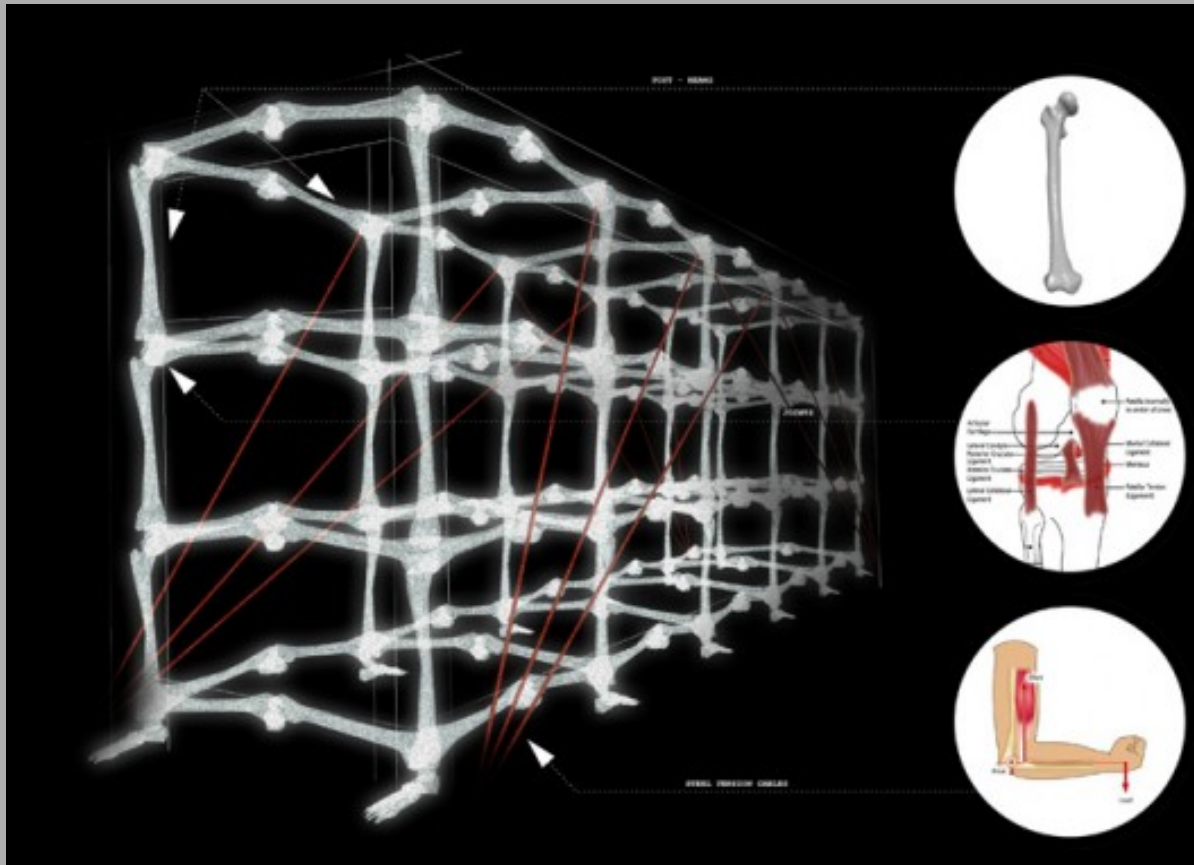


Bio Mimicry

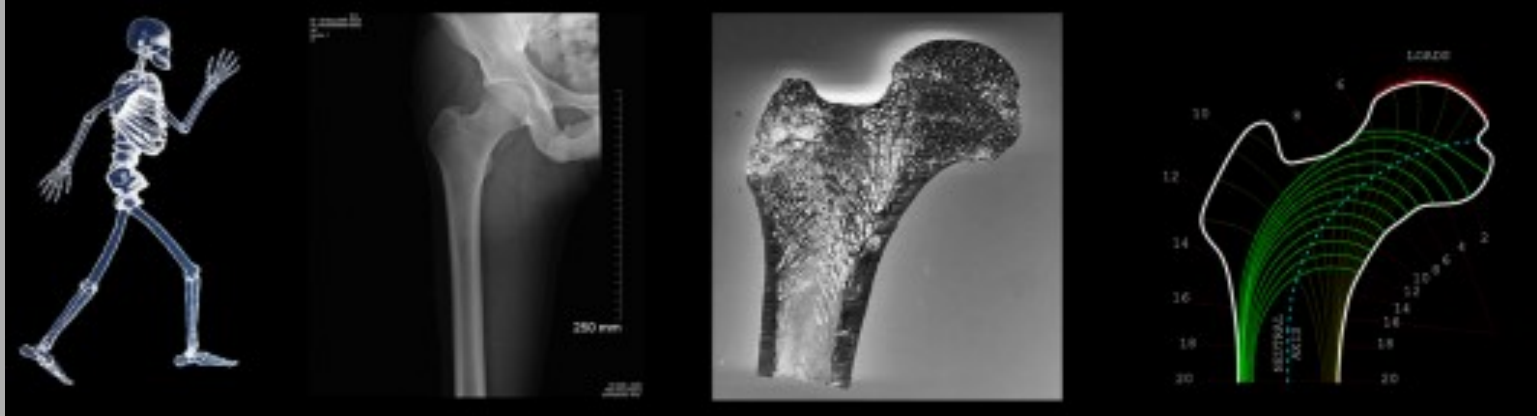
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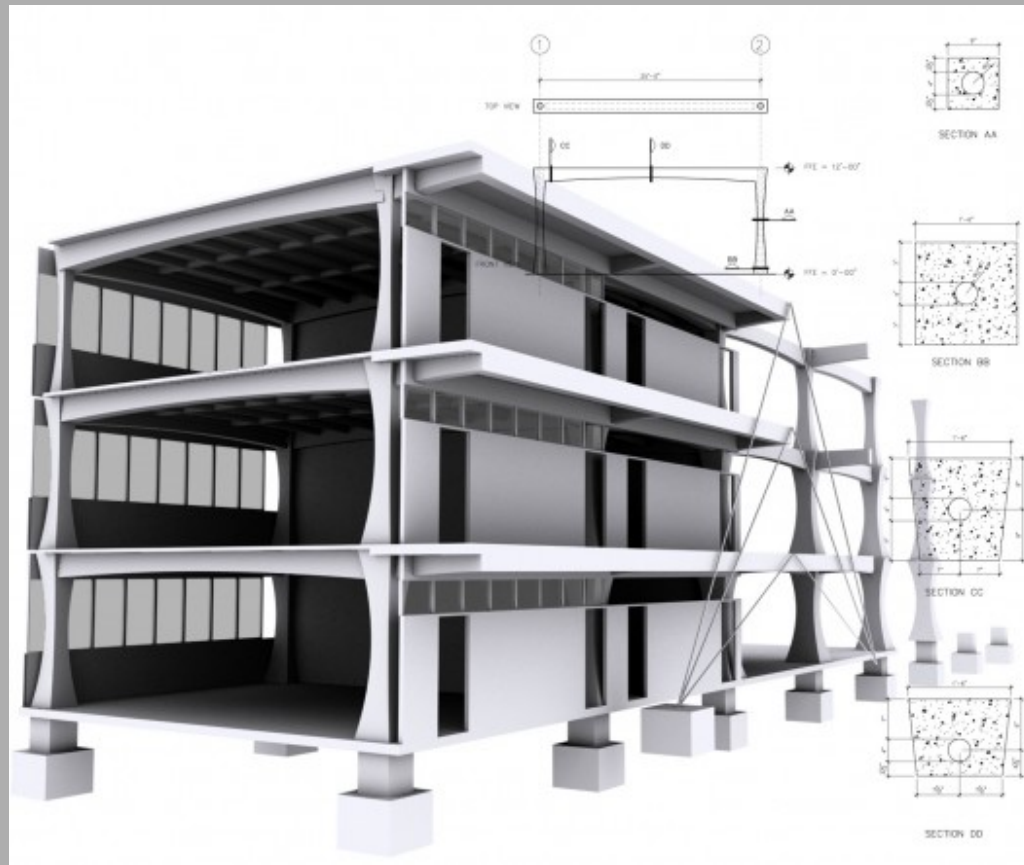
The philosophy of biomimicry assumes Nature as a constant of reference to a performance-based beauty for design.



Imitating nature has become a meaningful approach for contemporary architects and design futurists to the built environment, especially for those who foster a future that doesn't compete with nature but coexist with it.



Building structural system designed using a model of bone strength and shape



On a somewhat less serious note,
the 'Biomimicry Shoe'
designed by Marieka Ratsma and Kostika Spaho







'Vegetal Chair' by Ronan and Erwan Bouroullec
Mercedes Benz Bionic Car Skeleton



Bio mimicry



Joris Laarman chairs

inspiration from the way bones grow



Joris Laarman tables



Once again the humans copy Mother Nature



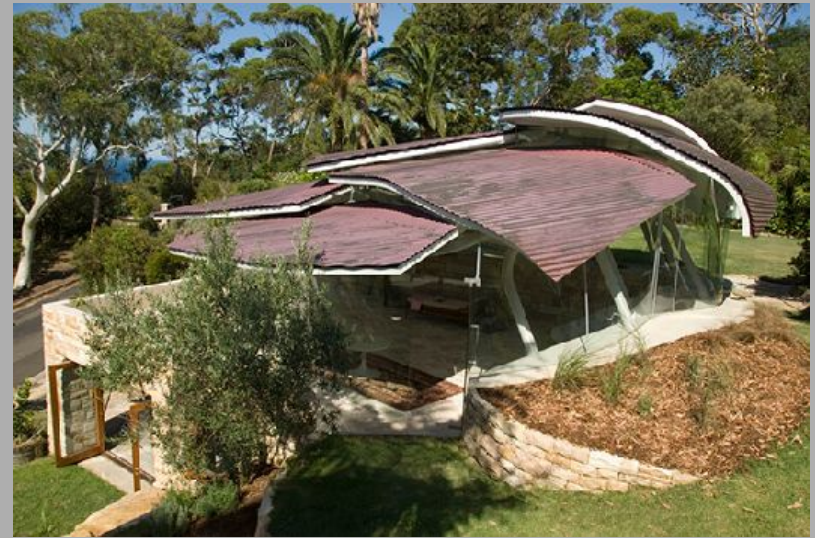
Buildings Inspired by Nature

9 Architectural Wonders Inspired by Nature

Google search 'architecture inspired by nature'

Wow!

The Leaf House, by Undercurrent Architects Australia







Zaha Hadid

Ideal House

Cologne, Germany

natural and biological forms such as bones, cells, and flowing water



Zaha Hadid

Avilon Triflow water faucet

Inspired by the fluid movement of water. The design by Zaha Hadid Architects creates a form derived from the internal movements of water, as a single fluid gesture, where all parts are meant to convey the continuous flow between tap, work surface, and basin.



Zaha Hadid
Hauser and Wirth Table



Zaha Hadid web page
<http://zahahadid.vm.bytemark.co.uk/>

- The process of creating Zaha Hadid's unique exhibition design was similar to carving a sculpture from solid blocks of material.
- The table and shelf were made through a combination of hi-tech and traditional craftsmanship. The newest automotive manufacturing techniques are used to whittle solid blocks of aluminium into the basic shapes of leg and tops.
- Each piece is then hand polished, welded and polished again by expert craftsmen in the Midlands to create a singular seamless piece.
- Table and shelf become an organisation of three separate pieces suited to the gallery and its walls, which are constructed of fabric stretched over a framework, like a canvas.
- The display can be rearranged after the exhibition into an array of combinations.



Ayodhyatra's Moss Table

made using dried moss

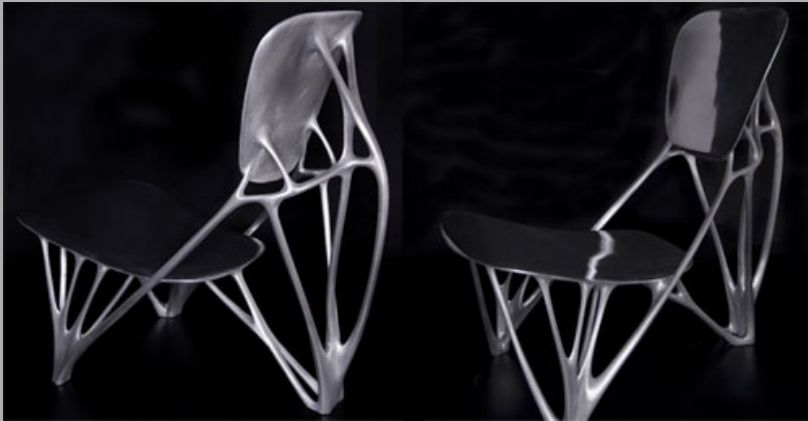


Designer Jukka Lommi created the stylish Koura Chair wooden seating for the Punkalive furniture manufacturer based in Punkaharju, Finland. The chair features a seamless wood shaped into a beautiful geometry, manufactured from Kerto, a laminated veneer lumber product manufactured by Finnforest.



Bone Furniture by Joris Laarman

Aluminium chair is the first in a series of works which are designed according to the way bones develop; growing where strength is needed, and shrinking where it is not.



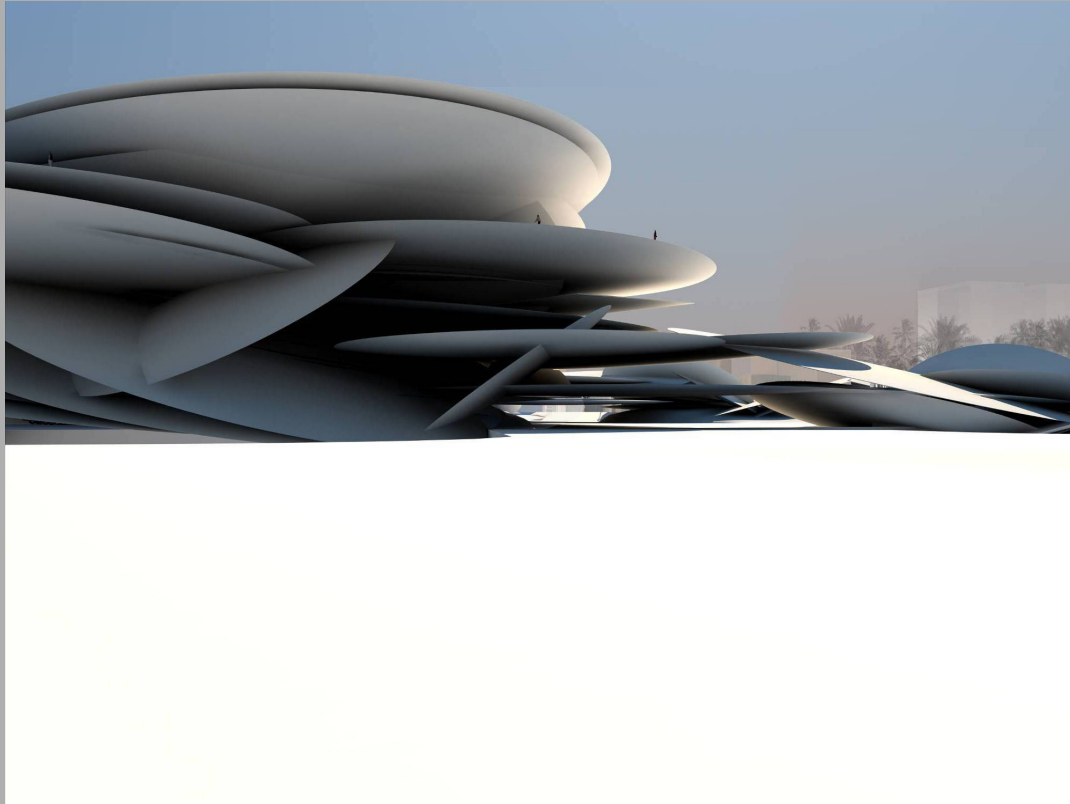
Bookshelf by dbd Studio.

Contemporary digitally fabricated bookshelf designed with organic curving surface and made of 17 sheets of 3/4" birch plywood created by dbd Studio for a condo in Washington, DC





Jean Nouvel's National Museum in Doha, Qatar.



A gypsum rock called a 'desert rose'.
Jean Nouvel used this natural form as the direct 'inspiration' for his National
Museum in Qatar.





A mobile home environment



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