



FROM THE EDITOR'S DESK

Hello Readers,
Welcome to the very first edition of Life: E-Newsletter for the academic year 2019-20.
Life provides a platform for the budding writers and photographers from different life science background to present their work.

It is said that the beauty of nature inspires many! Nature has immense creativity hidden in its every element which is now being appreciated and incorporated by some Designers and Engineers around the globe. Biodesign is one such field of interest where designers get their inspiration from nature and mimic its functioning in their work to provide a better model of interest.

BIODESIGN, an integration of biology with designing, what better can the theme for this year be?
We have tried to include the best and the most interesting articles. We are sure that all the readers will find it interesting and enjoy reading this edition.

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Sakshi Poojary
Editor of Life E-Newsletter, 2019-2020

LIFE E-NEWSLETTER

“WHEN THE FOREST AND THE CITY ARE FUNCTIONALLY INDISTINGUISHABLE, THEN WE KNOW WE HAVE REACHED SUSTAINABILITY.”



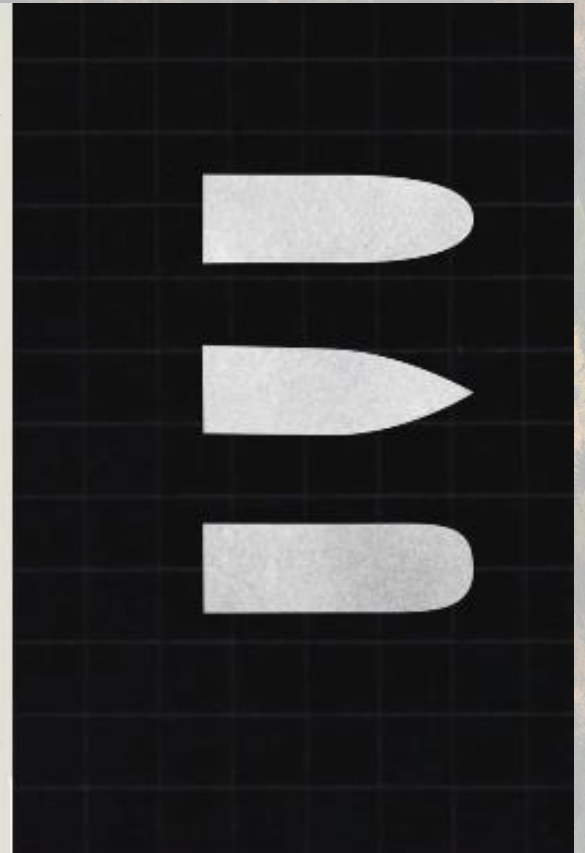
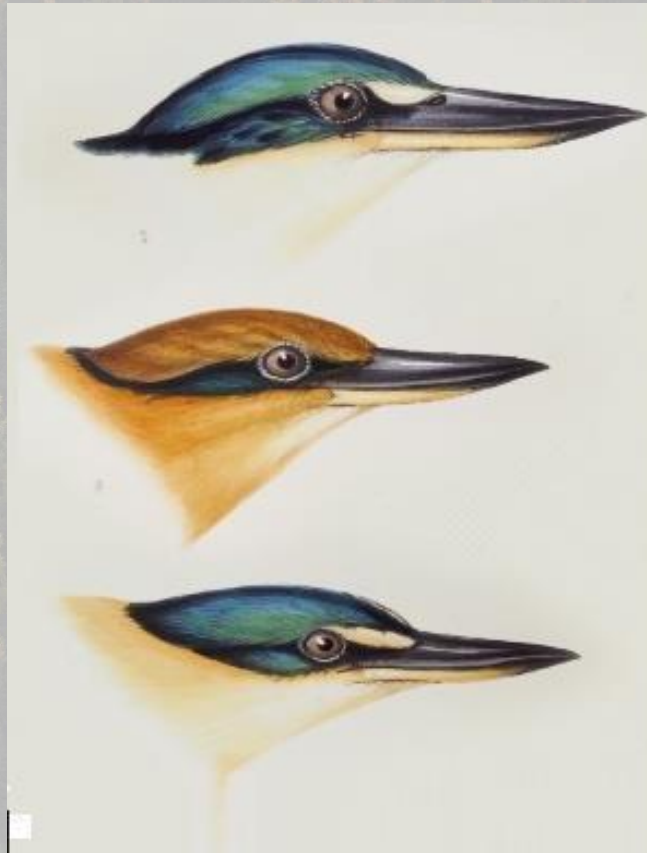
Solar panels facing the sun akin to sunflowers in a field, providing energy to the massive kitchens (source: REACHO, 9/12)

Sunflower inspired engineering marvel feeds over 40k people daily

SURABHI RANE
FYBSc- C

In the era, where solar power is the need of the hour, the Shirdi Saibaba temple runs one of the largest solar powered kitchens in India, the Shirdi Sai Baba Prasadalya. This state of the art kitchen is actually a one storey building, which is situated in the temple premises. The system of this kitchen comprises of 73 roof top circular solar panels of 16 sq.m. and 380 mirrors each. Unlike the traditional solar panels which are stationary throughout the day, these modified solar panels are inspired by the movement of the sunflower. Just as the sunflower moves in the direction of the sun, these circular solar panels move from east to west in the direction of the sun, to absorb maximum heat during the day. This system creates 3,500kgs. of steam when heat from all the 73 solar panels is concentrated. This kitchen harbours 6 cauldrons that cook upto 100 kilos of vegetables, which feed 3500 people in one sitting. But what happens when the sun doesn't shine? Or it's cloudy? This kitchen has the ability to store the energy which is consumed during these days. This kitchen is one of the biggest examples of a growing trend among the communal centers to use non-conventional sources of energy and environmentally friendly technologies.

For millions, the Shirdi Sai Baba temple is a place for solace and internal cleansing, but by reducing their carbon footprint, they also ensure that our external environment stays clean and healthy



Inspired by the beaks of these birds, the fastest train in Japan, the Shinkansen reduced its noise pollution and increased its speed by 15% (Image from Vox Media, NY)

The need for biomimetic design

ASHWATHI PRAKASH
SYBSc- A

BIOMIMETIC DESIGN

The world of animals has a lot to offer us in terms of their natural habitat as well as their body structure. The future of human life is inspired by the stunning ideas taken from the animal kingdom-put into our use. Well, how about we make climbers steadily approach the summit of a cliff in a desert; open palms effortlessly sticking to the rock; submarines of the future speed through water with the help of wiggling fish fins. These nature-inspired future technologies can be brought from dreams to reality using human brain and nanotechnology. This design already exists- something known as *The Biomimetic Design* where the science behind nature has been inculcated into technology. It works on the idea that a particular engineering problem has already been solved by nature and we try to recreate the solution artificially-artificial but with a natural touch.

BIOMIMETIC MATERIALS:

- Let's take a simple example of plants first- wherein their modifications have greatly benefitted us. Our national flower- the Lotus {*Nelumbo nucifera*}. Here we are interested in a common but undermined feature of the plant : its leaves. The leaves have a thick waxy coating preventing decay of the plant. Using this

property, man discovered “**superhydrophobic surfaces**” wherein it is possible to achieve something known as “**self-cleaning surfaces**”.

BIOMIMETIC DESIGN AND SHAPES:

There is always a need for animals to look in a particular manner. Their design is never simply for show. It is of some primary importance and it is for us to understand the logic behind it.

- Shape of wings of airplanes/sail of boats:** Inspired by the spindle shape {fusiform} body of fishes by which they easily cut across through water. This shape makes it easier for airplanes to stay up in the air and for the wind to make sailing boats move forward. This provides least resistance to air and water, while moving forward is kept to a maximum.
- Tentacle inspired Prosthetic arm:** Well, an interesting one here, Kaylene Kau, a designer of this concept, used the technology of a prosthetic hand in the shape of an octopus tentacle- it is **flexible and adjustable** in order to accommodate a variety of grips. It does this with the help of simple curling.

In this way we can be inspired by nature to form better functioning design with tried and tested forms for more efficiency.

KEEPING UP WITH THE TIMES

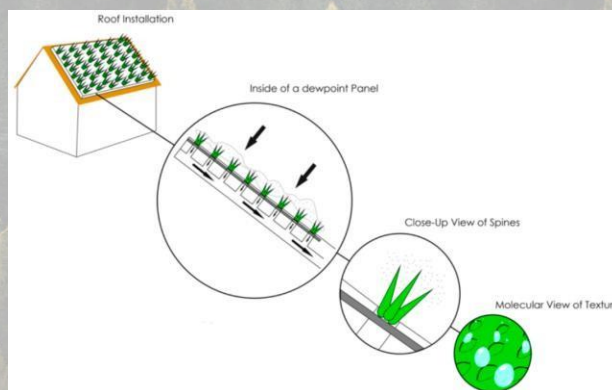
Articles and literature sourced and written by the students of SIES

Dewpoint: the cactus like water harvester

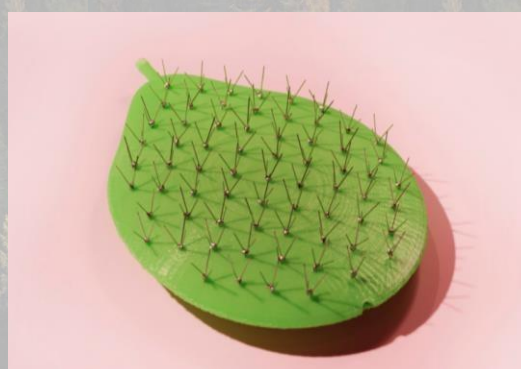
ISHIKA LAKSHMINARAYAN,
FYBSc-A

Dew-point is the temperature to which air must be cooled to become saturated with water vapour. When further cooled, the airborne water vapour will condense to form liquid water (**dew**). Cacti efficiently collect and store water droplets from fog for their survival. This was the inspiration behind **THE DEWPOINT**, a project initiated by the students from SAIC for **THE BIODESIGN CHALLENGE 2016**.

As droughts and desertification are increasing around the world and existing water sources are rapidly depleting, there is a great need to look for other sources of water. They believe, Biodesign may tackle the issues of water security and water management by helping foster a more sustainable relationship between humans and their environments and wish to use bio technology to change the way we use and recycle water.



(ABOVE) Schematic picturisation of a dewpoint panel



Surface of Opuntia leaf covered in spines

THE INSPIRATION

The team was inspired by the *Opuntia* Genus commonly called as Prickly pear. Cacti plants close their stomata, through which plants exchange air, during day, so they do not lose water when outside relative humidity is low and also do not exchange air. During night they open their stomata, absorb carbon dioxide and as outside relative humidity is very high, sometimes close to 100%, the cacti cannot lose water at this time. The flesh ("mucilage") of the cactus has also been found to purify water which was investigated by the USF for large scale water purification

THE PROJECT

Dewpoint aims to collect and store water droplets from fog. One of the ways to harvest water using Dewpoint is by installing a set of spiny panels (The Dewpoint Panels) on the rooftop in areas with heavy fog and or humidity. The spines on the panels would work like that on cacti and collect dew. Water droplets from all the spines on the panel would then be stored inside the panel and would be harvested like shown in the illustration. This is an excellent optimal use of biodesign which will help save a lot of water.

STUDENTS CORNER

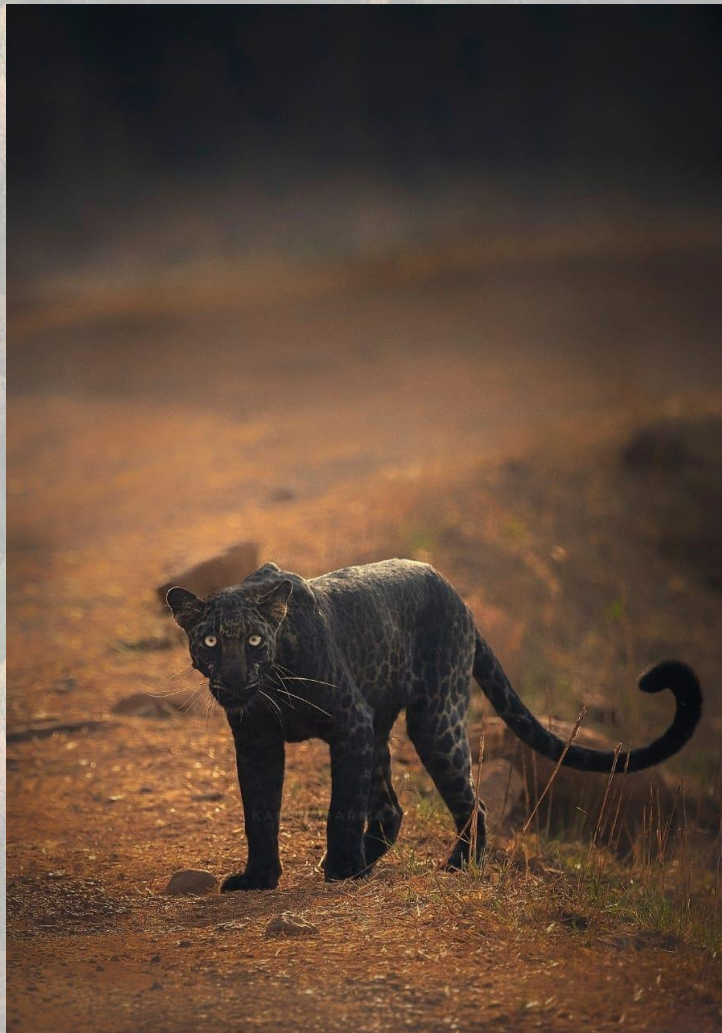
"for the poetry of the earth is never dead"

Shadow of the Forest

SHREYA KUMARI
FYBSc- C

On a dark night, freezing cold
From deep within a forest
The stories have told
Comes a shrill cry
Letting you know
The forest is
Not dead but alive
The moon looming
So far above
A peaceful presence
In the night sky
Against its glow
A shadow lies
Looking up
It lets out another cry
A fierce stench
Suddenly begins to arise
It's a scene from the legends
I stand there in surprise
When the wolf's gaze
Met my eyes.





The Dark Lord: Panther in Tadoba

KAPIL SHARMA, TYBSc



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SHARUMATHI MURUGAN, SYBSc B



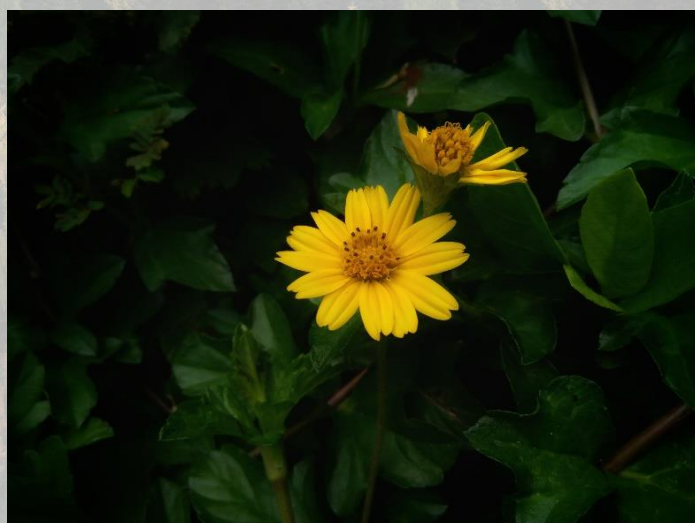
The endemic beauty: Malabar pit viper

KAPIL SHARMA, TYBSc



The Indian Bullfrog: Hoplobatrachus tigerinus

VIVEK PARAB, PhD scholar, Microbiology



Sphagneticola trilobata

AFIANA PERPAT JEEVAN: SYBSc BT



Egg candling

AMIT PATIL, MSc PROJECT WORK