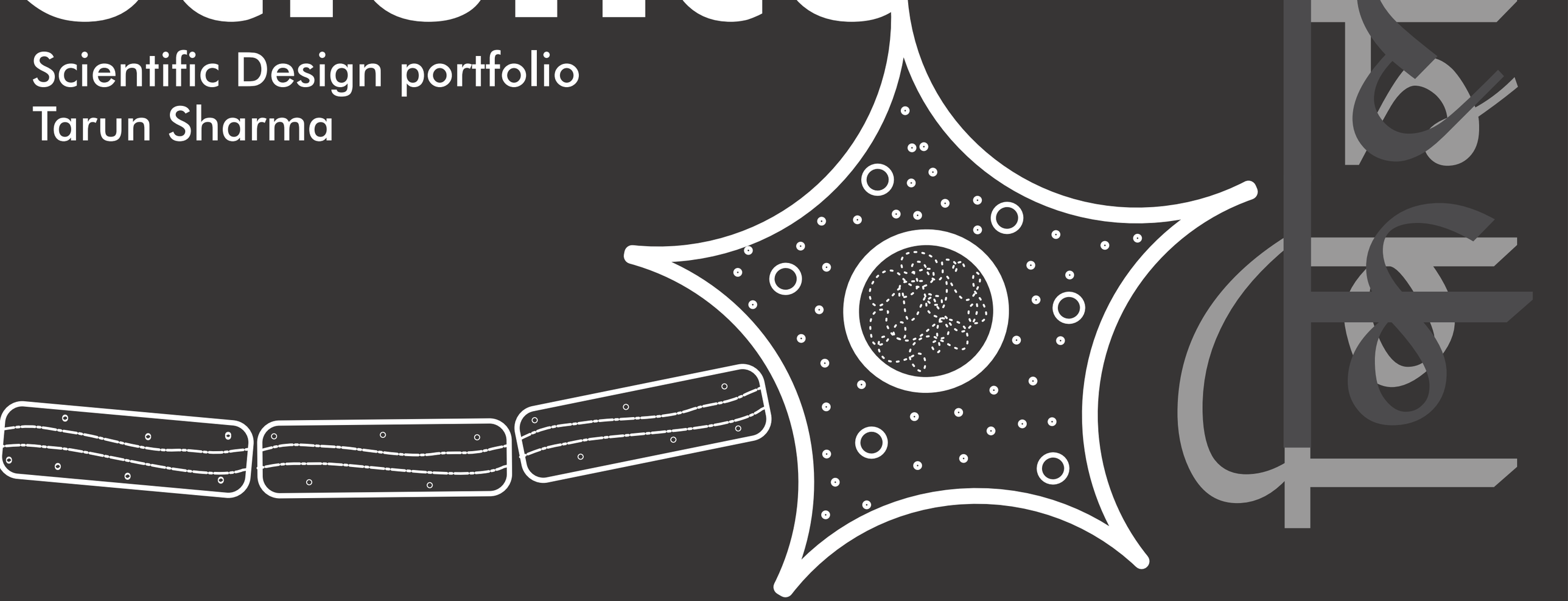
Designing Science

Scientific Design portfolio

Tarun Sharma



Designer Profile

Tarun Sharma

Illustrations
Graphical abstracts
Flowcharts

Coming from a 60 year old design legacy

Sterling Digital World
estd. 1963

M.Sc
Biotechnology

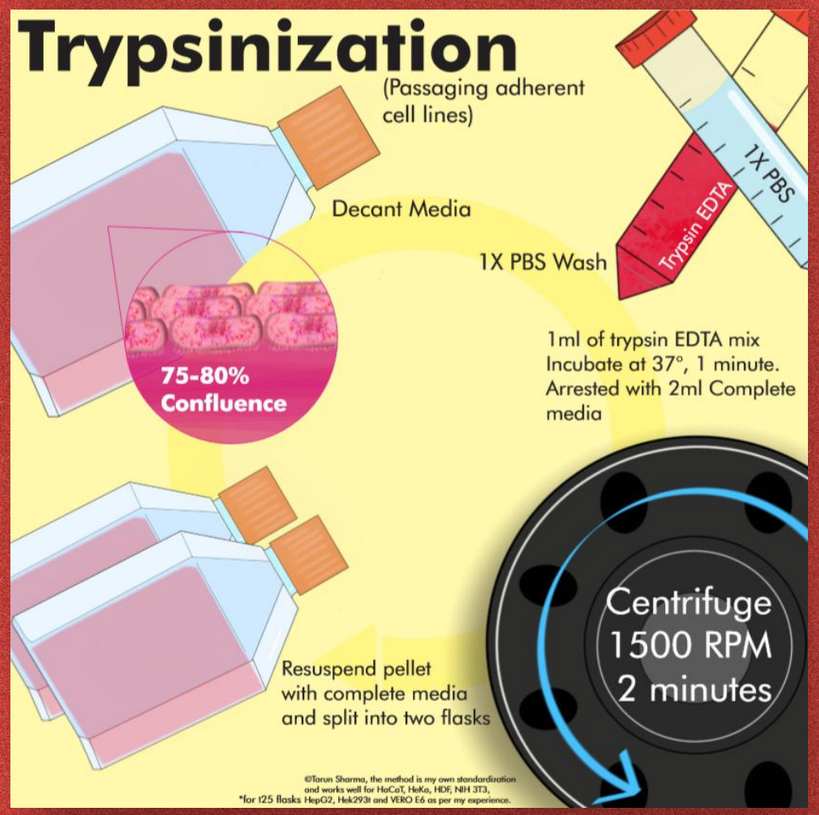
MBA
International Business

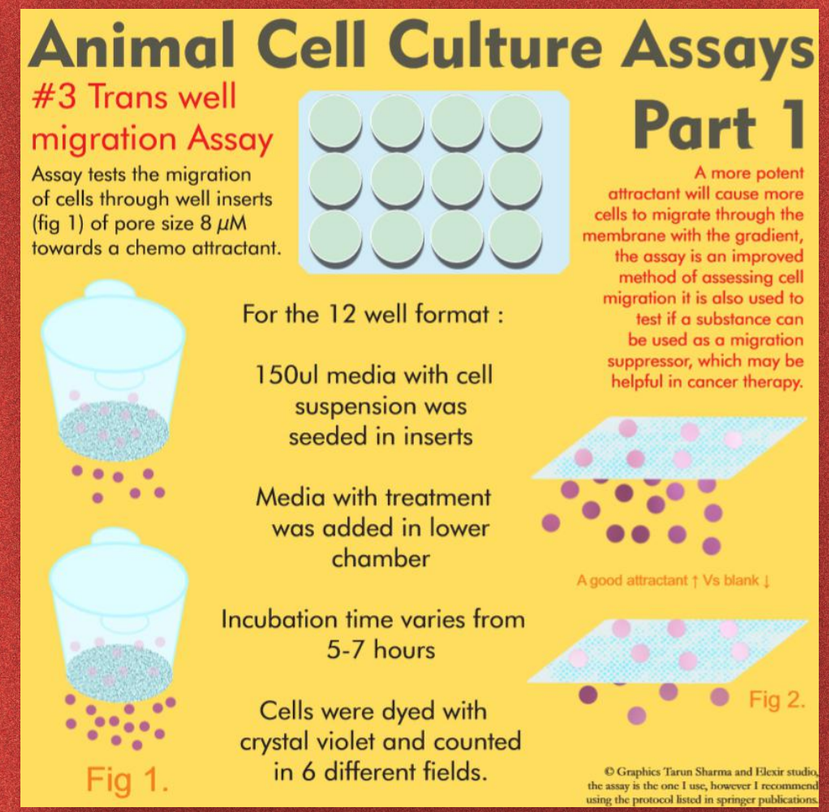
Scientific Illustrator by Passion

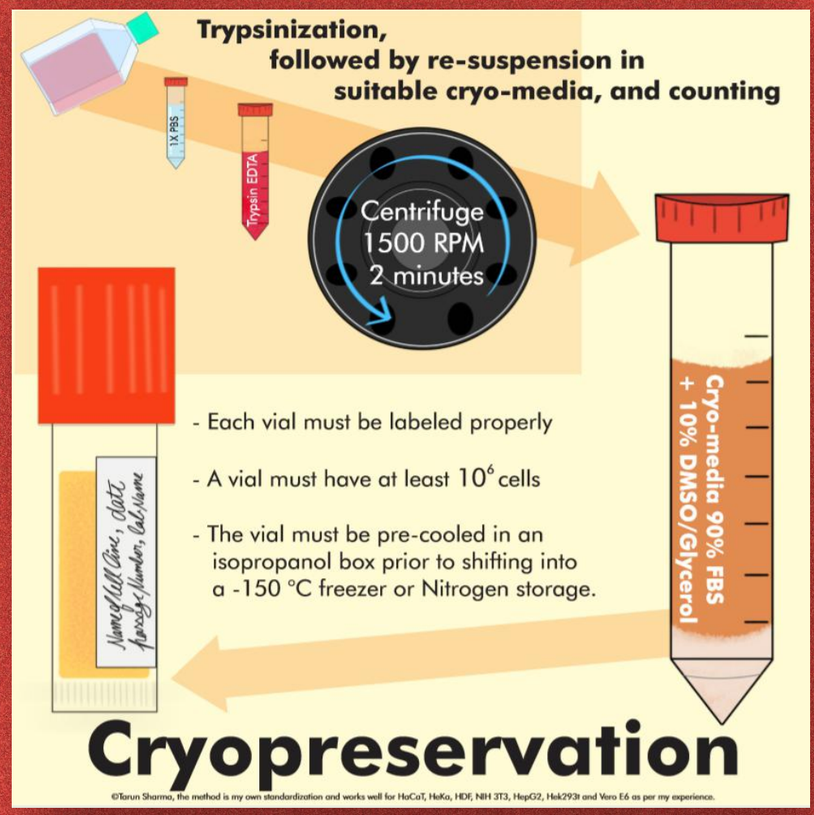
Specialising in Cell Biology & Biotechnology

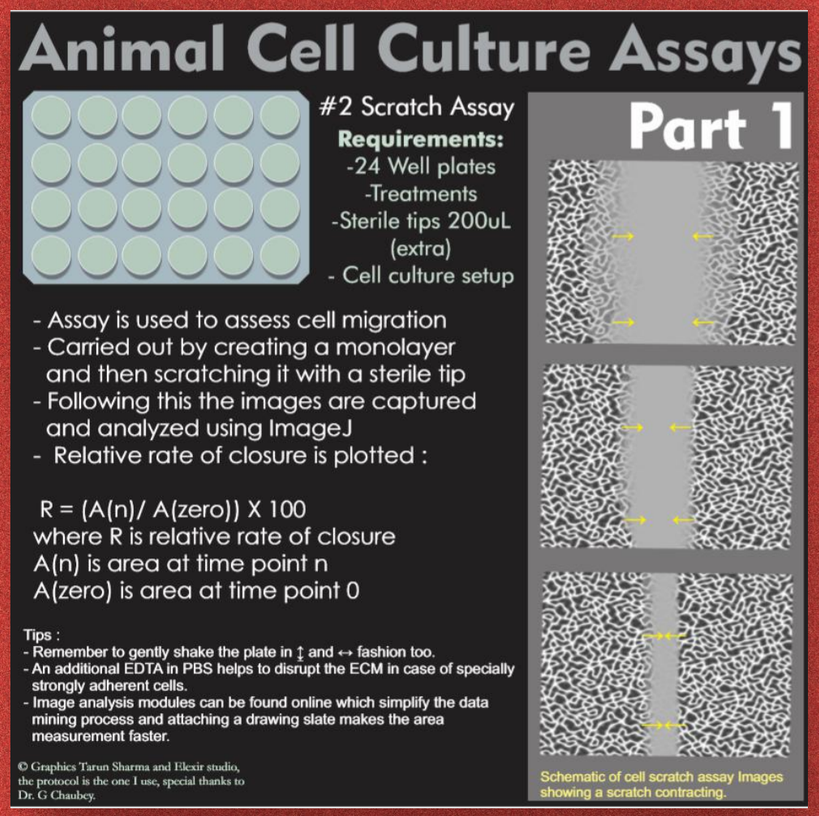
with an additional interest in theoretical Physics

Cell Culture Posters

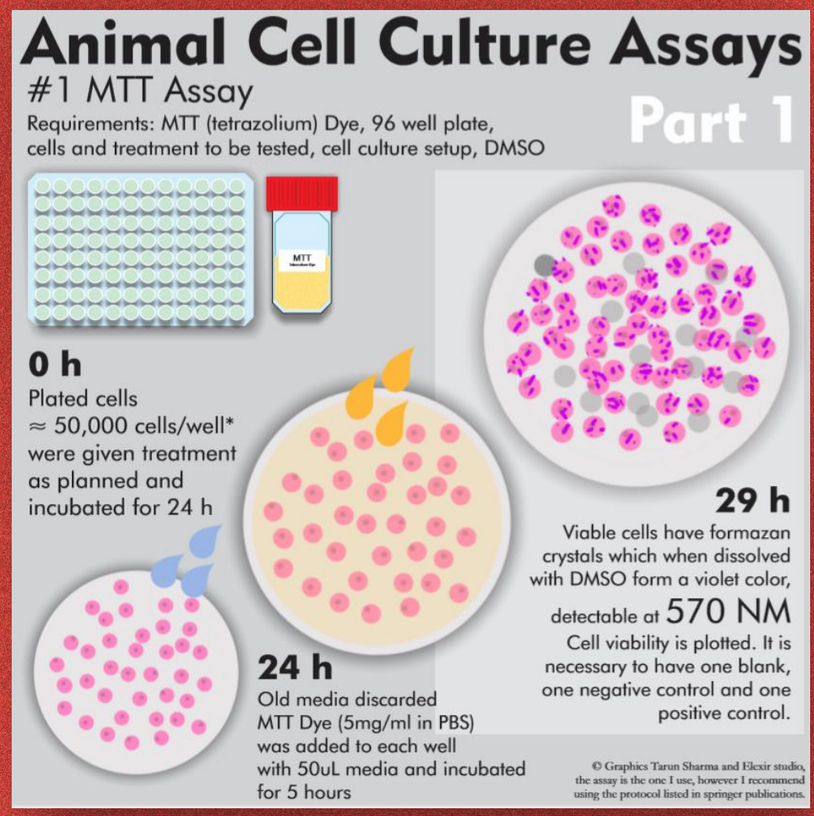




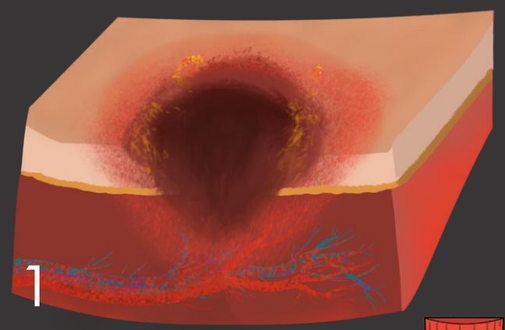


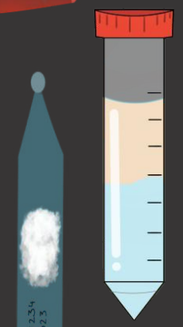


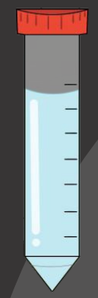
Posters meant to illustrate various aspects of Animal cell culture including various assays. Illustrated in Procreate and arranged in Corel Draw 21

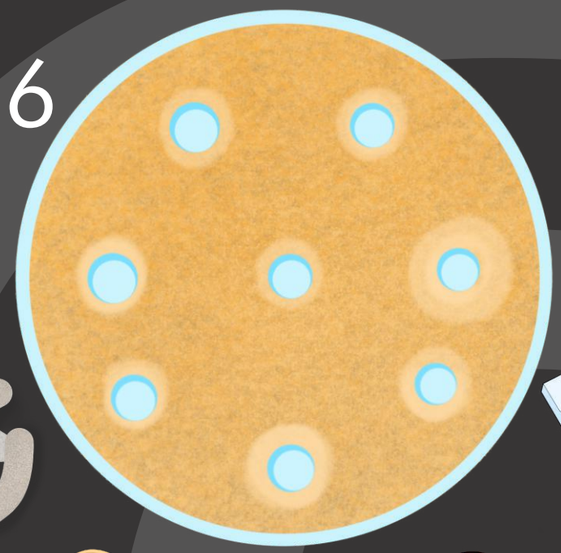


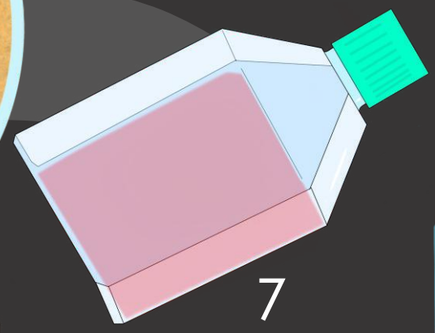
Independent Graphics

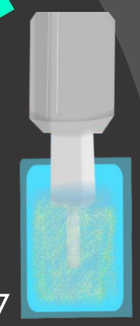


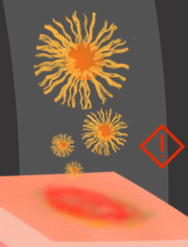


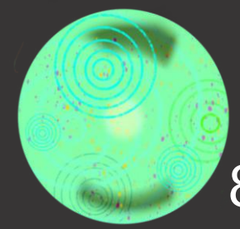


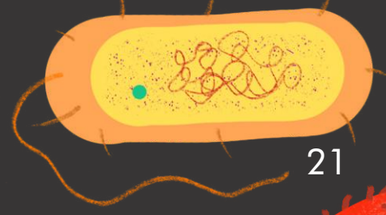


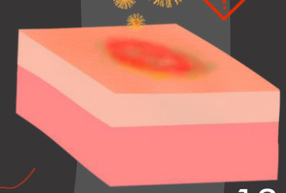


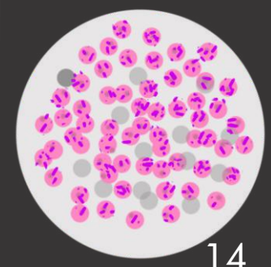


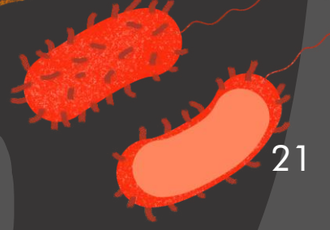


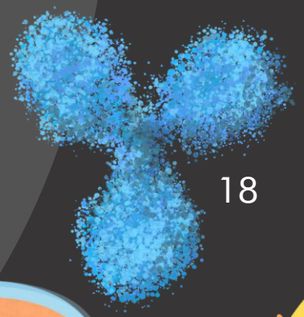


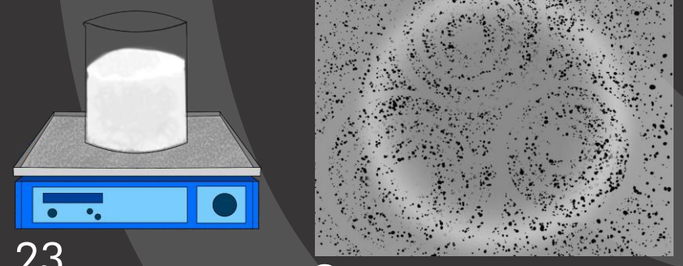


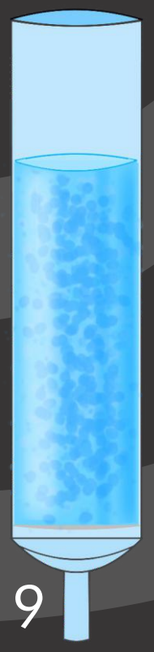


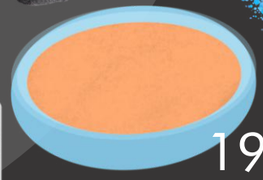


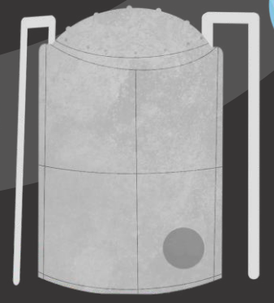












High resolution original graphics meant to be used as components in diagrams and flowcharts, compatible with MS Power point and all major Design platforms.

Index

Scientific Posters

The Four Pillars of Sustainable Biotechnology

A brief summary of emperical measures of approach for the future

By Tarun Sharma, M.Sc Biotechnology (3rd Semester)

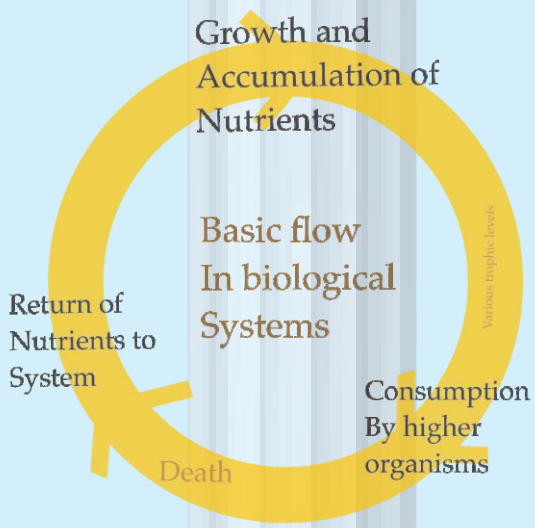
In light of various world changing events, many of the major scientists around the world agree that the path to the future is largely centered around a Bio-Techlogical approach rather than our current technological and industrial approach. The following are four core guiding principles which may serve as the foundation of a Sustainable Biotechnological age.

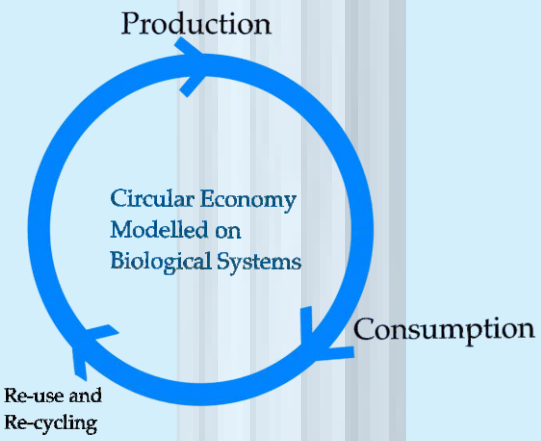
1. Circular methods modelled on nature:

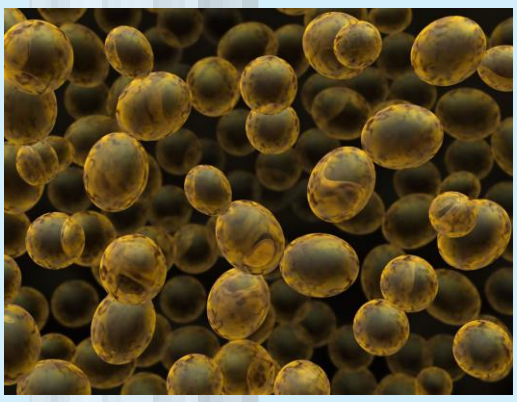
The Human approach to production and progress is generally linear, one directional, forward.

Nature on the other hand has a cyclic approach, the flow of Nutrients and energy through cells, organisms and trophic levels is what makes life possible

We should aim to model our processes over this basic approach, causing the processes to be naturally sustainable in the best possible way.







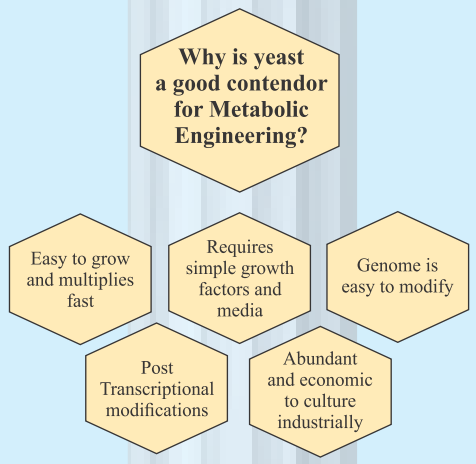
Microscopic View of E. Coli

2. Super factories and Synthetic Biology

Since its Sequencing , we discovered that Yeast (Saccharomyces Cerevisae) has massive potential as a bio factory to produce any substance which we know a genetic sequence for.

Consider this, we can produce any therapeutic anywhere in the world, reducing costs and perhaps removing availability issues.

This is through a larger discipline called synthetic biology.



3. Bioremediation

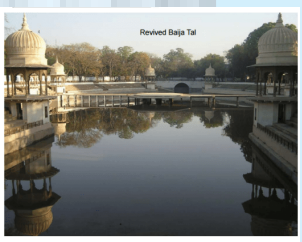
Since we are the species with the highest impact on the environment, it becomes our responsibility to help minimize and repair damage.

Bioremediation means using Biotechnology based techniques and processes have shown great success in the past.

This is extremely important because we cannot move into a sustainable future if we cannot repair the damage from the industrial past.

Name of Organism	Bioremedial function
1. E. coli	Phytochelatin synthase gene helps remove Cadmium
2. Deinococcus radiodurans	Toluene tod and xyl genes of Pseudomonas putida help toluene remediation.
3. Fusarium solani	DDT
4. Pseudomonas putida	Effective for Cadmium remediation

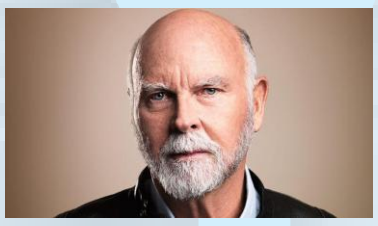
BEFORE



AFTER

Top

This years Nobel Laureates (Chemistry) for the discovery of CRISPR a novel gene editing technique Emmanuelle Charpentier and Jennifer Duodna.



left

The Legendary Craig Venter

4. More and Better Biotechnology education

As we move into a sustainable age, there will be a need of a very skilled, creative and rather large workforce. to put this into perspective, consider the fact that we produce more data EVERY DAY than we can read or interpret in the next many years.

Biotechnology in the future also demands the presence of great and effective communicators. The more people know about the science, less room there is for misconceptions. We need more great communicators like Richard Feynman and Stephen Hawking and Craig Venter and Emmanuelle Charpentier and Jennifer Duodna.

Sources:
-Books Life at the Speed of Light: From the Double Helix to the Dawn of Digital Life, Craig Venter
-Biomimicry , Janine Benyus
-Regenesis : How synthetic Biology will reinvent nature and ourselves George Church and Ed Regis
-A Crack in creation : Gene editing and the unthinkable power to control Evolution, Jennifer A Doudna, Samuel H Sternberg
-BioBuilder, Natalie Kuldell, Rachel Bernstein, Karen Ingram & Kathryn M. Hart
-BioCentrism, Dr. Robert Lanza MD,

Talks :
-Quantum Biology: the hidden nature of nature by John Hockenberry
-Biotechnology and Nanotechnology by Andrew Hessel at the Singularity U Germany Summit

Papers:
-Genetically Modified Microorganisms (GMOs) for Bioremediation Sandeep Kumar, Vikas Kumar, Ramesh Chander Kuhad

-Bioremediation. An overview
M.Vidali
Pure Appl. Chem., Vol. 73, No. 7, pp. 1163–1172, 2001.

-Science communication: a contemporary definition
T.W. Burns, D.J. O'Connor, and S.M. Stocklmayer

-Recombinant Escherichia coli as a biofactory for various single- and multi-element nanomaterials
Yoojin Choi a,b,c,d , Tae Jung Park e,1 , Doh C. Lee d , and Sang Yup Lee a,b,c,d,1

-Microorganisms relevant to bioremediation
Kazuya Watanabe

Scientific Posters

Uptake, Implications and Applications of Nano-particles in Plants

Nanoparticles are minuscule consolidated particles in the size range of 1 to 100 Nanometers in diameter.
They can enter the environment from:
- Natural sources: Volcanic eruptions, dust storms, forest fires, weathering or radioactive decay of Radon gas and so on.
- Artificial Sources: Smelting, Industrial waste disposal, Quarrying, mining and so on.
- Intentional creation and release: Sometimes silver and other nanoparticles are introduced in Agricultural environments.

The study of Nano-particles in plants is highly variable and for every plant, there is a need to develop a paradigm and methodology of study.

Some imaging techniques used frequently include Ultraviolet and visible light spectroscopy, near infrared spectroscopy, Scanning and transmission electron Microscopy, X-ray diffraction, High performance liquid Chromatography, Fourier Transform Infrared Spectrometry and single particle inductively couple plasma mass spectrometry.

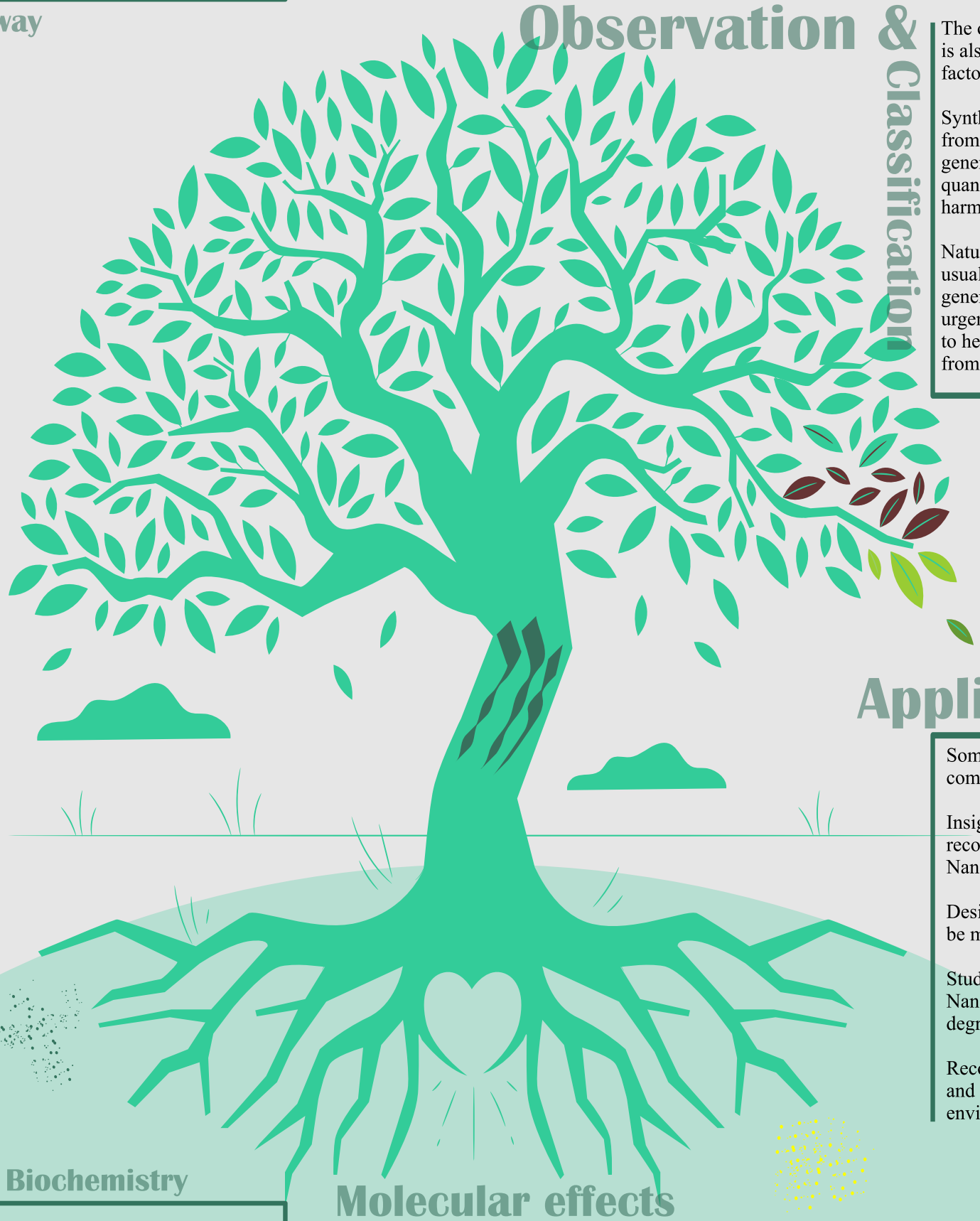
Case studies in Tobacco, Corn and wheat offer valuable insight into this process. There is a multitude of effects observed in each case.

Exposure Pathway

In plants, there are two main pathways through which Nano-particles enter their internal environment.

One way is through the leaves called Foliar exposure through stomata or pores in the surface.

The other way is through the roots, entering into the Xylem.



Observation & Classification

The origin of Nanoparticles is also a crucial deciding factor.

Synthetic Nano-particles from any source are generally found in greater quantity and are more harmful.

Natural Nano-particles are usually Non-toxic and are generally not considered an urgent threat when compared to heavy metals or residues from waste disposal

Applications

Some interesting Applications come out of this study:

Insight into Plant based recovery and neutralization of Nano-Pollutants.

Design of Nanomaterials to be more Eco-friendly.

Study of persistance of Nanomaterials and pace of degradation.

Recovery of precious metals and materials from the environment.

Physiology and Biochemistry

Uptake is through many different systems and membranes. The size and high specific surface area allows Nanoparticles to infiltrate the plant system.

Biochemical effects include a mixed response, in some plants there is enhanced growth and in some, inhibited growth and development. This is related to altered enzyme activity.

Physiological effects include growth inhibition, when in the presence of heavy metals and this can also be traced to oxidative stress.

Molecular effects

The Molecular effects are still under study and not very well known but they include a secondary effect from ROS.

Enzyme pathways such as Auxins and ABA are also effected by Nano-particles being present in the plants.

The molecular effects are usually permanent, and are dependant on nature, quantity and the period of exposure to the Nano-Particles.

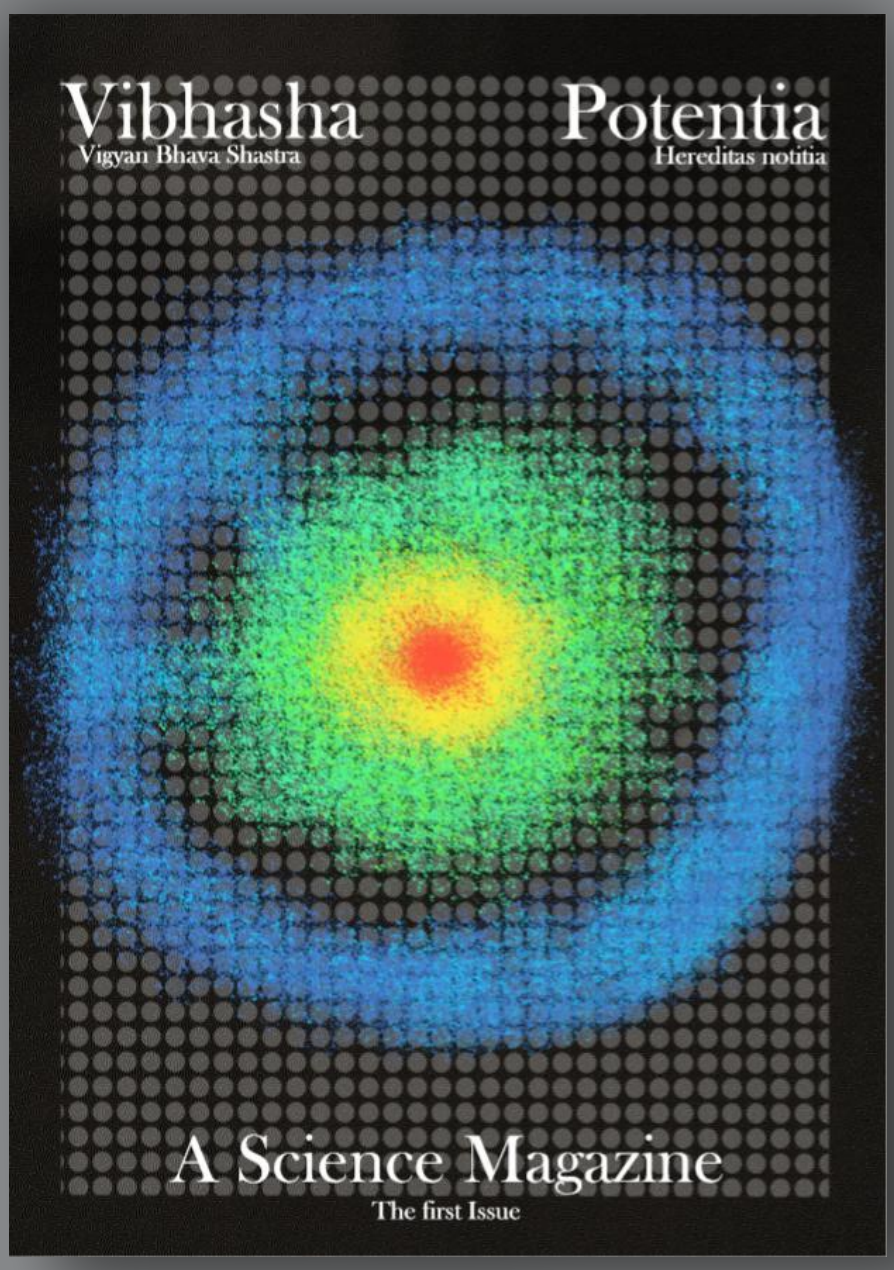
Sources

-Dietz, K.J., Herth, S., 2011. Plant nanotoxicology. Trends Plant Sci. 16(11), 582- 652 589.
-Lv, J., Christie, P. and Zhang, S., 2019. Uptake, translocation, and transformation of metal-based nanoparticles in plants: recent advances and methodological challenges. Environmental Science: Nano, 6(1), pp.41-59.
-Rico, C.M., Majumdar, S., Duarte-Gardea, M., Peralta-Videa, J.R., Gardea-Torresdey, J.L.,2011. Interaction of nanoparticles with edible plants and their possible implications in the food chain.J. Agric. Food Chem. 59(8).3485-98.
-Ma, X., Geiser-Lee, J., Deng, Y., Kolmakov, A., 2010a. Interactions between engineered Nanoparticles (ENPs) and plants: phytotoxicity, uptake and accumulation. Sci. Total. Environ. 408(16), 3053-3061
-Arruda, S.C.C., Silva, A.L.D., Galazzi, R.M., Azevedo, R.A. and Arruda, M.A.Z., 2015. Nanoparticles applied to plant science: a review. Talanta, 131, pp.693-705.

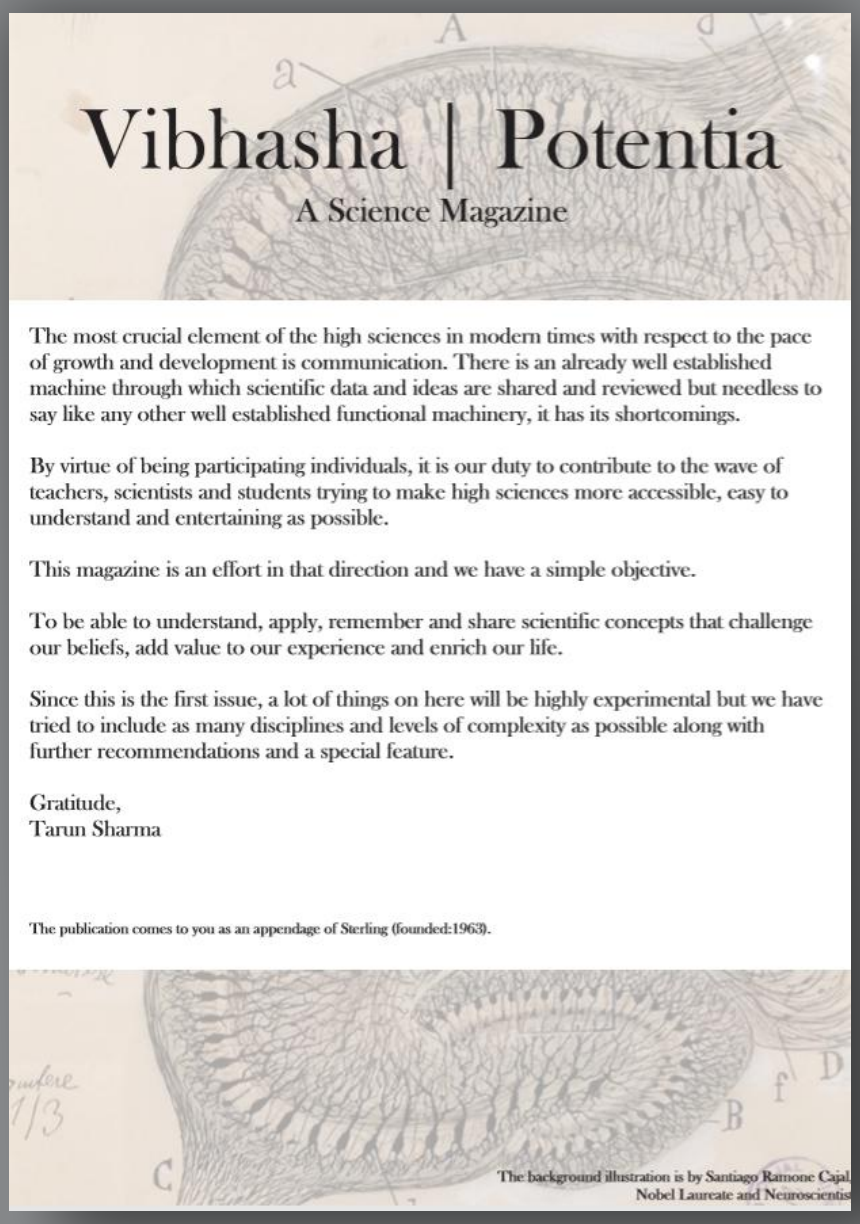
Winner of the best poster at the ABSEI
National Conclave held at GGDSD College, Chandigarh 2021

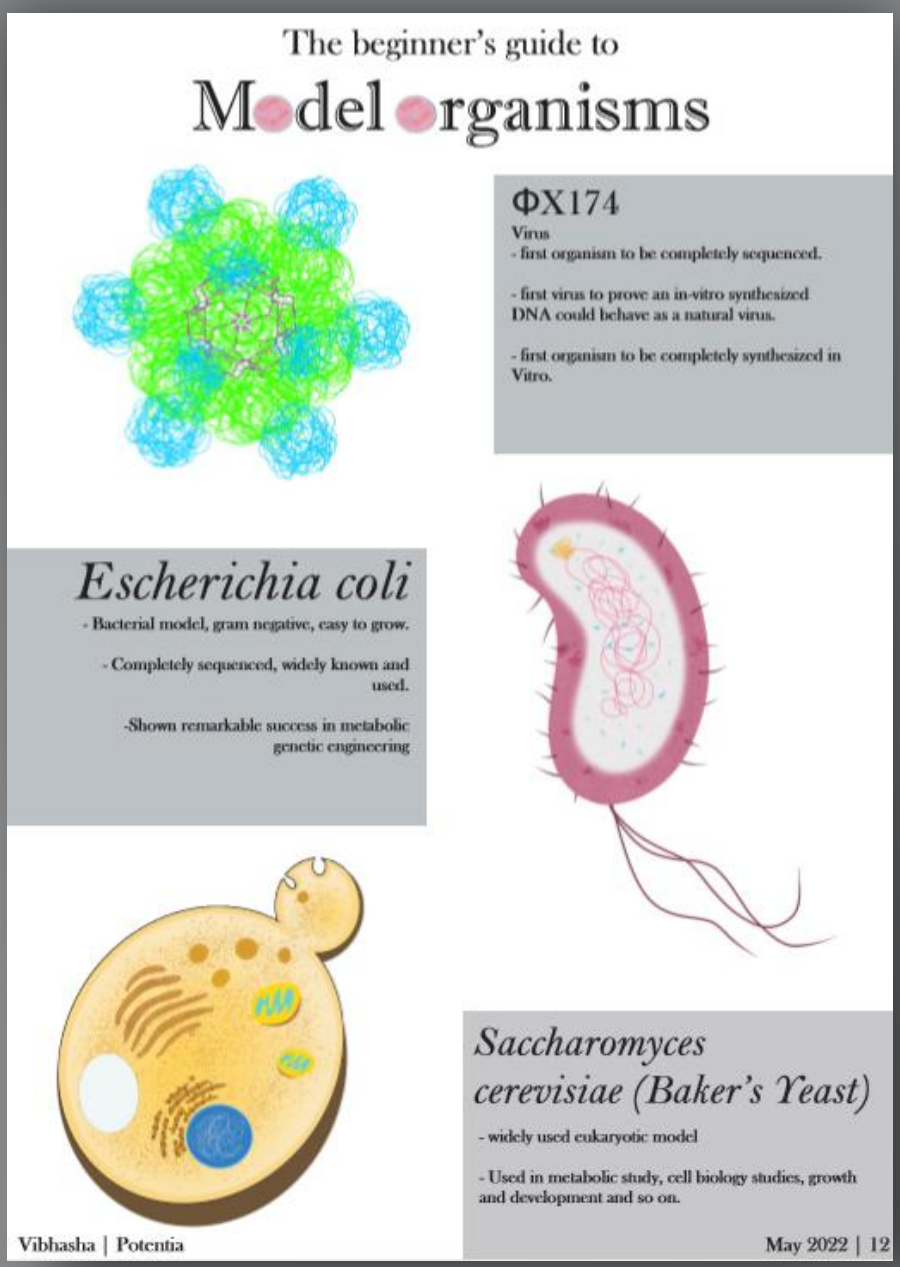
Highlights from Vibhasha/Potentia Magazine

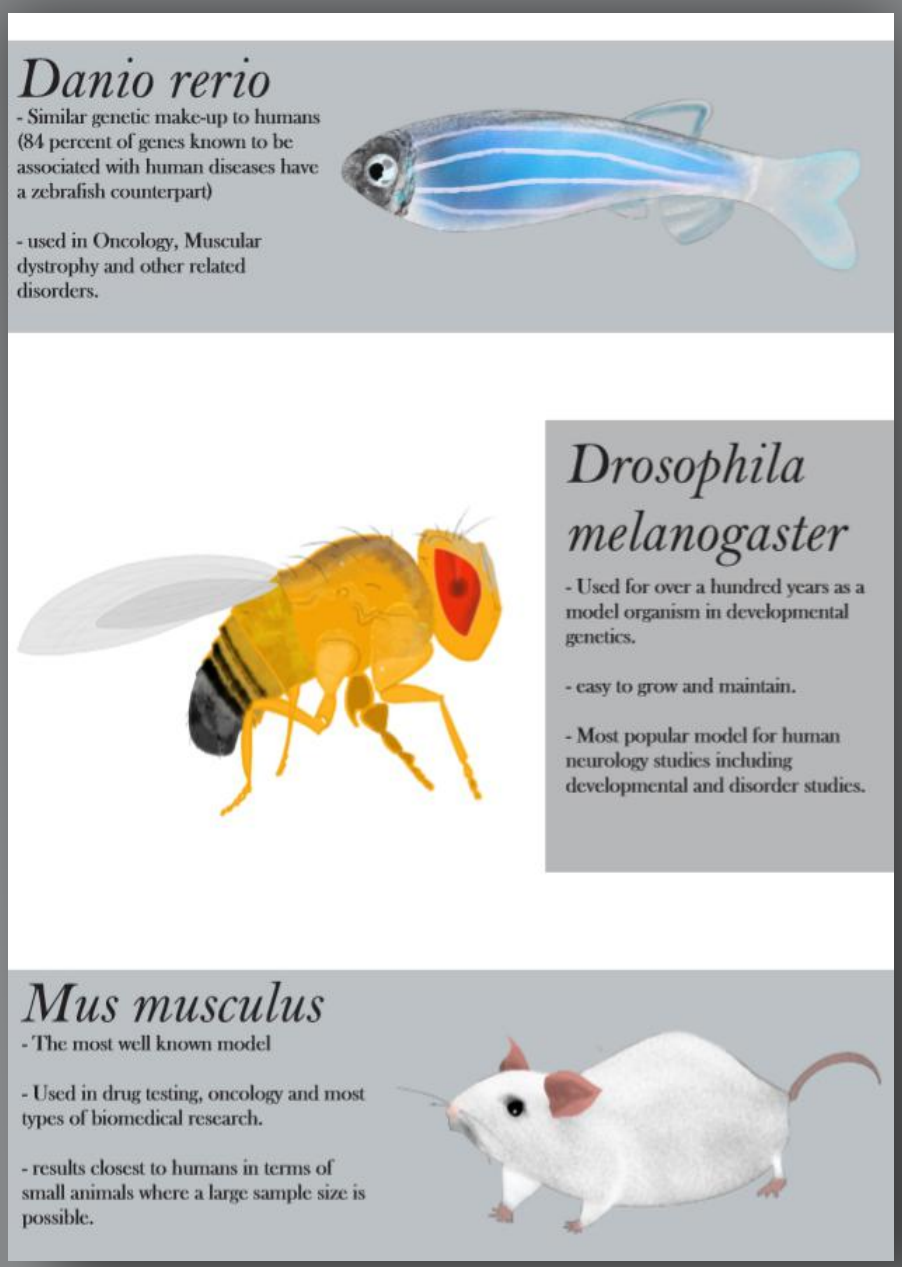
the first issue of an independent educational publication.



The cover page, a schematic drawing of a Hydrogen Atom.







A section on model organisms in life sciences.

As of June 2023, a significant portion of the work is a part of unpublished manuscripts and is therefore not ethical to showcase at this point.

My forte is 2d illustration; focused on preparation of high resolution graphical abstracts.

I am available for commissions and illustrations for research articles, reviews, presentations and book chapters.

EMAIL : tarunsharma150152@gmail.com

labelling concept for an Aliquot of NFW with a simple printed slip and a used pH strip.

Softwares used : Adobe fresco, Procreate, Corel draw 2023.