



## ABOUT US

Atavism is a phenotypic trait that appears suddenly in an organism. Yes, it is that feature we have always had the genes for, but have never expressed. Have you heard of the dolphin with legs or the baby born with a tail? Because if you have, you know what we're talking about!

Just like its name, this newsletter is a little something that we always had the genes for, but we never expressed. We agree that the newsletter isn't as weird as the chicken with teeth but it sure is something out of the blue to bring all of us together. We aim to make this newsletter the place you can go for the latest news in the biotechnology world, bizarre but true science headlines, and insightful conversations.

## The company that uses DNA to reconstruct criminal faces

Although forensic genealogy (tracing criminals through ancestry charts using DNA samples) is relatively unheard of in India, the police forces in the United States routinely works with companies using forensic genealogy techniques, to trace criminals. And one of those companies is the Parabon Nanolabs, which has developed the tool Snapshot that can perform face reconstruction using DNA. The Snapshot tool uses a mathematical model based on the current information of criminals and their genetic makeup the firm has. Although this method doesn't require the relationship between each SNP and phenotype, the company says it has helped to solve over 100 criminal cases. This firm has also faced controversies after it used information from the online database GEDmatch to find the accused after an assault in Utah.

What do you think of the privacy issues concerning the use of genetic information to trace criminals?

## GHOST CELLS: A HALLOWEEN SPECIAL

During hemolysis, red blood cells lose everything except their membranes and are seen as pale yellow under the microscope. These cells are referred to as "ghost cells" and they are indicators that something has gone wrong.



### References & Photo credits:

1. Photos from Pexels, Pixabay. Cartoon made using canva.com
2. <https://www.nature.com/articles/srep39661#:~:text=Introduction,their%20appearance%20under%20the%20microscope.>
3. [https://www.nature.com/articles/d41586-020-02545-5?WT.ec\\_id=NATURE-20200910&utm\\_source=nature\\_etoc&utm\\_medium=email&utm\\_campaign=20200910&sap-outbound-id=3DBD9E30EE7983D05587A900A28FFB6FEE37EAA8](https://www.nature.com/articles/d41586-020-02545-5?WT.ec_id=NATURE-20200910&utm_source=nature_etoc&utm_medium=email&utm_campaign=20200910&sap-outbound-id=3DBD9E30EE7983D05587A900A28FFB6FEE37EAA8)

# FACULTY SPEAK

Dr Anil Kant is an Associate Professor of Biotechnology at JUIT. And this month, we got a chance to talk to about his job, research and careers in biotechnology. Here are some excerpts from the interview:

## 1. What is the field you are working in right now, and how did you decide to go into it?

- My field of speciality is molecular biology and genetic engineering (genomics). I work on the applications of molecular biology, functional genomics, and exploration of genetic diversity, and characterization of plants for metabolic constituents. I did my masters in biotechnology, From Dr YS Parmar University, Solan, and during that time, I was fascinated by the many applications of molecular biology. And so I made it a point to work on these areas in my PhD.

## 2. How do you think undergraduate students should go about deciding what to do next?

- I suggest that undergraduate students should choose a field that has direct output or products, in the market and comparatively there is more demand for trained human resources in the industry, especially for those who are looking for a job immediately after their graduation. Areas like molecular biology, genetic engineering, are research areas where the main workforce should have post-graduate or/and doctorate degrees.

## 3. What part of your job is the most challenging? Is it writing publications or grading students?

- Grading students isn't as challenging as writing publications, as writing a publication has a lot of pre-requisites. To publish a research paper, you start with an idea, explore the literature, and if the idea is novel, you carry it forward. You require a lot of resources, including equipment, chemicals, financial support and bench work support for conducting experiments. And if the experiments generate useful data, you analyze the data to draw conclusions and write manuscripts. This is followed by communicating with the platforms you want to publish your work on.

- Apart from these two, teaching is also very challenging as a lot of preparation is needed, especially if the courses are designed around the latest research and developments.

## 4. Why teaching?

- When I did my PhD, one of the choices was to join university/college to begin teaching and I took that opportunity. I was very fascinated by teaching even during my PhDs. At that time, I loved disseminating information about new topics and discoveries to my fellow PhD students and even my juniors. After working as a postdoctoral researcher for a few years, I got an opportunity to join this university.

## 5. One piece of advice you follow through and through.

- If I want to learn about an idea or concept, then I explore that idea, technology or phenomenon in detail. Having a brief idea of a concept doesn't satisfy me. And this is the advice I would also like to pass on to my students, that explore any idea in depth so that you understand it comprehensively. My second advice would be that there is no substitute for hard work and practice.



## 6. How do you keep yourself updated on the latest happenings of your area?

- To keep myself abreast with the latest happenings, I keep an eye on good books, journals, research articles, review articles, news items and internet resources related to my discipline.

## 7. I want to take you back to your student years. Were there any experiments that you found challenging?

- During undergraduate and master's classes, the results of your experiments don't matter as much. But, during your PhD, the experiments on which your research is based are very important. Many times, procedures and protocols of the experiments are not well-defined and you may be uncertain of the outcome. During my PhD, one part of my research was to explore the genetic diversity of the plant using isoenzymes, which takes a lot of hands-on practice. When I started doing the experiments, I did not get any results for three months. After almost 6-9 months of making alterations to the protocols, I was able to get the results I needed for my doctoral thesis.

## 8. One piece of advice that you wish someone had given you while you were a student.

- I wish someone had told me that hard work prevails over talent over a long period. The more you practice, the more talent/skills you acquire in that area.

## 9. What do you think is the importance of failed experiments?

- Failed experiments and the outcome of failed research efforts are very important in my opinion. Edison failed a thousand times before he invented the light bulb. Failures are the stepping stones to success, and this applies not only to research but also in real life.

## 11. What do you think of the gap between academia and industry?

Yes, there is definitely a gap between academia and industry and this gap will always remain. In my opinion, this gap is due to the differences in the priorities and the mandates of academia and industry.

# SCIENCE: MYSTERIES & UNKNOWNNS

## The Mystery of Eel Reproduction

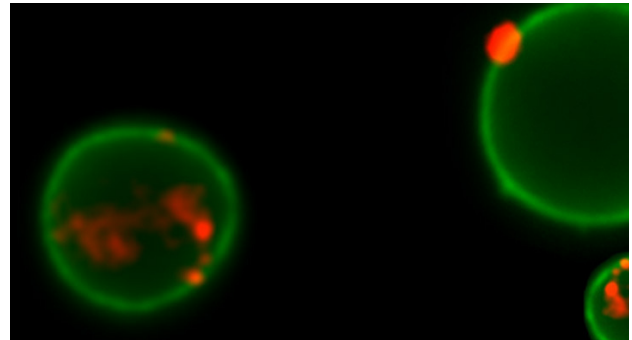


Eels are freshwater and saltwater fish that look very similar to snakes, but lack scales and have over 400 different species. The eel's life cycle comprises of five unique stages. So what makes these animals so interesting? The fact that no one has ever seen them mate. Despite countless dissections, no researcher till date has been able to find eel eggs or identify their reproductive organs, giving rise to various rather bizarre Eel origin stories from Eels rubbing themselves against the rock (Aristotle) to them manifesting from gills of other fish among others.

Despite its name, the life of a freshwater eel begins in the salty waters of the southern edge of the Sargasso Sea of the Bermuda triangle from where thousands of 3mm eel larvae (leptocephali) drift out of Sargasso Sea migrating to North America and Europe in next 300 days covering over 6500km of distance making one the longest known marine migrations. By the time of their arrival, they transform into glass eels and have grown up to 48mm. They migrate upstream of rivers and those who make upstream to their hunting ground develop into opaque elvers. These omnivores grow in proportion to their diets and develop into older yellow eels. This stage is the longest one and can last anywhere between 5-20 years. The final stage is the silver eel stage, in which the eel makes its journey back to the Sargasso Sea to spawn and die and it is in this stage that reproduction is believed to occur.

Despite the knowledge of their roundtrip migration scientists are let to successfully track an eel throughout its return migration. Scientists still haven't found a single eel egg or observed mating in wild. Leaving room for theories that suggest that eels reproduce in a flurry of external fertilization, in which clouds of sperm fertilise free-floating eggs. But powerful currents and tangling seaweed of the Sargasso Sea have made this theory difficult to believe, leaving this mystery indecipherable. TED-Ed has a wonderful video on this, you can watch it [here](#).

## Are extracellular vesicles the biological Trojan horses?



Extracellular vesicles, the primitive phospholipid vesicles, are not so easy to understand after all. This is not me saying but scientists who have spent a lot of their time studying these tiny bags containing biological molecules. These tiny bodies, released by the cell, are less than a nanometer in size. They cannot replicate on their own but can be used to transport cargo.

Although a lot of biological classification is done using size, scientists are still trying to confirm whether the size of these vesicles actually determines their functioning. Also, is the size of these tiny vesicles a characteristic of an independent cell or can cells across populations generate the vesicles of a particular size.

Another unknown about the extracellular vesicles or EVs is their composition and which pathways lead to their biogenesis. Not only this, but we also are unsure whether EVs of the same size have similar compositions. Many EVs have selective packaging according to their cargos, but how does this selective packaging occur in the cell, we have no idea! And since their function is to transport cargos to selective cells, how do these tiny vesicles deliver to the target cells?

A lot of work is being done on extracellular vesicles and understanding how they influence our cells. But right now, we have nothing more than just hypotheses about how the target cells go about unpacking extracellular vesicles, what effects do these EVs on the target cell physiology, and whether or not they are they healthy at all (are they markers or pathogenic).

But what we do know is that a lot of work remains to be done!

### References & Photo credits:

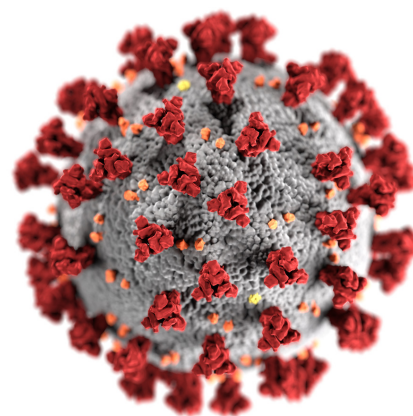
1. Photos credits: ScienceMag, Pixabay
2. [https://www.ted.com/talks/lucy\\_cooke\\_no\\_one\\_can\\_figure\\_out\\_how\\_eels\\_have\\_sex/transcript?language=en](https://www.ted.com/talks/lucy_cooke_no_one_can_figure_out_how_eels_have_sex/transcript?language=en)
3. <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000363#sec001>

### We want to hear from you!

If you have any feedback for the team or you want your opinion on biology to be featured in our next issue, please send it to [181824@juitsolan.in](mailto:181824@juitsolan.in). You can write to us even if you want to draw a cartoon for us!



# THE PANDEMIC, MISINFORMATION AND VACCINE



## COVID-19 Vaccine: Issues, Benefits and Myths

The global race for coronavirus vaccine is still ongoing, with more companies entering the Phase III trials. But, there are a series of issues that will remain unresolved even after the vaccine is approved for use.

The first issue is that the vaccine may not reach enough people even after the mass production begins. According to a report in The Mint, providing the AstraZeneca vaccine free-of-cost to 20% of the Indian population will cost around 11,000 crore rupees. More problems like the priority of distribution, which company to get the vaccines from (some vaccines require a temperature of -70 degrees Celsius for storage) are all issues and challenges that India faces as a nation.

Although immunizing a large part of the population will render herd immunity, the vaccine will take a year or two before it arrives.

Adding to the problem is the fact that myths coronavirus vaccine are circulating all around, making it really difficult for the vaccine to render populations immune to the virus.

## Why we need to fight misinformation now?

The last few months have had shocking announcements for the science community with a very renowned Ayurveda retailer releasing a 1000% effective medicine against the novel coronavirus, the American President removing his mask in public days after being diagnosed with the coronavirus, the Lancet and NEJM publishing retracting important studies and theories about the virus being man-made circulating all over the internet.

Though we are not educated epidemiologists or immunologists, we can fight misinformation in our own ways, by citing information from official sources, verifying any information from multiple sources before putting it out and most of all, educating as many people about the virus.

## Russia approves second coronavirus after good results in the early trials

The Russian authorities have approved the second vaccine for SARS-CoV-2 after successful completion of the early-stage trials. The announcement was made by the Russian president during a televised meeting with government officials.

The vaccine, EpiVacCorona, developed by the Vector Institute in Siberia, has been tested on 100 volunteers between 18-60 years ago. The approval has drawn a lot of criticism because the results from the trial haven't been published yet. A larger trial of the vaccine with thousands of volunteers is due to begin this November.

This vaccine is the second vaccine approved for use by the Russian authorities after Sputnik V.



### References & Photo credits:

1. Photos from Pexels, StopTheSpread.
2. <https://www.thehindu.com/news/international/russia-approves-2nd-coronavirus-vaccine-after-early-trials/article32858693.ece>
3. <https://www.livemint.com/opinion/online-views/covid-19-vaccines-are-coming-are-we-adequately-prepared-11602686992434.html>
4. <https://www.nature.com/articles/d41586-020-01834-3>
5. <https://www.nature.com/articles/d41586-020-02706-6>



**Authors: Yogesh Joshi, Janki Insan**

**Interview conducted by: Chaitanya Moghe & Janki Insan**

**Edited by: Literary Team, Synapse, Department of Biotechnology and Bioinformatics Club, JUIT.**