

# GULMOHAR NEWSLETTER



## FROM THE EDITOR'S DESK

by Shubham Patkar

TY B.Sc

A warm welcome to our second edition of the year 2020-2021. In this edition we have tried to publish some interesting articles and photographs. You may be well aware about different types of therapy. For example chemo therapy, gene therapy, massage therapy etc. But ever heard about forest therapy? If not in this edition we have introduced an article regarding forest therapy. We also have included an article regarding how blowing bubbles can be used for pollination. We have also put an article about RNA vaccines and health benefits of hazel nuts. Last but not least don't forget to check out the photography section which show amazing photography skills of the students.

HAPPY READING!

## IN THIS EDITION

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- Blowing bubbles to pollinate flowers.
- RNA Vaccines.
- Health benefits of Hazel nuts.
- Photo gallery.

# FOREST THERAPY



## What is Forest therapy?

Inspired by the Japanese practice of *shinrin-yoku*, or “forest bathing,” forest therapy is a guided outdoor healing practice. Unlike a hike or guided nature walk aimed at identifying trees or birds, forest therapy relies on trained guides, who set a deliberately slow pace and invite people to experience the pleasures of nature through all of their senses. It encourages people to be present in the body, enjoying the sensation of being alive and deriving profound benefits from the relationship between ourselves and the rest of the natural world.

*Shinrin-yoku* started in Japan in the 1980s in response to a national health crisis. Leaders in Japan noticed a spike in stress-related illnesses, attributed to people spending more time working in technology and other industrial work. Certified trails were created to guide people in outdoor experiences. Decades of research show that forest bathing may help reduce stress, improve attention, boost immunity, and lift mood.

## How does Forest therapy affect the body?

Stress raises levels of the hormone cortisol. Long-term stress and chronic elevations in cortisol play a role in high blood pressure, heart disease, headaches, and many other ailments. In test subjects, levels of cortisol decreased after a walk in the forest, compared with people who walked in a laboratory setting.

Trees give off volatile essential oils called phytoncides that have antimicrobial properties and may influence immunity. One Japanese study showed a rise in number and activity of immune cells called natural killer cells, which fight viruses and cancer, among people who spent three days and two nights in a forest versus people who took an urban trip. This benefit lasted for more than a month after the forest trip!

Some research suggests exposure to natural tree oils helps lift depression, lowers blood pressure, and may also reduce anxiety. Tree oils also contain 3-carene. Studies in animals suggest this substance may help lessen inflammation, protect against infection, lower anxiety, and even enhance the quality of sleep.

# BLOWING BUBBLES TO POLLINATE FLOWERS



A specially formulated soap bubble resting on a *Campanula*.

As wild insect populations decline and commercial honeybee colonies suffer maladies, farmers are seeking new ways to pollinate their crops. Some hire alternative insects, like blue orchard bees. Others drive huge pollen-spraying rigs, or daub each flower by hand with a paintbrush.

In the future, some may blow bubbles. In a study published Wednesday in *iScience*, researchers describe a type of soap bubble which, when laced with pollen, can propagate fruit as well as any of these other methods, save perhaps for bees themselves. Eijiro Miyako, an associate professor in the School of Materials Science at the Japan Advanced Institute of Science and Technology, has spent years looking for a better artificial pollination method

More recently, during a day in the park with his son, it occurred to Dr. Miyako that soap bubbles are much gentler. They also have a large surface area, are easily dispersed, and don't cost very much. He and a postdoctoral researcher, Xi Yang, headed to the lab to build a better bubble.

The first task was mixing the right soap. (As any enterprising former child knows, you can make bubbles out of a lot of different kinds.)

It was a balancing act: too little soap, and you can't make very many bubbles at once. But too much, or the wrong kind, and the soap interferes with the pollen. The sweet spot was a 0.4 percent concentration of a surfactant called lauramidopropyl betaine, common in baby shampoo.

The researchers settled on a pollen concentration that worked out to about 2,000 grains per bubble. They also juiced the solution with substances previously shown to enhance aspects of pollen germination and a polymer that strengthened the bubbles.

They took their super bubbles to a pear orchard, and blew them at each of 50 pear flowers. Ninety-five percent of the flowers later bore fruit. This was the same success rate as hand-pollinated pears but required less time and effort, and much less pollen about 1/30,000th the amount, Dr. Miyako said.

The bubble-based approach "does appear to have potential," said Dave Goulson, a biology professor at the University of Sussex in England and an expert in pollination. But, he added, there are still many things bees can do that bubbles can't, like collecting pollen in the first place, which is half the job.

Lila Westreich, a doctoral candidate in pollinator ecology at the University of Washington, fears that the bubble solution itself could harm local insects, as well as the bacteria that naturally occurs on flowers, which "plays an important role in the microbiome and health of native bees," she said. But she thinks bubble pollination could be a good alternative to trucking in nonnative pollinators.

# RNA VACCINES

## WHAT ARE RNA VACCINES AND HOW DO THEY WORK?

### WHAT ARE RNA VACCINES?

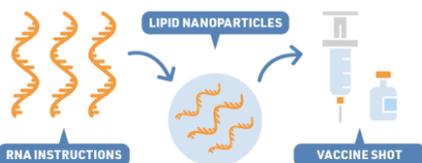
#### SARS-CoV-2

**Viral RNA**  
The virus's genetic material. Contains instructions for making proteins.

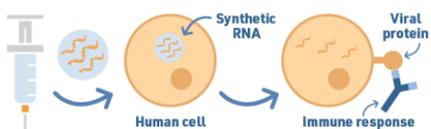


**Spike protein**  
Protein which helps the virus penetrate cells and initiates an infection.

The genetic code of the SARS-CoV-2 virus is made up of RNA. Scientists isolated the part of this genetic code that contains the instructions for making the virus's spike protein.



Synthetic RNA which codes for the virus spike protein is packed in lipid nanoparticles (very small fat droplets). This stops our bodies' enzymes breaking it down and helps our cells take it in.



Once the synthetic RNA is inside one of our cells, the cell follows the RNA instructions to produce the virus spike protein. Its production then triggers an immune response in our bodies.



### RNA VACCINES: BENEFITS AND CHALLENGES

#### VACCINE PRODUCTION

RNA is easy to make in a lab, so RNA vaccines can be developed quicker than other vaccines.

#### SAFETY OF THE VACCINES

RNA can't cause infection and is broken down by normal processes in our cells. An RNA vaccine hasn't been licensed for use in humans before but they've been under development for several years for other viruses, including influenza, HIV, and Zika.

#### STORAGE AND TRANSPORT

Some RNA vaccines must be stored at low temperatures to remain stable, which makes storage and transport more challenging.

### RNA VACCINES FOR COVID-19

Several proposed vaccines for COVID-19 are RNA vaccines. They can be based on two different types of RNA.

#### mRNA vaccines

Moderna  
Pfizer & BioNTech  
CureVac

#### saRNA vaccine

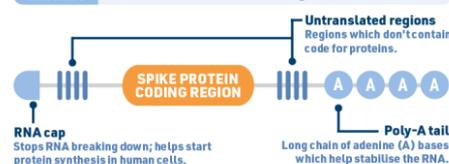
Imperial College  
Arcturus

### mRNA AND saRNA: WHAT'S THE DIFFERENCE?

The structures of mRNA and saRNA are similar but have a key difference, as the diagrams below show.

#### mRNA

mRNA stands for messenger ribonucleic acid



#### saRNA

saRNA stands for self-amplifying ribonucleic acid



As saRNA produces more copies of itself once it's in a cell, it can be given in smaller doses than mRNA vaccines. This makes the cost per dose lower and means higher numbers of doses can be produced from the same volume of vaccine.



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An RNA vaccine or mRNA (messenger RNA) vaccine is a type of vaccine that uses a copy of a natural chemical called messenger RNA (mRNA) to produce an immune response. The vaccine transfects molecules of synthetic RNA into immunity cells. Once inside the immune cells, the vaccine's RNA functions as mRNA, causing the cells to build the foreign protein that would normally be produced by a pathogen (such as a virus) or by a cancer cell. These protein molecules stimulate an adaptive immune response which teaches the body how to identify and destroy the corresponding pathogen or cancer cells.

The delivery of mRNA is achieved by a co-formulation of the molecule into lipid nanoparticles which protect the RNA strands and helps their absorption into the cells.

Reactogenicity, the property of a vaccine of being able to produce common, "expected" adverse reactions, is similar to that of conventional, non-RNA, vaccines. People susceptible to an autoimmune response may have an adverse reaction to RNA vaccines. The advantages of RNA vaccines over traditional protein vaccines are superior design and production speed, lower cost of production, and the induction of both cellular as well as humoral immunity. In RNA therapeutics, mRNA vaccines have attracted considerable interest as COVID-19 vaccines. By December 2020, there were two novel mRNA vaccines for COVID-19 that had completed the required eight-week period post-final human trials and were awaiting emergency use authorization: the Moderna COVID-19 vaccine (mRNA-1273) and the Pfizer-BioNTech COVID-19 vaccine (BNT162b2). On 2 December 2020, the UK's Medicines and Healthcare products Regulatory Agency (MHRA) became the first medicines regulator to approve an mRNA vaccine, authorizing the Pfizer-BioNTech COVID-19 vaccine (Comirnaty) for widespread use.

# HEALTH BENEFITS OF HAZELNUTS



Botanical source: *Corylus avellana*

Family: Betulaceae

The hazelnut is the fruit of the hazel and therefore includes any of the nuts deriving from species of the genus *Corylus*, especially the nuts of the species *Corylus avellana*. They are also known as cobnuts or filberts according to species.

Hazelnuts are used in baking and desserts, confectionery to make praline, and also used in combination with chocolate for chocolate truffles and products such as chocolate bars, hazelnut cocoa spread such as Nutella, and Frangelico liqueur. Hazelnut oil, pressed from hazelnuts, is strongly flavoured and used as a cooking oil. Turkey is the world's largest producer of hazelnuts.

Hazelnuts contain Vitamin E, healthful fat, protein and dietary fiber.

## Health benefits of Hazel nuts:

### 1) Supporting healthy bowel movements

Hazelnuts are a good source of dietary fiber. Eating plenty of fiber encourages regular bowel movements and helps prevent constipation.

### 2. Reducing weight gain

According to recent research, eating nuts may help some people to gain less weight.

### 3. Protecting against cell damage

Hazelnuts are rich in antioxidants, which are compounds that protect against the oxidation of cells. They reduce the extent of cell damage from free radicals.

Hazelnuts contain the antioxidant vitamin E. Some research suggests that vitamin E may help shield the body from types of cell damage linked to cancer.

### 4. Lowering cholesterol

Eating hazelnuts may help reduce cholesterol.

### 5. Improving insulin sensitivity

Eating a nut mix that includes hazelnuts may help improve insulin sensitivity.

### 6. Supporting heart health

Hazelnuts may help to promote a healthy heart.

### 7. Reducing inflammation

Eating hazelnuts may help to ease inflammation.

### 8. Improving sperm count

Recent research indicates that consuming more nuts, including hazelnuts, may increase sperm count and improve the sperms' quality.

# PHOTO GALLERY



*Datura stramonium*  
Asher Abraham (FY B.Sc)



*Zinnia species*  
Felix Sekar (FY B.Sc)



*Cosmos sulphureus*  
Shubham Patkar (TY B.Sc)



*Gerbera species*  
Shreya Kumari (SY B.Sc)

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