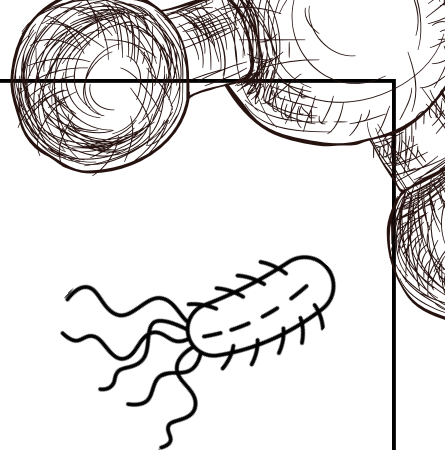
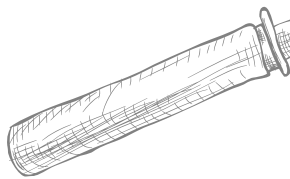


DELPHIC



*Great things are not on impulse,
but by a series of small things brought together*
-Vincent Van Gogh

The joy of science is curiosity.

Delving into the tapestry of existence, one cannot help but be ensnared by an insatiable curiosity—a flame that, once ignited, can illuminate the darkest corners of the universe. Such is the joy of science. Just as Rome wasn't built in a day, the essence of science unfolds over time.

Delphic presents a monthly newsletter to ignite a passion for science and all the qualities it brings about. With this, we hope to slowly build a sense of curiosity and questioning to actively challenge the status quo. In this issue, we shall delve into the side effects of a common household name, gaze into dark matter (*note the irony*), delve into the relation of AI and observe the migration of forests. We have also introduced an astronomy column spotlighting a constellation to look out for in the night sky.

Happy reading,
Keya Aggarwal
Editor-in-Chief

EXPLORING THE ENIGMA OF DARK MATTER

The universe, a grand tapestry of celestial wonders, still holds mysteries that baffle even our brightest minds—one prime enigma being dark matter. The actual nature of this invisible and ominous substance, despite being believed to constitute about 85% of the universe's matter, remains shrouded in mystery. It's termed "dark" because it doesn't engage with electromagnetic fields, making it invisible as it neither absorbs, reflects nor emits light. Nonetheless, it's instrumental in galaxy formation, exerting a gravitational grip that prevents galaxies from unravelling due to their rotational motions.

A leading hypothesis suggests dark matter comprises undiscovered subatomic particles, dubbed WIMPs (Weakly Interacting Massive Particles). These elusive entities seemingly interact with regular matter primarily through gravity and weak nuclear forces. Even though direct detection proves challenging, indirect observation methods have been employed, one involving the cosmic microwave background (CMB) radiation, a relic from the Big Bang.

The pursuit to decode dark matter illuminates our cosmic understanding, and while it captivates our imagination, its true essence remains a profound enigma despite years of rigorous study.

Vanya Gupta

THE PARACETAMOL PARADOX

We all have that one friend who pops Dolo-650 like candy for everything, from fever and headache to period cramps and toothache. Enter the world of 'one-size-fits-all' medicines, where the same remedy is prescribed for every sniffle and sneeze.

Dolo, Crocin, and Calpol are all brands that sell products with the same key ingredient: Paracetamol, a non-steroidal analgesic (painkiller) and antipyretic (fever reducer). It might seem perfect, but here's the twist: Paracetamol is akin to that tech-savvy friend who fixes your gadgets without explaining the rationale. It inhibits the production of chemicals, known as prostaglandins, which alert the central nervous system to pain and injury in the body. Paracetamol doesn't address the root cause of pain; instead, it simply heightens one's tolerance by reducing the effects of prostaglandins.

Paracetamol is available under various names and forms. It's also frequently combined with other medicines, often found in cold and flu medications or headache remedies, making it easy to overdose unintentionally. If you're already consuming a paracetamol combination (like Imol, which pairs paracetamol with ibuprofen), migraine preparations, or cough and cold remedies, it's advisable to avoid additional medications.

While Acetaminophen (Paracetamol) is typically safe in recommended doses, excessive consumption can lead to rare but severe side effects, such as skin rashes or yellowing of the eyes. Overdose symptoms might also include diarrhoea, vomiting, and stomach pain. In extreme instances, it can even result in liver failure.

-Syna Gupta and Sukhmeet Kaur

Celestial Conversations- Cygnus

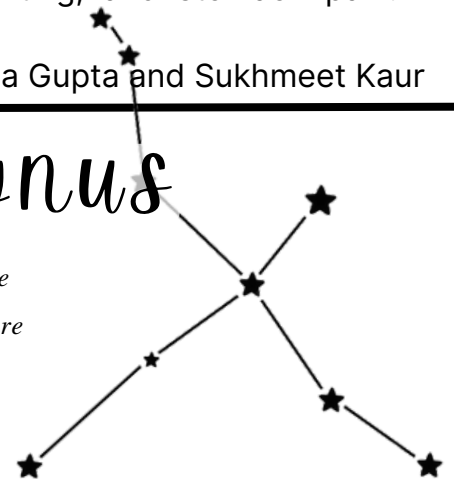
"Turn him into stars and form a constellation in his image. His face will make the heavens so beautiful that the world will fall in love with the night and forget about the garish sun"

-William Shakespeare

noun. Cyg·nus 'sig-nəs

Latin for "swan"

Best viewed in: October



To spot the Cygnus constellation, look for the five stars forming the Northern Cross. After sunset, find it rising high in the east. Deneb, its brightest star, represents the tail feather of the Swan or the top of the "t". As darkness deepens, trace the Swan's body and wings, leading you to the double star, Albireo, marking its head.

In Greek mythology, Cygnus is linked to various legendary swans. Zeus, masquerading as a swan, seduced Leda, leading to the birth of Helen of Troy and the Gemini. Additionally, after his murder, Orpheus was said to be transformed into a swan and placed beside his lyre (Lyra) in the sky.

-Vidya Jhamb



THE RELATION BETWEEN WORMS AND A.I.



Every year, the Neural Information Processing Systems conference gathers researchers to discuss the latest advancements in AI technology. However, the 2018 iteration presented something quite unusual: a presentation by developmental biologist Michael Levin. Even more peculiar was the face of this presentation: a worm.

This wasn't just any worm. Whenever its head was cut off, a new one would grow in its place. Researchers found that regardless of how many pieces you cut a planarian into, each segment could develop into a new worm. The standing record is 279 separate worms from a single planarian. Remarkably, every fragment knows how to regenerate, having an innate sense of its original structure. Building on this knowledge, Levin successfully cultivated a two-headed worm. It's important to note that Levin didn't modify the worm's genome. Instead, he tweaked the electrical signals between the worm's cells, effectively changing the worm's "memory" of its original form. Fascinatingly, such regenerative abilities are not exclusive to simple organisms. For instance, deer can regrow their antlers, and humans have the capacity to regrow livers.

Drawing a technological analogy, one might liken the brain to a computer. However, equating muscles or tissues to computers seems less intuitive. Yet, Levin's research suggests that, on a fundamental level, muscles might possess abilities to think, remember, and act. This introduces a novel perspective on biological coding. A major challenge in biomedicine has been modifying three-dimensional structures, but with Levin's insights, everything, barring infections, could potentially be addressed using this biological "coding." This encompasses birth defects, cancer, degenerative diseases, and much more. Ultimately, Levin's groundbreaking theories could pave the way for a harmonious integration of biology and technology, merging ancient scientific understanding with modern technological prowess.

-Tvisha Mahajan



JUST IN – *University Research*

Caltech researchers created a new drug delivery platform using ultrasound for targeting the medicines. This could help reduce the side effects of chemotherapy.

Researchers at **Georgia Tech** have identified a unique pattern (biomarker) in brain activity that reflects the recovery process in patients with treatment-resistant depression. It offers the first window into the workings and mechanistic effects of DBS (Deep Brain Stimulation) on the brain during treatment for severe depression.



The Unseen Odyssey

MIGRATION, often associated with the Monarch Butterfly fluttering for over 2500 miles or herds of zebras thundering across the African plains, can also be observed in trees, or more appropriately, forests.

Now, before you picture an oak tree sprinting down the forest path with roots waving in the air (though that would be a sight to behold), let's go for a more logical approach. Trees don't sneak around the woods quietly uprooting and settling at another spot. Instead, they perform a slow, intriguing travel that lasts for generations.

Trees reproduce primarily through seed dispersal by air, water or animals. Forests, over generations, develop around mature trees and expand further to habitable regions.

Now what happens if this seed is dispersed during drought or flood? Or when the winter is not as cold and summers not so warm? Suddenly, seedlings may encounter an environment to which they're not genetically well-suited. Perhaps the only ones that will survive are those that happen to be carried to, let's say, a slightly higher elevation. As the climate continues to change annually, trees will begin to diminish from their usual spot, sprouting only in suitable regions. This way the next generation will be carried further from the original habitat, giving the impression of a moving forest or in other terms- migration.

It sounds like these trees have found a quick way out of an uncomfortable situation, but is it helping the environment? The migration of trees might be temporarily beneficial for individual species, but it has been found to cause great disruptions in the balance of ecosystems. It can lead to a loss in biodiversity as some species struggle to keep up or find suitable habitats. The changing locations of these forests can alter soil compositions, disrupt the water cycle, and modify carbon sequestration rates. Furthermore, the arrival of new forests may introduce invasive species, affecting native ecosystems.

The moving tapestry of our forests underscores the vast impact of global changes.

-Bhavya Sangal and Pakhi Pragma Sinha

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