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Life
E-Newsletter

LIFE E-NEWSLETTER

INSIDE, WE ALSO TALK ABOUT:

Welcome to Cryosphere!

We are delighted to present the second issue of LIFE, the eNewsletter of the Department of Zoology. This edition centers on the theme **"Life in Glacial and Cold Ecosystems,"** thoughtfully aligned with the **International Year for Glacier Protection.**

Glacial landscapes, though often viewed as barren and silent, are home to complex and resilient forms of life. In this issue, we explore how organisms survive in extreme cold, how shifting climates alter these frozen worlds, and how certain species act as natural indicators of environmental change. A special photo feature further brings these icy habitats to life, offering a closer look at their hidden beauty.

As you flip through these pages, we hope you discover the remarkable adaptability of life in the planet's coldest regions—and the importance of understanding and protecting these fragile ecosystems!

Glacial Ecosystems: A Living Ice World

By Arshiya (SYBsc)

Glacial ecosystems are dynamic habitats composed of ice masses and cold-tolerant biological communities. Once considered lifeless due to extreme cold, UV radiation, and nutrient scarcity, glaciers are now known to host diverse life forms and ecological interactions.

Biodiversity consists of microbial producers, snow algae and cyanobacteria form the base of the food web, producing pigments like carotenoids and chlorophylls that protect against UV radiation and create phenomena like “watermelon snow.” Ice Worms (*Mesenchytraeus solifugus*) thrive entirely within ice, feeding on algae and bacteria. Other invertebrates—springtails, tardigrades, nematodes—inhabit cryoconite holes and aid in nutrient cycling. Macrofauna Connections, meltwater sustains surrounding alpine species like snow leopards, blue sheep, yaks, and birds that feed on glacier-emerging insects.

Life in glacial ecosystems survives only through extraordinary adaptations. Many organisms produce cryoprotectant molecules such as antifreeze proteins and trehalose, which prevent ice crystal damage and help maintain cellular integrity. Microbes often slow their metabolism or enter long periods of dormancy, relying on trace nutrients and reactivating when temperatures rise.

Their survival is further supported by efficient DNA repair systems and protective pigments that shield them from intense UV and cosmic radiation. These microbial communities are not just hardy—they are ecologically vital, influencing global carbon and nitrogen cycles, driving early soil formation, and shaping freshwater chemistry.Glaciers themselves act as natural archives, preserving ancient DNA, gases, and microorganisms that reveal past climate patterns and even guide the search for life on icy worlds like Europa and Mars. However, rapid glacial retreat threatens the stability of these habitats, disrupting microbial networks and endangering species with narrow thermal tolerance. Protecting these fragile icy realms requires urgent action through biodiversity monitoring, climate mitigation, and dedicated ecosystem conservation efforts.

Sentinels of changes: Animals as climate indicators

By Shrivasugi (SYBSc)

Climate change is one of the most pressing global challenges, affecting every aspect of the natural world. In this rapidly changing environment, certain animal species act as sentinels of change — living indicators that reflect the health of their ecosystems. These animals provide early warnings about alterations in temperature, ice cover, habitat, and food availability, helping scientists understand the ongoing impact of global warming. Polar Bears, Indicators of Arctic Warming. Polar bears (*Ursus maritimus*) are among the most recognized symbols of climate change. They rely on sea ice to hunt seals and travel across the Arctic. However, due to rising global temperatures, sea ice is melting at an alarming rate. The decline in polar bear populations, reduced body weight, and increased migration to land areas are clear signs of ecosystem imbalance. These changes indicate a loss of ice-dependent biodiversity and disrupted Arctic food webs.

Emperor Penguins it depends on stable sea ice for breeding and feeding. With rising ocean temperatures and melting ice, their breeding colonies are shrinking. Scientists monitor penguin population trends to assess changes in Antarctic ice dynamics and prey availability. A decrease in penguin numbers signals a direct disturbance in the marine food chain and oceanic ecosystem health.

Snow Hares they change their coat color seasonally white in winter for camouflage, brown in summer. Due to unpredictable snow patterns and warmer winters, many hares remain white even after snow has melted, making them vulnerable to predators. This mismatch between camouflage and environment reflects shifting seasonal cycles caused by climate change.

Nobel Prize in Physiology or Medicine 2025 - The Genetic Key to Immune Harmony

By Aarati (SYBSc)

In 2025, the Nobel Prize in Physiology or Medicine was awarded to Mary E. Brunkow, alongside Frederick J. Ramsdell and Shimon Sakaguchi, for their pioneering work in uncovering the genetic and cellular mechanisms that maintain immune tolerance. Their discovery of the FOXP3 gene and its role in regulatory T cells (Tregs) has transformed our understanding of how the immune system distinguishes between self and non-self, preventing it from attacking the body's own tissues.

Mary E. Brunkow's journey began with the study of a rare and devastating autoimmune disorder known as IPEX syndrome. Through meticulous genetic analysis, she identified mutations in a previously uncharacterized gene—FOXP3—as the root cause of the disease. This breakthrough revealed that FOXP3 is a master regulator of Tregs, a specialized subset of immune cells that act as peacekeepers, suppressing excessive immune responses and maintaining balance. Her discovery was soon complemented by Ramsdell's demonstration that FOXP3 is essential for Treg development, and Sakaguchi's decades-long work on the suppressive function of Tregs. Together, their findings provided a molecular and cellular framework for understanding immune tolerance, with profound implications for treating autoimmune diseases, enhancing cancer immunotherapy, and improving transplant outcomes.

The Nobel Committee's recognition of Brunkow and her colleagues marks a milestone in immunology, celebrating a discovery that bridges clinical observation with molecular insight. Brunkow's work exemplifies the power of curiosity-driven research and its potential to reshape medicine. By illuminating the genetic underpinnings of immune regulation, she has not only advanced science but also opened new therapeutic frontiers, offering hope to millions affected by immune-related disorders.

Remembering James D. Watson: A Pioneer in Molecular Biology

By Mohaddesa Fatema (TYBSc)

The scientific world recently bid farewell to James Dewey Watson, one of the most influential figures in the history of biology. Born on April 6, 1928, in Chicago, Illinois, Watson grew up far from the world of molecular biology that he would one day transform. The son of a businessman tailor, he developed an early fascination with nature, spending long hours bird watching and imagining a future as an ornithologist. But his life took a decisive turn after reading Erwin Schrödinger's celebrated book What is Life?, a work that inspired him to shift his gaze from birds to the microscopic foundations of heredity. This spark carried him into the heart of a scientific revolution.

Watson completed his B.Sc. in Zoology in 1947 at the University of Chicago, after which he pursued doctoral research at Indiana University under the Nobel laureate Salvador Luria. There, he studied bacterial viruses using X-rays, work that earned him his Ph.D. at the age of just 22—a remarkable achievement that foreshadowed the contributions he would later make. Realizing that unlocking the structural secrets of DNA required a deeper understanding of physics and chemistry, Watson moved to the Cavendish Laboratory at the University of Cambridge. It was here that he met Francis Crick, the brilliant and outspoken scientist who would become his closest collaborator. Their partnership became one of the most iconic in science. In 1952, Watson used X-ray diffraction techniques to determine the structure of the protein coat of the tobacco mosaic virus. Around the same time, new crystallographic data—especially the images produced by Rosalind Franklin—were changing how scientists viewed nucleic acids. By early 1953, Watson realized that DNA's four nitrogenous bases must pair in strict combinations. This insight formed the final missing piece that allowed him and Crick to propose the double-helix model of DNA, a structure so elegant and intuitive that it instantly transformed biological research.

Their discovery offered a molecular explanation for heredity, mutation, and life's diversity. In 1962, Watson, Crick, and Maurice Wilkins shared the Nobel Prize in Physiology or Medicine, confirming the global impact of their work. But the double helix was only the beginning of Watson's contributions.

From 1955 to 1976, Watson taught at Harvard University, becoming a professor of biology in 1961. His teaching and research during this period helped train a generation of molecular biologists. He investigated the role of nucleic acids in protein synthesis, and in 1965 he published Molecular Biology of the Gene, a landmark textbook still regarded as one of the most influential works in modern biology. His candid memoir, The Double Helix (1968), offered a personal view of the DNA discovery. Though controversial for its portrayals of certain scientists, it became a bestseller and humanized one of science's greatest breakthroughs.

In 1968, Watson accepted the directorship of the Laboratory of Quantitative Biology at Cold Spring Harbor Laboratory (CSHL) in New York. Under his leadership, the institute underwent dramatic transformation. Watson envisioned CSHL as a hub for cutting-edge molecular research, and by reorganizing its focus and infrastructure, he turned it into a global center for genetics and molecular biology. In 1969, he directed the laboratory's attention toward the study of cancer, especially DNA viruses that induce malignant transformation.

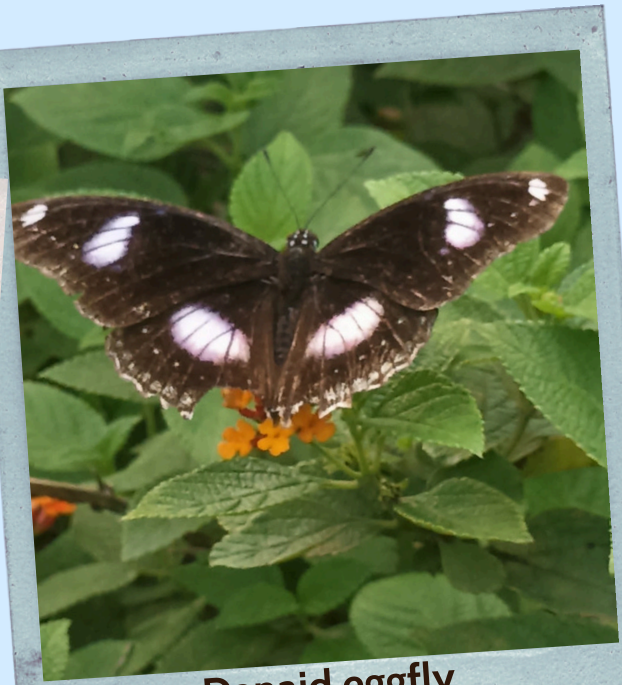
This shift led to numerous breakthroughs, including the Nobel-winning discovery of RNA splicing, which expanded our understanding of how genes function.

Always ahead of his time, Watson continued to advocate for scientific openness and technological progress. In 2007, he became only the second person in the world to have his entire genome sequenced and publicly released. This event marked a major milestone in the rise of personal genomics and emphasized Watson's lifelong commitment to advancing biological research. In 2014, in a gesture intended to support scientific advancement, he auctioned his Nobel Prize medal for USD 4.1 million, with the funds funnelled into research initiatives. Remarkably, the buyer later returned the medal to him.

As we remember James D. Watson, we honor not just a scientist, but a pioneer whose discoveries continue to influence medicine, biotechnology, evolutionary biology, and every corner of life science. His legacy endures in the textbooks students study, the laboratories where genes are decoded, and the expanding frontier of genomic research that he helped initiate. Watson's life, marked by curiosity and bold inquiry, reminds us of the transformative power of asking questions—and pursuing them with passion.

Photo Gallery


Sand bubbler crab
Scopimera globosa
By Arshia (Sybsc)


Danaid eggfly
Hypolimnas misippus.
By Rabia (Sybsc)


Sea cucumber
Holothuria leucospilota
By Lynn (Tybsc)


Hermit crab
Paguroidea sp
By Lynn (Tybsc)

LIFE E-NEWSLETTER IS AN UNDERTAKING BY THE ZOOLOGY DEPARTMENT OF SIES, SION (W)
EMAIL US: editor.lifenewsletter@gmail.com
INSTAGRAM: http://www.instagram.com/zoologylifenewsletter
MENTOR: DR. MADHAVAN GOPALAN, ZOOLOGY DEPARTMENT
EDITOR : AARATI ASHOKKUMAR
TEAM MEMBERS : MOHADDESA FATEMA PANJWANI (TYBSC), ARSHIYA CHOUGLE (SYBSC), SHRAVANI AYARE (SYBSC), PURVA GAUD (SYBSC), NIDHI DUBEY (SYBSC), RIYA JADHAV (FYBSC), LAWANYA (FYBSC), FATEMA DABIR (FYBSC), RABIA (SYBSC), SHRIVASUGI (SYBSC)