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ZOOLOGICA

A Magazine by-
DEPARTMENT OF ZOOLOGY

S.B. DEORAH COLLEGE, GUWAHATI, ASSA

ZOOLOGICA

Editor
Puja Bishaya

Published by
Department of Zoology
S.B. Deorah College
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Message from the Principal

I am delighted to learn that the Department of Zoology is set to publish its departmental magazine, ZOOLOGICA. Our college takes pride in fostering creativity and talent among learners, and ZOOLOGICA serves as an excellent platform to highlight the artistic and literary abilities of our budding students. My heartfelt congratulations to the entire team of the Department of Zoology for this commendable initiative. I encourage them to continue this endeavour by publishing more editions of ZOOLOGICA in the years to come.

Thank you.

Dr. Dharmendra Nath
Principal
S.B. Deorah College

Message from the Head of the Department

It is with immense pride and joy that I present to you ZOOLOGICA, the first official magazine of the Department of Zoology at S. B. Deorah College. This publication is a reflection of the passion, dedication, and creativity of our students and faculty, who continue to explore and celebrate the wonders of the animal kingdom and the intricate web of life on our planet.

In an era marked by rapid scientific advancements and growing environmental challenges, zoology stands at the crossroads of discovery and responsibility. Our department remains steadfast in its commitment to nurturing inquisitive minds, fostering research, and promoting awareness about biodiversity conservation. This magazine serves as a platform to showcase the academic achievements, research endeavours, and artistic talents of our vibrant zoological community.

The pages ahead are a treasure trove of articles, and photographs that highlight the diversity and beauty of life forms, while also addressing the pressing issues that threaten their existence. It is heartening to see our students and faculty delve into subjects ranging from the microscopic to the monumental, bringing their insights and observations to light.

I extend my heartfelt gratitude to the editor, contributors, and everyone involved in bringing this magazine to fruition. Your hard work and dedication have created something truly special that will inspire readers to appreciate and protect the natural world.

As you explore this edition, I encourage you to think critically, dream boldly, and remain curious. Together, let us continue to unravel the mysteries of life and work towards a future where all species coexist harmoniously.

Warm regards,
Dr. Sudem Basumatary
Head of the Department
Department of Zoology
S. B. Deorah College

HoD, ZOOLOGY
S. B. DEORAH COLLEGE
ULUBARI, GUWAHATI

Message from the Editor

Dear Readers,

It is with great excitement that I introduce to you ZOOLOGICA,the first official magazine of the Department of Zoology at S. B. Deorah College. This magazine serves as a vibrant platform to celebrate the intellectual pursuits and creative expressions of our students and faculty. The pages ahead offer a fascinating blend of ideas, research findings; and reflections on the world of zoology.

Beyond academics, this magazine also highlights the various activities and milestones achieved by the department. It is a reflection of our shared journey toward fostering a dynamic and inspiring learning environment, where curiosity meets purpose.

I am deeply grateful to all the contributors, and supporters who made this publication possible. Your dedication and creativity are the heart of this magazine. I hope that reading it not only informs and inspires you but also strengthens your connection to the wonders of life around us.

Wishing you an enlightening and enjoyable read!

Warm regards,

Puja Bishaya
Department of Zoology
S. B. Deorah College

About the Department

The Department of Zoology at S. B. Deorah College was established in 2018 with a single non-sanctioned faculty member. Since its inception, the department has been offering B.Sc. Major and General degree courses under the affiliation of Gauhati University. In 2020, the college sanctioned and filled three additional faculty positions, significantly enhancing the department's academic strength.

Equipped with modern laboratories and a digital classroom, the department ensures seamless delivery of both theoretical and practical lessons in alignment with the prescribed syllabus. Additionally, the department houses a museum and a library, enriching the learning experience for students.

Dedicated to fostering academic growth and holistic development, the department organizes regular student seminars, group discussions, peer teaching sessions, excursions, and personalized mentoring programs tailored to the needs of both slow and advanced learners. Beyond the classroom, the department has successfully conducted various workshops and extension activities, including collaborative initiatives with zoology departments of other institutions under the framework of signed MoUs.

Guided by its motto to provide quality education and promote all-round development, the department also offers coaching classes to help students prepare for higher education entrance examinations. With its dynamic approach to learning and collaboration, the Department of Zoology continues to empower students to achieve academic and professional excellence.

Faculty Members:

1. Dr. Sudem Basumatary (HoD)
2. Dr. Priyambada Chutia
3. Ms. Puja Bishaya

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Computer-Aided Drug Design (CADD) and Development

Dr. Rahul Sarma
Ex-Faculty, Dept. of Zoology, S.B. Deorah College

Computer-Aided Drug Design (CADD) is a technology-driven approach in pharmaceutical research that uses computational methods to design and discover new drugs. The primary goal of CADD is to identify compounds that can interact with specific biological targets, such as proteins or enzymes, involved in diseases. By leveraging computational tools, researchers can predict how these compounds will behave in the body, their potential efficacy, and possible side effects, all before they are synthesized and tested in the laboratory.

There are two main approaches in CADD: structure-based and ligand-based drug design. Structure-based drug design relies on the 3D structure of the target molecule. Researchers use molecular modeling to visualize how potential drug candidates might fit into the active site of the target, optimizing the interaction to enhance the drug's efficacy. Techniques such as molecular docking simulate the interaction between the drug and the target, predicting the binding affinity and stability of the drug-target complex.

On the other hand, ligand-based drug design is used when the structure of the target is not known. This method relies on the knowledge of other molecules that interact with the target. By analyzing the chemical properties and biological activities of known ligands, researchers can design new molecules with similar or improved properties.

CADD employs a variety of computational techniques, including:

1. Molecular Docking: This technique predicts the orientation and binding energy of a drug candidate when it interacts with its target. Molecular docking tools such as Auto Dock and Glide are widely used.
2. Molecular Dynamics (MD) Simulations: These simulations model the behavior of molecules over time, providing insights into the stability of the drug-target complex under physiological conditions.
3. Virtual Screening: Virtual screening evaluates large libraries of compounds to identify potential drug candidates that are likely to bind to the target.
4. De Novo Drug Design: This technique generates entirely new molecular structures optimized for a specific target.

The integration of CADD into drug discovery offers several key advantages:

1. Efficiency: By predicting drug-target interactions computationally, CADD reduces the need for extensive laboratory testing and accelerates the drug discovery process.
2. Cost-Effectiveness: The in-silico approach minimizes the expenses associated with traditional high-throughput screening methods.
3. Precision: CADD enables the rational design of drugs with high specificity, potentially reducing side effects.
4. Accessibility: With advancements in computational power and open-source software, CADD tools are increasingly accessible to researchers globally.

Applications of CADD

CADD has been instrumental in several areas of drug discovery:

1. Antiviral Drug Development: During the COVID-19 pandemic, CADD played a critical role in identifying small molecules and repurposing existing drugs to target the SARS-CoV-2 virus.
2. Cancer Therapeutics: CADD aids in designing inhibitors for cancer-related proteins, such as kinases and transcription factors.
3. Neurodegenerative Disorders: Computational tools are used to develop treatments for Alzheimer's and Parkinson's diseases by targeting misfolded proteins and neurotransmitter pathways.

Challenges and Future Prospects

Despite its success, CADD faces challenges such as the accurate modeling of biological systems and the complexity of drug metabolism and toxicity. Future advancements in artificial intelligence (AI), machine learning, and quantum computing hold the promise of addressing these limitations, further enhancing the predictive power and efficiency of CADD.

In conclusion, CADD has transformed the landscape of drug discovery, enabling faster and more precise development of therapeutics. As computational technologies continue to evolve, CADD will remain an integral part of the pharmaceutical industry, driving innovation in the search for life-saving medicines. □

The Ecological Importance of Birds

Ms. Puja Bishaya
Faculty, Dept. of Zoology, S.B. Deorah College

With over 11,000 recognized species globally, birds are one of the most diverse groups of vertebrates and play a crucial role as providers of ecosystem services. These services are sets of ecosystem functions that benefit people directly or indirectly, showcasing the essential contributions birds make to ecological health.

Birds deliver a range of services categorized into provisioning, cultural, regulating, and supporting functions. Provisioning services include direct benefits such as food, feathers for clothing, and other domesticated uses. Cultural services highlight the inspirational role of birds in art, music, religious practices, and ethno-ornithology, enriching human culture in numerous ways. Regulating services help maintain ecological balance by controlling pests, removing carcasses, and limiting the spread of diseases. Supporting services, such as seed dispersal and pollination, are critical for sustaining biodiversity and ensuring ecosystem functionality.

Birds act as vital genetic linkers by facilitating the movement of genetic material across ecosystems. For instance, hummingbirds pollinate flowers while feeding, transferring genetic material from one plant to another. Over 900 bird species, including hummingbirds, sunbirds, and honeyeaters, pollinate around 500 plant genera. Their high energy needs drive frequent flower visits, enhancing gene flow and pollination quality, particularly for self-incompatible plants with scattered distributions. Birds also contribute to seed dispersal, as seen in hornbills, which swallow fruits and defecate viable seeds far from the parent tree. This process reduces the risks of density-dependent mortality caused by predators, herbivores, and pathogens while aiding the colonization and regeneration of barren or marginal habitats, such as volcanic islands.

Beyond genetic linking, birds play a crucial role in transferring minerals and nutrients between ecosystems through their guano (droppings), making them essential resource linkers. For example, seabird guano provides significant amounts of phosphorus to terrestrial ecosystems, while waterfowl enrich wetlands with nitrogen and phosphorus, boosting productivity. Birds also act as critical connectors in food webs. Insectivorous birds help control insect populations, benefiting agriculture by reducing pests. Raptors, as predators, exert top-down control over prey populations, influencing ecosystem dynamics. Scavengers like vultures recycle carcasses, maintain energy flows, and prevent the spread of diseases.

Birds also influence ecosystems through non-trophic processes by modifying the physical and chemical environment. Cavity-nesting birds create shelters for other species, while nectarivorous birds sustain floral resources.

These direct and indirect contributions underscore the indispensable role of birds in maintaining ecological balance and promoting biodiversity.

Thus, birds play essential roles in maintaining and enhancing ecosystem health through their diverse functions as genetic, resource, trophic, and non-trophic process linkers. From seed dispersal and pollination to nutrient transfer and pest control, their contributions are vital to the sustainability of ecosystems. Understanding and preserving these roles is crucial for protecting biodiversity and maintaining the balance of nature. By safeguarding birds, we not only support ecosystems but also ensure the continued provision of services essential to human life and well-being. ❑

The Hoolock Gibbons of Barekuri village: An insight into the human-ape co-existence

Barshashri Talukdar
Alumni, B.Sc. Zoology(H): 2019-2022 Batch

"*The wildlife and its habitat cannot speak, so we must and we will.*"- Theodore Roosevelt

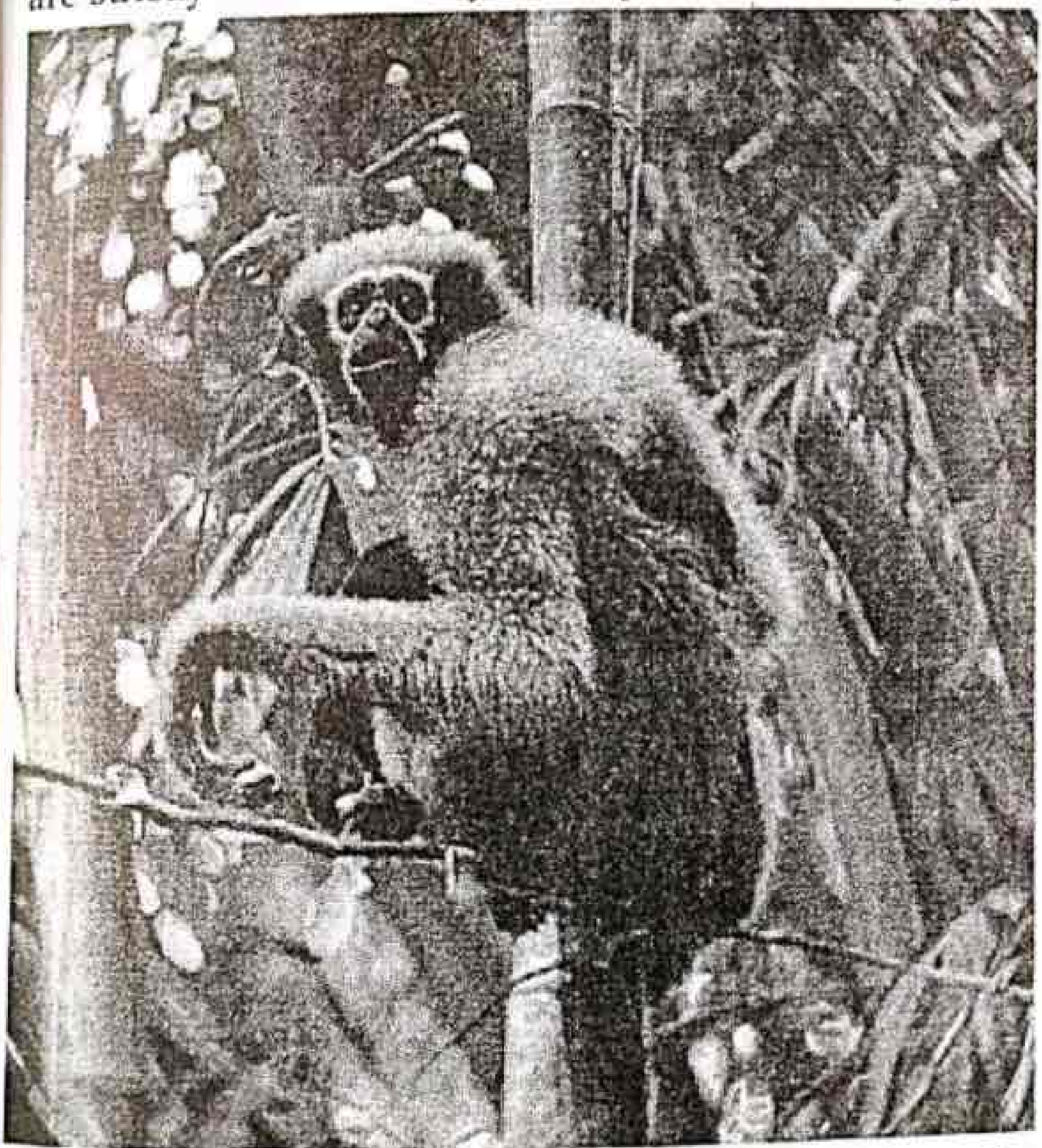
For people who are fond of wild animals, animals in short, finding ways to help them thrive in their natural habitat and to do something for them is a daily chore. The wildlife biologists, ecologists and anyone who is fond of animals work relentlessly for the betterment of the voiceless out there. On a cold February morning I got a chance to witness something similar on my own. The journey of two days to the district of Tinsukia left me with knowledge and memories of a lifetime. The journey included DibruSaikhowa National Park, Dehing Patkai National Park, Maguri Beel and the Barekuri village. To witness something so magical for two days back-to-back, was a treat to the eyes.

Coming back to the village, Barekuri (twelve times twenty) village, is a cluster formed of many small villages. Tinsukia is the place where we can find the only ape species of the Indian subcontinent, the Western Hoolock Gibbons. I was amazed and thrilled with joy to witness the humans and the ape counterparts living so peacefully. It is an

extremely rare sight to spot Hoolock Gibbons in the wild for the reason being they are extremely shy animals. But here in Barekuri village, people get a chance to witness something so magical from so near and it shows a picture of the centuries they have been co-existing together.

We were allowed to make no noise. I noticed it was so quite out there. Nobody was making any noises nearby. But we could hear the calls the Gibbons were making. Strong, distinct, loud calls. Very specific. The Gibbons were comfortable with the villagers. They would come down from the canopy to accept tokens such as a banana. The villagers even adapted themselves to the Gibbon calls and some of them could make such similar calls and Gibbons would respond to the same. What an amazing view to witness! Many of us got chances to offer bananas to the Gibbons. Everyone was overwhelmed.

If we talk about the Western Hoolock Gibbons, they are strictly arboreal. They are shy animals. They spend



months in the tall canopies without setting foot on the ground. The sexual dimorphism is distinct. The male Gibbons are entirely black and females are shades of brown and fawn.

Hoolock Gibbons are active for 8-10 hours in a day starting at dawn. They are also known for making loud, distinct calls to announce their territory to the rival males. They live in monogamous pairs. They survive on fruits and insects. For fruits, bananas are their favourite. The mothers carry the babies with themselves and are known to be very protective. From the villagers we came to know that the Gibbons have a very good memory. They remember which hands fed them and which abandoned them.

The rapid decline in the Gibbon population is a major concern. They are mainly due to electrocution and speedy vehicles. But the villagers have understood the presence of the Gibbons in the village would bring great values. They look up to the government for help.

The animals live here. This is their habitat which we humans have turned into ours. We should become the voice of the voiceless. The Barekuri village and their people have set an excellent example of 'live and let live'. It was a core memory. We must make sure that any form of human interaction would harm no animal out there. These changes start with us. They start with you. ❑

The Rare ONE- Pigmy hog!!

Nibedita Kalita
Alumni, B.Sc. Zoology(H): 2019-2022 Batch

Porculasalvaniawas the scientific name of Pigmy hog proposed by Brian Houghton Hodgson in 1847 who described a pygmy hog from the Sikkim Terai. This animal is currently on the verge of extinction. The species was formerly distributed along the narrow alluvial tract south

of the Himalayan foothills from south-eastern Uttarakhand in the west to central Assam in the east, along the international border of Nepal and Bhutan with Indian states of Uttar Pradesh, Bihar, West Bengal and Assam. Pygmy hogs are social animals which live in small family groups consisting of one or two females and their offspring. They are non-territorial, and sometimes family groups can consist of as many as 20 individuals. Adult males are generally solitary and live separately. It is the world's smallest and rarest wild pig most threatened by extinction and has been listed as "critically endangered" by the International Union of Conservation (IUCN) since 2008. Due to human encroachment and destruction of the pygmy hogs' natural habitat, the species was thought to have gone extinct in the early 1960s.

With an estimated population of less than 250 mature individuals, the animal is listed as an Endangered species on the IUCN Red List. Since pygmy hogs live among 'thatching grasses', their native environments are being destroyed by humans for their commercial purposes where most of these grasses are harvested annually, and most of them are subjected to wide-scale annual or twice-annual burning as a means of maintenance. In Assam, much of the pygmy hog's habitat has also been lost to settlements and agriculture due to rapid human population growth. Hunting the pygmy hog for meat by the native tribes of Assam had previously not been a problem, it is now posing a very real threat to the small population of pygmy hogs that still exist in the wild. Between 1995 and 2000 extensive surveys were carried out in all areas of northeastern India where pygmy hogs had been reported or suspected to occur in the past where these surveys confirmed the extinction of the species in Barnadi, where the species was last recorded in 1991, and all other sites except Manas National Park which now supports the last known viable wild population of this species. By 1993, the species had become restricted to only a few pockets of the Manas National Park.

The Pygmy Hog Conservation Breeding Programme (PHCP) was formed in 1995 in order to aid the implementation of a broad conservation action for the pygmy hog and its habitat. Two males and four female individuals were caught under permit in Manas National Park and transferred to a facility in Basistha, where they became the founders of the current captive-breeding program. After two years, the captive population had increased by over 600%, and an additional breeding facility was established at Potasali in Nameri. the pygmy hogs are divided into social groups, and live in environments simulated to resemble their natural habitat where they can engage in natural foraging, nest-building, and other natural behaviors. Just prior to their release, the pygmy hogs are taken to a reintroduction site where they are maintained for two to three days to ensure their readiness before they are officially released back into the wild. In 2024, nine pygmy hogs were released into Manas National Park, increasing its population to 63 individuals. □

Radio Telemetry: Modern Wildlife Management Technique for Conservation

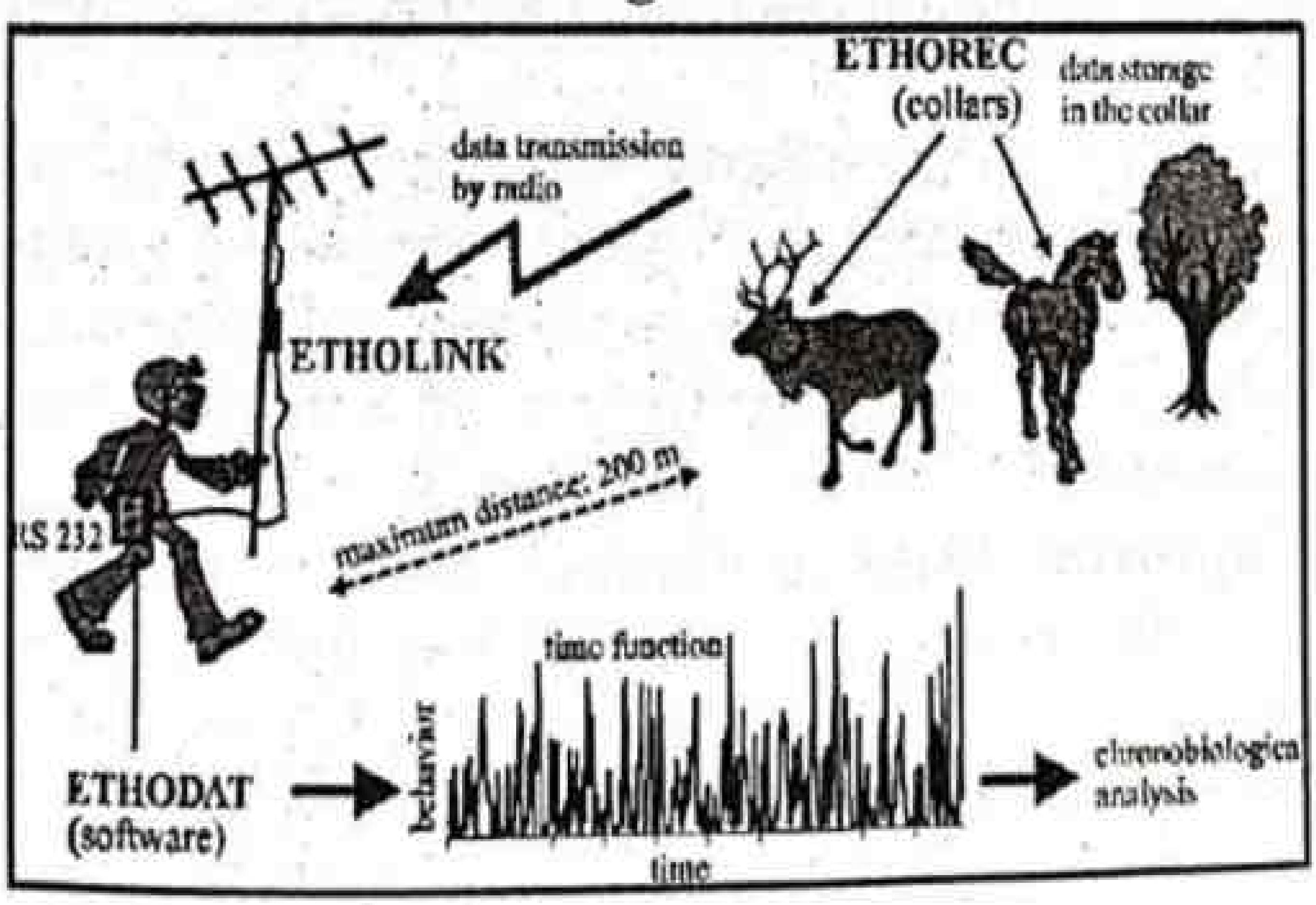
Chiranjeeb Sarma
Alumni, B.Sc. Zoology(H): 2020-2023 Batch

Radio telemetry is a cornerstone technology in the field of wildlife conservation, enabling researchers to track and monitor animals remotely. By attaching a radio transmitter to an animal, scientists can gather precise data about the animal's location, movements, and habitat use. This information is crucial for understanding the behaviour and ecology of different species, which helps guide effective conservation planning and decision-making

The use of radio telemetry has been instrumental in various conservation efforts, such as studying migration patterns, monitoring endangered species, and tracking reintroduction projects. The technology provides insights into how animals interact with their environment, adapt to changes, and face threats such as habitat loss and human-wildlife conflict

Radio telemetry offers the advantage of tracking animals in real-time, even in remote or difficult-to-reach areas. However, there are challenges, including limited range and accuracy, potential interference, and the need to carefully consider the impact of attaching transmitters on the animals' health and behaviour. Despite these challenges, radio telemetry remains a vital tool in wildlife conservation, contributing significantly to the understanding and protection of various species and their habitats.

- Radio telemetry is a method of identifying the information about an animal through the use of radio signals or frequency from Transmitter which is attached on the target species to a Receiver's device.
- Function: Transmitters are small devices that emit radio signals at specific frequencies. When attached to an animal, they allow researchers to track its movements and location.
- Function: Receivers pick up the radio signals emitted by transmitters attached to animals. By detecting the signal strength and direction, researchers can determine the animal's location
- Together, transmitters and receivers form the backbone of radio telemetry systems, enabling researchers to monitor and study wildlife effectively.
- It was first demonstrated by Cochran and Lord in 1963.
- The different types of radio telemetry:
  1. Very High Frequency(VHF),
  2. Global Positioning System(GPS)
  3. Satellite Tracking.



Important aspects of this device :

- Common Bands or The Frequencies are:
  1. -148 to 152 MHz (Mostly used)
  2. -163 to165 MHz
  3. -216 to 220 MHz
- Total weight of this device should be in a range of 3% -5% (Body weight) of the target species.

Importance of this device :

- Tracking Movement: Identifying the migration patterns, Corridors and Habitat Utilization.
- Monitoring the threatened species for further conservation planning to stable the species.
- Studying Behavior: By monitoring animals over time, researchers can gain insights into their behavior, such as feeding habits, social interactions, and mating patterns. This information helps in developing effective conservation plans.
- Monitoring the health and spread of diseases in wildlife species.
- Able to assess how wildlife species adapt to environmental changes.
- Monitoring Populations: Radio telemetry allows researchers to keep track of individual animals within a population. This helps in assessing the health and size of populations, which is crucial for conservation planning.
- Recovery Efforts: Radio telemetry is useful in species recovery efforts, such as reintroducing animals into the wild. It allows researchers to monitor the success of reintroduction programs and make adjustments as needed.
- Capturing Data in Remote Areas: Radio telemetry enables researchers to gather data in remote or difficult-to-reach areas where other methods might be impractical

Disadvantages of this device :

- As the transmitter is connected to rigid collar is that they potentially can causes venous outflow obstruction, which may elevate intracranial pressure.On the other hand, if the collar is not on tight enough then the chances of falling is high and when the collar is tight then the animal will suffer from tightness as the animal grows in size.
- Battery Life: Radio transmitters rely on batteries, which have limited lifespans. Once the battery dies, the transmitter stops working, and the animal can no longer be tracked. Frequent replacement can be costly and may require capturing the animal again.
- Limited Data: Radio telemetry typically provides data on an animal's location, but it doesn't capture other information such as health or physiological data. To gather a more comprehensive understanding of an animal's well-being, additional methods may be needed.
- Cost: The cost of radio telemetry equipment, including transmitters and receivers, can be high. Additionally, tracking requires significant time and resources, especially if the researchers need to follow animals over large areas.
- Human Disturbance: The process of capturing and attaching a transmitter to an animal can cause stress or disturbance to the animal, potentially affecting its behavior and well-being
- Signal Loss: In dense vegetation, rugged terrain, or underwater environments, radio signals may be lost or weakened, making it difficult to track the animal accurately

Despite these challenges, radio telemetry remains a valuable tool in wildlife conservation when used appropriately and in combination with other monitoring methods. Researchers must weigh the benefits against the potential drawbacks and choose the best approach for each conservation project. □

Infertity: A Social Stigma

Riya Yadav
Alumni, B.Sc. Zoology(H): 2021-2024 Batch)

Every 1 in 6 people globally is affected by infertility. Isn't it concerning?

Infertility is a disease of the male and female reproductive system defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse. WHO report (2023) states that every 1 in 6 people globally is affected by Infertility. The lack of awareness of the cause creates social stigma, disgrace and taboo in people. Millions of people around the world lack access to infertility treatments due to high costs, social stigma, limited availability of services. Fertility care is a major challenge in most middle and low income countries, it is rarely prioritize in national universal health coverage benefit packages.

Cause of infertility :

Though there are a number of factors, but sometimes is not possible to explain the causes of infertility.

The most common causes of infertility in females are- Tubal disorders such as blocked fallopian tubes, which are in turn caused by sexually transmitted infections (STIs) or complications of unsafe abortions, postpartum sepsis or abdominal/pelvic surgery; uterine disorders (such as endometriosis) congenital or benign in nature; disorders of the ovaries, such as polycystic ovarian syndrome and other follicular disorders and disorders of the endocrine system causing imbalances of reproductive hormones.

The most common causes of infertility in males are obstruction of the reproductive track causing dysfunctionalities in the ejection of semen. Blockages are commonly due injuries or infections of the genital tract; low sperm count, abnormal sperm function and quality that cause abnormal shape (morphology) and movement (motility) of the sperm negatively affect fertility and hormonal disorders leading to abnormalities in hormones produced by pituitary gland, hypothalamus and testicles.

Moreover, lifestyle factors such as smoking, excessive alcohol intake and obesity can affect fertility in both the genders. In addition, exposure to environmental pollutants and toxins can be directly toxic to gametes resulting in their decreased numbers and poor quality.

Importance of addressing infertility :

- Every human has the right to live life to the highest attainable standard of physical and mental health. Individuals and couples should have the right to decide the number, spacing and timing of their children planning process. Infertility causes hinderence to this basic Human right.
- Inequities and disparities in access to fertility care services adversely affect the poor, unmarried, unmarried, unemployed and other marginalized populations like heterosexual and homosexual partners, medical condition like HIV discordant couple, cancer survivors etc.
- Infertility causes social disgrace, stigma and taboo particularly blaming women, perceiving them to be the infertile one, who often experience. violence, divorce, &emotional stress, depression, anxiety and low self-esteem. Men are often mocked about their manliness when suffering from infertility.

- Lack of knowledge of family planning have also forced many young couples to deter using contraception and socially pressured to prove their fertility at an early age because of high social value of child bearing. In such situation normalising sex education, awareness- raising true knowledge is important.

Addressing challenges :

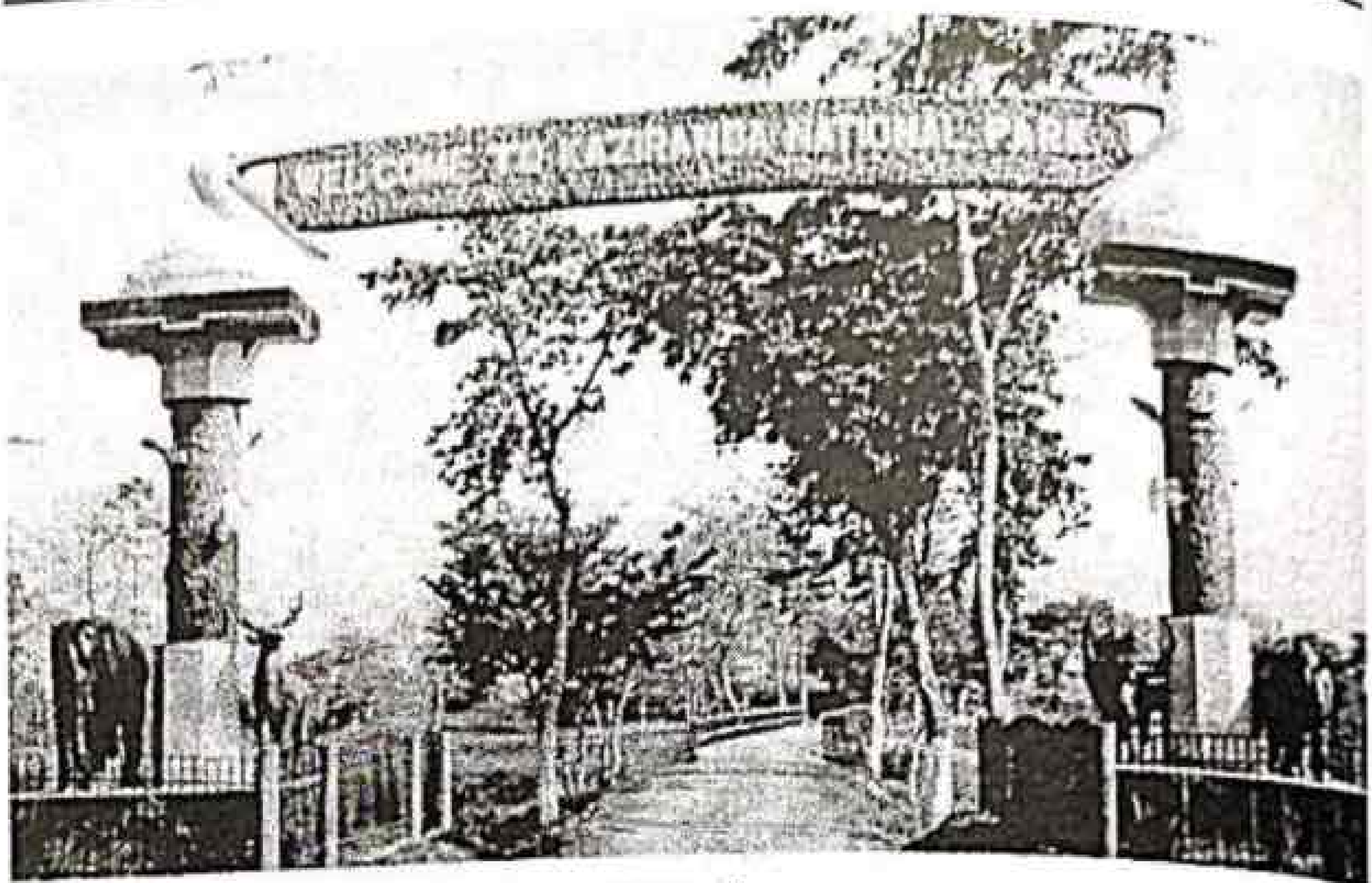
- Diagnosis and treatment of infertility should be prioritized. Necessary equipment and infrastructure, treatment and medicine at effective cost should be focused by the authorities.
- Assisted Reproduction Technologies (ART) such as In-Vitro Fertilisation (IVF), should be widely introduced under affordable conditions in particularly low and middle income countries.
- Government policies could mitigate the many inequities in access to safe and effective fertility care. To address infertility, awareness should be made that it is a disease that can often be prevented, making accessible treatment.
- Promoting sex education right from the school, spreading awareness about contraception, STD prevention, diagnosis and treatment, preventing complications of unsafe abortion, pastpartum care of surgery and addressing environmental toxins associated with infertility, stopping the alcohol, smoking, doping, or any such wrongly claimed modern culture, promoting healthy diet, exercise, yoga for well-being can be implemented by the government.
- Small effective steps from each of us can show a huge difference in understanding and tackling this mis-informed of infertility disease. ❑

National Parks of Assam

Shivanggan Thakuria and Rahul Chourasia
B.Sc. Zoology(H), 5th Semester, 2022-25 Batch

Assam, the gateway to India's northeast, is state rich in natural beauty, biodiversity, and cultural heritage. Its verdant landscapes, sprawling wetlands, and dense forests make it a paradise for nature lovers and wildlife enthusiasts. Assam is home to seven remarkable national parks, each showcasing unique ecosystems and housing a diverse range of flora and fauna. These parks not only protect endangered species but also play a vital ecological role for the region. The one-horned rhinoceros, Kaziranga, to the golden langurs of Raimona, Assam's national parks are truly a reflection of the state's commitment to wildlife conservation and eco-tourism. The varied terrain, from floodplains and grasslands to tropical rainforests, offers habitats for some of the most endangered and endemic species, making these parks a global treasure for biodiversity.

Assam, one of the vibrant states in India's northeastern region, is famous for its extraordinary biodiversity and rich cultural heritage. Assam boasts seven national parks that provide a glimpse into some of the most pristine and ecologically significant landscapes in the country. Here's a detailed account of each national park:



1. **Kaziranga National Park :**

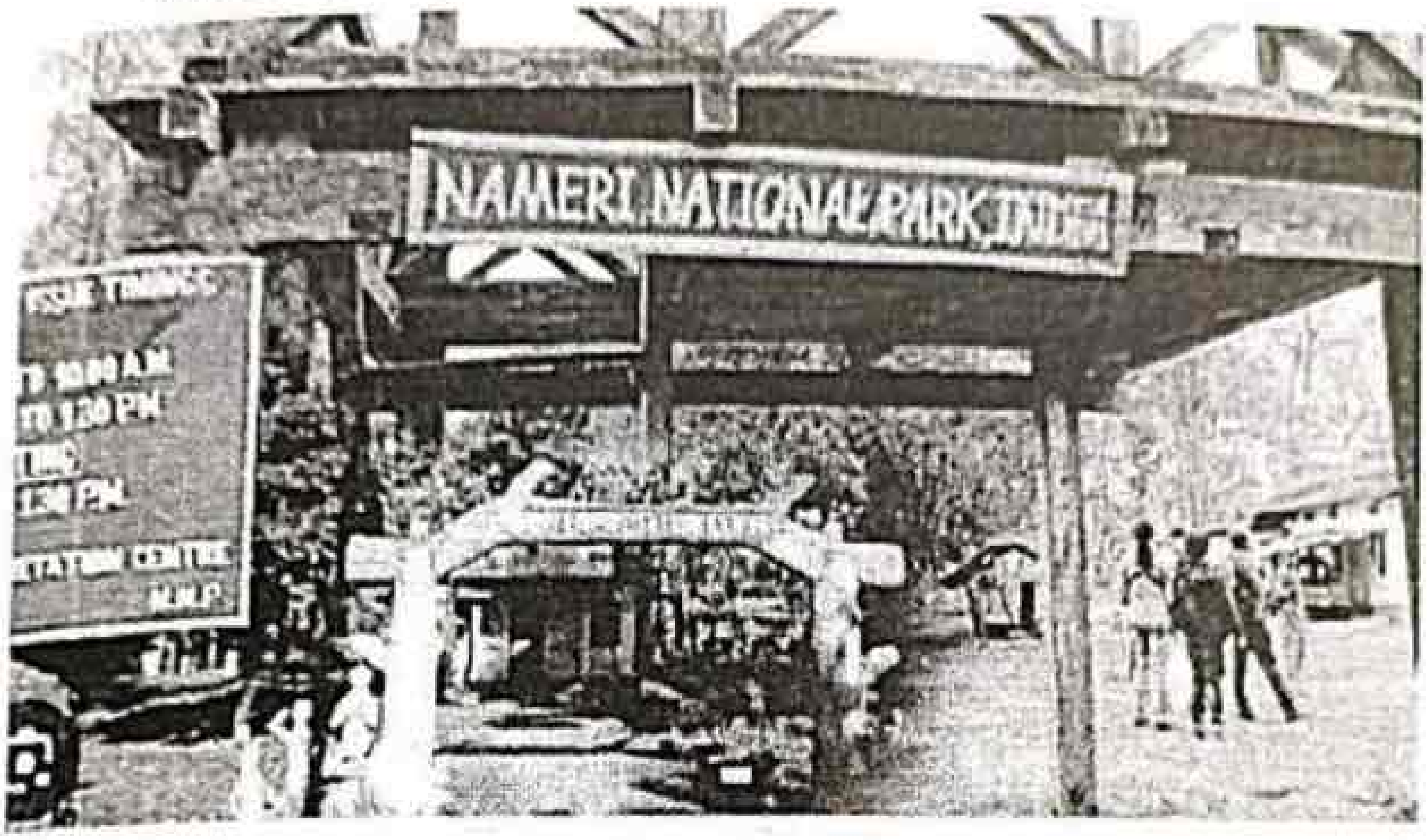
- Location: Nagaon, Golaghat, and Karbi Anglong districts.
- Significance: Declared a UNESCO World Heritage Site in 1985, Kaziranga is famous for its one-horned rhinocerous population, which comprises two-thirds of the world's total.
- Biodiversity: The park covers 430 sq. km of swampy grasslands, tropical moist forests, and riverine ecosystems. In addition to rhinos, it harbours tigers, elephants, swamp deer, wild water buffaloes, and more than 500 species of birds, including migratory birds like pelicans and storks.

2. **Manas National Park :**

- Location: Barpeta, Baksa, and Chirang districts.
- It is a biosphere reserve, tiger reserve, and

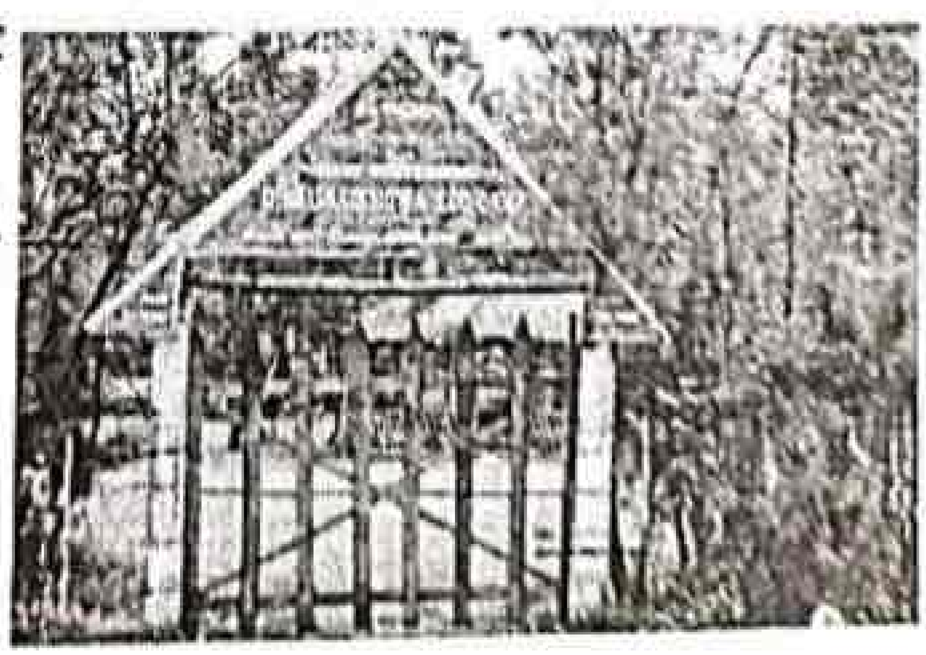
elephant reserve besides being a UNESCO World Heritage Site.

- Biodiversity: Manas is specifically, a breeding ground for grasslands and tropical forests, housing rare species such as the golden langur, pygmy hog, Bengal florican, and Assam roofed turtle.



3. **Nameri National Park :**

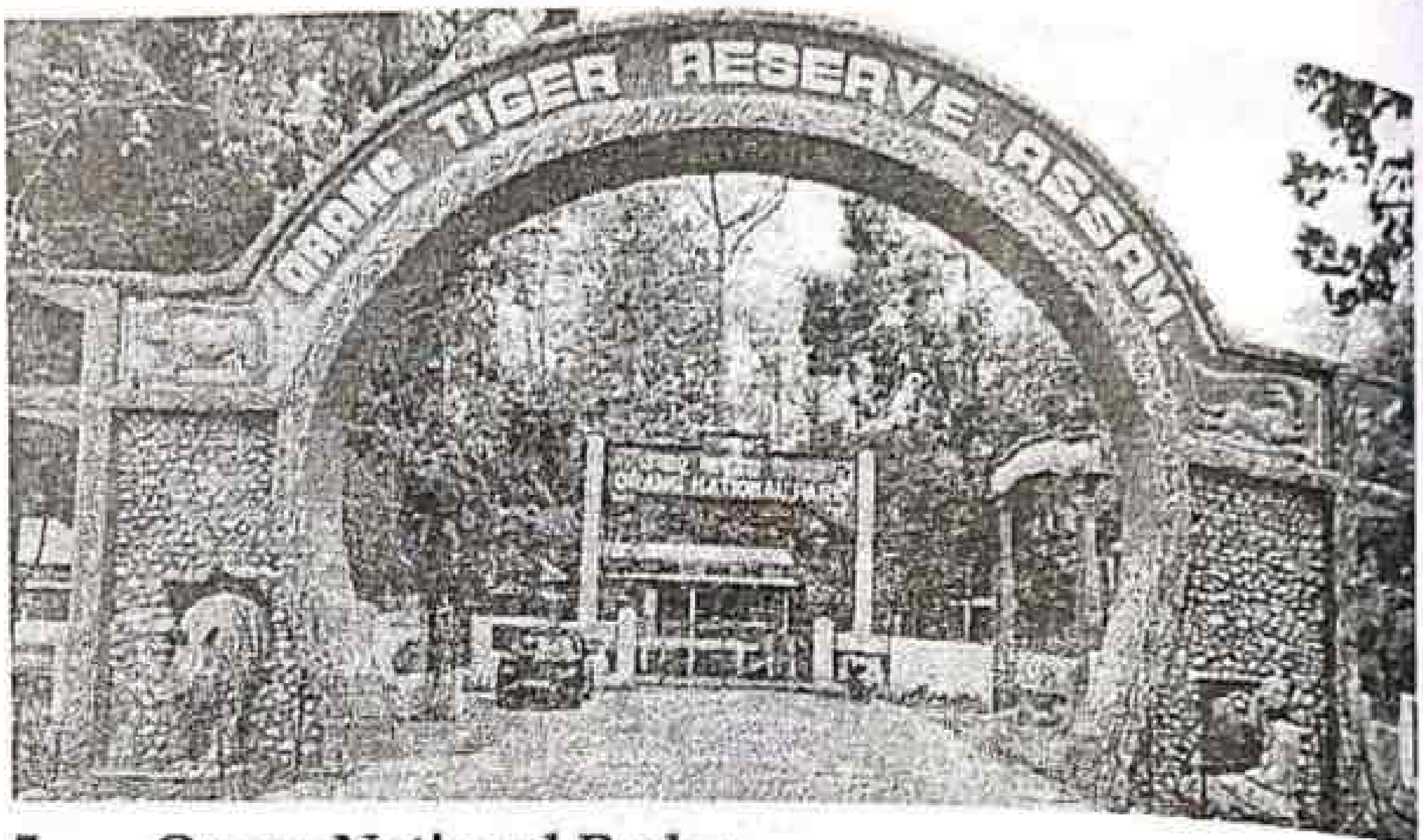
- Location: Sonitpur district, close to the Arunachal Pradesh border.
- Significance: The site is famous for its avian diversity and eco-tourism.
- Biodiversity: The park is home to endangered species such as the white-winged wood duck, hornbills, and tigers. The Jia Bhorali River flows through the park, providing aquatic biodiversity.



4. **Dibru-Saikhowa National Park :**

- Location: Tinsukia and Dibrugarh districts.

- Significance: A riverine park situated amidst the floodplains of the Brahmaputra and Lohit rivers.
- Biodiversity: The park is renowned for its feral horses, migratory birds, and wetland ecosystems. Other species are Gangetic dolphins, wild buffaloes, and many reptiles and amphibians.



5 **Orang National Park :**

- Location: Darrang and Sonitpur districts.
- Significance: Also called the "Mini Kaziranga" because of its similar landscape and rhino population.
- Biodiversity: Orang boasts Bengal tigers, elephants, wild boars, and numerous migratory birds, such as kingfishers and fishing eagles.

6. **Dehing Patkai National Park :**

- Location: Dibrugarh and Tinsukia districts.
- Significance: Declared a national park in 2020, it is part of the Dehing Patkai rainforest, often called the "Amazon of the East."

- Biodiversity: The park harbors rare orchids, clouded leopards, Asian elephants, and over 300 bird species, including hornbills and eagles.

7. **Raimona National Park :**

- Location: Kokrajhar district.
- Significance: Declared in 2021, this park is part of the Kanchenjunga Landscape, connecting India to Bhutan.
- Biodiversity: It is famous for golden langurs, elephants, and a variety of orchids. It also serves as a wildlife corridor between India and Bhutan.
- The national parks of Assam are much more than protected areas; they are sanctuaries of life, preserving ecosystems that are crucial to the planet's health. These parks demonstrate the harmonious coexistence of humans and nature, reflecting Assam's efforts toward sustainable development and conservation. Each park contributes to maintaining ecological balance, combating climate change, and promoting eco-tourism, thereby supporting the local economy. Visiting these parks provides a firsthand experience of Assam's aerial splendour and majesty in the wildlife, and serenity in landscapes and cultural richness. Preserving this natural haven is not just a regional responsibility but a global imperative.□

Cancer vaccine: A recent invention of Russia

Dariyali Mahant
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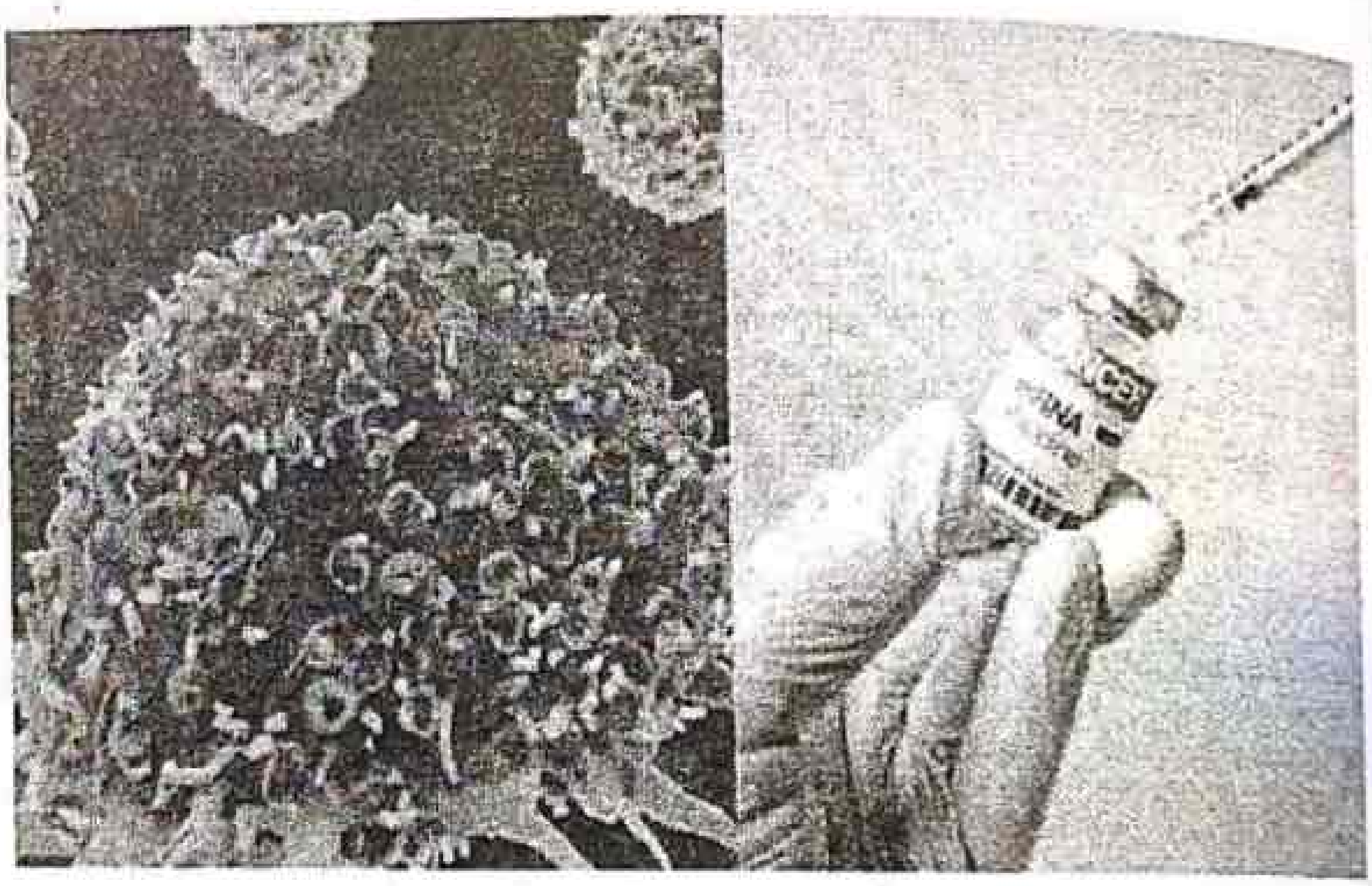

Cancer is a group of diseases that occur when cells grow and divide abnormally, invading nearby tissues and potentially spreading to other parts of the body. Cancer is caused by changes to DNA, which can be due to errors that occur during cell division, damage from environmental substances, or inherited DNA changes. Cancer can be treated by :

(1) Surgery
(2) Chemotherapy
(3) Radiation therapy

(4) Hormonal therapy
(5) Targeted therapy (including immunotherapy such as monoclonal antibody therapy)
(6) Synthetic lethality

The choice of therapy depends upon the location and grade of the tumor and the stage of the disease, as well as the general state of the patient (performance status).But recently the Russian government says they have developed their own cancer vaccine which is expected to be launched in early 2025.

"Russia has developed its own mRNA vaccine against cancer, it will be distributed to patients free of charge, General Director of the Radiology Medical Research Center of the Russia Ministry of health Andrey Kaprin has told Radio Rossiya," Russian news agency TASS has reported.

"The vaccine's pre-clinical trials had shown that it suppresses tumor development and potential metastases,". Director of the Gamaleya National Research Center for Epidemiology and Microbiology Alexander Gintsburg told TASS.

Earlier this year, Russia President Vladimir Putin said in televised comments that "we have come very close to the creation of so-called cancer vaccines and immunomodulatory drugs of a new generation".

AI can develop vaccines in an hour :

Amidst vaccine trials, Gintsburg told the media that the use of artificial neural networks could bring down the duration of computing required to create a personalized cancer vaccine, which is currently a lengthy process, to less than an hour.

"Now it takes quite long to build [personalized vaccines] because computing how a vaccine , or customized mRNA , should look like uses matrix methods, in mathematical terms. We have involved the Ivannikov Institute which will rely on AI in doing this math, namely neural network computing where these procedures should take about half an hour to an hour," Russia's vaccine chief said.

Role of vaccine in cancer management :

Accines can combat cancer by stimulating the immune system to recognize and attack cancer cells. Therapeutic cancer vaccine targets specific proteins or antigens expressed by tumor cells, training the immune system to identify and destroy them. For instance, some vaccines use weakened or modified viruses to deliver these antigens, prompting a strong immune response. Preventive vaccines, like the HPV vaccine, protect against viruses linked to cancer, reducing the risk of certain cancers, such as cervical cancer. By enhancing the body's natural defenses, vaccines can slow tumor growth, prevent recurrence, or even eliminate early- stage cancers, offering a promising tool in oncology.

Conclusion

Russia's cancer vaccine development is cautiously optimistic. The vaccine, which is mRNA-based and personalized to each patient's tumor, has shown promise in pre-clinical trials by suppressing tumor growth and preventing metastasis. However, it's still in the early stages, and detailed data from human trials are needed to confirm its efficacy and safety.□

Rosalind Franklin
The Dark Lady of DNA

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Rosalind Franklin's contemporary title as the "Dark Lady of DNA" was originally meant as an insult by one of her coworkers. But many others in the present day, like her biographer Brenda Maddox, see it as proof of her strong influence on science. Franklin was the biochemist who, in 1952, was the first to discover that DNA was double-helix-shaped after taking Photo 51 with her assistant. Her legacy inspired the European Space Agency to name an ExoMars Rover for her in 2019. It's a fitting name since this rover - set to launch later this decade - is programmed to search for genetic molecules or compounds to prove if there was ever life on Mars.

Franklin was born July 25, 1920, in the Notting Hill neighbourhood of London, England. The Franklins were a prominent British Jewish family; many of her relatives were involved in British politics, and some were even activists for women's suffrage. Her father Ellis taught classes about magnetism and electricity at the Working Men's College of London and greatly encouraged his daughter to study science as she grew up. Franklin studied natural sciences at Newnham College at the University of Cambridge, where she graduated from her initial studies in 1941.

In 1945, Franklin earned a PhD from the University of Cambridge, for her thesis exploring the density and porosity of coal. Two years later, she got a job as a researcher in the Laboratoire Central des Services Chimiques de l'État in Paris, France. Here she learned X-ray crystallography. This process, also called X-ray diffraction, involves reflecting X-rays off of crystals in order to determine the crystal's structure and makeup. At the Laboratoire, Franklin used this method to examine different types of coal, thus building off of her thesis research. She published her work in a 1951 paper in the prestigious scientific journal, Proceedings of the Royal Society.

In late 1951, she moved back to London to work as a research associate at King's College. Her new assistant in DNA research was a graduate student named Raymond Gosling. By the end of the year she discovered that DNA could exist either as a thin fiber at a relatively high humidity (in a "dry" form called A-DNA), or in wet conditions in a compact form (in a "crystalline" form called B-DNA). At this point, results were still inconclusive about A-DNA's shape, but the research team had concluded that B-DNA was definitely a helix. In fact, Franklin and Gosling's famous Photo 51 (taken in 1952) was of B-DNA.

However, in the moment, Franklin was not as excited about Photo 51 as Gosling was. Not only was she more focused on solving the A-DNA mystery, but she was also about to leave her position at King's College. As a result, Gosling was assigned to a new graduate advisor, Maurice Wilkins. Once Franklin officially left a few days later, Gosling showed the photo to Wilkins - and Wilkins then showed it to his other co-workers, James Watson and Francis Crick.

In 1953, the scientific journal Nature published Watson and Crick's chemical model of a DNA double helix molecule. Their model was published alongside their data on the subject - as well as articles by Franklin, Gosling, and Wilkins. However, Watson and Crick only cited their names in a footnote, mentioning that they had "been stimulated by a general knowledge of Franklin [and Gosling] and Wilkins' 'unpublished' contribution." Nine years later, Watson, Crick, and Wilkins received the Nobel Prize in Physiology or Medicine for their partial efforts.

Meanwhile, by 1953, Franklin had moved to a new position at Birkbeck College in London, where she pivoted to studying RNA. While there, she used X-ray crystallography to study RNA viruses such as the tobacco mosaic virus. Years later, this inspired her to research the makeup of the polio virus. She chose polio specifically after her 1956 visit to the University of California, Berkeley, where researchers there suggested it to her. Though the research was done in London, her grant money came from the US Public Health Service of the National Institutes of Health.

However, later that same year, Franklin was diagnosed with ovarian cancer. Throughout her illness, Franklin continued her crystallography research of polio - alive strands of polio, much to her colleagues' horror - all through 1957. Her research team would eventually conclude that the polio molecule has icosahedral symmetry (or that it has 60 sides, like a soccer ball). Franklin would not live to see these discoveries published, however. She succumbed to the cancer on April 16, 1958.

Franklin's discoveries have greatly changed our view of DNA, RNA, and polio, even today. She was a groundbreaking researcher whose legacy continues to inspire scientists and students around the world. The Rosalind Franklin University of Medicine and Science in Chicago was renamed for her in 2004. In 1997, an asteroid was named in her honor. And hopefully sometime in the not-too-distant future, a rocket will launch to Mars carrying a rover bearing her name - on a mission to search for the building blocks of life and potentially change how we think about life on - and off - Earth.□

COVID-19 Uncovered: Causes, Impacts, and Prevention

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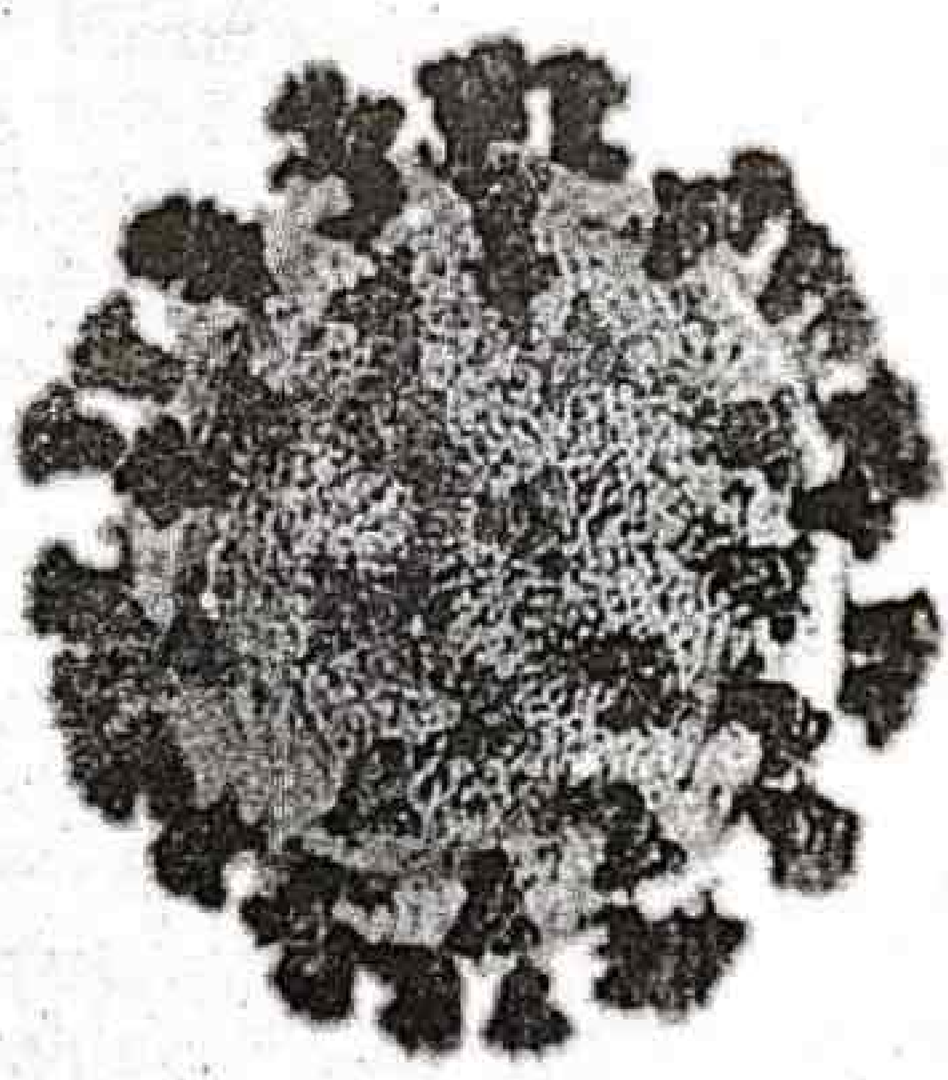

COVID-19 or Coronavirus is a term the world has been uttering for almost two years now. The coronavirus disease is an infectious disease caused by SARS-CoV-2 virus.

Research has shown that the outbreak of COVID-19 was in December 2019, and from then, there have been more than 600 million people who were infected with the virus and around 6.5 million deaths around the world, according to WHO reports, as of September 30, 2022.

Causes :

It is caused by the SARS-CoV-2 virus (severe acute respiratory syndrome coronavirus 2). Coronavirus are a family of viruses that can affect people and animals. They can cause mild to moderate respiratory illnesses, such as the common cold. Some coronaviruses can cause severe illness that can lead to pneumonia and even death.

COVID-19 most readily spreads to people within close contact (about 6 feet or 2 meters). When someone with the illness coughs, sneezes, sings, talks, or breathes, droplets and very small particles spray into the air. In some instances, COVID-19 may spread through the air and infect people who are more than 6 feet away. Small droplets and particles can remain in the air for minutes to hours.

Symptoms :

The symptoms ofCOVID-19 includes:

- Dry cough.
- Shortness of breath.

Loss of taste or smell.

- Extreme tiredness, called fatigue.
- Digestive symptoms such as upset stomach, vomiting or loose stools, called diarrhoea.
- Pain, such as headaches and body or muscle aches.
- Fever or chills.
- Cold-like symptoms such as congestion, runny nose or sore throat.

Precautions :

- To keep yourself from being affected by coronavirus, see to that you.
- Wear your masks covering your nose and mouth every time you step out of your house.
- Wash your hands thoroughly.
- Sanitise yourself.
- Avoid eating or drinking anything cold.
- Eat nutritious food to build immunity.
- Maintain a physical distance when you are in contact with a group of people.
- Avoid all sorts of direct physical contact.

Economic and Social Impacts :

COVID-19 disrupted global economies, leading to job losses, business closures, and shifts to remote work and education. The pandemic also highlighted inequalities in healthcare access and the digital divide, particularly in low-income countries.Mental health challenges, such as anxiety and depression, surged due to isolation, fear, and economic uncertainty.

Vaccination: A Ray of Hope :

Vaccination campaigns have been instrumental in controlling the spread of COVID-19. By the end of 2023, billions of doses had been administered globally, significantly reducing hospitalizations and deaths. However, vaccine hesitancy and unequal distribution remain hurdles to achieving widespread immunity.

COVID-19 has transformed the world, leaving an indelible mark on how societies respond to health crises. While progress has been made in combating the virus, vigilance and adaptability remain crucial as the world moves toward recovery. The pandemic serves as a reminder of humanity's resilience and the power of collective action in overcoming challenges.□

Teamwork in the Wild: Social Animals and Their Communities

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Teamwork is not just a human concept; it is a fundamental principle observed across nature and human societies. At its core, teamwork leverages the strengths of individuals to achieve goals that would be difficult, if not impossible, to accomplish alone. In wilderness, teamwork is one of the most critical survival strategies in the animal kingdom. For many species, cooperation increases their chances of overcoming challenges, thriving in their environments, and ensuring the survival of future generations.

In below there are some reasons why teamwork is essential in wild:

1. Enhancing Hunting and Food Gathering
2. Protection from Predators
3. Habitat Building and Maintenance
4. Thriving in Extreme Environments
5. Strengthening Social Bonds

In the wild, survival is often a team effort. From finding food to raising young, building habitats, and protecting against threats, animals rely on teamwork to overcome challenges and thrive. Their cooperative behaviours are not just fascinating but also offer valuable lessons for humans about the power of working together. The animal kingdom is full of remarkable examples of cooperation. This article dives into some of the most fascinating examples of teamwork in nature.

1. **Hunting in Packs:**

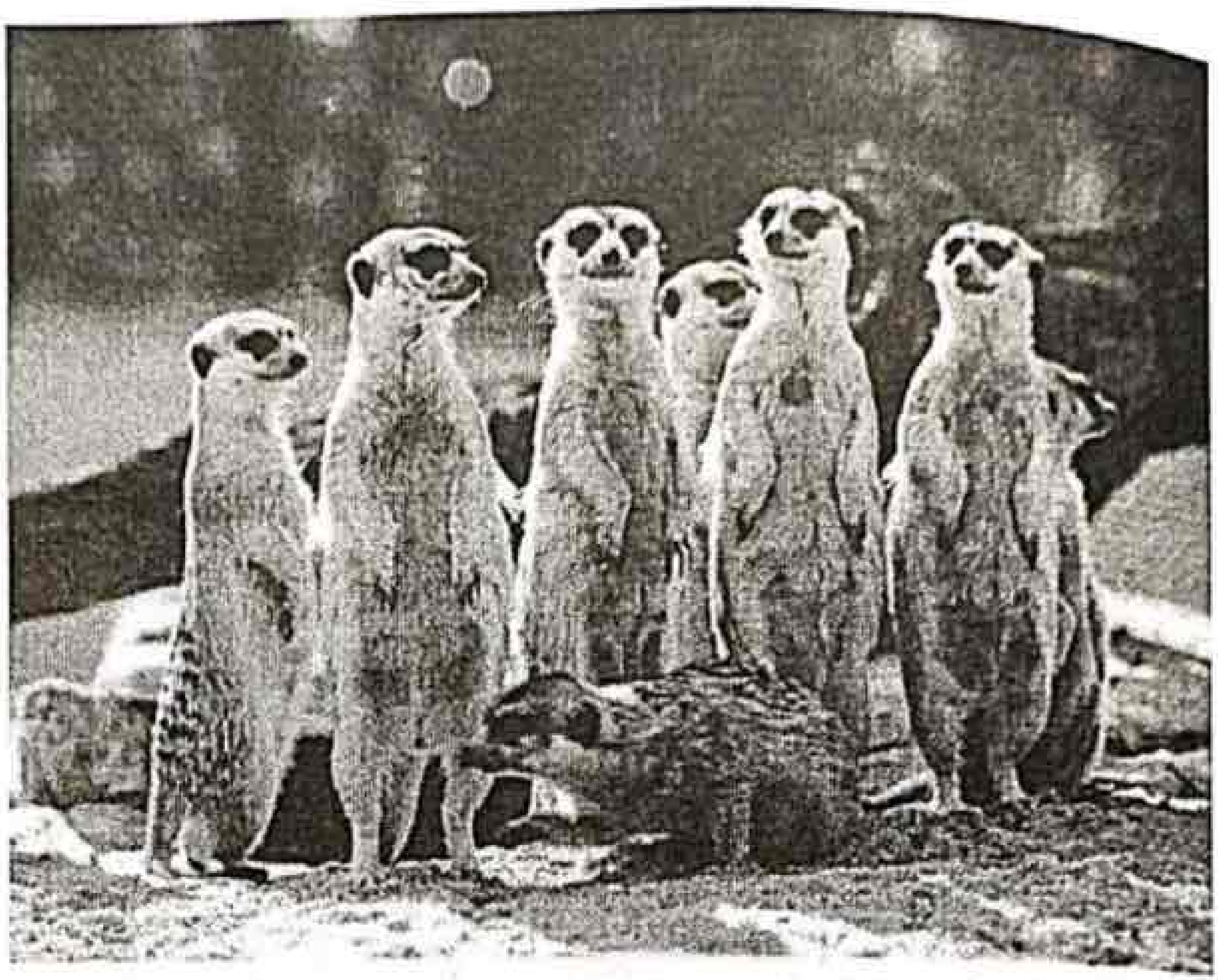
- Wolves: Wolves are apex predators known for their cooperative hunting strategies. A pack of wolves uses teamwork to herd, isolate, and take down prey much larger than themselves, such as elk or bison. Each member has a role, from chasing prey to ambushing it.
- Orcas (Killer Whales): Orcas display extraordinary coordination during hunts. They use techniques like "wave-washing," where they create waves to knock seals off ice floes. Their ability to communicate and strategize as a pod makes them formidable hunters.

2. **Building Homes Together:**

- Ant Colonies: Ants are famous for their complex colonies and division of labour. Worker ants build intricate nests, forage for food, and care for larvae, while soldiers defend the colony. Their coordination allows them to create vast underground networks and even living structures like rafts during floods.
- Beavers: Beavers are nature's architects. They work together to build dams that create ponds, providing safe habitats and food storage. This teamwork ensures their survival during harsh winters and protects their families from predators.

3. **Defence Mechanisms:**

- Meerkats: In meerkat colonies, individuals take turns standing guard while others forage or play. The sentry warns the group of approaching predators by emitting alarm calls, ensuring the safety of the entire group.



- Honeybees: When a hive is threatened, honeybees act collectively to defend it. They may swarm predators, such as hornets, and use coordinated heat generation to overwhelm intruders.

4. **Raising the Young:**

- Elephants: Elephants have a matriarchal society where females work together to raise and protect calves. Young elephants are nurtured by the entire herd, learning essential skills and social behaviours from multiple caregivers.
- Lions: Lionesses within a pride often synchronize their birthing and share the responsibilities of nursing and protecting cubs. This communal care increases the survival rate of their young.

5. **Migrating in Groups:**

- Bird Flocks (Geese):Geese fly in a V-formation to conserve energy during migration. The lead bird breaks the wind resistance, allowing those behind to fly with less effort. They take turns leading, ensuring the flock can travel long distances efficiently.

- Wildebeest Herds: During their migration across the Serengeti, wildebeest travel in massive herds for protection. Their numbers deter predators, and their collective movement ensures access to fresh grazing grounds.

6. **Mutualistic Teamwork:**

- Cleaner Fish and Hosts: Cleaner fish, such as wrasses, form partnerships with larger fish, removing parasites and dead skin. Both parties benefit: the cleaner fish gain food, while the hosts stay healthy.

These varied systems illustrate how social living enhances survival, fosters cooperation, and drives innovation. From the smallest insect to the largest mammal, social structures in animals reveal nature's ingenuity and adaptability.

The Science behind Cooperation:

In the animal kingdom, teamwork is a powerful survival strategy driven by evolutionary and ecological pressures. Social animals, such as wolves, ants, and dolphins, rely on cooperation to achieve tasks that would be impossible individually, like hunting, building shelters, or defending their group. This behaviour is often guided by instinct and communication systems, ranging from vocalizations to pheromones and body language. Cooperation is rooted in the concept of inclusive fitness, where individuals benefit indirectly by ensuring the survival of related genes within their social group. For example, meerkats take turns standing guard to protect their group from predators, sacrificing their immediate safety for the collective good. Similarly, honeybees work tirelessly for their hive, with specialized roles that ensure efficient resource gathering and reproduction. Teamwork also highlights the principle of reciprocal altruism, where individuals help others with the expectation of future benefits, seen in vampire bats sharing food with unrelated group members. These complex social interactions not only enhance survival but also showcase the intricate balance between competition and collaboration in nature. ❑

Malaria: A Global Health Issue

Bhaskar Jyoti Narzary
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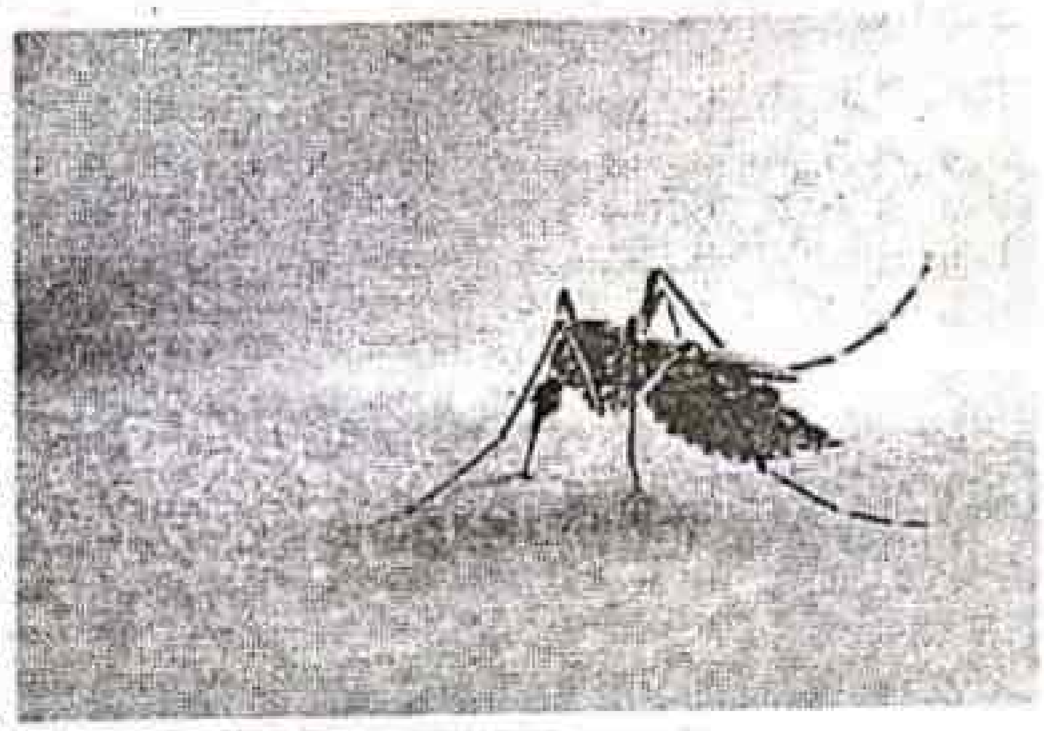

Malaria is a life-threatening disease caused by protozoan parasites of the genus Plasmodium. It is transmitted to humans through the bites of infected female Anopheles mosquitoes, making it a persistent public health issue, especially in tropical and subtropical regions. Despite global efforts to reduce its prevalence, malaria continues to affect millions, particularly in low-income and resource-limited areas.

Cause and Transmission:

The disease is caused by five species of Plasmodium parasites, each contributing differently to the global burden of malaria. Plasmodium falciparum is the most widespread and deadly species, while Plasmodium vivax is known for its ability to remain dormant in the liver, potentially causing relapses. Plasmodium ovale, a less common species, shares similarities with P. vivax. Meanwhile, Plasmodium malariae can cause long-lasting infections, and Plasmodium knowlesi, though rare in humans, poses risks in certain regions.

The transmission process begins when an infected mosquito bites a human, injecting the parasites into the bloodstream. These parasites travel to the liver, where they grow and multiply before re-entering the bloodstream to infect red blood cells. This cycle of infection is what triggers the symptoms of malaria.

Symptoms and Diagnosis:

Symptoms of malaria typically manifest within 10 to 15 days after infection and include fever, chills, sweating, headaches, muscle pain, nausea, vomiting, and fatigue. In severe cases, particularly with P. falciparum, the disease can lead to organ failure, coma, or death.

Accurate diagnosis is critical for effective treatment. Microscopic examination of blood samples remains a gold standard for detecting parasites. Rapid diagnostic tests (RDTs) provide a quick alternative by identifying malaria-related antigens. Advanced methods, such as polymerase chain reaction (PCR), offer precise detection of malaria DNA and can distinguish between different Plasmodium species.

Treatment:

Treatment options depend on the type and severity of the infection. Artemisinin-based combination therapies (ACTs) are the most effective treatment for P. falciparum. Chloroquine remains a viable option for non-resistant strains, while primaquine is used to target dormant liver-stage parasites. Early and appropriate treatment is vital to prevent complications and to reduce the spread of the disease.

Prevention:

Preventing malaria involves a combination of strategies aimed at reducing exposure to infected mosquitoes and limiting the spread of the disease. Mosquito control measures, such as sleeping under insecticide-treated nets, using repellents, and eliminating mosquito breeding sites, are crucial. For travelers visiting malaria-endemic regions, prophylactic drugs can offer protection. Additionally, the RTS,S vaccine provides partial immunity and is particularly beneficial for children in high-risk areas.

Global Impact and Future Challenges:

Malaria remains a major concern in over 90 countries, with sub-Saharan Africa bearing the heaviest burden. The disease disproportionately affects vulnerable groups, including children under five and pregnant women. International organizations, such as the World Health Organization (WHO), are spearheading initiatives to combat malaria through funding, research, and improved healthcare systems.

While significant progress has been made in reducing malaria cases, the fight is far from over. Continued investment in research, prevention, and treatment is essential to address this global health challenge. With sustained efforts, a malaria-free world is within reach, offering the promise of improved health and well-being for millions around the globe.□

Parasitism and Symbiosis in Nature

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Nature's intricate web of interactions often showcase remarkable relationships between species, ranging from beneficial partnerships to exploitative associations. In zoology, parasitism and symbiosis are key concepts that highlight the complex dynamics of interdependence among organisms.

Parasitism: The Exploitive Relationship

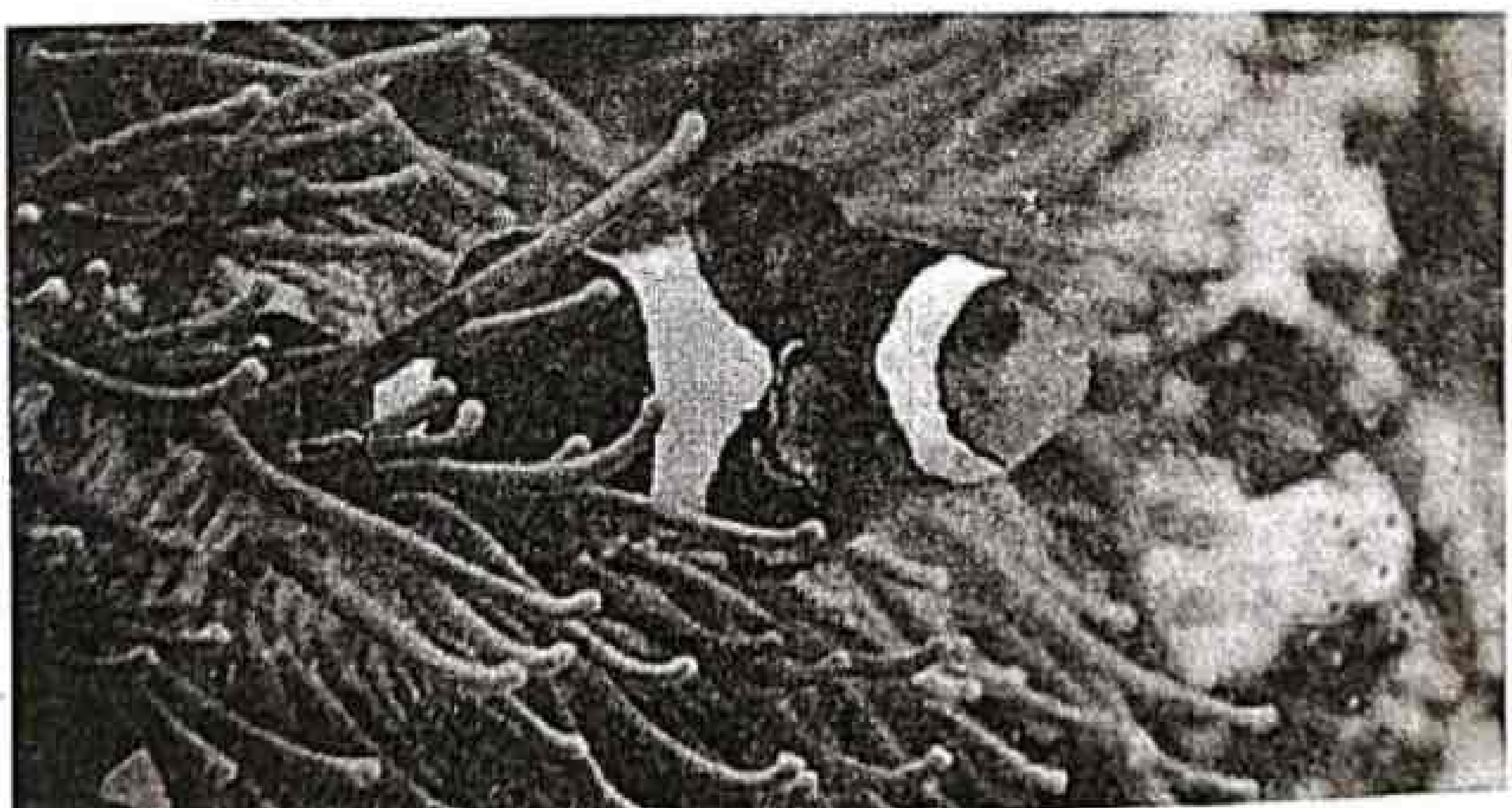
Parasitism is a relationship where one organism, the parasite, benefits at the expense of the other, the host. Parasites depend on their hosts for nourishments, shelter, or reproduction, often causing harm in the process.There are several types of parasites based on their mode of interaction with the host-

1. Endoparasites: These live inside the host's body, such as tapeworm in the intestines of mammals or Plasmodium species (causing malaria) in the blood.
2. Ectoparasites: These attach to the outside of the host, like fleas, ticks, or lice
3. Parasitoids: Organisms like certain wasps lay their eggs on or inside a host; the larvae then consume the leading to its death.

Parasites significantly impact their hosts by depriving them of essential nutrients, transmitting diseases, or altering their behaviour. For instance, Toxoplasma gondii manipulates the behaviour of rodents, making them more prone to predation by cats, thereby ensuring the parasite completes its life cycle within the cat, its definitive host. This intricate relationship drives an ongoing coevolutionary process, where hosts develop sophisticated defences, such as advanced immune responses, to counter parasitic threats. In response, parasites evolve strategies to overcome these defences, creating a perpetual "arms race" that shapes the evolutionary trajectories of both host and parasite.

Symbiosis: The Cooperative Bond

Symbiosis, on the other hand, describes close and often long-term interactions between different species. Unlike parasitism, symbiosis can be mutually beneficial, neutral, or even harmful, depending on the nature of the relationship. Hence, symbiosis can be categorised into the following types-



1. Mutualism: Both species benefit. For instance, cleaner fish remove parasites from larger fish, gaining food while helping their hosts stay healthy.
2. Commensalism: One species benefit, while the other is neither helped nor harmed. An example is barnacles attaching to whales for transportation.

3. Amensalism: One organism is harmed while the other remains unaffected, such large animals tramping vegetation.

Case Studies in mutualism:

1. Mycorrhizal Relationships: Fungi form mutualistic bonds with plant roots, exchanging nutrients and aiding growth.
2. Coral and Algae: Coral polyps host photosynthetic algae (zooxanthellae) that provide them with energy, while the algae gain shelter.

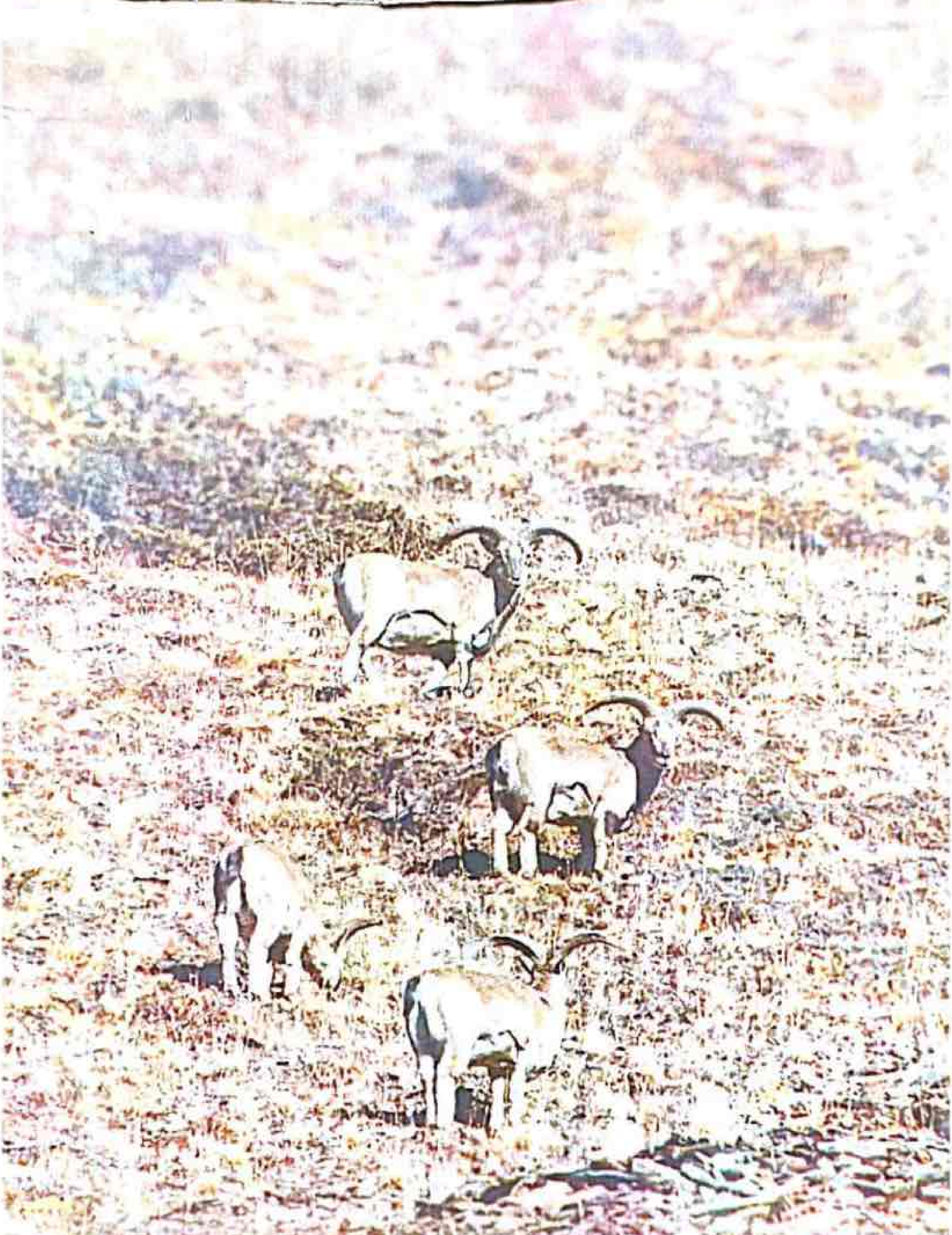
Parasitism vs. Mutualism: A Continuum

Interestingly, parasitism and mutualism often exist on a continuum. Some interactions may begin as parasitic but evolve into mutualistic relationships over time. For instance, certain gut bacteria, initially neutral or parasitic, can evolve into essential partners in digestion.

Thus, understanding parasitism and symbiosis becomes vital in zoology. Mainly because it is related to-

1. Ecosystem Health: These interactions influence biodiversity population dynamics, and energy flow in ecosystem.
2. Disease Control: Studying parasitism helps in managing diseases that affect both wildlife and humans.
3. Conservation Efforts: Symbiotic relationships are often fragile, and their disruption can threaten entire ecosystems, such as coral reef.

Thus, parasitism and Symbiosis show how species depend on each other in different ways. While Parasitism is about one organism benefiting at another's expense. Both types of relationships are important for keeping ecosystems balanced and thriving. By studying these interactions, we can learn more about the natural world and how to protect it for future generation. □



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