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Editorial

Dear Readers,

In the 21st century, a nation's strength is no longer measured solely by its military capabilities; it is increasingly defined by its scientific, technological, and innovative capacity. In this context, India stands at a crucial turning point in its scientific and technological journey. Significant progress has been made in areas such as space exploration, artificial intelligence, biotechnology, quantum computing, semiconductor manufacturing, and renewable energy. However, transforming scientific advancements into sustainable economic growth and social development remains a formidable challenge.

Over the past few years, India has achieved remarkable milestones that have enhanced its global scientific reputation. The successful landing of Chandrayaan-3 near the Moon's south pole made India the first country to achieve this feat. Similarly, missions such as Aditya-L1, India's first dedicated solar observatory, the Gaganyaan human spaceflight programme, and the National Quantum Mission demonstrate the country's growing scientific capabilities. India has also significantly improved its position in the Global Innovation Index published by the World Intellectual Property Organization (WIPO). Furthermore, India has emerged as the world's third-largest startup ecosystem, reflecting its growing culture of innovation and entrepreneurship.

Despite these achievements, several structural challenges continue to hinder scientific progress. India's expenditure on Research and Development (R&D) remains around 0.65–0.70 percent of its Gross Domestic Product (GDP), considerably lower than countries such as South Korea, which invests over 4 percent, and the United States and Germany, which invest close to 3 percent of their GDP in R&D. This relatively low investment limits the development of fundamental scientific research, world-class laboratories, and breakthrough technologies. To accelerate scientific advancement, India must substantially increase public and private sector investment in research and innovation, with a long-term goal of raising R&D expenditure to at least 2 percent of GDP.

Another persistent challenge lies in the prevailing gap between academia and industry. Despite the thousands of research projects and scientific discoveries generated annually within Indian universities and research institutions, only a limited number successfully translate into commercial products or deliver tangible societal benefits. It is imperative to identify and address the structural, financial, and regulatory barriers that hinder the effective transfer of knowledge from research laboratories to the marketplace. The practical feasibility and scalability of many promising innovations must be carefully evaluated to ensure their successful commercialization. Strengthening university-industry collaborations, establishing dedicated technology transfer centers, expanding research parks, and fostering robust startup incubation ecosystems are essential measures to bridge this divide. Scientific discoveries must transcend the confines of laboratories and evolve into practical solutions that drive economic growth, address societal challenges, and improve the quality of life for citizens.

The healthcare and biotechnology sectors also hold immense potential for India's future growth. During the COVID-19 pandemic, India established itself as one of the world's leading vaccine manufacturers. Nevertheless, significant improvements are still needed in rural healthcare

infrastructure, genomics research, bioinformatics, personalized medicine, and AI-driven healthcare technologies. As the global market for AI-based healthcare solutions expands rapidly, India has a unique opportunity to position itself as a global hub for medical innovation and biotechnology.

In this context, the Fifth Science, Technology and Innovation Policy (STIP) is expected to play a pivotal role in shaping the nation's scientific future. The policy emphasizes open science, public participation, inclusion of women and youth in scientific activities, socially responsible research, and innovation-driven economic development. By democratizing access to scientific knowledge and fostering collaboration across sectors, the policy seeks to ensure that scientific discoveries are translated into tangible societal benefits.

At a time when global technological competition is becoming increasingly intense, India must evolve from being primarily a consumer of technology to becoming a creator of technology. Achieving this transformation will require robust investment in research, skilled human resources, strong industry partnerships, and evidence-based policy decisions. Ultimately, India's scientific future will not be determined solely by achievements in laboratories or space missions, but by its ability to convert scientific knowledge into solutions that enhance the quality of life for its people. A nation that successfully harnesses science for public welfare will emerge as a true scientific powerhouse.

— Editor in Chief

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Cover page image : Acraea terpsicore, commonly known as the Tawny Coster, female

Family :Nymphalidae

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