India@75 looking at 100: A scientist speaks

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When I got married into a large Bengali family, I adopted a new culture, food, language and customs. A few days after the wedding, the only two unoccupied women in the house: the bed-bound grandmother and the young bride got talking. I discovered that her daughter, my mother-in-law, was born on August 15th, 1947. I was thrilled - what a fantastic experience it must have been to give birth to a daughter as the country was declared independent. She smiled and told me that my imagination, nurtured in a world where Independence Day meant a festive day of music, flag hoisting and distribution of sweets, did not quite match her memory. She was a young Hindu girl, fully pregnant, smuggled away by a Muslim friend to the safety of her parents' village home in the midst of riots and looting.

As she suppressed her cries in the darkened room between the waves of dizzying labor pain, she could see vague forms of men running with torches into the night. Her husband, a freedom fighter, was in jail or in hiding, and she wondered if her newborn child would see her father. That girl went on to graduate, teach in a village school for some time and eventually reign over a family, guiding them out of poverty into a world of opportunities and prosperity. The girl and the country born that tumultuous night have conquered many bastions, won a few wars, wisely chosen peace over strife many times and held together people of diverse cultures for 75 years. A youthful India embraced science and technology, using it to overcome poverty and hunger. In the confused senility of old age, @75, are we falling back on blind faith even as we crave the latest technology?

What lies ahead, then? In another 25 years, at the wise old age of 100? What challenges will we face, and how can we overcome them? As a scientist, especially a biologist, I think of two hurdles that await us; both will require us to embrace knowledge and shun misinformation.

Just a few years after India was born, one of biology's greatest mysteries was unlocked. What makes us human? How are humans different and yet like all living forms? Is an Indian any different from anybody else? All these questions point towards DNA - a long, twisted molecule we inherit, carry, and pass on to our children. It shapes us and holds the secrets of where we come from and what we are fundamentally predisposed to; the curl of the hair, the colour of the eye and even the maladies we are likely to suffer. For 70 years since its discovery, our DNA was an immutable truth we were born with, like the famous lines of Omar Khayyam:

The Moving Finger writes, and, having writ, Moves on: …Nor all thy Tears wash out a Word of it.

A few years back, this frontier was breached. We have now studied the most diminutive life forms-viruses and bacteria and learnt from them to change our genes in predictable ways. Humankind, one-sixth of which lives in India, will now have to learn to deal with the power that comes with this knowledge. In a country where many social boundaries are based on heredity and genetic relatedness, birth was the right of membership. Now we have to deal with the fact that it is verifiable, undeniable and actionable.

Convinced that the youth of today need to hear what DNA and genes mean so that they can grow up to be men and women equipped to take judicious decisions, we, a small team of scientists, conduct sessions where the participants can prepare their own DNA; see it, hold it, and think about it. In such a public session, in front of the ruins in Lodhi Garden, I was taken aback when a high school student asked me why does she "belong" to her father's family and write his family name when her DNA comes from both parents in equal parts? Knowledge of DNA will force our society to think about and, perhaps, wipe away many baseless norms and practices.

Health and wellness are linked to our DNA, but not in a vague conceptual way anymore. During COVID, some families saw more severe infections and death. Genetic differences can help the doctor choose the medicine that can spell the difference between a cancer-free life and death, in some instances. In the west, the widespread availability of gene testing has had unintentional consequences. As early adopters of technology, some scientists found that they were not related to the people they had assumed to be their parents all their life. Long-closed crimes were reopened after relatives of the perpetrator unwittingly signed up for genome sequencing and led the police to the criminal.

Perception of crime and behaviour itself will have to be revisited as genetic loci that predispose us to various mental conditions will be uncovered. If DNA was the uncharted frontier when India was born, the brain is a similar frontier now. Moving beyond the success of the White and Green Revolutions, having conquered famine and hunger in the last 75 years, we will have- to build a mentally and physically healthy India in the coming decades. India@100 must embrace the diversity of our genomes and brains rather than look at birth and heredity as an inevitable, inescapable dead end. We must learn to look at our genes and brains as unique signatures of the individual, learn to find space for each individual to integrate into society and be an indispensable knot that holds together the tapestry of India.