THE HINDU ANALYSIS – 13 JUNE 2023

EDITORIAL 1 : IN DEFENCE OF THE ANNOYING FRUIT FLY A TEST BED FOR GENETIC RESEARCH

CONTEXT

- Thousands of neuroscientists use fruit flies to study learning, memory, sleep, aggression, addiction and neural disorders – not to mention cancer and ageing, processes of development, the gut microbiome, stem cells, muscles and the heart

DIPTERA

- Flies and mosquitoes both belong to **Diptera**, the group of insects that have only two wings.
- The Order Diptera (true flies) includes many common insects such as mosquitoes, midges, sand flies, blowflies and the House Fly.
- Most of the insects we see flying around do so with four wings (two pairs), but dipterans (meaning 'two wings') use only one pair. The other pair of wings is reduced to club-like structures known as **'halteres'** that they use for balance.
- Common characteristics of the order include:
- One pair of wings (forewings)
- Hindwings reduced to club-like halteres
- A large and moveable head
- Compound eyes that are often very large
- Sucking, piercing and sucking or sponge-like mouthparts (all adapted for a liquid diet)
- The mesothorax (middle segment of the thorax or mid-body) is enlarged, with the prothorax and metathorax small

- Complete metamorphosis, with larvae (maggots) that are always legless, with chewing mouthparts or mouth-hooks, and that often pupate within a hardened case (puparium)

THE FRUIT FLY OR VINEGAR FLY (DROSOPHILA MELANOGASTER)

- The species Drosophila was first mentioned by German entomologist **Johann Meigen i**n 1830 and has since earned a celebrity status among scientists.
- It has become the best-understood animal organism on the planet and a powerhouse of modern medical research.
- Drosophila melanogaster has been used as a model organism for over a century.
- Mutant-based analyses have been used extensively to understand the genetic basis of different cellular processes, including development, neuronal function and diseases.

HELPING SCIENCE

- Morgan was not the first to work with Drosophila. But his idea to harness the fly's cheap husbandry (pieces of banana kept in milk bottles), and rapid reproduction (one generation in about ten days; about 100 eggs per female per day) would make it possible to study evolution in the laboratory.
- His mass-breeding experiments with hundreds of thousands of flies led to the discovery of a single fly with white eyes, instead of the red eyes fruit flies normally have. Morgan and his team's subsequent studies of its white-eyed progeny revealed that genes can mutate and are arranged into orderly and reproducible maps on chromosomes (a long DNA molecule). It led to an understanding of how genetic disease is inherited.
- In the 1940s, scientists, including George Beadle and Edward Tatum, established that some gene codes for proteins can facilitate chemical reactions and produce the molecules needed in cells.
- Scientists can study mutant defects, even if the eggs never hatch, which can then inform us about the normal function of the affected gene. These kinds of genetic studies of Drosophila, combined with emerging technologies, such as gene cloning, helped us understand how gene networks can

determine the development of a body and how they can sometimes cause inherited disorders.

A STARTLING LIKENESS

- The common ancestor that founded the evolutionary lines of flies and humans, half a billion years ago, appears to have been equipped with biology so well-designed that many of its aspects are still maintained, such as mechanisms of growth or neuronal function.
- Because we are so alike genetically, many aspects of human biology and disease have been explored first in Drosophila. Meanwhile, research on fruit flies is fast, cost-effective and extremely versatile. It's ideal for scientific discoveries.
- It is used by neuroscientists for studying learning, memory, sleep, aggression, addiction and neural disorders. Not to mention cancer and ageing, processes of development, the gut microbiome, stem cells, muscles and the heart.

CONCLUSION

- Fruit flies hovering in your kitchen might be aggravating, but hopefully you will see them in a different light now.

EDITORIAL 2 : AMPLIFY THE SUBJECT OF ADOLESCENT GIRL NUTRITION

CONTEXT

- To unlock the full potential of India's future, we have to prioritise the health and nutrition of its adolescent girls.

ADOLESCENCE

- It is a pivotal period of cognitive development and, therefore, improving access to nutrition during this "second window of opportunity of growth" compensates for any nutrient deficiencies acquired during early developmental stages in the girl child.
- Furthermore, adolescent health is a significant indicator of women's labour force participation in India in the long term, as better nutrition improves every young girl's prospect to participate in productive activities.
- Thus, the country beholds a colossal opportunity to add to its nation's demographic dividend by investing in nutrition interventions in adolescent girls.

EVER-GROWING NUTRITIONAL CONCERN

- Adolescent girls are particularly vulnerable to **undernutrition** and **anaemia** due to the onset of menstruation. The findings of the National Family Health Survey-5 (2019-21) confirm these concerns, as a staggering 59.1% of adolescent girls were found to be anaemic.
- There has been reports that 41.9% of school-going girls as underweight, the numbers showcase a worrying trend.
- What makes the situation more complex is the fact that a range of factors, from environmental conditions to cultural norms that lack a gender-neutral environment within a household, affects the nutrition uptake in adolescent girls.

CONCERNS

- Poorly balanced and insufficient diets can lead to cognitive impairments that affect one's academic performance. This can result in lower educational attainment, which can limit opportunities for employment and economic self-sufficiency later in life.
- Undernourished adolescent girls are also at a higher risk of chronic diseases and pregnancy complications, which can lead to a higher health-care burden on both families and communities, potentially leading to financial instability and increased poverty.
- If our girls are less healthy and less educated, they are less likely to participate fully in society, whether through work, politics, or community involvement.

REDEFINE THE INTERVENTIONS

- Therefore, it is imperative that we redefine interventions such that we not only centre it around good nutrition but also adopt a life-cycle approach, ensuring that no girl gets left behind. Additionally, a few strategic modifications to existing interventions can significantly expand the scope of its outcomes.
- The **convergence of various government initiatives** such as the Scheme for Adolescent Girls (**SAG**) within the umbrella of the Prime Minister's Overarching Scheme for Holistic Nutrition programme (**POSHAN**) 2.0 is a step in the right direction, provided it is implemented effectively.
- Targeted adolescent-oriented schemes such as the **Rashtriya Kishor Swasthya Karyakram (RKSK)** could include even stronger awareness and nutrition education programmes that would help sustain beneficiary compliance.
- Targeted and regionally contextualised Social and Behaviour Change Communication (**SBCC**) efforts around adolescent girls' nutrition are sure to generate greater demand and the adoption of good practices.
- For improved outcomes, it is very imperative for effective **convergence and collaborations among all the relevant departments,** in a way that fosters a collective endeavour.

- **Routine training of health workers** for effective implementation and monitoring of various schemes, and to adapt with an evolving landscape, is also a crucial step in this process.

CONCLUSION

- We have an enormous responsibility, as well as a tremendous opportunity, to ensure the welfare and the upliftment of the nation by prioritising the nutritional needs of India's girls. The strength of a nation is measured by its ability to nurture its future generations; hence, let us work collectively to sow the seeds of a healthier, stronger India, where every girl can reach her full potential.