



Plagues Upon the Earth: Disease and the Course of Human History. Kyle Harper. Princeton University Press, 41 William Street, Princeton, New Jersey 08540, and 6 Oxford Street, Woodstock, Oxfordshire OX20 1TR. 2021. xii + 686 pages. Price: £ 28.00.

‘One of the chief blessings of living in the modern world is supposed to be that the risk of dying from an infectious disease has become vanishingly small,’ says Kyle Harper, the author of *Plagues Upon the Earth*. Not so in India. We still have too many infectious diseases (IDs) of a wide variety, many of which have been controlled or even eliminated in all countries with established Public Health System. One estimate is that IDs (synonym: communicable diseases) cause about a third of all deaths in India. Our collective ignorance covers, the fact of microbial causation of diseases; our neglectful behaviours in catching them; and worse, in spreading them.

When the COVID-19 pandemic struck the world, humanity was more or less equally affected. The pandemic functioned as a spotlight on human vulnerability to IDs that can cause death in large numbers and disrupt several organized activities.

Awareness of virology expanded globally, especially in India. The pandemic lasted in India for two and a half years from January 2020, before it became endemic, adding one more disease to our list of common communicable diseases. For us in India, the pandemic also exposed our many weaknesses in disease diagnosis with microbiological evidence, disease surveillance clocking in every non-trivial ID in real-time, interventions to prevent and control IDs and their outbreaks, and in quantitative documentation of disease distribution, determinants and death with cause-of-death diagnosis – all attributable to the lack of a

Public Health System. For policy designers of health management in India, the book under review is a must-read book.

Are pandemics or new emerging IDs inevitable? Did our ancestors have a blissful time without them? *Plagues Upon the Earth*, is all about the history of infectious diseases from the earliest human history and how the two histories have impacted each other. The concept of ‘emerging IDs’ was the product of the 1980s, in the wake of the AIDS pandemic. But ubiquitous IDs of today, like tuberculosis and measles, and geographically restricted ones, like cholera and malaria, had all emerged somewhere thousands of years ago, and humans carried and spread their microbes widely. Pandemics of global magnitude are a relatively recent phenomenon because global spread requires global travel.

Emerging and already-emerged diseases were geographically restricted in the past. The history of mass migrations – voluntary, incentivized for wages for labour, or forced for slave trade – and the rise and fall of nations/empires were all intertwined with IDs – human-to-human or vertebrate-to-human transmitted. We have seen that happening right before our eyes – a ‘new’ virus emerged in China in 2019, became a pandemic in 2020, and settled down as a pan-endemic in 2023.

The book is large – the text is 510 pages, and the entire book is 686 pages – making it potentially intimidating to the reader. But it is a great repository of information for all those interested in the epidemiology of IDs, the amplification of their causative microbes and their transmission to human hosts. For those in government circles responsible for managing human and animal health, it may not only be an eye-opener, but also a source of motivation for taking disease prevention as a duty.

Kyle Harper, Professor of Classics and Letters at the University of Oklahoma (USA), walks the reader through the epochs of Pleistocene and Holocene and through the prehistoric Stone Age, Bronze Age and Iron Age – through historic times (circa 5000 years of our past) to the present day, describing what, how and why, we became hosts to a fascinating and frightening variety of sub-microscopic, microscopic and larger infectious agents and parasites. So, some basic knowledge of microbiology, molecular biology, palaeontology, archaeology, geology, will be of help fully appreciate the whole story. University education ought to cover the basics of these disciplines before students branch off to any of their many

choices. A basic understanding of microbial causation of infectious diseases ought to be an asset of every educated person – that by itself, can be life-saving when the ignorant may have no clue what hit him/her or the beloved child. Ignorance is not bliss in the domain of IDs.

For the reader who is unfamiliar with the principles or jargon of microbiology, the book begins with a primer (Chapter 1: Mammals in a Microbe’s World) on the basics of ‘parasites’ (ecological term, stealing energy from host) and ‘pathogens’ (medical term, parasites causing disease).

Charles Darwin, as he formulated and consolidated his thoughts on the evolution of the animal world, was not aware of the existence of disease-specific pathogens. Before his death, he learned with great delight of his contemporary, Robert Koch, and his discovery of the cause of tuberculosis (TB) as a bacterium now called *Mycobacterium tuberculosis* (MTb). Darwinian theory links all living things in a tree of life, including microbes. They have evolved and diversified into an unimaginably broad set, a tiny fraction of which are human parasites. Tracing ancestry is ‘tree thinking’ (a phrase used in the book for phylogenetics) which is one method the author uses to describe the history of infectious diseases. A second method he uses effectively is ‘time travel’ – a phrase for tracing the history of IDs through palaeogenomics or archaeogenetics.

Tree thinking tells us about the animals that served as hosts to the ancestors of our germs. Phylogenies clarify where pathogens fit in the tree of life. Human TB and bovine TB are closely related, and microbiologists supposed that originally, we caught TB from cows. Reality is the reverse. MTb is comprised of five major human-adapted lineages, two lineages classified as *M. africanum*, and nine animal-adapted lineages infecting bovines, apes and sea mammals (seals and dolphins). ‘TB is the ultimate human disease, then, in the disturbing sense that we have been unwitting agents of its global dispersal and evolutionary diversification ... the perfect pathogen, a methodical deceiver living inside the very cells we expect to save us.’

We were taught in medical school that TB lesions were present in New World human skeletons long before Columbian contact with Europeans – so the theory was that the Old World got TB from Indigenous Americans. Genomic studies show that old TB in the New World was from the sea mammal lineage, and all present highly

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virulent TB there is post-Columbian export. For MTb to flourish in humans, closeness of contact between people is essential; otherwise, the germs will be so diluted in the atmosphere that their chances of getting inhaled become near-zero. Our lesson in India – we are the culprits promoting TB by providing the necessary population density with squalor. Only we can control TB. But we do not seem to have any serious motivation, despite repeated statements of great desire to eliminate TB.

Palaeogenomics (Time travel) that explores ancient DNA – ‘an evolutionary photo album’ – has been extensively reviewed and described in the book, illustrated with innumerable fascinating facts. DNA from ancient cemeteries in Europe with mass burials of victims of Black Death in the mid-14th century has clinched that it was truly a plague caused by *Yersinia pestis*. In Mexico, in the post-Columbus period, an epidemic killed vast numbers of people. DNA from a mass-grave has proven that the disease was paratyphoid fever caused by *Salmonella paratyphi* C. Its ancestor was a pig parasite, *S. choleraesuis*.

Currently, India is striving to eliminate measles, a major killer disease of infants

and toddlers, using the measles–rubella vaccine. When achieved, the bonus is rubella elimination since the combination vaccine is handy. The evolutionary pathway of measles, as described in the fifth chapter – The Sneezing Ape – leads us to the origins of many acute respiratory diseases from bats and rodents. Nipah virus disease and leptospirosis remind us that IDs continue to spread from bats and rodents. Should we not spend funds to know more about the transmission dynamics of zoonotic IDs?

Chapter 12, titled The Disinfected Planet, has many lessons for makers of policies on health management. It mentions ‘...an enduring tension between... “magic bullets” (targeted technical or biomedical interventions to control specific diseases) and broader development programs... This tension runs throughout the entire history of public health... it was there in the beginning, in European debates over whether disease caused poverty or poverty caused disease... a constant question for governments... operating on finite budgets: whether to invest in projects that reduce morbidity and mortality, or in reforms that focus more holistically on equity and human development. The two can be complementary, but

visions compete for resources and influence.’ This aptly depicts an unresolved tension faced by India.

An entirely new era of global IDs opened after Columbus reached the Americas. Europeans traveled in large numbers in search of gold first and to cultivate sugarcane and coffee next. In 1647, the slave trade started with 465 caught and brought from West Africa, mainly for the ‘plantation economy’. The microbial exchanges were invisible, but the diseases they caused illustrated the globalization of IDs and heroic human endeavours to prevent them in individuals and control and even eliminate them in human communities. These make fascinating reading in the book.

I confess that it took me months to finish reading the book – but it has been a great educative experience. I highly recommend it to all students and teachers of IDs.

T. JACOB JOHN

439, Civil Supplies, Godown Lane,
Kamalakshipuram,
Vellore 632 002, India
e-mail: tjacobjohn@yahoo.co.in