ned by the formula: NDVI = (near infrared – red)/(near infrared + red), where red and near infrared are the bi-directional reflectance factors in red and near infrared channels respectively[6]. Depending on the time of year (season), the values derived from the remote sensing data can be used to identify the vegetation type and growth stage of plants and predict the possible vector-breeding sites.

The cloud temperature is known to be related to the rainfall. Cold cloud duration (CCD) values obtained from cloud temperature represent the length of time during which a cloud top is below a particular, cold threshold temperature. This product has been shown to be very good in providing rainfall estimates[6]. The CCD is valid for monitoring a particular type of rain, that from convective clouds. Incidentally, this method of rainfall estimation will work well in the present JE-prone areas, as most of the cloud in this region (tropics/subtropics) are convective. A linear discriminant analysis, using the NDVI, rainfall and temperature can identify periods with and without mosquito immatures. The satellite imagery could thus be used in the estimation of larval abundance and consequently adult abundance. A GIS will facilitate acceptance of satellite information, fit it to a vector mosquito model and produce imagery, indicating best estimates of where the vector population can breed and survive. A combination of both CCD and NDVI may be the best way to indicate a probable sharp increase in vector abundance, which is critical in JE outbreaks, when the host transmission parameters are conducive.

There is, at present, neither long-term strategy for disease vector control nor any emergency preparedness to prevent the epidemics in any of the JE problem countries. Rapid response and prevention are the immediate requirements. When there is a precise probability on the key element – 'vector abundance', predictability will be stronger, and the decision makers could use this information for taking precautionary action to avert the possible disease outbreaks.

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Microbes strike again

Ingenuity, knowledge, and organization alter but cannot cancel humanity's vulnerability to invasion by parasite forms of life. Infectious disease which antedated the emergence of humankind will last as long as humanity itself, and will surely remain, as it has been hitherto, one of the fundamental parameters and determinants of human history.

William H. Mc Neill,
Plague and Peoples (1976)

Killer flue grips the world, a news item in *Times of India* dated 4 April 2003 reminds us of yet another epidemic of a killer infection. Until quite recently there was a growing feeling in the developed world that the struggle against infectious diseases was almost won. Global eradication of small pox predicted eradication of polio in the near future, near-total control of plague, diphtheria and tetanus from most developed regions of the world led to a certain degree of complacency. Research on infectious diseases was relegated to non-priority status. Thus in 1969, the US surgeon General William H. Stewart declared that it was 'time to close the book on infectious disease'. Today, less than 10% of global research and development budget is used to address the largest disease burden, which is found among poorer populations of the world. It came to be believed that most of the infectious diseases, predominantly restricted to the developing countries, specially the sub-saharan Africa and Asia, can be traced to malnutrition, poor sanitation, and lack of both clean drinking water and basic preventive health care. While this is no doubt true to a great extent, it is far from the whole truth. The first wake-up call was provided by the unsuspected appearance of HIV/AIDS which has rapidly acquired pandemic proportions. Already approximately 4 million persons are estimated to be infected with HIV in India. World Bank warns that India could have 37 million people infected with HIV by the year 2005 unless preventive measures are accelerated. With the advent of HIV/AIDS, tuberculosis once again raised its head even in the developed countries. WHO has already declared tuberculosis to be a global emergency. The number of TB cases worldwide is currently reported to be rising at 2% per year.

More than 30 new, previously unknown highly infectious diseases have been identified since 1973. In addition to HIV/AIDS, these include Ebola-type haemorrhagic fever, Henta virus, hepatitis C, *Helicobacter pylori*, *Legionella pneumophila*, *Vibrio cholerae 0139*, New variant of Creutzfelt–Jacob (mad-cow) disease, etc. According to Cohen[1], heptatitis C (HCV) discovered in 1989 has infected an estimated 170 million people worldwide – more than four times as many as HIV, and it is predicted that during the next few years, the number of annual US deaths from HCV-caused liver damage and cancer may overtake deaths caused by AIDS.

Major outbreaks of infectious diseases through food-chain are now well recognized in spite of the highly regulated and

monitored food industry in the West. A survey conducted by the Public Health Laboratory Service in 1994, revealed one in three chilled chickens sold at British supermarkets contained *Salmonella* and two-fifths contained *Campylobacter*. In 1997 notified cases with *Campylobacter* exceeded 50,000 and *Salmonella* cases approached 40,000. Recently the US authorities had to recall 19 million pounds of ground beef – used for preparing hamburgers – fearing contamination with the deadly *E. coli* after 19 people fell ill. The story of the mad-cow disease, which forced Britain to destroy hundred thousand cattle, was still haunting the British farmers, when an epidemic of foot and mouth disease led to slaughter of 4 million animals[2].

It is surprising to note that a few years ago in a highly developed country like the USA, a failure in a large municipal water supply system resulted in infecting more than 400,000 people in Milwaukee with *Cryptosporidium parvum* within a few days. These examples only indicate that the experience world over, including the highly developed countries, shows that the threats posed by infectious diseases should never be lost sight of. These call for eternal vigilance and an alert health care system to promptly deal with these.

The current outbreak of severe Acute Respiratory Syndrome (SARS) which has already spread worldwide, at least to more than 20 countries from China to Canada and Hongkong to Australia, reminds us of some other features which make such infections so dangerous. The phenomenal increase in international travel, more than 500 million people cross the international borders on commercial flights every year, provide an easy route for spread of infections across the globe. This is what led Joshua Lederberg[3] to warn that, 'The microbe that felled one child in a distant continent yesterday can reach yours today and seed a global pandemic tomorrow.' The second feature of the emerging infections is the ease with which microbes can mutate to acquire renewed pathogenesis as was recently experienced in India in case of *Cholera vibrio 0139*. The inherent capability of microorganisms to develop antibiotic resistance is already a matter of global concern. The widely prevalent pernicious habit of prescribing antibiotics, even when not indicated, their use to promote animal growth or as aerosols for fruit trees, use of inadequate or incomplete therapy even when indicated all contribute to the increasing prevalence of multidrug-resistant organisms, keeping ahead of the development of newer, more powerful and costlier antibiotics. The current epidemic of SARS once again brings this dilemma to the fore. We still do not know if antibiotics or even antivirals have a role to control or modify this infection. It must also be pointed out that notwithstanding all the recent advances in molecular biology, genetics and biotechnology, and billion of dollars spent in research and development, as of today there are only a few really effective antiviral drugs. Once a new infection is identified, it takes years, if not decades, before an effective prophylactic vaccine can be developed. Even to develop a diagnostic test with desirable sensitivity and specificity takes several years. In spite of repeated warnings by the medical profession the country lacks an effective disease surveillance system to detect and institute control measures promptly. This only adds to the advantage for the invading organisms and unmitigated misery for the people. This certainly justifies the prophesy by René J. Dubos, 'Human destiny is bound to remain a gamble, because at some unpredictable time and in some unforeseen manner, Nature will strike back'.

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NEWS

Visas to the United States: Return of the Preying Mantis

Despite rhetoric and anodyne from the US ambassador to India and other high-ranking diplomats about the 'burgeoning US–India relationship', after a period of relaxation the United States has re-implemented a programme of visa review for Indians that 'renders ineligible any [Indian national] who a consular officer knows or has reasonable ground to believe is seeking entry to engage solely, principally, or incidentally in any activity to violate or evade any law prohibiting the export from the United States of goods, technology, or sensitive information'. US consular officers now apply this ground of ineligibility particularly to Indians who are going to engage in an activity involving one of the scientific or technical fields on a Technology Alert List (see below). Such activity includes *graduate-level studies*, *teaching*, *conducting research*, *participating in exchange programmes*, *receiving training or employment, or engaging in commercial transactions*.

The Mantis Programme was evolved by the United States as one response to concern over the 'illegal transfer of [US] controlled technology'. Initially, the visa-screening process was accomplished using post-check name-check procedures known as SPLEX, CHINEX and VIETEX and focused on nationalities from the former Warsaw pact, China and Vietnam.

In January 1998 (i.e. pre-Pokhran), the VISAS MANTIS programme was extended to other countries such as India 'due to law enforcement/intelligence community concern that US-produced goods and information are vulnerable to theft on a worldwide basis'. Consulates now flag visa cases using the VISAS MANTIS indi-