Neurology in the developing world

On November 16, 1959, I landed in Bombay and met a small group of physicians who were to play a major role in developing neurology in India. Noshir Wadia and Anil Desai were neurologists, Darab Dastur a neuropathologist and Jimmy Sidhwa a neuroradiologist. That evening I met with Eddie Bharucha, the first neurologist in Bombay (see Fig. 1), and his wife, Piloo, a pediatrician who promptly told me that the key to the serious problem of control of overpopulation was rural electrification. A few days later, in New Delhi, I also met Baldev Singh, who had trained in the USA; he was the first to practise and teach neurology in India and was one of the founders of the Neurological Society of India in 1951, along with the renowned neurosurgeons Jacob Chandy and B. Ramamurthi.

Each had received his neurological education in the United Kingdom except Dastur, who trained with Webb Haymaker at the Armed Forces Institute of Pathology in Washington. Neurology in India, as in most of Latin America at the time, had long been dominated by neurosurgery. Noshir Wadia would soon become one of leaders in the field of tropical neurology and a legend in his own time (see Fig. 2). After obtaining his medical degree from the Grant Medical College, named after Sir Robert Grant who was governor of Bombay in the early 19th century, and his neurological education at Maida Vale and the London Hospital under Sir Russell Brain (see Fig. 3), he returned to found and head the department of neurology at Grant. He has received many honours, among which must be mentioned his Fellowship of both the Indian National Science Academy and the Indian Academy of Sciences, and an honorary DSc from the Benaras Hindu University. His wife, Piroja, is a distinguished clinical neurophysiologist.

Neurological Practice: An Indian Perspective, edited by Prof. Wadia, is a multiauthored textbook, with 32 contributors, all of whom are Indian, a striking manifestation of the vitality of present-day neurology in India. Wadia wrote or co-authored 15 of the 32 chapters. The spirit and thrust of the book are well described in the introduction: ‘Though the same diseases ail humans across the world, their prevalence and presentation have considerable regional variation, dependent upon the local environment and genetic profile of its peoples. Even within one country, there can be variable distribution of disease, especially if that country is as large and populous as India, with its multicultural and multiconfessional heritage spread over the millennia.’ To my mind, one of Wadia’s most important publications described the remarkably high prevalence of multiple sclerosis amongst the Parsis of Bombay and Poona (Wadia & Bhatia, 1990). Indeed, with a population of almost 1.1 billion, and an extraordinarily diverse population, the realities of Indian medical practice are difficult to appreciate. The book accurately reflects the changes that have occurred in neurology, and in particular its tropical aspects, since World War II. Much of India is hot and humid and fits the 2003 Dictionnaire Larousse definition of a tropical climate: ‘Absence of periods of severe and prolonged cold, and presence of at least three months of heat and rain’; but perhaps more to the point is that it also exhibits other characteristics of tropical...

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countries: overpopulation, extreme poverty and malnutrition. Nonetheless, political stability and democracy have made it possible for the government to pursue serious efforts to improve education, public health and human rights.

*Neurological Practice* qualifies as an up-to-date text of tropical neurology, a worthy successor to earlier publications on this subject. Most tropical medicine consists of infectious diseases and parasitic infestations. The same can be said of tropical neurology, except that in India there are several conditions that are almost unknown in other countries: Japanese B encephalitis; subacute sclerosing panencephalitis, a sad consequence of the failed measles vaccination programme; manganese intoxication; the ubiquitous, heterosexually transmitted HIV/AIDS; the curiously high incidence of cerebral venous thrombosis; Madras motoneuron disease, which affects young South Indians; congenital atlanto-axial dislocation; and megalencephalic leuodystrophy. Of course, all the diseases that are familiar to Western neurologists such as epilepsy, stroke, headache, Alzheimer’s disease and parkinsonism are also seen in India, in some cases with a somewhat different prevalence and incidence, or even in a different form. For example, increased intracranial pressure in an Indian child is tantamount to a clinical diagnosis of tuberculosis, and treatment is immediately started without first proceeding to any kind of diagnostic tests or procedures. It is impossible to list all the ills that affect the nervous system in India because of peculiar environmental conditions.

The book makes it clear that the discipline of neurology has, at least in some of the major cities, reached the same degree of diagnostic and therapeutic sophistication as in Western countries: genetic studies, neuroimaging, immunological investigations and epidemiological surveys are available and carried out, certainly in the major medical centres of the big cities. This also applies to most, if not all, developing countries. Nevertheless, it seems unlikely that these new and expensive methods will become widely used, since such a large proportion of the population has little, if any, access to, or can afford, appropriate medical care. The environment, whether political, economic or physical, not only influences the manifestations of disease but also determines the available methods of treatment.

The post-war period saw the emancipation of neurology from neuropsychiatry and the domination of neurosurgery;
the latter was particularly true in Asia and Latin America, the former more so in the United States. Neurology changed from being a contemplative discipline to a more therapeutically oriented one, in some instances perhaps too vigorously so. For example, drugs of still unproven efficacy in terms of actually modifying the course of the disease are widely used to treat multiple sclerosis and some forms of cancer, being used even in patients where the diagnosis is unclear. Tropical medicine that had, to a very large extent, been practised by the military became a more civilian endevour as colonies achieved independence. Observations of neurological diseases had been reported from many tropical areas, but the sub-specialty of tropical neurology did not come into being until the 1960s and 1970s.

Tropical medicine is difficult to define. In his History of Tropical Medicine, Sir H. Harold Scott (1939) recognized the problem: ‘Another difficulty, and a very real one, consists in the fact that we have no definition of the term “tropical medicine”, which in essence is that of infectious diseases and parasitic infestations. If we take its narrow interpretation as “disease restricted to the tropics”, that is, to 23° 27′ of latitude on either side of the equator, we could with a close approximation to the truth say that it is non-existent.’ According to the Columbia Encyclopedia, ‘The warmth and humidity of the tropics, and the often unsanitary conditions under which so many people live in those areas, contribute to the development and dissemination of many infectious diseases and parasitic infestations.’ The general heading of ‘living conditions’ encompasses many highly influential environmental factors including extreme poverty, famine and malnutrition; lack of medical care and/or access to it; inadequacy or total lack of public health organization; war and political instability together with the population dislocations that ensue; gender and ethnic-cultural discrimination and infringement of civil rights, racial and religious persecution; climatic catastrophes such as tsunamis, earthquakes or typhoons; as well as tribal, cultural and family traditions. Many of these problems derive from what may well be the single-most important adverse environmental factor, overpopulation. It is a combination of these factors along with genetic profiles more than warmth and humidity that define tropical or developing countries. Many of what we now call tropical diseases were, at one time, widespread: leprosy, malaria, cholera and plague were well known in Western countries and temperate climates. Until recently, most research on these diseases and the resulting discoveries belonged exclusively to the West. Wadia’s book is an excellent illustration of the fact that primary research in these diseases is now carried out in the countries where the disorders are endemic—Africa, Asia and Latin America.

The best description of the origins of the discipline of tropical medicine is provided by Fielding Garrison (1929) in his History of Medicine: ‘Tropical medicine, vaguely rooted in antiquity, came into being largely through the exploration of the globe by navigators and the settlements made in tropical and torrid regions by Spain, England, Holland, France and Germany. It had its authentic start with the organization of the Indian Medical Service of the British Army in 1764.’ It is not surprising that many major contributions were made by military medical officers working in the far-flung colonies of Western powers. This tradition is, to some extent, maintained to this day in France, where the military hospital ‘Le Pharo’ in Marseilles continues to specialize in tropical diseases. The first governmental agency concerned with tropical diseases was the Tropical Disease Bureau, established in the British Colonial Office in London in 1908. The sub-specialty of tropical neurology can be traced back many centuries. Only a few examples will serve to introduce the subject. Johannes Rumler found cysticerci in the human brain in 1558. Jacob Bontius, a Dutch physician, was the first to describe beriberi in the East Indies in 1642. Other tropical conditions affecting primarily the nervous system had also been known for a long time. African sleeping sickness (trypanosomiasis) was described by Thomas Winterbottom in 1803 in Sierra Leone. Lathyrisms was reported by General William Sleeman in 1844. The peripheral nerve disturbances of leprosy had been observed by Daniel Danielssen and Cesar Boek in Norway in 1848—the classical study by Georg Monrad-Krohn of Oslo did not appear until 1925—and William Strachan’s seminal report on 510 cases of ‘a strange peripheral neuropathy’ in Jamaica was published in 1888.

It is probably impossible to credit a single individual with establishing the modern discipline of tropical neurology, but the one who comes closest to qualifying is Henri Collomb, who in 1958 founded a department of tropical neuropsychiatry at the Fann Hospital of Dakar, Senegal (Fig. 4). After he left neurology to devote himself to ethnopsychiatry, he was succeeded as professor of neurology by Michel Dumas in 1969. In 1962, Collomb and Dumas, along with neurologists and neurosurgeons from many African countries founded the Pan-African Association of the Neurological Sciences, a bilingual group of clinicians and neuroscientists that is still active today. I was honoured by an invitation to be

![Fig. 4 Henry Collomb.](image)
the keynote speaker at their 1994 meeting in Addis Ababa. Simultaneously, a powerful and highly productive group of tropical neurologists was developing in Latin America. Their activities had already culminated in the First Congress of Tropical Neurology in Buenos Aires during 1961 (Fig. 5). This meeting was sponsored by the World Federation of Neurology (WFN) and organized by Ludo van Bogaert of Belgium, the President of the WFN, Jose Pereyra-Käfer and Gustavo Poch of Argentina. The proceedings of this Congress were published in 1963 and constitute the first collection of papers dealing exclusively with tropical neurology. Contributors included van Bogaert, who for many years was associated with Antwerp’s Institute of Tropical Medicine; Abe Baker of Minneapolis, the founder of the American Academy of Neurology; Antonio Spina-França and Deolindo Couto of Brazil; Oscar Trelles of Peru; Roman Arana-Iniguez of Uruguay; Henri Collomb of Senegal; Neville Proctor of South Africa; John Spillane of Wales; George Monekosso of Nigeria; Hatai Chitanondh of Thailand and Noshir Wadia of India. During the Congress, the Research Group on Tropical Neurology of the WFN was formed, of which Wadia eventually assumed the chair. A landmark in the history of tropical neurology was the foundation in 1982 by Michel Dumas of the Institut d’Épidémiologie Neurologique et de Neurologie Tropicale in Limoges, France. This unique research and training centre is dedicated to the neurological education of African physicians who will return to their native countries. Dumas and other staff members of the Institute frequently make teaching visits to French-speaking West Africa, Laos, Cambodia, Vietnam, Cuba, Peru and Uruguay. In New Delhi in 1989, Wadia directed what was the first section on tropical diseases at a world congress of neurology, and an important international meeting completely devoted to tropical neurology, organized by Dumas, was held in Limoges in 1991. It was followed by the first meeting on neurology of the Royal Society of Tropical Medicine and Hygiene, chaired by Ra’ad Shakir, in London in 1993. In 1998, a session on tropical neurology was included for the first time at the Second Congress of Tropical Medicine in Liverpool. Tropical neurology had come of age. Many others throughout the world, in addition to those already named, made contributions to tropical neurology over this period of intense evolution and emancipation. Most had been educated in France, The Netherlands or the United Kingdom. Among a number of outstanding practitioners of the new specialty in recent years, a few deserve special mention: Benjamin Osuntokun of Nigeria (Fig. 6), a student of John (Jerry) Spillane (Fig. 7), Athasit Vejjajiva of Thailand, Redda Tekle-Haimanot of Ethiopia and Julio Sotelo of Mexico.

Although many textbooks of medicine mentioned neurological aspects of tropical diseases, the first and most extensive descriptions appeared in August Hirsch’s encyclopaedic Geographical and Historical Pathology, first published in German in 1860, and in English translation from London in 1886. However, the modern study of tropical neurology is often dated from the appearance of J. D. Spillane’s famous Tropical Neurology in 1973. Indeed, it was the first textbook written exclusively on the subject and included contributions from many very prominent clinicians and investigators of tropical neurology. An important event in the evolution of tropical neurology was the publication in 1983 of the

Fig. 5 WFN Commission on Tropical Neurology, Buenos Aires, 1961. From left: Noshir Wadia, Webb Haymaker (USA), Oscar Trelles (Peru), Gustavo Poch (Argentina).
Spanish-language *Neurologia Tropical* by Gabriel Toro, Gustavo Roman and Lydia Navarro de Roman of Bogota, Colombia (Toro et al., 1983). Ra’ad Shakir, Peter Newman and Charles Poser’s *Tropical Neurology* appeared in 1996 (Shakir et al., 1996). Several important topics in tropical neurology are found in John Cruickshank and Gareth Beevers’ *Ethnic factors in Health and Disease* (Cruickshank and Beevers, 1989). Although not specifically written about neurological problems, two important books from Africa must be mentioned because they include valuable information on many aspects of African lifestyle and environment: Michael Gelfand’s (1957) *The Sick African* and William Trowell’s (1960) *Non-infective Disease in Africa: The Peculiarities of Medical Non-Infective Diseases in the Indigenous Inhabitants of Africa South of the Sahara*.

New diseases have been discovered in the tropics, while differences in the prevalence of those that are more widely distributed, and already recognized, may provide important genetic and environmental clues to the aetiology of these ‘western’ illnesses. One such example is multiple sclerosis, which is rare in natives of tropical countries. An excellent illustration of the impact of an observation in a remote exotic, tropical region on neuroscience is kuru: Victor Zigas, working in the jungles of New Guinea, was the first to note the existence of a strange illness among the Fore people, who called it ‘kuru’. After it was extensively investigated by Carleton Gajdusek, Ivan Klatzo and Clarence Gibbs, a veterinary neuropathologist, William Hadlow, noted its similarity to scrapie, thus opening the door to the elucidation of the concept of the prion diseases.

Young physicians from developing countries continue to seek specialty training in programmes in Western Europe and North America, although it has now become possible to obtain this education in the home country. Clinical neurology has become increasingly dependent on laboratory tests, and to an even greater degree on imaging procedures, at the expense of the history and the physical examination, a practice described by George Schumacher under the felicitous term ‘mechanodiagnosis.’ Although this kind of technological support has become available in much of the developing world, albeit to a limited extent, it is unlikely that investigative facilities are poised to become widespread because of the high cost of apparatus and the shortage of specialists to interpret the results. Clearly, the practice of tropical neurology will remain a ‘hands-on’ clinical discipline for many years to come. Young neurologists coming home from abroad, who have been accustomed to the easy availability of an avalanche of ancillary diagnostic aids, may find it difficult to go back to relying on not much more than a thorough history and a detailed neurological examination. With the exception of epilepsy, they will find that the pattern of neurological practice is different from that experienced during their training. The shorter lifespan of most inhabitants of tropical climates means that the commonly encountered strokes, dementias and parkinsonism of the developed world are more likely to be replaced by the neurological complications of AIDS, malnutrition, malaria and trauma, as well as various unusual bacterial and viral infections in patients with impaired immune systems, sleeping sickness and other parasitic infestations. Regardless of what kinds of neurological diseases they must deal with, it will be hard for them to use the medications they know to be effective as long as their prices remain far above what most people or even governments are able to afford.

Probably the greatest problem hampering development in many African, Asian and Latin American countries is that of overpopulation. Religious, cultural and political proscriptions and restrictions against contraception and abortion, combined with illiteracy and lack of education, a poorly organized public health service, along with dismal records of rank discrimination against women, are overwhelming obstacles. As was suggested by Dr Piloo Bharucha, rural electrification, making the reception of radio and television possible, might result in a beneficial alternative to reproductive activity! Regrettably, the current American
administration’s policy of endorsing sexual abstinence as the only method of contraception, and forbidding any discussion of condoms and abortion in its foreign aid programmes, is a seriously counterproductive factor in controlling this problem. Poverty is the handmaiden of overpopulation and a powerful handicap in the fight against disease; it also drastically and tragically inhibits combating HIV/AIDS and other sexually transmitted diseases. Falciparum malaria could be completely eradicated if insecticide-impregnated mosquito nets that cost ~£3 apiece were to be distributed amongst the people of endemic districts, and their utilization properly monitored. A vigorous vaccination programme that included a strong educational component could eliminate measles and subacute sclerosing panencephalitis, and other often fatal exanthemata, as well as poliomyelitis.

Outsourcing of jobs and resources resulting from economic globalization has improved the socioeconomic status of the people of some developing countries, aided by a number of international organizations engaged in disease prevention and health maintenance programmes. Considering the magnitude of the problems, funds are inadequate and their distribution inefficient and hindered by corruption at the highest levels of government. Despite these well-meant but often poorly conducted programmes, the populations of the tropics are rapidly growing, but their living conditions are barely changing and unlikely to improve. The next generation of neurologists all over the world will have to deal more and more with what we now call tropical diseases.

There is little question that Noshir Wadia’s book is now the standard text on tropical neurology, but it would be a mistake to think that it will be of interest only to those specialists. All neurologists will benefit from the clinical experience and wisdom contained in its many contributions.

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