DEATH BY MIGRATION
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EUROPE'S ENCOUNTER WITH THE TROPICAL WORLD IN THE NINETEENTH CENTURY

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From the beginning of European trade and conquest overseas, Europeans knew that strange “climates” could have fatal effects. Later, they came to understand that it was disease, not climate, that killed, but the fact remained that every trading voyage, every military expedition beyond Europe, had its price in European lives lost. For European soldiers in the tropics at the beginning of the nineteenth century, this added cost in deaths from disease – the “relocation cost” – meant a death rate at least twice that of soldiers who stayed home, and possibly much higher.

This book is a quantitative study of the relocation costs among European soldiers in the tropics between about 1815 and 1914, but it has broader implications. For Europe itself, this was the crucial century of the “mortality revolution,” with its profound influence on European and world demographic history. For the history of medicine, this was the transitional century between the kind of medicine that had been practiced in Europe since classical times and the kind of scientific medicine that would be spawned by the germ theory of disease. For Europe’s global political and military relations, this marked the final period for the European conquest. For all these reasons, the relocation costs of this period have great bearing on human history.

In the longest run of time, human culture and human relationships to disease have passed through three phases. In the earliest, before the agricultural revolution of 10,000 B.C. – plus or minus a few millennia – human beings lived in small communities, as hunters, fishers, and gatherers. As they spread out from their presumed place of origin somewhere in eastern Africa, their ways of life changed and became increasingly varied. The major languages came into existence, along with ancestor ways of life that continue deep in the backgrounds of present human communities. Geographically, these early people occupied all of the major continents, including the Americas and Australia.

That earliest phase was by far the longest in human history, and it began a process of mutual adjustment between people and disease that has gone on ever since. In the 1940s and later, biological scientists
began to see the relationships between diseases and people as part of a broader ecological system in which many different forms of life are interrelated. The ecological point of view suggests that, as human communities in semi-isolation spread, humans and their parasites engaged in a continuous process of adaptation and readaptation. Parasites evolved to take better advantage of their hosts; hosts responded with adjustments in their immune system, which sometimes promoted evolutionary change that resulted in genetic immunities. Most immunities, however, are acquired. The diseases of childhood are precisely that because they are broadly endemic in our society. Most people are infected in childhood and thus acquire the antibodies needed to protect them from further infection as adults.¹

The process of adjustment between parasites and people is subtle, changing, and still not fully understood. In the preagricultural world, human communities were small and isolated. We can guess that they had comparatively few diseases, which had adapted and readapted to that particular community over a very long period of time. The human community in turn acquired a set of immunities that were limited but suited to their particular disease environment.

Then, with the development of agriculture, population density increased, which in turn led to widespread urbanization and intercommunication. Trade expanded across the Afro-Eurasian landmass, and by sea along its fringes. The intercommunicating zone for commerce became an intercommunicating zone for the spread of ideas and religions – and of diseases. As a result, the isolated disease environments were invaded by the diseases of their neighbors and underwent the painful process of acquiring immunities. The initial cost of entering the intercommunicating zone was a series of virgin-field epidemics with high death rates and probably a population decline until the necessary immunities were in place. The long-term cost was to live with a wider variety of parasites than the scattered hunting communities had had to put up with.

In the nineteenth century came the third phase, coinciding with the commencement of the industrial age. This period is comparatively short, barely two centuries, and the history of modern science is the account of its triumphs. With the rapid growth of science and technology, beginning in the late eighteenth century, Western countries learned how to produce more goods with less labor than any previous human society had used. Technical triumphs were not limited to manufacture and distribution. The new technology included means to intervene more effectively than ever before in the human battle against disease. People succeeded in reducing the threat of some diseases, like

¹ For a synthesis of this point of view, see Macfarlane Burnet and David O. White, *Natural History of Infectious Disease*, 4th ed. (Cambridge, 1972).
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Typhoid fever, and in destroying a few, like smallpox; but since that
time they have also had to contend with new challengers, like AIDS.

We know much less about the middle period, between the agricultu-
ral and industrial revolutions. Medicine was comparatively ineffecti-
ve in controlling parasites, though it laid the basis for modern medicine.
In the history of disease, we are broadly acquainted with the impact of
an unfamiliar disease on a nonimmune population, like that of the
Black Death in Medieval Europe, the die-off of the American Indians
from the sixteenth century into the nineteenth, or that of the Aus-
tralian aborigines and the Pacific islanders in the late eighteenth and
nineteenth.\(^2\) We thus have some idea of the impact of alien diseases on
isolated populations at the moment they entered the intercommunicat-
ing zone with its more diverse range of diseases.

Another important factor to consider is the European death rate as
the Europeans moved overseas. We have some knowledge about this
for particular areas, and the phenomenon is known generally, if not in
detail.\(^3\) For a better understanding of this process – of what happens
when people leave their childhood disease environment – we need
more than the impressionistic observations and scattered figures that
make up most of the historical record. Ideally, we need experimental
evidence. If several thousand human subjects could be recruited in a
particular region of Europe, one part sent to live overseas while
another stayed at home, and the health of both groups kept under
careful medical observation over a period of years, with particular
attention to the cause of death, we would have some hard evidence.
The group at home could serve as a control from which to measure the
changing health of the group overseas. The experiment should also
exclude the application of modern medicine, and it should be repeated
at intervals of ten years or so.

Needless to say, no such experiment is possible today. Aside from the
cost, the loss of life would make it unthinkable. Yet the experiment
was actually performed in the nineteenth century, not once but over
and over again. European governments recruited men for military
service, sent some overseas and kept others at home. They made care-
ful records of the health of both groups – the most careful records of
this kind available for any human group of equivalent size anywhere in
the world before this century – and they published these records in

\(^2\) Alfred W. Crosby, Jr., *Ecological Imperialism: The Biological Expansion of Europe, 900–1900*
(New York, 1986); *The Columbian Exchange: Biological and Cultural Consequences of 1492*
(New York, 1972); P. M. Ashburn, *The Ranks of Death: A Medical History of the Conquest of

\(^3\) K. G. Davies, “The Living and the Dead: White Mortality in West Africa, 1664–1732,”
in Stanley L. Engerman and Eugene D. Genovese, *Race and Slavery in the Western
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printed annual reports on the health of the army. These reports are especially comprehensive from the 1860s onward, but they exist for periods as far back as 1816 and occasionally date back into the eighteenth century. For much of the nineteenth-century tropical world, military health records are the earliest, and sometimes the only, quantifiable guide to the history of disease.

The nineteenth century was also the prime century of the mortality revolution in Europe itself. As the first century of the industrial age, it was a period of transition, among other things from a world in which birth rates and death rates were typically 30 or more per thousand, to one in which both were a small fraction of that number. For men of military age, even in Europe, death rates per thousand dropped by more than 80 percent in the course of that century. The improvement was still more striking for Europeans overseas.

Although this study focuses on the problem of relocation costs and death in the tropical world, the data have important implications for Europe as well. The control group of soldiers is not necessarily typical of European populations – even of populations in the twenty to forty age range – but the military doctors produced more careful and consistent data on cause of death than any contemporaneous civilian records did. These data add something to what was previously known about the transition in demographic history from the mainly agrarian to the industrial period in world history.

The first objective is to establish the principal patterns of European military death from disease in the tropical world, then to discover why they changed. The book contains two parts. The first deals with the period up to the 1860s, a period of relative stability in a mainly pre-industrial world. The second deals with the 1870s to the beginning of the First World War, the transitional decades when scientific medicine became a major influence. Each part begins with a chapter measuring disease among the military at home and abroad. Chapters 2 and 5 examine major trends of European thought about tropical hygiene, while Chapters 3 and 6 take up the applications of that thought in the field situation.

The military medical data are rich and various. By the early twentieth century, they covered scores of different overseas territories and half a dozen European and North American armies. This study is limited, however, to the French and British armies, with special attention to three colonial settings – the British West Indies, Algeria, and the Madras Presidency of British India. The three sample territories represent different overseas environments. The British West Indies represents the New World, humid tropics, where malaria and yellow fever were especially serious. Algeria represents a Mediterranean climate similar to that of southern France, not strictly speaking tropical but epidemiologically different. South India is an example of monsoon
Preface

Asia, where the principal killing diseases were again different. Algeria and India provide the best samples because Europeans were there longer and in larger numbers than anywhere else. Other important disease environments are omitted. Tropical Africa was the most dangerous place in the world for Europeans, but the number of European troops there was not large enough to be used comparatively over a long period of time. Other sample areas might have been chosen in Asia – such as the Dutch East Indies, mainland Southeast Asia, the China coast, and other parts of British India – but, at this stage, it seemed preferable to work with the sample area that provided data for the largest number of troops over the longest period of time, with the least distortion from frequent campaigns.

These military records as a whole open several lines of investigation, of which the present study is only one. They report on the health of non-European as well as European recruits into Western armies. In a second projected study I plan to compare the mortality experience of “native” troops with those of Europeans serving in the same place. This topic has important implications for comparative immunology and for European colonial and military policy. A third project will trace the patterns of disease and death among non-Europeans who were moved from their home environment as soldiers in European armies, including the nineteenth century West Africans who served in the French, British, and Dutch armies in places as various as the Caribbean, East Africa, Ceylon, Indonesia, and Morocco.

The nineteenth century was the central period of European imperialism in the tropics, made possible by the achievements of industrial technology. One of those achievements was scientific medicine. Between the early nineteenth century and the eve of the First World War, the typical death rate of European soldiers in the tropics dropped by 90 percent. In due course, I hope to explore some of the policy implications of this decline in the cost of empire.

Every book leaves a trail of debt the author has accumulated that can never be repaid. The specialized collections in the field of military history at the National Library of Medicine in Bethesda are certainly the richest in the world, going back to the period when that library was the Library of the Surgeon-General of the United States Army. I am especially grateful to its staff, especially to the Division of Medical History, and in particular to Mrs. Dorothy Hanks for her uncanny skill in being able to lay her hands on uncatalogued works in the collection. The


5 Philip D. Curtin, “African Health at Home and Abroad,” Social Science History, 10:369–398 (1986), is a pilot study for that project.
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Interlibrary Loan staff at the Milton E. Eisenhower Memorial Library at The Johns Hopkins University in Baltimore also responded far beyond the call of duty to requests for aid.

The other inevitable debt is to those who have been kind enough to read manuscripts under construction and to reply with criticisms and suggestions. For this chore, I am especially beholden to my friends and colleagues James Cassedy, Anne G. Curtin, Robert S. Desowitz, Caroline C. Hannaway, Rachel Laudan, Harry M. Marks, and Charles Rosenberg.
ABBREVIATIONS

AHMC  Annales d'hygiène et de médecine coloniale
AHPML Annales d'hygiène publique et de médecine légale
AHR American Historical Review
AMN Archives de médecine navale
AMPM Archives de la médecine et pharmacie militaire
AMSR British Army Medical Service Reports (later Army Medical Department)
BHM Bulletin of the History of Medicine
DESM Dictionnaire encyclopédique des sciences médicales (Paris, 1861)
GMA Gazette médicale d'Algérie
ICHID International Congress of Hygiene and Demography
JAH Journal of African History
JBS Journal of British Studies
JIH Journal of Interdisciplinary History
JRAMC Journal of the Royal Army Medical Corps
JSSL Journal of the Statistical Society of London
JTMH Journal of Tropical Medicine and Hygiene
MH Medical History
MS The Military Surgeon
MTG Medical Times and Gazette
PP Great Britain, Parliamentary Sessional Papers
PSQ Political Science Quarterly
RC Revue coloniale
RGCSMR Revista general de ciencias médicas y de sanidad militar
RHPV Revue d'hygiène et de police sanitaire
RMM Mecmoire de médecine militaire
RTC Revue des troupes coloniales
WHO World Health Organization

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