The Anthropology of Infectious Disease

International Health Perspectives

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CHAPTER 1

Introduction

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INTRODUCTION

As the year 2000 approaches, a large portion of the world's population still suffers from, and struggles against, diseases caused by infectious agents. Indeed, at the dawn of the new millennium, infectious diseases remain *the* major cause of death worldwide, and are an incalculable source of human misery and economic loss. The Institute of Medicine's recent, ominous report, *Emerging Infections: Microbial Threats to Health in the United States* (1992), outlines the daunting number and variety of microbial threats to human health. More infectious pathogens exist than ever before, and, given the current state of preventive and therapeutic knowledge, the vast majority of these infectious disease threats are likely to persevere well into the twenty-first century (Institute of Medicine 1992).

Indeed, the committee charged with writing the Institute of Medicine report focuses on what it calls the "trouble ahead" – namely, the emergence, and re-emergence, of serious infectious disease problems. These problems comprise four basic categories. First, a host of "new" infectious diseases have been identified during the past two decades, and they are affecting more and more people every year. AIDS, caused by the human immunodeficiency virus (HIV), provides the most sobering global example of this class of new emergent infections. There are numerous examples of other new infectious diseases that have been shown to be lethal, despite their more limited geographic scope

than HIV. Diseases such as *Hantavirus* pulmonary syndrome, Legionnaires' disease, and the widely publicized Ebola hemorrhagic fever can be included in this category.

The second category of threats includes a number of "old," well-known infectious diseases – once considered by many to be "under control" – that have increased in incidence beyond all expectations during the past two decades. The two primary examples of these re-emergent infectious diseases are malaria and tuberculosis. Not surprisingly, both of these diseases also provide excellent examples of what happens when microbial agents become resistant to mainstay therapeutic drugs and what happens when public health control measures slacken or break down altogether. The re-emergent infectious disease category includes many other examples, some of which, such as dengue, cholera, and measles, will be described along with malaria and tuberculosis in this volume. Taken together, the numbers of infectious disease agents in these first two categories are quite impressive: seventeen forms of bacteria, rickettsiae, and chlamydiae, twenty-seven forms of viruses, and eleven forms of parasites (both protozoans and helminths) and fungi (Institute of Medicine 1992). All the scientific evidence suggests that these are not merely newly *identified* forms of disease, but actually new species of pathogens that have evolved through natural selection, often because human behavior has changed the ecological context.

The third category includes microbial agents that are the likely causes of some widely occurring chronic diseases whose precise etiology had previously remained obscure. Two salient examples of such diseases are peptic ulcer (and possibly stomach cancer), which appears causally linked to previous infection with the *Helicobacter pylori* bacterium, and cervical cancer, many cases of which seem causally linked to previous exposure to a sexually transmitted pathogen, the human papillomavirus (HPV). Although not listed in the Institute of Medicine's report, many other non-infectious conditions, such as tubal infertility described in Chapter 7 of this volume, also share an underlying infectious etiology. The important point here is that morbidity and mortality from some chronic diseases may actually be caused by infectious agents, so that prevention efforts must target the earlier infectious causes.

The final category of "trouble ahead" identified in the Institute of Medicine report involves the introduction of infectious disease agents into previously unaffected populations. Throughout history, the introduction of infectious diseases to "virgin" populations with no immunities to the disease has caused untold human suffering and

massive mortality. Indeed, McNeill (1976) has tied such epidemics to the collapse of New World civilizations. Nevertheless, it is impossible to build impenetrable epidemiologic borders between populations, so that constant surveillance and political willingness to protect populations proactively from new diseases (while justly and humanely treating infected people) will remain an important challenge for the future. In this regard, the notion of infectious disease "traffic" – a term coined by virologist Stephen Morse (1993) in reference to the movement of infectious disease agents to new species or new individuals – is significant. Indeed, Morse, who is not a behavioral scientist, recognizes that human beings are often unwittingly responsible for infectious disease traffic through, for example, ecologically disruptive agricultural practices or various culturally prescribed methods of water impoundment and storage. As he concludes in his book on *Emerging Viruses*:

> Viral traffic, often abetted by human actions, is the major factor in viral emergence. Because human activities are often involved in emergence, anticipating and limiting viral emergence is more feasible than previously believed. Basically, people are creating much of the viral traffic, even though we are doing it inadvertently. We need to recognize this and learn how to be better traffic engineers (Morse 1993:210).

Given the role of human behavior in infectious disease traffic, it seems only logical that anthropologists, as professional observers and interpreters of human behavior in its social and cultural context, play a significant role in global efforts to curb infectious disease problems.

This volume on *The Anthropology of Infectious Disease* is dedicated to four simple propositions: first, that infectious diseases are profoundly important to all human societies for the reasons outlined above; second, that anthropologists, particularly medical anthropologists with interests and experience in international health, should therefore study these diseases; third, that these anthropologists should share their research findings in cross-disciplinary dialogues and collaborative efforts with people in biomedical sciences and international public health who are working to stop the spread of infectious diseases; and fourth, that these anthropological research findings should be seriously considered by biomedical scientists and international public health personnel. Although these propositions may appear simple and even self-evident, they have been met with variable reception in both anthropology and international public health circles. Why might this be so? To answer this question, one must first take a look back at the history of infectious disease research in international health, before examining the role of anthropologists in that history.

LOOKING BACK: THE HISTORY OF INFECTIOUS DISEASE RESEARCH AND CONTROL IN INTERNATIONAL HEALTH

Although infectious diseases have once again gained the spotlight, the history of infectious disease research and control during the modern, post-World War II era of international health has generally been inglorious. Without a doubt, there are some well-deserved success stories – including the global eradication of smallpox (to be described in this volume), the elimination of poliomyelitis from the Western hemisphere, and the substantial reduction in childhood killers like diphtheria and measles in the Western industrialized countries (AMA Council on Scientific Affairs 1996). In general terms, however, this fifty-year period has been characterized by: (1) the scientific neglect of both major and minor infectious diseases, leading to numerous "scientific blind spots" in our understanding of infectious disease threats; (2) missed opportunities for basic and applied research that may have improved public health interventions; (3) an overzealous emphasis on eradication of certain priority infectious diseases, mixed with often feeble attempts to control others; (4) a general "mood of complacency," or a critically low awareness of and concern about infectious diseases, except among a handful of infectious disease specialists (Institute of Medicine 1992); and (5) the underdevelopment of a global infectious disease surveillance and public health infrastructure to deal with epidemics. These historical characteristics, in turn, have affected how anthropologists have – or have not, in most cases – contributed to infectious disease research and control programs.

International health efforts to understand and control infectious disease problems harken back much longer than fifty years – at least to the turn of the twentieth century, when the discipline of Tropical Medicine emerged to help cope with the diseases of colonizing groups, including military forces, and, to a lesser extent, colonized labor forces (Brown 1976; Curtin 1989; Warren 1990). However, modern international health programs are largely a post-WWII phenomenon linked to the foreign policy aims of Western industrialized nations, who continue to use health aid as a part of attempts to gain or maintain national political loyalties in the post-colonial era.

Some of the neglect of infectious disease in international health circles during this period is certainly linked to disappointments regarding disease eradication programs, particularly the failure of malaria

eradication during the 1950s and 1960s. As described by Warren (1990), the concept of eradication of a major human disease may have originated with the Rockefeller Foundation, which set as its major goal in 1913 the eradication of hookworm, the so-called "germ of laziness," in the southern United States. Although the Rockefeller campaign to eliminate hookworm infection from the U.S. (as well as fifty-two other countries where the campaign was carried out) was a failure, this did not prevent the foundation from attempting to eradicate another disease, yellow fever, from the Western Hemisphere. Again, this campaign was unsuccessful, but the concept of disease eradication remained in tact. Undaunted, Rockefeller Foundation officers worked with World Health Organization (WHO) officials to initiate a global campaign to eradicate malaria in 1955. This campaign lasted for seventeen years and was responsible for eliminating malaria from large areas of the world, including the United States and Europe (see Chapter 5 of this volume). However, malaria eradication was never even remotely complete due to the development of resistance to both insecticides and drugs, as well as the impossibility of controlling malaria-carrying mosquitoes in their native African habitat (Warren 1990). Thus, WHO decided to terminate the effort – or, at least, to redefine the goal to malaria control – after spending approximately four billion dollars. Following malaria program termination, malaria has re-emerged in some parts of the world in massive proportions.

Although the subsequent eradication of smallpox was an absolute and unprecedented success – the world was declared officially free from smallpox on December 9, 1979 – the failure of malaria eradication (as well as programs that had preceded it) had taken its toll in the international public health community. As described by Warren (1990:149), "there was a major backlash, not only against the concept of eradication of disease but against direct, targeted (vertical) attempts to improve health in the developing world." As part of this backlash, the international health community renounced the high-technology, "engineering" approach to solving infectious disease problems through drugs, vaccines, and insecticides. The decline of the vertical disease-oriented approach was linked to the growth of international health's Primary Health Care (PHC) revolution of the late 1970s. But there was a negative consequence in that the rise of PHC succeeded in further marginalizing the many serious, but underappreciated infectious disease problems that had never been targeted for eradication.

With the concept of eradication all but eliminated from international public health discourse by the 1970s, few of the international health agencies were interested in tackling what appeared to be insurmountable infectious disease problems in the developing world. As a result, WHO remained the sole – and seriously underfunded – force in international infectious disease research and control. Specifically, WHO responded to the demands of public health leaders from sub-Saharan Africa that the organization increase its prioritization of infectious disease work. In 1975, WHO initiated the Special Program for Research and Training in Tropical Diseases (TDR), with the following statement: "The recent enormous extension of knowledge in the biomedical sciences has as yet hardly begun to be applied to the problems of tropical diseases where methods of control and treatment have scarcely changed in the past 30 years." Through its TDR program, WHO hoped to terminate the old colonial tradition in tropical medicine, where European experts would go "to the field" for short periods of time. The emphasis instead was on self-reliance through the training of researchers in the countries where tropical diseases were endemic. However, given the huge number of tropical disease problems present in the developing world and WHO's limited funds for TDR (raised outside the regular WHO budget, but with an average annual level of twenty-five million dollars), WHO restricted its TDR program to six "priority" diseases. Five of these – filariasis, leishmaniasis, malaria, schistosomiasis, and trypanosomiasis – were parasitic. Only one – leprosy – was bacterial. The soil-transmitted helminths (or intestinal "worms" to be described in Chapter 9 of this volume) were left out despite their global prevalence; essentially, WHO recognized that control first required fundamental (and expensive) improvements in environmental sanitation and water supply.

Soon after, a few philanthropies joined WHO in attempting to curb infectious, primarily parasitic, diseases. The Edna McConnell Clark Foundation initiated an innovative schistosomiasis research program, later extended to include trachoma. In 1977, the Rockefeller Foundation started the "Great Neglected Diseases" program, which involved many of the important infectious diseases of the developing world as well as the hemoglobinopathies related to malaria (Warren 1990). In the early 1980s, the MacArthur Foundation began a five-year program, the Biology of Parasitic Diseases, while Burroughs Wellcome initiated fellowships in the Molecular Biology of Parasitic Diseases (Warren 1990).

These programs resulted in many basic scientific advancements in the biology, diagnosis, treatment, and prevention of parasitic diseases

during the 1970s and 1980s (Warren 1990). But these programs were small compared to other major international public health efforts. More important, the programs never focused on bacterial and viral illnesses. This was a crucial oversight, because studies from the late 1970s and early 1980s revealed that bacterial and viral infections are the leading causes of death for individuals of all ages in the developing world (Grant 1983; Walsh and Warren 1979; Walsh 1988). Of particular concern are diarrheal diseases (and associated dehydration and malnutrition) and acute respiratory infections (ARIs), which continue to be the major killers of children in developing countries.

Recognition of the importance – and neglect – of deadly bacterial and viral childhood illnesses forced a policy shift in international health circles. Namely, the 1980s initiative known as "Child Survival" defined the next phase of infectious disease research. UNICEF's declaration of "A Children's Revolution" in 1983 fit in with the overall mission of PHC, which aimed in part to improve the health of the world's children by controlling the major causes of childhood morbidity and mortality. Diarrheal diseases and acute respiratory infections (ARIs) were therefore targeted for intervention. Similarly, six vaccine-preventable childhood diseases – diphtheria, pertussis, tetanus, measles, poliomyelitis, and tuberculosis – became the focus of a joint WHO/UNICEF program, known as the Expanded Programme on Immunization (EPI). Indeed, WHO, although maintaining its TDR parasite control activities on a shoestring budget, became a major force in the field of children's infectious diseases, developing separate programs for the control of diarrheal diseases, ARI, and what came to be known simply as the "EPI diseases."

Child Survival created an important opening in the world of infectious disease, by moving research and control activities "beyond parasitology" (Warren 1990). However, infectious diseases themselves were never the major focus of Child Survival, as they were in the TDR program. Thus, the Child Survival initiative did not serve to generate concern for other, non-"priority" infectious diseases of childhood – nor for infectious diseases in a more general sense.

As of this writing, Child Survival is no longer the leading initiative in international health, although organizations like WHO and UNICEF retain their focus on children. Newer international health activities are women-centered, in part because of the realization that child survival depends largely on the health and well-being of mothers. Generally speaking, these women-centered initiatives do not have an explicit infectious disease agenda – even though reproductive tract

infections and the infectious complications of childbirth and abortion represent major problems for women around the world.

Rather, infectious disease research in international health today revolves around AIDS and the opportunistic infections, such as tuberculosis, that are AIDS-related. Without question, AIDS is *the* disease of international concern today, as it has been for the past decade. This has led some observers, frustrated with an AIDS-exclusive focus in international infectious disease research, to speak sardonically of an internationally funded "AIDS industry" in Africa and other parts of the developing world. Nonetheless, the focus on AIDS has been extremely important. Not only has it sparked interest in – and initiatives for – other emerging infectious diseases, but it has served to unseat the kind of complacent attitudes toward infectious disease problems that have hampered international health work over its fifty-year history.

Today, the Centers for Disease Control and Prevention (CDC) and WHO are attempting to address AIDS and other emerging infectious disease threats in the U.S. and beyond. Their strategy – first outlined in the CDC's 1994 report, *Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States*, then adopted on an international level by WHO – involves the prioritization of four areas of activity. These activities, if successfully carried out, could have far-reaching implications for the understanding and control of all infectious diseases.

The first priority is strengthening infectious disease surveillance activities. As noted in the Institute of Medicine report, this will involve the formation of global consortia to promote detection, prompt investigation, and monitoring of emerging infections and the factors influencing their emergence. Specific objectives include monitoring trends of antimicrobial resistance, investigating food- and water-borne outbreaks, and studying animal reservoirs and vectors associated with human disease agents (Inhorn 1995). This attempt to improve surveillance is being closely linked with the campaigns for global eradication of polio and for elimination of measles from the Americas, making maximum use of existing networks of collaborating laboratories (LeDuc 1996).

The second priority is applied research, in which attempts will be made to integrate laboratory science, biotechnology, and epidemiology with public health practice (Inhorn 1995). Among the research activities to be undertaken are vaccine efficacy studies, laboratory studies of diagnostic techniques for identifying new pathogens, studies of the economic impact of emerging infections, and, most important to

anthropologists, studies of the behavioral factors that contribute to microbial emergence and affect individual risk of infection.

The third priority is prevention and control. Because most infectious disease problems are not manageable through vaccination alone, attempts will be made to define and institute practical public health measures which rely heavily on the effective dissemination of information, including to the public. Currently, CDC is in the process of strengthening its communications related to infectious diseases through free electronic dissemination of a new journal, *Emerging Infectious Diseases*, as well as its *Morbidity and Mortality Weekly Report* and other CDC publications.

Finally, a fourth priority involves strengthening public health infrastructure. Breakdowns of public health infrastructure have been deemed crucial to the re-emergence of infectious disease problems such as tuberculosis and cholera. Thus, the goal here is to improve the physical infrastructure, such as public health laboratories, and to train infectious disease professionals in countries around the world.

The ultimate goal of this four-pronged strategy is to be able to anticipate and prevent infectious diseases rather than having to react with expensive and possibly ineffectual containment measures. Although CDC and WHO officials recognize that such actions cannot guarantee protection against future, pathogen-caused "disasters," they argue that "a strengthened epidemiological and microbiological defense will surely afford better protection and ensure prompt response to the microbial challenges that lie ahead" (Berkelman, Pinner, and Hughes 1996).

LOOKING BACK: THE HISTORY OF INFECTIOUS DISEASE RESEARCH IN ANTHROPOLOGY

But the question remains: Where does anthropology fit in this history, including the most recent attempts to deal with emerging infectious diseases? Looking back over fifty years, it is possible to discern an anthropology of infectious disease – or, perhaps more accurately, anthropol*ogies* of infectious disease, since no single paradigm or approach can be said to characterize this work. However, this anthropological history of research on infectious disease is even more fragmentary and inchoate than the international health efforts described above. Moreover, it is largely restricted to the last twenty years, as reflected in the

review of studies contained in Chapter 2. Indeed, in a 1990 editorial retrospective in the *American Journal of Public Health*, anthropologist-physician Frederick Dunn lamented the relative dearth of culturally oriented behavioral research on infectious disease. "It is fair to say," he states, "that studies of human behavioral, social, and cultural factors have not been prominent in the long history of research on communicable disease transmission, control, and prevention, even though it is generally recognized that some of these factors did attract the attention of the earliest epidemiologists" (Dunn 1990:141).

Although anthropology's disciplinary roots can be traced to the turn of the twentieth century, anthropological work on infectious disease did not begin until the 1950s. With the rise of modern, post-WWII international health, anthropologists were soon invited to join these efforts in various capacities. As described by Foster (1982) in his retrospective on anthropology and international health, the years of 1950 and 1951 stand as milestones. In 1950, WHO hired its first anthropologist (Cora DuBois, whose appointment lasted only one year), and the Rockefeller Foundation hired Edward Wellin, still an anthropology graduate student at Harvard University, to undertake research on typhus control in southern Peru. In 1951, Benjamin Paul was invited to join the faculty at the Harvard School of Public Health, an appointment that lasted until 1962.

Paul's tenure at Harvard was particularly significant, for it was there that he produced his classic edited volume, *Health, Culture and Community* (Paul 1955). From the perspective of infectious disease research in anthropology – and medical anthropology more generally – Paul's book was highly significant. Several of the sixteen case studies in the book dealt with community reactions to vertically imposed infectious disease control programs. Among the case studies were Wellin's work on typhus and water boiling in Peru (Wellin 1955); Hsu's study of community reaction to a cholera epidemic in southwestern China (Hsu 1955); and the Hanks's study of diphtheria immunization in a Thai community (Hanks and Hanks 1955). (For additional description of these studies, see Chapter 2.) These studies presaged the future role of many anthropologists in infectious disease work and in international health work more generally: namely, to serve as cultural interpreters and "troubleshooters," who were brought into projects to anticipate, or to provide post-hoc explanations of, negative community responses.

Although the Paul book was notable for its infectious disease orientation, there was relatively little other significant anthropological

work being done on infectious disease during the 1950s, a lacuna which lasted well into the 1970s. As described by Dunn:

> By the 1950s and 1960s social and behavioral scientists – and epidemiologists employing some of the methods of the social and behavioral sciences – were beginning to change and broaden perspectives in chronic non-infectious disease research. Through those years, however, only a very few sociomedically oriented studies were undertaken of communicable diseases... Even through the 1970s, however, reports on social or behavioral factors in communicable disease transmission or control were mostly anecdotal (Dunn 1990:141).

The relative lack of anthropological participation in infectious disease research during this period is reflected most poignantly in the fact that smallpox eradication, a major collaborative effort between the scientific and public health communities during the 1970s, was accomplished with virtually no anthropological input (see Chapters 2 and 4 for further details).

It was not until the creation of WHO's TDR program in the mid-1970s that the impetus and monies for social science research on infectious diseases clearly emerged. WHO, through TDR, began to support substantial field-based studies of malaria, schistosomiasis, and the other TDR "priority" diseases; these field studies included specific agendas for behavioral research by anthropologists and human geographers, as well as research on the economic impact of parasitic disease by economists. Among the most significant of the examples of this kind of WHO-promoted behavioral research were the extensive observational studies of human water contact (and, to a much lesser extent, defecation behavior) in relation to schistosomiasis transmission. (These schistosomiasis transmission studies, which were carried out mostly by medical geographers but also by anthropologists, are reviewed in Chapter 2, as well as in Brown and Inhorn [1990].)

Largely as a result of the TDR initiative and the international health community's renewed interest in infectious disease problems, the anthropology of infectious disease was given new life by the end of the 1970s. Studying infectious disease was no longer considered an unusual or pedestrian pursuit for anthropologists, especially those identifying themselves as belonging to the newly emerging subdiscipline of medical anthropology. Indeed, many of those anthropologists choosing to study infectious disease problems did so through traditional anthropological channels, conducting their fieldwork with anthropological (as opposed to international health agency) funding. In 1980, at the 79th Annual

Meeting of the American Anthropological Association, a group of these anthropologists met in a small symposium to address the potential role of anthropology in infectious disease research. Together, they formed a "Working Group on Anthropology and Infectious Disease," defining as their research platform "the broad area which emphasizes the interactions between sociocultural, biological, and ecological variables relating to the etiology and prevalence of infectious disease" (Brown 1981:7).

The year of 1980, when the working group first met, marks something of a watershed for the anthropology of infectious disease. Compared to the previous thirty years, the period from 1980 forward has been a research boom period, with more anthropological research on infectious disease than even before. There appear to be four major reasons for this veritable flurry of activity.

First, the subdiscipline of medical anthropology has come of age, attracting more and more cultural and biological anthropologists interested in issues of human health and illness. As the ranks of medical anthropology have grown (to more than 1,500 members of the Society for Medical Anthropology as of this writing), so have the numbers of anthropologists interested in pursuing infectious disease research agendas – either through traditional anthropological routes of solo fieldwork or through participation in agency-funded, collaborative health development projects. This does not mean that infectious disease research is one of the major foci of medical anthropology; in the conclusion of Chapter 2, which is a major review of the literature first published in the *Annual Review of Anthropology* in 1990, we bemoan the relative abandonment of infectious disease research on the part of many medical anthropologists as they have moved into other domains of empirical research and critical theory. Nonetheless, as reflected in the research presented in this volume, a significant minority of medical anthropologists, particularly those working outside the academy as applied researchers in international health development projects, have continued to pursue infectious disease research agendas. Such individuals convene at anthropological meetings, like the symposium on "The Anthropology of Infectious Disease" held in 1992 at the 91st Annual Meeting of the American Anthropological Association, which provided the springboard for this edited volume. They are active disseminators of their research findings through reports written for international health agencies, as well as through publications intended for both anthropological and public health audiences. And they continue to meet and communicate through the mails and over the Internet as members of the Society for Medical Anthropology's "International Health and Infectious Disease Study Group" (IHIDSG), the outgrowth of the 1980s working group described above. In other words, although anthropologists interested in infectious disease are by no means a dominant force in the discipline of anthropology as a whole or in its medical anthropology subfield, they nonetheless see themselves as a loosely linked collectivity with basic and applied research interests of paramount importance.

Second, many of these anthropologists have been drawn into infectious disease research because of the 1980s Child Survival initiative, which has provided one of the major impetuses for an anthropology of infectious disease. Essentially, Child Survival, with its focus on diarrhea, ARI, and immunization for the EPI diseases of childhood, has opened up numerous research opportunities for anthropologists interested in infectious disease problems. Diarrhea and oral rehydration therapy (ORT) have been particularly well studied from a cross-cultural and hence comparative perspective, as reflected in Kendall's 1990 review of the literature (Kendall 1990), as well as the 1988 special issue of *Social Science & Medicine* (Vol. 27, No. 1) devoted entirely to anthropological studies of diarrheal illness. (It is interesting to note that five of the contributors to that special issue are also contributors to this volume.) Although anthropological studies of ARI and the EPI diseases are more recent (reflecting the later starting dates of the WHO/UNICEF programs in these areas), a significant amount of rich ethnographic work has nonetheless been carried out on these topics, as reflected in Chapters 8, 11 and 12 of this volume, as well as in a recent review of vaccination studies in the Third World (Nichter 1995) and a 1994 special issue of *Medical Anthropology* (Vol. 15, No. 4) devoted to ARI. (Again, four of the contributors to that special issue are also contributors to this volume.) Because Child Survival is an outgrowth of PHC, anthropological research in all of these areas reflects the entrance of large numbers of medical anthropologists into PHC – both as participants in community-based PHC projects and as outside evaluators/critics of those projects (Coreil and Mull 1990).

Third, anthropologists have also been drawn into infectious disease research in large numbers as a result of the global AIDS pandemic. Those anthropologists who study AIDS – domestically and internationally – now represent a significant force in the profession. The American Anthropological Association has a Task Force on AIDS, and the AAA's Society for Medical Anthropology has an "AIDS and Anthropology Research Group" which is hundreds of members strong. AIDS has been the topic of numerous papers and special sessions at

annual meetings of anthropologists over the past decade. And, perhaps most impressive, the published anthropological research literature on AIDS has truly proliferated. Chapter 2 of this volume summarizes some of this research (as does Brown, Inhorn, and Smith [1996]), and Chapters 13 and 14 provide excellent exemplars of internationally based studies. The full scope of both the domestic and international research on AIDS truly becomes apparent, however, in the impressive bibliography on AIDS and anthropology put together by Bolton and Orozco (1994).

Finally, AIDS has generated anthropological interest in other emerging infections – especially, but not limited to, those infectious diseases such as tuberculosis which are AIDS-related. Tuberculosis has been particularly well studied by anthropologists, as reflected in Chapters 10 and 14 of this volume, as well as in the session on "Cultural Factors in Tuberculosis Prevention and Treatment" held at the 93rd Annual Meeting of the American Anthropological Association in 1994. That same year, the president of the American Society of Tropical Medicine and Hygiene invited a group of anthropologists, organized by Barry Hewlett and Joan Koss, to present a panel of research findings about cultural and social factors related to tropical infectious diseases.

Other emerging and re-emerging infectious diseases are also on the research agenda of anthropologists, whose interests in some cases predate the CDC/WHO global initiative described above. For example, several of the studies of (re)emergent infections included in this volume were carried out in the late 1980s and early 1990s, before the 1994 global initiative was launched. Furthermore, soon after the initiative began, anthropologists convened to discuss their possible contributions to the global effort to understand and control these diseases. At the 94th Annual Meeting of the American Anthropological Association held in Washington, D.C., in 1995, a group of anthropologists participated in a session on "Emerging and Reemerging Infectious Diseases: Sociocultural and Biocultural Approaches."

LOOKING FORWARD: FUTURE DIRECTIONS IN INFECTIOUS DISEASE RESEARCH IN ANTHROPOLOGY AND INTERNATIONAL HEALTH

It would appear from this history that the anthropology of infectious disease is here to stay and is perhaps even at its most robust historical moment as the new millenium approaches. However, we must not become overly sanguine. Much more has yet to be done in infectious disease research and control on every level. As the global Emerging Infections initiative takes off, now is a prime time for anthropologists to seize new opportunities – not only to enlarge significantly the research agenda, but to build interdisciplinary bridges in ways heretofore untried.

Here, we propose five overarching recommendations for future research in the anthropology of infectious disease. (For an impressive list of more specific recommendations on infectious disease research topics, see Sommerfeld [1995].) Quite intentionally, we have organized this volume in sections that reflect these recommendations, for it is our belief that the anthropological research on infectious disease contained in this volume is "cutting edge" and thus presages these future directions.

Recommendation One: Undertake the Anthropologies of Neglected Infectious Diseases

As revealed in WHO's *International Classification of Diseases*, the variety and complexity of infectious agents and the diseases they produce is impressive. Yet, few of these infectious diseases have been well studied, a problem that reflects the long international health history of disease "prioritization" and the subsequent marginalization of all but a few privileged disease categories. Unfortunately, anthropologists' infectious disease studies tend to reflect fashions and funding opportunities in international health. Thus, anthropologists by fiat or by choice have focused rather narrowly on what, in the grand scheme of things, are a relatively small number of infectious disease problems. For example, in this volume, eleven infectious disease problems are explored in some depth, and the anthropological literature on a limited number of other infectious disease problems is briefly reviewed in Chapter 2. Frankly, few other infectious disease problems – of either major or minor importance – have received serious anthropological consideration. This anthropological neglect extends even to some of the "priority diseases" – such as trypanosomiasis (African sleeping sickness, American Chagas disease), leishmaniasis, filariasis, leprosy, and polio – targeted in the TDR and Child Survival initiatives. On a most basic level, anthropologists need to cast their research nets more widely to begin studying some of these lethal and disfiguring conditions, as

well as the many infectious agents whose disease toll may include, *inter alia*, pain and suffering, short- and long-term disability, and social stigma. In addition, we need to examine these infectious diseases as they manifest themselves in different cultural and ecological settings, for causal factors, cultural models of individual risk, and community responses may vary widely. Although anthropologists have made a good beginning in their understanding of diseases such as malaria, tuberculosis, and measles, many more diseases remain to be studied wherever they occur. Indeed, there are many anthropolo*gies* of infectious diseases yet to be undertaken – of different diseases, in different settings, by anthropologists of different theoretical and methodological persuasions. Exploding the restrictive boundaries of our inquiry must be our most basic charge.

Recommendation Two: Reconstruct Infectious Disease Histories

Looking back in time, the plague pandemic of the mid-1300s and the influenza pandemic of the early 1900s – both of which claimed thousands of human lives – demonstrate the potential danger of uncontrolled infectious diseases and alert us to the importance of history in contemporary understandings of infectious disease threats. As new infectious diseases appear on the horizon and old ones return in sometimes frightening proportions, we are forced to ask: Why now? This is an historical question that raises multiple issues of anthropological concern – about why new infectious diseases agents evolve, about why epidemics occur at particular historical moments in particular places, and about why public health measures to combat infectious diseases are (or are not) implemented over time. As virologist Stephen Morse (1993:viii) puts it, "Despite our wish to anticipate emerging diseases, we cannot foretell the future. What we can do is to draw the best inferences possible from past experience; for this, history can be a valuable guide."

As demonstrated in this volume, historically oriented anthropologists have much to contribute to the writing of infectious disease histories on multiple levels – including the biological history of disease evolution, the cultural history of human response to epidemics, and the critically oriented, political economic history of public health measures to eradicate or control infectious diseases. In the future, anthropologists need to consider the historical forces underlying the epidemiologic transition – or the shift from infectious to chronic disease mortality in

the developed countries of the West. More important, we need to evaluate critically why large proportions of the human population in developing countries have yet to experience this transition as they cope with *both* infectious and chronic disease mortality simultaneously. Furthermore, this evaluation will entail a discussion of why the epidemiologic transition seems to be "reversing" in the West as new infectious diseases emerge with frightening rapidity.

Recommendation Three: Employ Methodological Triangulation

For anthropologists to become more useful members of multidisciplinary teams devoted to infectious disease research, it is imperative that we become much more explicit about the logic and usefulness of the ethnographic research methods we employ. Although we use the term "ethnography" to refer to both the methodological process and written product of our cultural anthropological research, there is no single ethnographic method, as there is no single theoretical paradigm that dominates the field. We see this multiplicity of theories and methods as an important strength, rather than a weakness, of anthropology in general and medical anthropology in particular. To build on that strength, however, it is essential to identify some consensus on commonly used ethnographic field methods, as has been attempted by Plattner (1989) in the AAA's widely read *Anthropology Newsletter*. There also needs to be more discussion within anthropology about the strengths and weaknesses of methods, the standards for recognizing persuasive evidence, and the complementarity of methods. Anthropologists can better contribute to interdisciplinary research on infectious disease when they are able to identify how the anthropological data collected through such means as in-depth interviews and participant observation will complement other sources of information.

Denzin (1970) has described methodological triangulation in social science as combining the strengths of multiple methodological approaches – like in-depth interviews, direct observation, and surveys – while simultaneously minimizing the weaknesses of these approaches – like observer effects. In medical anthropological research on infectious disease, this type of triangulation might best be considered when combining ethnographic and epidemiological methods, as exemplified in Chapter 7 of this volume. In the future, researchers should design other "qualitative case-control" studies of epidemiologic

phenomena to better understand why populations engage in high-risk behaviors. The use of multiple methods in a research project also allows for the comparison of the methods themselves, and this provides an important service to the discipline. Chapter 8 of this volume, which assesses the advantages and disadvantages of traditional versus "rapid" and "focused" ethnographic interview methods in the study of ARI, is a fine example of this type of work.

In summary, we recommend the strategy of methodological triangulation for two reasons. First, by using complementary methods – for example, from ethnography and epidemiology – the validity and completeness of explanations of human behavior can be enhanced in infectious disease research efforts. When the use of multiple methods results in conflicting analyses, the goal of triangulation is to refine the methodological tools to reduce the discrepancies. The strategy of triangulation implies a cooperative stance between the "advocates" of different methods or theories; it also implies that there is little to be gained in having fixed conclusions based on single methodologies, especially when these intellectual stances are based on personalistic biases. Second, a commitment to both methodological and theoretical triangulation will make medical anthropologists more valuable colleagues in multidisciplinary research teams. We believe that the political-economic approaches in medical anthropology described below will be better understood and appreciated by infectious disease collaborators when offered in the spirit of methodological triangulation.

Recommendation Four: Enrich Infectious Disease Ethnography

As CDC and WHO launch the global Emerging Infections initiative, much mention is made of human behavior – not only as one of the six broad factors responsible for infectious disease emergence, but also as something that must be "changed" in order to achieve infectious disease prevention and control. Yet, in the Institute of Medicine report that helped to spawn this initiative, human behavior is decontextualized from any larger sociocultural or political-economic context, and human behavioral change, as an explicit strategy to help achieve infectious disease control, is not included in the four-part CDC/WHO agenda for dealing with emerging infections outlined above.

Anthropologists, as professional "participant observers" who consider behavioral observation to be a key element of their methodological

tool kit, have much to contribute to future behavioral studies of infectious disease risk factors. This includes microsociologically oriented studies of individual risk behavior (such as when a woman steps into a schistosome-infected canal in order to collect water for cooking), as well as macrosociologically oriented studies of population-based risk behaviors (such as when poor homesteaders in Brazil clear a section of the rain forest to open it up for farming). Anthropologists are behavioral scientists *par excellence*, who are trained to record and describe human behavior in field-based settings.

But anthropologists have much more to contribute to infectious disease studies by helping to explain *why* people behave as they do. This is what good anthropological ethnography is all about – interpreting human behavior by understanding the human rationales for that behavior. Indeed, such understanding is of critical importance for the design of culturally appropriate and effective public health interventions. For example, in the efforts to combat growing problems of antibiotic resistance in pathogens, there is a need for more research on the pharmaceutical practices of people, including the use and misuse of drugs, the role of media in promoting the use of particular medicines, and the cultural perceptions of antibiotics. There is a dearth of studies combining fine-grained behavioral research – for example, observational studies of how medicines are actually dispensed at pharmacies or used in people's homes – with interview research on the cultural ideas and beliefs about how medicines work. Indeed, another method that needs to be added to the aforementioned strategy of triangulation is the elicitation through discourse analysis of "cultural models" (Shore 1996), or the cognitive schema that people use to think and talk about phenomena, such as medicines or infectious diseases themselves. For example, elicitation of cultural models might reveal that some infectious diseases induce fear – even panic – in populations, while others do not; some infectious diseases are simply more frightening and stigmatizing than others. Although the individual interview-based elicitation of explanatory models of illness has become widespread in clinically applied medical anthropology, there is a need to utilize this powerful method in population-based infectious disease research as well.

Enriching the explanations of health behaviors through descriptions of the cultural ideas and beliefs surrounding those behaviors should be an important contribution of medical anthropology to infectious disease research. In so doing, anthropologists can demonstrate the salience of culture for public health programs in infectious disease that attempt to induce behavioral change.

Recommendation Five: Provide Political-Economic Context

Medical anthropologists have taken a leading role in adding the political-economic dimension to research on infectious disease. Indeed, the final section of this book provides three excellent examples of this type of work. We believe that widening the scope of analysis beyond the narrow biomedical frame is a vitally important contribution of medical anthropology to infectious disease research. Yet, as mentioned in the methodological triangulation section above, this political economic contextualization must not be offered with an "us versus them" attitude.

To date, many of the political-economic (or political ecological) studies of infectious disease have made a strong general argument about macrosociological factors involved in changing disease frequencies (e.g., Turshen 1980). There is an important need, however, for research demonstrating in very specific terms and places *how* ecological changes and disruption have been influenced by political-economic policies. The particular linkages between political economy and disease transmission are likely to be played out through two mechanisms – the local economic market and the cognitive processes of individual decision making in the context of scarce resources. Because the role of political-economic factors in infectious disease transmission is often not sufficiently recognized, arguments for political-economic contextualization will become much more persuasive when medical anthropologists begin to demonstrate the linkages between macrosociological pressures and microsociological processes.

Indeed, medical anthropologists studying infectious diseases need to build more sophisticated models which link three levels of analysis: biological outcomes experienced on the individual level, cultural processes affecting social groups, and political-economic conditions affecting regions or nations. Some important work in this regard has been done by biocultural anthropologists in a special issue of *Human Organization* on "Agrarian Transformations and Health" (Leatherman and Gordon 1994), in the edited volume *Disease in Populations in Transition* (Armelagos and Swedlund 1990), and in a 1992 Wenner-Gren conference on "Political Economic Perspectives in Biological Anthropology." The development of models linking biology, culture, and political economy should be an important goal in the future anthropology of infectious disease.

THE ORGANIZATION OF THIS BOOK

These five recommendations for future research on the anthropology of infectious disease are also reflected in the five major sections of this volume. The section headings – Anthropologies, Histories, Methods, Ethnographies, and Political Economies – are plural because no single theoretical paradigm or methodological orientation encompasses all of this work. We have grouped these case studies, all of which describe an infectious disease problem in a particular historical or cultural context, in broad categories based on their epistemological approach. Note that we did *not* organize the volume by biomedical criteria, like the type of pathogen or the route of infection. Rather, we have combined these chapters into sections based on their outstanding strengths in describing either the history of an infectious disease problem and its control, methodological approaches to studying infectious diseases, ethnographic descriptions of the cultural context of infectious disease problems in particular places, or the larger political-economic contexts which put people at risk of infection.

The introductory section, including this essay, refers to the anthropologies of infectious disease. This essay has described medical anthropological approaches to the study of infectious disease and how they have changed over time. Given the growing importance of infectious diseases at the present historical moment, it makes sense to survey the history of research that has brought us to this present volume, and also look ahead to the future. Chapter 2 is a review of the literature, reprinted from the *Annual Review of Anthropology*, that provides an overview of research examples about a wide range of infectious diseases. A major focus of the chapter is how culturally prescribed behaviors either increase or decrease the risk of infectious disease transmission.

Part Two – Histories – provides three examples of diachronic analyses of disease and culture. The first case demonstrates the contribution of paleopathology to infectious disease research. Harrison (Chapter 3) describes a case of Valley Fever identified in a human skeleton with severe bone lesions uncovered in an archaeological excavation in Arizona. Microscopic examination of stained thin sections of bone from this 750-year-old male revealed infection with the cocci fungi that cause Valley Fever. Although this finding is interesting in itself as the oldest documented case of this fatal fungal infection in a Native American, the actual analysis goes much further, highlighting issues of race,

stigma and the social epidemiological distribution of Valley Fever. Harrison argues that groups at high epidemiologic risk for Valley Fever are disadvantaged on many fronts and therefore have more exposure to the "dangerous dirt" carrying the cocci fungi. The second case in this section is about smallpox, one of the most famous diseases in history and the only infectious disease to be globally eradicated. McClain (Chapter 4) provides a cultural history of smallpox and its eradication, beginning with the traditional cultural responses to the disease through variolation techniques and ending with the contemporary scientific and technological debates about the post-eradication destruction of the two remaining laboratory samples of the smallpox virus. Her look at "culture," therefore, is two-pronged: the cultural beliefs of peoples who have historically suffered from smallpox, and the beliefs of the virologists who, as biotechnological "cultural insiders," now control the virus. Important cultural themes emerge from the ethical debate about the destruction of the virus stock. The third example concerns a disease that the WHO targeted but failed to eradicate. Brown (Chapter 5) traces the cultural history of malaria control efforts from early in this century to the postwar heyday of eradication and finally to the current resurgence of the disease, particularly its chloroquine-resistant varieties. This historical analysis suggests that cultural, rather than parasitological or entomological, factors are the primary cause of the current resurgence. These cultural factors include "ideological resistance," a consequence of the military metaphors of the early eradication campaigns that later caused a precipitous decline in anti-malaria efforts.

Part Three – Methods – demonstrates the advantages of methodological triangulation in medical anthropological work on infectious disease. These case studies combine qualitative and quantitative methods, analysis of individuals and households, and analytical epidemiology and ethnography. In a study of the mosquito-borne disease dengue fever, Coreil and colleagues (Chapter 6) demonstrate the utility of the household as the unit of analysis for health studies. They argue that there are particular advantages to an analytical strategy that describes the variations within households (e.g., based on gender and age) and between households (e.g., based on social class and living conditions), rather than an analysis that assumes that individuals are all independent actors. Their study is truly triangulative, combining the research strategies of mapping, survey research, and direct observation to understand a dengue outbreak in one Dominican community. The study therefore generates important background information

regarding the feasibility of community participation in disease control efforts. The combination of ethnographic and epidemiological methods is well exemplified in Inhorn and Buss's study of tubal-factor infertility among poor urban Egyptian women (Chapter 7). Although the synergistic power of combining epidemiology and ethnography has been recognized before (Janes, Stall and Gifford 1986), this study shows how many of the most salient categories for epidemiological analysis can be generated from ethnographic interviews. Furthermore, by using ethnographic and political-economic contextualization to widen the scope of the analysis, the "anthropologist-epidemiologist" is able to identify and explain epidemiologic risk factors – like exposure to harmful procedures within the biomedical system – that are usually neglected in epidemiologic studies. In the last chapter of this section, Bhattacharyya (Chapter 8) shows how the use of multiple social science methods can be used to examine the validity and reliability between those methods. This comparative methodological study, based on fieldwork about cultural factors related to ARI in West Bengal, introduces the reader to the variety of methodologies available to social scientists – from structured survey instruments (KAP) to focused ethnographic study to participant observation – and their strengths, weaknesses, and requirements. This type of comparison yields a fruitful analysis of the question of qualitative versus quantitative methods; it is not a question of one or the other, but rather what combination is best suited for the needs of a particular research agenda.

Part Four – Ethnographies – includes four excellent examples of how medical anthropologists examine ethnomedical health cultures and the way ethnomedical beliefs influence health-seeking behavior and clinical treatment of some important infectious diseases. Vecchiato (Chapter 9) focuses on the relatively neglected disease of intestinal parasitism in Southern Ethiopia. This study provides a classic ethnomedical description of native theories of causation, categorization, diagnosis, and traditional modes of treatment of intestinal illnesses. For example, in this population, "digestive worms" are thought to be a necessary part of normal physiological functioning. Vecchiato not only points out the importance of these health beliefs but also discusses their practical implications for the implementation of a helminthic disease control program currently ongoing in the region. It is important to remember that the people engaged in international health activities also have their own cultural beliefs and values, and that problems of communication and cooperation can emerge when there is a disjuncture between those cultural beliefs and the local ethnomedical system.

Nichter (Chapter 10) offers an excellent example of this phenomenon in a detailed ethnographic description of the native illness terms for respiratory problems, including tuberculosis, in the Philippines. Using methods developed in linguistics and cognitive anthropology, he analyzes the semantic domains of illness categories and shows how these native terms do not correspond with the labels in the *International Classification of Diseases*. The poor overlap between these two types of disease labels represents a cultural challenge to effective TB prevention and control; it is not simply a question of translation. In Chapter 11, Mull reports on ethnomedical beliefs surrounding the treatment of measles, including measles associated with diarrhea and dehydration, in Pakistan. While measles is a minor childhood disease in the West, it remains a major killer in the developing world, in large part because chronic malnutrition makes recovery from the measles infection more difficult. Cultural beliefs about the Sitala goddess, previously associated with smallpox, as well as traditional beliefs about hot and cold illnesses, have a significant impact on the clinical management of measles and its associated diarrhea. It is obvious how important these ethnomedical features are to local mothers, and how local disease categories influence the acceptability of clinical treatments, like ORT in the case of diarrhea. Also, for better or for worse, a new class of unlicensed practitioners are sought out by mothers for treatment of measles in this setting. In the final example of research on local health culture and its influence on infectious disease management and control, Cody and colleagues (Chapter 12) examine the differences in maternal and professional cultural knowledge of ARI in Pakistan. One of the most salient aspects of this research is its dual focus on the behaviors of local biomedical practitioners, as well as the mothers of sick children. In an era of growing antibiotic resistance of the pathogens causing ARI, patterns of health seeking and treatment are important; it is striking in this case how poor families are steered by physicians into purchases of a panoply of medicines to treat a single ARI episode. Better understanding of the knowledge and behaviors of practitioners as well as mothers should provide a key element in the improved efficiency and effectiveness of basic health services. It is critical that medical anthropologists continue to do research on how ethnomedical beliefs and practices affect the acceptability of public health interventions. But, as the cases in this section so aptly demonstrate, it is also essential that anthropologists focus their attention on the ethnomedical beliefs and practices of local professional health care workers, both biomedical and traditional.

Finally, Political Economies is the focus of Part Five, even though a sensitivity to political and socioeconomic factors can be found in virtually every case study in this volume. Based on fieldwork in Kenya, Kielmann (Chapter 13) provides a critical analysis of the cultural and political-economic underpinnings of concepts such as "prostitution" and "risk" as they are used in AIDS prevention discourse. The process of blaming the victim for disease is both a social and political-economic issue, and the case of blaming "prostitutes" for the spread of HIV in Central and East Africa is an excellent case in point. Based on a detailed analysis of the cultural context of and economic constraints on individual Kenyan women's lives, Kielmann challenges the culturally loaded category of "prostitute" and demonstrates how the continuing AIDS epidemic needs to be seen in a broader macrosociological context. In Chapter 14, Farmer pushes further the political-economic analysis of the AIDS epidemic in Haiti that is found in his excellent ethnography, *AIDS and Accusation* (Farmer 1992). Linking personal experience to political context, Farmer demonstrates the political-economic dimensions of gender and poverty, while at the same time offering a powerful indictment of the depoliticization of standard epidemiological analyses of AIDS. By offering a political-economic analysis from the viewpoint of Haitian peasants, Farmer shows how anthropological research can be applied to local empowerment and the development of community control over local health education. Finally, in a masterful description of epidemic politics surrounding an outbreak of cholera in Brazil, Nations and Monte (Chapter 15) show how the victims of a disease, if they happen to be poor and powerless, may be blamed for the disease by the wider community, including the politically powerful biomedical community. In this case study of the social responses to a cholera epidemic – one that is related to the lack of adequate water and sewer infrastructure – important themes of scapegoating and conspiracy emerge. Here, the anthropologists are able to give voice to the experience of those living through the epidemic, powerfully representing their feelings of stigmatization in the context of severe political-economic inequality.

We hope that all five of these kinds of anthropologies of infectious disease will add to our understanding of ongoing and emerging infectious disease problems. More important, we hope that such knowledge will assist in the design of effective interventions to reduce the human suffering caused by infectious disease.

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