

*Traversing the Chasm between Biology
and Culture: An Introduction*

Alan H. Goodman and Thomas L. Leatherman

As we approach the next millennium the cold war has ended and the threat of a nuclear holocaust may be diminished. Metaphors of a divided east and west, north and south, have been replaced by ones accentuating global unity and a "new world order." New international trade agreements such as GATT and NAFTA epitomize to some a blurring of national boundaries and the free exchange of goods and ideas. In Mexico, Indios, farm workers, and maquiladores respectively produce ethnic art, fruits, and industrial parts for distant markets. Like workers in other emerging countries, these individuals also enter the global community as consumers of foods and ideas; Mexicans drink an average of one Coca-Cola per day (Pendergrast 1993), and new ideas are absorbed from ubiquitous billboards and U.S. television programs.

Yet there is no blurring of relations of power. The poor emulate the rich, but the gap in wealth only widens. The wealth of 447 billionaires is greater than that of half of humanity. A sugary beverage might relieve pangs of hunger, perhaps an effective short-term solution to calm a crying infant, but persistent malnutrition and endemic disease remain unabated. Each year over ten million children die from the deadly synergy of malnutrition and disease, the equivalent of a jumbo jet full of passengers crashing every ten minutes of every day. Unlike the jet crash, these deaths are so much an everyday part of the background of life that this "silent violence" is accepted as inevitable, common, and even natural. The human toll commands little attention or action.

While the old scourges of malnutrition and infectious diseases persist, globalized capitalism has increased the pace of population displacement and environmental contaminations. Chronic "diseases of civilization" such as diabetes, heart disease, and obesity, as well as new and reemerging

infectious diseases, also threaten survival. The new world order has also brought a crisis of disorder evidenced by an increase in ethnic conflicts, terrorism, racist attacks, and genocide.

These old and new challenges continue to deny many individuals access to a safe environment, basic productive resources, and the ability to meet basic needs. Peasants now often have the worst of both worlds. As parents and workers find their efforts insufficient to maintain the basic needs of their families, they begin to evade or alter the sociopolitical systems constraining them. Their strategies range from systems-altering reform to transformation—from resistance to revolution (Thomas, this vol., chap. 2).

Our ability to understand the social, environmental, and biological dimensions of these problems tests the relevance of anthropology. Understanding symbolic meanings or evolutionary implications, while important to some degree, is insufficient in the face of extreme poverty. Clearly, too, ethnographic and population description as closed, autonomous systems have little pertinence in addressing these complex changes. What is key, we think, is understanding local realities in global contexts. The infinite intersections of global economies and local ecologies, and of world history and local history, have made it equally critical to understand the local, and the global within the local. With its broadly holistic and biocultural approach, anthropology is seemingly well-positioned to help address these challenges.

Anthropology, unfortunately, has not been very helpful in these struggles. One key reason for this failing—the *biocultural split*—is addressed in this volume. Biocultural syntheses (or synthetic models of any type) have not been a central concern of anthropological theory in the past two decades. With the specialization and diversification of subdisciplines and perspectives, the chasm dividing biological and cultural anthropologies has deepened. Sociocultural anthropologists generally have been inattentive to the biological consequences of changing cultures and environments; biological anthropologists have not paid attention to how large-scale political-economic processes interrelate with local-level ecologies to shape biologies. Sociocultural anthropologists have perhaps been too introspective, and this has further muffled anthropological voices; biological anthropologists have not been reflexive enough. Thus, we see the need for synthetic approaches that incorporate the diversity of knowledge and approaches in anthropology and that provide an effective framework for

analysis of how the processes of inequality and social change interact with human biologies.

Unfortunately, the biosocial perspective is most recognized for efforts to bridge biology and culture. Derived from evolutionary ecology and sociobiology, this approach aims to explain such behaviors as food gathering and fertility regulation as having evolved to maximize Darwinian fitness (see Betzig 1997). We say “unfortunately” because while this approach appeals to some cultural anthropologists, its lack of sensitivity to learned behavior and its strong genetic-evolutionary determinism have without doubt further distanced most cultural anthropologists from biologically oriented anthropologists.

We, and the contributors to this volume, propose a radically different science. Our dominant interest is in how sociocultural and political-economic processes affect human biologies, and then how compromised biologies further threaten the social fabric. Behaviors are not seen to maximize fertility due to genetic adaptations; rather biology and culture are dialectically intertwined (Levins and Lewontin 1985). As biological anthropologists our ultimate concern is with understanding the roots of human biological conditions, which are traced to the interaction of political-economic processes and local conditions. We surmised that integrating perspectives from anthropological political economy and ecology-adaptation is a logical place from which to begin building a biocultural synthesis.

In order to begin working toward such a synthesis we organized a Wenner-Gren International Symposium entitled “Political-Economic Perspectives in Biological Anthropology: Building a Biocultural Synthesis.” Participants included biological anthropologists with diverse subfield specialties, archaeologists, a historian, and cultural anthropologists with specializations that included ecological, nutritional, medical, and political-economic anthropology.¹ The main goal of this conference was to consider fresh, new approaches in which human biologies are understood in broader historical, political-economic, ideological, and sociocultural contexts. We hoped that a more contextualized study of human biologies would, as Singer (this vol., chap. 4) discusses for medical anthropology, provide a disciplinary adhesive, thus reinvigorating communication across divided anthropological specialties. Moreover, better understanding of the biological dimension of economic and sociocultural changes broadens and deepens understanding of these changes. And framing biological studies in

an analysis of history and large-scale political-economic processes illuminates the contexts and processes by which biological suffering and adaptation occur. It is one thing to know that limited access to food causes malnutrition. We know that it does. The questions we now wish to answer concern the processes by which food is limited, not least because the answer to these questions may point to solutions.

In a review of the political economy of demography, Susan Greenhalgh (1990) pays homage to Eric Wolf's *Europe and the People Without History* (1982), a masterpiece of anthropological political economy. She notes that "*People* is filled with people, their production, displacement, enslavement, and eradication," but goes on to comment, "How much stronger Wolf's forceful arguments could be were they systemically backed up and perhaps sharpened by quantitative assessments of the levels and trends of fertility, migration, mortality and population growth" (Greenhalgh 1990, 101).

We agree. In analyses seeking to capture the everyday realities of anthropological subjects, an understanding of human biology—from cumulative fertility and mortality to skinfolds, blood pressures, stress hormone levels, and rates of anemia—adds an integral layer of information that is too often missed. To paraphrase Duden (1991), histories are inscribed beneath the skin. A political-economic perspective that includes biologies should not merely integrate biological anthropology back into anthropology proper, but should sharpen and enrich the relevance of anthropology for understanding a wide variety of struggles to cope with and combat persistent human suffering.

The following chapters reflect their authors' ideas and efforts toward a new analysis of the relationship between sociocultural and biological domains. Because of the degree to which sociocultural anthropologists have not kept up with developments in biological anthropology, and vice versa, readers from different backgrounds may find various parts to be novel, old, or perhaps overly simplified. Given the bridging nature of the volume, we hope this introduction helps to bring readers onto a common ground. In the following sections we present background on the biocultural split in anthropology and our vision of common ground in bringing together perspectives from human adaptability/human ecology and political-economic anthropology. We illustrate themes and perspectives from anthropological political economy that we find particularly useful for building a new biocultural synthesis (see this vol., Roseberry, chap. 3, and Singer, chap. 4, for a more complete review of the roots of political econ-

omy and its merging with anthropology). We conclude by introducing the individual chapters and their particular contribution toward achieving this synthesis and with a parable on the need for biological anthropologists to look upstream.

The Biocultural Split: Forces of Fission and Common Ground

In a commentary in *Science* entitled "Failing to Cross the Biology-Culture Gap," Holden (1993) scolds anthropologists, trained to bridge gaps between cultures, for their inability to bridge the chasm between biology and culture. She characterizes the discipline as having broken down into two tribes, one oriented toward science and the other toward more humanistic and interpretive approaches. The tribes typically ignore each other, which is bad enough for a discipline that prides itself on its holism. At other times, wars break out at the most fundamental levels of worldview, ethics, and goals. According to Holden, there is a growing inability to find common language, concerns, and relevance. Biological anthropologists' interpretations of the human condition, too often empty of social content, and often reductionistic, appear irrelevant or simply wrong to many cultural anthropologists. Many of the recent theoretical directions in cultural anthropology are seen by biological anthropologists as excessively relativistic navel gazing, unimportant, and antiscientific.²

This crisis of excessive specialization and fragmentation is also recognized by anthropologists (Peacock 1995; Weiner 1995). In an editorial in the *Anthropology Newsletter* Brown and Yoffee ask, "Is anthropology coming apart at the seams? Is it breaking down into academic specialties that are unable and unwilling to talk to one another?" (1992, 1). The conclusion of a conference they organized at the School of American Research (Santa Fe, NM) on "Is Fission the Future of Anthropology?" as well as of subsequent commentators in the *Anthropology Newsletter* is that there are myriad signs of fission. Moreover, fission is welcomed by many who feel uncomfortably tied to individuals of different perspectives and methods. Historical critiques point out that biological and cultural anthropologists are members of the same discipline because anthropology was constructed to suggest that "primitive men" are more natural (biological) than men of civilization, an uncomfortable reminder of the colonialist project. Yet, most commentators recognize the dangers of fission: anthropology without biology loses much of its uniqueness, and a biolog-

ical anthropology without anthropology becomes second-rate biology. The questions raised by Brown and Yoffee are critical. The points made by Holden ring true. How did we get here, and can we get out of this mess?

Of particular concern is that the forces of fission are reinforcing. A common opinion among biological anthropologists is that training should increasingly emphasize biomedical and physical sciences.³ In the mid-1980s membership in the Biological Anthropology Section (BAS) of the American Anthropological Association was nearly on a par with membership in the American Association of Physical Anthropologists (AAPA), suggesting that biological anthropologists valued their dual connections to anthropology proper and to the subdiscipline. Not surprisingly, since the mid-1980s membership in the AAPA has gradually increased while membership in the BAS has declined by over 50 percent.

As biological anthropologists continue to separate themselves from current thinking in cultural anthropology, they remain uninformed about theoretical shifts and, not surprisingly, might view these changes as incomprehensible and foreign. Jokes about postmodernism have become standard fare at physical anthropology gatherings. When listening to these comments and jokes, one clearly senses a disdain along with fear and apprehension. Postmodernism jokes sound like ethnic jokes.

We are less privy to the unedited thoughts of cultural anthropologists, but similar signs of disdain are evident. Many of us have encountered cultural anthropologists who, having found out that we are biological anthropologists, fit us into a tired, old stereotype. They assume we have no interest in the living, we believe in "race," and we explain all human behaviors and differences as due to primordial genes. Saying that one is interested in culture and behavior, and, worse yet, biocultural interactions seems to conjure up the most stereotyped images of sociobiological reductionism. We sense that they have not read any biological anthropology since they were undergraduate students. Particularly disheartening is that this stereotyped view of biological anthropologists may be most strongly held by younger cultural anthropologists. Cultural anthropology doctoral students now study physical anthropologists as "the Other."

In summary, the gulf between biological and cultural anthropology is widening. Yet, there is a countertrend. In the last decade a sustained dialogue among biological, ecological, and political-economic anthropologists has emerged in specialties such as medical and nutritional anthropol-

ogy (Baer 1996), and growing interest in "political ecology" as an interdisciplinary approach is attracting political economists, poststructuralists, and ecologists alike (e.g., this vol., Dewalt, chap. 12, and Hvalkof and Escobar, chap. 18). These movements give us hope in the possibility of developing a radical, biocultural middle ground.

Still, fragmentation is the rule, synthesis the exception. As a preface to presenting one version of a critical biocultural approach, we provide some historical perspective on how this chasm grew and on possible paths toward synthesis. Here we are concerned with the development of three approaches within materialist anthropology—ecology, human adaptability, and political economy. It is the diversion of paths that resulted in fragmentation and it is their reconnection that we see as a part of the solution. In the following section we aim to provide an outline or sense of the approaches that have influenced the synthesis attempted in this volume. Chapters 2, 3, and 4 in the first section, by Thomas (on human adaptability), Roseberry (on political economy), and Singer (on critical medical anthropology), elaborate on these themes.

Toward a New Biocultural Synthesis: History and Trends

Ecological Bioculturalism: A Golden Age?

In the 1960s ecological and evolutionary perspectives merged, and the concept of adaptation provided powerful means of understanding human biological diversity and evolution. Livingstone's (1958) work on the adaptiveness of sickle-cell trait to endemic malaria was influential in convincing biological anthropologists of the promise of finding genetic adaptations to specific environmental challenges. Throughout the 1960s and 1970s, research focused on adaptation in challenging environments such as arctic and high altitude regions. Investigators searched for genetic adaptations and, with insights from environmental physiology, nongenetic acclimatization responses. As research expanded into considerations of phenotypic plasticity, socially influenced factors such as nutrition, disease, energy flows, and migration emerged as research foci. These studies were framed in a general ecological approach that considered systemic interaction of cultural, physical, and biological environments as milieus of human biology and behavior. The breadth of these interactive systems, and the conceptual underpinnings of evolution and adaptation, seen as applicable to

both biological and cultural phenomena, seemed to provide the holism that many anthropologists strived for (Baker 1996; Little 1982; Thomas, Gage, and Little 1979).

Similar approaches infused much of anthropology, and by the late 1960s the "ecological perspective" was dominant among materialist perspectives. In a way that had not existed before or since, it served to unify work in biological, archeological, and sociocultural anthropologies, and led to the formation of bridging fields such as medical and nutritional anthropology (Singer, this vol., chap. 4). Pioneering field studies such as those by Lee (1968) and Gross and Underwood (1971) focused on the flow of protein and calories, and the technological and social features (adaptations) that allowed people to extract resources from their environments. These studies, conducted during what might be called the golden age of biocultural and ecological anthropology, were resolutely materialist, ecological, and biocultural and also made important links to larger theoretical issues. Lee's (1968) work on San time allocation was critical to disrupting the discourse that capitalism represented the pinnacle of progress. Gross and Underwood's (1971) paper on sisal production in Brazil provided a devastatingly clear view of the nutritional costs of the shift from subsistence to market production. For many commentators, anthropology had found its theory and voice (Harris 1968).

Yet, there were problems in the application of 1960s-style ecological approaches—especially in applying biological metaphors to sociocultural systems. Critiques within evolutionary biology argued against progress as inherent to evolution, noting that the concept of adaptation as used in the "adaptationist program" was tautological, teleological, reductionist, progressive, and victim-blaming (Gould and Lewontin 1979; Levins and Lewontin 1985; Lewontin 1978). Rather, evolution and adaptation should be seen as less purposeful and progressive and as more historically contingent (Gould 1991). Sociocultural critiques targeted the functionalist view of systems as closed, homeostatic, and self-regulating (Orlove 1980; Ortner 1984; Wolf 1982, 17). As Singer (this vol., chap. 4) notes, "Ignored in this close-to-the-ground empiricism were the sweeping processes and broader social relations that transcended micro-populations historically uniting them with each other and with broader developments in capitalist development."

It is within these critiques and responses to critique that separate

paths formed and unification became less evident. In sociocultural anthropology, critiques of ecological approaches came from emerging political-economic approaches and later from more humanistic, interpretive, and postmodern approaches. Within ecological anthropology, neoevolutionist and neofunctionalist studies persisted alongside a newer "processual ecology," which is in part a response to critiques from political economy.

Developments in Sociocultural Anthropology

Key to our project are insights from an anthropological political economy and a more sophisticated "processual ecology," providing a basis for current thinking in political ecology (Hvalkof and Escobar, this vol., chap. 18). These developments open up an essentially materialist perspective to ideology, politics, and outside influence.

We also wish to break out of the separation of materialist-scientific from humanistic-interpretive approaches.⁴ Of clear importance to the future of any human science are understandings of the social contexts of both subject and scientist, and how these contexts influence fact-gathering and the generation of knowledge. Also, increased attention to the more subtle uses of power in the "daily lives" of "real people," as well as to scientists generating knowledge (Foucault 1980), is a further "postmodern trend" in anthropological theory. There, sensibilities contribute to current perspectives in anthropological political economy and political ecology. Finally, attention to these issues aids us in understanding biologies: who becomes ill and what are the consequences, who gets fed when food is limited, and why is food limited in the first place.

Processual Ecology. Processual ecology developed alongside neoevolutionist and neofunctionalist approaches which dominated cultural ecology in the 1970s and beyond. Key themes included a greater concern with the mechanisms of change (as opposed to homeostasis), a stronger focus on actor-based models, and the development of adaptive strategies (Bennett 1976). Conceptions of adaptation as "actors operating under a set of constraints allocating scarce resources to a hierarchical series of ends or goals" (Orlove 1980, 247) provided a strong link to human adaptability studies in biological anthropology (Thomas 1997; Thomas, Gage, and Little 1979). One influence from political-economic theory was the role of

position and power in shaping decision making and adaptive strategies. As Orlove notes, "If adaptive strategies are seen as the outcome of decision making, or repeated allocation of scarce resources to a hierarchy of goals under conditions of constraints, then it is necessary to examine the pattern of resource distribution and the source of the goals and constraints" (1980, 252). The contribution of political economy to processual ecology was in specifying resource distribution and the source and goals of constraints. These perspectives were used to examine social responses to challenges such as famine and environmental disasters.

More sophisticated merging of macro-micro processes emerged in the processual ecology of the 1980s, which some even called political ecology (DeWalt and Pelto 1985; DeWalt, this vol., chap. 12). Many of these studies were in applied settings, and this, along with the perception that they were refinements rather than paradigm shifts, may be why they failed to receive much attention as advances in theory. Nevertheless, they provide a foundation for the recent emergence/resurgence of a variety of approaches labeled political ecology that share a focus on environment, macro-micro interaction, and power relations.

Political Economy. With radical social movements, political-economic theories proliferated in the 1970s as challenges to anthropology's colonial past and current theoretical frameworks (Ortner 1984). Cultural ecology was criticized for its vision of closed and homeostatic systems, and modernization theory for its progressive evolutionism. While there are many "political economies," for the most part new approaches were reformulations and expansions of Marxism⁵ (Roseberry 1988).

The related approaches of dependency theory and world systems theory were central to this resurgence within anthropology. Dependency theory emerged as a direct refutation of modernization theory, which held that the development process was ideologically neutral, that development occurred in stages, and that the Third World, which creates its own perpetual state of poverty, could only "modernize" by following the lead of the West. Dependency theory radically challenged this evolutionary and deterministic view. It highlighted how relations with capitalist/imperialist powers distorted third world economies; development and underdevelopment were, in fact, inextricably tethered. Development occurs at the expense of underdevelopment (Frank 1967; Williams 1966; also see Marable 1983 on the underdeveloped of Black America). World systems

theory was developed from dependency theory by Immanuel Wallerstein (1976, 1977) and focused on the emergence of the modern world (capitalist) system as a process of shifting relationships between capitalist core areas and peripheries that supported the core.

Both theories (and sometimes the whole of political economy) have been criticized for their "capitalism-centered view of the world" (Ortner 1984, 142) and for providing too little attention to "real people doing real things" (Ortner 1984, 144; also see Morgan 1987 on the consumption of dependency theory in medical anthropology). The critiques highlight the concern for placing human agents at the center of analysis, as in a more anthropologically informed political-economic analysis.

An anthropological political economy can be traced to early proponents such as Wolf, Mintz, Leacock, and Nash. Wolf and Mintz developed a "cultural history" approach to political economy, a specific reaction to cultural ecology (Roseberry 1988). Themes carried on in their later works include a focus on the importance of history on a global scale and the struggles and conflicts that formed anthropological subjects, real people doing real things at the intersection of local histories and the larger processes of state and empire making. The goal of such analyses is a "unity of structure and agency, the activity of human subjects in structured contexts that are themselves the products of past activity but, as structured products, exert determinative pressures and set limits upon future activity" (Roseberry 1988, 172). These approaches were also more explicitly concerned with class, ethnicity, gender, culture, and politics. Wolf's *Europe and the People Without History* (1982) begins to consider both the big picture of historical development of capitalism and the significance of local variations that account for the actions and local realities of diverse populations outside of the capitalist core.

Themes that emerge in anthropological political economy include concerns with how global systems and history intersect with local systems and history in creating the contexts for understanding the actions of peoples. This approach is concerned with the social relations and institutions which control fundamental resources, including social labor, the exertion of this control being an expression of power. It locates actors wielding power in social fields and concentrates on the specificity of local constructions of power relations in these fields, including those that have their source outside of particular regions—that is, how "external" forces are "internalized." A concern with power as wielded by everyday people in

everyday situations, and the recognition that cultural formations are grounded in unequal relations, also were central to "domination and resistance" studies (e.g., Scott 1985, 1990).

Merging Critical Perspectives into Anthropological Political Economy. Recent poststructuralist contributions expand upon anthropological political economy by providing a stronger sense of the contingency of social realities, and by showing how power and meaning are constructed in the specific contexts and moments of everyday action and discourse. For example, Emily Martin's (1987, 1990, 1994) work on the metaphors and tropes used to describe immunological and physiological processes has made us aware of the degree to which doctors and patients view health as a military-like battle and disease as an enemy. Escobar (1995) has similarly "unmasked" the ideology of the development enterprise, still rooted in modernization theory, to show how the practice of development validates existing relations of power. Smedley (1993) has shown how "race" developed as a Western worldview and became reified.⁶ All of these works provide insights into the stakes involved in the control of knowledge, and all have clear relevance for biocultural and biological research.

Although theories of postmodernism are certainly assailable, there is no doubt that in this postmodern time scientist-researchers cannot assume shared ideologies or the obvious superiority of their explanations. This change is seen in recent challenges by Native Americans and other indigenous peoples to the ethics of research into human genomic diversity (Corpus 1996) and to the analysis of the skeletal remains of ancient peoples (see Martin, this vol., chap. 7). The debates over the study of archaeological remains have been simplified to one of science and freedom versus religion and uninformed antisience (Clark 1996). Yet, possibilities for a new "collaborative science" are now emerging out of greater concern for the different positions (and sometimes variant interests) of archaeologists and the "subjects" of their research (Fine-Dare 1997). Skeletal biologists are now frequently consulting and working with Native Americans to answer questions of mutual interest (Martin, this vol., chap. 7). The title of Rose and co-workers' (1996) recent review, "NAGPRA Is Forever," is to the point. Few can doubt that there has been a strong "postmodern" shift away from viewing science and scientists as absolute authorities and problem solvers. The possibilities for collaborative knowledge and solutions make biocultural work more complex, more interesting, and more exciting.

The Position of Biological Anthropology

It is revealing that the developments of the last quarter century that come to mind on the biological side of anthropology are nearly entirely methodological. Almost every area of inquiry has gotten better at measuring human biologies. For example, developments in endocrinology have made it much easier to measure stress (Flynn and England 1997) and reproductive hormones (Ellison 1990) in the field. Chemical methods for the analysis of bones and teeth have led to more direct dietary interpretations in bioarchaeology (Armelagos et al. 1989; Klepinger 1993). The development of the polymerase chain reaction (PCR) has allowed biological anthropologists to obtain detailed knowledge of the genetics of individuals, both living and past. These methods, borrowed and modified from other fields, collectively promise more precise answers to old questions and the possibility of addressing questions that formerly could not be scientifically studied (note 3).

Less developed are models and theories, especially those that make central interactions between culture and biological systems.⁷ This is particularly surprising at a time when the social sciences and humanities have undergone deep and prolonged debates around fundamental issues of theory, practice, and ethics. What Martin (this vol., chap. 7) says for skeletal biology—that the laboratory blinds were pulled down to avoid contact with an external reality—generally applies to other areas of biological anthropology. Biological anthropologists, for the most part, became more attached to developments coming from biomedical sciences. They increasingly began to be employed in departments in professional health schools, where they could work alongside geneticists, cell biologists, and anatomists, rather than with linguists, archaeologists, and cultural anthropologists.⁸

It is understandable, though unfortunate, that biological anthropologists have generally been reluctant to engage in dialogues over the origin and salience of theory and scientific practice (see note 3). As we hope this volume begins to show, insights from political-economy perspectives on relations of power, on the importance of historical contingency, and on local-regional-global interactions are pivotal to understanding human biologies. These realizations have been central to the concerns of a number of researchers in human adaptability. It is in this effort to integrate human adaptability with political-economic perspectives that we see promise for building a new biocultural synthesis.

Developments in Human Adaptability. Following Livingstone's (1958) explication of the sickle cell trait–endemic malaria connection, nearly four decades of searching for similar genetic adaptations have not led to similar successes. There seem to be few situations in which human populations develop a genetic adaptation to a local and specific environmental challenge.⁹ On the other hand, decades of research reaffirm that biological plasticity is a species-wide adaptive mechanism; evolutionary history has produced a species that is adept at rapid, plastic adjustments to a range of environmental conditions.

Less clearly understood at first were the limits to plasticity. At what point, for example, is short stature a sign of intolerable stress, rather than an adaptation to caloric limitations? Impoverishment takes its toll on the resilience of many populations and on their ability to cope. The underside of adaptation is seen in the realization that much of the biological variation measured is attributable to malnutrition and disease (Thomas, this vol., chap. 2). Labeling this an “adaptation” seems to be perverse and vulgar (Goodman 1994).

Research in the 1980s increasingly became oriented to documenting biological dysfunction in impoverished environments and the biological consequences of ubiquitous social change. In this work, biological anthropologists have excelled at relating a range of proximate social indicators (household demographics and socioeconomic status, parental education and occupation) to nutrition and disease, and in effect mirroring a social epidemiological approach.¹⁰ They also have provided rich detail on the costs of intolerable conditions on adaptive domains (Mazess 1975) such as disease resistance and work capacity.

Most research, however, still fails to assess the roots of socioeconomic variation or historical forces of change. While adept at relating proximate conditions (such as lack of available food and exposure to stressors) to biological suffering, researchers have not addressed well the reasons for variation in exposure to these conditions. In characterizing social and historical change by generic terms such as traditional versus modern, we learn almost nothing about why and how people experience change differently. Thus, the childhood deaths noted in the prologue are viewed as natural and even inevitable, rather than as products of human interaction. In many ways, our use of a telescopic evolutionary lens obscures the historical specificity needed to understand changing patterns of human-environment interactions.

Toward a Political Economy of Human Biology

The ascent of political-economic and critical approaches in the social sciences led to the development of complementary approaches in archaeology and medical anthropology (critical and postprocessual archaeology and critical and political-economic medical anthropology). These approaches all foregrounded perspectives from political economy and adopted a self-critical stance on the social context of praxis and theory in their related disciplines. Adherents of the critical/political-economic medical anthropology see their approach as a much needed “corrective for the disciplinary fragmentation of social science that obscures the relationship among economic systems, political power, and ideologies” (Morsy 1990, 27; also see Singer 1989b; Singer and Baer 1995). Archaeologists turned their attention to social relations in shifting modes of production as a corrective to “stage” analyses common to neoevolutionary approaches, and to documenting social inequalities in prehistoric and historic contexts (Paynter 1989; Cobb 1993; Maguire 1992, 1993; Saitta 1988 and this vol., chap. 5).

As noted before, critiques by evolutionary biologists showed the tautology and functionalism in the “adaptationist program” (Gould and Lewontin 1979). Variations in traits, by their mere existence, are assumed to have functional import and to have arisen to meet that function via natural selection. Adaptation to fill niches is particularly problematic since niches are created through organism–environment interactions. Looking back through evolutionary time provides a false sense of inevitability and progress (Gould and Lewontin 1979). This view tends to “naturalize” social processes.

Applied to human biocultural studies, Blakey, in his historical research on the roots and continuities of American physical anthropology, shows a history of naturalizing social processes, which rather than being based on good science, tends to maintain existing socioeconomic inequalities (Blakey 1987, 1991; also see Haraway 1989, 1990).

At about the same time, human adaptability studies increasingly focused on adaptive responses to “multiple stress” environments. Researchers found that responses to one stressor could influence (and often constrain) responses to another (Baker 1984; Thomas, Gage, and Little 1979). As well, while stress and response occur at several levels (cellular, individual, population, etc.), responses at one level cannot be

directly extrapolated to other levels; what serves the individual phenotype might not benefit larger social groups (Mazess 1975). These insights challenged the understanding that the environment simply selected the best-fit phenotype.

The history of Andean research provides a relevant example because so much has been written about Andean "adaptations" from an ecological and evolutionary perspective (see Leatherman, this vol., chap. 10, for a more detailed discussion). Early expectations were that broad adaptive patterns would be discerned through comparisons of human biobehavioral adjustments to Andean, Himalayan, and Ethiopian high mountain systems. However, less similarity than expected was found, and in spite of the constancy of hypobaric hypoxia, relatively little evidence has been found of any genetic adaptation. Taking histories into account, particularly the frequent population movement between low and high altitude ecosystems (e.g., Murra 1984), helps to explain this result.

Issues raised by the "small but healthy" hypothesis illustrates deeper problems with the notion of cost-free adaptations. The small-but-healthy hypothesis, as developed by economist David Seckler (1980), asserted that short stature is an adaptation to mild-to-moderate malnutrition (MMM). Seckler suggested that small body size ought to be interpreted as an appropriate and effective biological adaptation to marginal food supplies. Hence, national economic/food resources should be directed at those who most clearly suffer from severe malnutrition, and not at the moderately malnourished. They were small, yes, but healthy and adapted to their conditions of life.

This "insight" into the adaptiveness of small body size came from the writing of biological anthropologists and international nutritionists who had estimated caloric savings of smaller bodies. Anthropologists and others responded and soon began to explore the biobehavioral and sociocultural contexts of smallness (Martorell 1989; Messer 1986; Peltó and Peltó 1989). Whereas smaller people require fewer calories (beneficial in low energy contexts), their "smallness" entailed substantial cost to their biology and behavior. In context, smallness could also signal a plethora of functional deficits (Allen 1984; Martorell 1989), thus Peltó and Peltó (1989, 14) conclude that "the concept of a 'no-cost' adaptation makes virtually no sense." Perhaps more important, the small-but-healthy hypothesis alerted us to the political implications of research findings and theorizing. In this case Seckler was writing to advise the Indian government on its food relief policies.

These realizations and trends led some biological anthropologists in the 1980s to begin integrating perspectives from anthropological political economy and human adaptability. These developments were influenced by similar developments in medical anthropology and archaeology and were applied to examples of how social inequalities shape human biology in prehistoric, historical, and contemporary contexts (Goodman et al. 1988; Goodman and Armelagos 1985; Leatherman et al. 1986; Thomas et al. 1988). This work was variably labeled as "biology of poverty" (Goodman et al. 1988; Leatherman and Goodman 1997; Thomas, this vol., chap. 2), "critical bioculturalism" (Leatherman 1996), "critical biological anthropology" (Crooks 1996), "dialectical biological anthropology" (Leatherman et al. 1986), "political ecology of human biology" (Goodman, Leatherman, and Thomas 1996; Leatherman and Thomas 1996), "political economy of human biology" (Blakey 1985), and "humanistic biological anthropology" (Blakey, this vol., chap. 16).¹¹

Political Economy and Its Relevance to Biocultural Analyses

The developments previously noted provided a framework and context for biological anthropologists to search for perspectives that complement evolution, ecology, and adaptation, particularly ones that direct attention to global contexts, history, and social relations that shape local environments. Because human biologies are affected by and reciprocally influence such factors as the control, production, and distribution of material resources, ideology, and power, we find a political-economic perspective to be an invaluable and necessary complement. In outline, political-economic perspectives contribute to biocultural anthropology by emphasizing five interrelated issues.

The importance of examining biological variation in terms of *social relations* through which individuals gain access to basic resources and labor. Simply stated, these social relations are key to resource production and distribution (that is, they are relations of power) and are thus key to forming proximate environments—what individuals eat; their exposure to pathogens, temperature stress, and toxic substances; and what resources may be brought to bear to adjust to these stressors and constraints. Political-economic analysis calls for the analysis of social processes, rather than just indicators such as socioeconomic status. As Saitta notes (this vol.,

chap. 5), these social processes, although full of complexity and contradiction, are key to a deeper understanding of who becomes ill and other biocultural processes.

The importance of *links between the local and the global* (macro-micro interconnections). Threats and benefits to health and nutrition are invariably linked to regional and international processes, and how they intersect with local conditions to shape the microenvironment of adaptation. To not consider how these processes affect biologies in this interlinked world is clearly limiting, and the same may be true for ancient populations (Goodman, this vol., chap. 6).

History and historical contingency are critical to understanding the direction of social change and the biological consequences of change (and by extrapolation, evolutionary change; cf. Gould 1991). As suggested by the example of Andean research, understanding biological responses often requires understanding local history.

Humans are *active agents in constructing their environments*. Part of this constructing entails resistance and revolution, as well as accommodation and adjustment; and these system-challenging responses need to be more fully integrated into our understandings of coping and adaptation. Humans create their environment and at the same time are created by their environment, an insight that goes back to Frederick Douglass (Blakey, this vol., chap. 16). The environment takes on meaning only in relationship to the subject (Levins and Lewontin 1985).

Ideology and knowledge, of subjects and scientists alike, are key to understanding human action. While both adaptation and political economy are materialist perspectives, it is increasingly clear how power and resources are maintained by control of knowledge.

Hence, a bioanthropological political economy seeks to understand how particular local histories shape everyday realities of anthropological subjects, and moreover, how separate communities are connected through larger historical political-economic processes that affect human biologies. Understanding humans "under the skin" can enrich our understanding of the link between global change and the everyday struggles of human groups. After all, *what is more real about the human condition than people's biology?*

Directions and Implications for Biological Analyses

The development of a political-economic perspective has a variety of implications for biological anthropology theory and practice. In the following sections we outline some possible implications for: (1) human-environment interaction and adaptation, (2) the expanded context of research, (3) dialectics and the conceptualization of the adaptive process, and (4) the politics and practice of bioanthropology.

Human-Environment Interaction and Adaptation

Both ecological and political-economic approaches are concerned with how people transform nature into human resources. This economic act of transformation, whether by direct extraction or through production, is carried out by social groups. The nature of this social organization (who makes decisions over how labor is allocated in production and who controls the product) is key to descriptions of economy.

Ecological perspectives tend to treat these acts as processes in which homogeneous social formations operating with a given technology and social organization (e.g., hunter-gatherers, horticulturalists, industrial agriculture) work toward a particular end that serves the group. In contrast, a political-economic perspective highlights the social relations involved in the allocation and control of labor. These relations of power underlie inequalities and exploitation, exposure to risks, who eats what, and so on, all of which have biological consequences. Biological anthropologists often study the process of transforming environment in light of adaptive decision making about resource and labor allocations, whereas those taking a political-economic approach study environmental transformations in terms of social and power relationships. Central to both perspectives is control over resources and labor. In adaptation studies, autonomous control by the individual, group, or population is central. Key is their ability to read the environment and act to achieve best outcomes (or, in the face of unpredictability, to minimize costs by hedging bets). Over the long run those strategies that enhance survival, reproduction, and prosperity will be perpetuated through time, biologically via natural selection and/or culturally as "adaptive strategies."

A political-economic perspective views individuals and groups as acting in what Roseberry refers to as social fields of power (chap. 3). These webs of relationships structure what responses are appropriate, available,

and allowed. The content of these relationships is power: over who owns what, who works where, for how long, and with what return. Thus, human responses, what one might label as adaptations (if successful) or maladaptations (if not), are fraught with conflict and contradiction. Individuals try to balance these conflicting inputs and imperfect knowledge using personal experience, local cultural knowledge, and available resources to meet specific goals. The adaptation perspective implies that if it works more than it fails, then the response is adaptive. A political-economic perspective implies that responses and their consequences differ depending on their contexts and individuals' positions within social webs. "Logical" and "appropriate" behaviors may differ by class, gender, and ethnicity. What works for one group might work against another. Moreover, humans have imperfect knowledge and structural constraints on their actions, and they necessarily respond in ways that have unintended consequences, which are just as critical to understand as those that are intended.

A political-economic perspective is particularly useful for biological anthropology because it addresses our attention to problems people must confront and their capacity to cope, both of which are conditioned by available material and social resources. Biological anthropologists have made great strides in detailing variation in biology (such as growth, morbidity, mortality, nutritional status), but have paid less attention to variation in coping capacity. A political-economic perspective adds a potential to go beyond static measures of social status and class to examine the factors that perpetuate poverty such as lack of land and education, high rents, illness, and so forth. The list goes on; the point is that underlying causes of material and social conditions vary, and they vary with different effects and solutions.

Expanding Contexts

A major goal of a political economy of human biology is to frame questions in broader environmental and sociopolitical contexts. How, for example, in an increasingly delocalized and interlinked world, do the flows of information, resources, peoples, and their genes move from nested regional, national, and global systems to new local systems? Hence, the changing use and meaning of sugar in English food systems, the colonization of the Caribbean, and the creation of plantation economies in the Dominican Republic are interconnected and part of the same history (Mintz 1985). The marginal Andean environment is as much a product of

four centuries of domination and recent capitalist penetration as of low oxygen pressure and irregular rainfall (Leatherman, this vol., chap. 10). The environmental context of disease and evolution in the Amazon is largely a context of conquest and colonization (Santos and Coimbra, this vol., chap. 11). Even in antiquity, the health and nutritional status of individuals living in Sudanese Nubia and west-central Illinois is more fully understood in relationship to seats of political power and changes in political autonomy (Goodman, Leatherman, and Thomas 1996, chap. 8).¹² By framing local problems within broader contexts, different questions are asked, questions about deeper roots of exposure to stress. Without consideration of these broader contexts, the preferential feeding of adult males to the detriment of child growth among sisal farm workers in Brazil could be seen as a case of maladaptive intrahousehold food allocation. Rather, it can be seen as a product of horticulturalists abandoning subsistence farming for cash cropping sisal, at the insistence of development efforts (Gross and Underwood 1971). To see the malnutrition of Brazilian children as a product of their own adaptive failures rather than of maldevelopment suggests a variant of victim blaming.

Rethinking Adaptation: The Dialectics of Adaptation

Merging a political-economic perspective into human adaptability leads to a rethinking of the concept of adaptation. First, it leads us to see adaptation as an ongoing process rather than a collection of measures. Speaking of problems inherent in the comparative analysis of cultures, Eric Wolf (1981, 42) notes that "we often take the data observed or recorded as realities in and of themselves, rather than as more or less tangible results of underlying process operating in historical time." In adaptation studies, the tendency is to apply a cost-benefit analysis and cite a measure or behavior as an adaptation, forgetting the caveats raised by Mazess (1975) that what is adaptive at one level or domain is not necessarily so at another, that what is adaptive now is not necessarily so in the future, and that what is adaptive for one person is not always so for another. Thus, it is always relevant to ask, "adaptive in what context, adaptive for whom, at what level, at what point in time?"

A variety of biobehavioral responses may satisfy an immediate set of problems. The danger is that labeling them as adaptations suggests that an adequate or acceptable solution has been reached; the potential costs of the response are of little importance. One solution is to focus on adapta-

tion as a process with tangible outcomes one can measure and record, but not end points in and of themselves, thus avoiding reifying responses as adaptations or maladaptations. In turn, by considering a range of outcomes, one sees costs and conflicts along with benefits. It is critical to recognize that costs are not negated by benefits, but often create future binds and limitations. Thus, the context for future response is altered by the responses themselves; the adaptive process operates dialectically, contributing to ongoing change in the human condition and the nature of human-environment interactions (Leatherman 1996; Levins and Lewontin 1985).

Biology, Politics, and Praxis

The “small but healthy” debate, NAGPRA, and indigenous responses to the Human Genome Diversity Project (HGDP) all highlight the need to foreground the politics and ethics of bioanthropological research. The key lesson from the “small but healthy” hypothesis is that the reporting and interpretation of biological information is unavoidably a political act. Discussions of adaptations are not abstractions, but potentially consequential for real peoples. NAGPRA and indigenous concerns over the HGDP show clearly that a hidden and unapproachable ivory tower no longer exists.¹³ Increasingly, research can no longer be justified for the sake of knowledge alone. It is no longer possible for biological anthropologists to measure and probe biologies with only vague notions of consent. Rather than see these developments as attacks on science, they are calls to make science ethically accountable and to debate what is at stake.

It may come to be that the anthropology of the twenty-first century will be an anthropology of praxis—of collaboration and applied work—and if so, a new ethics of practice is needed. In many places biological suffering is witnessed and ignored, or explained with reference to genetics and evolutionary theory or static notions of maladaptive cultures and naturalized class divisions. A new ethics of practice mandates that we examine the human condition with an eye to the complex social relations that shape lives and biologies, and with a commitment that our analysis should be relevant to relieving persistent suffering. As noted before and by Martin (this vol., chap. 7), NAGPRA has led to collaborative efforts involving researchers and descendant communities (also see Blakey’s discussion of collaboration around the African Burial Grounds Project, chap. 16).

These collaborative efforts make clear that science can be done in many ways, and there is no natural division between science and human rights. In fact, the science we stand for should be “for the people” and on the side of human rights.

Goals and Structure of the Book

It is our hope that this volume points to a new biocultural anthropology, one that is nearly 180 degrees different from a biosocial perspective. The goal of this volume is to consider the possibility for a biocultural synthesis that takes into account the complexities and contradictions of social life and how they influence biologies. Following the goals of the original Wenner-Gren conference, for which most of these papers were originally written, the chapters focus on a wide range of biocultural topics. As well, all of the papers from the original conference focus on the Americas, although their implications are global.

The conference generated great excitement and optimism for the future of biocultural perspectives in anthropology in which the “realness” of biology and biological well-being are brought back into anthropology. We hope this excitement is conveyed in this volume. There is a healthy diversity of ideas and opinions, and even some serious trepidation over the merging of metatheories with such obvious differences. Can ecological and evolutionary theory, with the central concept of adaptation, merge with a political-economic theory of power and social relations? Is a reformulating of the adaptation concept simply pouring new wine into an old and worn-out wineskin (Singer 1996), or are we creating a more socially informed and relevant adaptation theory? The authors of the chapters to follow suggest a wealth of responses to these questions, and a diversity of foci in building a new biocultural anthropology. We hope the diversity provides food for rethinking theory and practice and that this volume, as a whole, is a step toward building a biocultural approach that is of greater relevance to the human condition.

Historical Overview and Theoretical Development

The first section further develops the historical and theoretical themes introduced in this chapter. In the following chapter R. Brooke Thomas outlines the historical development of the human adaptability perspective.

He delineates a series of key phases and human-environment models that document an increased focus on the importance of sociopolitical conditions, ending with a discussion of an emerging "biology of poverty."

In parallel fashion, William Roseberry presents an overview of the development of political-economic perspectives in anthropology (chap. 3). Of particular note for biological inquiry is Roseberry's development of the notion of "fields of power" and the problematization of commonly held concepts such as region and household.

One purpose of including a wide range of participants from cultural anthropology and archaeology is to gain perspective on the development of critical and political-economic perspectives in other areas of anthropology. As a key example, Merrill Singer outlines the development of critical medical anthropology. This perspective foregrounds the political-economic roots of (dis)ease and suffering as well as the significance of power in medical care and research, in the process of medicalization, and in defining normality and disease.

Case Studies from Prehistoric and Historical Contexts

The second and third parts of the volume focus on case studies and applications. Rather than show a uniformity in method and vision of what a political economy of human biology ought to look like, which would not be sensitive to local conditions and problems, these five papers illustrate a wealth of issues for consideration.

Dean Saitta (chap. 5) brings the perspective of a critical archaeologist to the task of linking political economy and human biology in North American antiquity. He argues that a class perspective has utility in precapitalist societies and focuses on labor as a key variable in political-economic analyses, linking the social and the biological. Yet he also provides an important cautionary note by showing how simplified notions of class might break down in studies of precapitalist, past populations.

Alan Goodman follows by considering the health consequences of relations of power in antiquity. He first looks at evidence for class or rank-type variation in biological health and provides two different examples of class-based difference in health. Goodman then focuses on precapitalist regional systems of exchange and exploitation, and suggests that such systems had biological consequences for diet, nutritional status, and health.

Debra Martin begins with a critical history of bioarchaeology in the

American Southwest (chap. 7). For Martin, a political-economic approach includes concern for power relations in the research process, as well as attention to the role of political-economic factors in the lives of past peoples. Although the Southwest was used as a training ground for biological anthropologists, she contends that they ignored the needs and problems of the descendants' communities. In her analysis of the evidence for violence directed against women she considers how larger political-economic processes such as raiding and migration articulated with gender relations.

Moving to historical populations, Alan Swedlund and Helen Ball focus on current and past explanations for childhood mortality in Massachusetts from 1830 through 1920 (chap. 8). Their innovative approach simultaneously considers current statistical models to explain mortality and explanations of experts of that period. Their historical research shows how public health workers framed problems such as the relationship between mothers' work and child mortality, and it provides insights into the use of previously collected demographic data.

In an example of how ethnicity, migration, and class affect health, Lourdes Márquez Morfin focuses on the typhus epidemic in Mexico City in 1813. She shows how the epidemic differentially affected individuals depending on their geographic location within the city. Migration to the city to find employment led to crowding and swamped public resources, leading to poor sanitation and increased exposure to infectious agents. Thus, Márquez is able to draw connections between larger historical processes and how they affected local conditions, which ultimately affected morbidity and mortality. She also situates her work within the historical development of Marxian biological anthropology that developed in Mexico at about the same time that ecological perspectives developed in the United States.

Case Studies of Contemporary Groups

These five chapters approach a variety of human biological problems faced by peasants and impoverished populations in the Americas. Leatherman (chap. 10) begins this section by comparing bioanthropological research in the Andean Highlands in the 1960s and 1980s. This chapter provides a grounded example of developments in human adaptability that mirror theoretical issues discussed previously and by Thomas (chap. 2).

The case study, which examines relationships between health and household economy in three Andean communities, is an explicit attempt to merge adaptability and political economy.

The three chapters that follow all focus on aspects of economy and health in local systems framed in larger and historical, political-economic contexts. In a provocative paper on the "(un)natural history" of the Tupí-Mondé Indians of the Brazilian Amazon, Ricardo Santos and Carlos Coimbra show how contact with the West, the "un-natural history," nearly destroyed the Tupí-Mondé (chap. 11). Although physiological stress, as measured by enamel hypoplastic defects and other means, was clearly evident before sustained contact, stress increased dramatically at this time.

Billie DeWalt examines a similar point of articulation of contact between the West and peasants (chapter 12). Working in southern Honduras, he focuses on the larger context of population increase and its association with malnutrition. DeWalt labels his approach "political ecology," which he defines as a blending of human ecology and political-economic perspectives. DeWalt shows how development efforts often fail to consider either the locations of peasant farmers in political-economic systems or local ecological constraints, resulting in ecological and social destruction, rather than revitalization.

Daltabuit and Leatherman (chap. 13) focus on a third type of contact—tourism. They show how tourism-led development is having unpredictable effects among Mayan communities in the Yucatán, Mexico. Because men are most likely to be employed for wages, and frequently migrate on a weekly basis for work, tourism differentially affects men and women. A particular effect examined here concerns shifting aspects of women's work, health, and reproduction. Also, diets are changing to the point where soft drinks and junk foods are the third leading source of calories, and the stage is set for a paradoxical combination of micronutrient undernutrition and obesity.

The final paper in this section, by Debra Crooks, focuses on policy developments and research into child malnutrition in the United States. Crooks uses studies of human growth to highlight the problems of persistent malnutrition in eastern Kentucky and shows how individuals are given mixed messages about what to eat (and what they can afford to eat). This paper is particularly important in that it provides an example of the biological problems and the possibility for practice-oriented research among the hidden poor in the United States.

Toward a Critical Biocultural Anthropology

By raising a number of issues, the papers in the final section suggest key elements and possible directions toward the further development of a critical biocultural anthropology. Armelagos and Goodman (chap. 15) provide a historical review of the concept of race in biological anthropology. They suggest that race has long outlived its scientific utility; its persistence is an example of the power of politics in our science, a power that has long been ignored. They call for a focus on the biological consequences of racism, a new and vital area of biocultural inquiry.

Michael Blakey calls for a humanistic approach that is reflexive, considers the role of the researcher and the subjects of research, and pays explicit attention to embedded politics and hidden assumptions (chap. 16). He questions the historic politics of positivism and naturalism, and provides examples of alternative approaches. For example, Blakey and colleagues' work on the New York African Burial Ground illustrates the involvement of the descendant community in research decision making.

In her paper "Latin American Social Medicine and the Politics of Theory" (chap. 17), Lynn Morgan continues the theme of reflexivity. She focuses attention on the contexts in which a critical theory has already developed. Like Saitta's chapter on archaeology and Singer's chapter on critical medical anthropology, Morgan's provides important lessons for the development of a critical biocultural theory and praxis. More than the others, Morgan emphasizes efforts to be explicit about the role of the researchers in their work.

The last chapter, by Søren Hvalkof and Arturo Escobar, illustrates that some anthropological concerns and theories are coming full circle and also suggests the possibility for a radical and praxis-oriented bioculturalism. These authors elaborate upon the development of a political-ecological approach, as noted earlier by DeWalt. They provide a brief history of the development of ecological and materialist approaches in anthropology and the way they were critiqued for excessive materialism, closed-systems perspective, and functionalism. In their example of the rain forest-human relationship, it becomes very clear that, as they paraphrase Raymond Williams, there is a lot of culture in nature.

The final commentary brings together Gavin Alden Smith, a political-economics-oriented anthropologist, and R. Brooke Thomas, a leading theorist in human adaptability. They provide some cautions around the pitfalls of ill-defined concepts, for example. However, the basic thrust

echoes the introduction in suggesting the need for a new and radical synthesis, and the great promise of merging perspectives for a new generation of anthropologists.

Conclusion

As we approach the next millennium, the U.S. economy has entered a phase of bullish growth and there is optimism in continued economic expansion. Multinational corporations are extending markets and going global. Peasant farmers in Tezonteopan, Mexico, grow peanuts for foreign markets, while their children suffer from protein-energy malnutrition. Pastas, which cook quickly and require less fuel, are replacing beans in diets. (However, the amino acid complementarity with maize is diminished, and the biological costs are unknown.) Further south, Mayan villages are replete with advertisements on tienda walls proclaiming the excellent flavor and healthiness of Fanta, Crystal, Pepsi, and Coca-Cola. Yet it is little understood how drinking a "harmless cola" might affect a Mayan peasant family's economics and the nutritional status of infants. Hannerz writes that "the people in my favorite Nigerian town drink Coca-Cola, but they also drink *burukutu* too; and they can watch *Charlie's Angels* as well as Hausa drummers on the television sets" (cited in Clifford 1988, 17).

Ours is a time of both great optimism and widespread criticism of the production and use of scientific knowledge, and even of the privileged position of science itself. On one hand, the promise of science is greater than ever, but so too is distrust and lack of faith in science. Newspapers report on a daily basis advances in genetic research that promise better crop production and the elimination of defective traits—from AIDS cures to increased agricultural productivity, from designer drugs to designer genes. But the promise has not yet improved the human condition. Scientific and biomedical advances are heralded; the public grows weary. The Human Genome Project is equated with the Holy Grail, like reading the book of life (Gilbert 1992). Yet the chronic diseases that kill most individuals are still exacting their toll and are joined by new and emergent infectious diseases, most notably AIDS, further decreasing the triumph of science "over nature."

Indeed, there is great public confusion over the very nature of human nature, and over the relationship between culture and nature. What, for example, do genes actually do and control? As reported in the popular

press, are there really "risk-taking" and "jigsaw-puzzle solving" genes? Are intelligence and violence in our genes, and more prevalent in the genes of individuals from certain "races"?

While starvation is a daily event in much of the world, in the United States an abdominal exerciser was the number-one selling gift of the 1996 Christmas season. New nonfat products appear on a daily basis; a potato chip made with the synthetic compound olestra mimics the taste of fat. Yet restaurants serve bigger and bigger proportions, and obesity rates increase.

Despite advances in predicting the weather, better and more varied systems of communication, the development of the information superhighway, and unprecedented knowledge of the human genome, not everyone has shared equally in the benefits or been positively affected by these changes. Poverty, class divisions, exposure to toxic substances, and starvation persist in many places. As cultures, peoples, and ideas come into contact, the fabric of daily life can do little more than unweave. Some individuals benefit, but many more suffer socially, economically, and biologically.

As scientists and citizens, we look ahead with both excitement and some skepticism. The last decades have witnessed increasing fragmentation and specialization, especially between biological and cultural analyses, scientific approaches, and humanistic approaches. Our overriding optimism is that the divide between approaches can be bridged, and that bridging, rather than diminishing the parts, leads to better understandings—of real people doing real things with real consequences. Finally, we hope that these stronger analyses will lead to improvements in the lives of individuals in the real world.

Epilogue: Refocusing Upstream—The Making Social of Biology

An often repeated parable is germane to our efforts. The first version we are aware of is from McKinley's (1986) "A Case for Refocusing Upstream: The Political Economy of Illness" and is credited to Irving Zola.¹⁴ In the original version a physician on the shore of a swiftly flowing river hears the cries of a drowning man. He jumps into the river, pulls the man to safety, and successfully applies artificial respiration. Just when the man recovers, there is another cry from the river. The physician jumps back in, pulls the second man out, resuscitates him, and then hears another cry, another

body to resuscitate. He finally realizes that he is so busy with rescue that he has no time to see "who the hell is upstream pushing them all in" (McKinley 1986, 613). The point of this tale is that resources and activities in health are excessively devoted to downstream endeavors that are often inefficient, expensive, and superficial; efforts are sometimes heroic but ultimately inefficient. Because they do not solve any deeper or more systemic problems, McKinley suggests that biomedicine ought to cease excessive preoccupation with short-term tinkering and begin to refocus upstream to the origins of the problem.

In our version the physician goes about rescuing the drowning victims while the biological anthropologists huddle at the riverside discussing who will get to measure and probe the bodies as they are laid on the side of the river. One, trained in forensics, measures the bodies in order to establish sex, age, and "race." Another, trained in demography and epidemiology, records the numbers of dying and surviving in order to establish the incidence and prevalence of morbidity and mortality. A third, trained in environmental physiology, measures skin temperatures to establish the thresholds of adaptive responses to hypothermia. A fourth, with a stress perspective, obtains saliva samples in order to measure hormones, concluding that almost dying of hypothermia is a stressful event. A fifth, biomedically trained, asks the now resuscitated individuals about their education, SES, family size and structure, and activity patterns to isolate proximate determinants of near-drowning. A sixth biological anthropologist, trained in nutritional anthropology, measures skinfolds and conducts a dietary interview to establish the role of diet and nutrition in the etiology of drowning. A seventh, an anthropological geneticist, takes blood samples in order to establish genetic risk factors for falling into rivers. A session on the biology of exposure to cold water is organized for next year's annual meetings.

The main point of this parable is that nobody hikes upstream or questions what is going on. Biological anthropology has a long tradition of describing and documenting biological status—stunting and wasting in children, disease, birth and death rates, changes in working capacity, and so on. We are good at reading signs from the body. It is also common for us to be involved with individuals in dire situations (although their thoughts and sufferings infrequently appear in our writings). However, we have rarely "focused upstream" to the larger factors shaping shorter height, reduced working capacity, or high mortality rates. For example, while it has become relatively common to associate biological variation

with socioeconomic variation, it is rare that the context or roots of the socioeconomic variation are addressed. It is not trivial whether the poverty associated with undernutrition and illness in much of the Third World stems from marginal physical environments, drought, feudal arrangements with wealthy landowners, or low wages and constrained subsistence production often associated with capital penetration. Too often, we view undernutrition and illness as regrettable but inevitable consequences of an impoverished environment, as if poverty were a component of a natural environment and not a product of social relations and inequality. The point is that people don't just end up rich or poor, sick or healthy, landed or landless. These all happen for reasons, and those reasons frequently lie upstream. If there is a single overarching theme to a political-economic perspective it is in focusing upstream on the intersection of forces which place people by the river and push them in.

In various ways the authors of the papers that follow have tried to leave the safe banks of the river, and, with apologies for mixed metaphors, have tried to bridge the chasm between biology and culture.

NOTES

We owe a great debt of thanks to R. Brooke Thomas, who commented on drafts of this paper. More important, Brooke's continued reflections on human adaptability theory, and his ability to expand and challenge his own ideas and assumptions, have been a constant inspiration to both of us. Ann Kingsolver, Debra Martin, Lynn Morgan, Sydel Silverman, and Alan Swedlund provided a wealth of helpful comments on a prior draft. Finally, we wish to express our gratitude to Sydel Silverman for her constant support, advice, and direction of this project.

1. Participants in the 115th Wenner-Gren Conference (November 1992; Cabo San Lucas, Mexico) included George Armelagos, Barbara Bender, Michael Blakey, Magali Daltabuit Godas, Billie DeWalt, Fatimah Linda Collier Jackson, Arturo Escobar, Alan Goodman (co-organizer), Steven Kunitz, Thomas Leatherman (co-organizer), Lourdes Márquez Morfin, Debra Martin, Ann Millard, Lynn Morgan, Pertti Peltto, William Roseberry, Dean Saitta, Ricardo Santos, Merrill Singer, Gavin Smith, Alan Swedlund, and R. Brooke Thomas. Sydel Silverman, Laurie Obbink, and Mark Mahoney provided intellectual guidance and assistance at all levels.

2. Cartmill (1994) is one of just a few biological anthropologists to write about the effects of the postmodern turn in anthropology on biological anthropology. As a primatologist and evolutionary theorist Cartmill apparently cannot easily envision a biological anthropology that is not solidly based on evolutionary theory. Conversely, he recognizes the danger of evolutionary metaphors and modes of

inquiry in cultural anthropology and agrees with the trend wherein many cultural anthropologists have stopped trying to explain sociocultural phenomena as evolutions. We agree in part. In some places where humans suffer biologically, evolutionary theory is of little utility, at least at the level of practice, yet we strongly believe that our work, for example, in exploring the relationship between food, nutrients, and growth, is biological anthropology. Second, we are more enthusiastic about the potential contribution to biological inquiry of current developments in sociocultural anthropology. Cartmill misses entirely the development of political-economic anthropology and sees little more than some minor correctives to excessive positivism in the postmodern turn. We see more, and this too is likely due to our political commitments and our position as human biologists/ecologists.

3. At a recent plenary symposium on the future of physical anthropology at the 1996 annual meetings of the American Association of Physical Anthropologists, leaders in the field commented on the future of their subfield or specialization. With one exception all commentators saw a bright future based on improved methods and technological developments. Theory was not in question; it is fair to say many simply see no need for theoretical revision or infusion. A sign of this thinking is that some major departments such as at Duke University now have split biological and sociocultural anthropology.

4. An example of the separation of what we here characterize as materialist-scientific versus humanistic-interpretive approaches developed within medical anthropology, where both a political-economic and an interpretive/critical perspective developed as separate responses to the ecologically and clinically dominant perspectives. Soheir Morsy (1990), talking of the more political-economic perspective, has aptly said that medical anthropologists need to switch focus from what is in people's heads to what is on their backs. While we agree, we hope to go further to consider the relationship between what is in people's heads and what is on their backs.

5. This discussion on developments in political-economic theory and practice is necessarily brief. The contribution of structural marxists, modes of production theories and debates, and a host of other important themes are left out. Included are references to dependency and world systems approaches and the legacy of a cultural historical approach in political economy. The ideas and approaches of these latter schools of thought we feel have more direct relevance to the problems focused upon in this volume. The anthropological political economy we are advocating here was developed at least in part in response to the lack of agency in these macro-system models.

6. There is great consternation over the importance of the history of ideas in biological anthropology. In her review of Barkan's *The Retreat of Scientific Racism*, a book that emphasizes how politics affects scientific ideas about race, Alice Brues (1992, 52) states that it is "unlikely that physical anthropologists will find this book of much interest" as it is a study in "the sociology of knowledge." Armelagos (1994) responded to the contrary.

7. There are still many debates over the interpretation of the fossil record, highlighted by the long-standing debate between the "multiregional" and "Eve" hypotheses. The most relevant theoretical development of the last decade is the

development of evolutionary or Darwinian medicine (Lappé 1994; Nesse and Williams 1994), which, unfortunately, in its popularized version comes off as evolutionary just-so stories.

8. Many others who discerned the importance of maintaining anthropological connections have begun to affiliate with bridge fields such as nutritional, medical, and applied anthropology. The depth of their continued commitment to biological anthropology remains to be seen.

9. It is interesting that what is remembered and reproduced in Livingstone's work is how the sickle cell trait provided a case of natural selection. Less emphasized is that the context for endemic malaria was a social construction, what Singer (this vol., chap. 4) and Santos and Coimbra (this vol., chap. 11) call "un-natural selection." In retrospect, while we may have been misguided in so readily accepting this genetic mode of adaptation as typical of human populations, it set the agenda for much subsequent research on human adaptation.

10. This led one participant at the conference to speak of the "epidemiology wannabes" among biological anthropologists. More to the point, it is interesting that as biological anthropology has expanded perspectives into the social arena of health and nutrition they have by and large sought guidance and legitimacy from the more reductionistic epidemiology and biomedical sciences—rather than from social anthropology.

11. Many of us involved in this endeavor were students or professors at the University of Massachusetts, Amherst during the 1980s. The department's rich tradition of biocultural research and strong political-economic perspectives within social anthropology and archeology provided an encouraging environment for these efforts.

12. While these broad historical contexts are often recognized by biological anthropologists, they are typically left to others (archaeologists, historians, social anthropologists) to explore. Although this follows a presumed more efficient and pleasing division of labor in science, unless the analyses are linked back to biology, the biology remains disconnected, and the power of analysis is diminished.

13. The negative publicity received by the HGDP is perhaps summarized by the fact that it is labeled the "vampire project" by many indigenous groups. This project, which involves immortalizing bloods (genes) of indigenous peoples from around the globe, highlights the problems of doing anthropological research in a world of widespread communications. The increased political awareness of indigenous peoples, along with their development of computer networks (Lock 1994), makes very public any case of possible ethical violation.

14. Another version was adapted to medical anthropology by Scheper-Hughes (1990). The use of masculine pronouns is from the original.

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