Biocultural Models in Studies of Human Health and Adaptation

Ann McElroy


Stable URL:
http://links.jstor.org/sici?sici=0745-5194%28199009%292%3A4%3A3C243%3ABMISOH%3E2.0.CO%3B2-N

Your use of the JSTOR archive indicates your acceptance of JSTOR’s Terms and Conditions of Use, available at http://www.jstor.org/about/terms.html. JSTOR’s Terms and Conditions of Use provide, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

*Medical Anthropology Quarterly* is published by American Anthropological Association. Please contact the publisher for further permissions regarding the use of this work. Publisher contact information may be obtained at http://www.jstor.org/journals/anthro.html.

*Medical Anthropology Quarterly*
©1990 American Anthropological Association

JSTOR and the JSTOR logo are trademarks of JSTOR, and are Registered in the U.S. Patent and Trademark Office. For more information on JSTOR contact jstor-info@umich.edu.

©2003 JSTOR

http://www.jstor.org/
Thu Oct 16 14:45:45 2003
INTRODUCTION

Ann McElroy
Department of Anthropology
University at Buffalo, State University of New York
Guest Editor

Biocultural Models in Studies of Human Health and Adaptation

Biocultural studies, defined as research on questions of human biology and medical ecology that specifically includes social, cultural, or behavioral variables in the research design, offer valuable models for studying the interface between biological and cultural factors affecting human well-being. Two models of biocultural research predominate in health studies: one which integrates biological, environmental, and cultural data, and a second, more segmented model in which biological data are primary and data on culture and environment are secondary. Although critics have claimed that biological studies ignore the role of social and political systems in health, the studies included in this issue counter such criticism with research models that include cultural and political stressors. To illustrate an additional dimension of the integrative biocultural approach, I discuss models for understanding morning sickness, perception and tolerance of pain in labor, and depression in the postpartum period. Though these phenomena are clearly both biologically and culturally determined, they are usually studied by anthropologists only in their cultural dimension and by medical researchers in their biological dimension. Biocultural study of reproduction and of other aspects of women’s health will contribute to transdisciplinary collaboration and, it is hoped, will also reduce the fragmentation of medical anthropology.

It would seem that the range of human capacities, including cold-tolerance, heat-tolerance, and load-carrying will have to be reinvestigated with more adequate attention to the cultural factor. As with studies involving nutrition, genetics, or human growth, these more coldly physiological aspects of human biology cannot be investigated as if the subjects lived in a cultural vacuum, up to the time they were enlisted as “volunteers” for research.

—Stanley Garn (1954:79)

Biocultural studies offer valuable models and methods for studying the interface between biological and cultural factors affecting human well-
being. This interface has been explored theoretically and programmatically since the 1950s, as the quote above suggests, in a “movement away from descriptive studies of race and toward problem-oriented studies of human population” (Little and Haas 1989:3–4). Excellent pioneering research on human adaptability in varying environments has been carried out (e.g., Baker and Little 1976; Baker, Hanna, and Baker 1986; Friedlaender 1987; Lee and DeVore 1976; Neel 1970; Steegmann 1983a; Thomas 1973), and studies of the biological impacts of poverty, malnutrition, seasonality, and agricultural change in developing countries demonstrate important applied dimensions of biocultural approaches (e.g., Bogin and MacVean 1983, 1987; Huss-Ashmore and Curry 1989; Huss-Ashmore and Johnston 1985; Johnston et al. 1987; Leatherman, Thomas, and Luerssen 1988; Malina et al. 1981; Martorell and Habicht 1986).

The value of the biocultural approach lies in its comprehensive view of humans as biological, social, and cultural beings. Anthropology has in theory held this view of humankind since its inception, but in terms of professional networks and the training of students, it has in reality encouraged specialization and maintained subdisciplinary boundaries. One goal of medical anthropology has been to cross these boundaries, linking physical and cultural anthropology (Alland 1966:40), and also to open communication between the health sciences and the social sciences. A second goal shared by many medical anthropologists is to understand the dynamics of evolutionary processes, both biological and cultural, in relation to human responses to their environments. We suggest in this volume that biocultural studies are steps toward both these goals, in the sense that they are inherently interdisciplinary and usually address questions of human adaptability in specific environmental contexts.

In this volume, the term “biocultural studies” is defined as research on questions of human biology and medical ecology that specifically includes social, cultural, or behavioral variables in the research design. To be truly integrative in design means more than doing a little ethnography as a supplement to collecting biological data, or arranging for an anthropometric assessment of children as a supplement to ethnographic research, or joining a multidisciplinary project and learning the approaches of scientists from other disciplines—although each of these steps is commendable. Integrative thinking means rethinking basic assumptions, asking new questions, challenging existing theories, and forging new methods. It means moving flexibly between biological and cultural realms in an era that rewards specialization. An integrative approach is often a lonely and misunderstood stance, and many methodological and conceptual issues remain unresolved. It is fairly easy to include both biological and cultural variables in research designs for heuristic purposes, but to operationalize the variables and to carry out systematic collection of both cultural and biological data is a more challenging task.

The research represented in this volume demonstrates the use of the biocultural paradigm by people trained in conventional human biology. Each of the authors represents a generation of researchers who show exceptional tolerance of strenuous living and working conditions. The difficulties of doing research in field settings—attempting to measure people and collect samples while working in a foreign language or through interpreters, traveling to isolated, harsh regions, finding that clinical or public health records are extremely limited and often not ac-
curate, collecting health histories from people who often hold differing views of health and explanations of illness—are challenges that these human biologists have accepted with equanimity. The fact that they have attempted to deal with a multiplicity of variables affecting people’s health, growth, and well-being also makes these projects methodologically unique.

James Carey’s study, while coming out of the tradition of adaptability studies in rural, high-altitude regions of Peru, goes beyond earlier studies in the sense that it systematically includes sociocultural variables as adaptive resources. Much research by clinicians, epidemiologists, and psychologists in the United States has demonstrated links between support systems and health, and support networks have been shown to facilitate economic well-being in the Andes. Thus Carey’s application of support systems theory to understanding health patterns in the Andes is a logical methodological extension. Yet given the general inclination in human population biology to focus on physiology, genetics, demography and population structure, and growth and development (Little and Haas 1989:5–6), Carey’s inclusion of such “softer” and more elusive variables as reciprocal relations between households, exchange of labor and advice, and emotional and material support represents an innovative step.

In the larger project from which Carey’s paper is drawn (Carey 1988), study of social support networks and health in four types of communities with separate microecologies, as well as distinct social organizational patterns, allowed him to assess intracultural variability in his findings. Comparison of intracultural differences is also built into the article by Emőke Szathmary and Robert Ferrell on hemoglobin markers of glucose level as related to the prevalence of noninsulin dependent diabetes and life-style in several Dogrib communities in the Canadian Northwest Territories. Acculturation, sedentism, dietary change, reduced exercise, and obesity are among the phenomena considered in this study to attempt to explain the elevated glucose levels among Dogrib living in a large settlement, in comparison to those living in smaller, more isolated communities. With rigorous statistical methodology, the study fails to show that these life-style factors contribute conclusively to elevated glucose and the risk of diabetes. Psychosocial stress is suggested as a possible factor for future study.

Focusing more directly on the effects of culture change on health, the article by Michael Little and Sandra Gray examines the nutrition and growth of Turkana children in the context of a shift in East Africa from nomadic pastoralism to sedentism, a transformation of major significance for anthropological theory. Choosing to assess the effects of change by comparing children’s size and body composition in settled and nomadic groups reflects a central interest of human biology in the effects of the physical and socioeconomic environment on human growth (Pawson, Ballew, and Bindon 1989). Both stunting and wasting of children, indicators of malnutrition or undernutrition, are often found among the urban poor in less developed countries. Whether they will also be found among those making a transition from pastoralism to farming is an important question which provokes a complex answer from Little and Gray. When settled children receive institutional food support, they are taller and larger than nomadic children, but without supplementation, children in settlements experience stunting and wasting. Hence dichotomous sociocultural variables, such as settled versus nomadic, are not adequate for assessing the range of health effects determined by
local differences in access to food and other resources. Both ethnographic research and nutritional surveys must be carried out to assess variation between communities.

The cross-disciplinary strengths of the studies in this volume clearly undercut recent criticism that biological studies, biomedical approaches, and medical ecology fail to incorporate social and political factors into studies of health (e.g., the commentaries to Browner, Ortiz de Montellano, and Rubel 1988; Jones and Moon 1987; Singer 1989, 1990). To oppose biology to culture is a spurious and polemical distinction in characterizing the principal interests of adaptive human biology. Recent studies of stress in prehistoric as well as historic and contemporary populations (Goodman et al. 1988) indicate the extent to which physical anthropologists are becoming increasingly concerned with sociopolitical context. Goodman et al. (1988:188) trace a change in Andean studies in which “socioeconomic conditions began to compete with environmental stressors as prime factors in explaining Andean human biology. . . . as conditions of economic and political marginality characterize rural highland communities, the adaptive fabric has worn thin, and indicators of biosocial well-being are sending warning signals.”

Emergence of the Biocultural Paradigm

Study of cultural variables has been a part of human biology since the 1960s, when the field of adaptive human biology went through major methodological and conceptual transformations. Initially concerned primarily with studying the influence of the physical environment on human biological variation (Baker and Weiner 1966; Lasker 1969), biological anthropology has matured into a field that readily incorporates sociocultural variables into research designs.

Biocultural research methods were developed through the approximately 200 research projects sponsored by the Human Adaptability Project of the International Biological Program of the 1960s (Little et al. 1984). These projects were carried out among isolated populations. To assess and understand adaptive patterns, it was necessary to study these groups not as biological specimens, but rather as whole communities, a task representing a conscious application of the new synthesis in evolutionary theory which focused on the population within environmental context as the unit of evolutionary change (Wellin 1978:34). Although rigorous measures of work capacity and performance, body temperature, oxygen consumption, and similar variables were still valuable indices of adaptability for cross-population and cross-regional comparisons (Baker 1969:1152), measures of people’s physiological functioning in natural environments—as they hunted, farmed, carried heavy loads, ate, and slept—proved more enlightening than measuring people in narrow, laboratory-based situations.

These early studies created in human biologists, as well as in medical anthropologists, an appreciation of the complexity of measuring or explaining adaptation and increased our awareness of the wide spectrum of response mechanisms for responding to environmental stressors. For example, after eight years of research on cold adaptation among northern Algonkians in Ontario, Canada, A. T. Steegmann, Jr. and his colleagues concluded that complex behavioral adaptations in native subarctic populations played an even more critical role than did
genetically based physiological responses in maintenance and regulation of body warmth. Use of appropriate clothing, frequent tea breaks to avoid dehydration during hunting and outdoor work, pacing of work to avoid hyperthermia and excess sweating, specialized fire and shelter patterns, and strategies to maintain the warmth of infants all contributed to a low incidence of frostbite, cold injury, and mortality due to cold (Steegman, Hurlich, and Winterhalder 1983). Field research of this sort, involving not only collection of biological data but also long-term, cross-seasonal participant observation, has helped to revise our concepts of adaptation. As Steegman states,

The struggle to raise children to maturity, stay healthy, and extract a living from the environment requires that people practice adaptive skills constantly. To the native and to the visitor, this aspect of adaptation is simply central to life, whether it is exclusively behavioral, or conditioned by biological advantages as well. Those problems, in my view, must become the focus of human adaptation research. [1983b:4]

Study of interactions between biology and culture has not been exclusive to physical anthropology, of course. The biocultural paradigm has also played a central role in the development of medical anthropology (Alland 1966, 1970; Moore et al. 1980), principally through the models and methods of medical ecology (Hunt 1978; Landy 1983; McElroy and Townsend 1989; Newman 1964; Wellin 1978). Sociobiology has also used biocultural models to develop its theories of the biological bases of human behavior (Chagnon and Irons 1979). Biocultural models have proven productive in archaeological study as well (e.g., in Buikstra’s [1977] use of osteological evidence for inferring seasonality, food shortage, and disease stress in Middle to Late Woodland populations in the lower Illinois River region). The strength and generalizability of the biocultural approach has been such that theoretical and conceptual boundaries between subdisciplines using this approach are often blurred. Nevertheless, biological anthropology and medical anthropology remain separate disciplines, both within most academic departments and within the structure of the American Anthropological Association. Later in this introduction I will explore some of the reasons for this professional division and discuss the potential for integrating the two subdisciplines.

Key Concepts in Biocultural Studies

The Concept of Culture

Because the definition of culture varies widely in anthropology, it is essential to specify the uses of the term in the present context. A sample of early and more recent literature indicates that many writers refer to ‘biocultural adaptations’ without actually specifying a definition of culture (e.g., Baker 1969; Blakely 1977). Early theoretical formulations defined the emergence of learned, socially transmitted, symbolically mediated behavior as an evolutionary step of unprecedented significance, a quantum shift in which there ‘appeared an organism whose mastery of technology and of symbolic communication enabled it to create a supraorganic culture’ (Dobzhansky 1972:85). A theory of culture as evolving from a biological base, and still firmly rooted to that base, persists (cf. Ortner 1983:135), although some anthropologists have long argued that the roots have
been severed and that human society has been "liberated from direct biological control" (Sahlins 1960:76). The degree to which biology determines human behavior is still being debated by sociobiologists and their critics (Sahlins 1976), but human biologists generally accept that the potential for culture is genetically derived. Genes do not control what we think, or how we form social bonds, or the symbols we use, but they do provide the neurophysiological template for cultural patterning to develop (Laughlin and d'Aquili 1974).

Biological anthropologists often describe culture as an adaptive mechanism that is distinct from genetic processes. Unlike the slow evolution of genetically based disease resistance, cultural responses allow populations to respond relatively quickly and flexibly to environmental stressors. A major shift in subsistence patterns can occur in a generation; an adaptive shift in hemoglobin types might take 200 generations. However analogous selective retention of adaptive culture traits is to natural selection of genetic traits (Alland 1970:32–44; McElroy and Townsend 1989:118–119), most biologists nevertheless reject the idea that cultural evolution and biological evolution are fundamentally identical processes. The question of feedback loops—that is, the potential of culture (say through reproductive technology) to influence the genetic characteristics of a population—remains open.

Another use of the concept of culture is as a human organizational variable that provides useful categories of human groups for comparative purposes. When dealing with a population that shares a cultural identity, these organizational characteristics are often called social determinants. The groupings may be framed in terms of life-cycle variations (e.g., nulliparous females, reproducing women, postmenopausal women), social organizational variables (ethnic group, socioeconomic status), subsistence pattern, and so on. An excellent illustration of the role of culturally defined categories in the design of a biological study is provided by Little (1980). In addition, Leonard's study (1989) comparing food consumption and anthropometric measures of different SES (socioeconomic status) groups in an Andean town is an example. Leonard, who measured SES in terms of the primary occupation of the head of household, found great disparity between upper and lower SES groups in the diversity and quantity of their food intake during certain seasons. He concluded that "socially mediated differences in food consumption are correlated with very marked differences in growth" (Leonard 1989:350).

**Adaptation**

The concept of adaptation is a core feature of the intellectual basis of biocultural studies. Like culture, adaptation has many definitions. A parsimonious one, used by Lasker (1969:1480), is: "Adaptation is the change by which organisms surmount the challenges to life." Biological adaptations, in Lasker's view, encompass biochemical, physiological, and genetic processes and are involved in a wide spectrum of change, including "major evolutionary events, growth of the individual, and behavioral and physiological changes" of short duration (1969:1480).

Although some physical anthropologists prefer to restrict the use of adaptation to genetic change, medical anthropologists have extended the concept to be-
havioral and cultural domains as well. McElroy and Townsend (1989:73, 76) define adaptation as "processes of change and adjustment that increase a population's chances of continuing to exist through successive generations in a given environment," and they use a four-celled grid to categorize types of adaptive mechanisms: (1) genetic change, (2) physiological and developmental adjustments, (3) cultural responses, and (4) individual coping. The question of whether these four categories of adaptation are fully comparable revolves partly around the issue of the appropriate unit for measuring adaptation—the species, the population, the community, or the individual. The models of adaptation used by many sociobiologists, for example, emphasize the individual and the kin group as critical units for analysis, whereas human biologists usually focus on the population.

Although criticized in recent years as being circular, teleological, too broad, or too functionalist (Alland 1987; Bargatzky 1984; Gould and Lewontin 1978; Singer 1989), the adaptation paradigm continues to serve as a heuristic and conceptual tool for organizing data on human responses to environmental stressors, disease, disability, loss, and life transition (e.g., Becker 1980; Becker and Nachtigall 1989; Landy 1989). These responses are multiplex, with dimensions that encompass a range of systems: autonomic, immunologic, hormonal, cognitive, social, and cultural. To restrict the concept of adaptation to evolutionary change would disregard the striking parallels between evolutionary change and other mechanisms of change and adjustment.

Adaptation functions well as an explanatory concept. Little (1989:2) notes that "the concept of adaptation has considerable explanatory power and can be used to understand complex relationships that cannot be conceptualized by other means." Little (1989:4) illustrates his point through a case study on South Asian migrants to the United Kingdom who showed high prevalence of rickets and osteomalacia among children and pregnant and lactating women (Ford et al. 1972; Goel et al. 1981; Pietrek et al. 1976). The complex etiology of these nutritional deficiencies included: (1) ethnicity and immigrant status contributing to poor housing; (2) cloudy conditions limiting exposure to solar radiation; (3) melanin pigmentation reducing the ability to synthesize vitamin D; (4) the traditional diet preventing people from using foods such as milk with vitamin D fortification; and (5) high levels of phytate in the traditional bread (chapattis) interfering with calcium absorption. This example (which, by the way, also demonstrates maladaptation) illustrates the need to include cultural variables (in this case, ethnicity and dietary preference) in epidemiological analysis.

Adaptive Strategy

In some writings by human biologists physiological, morphological, and cultural characteristics that enhance survival in given habitats are referred to as "adaptive strategies." For example, Stini (1988:22–23) views sexual dimorphism in malnourished populations as adaptive. These adjustments include sex differences in protein requirements, fat storage as nutrient reserves (especially critical in pregnancy and lactation), and differences in sexual maturation. Stini (1988:23) further notes that "in many instances . . . the human adaptive strategy is to involve behavioral and cultural responses that augment and often transcend those seen in non-human species. Humans have learned where the limits of their
physiological responses lie and have built on these responses to expand the limits of adaptation. Clothing, fire, shelter, cooperative hunting, horticulture, agriculture, and animal husbandry might all be considered as behavioral means of augmenting physiological coping strategies.

As a functional concept, adaptive strategy does not necessarily imply that human behavior and customs are the result of conscious planning or trial and error to reduce disease or increase well-being. In fact, dietary and ethnomedical practices often involve both functional and dysfunctional relationships to health. Staple crops such as cassava and yams grown in Africa and the West Indies contain cyanate and thiocyanate, chemicals that may reduce sickling of the red blood cells of people with sickle cell anemia or who are heterozygous for the trait (Frisancho 1981; Haas and Harrison 1977). However, too high a concentration of cyanate and thiocyanate can be toxic, and tedious washing and leaching techniques are necessary to avoid toxicity in cassava (manioc in the New World). Walker (1989) suggests that West African women, burdened with family and agricultural responsibility while their husbands are away as wage laborers, may be processing cassava too hastily or ineptly, leaving a toxicity level high enough to contribute in some cases to neurological difficulties such as spastic paraparesis.

Two Models of Biocultural Studies

The term ‘‘biocultural’’ ideally implies a model in which cultural data are systematically collected and integrated with biological and environmental data. Figure 1 depicts this ‘‘integrative’’ model. It is an approach which is easy to teach, a bit harder to incorporate into a research design, and very difficult to execute in field research.

The medical anthropologist attempting to integrate cultural with biological data (as indicated by the shaded area in Figure 1) must of course gain access to biological and medical data. Sources for these data include clinic or public health records, previous epidemiological surveys, household surveys, and informants. Historical materials often allow integration of medical, ecological, and sociocultural data, as in Laderman’s (1975) use of written materials from antiquity to document the spread of malaria through the Near East and the Mediterranean. In studying adaptation to endemic malaria in Sardinia, Brown (1981) relied on archival sources, use of extensive secondary data on population genetics and incidence of genetic buffers such as G6PD, analysis of information about anopheline ecology in relation to human cultural ecology on the island, and extensive traditional ethnography. With an excellent epidemiological and ecological data base, Brown was able to study systematically three adaptive levels of the cultural system, each of which affected risk and prevalence patterns of two strains of malaria: (1) settlement patterns and land utilization that led to differential risk for pastoralists and agriculturalists; (2) social organizational patterns that limited malaria exposure for children and women, especially pregnant women, as well as for the elite classes in general; and (3) ethnomedical beliefs that promoted certain practices which reduced the risk of periodic relapses. Besides looking at sociocultural and historical factors in the epidemiology of biomedically recognized diseases, medical anthropologists have also searched for biological components of so-called culture-specific syndromes. Research on pibloktoq (arctic hysteria) serves
as an example (Foulks 1972; Landy 1983, 1985; Wallace 1972). The most recent and plausible hypothesis, developed by Landy (1985), is that hypervitaminosis A (an excess of vitamin A from consumption of the liver and fat of marine and arctic animals) is responsible for the aberrant behavior.

In contrast to this more integrative model of biocultural interaction, human biologists focus their biocultural studies, which tend to be deductive, on human biological variability. Each of the three studies reported in this volume used multiple biological measures to assess health status. A field protocol might include, for example, 24-hour dietary recalls, medical history taking, genealogical infor-
mation, blood pressure readings, anthropometric measures including skinfolds, venipunctures, and fitness tests. The centrality of collecting physiological and morphological data in human biology is suggested by Figure 2, which depicts what I call a "segmented" biocultural model.

For many human biology researchers, steps toward a biocultural perspective are taken in seeking associations or correlations between biological data and other, discrete categories of data. Thus environmental and cultural data are segments of a broadly conceived research design, rather than central and holistically connected to the design, as they were in Brown's study of malaria. In a segmented model, the impact of culture upon the physical environment is often not fully addressed.

I am not claiming that human population biology always uses a segmented rather than an integrative biocultural model. Indeed, some of the best analyses of the distribution of sickle cell trait integrate cultural, ecological, and biological data in demonstrating historical links between agricultural expansion and technological change in West Africa, increase in the prevalence of falciparum malaria, and evolution of the sickle cell gene (Livingstone 1958; Wiesenfeld 1967). Carey's paper in this volume, with its complex holistic design, demonstrates quite a sophisticated level of integration among biological, biomedical and ethnomedical, and social variables. Szathmary's and Little's studies, in contrast, use a more

![Diagram of biological and biobehavioral variation]

**FIGURE 2**

*The segmented biocultural model.*
segmented approach which holds that biology and culture are linked, so that when one factor changes, effects can be measured in the other domain.

In the Dogrib study by Szathmary and Ferrell, the central issue is the association between change in life-style and change in the rates of a specific disease, noninsulin dependent diabetes mellitus (NIDDM), which affects many Native Americans. The population studied still has low rates of clinically defined diabetes but is considered at risk in terms of dietary, subsistence, and life-style change. In addition to concern with factors influencing disease prevalence and variability, Szathmary and Ferrell are interested in assessing the diagnostic applicability of a biochemical marker of circulating glucose level, %HbA1c, for identifying diabetics in this population. Their article reflects the biomedical definition of health that prevails in human biology and the reliance on clinical measures and laboratory analysis for the assessment of health.

Cultural variables become operationalized differently depending on the prior training of the anthropologist and how conveniently ethnography can be carried out. Human biological research is extremely rigorous. Large samples of subjects must be measured anthropometrically; blood, urine, saliva, stool, and other specimens may have to be collected; fertility data amassed; diets analyzed; measures of physiological response taken (e.g., diurnal temperature variation and blood pressure); health histories obtained; and so on. There may not be time for systematic ethnography, or perhaps funds may not have been allocated to include an ethnographer on the research team. Furthermore, prejudice against biocultural studies within physical anthropology reduces the chances of getting such work funded. Given these problems, a few well-chosen cultural variables are often simply built into the research design without requiring extensive ethnographic research. Settlement patterns, social structure, or subsistence become the key cultural variables, allowing comparisons between readily identified urban and rural groups of the same population, settled versus nomadic groups, polygynous versus monogamous households, fishing villages versus farmers, and so on.

For example, Little and Gray’s article demonstrates a comparative approach for assessing the impact of a changing subsistence system on children’s growth and nutritional status. As the authors note, nomadic pastoralism is on the decline in Africa. Population increase, drought, and outside intervention have led some pastoralists to seek wage employment and to settle in towns, while others maintain a traditional life-style. An obvious question is whether the move to towns is proving adaptive for the population. Infants, young children, and the elderly are the most vulnerable members of a society, and their growth rates, morbidity, and mortality are valuable indices of the stressors it faces. In Little and Gray’s study the central question is not whether settled Turkana are surviving, but rather whether their children are growing as well or better than nomadic children, what their sources of food are and its quality, and their levels of disease resistance. Change in subsistence and settlement pattern is a key cultural variable in the article by Szathmary and Ferrell as well, operationalized there in terms of a regional acculturation continuum along which clinical biochemical markers indicating risk of diabetes might be plotted. The key variables in Carey’s study, in contrast, are geared less to culture change than to social structural patterns and variations in social networks. Moving from microlevel analysis of health patterns, including work productivity, to macrolevel analysis of historical trends and political forces
in the region, Carey attempts to develop conceptual linkages between social systems and biological well-being. Carey is also concerned with assessing the utility of the adaptation paradigm and suggests that “discarding [the concept of] adaptation is premature, provided one can adequately mitigate its previous shortcomings through further methodological and theoretical integrated biocultural research” (p. 267).

A Biocultural Approach to the Study of Childbirth

Biocultural paradigms have been applied productively in studies of fertility management, especially in groups such as the !Kung San, whose fertility is greatly influenced by seasonal variations in nutrition (Bentley 1985). Study of demographic changes in the Nunamiut of Alaska (Binford and Chasko 1976) also used a holistic and integrative biocultural model. However, studies of childbirth itself have been oriented primarily toward cultural theory and methods (e.g., Jordan 1983; Kay 1982), with notable exceptions in the research by Trevathan (1987), a physical anthropologist, at a birth center in Texas, and studies of the timing and management of birth among the !Kung by Konner and Shostak (1987).

Birth is a human universal, with biological and cultural components interacting and affecting birth outcomes in any setting. While every pregnancy is a personal, psychological experience for a woman and her family, for the biocultural anthropologist it is also a demographic datum that reflects the fertility management strategies of a population or group. Every experience of labor is influenced by cultural conditioning, but labor is also a physiological process equally influenced by endogenous neurological and biochemical processes. First encounters between a newborn, the parents, and any siblings are very special events in the life cycle of each family, yet the ethnographer can study in these encounters species-specific communication that reflects behavior patterns which may have helped ensure the survival of human infants for millennia.

Three topics in the study of pregnancy and birth are especially amenable to a biocultural approach: theories of morning sickness and pregnancy cravings, management of labor pain, and postpartum depression. We will briefly consider each topic in terms of conventional explanations and alternative approaches.

Morning Sickness

About 50% of women of European background experience nausea or queasiness, food aversions, and sometimes vomiting in the first trimester. The reported frequency is around 25% in non-Western societies (Minturn and Weiher 1984). The sensations of excessive salivation and intestinal queasiness, which sometimes lead to vomiting, may be universal components of human pregnancy, yet they are highly variable in the degree to which they become defined as a symptom or syndrome and induce culturally framed biobehavioral responses. Men’s pregnancy symptoms, or “psychosomatic couvade” (Browner 1983), are fairly rare in Europe and North America but have been reported widely in non-Western societies. Both these syndromes are generally interpreted as psychosocial phenomena. Morning sickness is thought to be symbolic of ambivalence about pregnancy (Uddenberg, Nilsson, and Almgren 1971), and male pregnancy symptoms are be-
lieved to be psychosomatic expressions of anxiety or ritualized expressions of paternity (Munroe, Munroe, and Whiting 1973; Paige and Paige 1981).

However, there may be ecological determinants as well. A cross-cultural study of morning sickness by Minturn and Weiher (1984:72) suggests that certain foods, including maize, green vegetables, and foods with high fat content, seem to protect against nausea. Using data from the Human Relations Area Files, Minturn and Weiher found that 30 societies (of a sample of 83 societies reviewed) had information on morning sickness. Eight of these (27%) reported no morning sickness in pregnancy, and seven of the eight used maize as their staple food in addition to green vegetables and fats on a regular basis. None of the societies with morning sickness used maize as a staple (most used rice, meat, and milk products). Deficiency of vitamin B₆ is believed to contribute to morning sickness, and maize and green vegetables are good sources of this vitamin. Environmental factors, as played out in the interaction of available resources and food preferences, may play a larger role in morning sickness than previously believed. Clearly, additional research is needed with a larger sample of societies and field studies. Laderman’s study (1983) of the nutritional impact of postpartum food restrictions in Malaysia provides an exemplary biocultural model for the study of dietary practices and pregnancy symptoms. Investigation of cravings, geophagy and other forms of pica, and food aversions during pregnancy may also yield evidence of biocultural interactions (Hochstein 1968; Hunter 1973).

Labor Pain

Cultural models in anthropology hold that perception and management of pain in labor also depend on learning and cultural conditioning. There is considerable variation in the degree to which laboring women express pain in labor (cf. Sargent 1984), and we know from both classic studies (Zborowski 1969) and current research (Bates 1987) that ethnicity influences the interpretation of pain. Certainly no one goes into labor without some cultural guidelines (Morse and Park 1988), but the problem of the exclusively cultural view is that we may fail to recognize that environmental stimuli can induce physiological inhibitors or buffers against pain. We have much to learn about how symbolic associations, rituals, and placebos affect physiology (Moerman 1979). Endorphins, for example, not only reduce pain but also suppress anxiety and induce a sense of well-being, even ecstasy. Cultural practices known to raise endorphin levels include jogging, prayer, meditation, yoga, and acupuncture. Endorphins become elevated during labor and remain high in the blood of both the mother and the newborn for hours after delivery. The elevated endorphin level plays an important role in facilitating bonding, in stimulating milk production, and in giving a sense of euphoria to women who have not received medication during labor (Odent 1984:14–15, 77).

The Lamaze breathing techniques taught in childbirth preparation classes often help to induce a semidissociated state that buffers pain. And just as American husbands often learn controlled breathing with their wives in preparation for labor, so do people in other societies join in labor prayers and chants. Members of ashrams chant and pray in unison with the laboring woman (Hubbell 1982:15), and African-American women traditionally were encouraged to pray with the midwife on their knees during labor (Carrington 1978:45). Among the Mayans of Yucatan (Jordan 1983), birth talk is highly ritualized, almost chant-like.
Touch is another modality that can induce relaxation and reduce pain. Lamaze classes often teach massage and conditioned response to touch, and the British social anthropologist and childbirth educator Sheila Kitzinger (1979) teaches touch relaxation for clients from a wide cultural spectrum. Therapeutic touch, a formal healing mode taught to nursing students, is also used effectively in some childbirth classes (Peterson and Mehl 1984). Therapeutic touch, touch relaxation, birth talk, prayer and chanting, and self-induced meditation are all examples of biocultural techniques in which symbols and rituals affect physiology, reduce stress, and facilitate labor. As we discover how closely neurotransmitters, cognition, and somatic responses are integrated, the dichotomy of mind and body no longer seems very useful.

Management of the Postpartum Period

The postpartum period is also amenable to the biocultural perspective. Mead and Newton (1967) point out that in the critical transition from birth to the third or fourth month of life, when the infant is highly dependent on the mother, cultural practices clearly affect infant survival and neurological development. Trevathan (1987:143) refers to the human infant in the first months of life as "an exteroestagist fetus" in the sense that it is developmentally closer to a fetus in other primates than it is to nonhuman primate neonates (for example, in the proportionally small brain size, relative to adult size, and the late fusion of cranial sutures, which allows continued brain growth). Many traditional societies seem to recognize the "fourth trimester," in Newton’s terms, ensuring that infant and mother remain in skin-to-skin physical contact, with frequent nursing on demand, cosleeping, and usually vertical carrying during this period. In contrast, in industrial societies the mother-infant relationship in this transition is often more muted or attenuated, with mother and infant separated in hospitals after birth and later by clothing, cribs, strollers or prams, separate bedrooms, and nursing at wide intervals—conditions likely to interfere with normal bonding and optimal neurological and emotional development (see McKenna [1986] for analysis of a possible relation between sudden infant death and separate sleeping).

Postpartum care of the new mother differs across societies, too, with rituals, gifts, special foods, and taboos to mark the vulnerable transition from pregnancy to motherhood (Laderman 1983). For example, postpartum women in Taiwan and the People’s Republic of China observe a period of seclusion called “doing the month” (Pillsbury 1978), during which they eat special foods, avoid drafts, do no housework, and rest. Traditionally, Hispanic women have observed a period called la cuarentena, during which they, too, have been expected to rest, receive help with housework and child care, and avoid certain foods and unpleasant or upsetting experiences. Given this management, it is not surprising that reported rates of depression are low in Stern and Kruckman’s cross-cultural review (1983) of postpartum depression. Harkness (1987:199) found no evidence of depression in psychosocial interviews of postpartum Kipsigis women of rural Kenya, where a new mother is secluded for a month while various women carry out her usual household work.

In urban Europe and North America, in contrast, women living in nuclear families are often expected to resume normal activity levels shortly after birth, in
spite of lack of sleep and changing hormonal patterns. They are frequently iso-
lated and unsupported in caring for the newborn. Many experience depression, a state which medical personnel explain as hormonally induced, failing to rec-
ognize that cultural expectations can interact with fatigue and hormones to exac-
terbate depression (Harkness 1987).

This section has demonstrated issues in the study of women’s health for
which biocultural research designs could be developed. Similar issues have been
raised in reference to seasonality and women’s work (Huss-Ashmore and Good-
man 1988), ecological dimensions in differential survival of male and female chil-
dren (MacCormack 1988), and medical ecology models for study of women’s
reproductive health issues (Townsend and McElroy 1990).

Conclusion

The field of medical anthropology has tended to fragment along intradiscipli-
ary boundaries between cultural and biological anthropology and along inter-
disciplinary boundaries between anthropology and medicine. Biocultural studies
offer the promise of bridging these boundaries through the development of both
theory and methods that link biological and cultural variables. The move toward
transdisciplinary integration should have interesting and complex repercussions
on the ways we teach and carry out research over the next decade.

Notes

Acknowledgments. I would like to thank Alan Harwood, A. T. (Ted) Steegmann, and
Patricia K. Townsend for helpful comments on initial drafts of this article, and Rebecca
Huss-Ashmore, Carol Laderman, and Deborah Crooks for thoughtful suggestions regard-
ing appropriate literature. Participating in the graduate Integrative Seminar of the Depart-
ment of Anthropology at SUNY Buffalo over the past two years with Fred Gearing, Mar-
garet Nelson, Ted Steegmann, and Barbara Tedlock has strengthened my commitment
to developing integrative approaches in the training of students and has increased my appec-
tiation of the challenge and difficulties of launching interdisciplinary and collaborative
research.

Correspondence may be addressed to the author at the Department of Anthropology,
State University of New York at Buffalo, 380 MFAC, Buffalo, NY 14261.

The terms “human biologist” and “biological anthropologist” will be used inter-
changeably in this paper. More formal terms often used for this discipline are “adaptive
human biology” and “human population biology.” Little and Haas (1989:3) identify the
field as transdisciplinary with a biobehavioral and biocultural base and origins in anthrop-
ology. The term “physical anthropologist,” used occasionally in the paper, refers more
broadly to a subdiscipline of anthropology that encompasses a wide range of specializations
(paleontology, paleopathology, primatology, population genetics, comparative primate
anatomy and morphology, human biology, and others, some of which address biocultural
issues and others which do not). The term “biocultural” does not refer to a type of anth-
thropologist, but rather to an approach or paradigm that has been used by a variety of re-
searchers, including medical geographers, medical ecologists, human biologists, and oth-
ers.

3Predicated on distortions of key concepts in medical ecology and adaptation theory,
these criticisms view biological categories merely as emic categories of Western culture,
without cross-cultural or universal applicability. The thrust of these criticisms is to question
the value of the natural science paradigm in medical anthropology, a trend that has been
called "science-bashing." Those on the current antiscience bandwagon seem to be proposing that we abandon biological and evolutionary models and replace them with critical, interpretive, and cognitive models. The ecological perspective has come under particular attack by critical medical anthropologists such as Singer, who equates ecological models with environmental determinism. Singer (1990:180) claims that medical ecologists interpret disease rates as "measures of environmental fitness," an approach that he thinks "sets the stage for victim-blaming." This interpretation of the ecological approach oversimplifies the concepts of environment and adaptation. Medical ecologists do not limit "environment" to the physical resources and constraints of the immediate area, nor do we consider disease to be evidence of lack of "fitness" in either a Darwinian or Spencerian sense. Rather, relative health of a population (as reflected in its morbidity, mortality, fertility, and stress profiles) is studied and interpreted in medical ecology in terms of population level as well as individual responses to problems and challenges in the sociocultural (including political) and physical environment. Where malnutrition, high infant mortality, infectious disease, and subfecundity are outcomes of these responses, we do not blame the "victim" (the responding population) but rather interpret these outcomes as reflecting a wide range of interactional determinants. Singer (1989:227) states that medical ecologists ignore historical cases of oppressive social relations or try to squeeze them into "conceptual categories of ecologic theory," confusing social relations with environmental relations. This distortion is partly based on selective reading of Moore et al. (1980) and of McElroy and Townsend (1979, 1989), without consideration of the texts' discussion of alternative perspectives for analyzing cases of colonialism, culture change, economic development, and modernization (e.g., McElroy and Townsend 1989:292–296, 325–334, and 346–349). Morgan (1987:145), while still critical of biomedical approaches, acknowledges that ecological and biological factors do affect health.

Among the major projects considered to be exemplars were the studies in the Peruvian Andes directed by Paul Baker (Baker and Little 1976), work with the Yanomamo and other South American tribes by Neel, Chagnon, and colleagues (Neel, Layrisse, and Salzano 1977), and work with the Inuit and Aleut of Alaska (Jamison, Zegura, and Milan 1978; Laughlin 1970; Laughlin and Harper 1979).

Townsend (1989) questions why the "dominant paradigm" (that is, medical ecology) "does not dominate" and why, with "the exception of excellent work in human biology, the ecological approach is not being tested much in research" (1989:8). Among the reasons she considers are that while medical ecology "fits comfortably within the evolutionary ecology that remains characteristic of physical anthropology, relationships with cultural anthropology are considerably more strained . . . and at odds with key assumptions that dominate the cultural anthropology of the 1980s" (1989:9).

The anthropologist who is also a physician and is trained and qualified to do physical examinations and analyze biological specimens is at a special advantage in biocultural studies. Lewis (1975), whose study of New Guinea is considered by Landy (1983:202) to be an outstanding medical ethnography, serves as an exemplar. Some nonmedically trained anthropologists acquire necessary skills (for example, in drawing blood and preparing it for laboratory analysis) when the research design makes such techniques imperative. Laderman (1983) provides an example of this approach in her study of the nutritional status of pregnant and postpartum women in Malaysia.

Inclusion of a research team member trained and assigned to collect ethnographic and social epidemiologic data greatly enriches biomedical studies of isolated populations, as illustrated in Dye's study (1989) of infant diarrhea patterns in a Himalayan Kashmir Indian village.

This view is based on information provided by A. T. Steegmann, Jr. (1990, personal communication).

Trevathan (1987:102) notes that nonhuman primates and other animals have been observed to be in apparent pain (grimacing, moaning, crying) during labor and delivery,
bringing into question claims by advocates of prepared childbirth that pain in labor is not ‘‘natural’’ but rather is due to cultural beliefs inducing fear and protective tension in uterine muscles (e.g., Read 1953:12).

Trevathan (1987:144) traces a complex interplay between biology and culture in her analysis of delayed maturation in human infants. She states, ‘‘It may have been adaptive to be born at a more undeveloped stage so that brain growth could take place in the presence of environmental stimuli rather than in the relatively unstimulating uterus.’’

The assumption that maternal-infant bonding is universal and perhaps species-specific has been questioned by Scheper-Hughes (1987) in her study of maternal detachment in Brazil.

Harkness (1987:194) states that transient depression affects 50%–80% of American women in the first week after childbirth, while about 20% experience clinical depression.

REFERENCES CITED

Alland, Alexander, Jr.
Baker, Paul T.
Baker, Paul T., and J. S. Weiner, eds.
Baker, Paul T., and Michael A. Little, eds.
Baker, Paul T., Joel M. Hanna, and Thelma S. Baker, eds.
Bargatzky, Thomas
Bates, Maryann S.
Becker, Gaylene
Becker, Gaylene, and Robert D. Nachtigall
Bentley, Gillian R.
Blakely, Robert L.
Bogin, Barry, and Robert B. MacVean
Brown, Peter J.
Browner, Carole H.
Browner, Carole H., Bernard R. Ortiz de Montellano, and Arthur J. Rubel
Buikstra, Jane E.
Carey, James W.
1988 Health, Social Support, and Social Networks in a Rural Andean Community of Southern Peru. Ph.D. dissertation, Anthropology Department, University of Massachusetts at Amherst.
Carrington, Betty W.
Chagnon, Napoleon A., and William Irons, eds.
Dobzhansky, Theodosius
Dye, Timothy De Ver
Fouks, Edward F.
Friedlaender, Jonathan S., ed.
Frisancho, A. Roberto
Garn, Stanley M.
Kay, Margarita, ed.  
Kitzinger, Sheila  
Konner, Melvin, and Marjorie Shostak  
Laderman, Carol  
Landy, David  
Lasker, Gabriel W.  
Laughlin, Charles D., Jr., and Eugene G. d’Aquili  
Laughlin, William S.  
Laughlin, William S., and A. B. Harper, eds.  
Leatherman, Thomas L., R. Brooke Thomas, and Susan Luerssen  
Lee, Richard B., and Irven DeVore, eds.  
Leonard, William R.  
Lewis, Gilbert  
Little, Michael A.  
1989 Adaptation as a Concept in Biological Anthropology. Paper read at the 88th annual meeting of the American Anthropological Association, Washington, DC.
Little, Michael A., and Jere D. Haas, eds.  


Stini, William A.

Thomas, R. Brooke

Townsend, Patricia K.

Townsend, Patricia K., and Ann McElroy

Trevathan, Wenda

Uddenberg, Nils, Ake Nilsson, and Per-Erik Almgren

Walker, Sonia L.

Wallace, Anthony F. C.

Wellin, Edward

Wiesenfeld, S. L.

Zborowski, Mark