

CULTURAL NUTRITION: ANTHROPOLOGICAL AND GEOGRAPHICAL THEMES

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Louis Evan Grivetti

Department of Nutrition, University of California, Davis, California 95616

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INTRODUCTION

Cultural nutrition is a modern name for an ancient subject. The integration of dietary-nutritional themes with cultural disciplines, specifically anthropology, economics, geography, history, psychology, and sociology, may be traced to ancient societies of China, India, Mesopotamia, Egypt, Greece, and Italy. Themes of cultural nutrition persist throughout the Medieval period and form a distinct field during the early 20th century in Europe, and subsequently in North America (76).

Nutritional anthropology, a subfield of cultural nutrition, has received increased attention during the past 50 years, beginning with classic publications by Richards on the social-nutritional roles played by food in traditional African society (171–173). Nutritional anthropology, however, also draws on the vast literature of archaeology and ethnography, as well as on accounts by explorers, missionaries, and travelers who describe food behavior, diet, and nutritional consequences of ancient and contemporary non-Western hunting-gathering, pastoral, or agricultural societies. Although recent reviews (66, 67, 83, 84, 89, 128, 129, 147, 148, 205, 206, 224, 225) and texts (8, 62, 107) on nutritional anthropology take different organizational approaches to the complicated interrelationships between culture, diet, and nutritional status, all demonstrate clearly that humans seek food, not nutrients, and suggest that sound diet, as well as malnutrition, are best understood through examination of cultural, economic, environmental, and historical determinants.

Nutritional geography, which originated with ancient Greek and Roman Mediterranean geographers (83) and subsequently developed in Europe and North America during the early 20th century, builds on the pioneering work of Hettner and his students at Heidelberg, who investigated historical food habits and dietary traditions of European and Middle Eastern societies (48, 113, 183). Geographers, like anthropologists, have sought the environmental and social determinants of food habits and their nutritional implications (195). Geographers, too, have focused on historical (196, 197) and religious (85, 106) themes in their investigations of food and diet. Other geographical research in recent years has concentrated on the cultural-environmental determinants of famine (38, 119, 154), why humans consume toxic foods (80, 116, 146), geographical and historical aspects of pica (104, 212, 213), and the geographical distribution of lactose malabsorption (52, 186, 187, 189, 191).

Historians interested in food and diet also have been prominent contributors to cultural nutrition. Historical works generally have focused on regional dietary patterns, usually by specific time periods, as demonstrated by important publications on American (35), English (13, 51, 142), Italian (143, 176), Russian (216), Chinese (30, 103), and Japanese (158) food habits, or on specific food items or themes such as the potato (181), infant feeding practices (222, 223), or the history of food procurement (37, 137, 168). Psychologists, long intrigued by questions of food aversions (193, 215), problems of dietary acceptance of new foods (96, 163), and principles underlying sensory evaluation of foods (156), have advanced cultural nutrition since the mid-20th century. Indeed, it can be argued that two psychologists, Lewin (131) and Maslow (139), established the research paradigms that permit careful description and analysis of human food preferences,

assessment of the cultural, economic, and environmental determinants of food selection, and evaluation of food use as an expression of social status. Sociologists, with their focus on contemporary rural or urban societies, have investigated food habits and dietary intake especially in American rural populations (36, 41). Economists, not widely recognized as contributors to cultural nutrition, nevertheless have published widely on cultural-economic factors that affect production of foods in Africa (108, 110), on nutritional and production costs of field crops (111, 144, 226), and on maximizing economic-nutritional return under conditions of limited cash and environmental resources (43, 44).

This essay considers cultural nutrition, the broad associations between human behavior, dietary intake, and nutritional status. The initial sections identify the ancient, historical foundations of the field; the remaining sections turn to complementary approaches used by cultural nutritionists. The historical foundations and research approaches serve to introduce three selected research themes: evolution and development of human dietaries, religion and restricted dietaries, and perspectives and ethical considerations associated with the world food problem.

CULTURAL NUTRITION: EMERGENCE OF A THEME

Archaeological records abound with information on human diet. These data, however, vary in quality and quantity depending upon the study area and the time-period investigated. In arid or cold climates food remains are better preserved than in moist, humid tropics where archaeological information on food and diet is nearly nonexistent. Researchers on ancient diet, or paleonutritionists, must evaluate many kinds of data: traces of food found in the stomach or intestines of well-preserved mummies; human coprolites (fossilized feces); desiccated food offerings found in tombs or burials; artistic renditions of food production, processing, cooking, storage, and even dining; texts that identify rations, food offerings, and menu items; and the hypothetical mythological, magical, and religious texts concerning food (21, 25, 98, 178, 209, 210, 217).

The most complete chronological sequence known of ancient human food and diet stems from the Nile Valley civilizations (Ancient, Ptolemaic, Roman, Byzantine, and Arab Egypt), where aridity, coupled with religious beliefs that necessitated food offerings and tomb ornamentation, presents a legacy of more than 5000 years of continuous food-dietary history (39, 70, 115, 135, 177). Less complete but equally important are data from ancient China, where the archaeological history of food, diet, and nutrition may be traced for over 7000 years and beyond to remains associated with Peking

man (27, 28, 30, 132). Indeed, archaeologists, food historians, and geographers have looked to China and Southeast Asia in general as early centers for human food production (30, 133).

Between the geographical positions of China and Egypt lie other great ancient civilizations with less-well-preserved food and dietary records. The foods of Mesopotamian cultures are partially known (34, 208), but because of problems of preservation, sedimentation, and incomplete records, the level of knowledge is less than that for Chinese or Egyptian sites. Although knowledge of the Indus valley civilization of ancient India is incomplete, elsewhere on the subcontinent a rich, ancient food heritage has survived. The Dharma-Sutra texts outline dietary codes, identifying permitted and forbidden foods, activities associated with food preparation, the correct manner and place of eating, how food is to be received, and techniques of food disposal and storage (6, 14, 69, 123, 211).

The Mediterranean societies, specifically those of ancient Greece and Italy, have left unparalleled descriptions of food and diet, ranging from everyday fare to exotic banquets (7, 161). Of specific interest are descriptive geographical accounts of diet by Herodotus (99), Strabo (202), Pliny (165), and Diodorus Siculus (47) that detail food production, preparation, and dietary habits of various Mediterranean peoples from Gibraltar eastward to the Bosphorus. The most important account, however, is by Athenaeus (9), who used the literary medium of the banquet discourse to identify and locate geographically the principle food resources and dietary traditions throughout the ancient Mediterranean lands.

It is the Mediterranean societies, too, that produced the Hippocratic (101) and Galenic (68) systems of medical diagnosis and treatment, the humoral theory based on perceived imbalances of blood, phlegm, black bile, and yellow bile. This ancient healing system utilized diet in treating disease, the so-called hot-cold system, ultimately transferred to Arabic medicine with dietary impacts throughout the Middle East and North Africa (105), Spain (31), and ultimately the New World (97). The Mediterranean semetic faiths of Judaism and Islam eventually evolved sharp cultural dietary differences in food use, apparent when examining food habits with regard to mixing dairy with meat products: Moslems are permitted to blend milk with meat but not milk with fish, whereas Jews may mix milk with fish but not milk with meat (81, 145).

The era of European sea navigation, beginning in the late 15th century, brought a widened exposure to world food and dietary patterns with subsequent radical changes in diets and nutritional status. After exploration came trade in spices and exchange of food resources between the New and Old Worlds. These contacts ultimately led to the "Americanization" of the West African diet via the slave trade after establishment of New World crops

such as maize, peanuts, and tomatoes (108, 214). The emergence of the nutritional disease pellagra in the Old World was one result of the transfer of maize from Mexico into southern Europe (160). The classical report by naval surgeon Lind, physician with Captain Cook, on the role of citrus fruits in preventing scurvy during long voyages (134) stems from this period. Less well known, however, is the professional relationship between Captains Cook and Bligh, and the subsequent British plan for transplanting breadfruit from the South Pacific into the Caribbean. It was Bligh's decision to water the precious seedlings, rather than serve scarce fresh water aboard ship to his crew that led directly to the famous *Bounty* mutiny, with important ramifications on British international policy, Western literature, and ultimately the cinema (18, 102, 151). Other important historical themes in cultural nutrition have included the wide-spread distribution of tea and coffee and their eventual positive impact on public health due to the boiling of water, and the parallel rise in the importance of sugar as a reflection of increased consumer demand for a readily available sweetener (10, 17, 149, 207).

CULTURAL NUTRITION: RESEARCH APPROACHES

Although food, diet, and history remain inextricably linked from antiquity to present, each social science field contributing to cultural nutrition has evolved different perspectives and research approaches.

Environmentalism

Widely held from antiquity to the early decades of the 20th century, environmentalism still has adherents today. The approach holds that cultural traditions associated with food intake, and thus the nutritional status of the consumer, are determined primarily by environmental or external influences. Environmentalism, disputed today by most cultural nutritionists, states that humans are molded culturally and physiologically by their environmental setting. Diet, therefore, is regulated by heat, cold, altitude, and humidity and is determined by available foods. As a result, environmentalists suggest that different individuals or cultures will evolve parallel patterns of food behavior and diet under similar environmental settings. Other environmentalists suggest that malnutrition is a function of external factors, for example drought, and basically is uncontrollable by humans destined to live and occupy niches of poverty (40).

Cultural Determinism

The opposite of environmentalism is cultural determinism which is controversial today. Followers suggest that dietary behavior is culturally deter-

mined and that humans have the capacity to mold their environment at will, with the result that any dietary pattern is possible. Culture is viewed as the major determinant of diet, which suggests that different dietaries will evolve within similar environmental niches, depending on social factors present. Famine is viewed as a cultural problem and malnutrition is considered to be culturally based, not the result of environmental deprivation.

Cultural Ecology

The approach of cultural ecology lies midway between the poles of environmentalism and cultural determinism. Practitioners examine the contributions to food, diet, and nutritional status presented by both the environment and the culture. Cultural ecologists recognize that both humans and the environment exert pressures on the other to ultimately influence opportunities or potentials for dietary and nutritional success or failure.

Cultural History

Although the cultural-ecological approach is widely followed today, other researchers prefer a historical-archaeological perspective to their studies of human diet. Such cultural history researchers attempt to unravel the origins and dispersals of foods within and between world regions. Ultimately they seek to understand the nutritional relationships that have evolved through time, which result in given dietary and nutritional patterns.

Functionalism

Functionalists identify and explain the origin, development, and maintenance or abandonment of food habits on a non-nutritional basis. They believe that customs associated with food and diet are not founded on nutritional knowledge or physiological drives. Functionalists hold that food habits stabilize society, that foods are used primarily in non-nutritional ways, specifically to identify the age, gender, physiological status, class, social status, even occupation of the consumer. The functionalist approach, coupled with cultural history, permits researchers to examine how dietary practices originated, why they persist, or change, and whether they have predictive value when examining suggested programs of dietary change.

Regional vs Local Studies

Most cultural nutrition investigations are conducted among small populations within a limited geographical area and thus present a problem when the results are extrapolated beyond the immediate study boundaries. Conversely, understanding problems on a regional or global level necessitates a broad investigation, permitting little depth, with minimal applicability to local conditions. This research paradox is called the problem of scale by geographers. It cannot be resolved; it can only be appreciated.

CULTURAL NUTRITION: SELECTED TOPICS

Evolution and Development of Human Diets

How have humans evolved safe and nutritionally sound dietary habits? It is difficult to unravel the history of human dietary evolution, and researchers in recent years have been sharply divided. One view is that ancient humans were primarily carnivores (91), whereas others believe that ancient humans were primarily vegetarians (109). Still others take the intermediate position that early humans were omnivorous, utilizing a relatively balanced intake between animal and vegetable foods (204).

The archaeological fossil record is used unsuccessfully to buttress all views. The data however are incomplete because of the selective preservation of bone, chitin, and teeth, with differential loss of soft animal and vegetal tissues. Such selective preservation precludes a detailed evaluation of the fossil record for the dietary composition of early human diet. Osteological and dental evidence, combined with comparative morphology, however, suggest that early humans had a general nonspecialized diet (15). But such a view, although tempting, is unsupported by the accompanying fossil record since associated food remains are almost devoid of plant materials.

Central to the argument surrounding the "human as carnivore" theme is the controversial thesis of Leopold & Ardrey (130), which suggests that most wild plants are toxic to humans, because of the presence of allergens, enzyme inhibitors, physiological irritants, vitamin antagonists, or substances that interfere with human hormonal balance. Cooking neutralizes most of these antagonistic properties, but fire as a cooking tool dates only from ca 300,000 BC. Thus, for 80% of the nearly 2.5 million years humans have been on earth, food has not been cooked. Although a diet based on raw flesh and plants can be sound, Leopold & Ardrey (130) suggest that inclusion of plant materials in the primitive human diet would sharply increase its toxicity. They conclude that a plant dietary pattern would be maladaptive.

Human jaw and tooth morphology, however, argue against the concept of "human as carnivore." Leopold & Ardrey, nevertheless, have raised the important issue of dietary safety in relation to human dietary evolution. How have humans evolved safe patterns? Although many toxic plants are bitter and therefore easy to identify, others remain quite palatable. Bitterness alone does not deter human infants from tasting and testing such products. As many as 9000 infants and children in 20th century America, poisoned each year by ingesting bitter portions of decorative household plants, attest to this fact (140). Societies, therefore, have had to develop screening, filtering mechanisms to evaluate unfamiliar plant items. Whether this has been accomplished through a period of trial and error, during which many individuals were poisoned, including formalized use of human

or animal “tasters,” or through other mechanisms, is not clear. Once the plants within an econiche were identified as safe or toxic, the information could have been transmitted through language.

Traditional hunting-gathering societies in antiquity as well as today are not static in territory. Conventional views hold that the New World was populated by humans for the first time via the Siberian land bridge, perhaps as early as 35,000 BC (136). The distance from Alaska to the southern tip of Argentina, however, exceeds 15,000 miles—a distance encompassing hundreds of different vegetation zones and botanical econiches. If Leopold & Ardrey (130) are correct, what mechanisms permitted humans to migrate such distances while maintaining a stable, safe food supply?

In studies on early human dietary patterns researchers have turned to two research paradigms. The first are investigations of free-ranging primates, examination of foraging strategies and dietary intake under environmental conditions similar to those of early humans. The second are studies of contemporary hunter-gatherer societies and examination of how humans have resolved the food quest and maintained quality nutritional status without utilizing domesticated plants or animals.

Evidence from free-ranging primates has provided some clues. Baboons prefer meat to all other dietary elements. Fruits, seeds, and buds are second choices and leafy vegetation is third. Plants rejected as food may become part of the baboon diet if they have previously been burned, e.g. in a brush fire. Baboons, gorge on specific single foods; they do not pick and choose a variety. The items selected tend to be either sweet or sour with dominant males and females having more access to food than subordinate males and females (91). Further studies by Hamilton and co-workers on free-ranging baboons in the Okavango delta of Botswana pose an interesting question. In 3 years of observation, no researcher has ever seen adult males or females feed infants. Furthermore infant feeding patterns appear not to match adult patterns in a given feeding space. This suggests that infant feeding patterns are not based on observation of adults (personal communication). Given the relative toxic plant environment suggested by the Leopold & Ardrey thesis (130), how is information on food safety transmitted to infant baboons?

Complementary studies conducted on contemporary African hunting-gathering populations have provided insights into food safety, nutritional quality, and food procurement strategies of ancient humans (126, 127, 138). It was once widely believed that such societies never advanced economically or technically because most waking hours were required for the food quest, thereby allowing no leisure time for substantive inventions or occupational specialization. This archaic view has been challenged by researchers (100, 124, 127) who noted that hunter-gatherer bands spend relatively little time hunting game. Most of their diet is plant based, provided primarily by

females, not males, and 3–4 days per week are spent in leisure, basically resting or in social exchange.

Since hunter-gatherers appear to have abundant leisure time, how that time is utilized has intrigued cultural nutritionists interested in the evolution of human dietaries. Since hunter-gatherers do not possess domesticated plants or animals, what are the processes that ultimately have led to domestication? It is widely agreed that domestication does not occur as a direct response to drought, famine, or periods of social unrest, since satisfying immediate food needs are paramount at those times. It logically follows that domestication must take place during periods of leisure and abundant food supply, hence the paradox, why domesticate? Indeed, in a classic paper, Harlan demonstrated that a human armed with a flint sickle could easily harvest enough wild grain to supply family dietary needs (94).

Was domestication primarily purposful or accidental? Were the motives that underlie domestication based on food or non-food needs? Those supporting accidental domestication believe the process resulted when humans and animals were brought together within constricted geographical areas, such as narrow river valleys, oases units, even land pockets surrounded by glacial ice during the Pleistocene, a proximity that resulted in mutual exploitation (227). Still others have suggested an accidental origin for plant domestication in refuse heaps along the periphery of hunter-gatherer encampments. There, food refuse could sprout, then become available for human use when the nomadic band returned to the site at a later time in the annual activity cycle (4). It is also possible that useful plants could have sprung from the concentrated dung of penned animals (82).

Other researchers, however, believe that domestication was purposeful. Such views, however, are sharply divided between domestication for food or domestication for other economic or for religious purposes. The latter suggest that the motives for domestication were for animal by products such as leather and hair, or for riding purposes or beasts of burden (32, 122). Religion could have provided a motive for domestication in the sense that animals were needed for aesthetic purposes, as sacrificial subjects, or for use of byproducts, such as horns, in religious ceremonies (90, 159).

With plants it is difficult to suggest a food purpose for domestication. Research on wild plant utilization of contemporary societies suggests that decorative ornamentation, fiber, magical, and medicinal uses are attached more directly to semidomesticates (wild species removed from bushlands and transplanted and tended by humans) than food value (74, 77) (see also 125).

Whatever the accidental or purposeful motives behind plant and animal domestication, and whether the impetus was for food or non-dietary needs, the appearance of domesticated plant and animal species radically affected

the food supply of humans and changed their economic activities. Current archaeological data suggest the earliest appearance of domesticated plants and animals is China and Southeast Asia, with dates exceeding 20,000 BC (29, 72, 194). Such dates are substantially earlier than those for the Fertile Crescent, the archaeological-civilization zones that extend from western Iran westward in an arc through Mesopotamia to ancient Palestine, or for northern Egypt (12, 201). Yet exciting new information, relating to possible domestication of barley, has emerged from southern Egypt, implying that ancient Nile Valley hunter-gatherers were utilizing wild grasses as food as early as 19,000 BC (218, 219).

The impacts of domestication have been worldwide. As a result, diets have become progressively less diversified as societies have focused on a more specific range of domesticated food resources. This loss of diversification is normally offset by the quantity of food produced, but with some risk. There remain serious potential nutritional consequences when shifting from a wide dietary resource base (hunting, gathering, animal husbandry, agriculture, horticulture, barter, gifts, and cash) to gradual elimination of available wild plant foods that have played important nutritional roles in human diet, that are protective and environmentally adapted to heat, cold, and other climatic vagaries (45, 49, 164). Although no serious person calls for a return to a hunting-gathering past, it is important not to lose ground by accelerating bushland destruction for intensification of monoculture of consumables and then shifting economically to intensified monoculture of non-consumables merely to improve income and cash distribution.

Thus, one of the most controversial topics today within cultural nutrition is, does agricultural development and economic improvement lead to improved nutritional status? The evidence, at best, is mixed (46, 175), since it is not logical to expect that improved economic conditions automatically lead to better health or nutritional status. Nutritional improvement is but one component of a complicated system linking culture, environment, and health. A change or improvement in the system may lead to better nutritional status, but results are not certain.

Religion and Restricted Diets

Religion and its relationship to food habits has attracted writers for at least 1800 years, beginning with the appearance of early works that evaluated Jewish dietary traditions (155). Today, most work on food and religion considers dietary taboos associated with Judaism (85, 152), Christianity (185), Islam (179, 180), and Hinduism (188, 190). Other research, however, has considered the nutritional implications of religious practices, especially physiological aspects of fasting during the Islamic month of Ramadan (117, 150), or examination of the historical and political consequences of Advent

and Lenten fasts practiced by Ethiopian Coptic Christians (120). Religion, diet, and public health as they relate to carrion consumption has been another area of research (57, 162), because societies without a carrion taboo may be nutritionally advantaged over Jewish, Christian, or Islamic peoples during periods of drought or social unrest when flesh from animals dead from starvation is readily available (74). Religion, too, may strongly affect nutritional status if alcohol prohibitions are enforced, especially when lightly fermented products provide essential nutrients and serve as sources for safe, uncontaminated fluids (5, 63, 157).

Another research interest of cultural nutrition is maintaining dietary codes in a 20th century food-processing world. Both Judaism and Islam have parallel injunctions defining fit (kosher; halal) and unfit (terephah; haram) meats. Although easy to distinguish in the broad view, problems arise when decisions must be made daily regarding suitability of food products in the marketplace. Without knowledge of how permitted animals are slaughtered, or what the source is of animal byproducts listed on package labels, Jews and Moslems must restrict consumption of numerous items, rejecting vitamin pills, marshmallows, and many types of desserts. Cheese is suspect since some varieties have been produced by using rennin obtained from swine. Emulsifiers, such as magnesium stearate, mono-diglyceride, glycerine, polysorbates, and monostearates may be produced from either plant or animal substrates or resources. Vitamin and mineral supplements are subject to close scrutiny since vitamin D from shark oil is forbidden as a fish without scales, but vitamin D from immature sharks is permitted. Even calcium supplements obtained from bone meal is prohibited unless the animal is slaughtered correctly (33, 50, 88, 114, 169).

As a result of labeling confusion and difficulties of maintaining Islamic dietary codes within the United States, conservative Moslem students may become vegetarians to adhere to their religious practices. Given that most Moslem males come to America from societies where men do not regularly shop for food or cook, arrival in America for graduate studies may pose a potential nutritional risk, especially if the individuals elect a vegetarian regimen as well.

At the core of cultural nutrition, however, are studies on ethnic diet. It has been suggested recently that the term food habits is inappropriate, since habit implies a static relationship and dietary patterns are dynamic (86). It is clear, however, that specific components of diet are subject to radical, abrupt changes, whereas other elements resist change even through generations of consumers.

One current research area is examination of dietary changes by adults. What factors contribute to sudden decisions to alter diet, whether to lose weight, adopt vegetarian regimen, or modify protein, fat, or carbohydrate

percentages? Minor changes in food habits pose little problem with nutritional or health status of consumers, but major, radical dietary shifts pose potential problems, especially if the new consumption patterns are based on misinformation or are made eclectically without regard to established nutritional principles.

The attitudinal and behavioral factors that influence radical dietary change in human populations have been investigated in fad dieters who regularly institute and practice major changes in regimen, only later to resume previously engrained patterns (112, 198). Immigrants, too, experience radically altered dietary patterns because locally available foods may not permit maintenance of former diet. Thus, immigrants must make major dietary modifications or purchase costly specialty foods (200). Religious converts also experience radical shifts in diet as reflected by Seventh Day Adventist customs (220, 221), initiates into several Christian monastic orders (95), and American devotees of several Asian religious philosophies (59–61, 64, 153).

Religious converts appear to be more successful in maintaining altered dietary regimen than either fad dieters or immigrants. Today, within the United States, there is an increasing attraction towards religious philosophies requiring non-flesh, vegetarian diets. Vegetarianism, although not specifically a religion, is especially attractive to many college- and university-age students.

Building upon the work of Johanna Dwyer et al (53–56), at least 13 factors that influence the shift to vegetarian practices may be identified: body image (I became a vegetarian to lose weight); chemical use (I became a vegetarian to avoid chemicals/hormones in meat); curiosity (to examine the vegetarian lifestyle and discover what it was about); ecological reasons (vegetarianism is less wasteful than a flesh regimen; vegetarianism does not contribute to the world food crisis); economics (meat has become too expensive); health (to improve personal health and vitality); imitation (because friends were vegetarian); mental needs (to improve thinking and mental clarity); political protest (directed against the “establishment” food industry); rebellion (because parents consumed meat); religion (to attain spiritual balance); sanctity for life (wrong to kill); and sensory/aesthetics (bloody meat is unsightly; meat smells; meat is awful to touch; meat tastes terrible) (79, 87).

Once the decision for vegetarianism has been made, the convert is pulled two ways: towards maintenance and towards recidivism. Supporting factors that help vegetarians maintain their regimen include environmental setting (living/cooking with other vegetarians), peer support, parental support, perceived religious/spiritual growth, perceived less-offensive body odors than previously, perceived improved digestion than previously, perceived

new calmness (expressed as better able to control factors affecting one's life), sensory reinforcement (sight, smell, taste, and touch of meat remain repugnant), and perceived health reinforcement (expressed as becoming ill when abandoned vegetarianism, so resumed) (79, 87).

Conversely, other factors pull or divert vegetarians from their decision and contribute to recidivism: parental pressure; pressure from older, non-vegetarian siblings or relatives; pressure from non-vegetarian peers/friends; cravings or force of previous food habits; frustration (expressed as being a vegetarian is too much of a problem); fear (expressed as not knowing how to prepare safe, nutritious vegetarian meals; not being able to distinguish sound from unsound vegetarian literature); meal setting (forced to eat where it was not possible to avoid meat or meat products); meal setting (dining at parent's home when an old, favorite meat dish was served); meal setting (dining at home during special holidays or sentimental family gatherings where meat is served); and meal setting (invitations to dine with non-vegetarian friends or employers) (79, 87).

Despite a vast literature on vegetarianism, approached from the viewpoints of historical development (92, 174), nutritional findings (58, 93, 118, 121, 170), and religious considerations (22, 42, 95, 167, 192), it remains unclear why, how, and when potential vegetarians make their initial commitment. Awareness of vegetarian tenants can occur early or late in life, well after establishment of ingrained, personal dietary patterns. The resolution to initiate a vegetarian regimen can take a long or a short while: It may be experimental first, with several oscillations between vegetarian and non-vegetarian patterns, before final implementation; or it may be suddenly abrupt. Regardless of how the decision is reached, dietary behavior is substantially and radically altered. Such behavior runs counter to the frequently expressed belief that food habits are hard to change.

Maintenance of vegetarian dietary changes may be sharply contrasted with failures of fad dieters, who quickly alter their food habits, only to resume their earlier customs and regain lost pounds. Vegetarians frequently state that a strong motive for their decision was based on health improvement (79), yet health and nutritional concepts provide only limited stimulation to fad dieters, or the obese undergoing dietary counseling, who primarily are influenced by cosmetic purposes (198, 199).

One method clearly identifying the processes associated with dietary change is examination of diet by generation. The food patterns of first-generation immigrants are compared with second- and third-generation progeny. From these studies it appears that many so-called ethnic foods are not used by ethnic peoples: Chinese-Americans may not consume shark-fin soup, but they use tortillas (86); Greek-Americans may not eat fetta cheese or drink ouzo, but they like potato chips (65); Japanese-Americans may not

have consumed yumi-kamaboko or chimaki, but they like hamburger (166). It is important, thus, to identify what people actually consume, and not anticipate what they eat.

World Food Problem: Perspectives and Ethical Considerations

Malnutrition is not a recent product of 19th or 20th century technology or economic maldistribution (20, 182, 217). Although dietary disease, famine, and human suffering are ancient, it is the modern scale and magnitude of the suffering set against rising population statistics that graphically demonstrate the world food problem today. [For a more complete review of ethics and the world food problem, see the article by Samuel E. Stumpf in this issue (202a).] During the recent Sahel drought there was massive starvation accompanied by social disruption, with the resulting misery measured in human, economic, ecological, and medical terms (2, 23, 24, 73, 184). Yet in the Kalahari desert of southern Africa similar droughts of equal intensity occur and nutritional and social disruptions are minimal (26, 75). Given similar environmental settings, conditions of aridity, comparatively similar social institutions, why does disaster occur in one desert zone and relative nutritional accommodation result in another? One conclusion that has to be drawn is that roots of famine and malnutrition are cultural, not environmental (78).

One explanation for Kalahari success during drought has been maintenance of food procurement strategies, especially hunting and collecting by so-called agricultural-pastoral peoples (75, 77). Nutritional success under semi-arid conditions, therefore, requires maintenance of numerous food procurement strategies and the delicate balance between agricultural expansion into bushlands, and maintenance of other uncultivated bush areas as reservoirs for wild plant collecting and hunting. Thus, any incautious plan to expand average farm size, consolidating holdings into larger farm units, would result in reduction of bushlands that previously provided nutritionally sustaining food resources during times of drought and environmental stress—resources already acclimatized and environmentally adapted. Although famine may be cultural in origin, within the abilities of human societies to control, eradication of famine and malnutrition through incautious agricultural development needs careful reevaluation.

Central to the world food problem today is an ethical question: Is it moral or immoral to provide food relief? Does relief save lives in the short run, but act as a disincentive for self-help with more lives lost eventually? As the world moves into the 21st century difficult choices regarding international food assistance will be required. If it is moral to provide food relief (and the question may be debated), there remain several additional moral questions to consider once a decision to supply food is made. There appear to

be four options along a continuum: provide food relief to any country only after specific economic, medical, population, and political requirements are met that satisfy the donor; provide food upon request, but attach specific political requirements at the time; provide food upon request, but only to previous political allies; or provide food upon request, without reservation, without political-economic strings.

Regardless which position is argued, once the decision to implement a food relief program is made, it follows that the food assistance should be targeted to specific needy subgroups, not to the general population. Furthermore, food gifts should not be sold and all items provided should be safe, palatable, and culturally suitable. Nonetheless, each cultural nutritionist and nutritional scientist working abroad can provide numerous examples where such basic conditions were not met.

It is curious, therefore, that the basic principles that underlie implementation of effective emergency food relief have been known since the end of World War I (11, 203). Why, then, are recent programs of food assistance so poorly managed and food mistargeted, or inappropriate items sent to needy areas, as clearly documented by the disastrous food relief program implemented at the close of hostilities in Biafra (1)? Is it moral, ethically correct, let alone nutritionally sound, to send cans of creamed corn and sauerkraut to Thailand for Cambodian relief? Ethically, the success or failure of a food assistance program must be measured against ingestion and improvement in nutritional status of the respective target groups, not by statistics that measure tonnage of food passing from one port to another, or distribution within general populations not directly needing the food assistance.

If, as was recently suggested, the world food problem primarily is one of calories, not protein (71, 141), the question of targeting food assistance becomes more important than previously. Most societies starve in the midst of abundant food resources, as items potentially edible are not recognized because of cultural prohibitions or taboos (84). No food should be targeted that is culturally unacceptable. Yellow maize sent to the Republic of Botswana in 1973, for example, was incorrect because of the view of some citizens—yellow maize is animal food, white maize is human food. Wisconsin dairy butter sent to the north coast of Egypt for use by settled *bedouins* rotted in the sun (L. E. Grivetti, personal observations).

If the strength of dietary taboos is doubted, one need only examine American likes and dislikes. What if Nigeria was a nutritionally protected country and the United States an emerging nation with a severe food shortage. One morning Americans awaken to advertisements of a new governmental contract with Nigeria to provide food. When these Americans lined up to receive the assistance they were given termite porridge, locust bread, beetle soup, and similar products. That insects are highly

nutritious is well recognized (3, 16, 19), but would Americans radically alter their food habits—even if hungry—to incorporate insects into their daily regimen? Nigerians, puzzled by American rejection of favorite Nigerian food specialities, might claim that the problem can be solved through education. Education is much too slow a process to correct for the mistargeting of food relief.

High quality, nutritious food should not be wasted by sending it to the wrong population. The view that hungry people will consume anything is callous and insensitive. The technical and administrative abilities of donor governments should guarantee the selection of suitable foods in relief programs for specific target groups. It is towards resolving such problems that cultural nutritionists and laboratory nutritionists, as well as administrators and physicians, should work by blending their complementary skills and talents. Cultural nutrition, born in antiquity and maturing in the 20th century, can contribute to resolution of nutrition problems facing the world today.

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