

E A R L Y D R A F T

The Natural Selection of Longevity for Cultural Survival

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Introduction

Natural selection and cultural behavior play important roles in the evolution and survival of indigenous groups. Natural selection assures the development of genetic traits necessary to the continuation of species or race. Cultural behavior often strengthens these features of natural selection as well as selects for and against other traits defined by mores and taboos. Whereas much of natural selection stems from features which are environmental in origin, cultural behavior relies upon human-environment interactions and interpersonal behaviors. Both of these in turn result in "environmental determinism."

By researching the changes in health and living conditions which take place due to modernization (at times referred to as "westernization") in a given living region, medical anthropologists have been able to ascribe causes for the changes in longevity which take place due to changes in human behavior as these changes relate to natural selection and racial genetics. In 1982, this conception of genetics led anthropologists to pose the theory of co-evolution, which states that cultures develop according to the interactions taking place between society and environment. These interactions in turn help define cultural mores and taboos, which in turn can be related to such survival features as health and disease.

Ecologists have made reference to a similar series of observations by defining the ecosystem-based theory of social and cultural evolution. Simmons for example suggested that biology and cultural work together to assure the mutual survival of each (Simmons, 1981, 35). Boyden claims that cultural evolution not only takes place due to a healthy biosphere, but in fact it remains capable of undergoing further evolutionary changes in environment and culture due to the process of "evodeviation" (Boyden, 1992, 64).

Biological Evolution and Evodeviation

Evodeviations exist as "phylogenetic maladjustments" or changes in evolution which take place due to modifications of social settings (Boyden, 1992, 64). They begin as changes in natural resource availability, which in turn are followed by changes in traditional craftsmanship, housing, foodways (anything pertaining to food and diet), and physical maintenance activities (such as hiking, hunting, canoeing, and other natural resource-based exercises). In a biological sense, the impact of these stresses on human physique and diet help to define human health throughout the life of a given society. They demonstrate the various ways in which local ecology can become largely responsible for the continued survival of aboriginal cultures.

In order for ecodeviation to impact the genetics of a particular group, the natural selection processes which take place must impact individuals before their reproductive and early child-raising years. By accomplishing this, they prevent these members from passing on their personal and familial genetic traits. Whereas traditional biology can explain the physical means of these selection processes and their roles in the survival or extinction of an individual, we must turn to anthropology research to better understand how this selection process influences aging and longevity at a cultural level.

Cultural Selection

Whenever members of a society make decisions about the future of their newborns and their elders, their decisions become a form of cultural evolution. The interpretations made of human behavioral and biological features can often result in accepted genocide, and thus the riddance of that unwanted part of the cultural genome. An important example of this is the socially-accepted practice of infanticide or selective infanticide of weaker and deformed newborns, female newborns, and children born during periods of social duress who are sacrificed for the betterment of the group's chances of survival. A similar practice which took place historically in nomadic sub-arctic groups related to the acceptance of aging elders. As groups prepared for

migration to the next season's habitat, elders remained behind in lieu of migrating with them in order to prevent any stress from developing within the community due to their personal needs. Still other groups once practiced an acceptable form of suicide in which the spouse ingested a poisonous plant following the death of a mate. In biological terms, this latter form of natural selection reduced the likelihood that genomic traits responsible for an unanticipated family death were selected against by not being passed on to future generations.

The potential stresses an elder may experience as part of his or her communal group are lessened by their physical strengths selected for naturally, followed by a cultural selection process. Examples of this include the increased likelihood of social acceptance for those who were highly skilled or who bore the endurance, stamina, and strength needed to survive as a hunter and mountaineer by resisting the environmental changes which take place within these occupational settings. Anthropologists use this reasoning to explain such physical traits as the epicanthial fold, short stature, skin pigmentation, and even pathogenic blood types. Some researchers have even used this reasoning to give reason to perceived racial differences that exist with human longevity and intelligence and their relationship to both human and cultural survival (Lynn, 1991; Andrews, 1992; Roper, 1992; Phelps, 1994).

In sum, the events necessary for later cultural selection of the longevity trait to take place have occurred by mid-life as both biological and cultural selection processes. Once the late mid-life years have been reached, it is up to the young elder, the leaders of a family, and the social group to decide upon the future life of the elder due to his or her potential impact on their chances for survival as individuals as well as as a culture.

The Biological-Cultural Purpose of Longevity

In 1959 Eric Erikson posed a potential psychology-based reason for longevity. He theorized that middle age (ca. 35-65 years) and old age (65 years and older) play important roles in human development and maturation and are responsible for the important life stages we go through as individuals (Erikson, 1980, 217). An alternative view of longevity was posed by anthropologist Margaret Mead, who claimed there to be a cultural importance of aging. The life of a Navajo elder, for example, whose role as an elder converted to that of a medicine man, implies the purpose of this period in life to relate to the passing on of cultural information as a teacher, historian, problem solver, and political-religious leader.

Numerous sociologists and anthropologists use the term "generativity" to refer to this decisive stage in an elder's life. They define it as the period during which important

personal decisions are made regarding the future of self and of one's cultural group (Kotre, 1984; McAdams, 1992; McAdams, 1993, 21-22). Medical anthropologists address this same issue by claiming it to be the result of an environmentally-based human and cultural co-adaptation process (Beall, 1994). Still others suggest it to be due to the past history and geography of fatal diseases (Crews and Gerber, 1994; Garn, 1994; Mayer, 1994), and the result of successful DNA-borne aging processes which are being expressed during the productive longevity years and extending beyond the octagenarian years into the centenarian period of life (Miles and Brody, 1994; Stiles, 1994; Wood, Weeks, Bently, and Weiss, 1994).

Acculturation-induced Health Changes

The most significant changes in health in aboriginal groups as they become westernized relate to the past natural and cultural selection for the longevity trait. The acculturation of various aboriginal groups has had detrimental effects upon their health and stamina. These physiological changes include the introduction or increased incidence of numerous dietary-based diseases due to modernized lifestyle and dietary habits, and the change in former habitual exercise patterns.

One of the most extensively studied ethnic groups impacted by "westernization" are the Native Americans.

Excluding alcoholism from this review, the longevity of Native American groups has been altered the most due to dietary changes and the related medical problems that exist due to these changes. Endemic to native groups that have been acculturated, westernized, or modernized are the increased incidence of obesity, gall bladder disease, cerebrovascular accident (stroke), chronic heart disease (i.e. atherosclerosis), and non-insulin dependent diabetes mellitus. This increase in numerous diseases due to a single ethnic-related trait in turn has received the attention of numerous genetic researchers, the results of which have led to an improved, but unpublicized, understanding of urban-based chronic degenerative diseases, their causes, and their prevention.

Diabetes and obesity were first related to each other in a medical study by Hrdlicka in 1908 which described the diminishing health of Hispanic and Native American groups who resided near the Texas-Mexico border and in the Southwestern United States. (Hrdlicka, 1908; also see Cohen, 1954). During the decades which followed, this increased incidence of disease noted in certain Native American groups led to similar discoveries related to the Seminole (Hamlin, 1933), the Pima of Arizona (Jolin, 1940; Parks and Washkow, 1961; Reid *et al*, 1971; Knowler *et al*, 1978, 1981, 1983), the Seneca of New York (Doebelin, *et al*, 1969), and the Cree, Ojibway, and Algonkins of southeastern and south-central Canada (Delisle and Ekoe, 1993; Gittlesohn, 1996).

Since Hrdlicka's first recognition of this acculturation-related medical syndrome, numerous reasons, both genetic and cultural, have been given to its causes. The first convincing reason defined it to be the result of a cultural-based malady related to human genetics. In 1962 James Neel speculated about the "Thrifty Genotype" that existed in certain Native American groups. He defined this as the rapid accumulation of body fat due to periods of heavy consumption, a genetic trait selected for in order to prevent starvation during periodic famines (Neel, 1962). For more than a decade, medical practitioners began to accept the thrifty genotype as a cause for many Native American cultural and genetic-based maladies.

Throughout the 1970s, this turned Native American nutrition, health, medicine, and genetics into important research topics. As this "Thrifty Genotype" continued to be accepted by many medical anthropologists and physicians, this in turn led subsequent researchers to uncover further diseases and syndromes attached to the westernization of Native diets.

Hrdlicka's syndrome was originally associated just with the increased incidence of morbid obesity and diabetes in Native American groups. But over the next decade, numerous other diseases and syndromes became attached to this syndrome as well. Obesity was found to be equally responsible for hypertension onset. The diabetes in turn was related to the high incidence of kidney failure in these

groups, as well as the increased incidence of blindness and gangrene that often ensue with the more severe diabetic cases.

By 1984, the association of these newly discovered chronic metabolic diseases with the "Thrifty Genotype" led an anthropologist to rename it "New World Syndrome," a condition defined by a series of maladies due to the increased consumption of sucrose, complex carbohydrates, and saturated fatty acids (Gadacz, 1979; Weiss, et al, 1984; Szathmary, et al, 1987; Young, 1988). Thus came the realization that these same maladies which were responsible for increased longevity could be attributed to the same genetic trait(s) responsible for increased mortality rates in elders due to heart disease (Weiss,).

Conclusion

Since 1988, these studies of chronic heart disease, diabetes, and liver, gall bladder, pancreas and kidney syndromes have all pointed to a single genetic disorder as the reason for longevity beyond the octagenarian years. This trait may as well be the reason for the increased mortality of elders who reside within westernized or modernized aboriginal cultures.

When given a diet similar to that which many of these indigenous cultures evolved with, most likely this longevity problem would be greatly reduced, thereby improving the

survival of certain biological and cultural evolution traits. In particaulr, the longevity selected for by this process would better enable individuals to pass on their knowledge of important cultural history.

In order to understand as much as necessary to accomplish this task in a lifetime, life beyond the typical late septagenarian-octagenerian years is necessary. According to philosophers, theosophers, and metaphysical psychologists, these individuals reach their state of reformed cosmic consciousness, a condition in which the physical and metaphysical understanding of life are combined. Since an elders' longevity (i.e. Gurus, Sages, and Shamans) often surpass the average longevity of average western citizens, these religious-political leaders will more than likely continue impacting their own cultural groups, long after numerous sexegenarian retirements have taken place in western societies. The impact of this European-borne cultural change on longevity since the post-Renaissance industrial revolution will be experienced less by members of these cultures, and unfortunately more by the remaining aboriginal cultures as they begin undergo their modernization.

A Purpose for Such Studies

An important reason for understanding the evolution and selection of longevity relate to the changes currently underway in lifestyle and subsequent medical histories attached to westernized aboriginal groups. The most important part of this issue pertains to the longevity of elders, who were, in anthropological and biological terms, genetically selected for both naturally and culturally as definitive members for a given culture. The reduced longevity which has taken place since the transformation of aboriginal lifestyles due to increased economic and social service reliance have reduced the impact these elders might make as important religious and political leaders.

The importance of the naturally-selected longevity trait as a cultural trait relates to the traditional and modernized roles elders play as part of a modernized aboriginal societies. In most traditional cultures they have traditionally served as historians, myth-, legend-, and story-tellers, and spiritual and religious leaders. As medicine men their historical roles are comparable to the more modern day roles of naturalists, ecologists, engineers, conservationists, environmentalists, physicians, and psychologists, all of whom serve as important information sources for many modern day aboriginal living spaces. These purposes in turn are not only important to the survival of the people. They also increase the likelihood for cultural survival, a feat difficult to accomplish during the

modernization processes which take place. By improving their longevity, we culturally select for the continued existence of traditional cultural beliefs by increasing the the likelihood they will be passed down as traditional knowledge from elders to their young apprentices.

Afterthoughts: Fishy Diets and Aquaculture

Many physicians, nutritionists, and medical anthropologists define the cause for decreased longevity to be primarily diet-based. To increase longevity and thereby improve the chances for cultural survival it remains a difficult process to reverse westernized behaviors. Whereas living conditions, exercise and recreational activities, and occupational and environmental exposures are difficult practices to change, dietary and preventative health practices remain viable means to improve the likelihood for genetically-based extralongevity. With the reduced availability of traditional foods required to assist in the return to a traditional lifestyle, we are left to consider the applications of new techniques in food growth and preparation. In circumpolar regions where food intake consists primarily of natural fruit, meat, and animal fat intake, greenhouse phytotechnology procedures and careful monitoring of Musk-ox and Caribou successful calving versus hunting behaviors can be studied and improved. In Sub-Arctic regions which are heavily dependent on fish spawning

cycles, aquaculture may become a useful additional source for traditional eel and fish oils (Organization for Economic Cooperation and Development, 1989; Pillary, 1992), each of which are important sources of the preventative polyunsaturated fatty acids (Hearn, et al, 1987; Beare-Rogers, 1988). In India, the recommendation has been to rely more upon polyunsaturated seed oil sources for seed oil intake (Indu and Indu, 1993).

A reduction in the consumption of sucrose, complex carbohydrates (plain starch sources such as farmed root crops, esp. potatoes), and seed oil products (fried) will reduce the likelihood for onset of obesity, non-insulin dependent diabetes, and atherosclerosis-related chronic heart disease.

Native groups have existed for centuries without the problem of chronic disease onset due to traditional European lifestyle. Unfortunately, the gene selected for as a survival trait for by the lifestyles of most traditional cultures, has succumbed to the westernization of groups which left their aboriginal cultures history behind. In Europe for example, it was most likely during the post-Renaissance industrial age that the European-bred longevity gene was selected against by nature, especially amongst upper class societies. In the more rural and often impoverished communities such as in the highlands of both Scotland and Sweden, longevity remained a fact of life and continued to be expressed in the New World during the

colonial years where self-sustaining families and communes resided. The same living practices remain intact in other poor communities of Eurasia as well. Where they are lacking is in western society, is where economic behaviors have evolved due to to social and personal gluttony since the cohabitation and industrialization of the New World.

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