THE CONSERVATION OF CULTURE: UNESCO VERSUS NATURE

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Introduction

UNESCO's Man and Biosphere Program [MBP] is dedicated to the conservation of biological and human diversity. This is evidenced by its commitment to natural, anthropological and historical-archaeological zones in 1972 at the IUCN meeting (IUCN 1977 Code: P.5.1). The goal of natural zone protection requires little explanation, for it involves both the preservation and conservation of common physical features or traits definitive of natural zones such as fauna, flora, and inanimate natural resources. This same distinction cannot be made as facilely regarding the preservation and conservation of culture. Whereas we strive to preserve nature in MBPs, we are more open to the potential modification that takes place whenever an indigenous culture clashes with a modern society due to the establishment of national parks and reserves.

Such modifications produced by MBPs impact cultures in two opposing ways. The first selects for the preservation or conservation of certain traditional culture behaviors. The second works against the perpetuation of traditional culture (IUCN 1977). If we view culture as a living being of complex biodiversity, then like any biotic gene pool, cultural gene pools have the potential of losing their diversity due to population declines followed by extinction and/or acculturation. Such is the case for aboriginal groups. Whenever two cultures clash, the larger one dominates and selects against the diversity of the other; as examples, consider the number of cultures modified or transformed by past political and missionary pursuits[1] and the related conversion of floral regions from native to introduced species.[2] In spite of the benevolent goals of UNESCO and IUCN, evidence suggests that MBPs may produce unintentional outcomes.

Longevity: from idealism to science[3]

The focus of MBPs includes "combining the preservation of ecological and genetic diversity with research, environmental monitoring, education and training" (Batisse 1986 p. 3), achieved by the sharing of traditional knowledge with others through various educational and research programs (Atmosoedarjo 1982 p. 240). Researchers now accept the premise that important knowledge is to be gained by interviewing indigenous groups, especially elders (Burger n.d. p. 107). This in turn has led to the designation of specific areas within biospheres defined as "Protected Anthropological Areas" or "areas set aside to provide for the continuance of ways of life endangered by the expansion of industrial civilization and its technology" (IUCN 1977 Code: P.5.1). The chief goal of this type of area is to protect environmental regions important to indigenes and cultural diversity.

Whereas most natural resources preserved by IUCN serve to meet national, international and global economic and humanistic goals, the preservation of indigens is defined by a separate set of goals. Indigenous groups are confronted by and react to the numerous opportunities for modernization presented to them. Unlike most conservation programs, written for the protection of genetic diversity, MBP programs have the potential of selecting against the genetic diversity and knowledge of indigens. In other words, culture is less equated with biodiversity, and more with the goals of various international groups. This re-defining allows for the preservation of cultural diversity and indigens so long as each meet the MBP requirements as an intact although modified organism. Not only does culture and its indigens bear indigenous knowledge which needs to be protected, so too are the genetic traits borne by these cultures in need of protection. One such trait is the longevity gene, without which the elders who make the best sense of traditional knowledge no longer exist.

According to recent medical anthropology writings, natural selection and human genetics are responsible for the new chronic disease patterns which take place within acculturated groups (Moran 1982 p. 137). Such genetic traits are not only responsible for increased morbidity and mortality due to contagious diseases, but also a reduced longevity brought on by "longevity genes" or trait following the introduction of cultures to a non-traditional setting (Glueck et al. 1975; Moran 1982 p. 32; Eisenberg 1987 p. 279; Rowe 1988 pp. 6-7). Numerous studies demonstrate that natural and cultural biological events give rise to longevity through genic diversity (Ledig 1986 p. 72, 98; Allendorf and Leary 1986). In a genetic sense, the trait which is selected for is an autosomal dominant phenotype responsible for the wide-dispersal of most plants and animals. This same genetic behavior is typified by human genetics through the selection of the old-old age (nonagenarian-centenarian) syndrome distributed across various human populations. The selection for this trait took place culturally through the behaviors of society determined by mores and taboos and the resulting social acceptance of old-old age elders. Whereas biological natural selection processes ensure the survival and development of fauna and flora into reproductive years, cultural selection expressed through anthroponomic and social behaviors ensures the survival of individuals well beyond their reproductive years (Moran 1982 pp. 34,98).

The discovery and supporting documentation of a longevity trait in humans took place in four stages. First came the realization that aboriginal groups do in fact bear a longevity trait. Second came the separate realization that a single genetic trait was responsible for the early onset life-threatening diseases within acculturated indigenous groups. Third came an understanding of lipid, fatty acid, and prostaglandin pathways, along with their relation to life-threatening diseases. Finally, came the

conclusive evidence drawn by medical researchers that the causes for increased morbidity and mortality were closely related, if not identical, and cause either the shortening of a typical lifespan of elders who bear a non-traditional lifestyle or the much longer lifespan associated with non-acculturation.

Therefore, the numerous medical and anthropological studies which support the longevity trait theory indicate that nature offers those who bear the longevity trait the choice of two life styles. One may increase the chances for longevity by practicing traditional dietary patterns, including periods of starvation (or fasts) to reduce accumulated fat stores. Alternatively, one may practice a sedentary, non-traditional lifestyle with a non-traditional diet, leading to the onset of obesity, a matching increased incidence in morbidity and mortality, followed by a reduction in expected lifespan due to the potential for chronic disease onset.

From Thrifty Gene to New World Syndrome

The interest in medical syndromes unique to natives and aboriginal groups was first discussed in 1908 by Ales Hrdlicka (1908, 1925), a member of the American Association of Physical Anthropologists, the American Medical Missionary Board (later renamed Race Betterment Foundation) founded by John Harvey Kellogg of the famous Kellogg health food company, and the American Eugenics Society. As a physician and physical anthropologist, Hrdlicka's interest was in the relations he felt existed between environment, disease, culture, longevity, and Mendelian genetics (Hrdlicka 1908; 1925; Pearsons 1995 pp. 246-9).[4] This work led numerous researchers to speculate about the roles which genetics, the environment, foodways, and medicines played in maintaining good health and improving longevity.

What interested Hrdlicka were his personal observations of indigenous groups and his readings as an Eclectic Medical physician about elders residing within China, the Near East, and various mountain communities.[5] Since many past explorers and missionaries made claims in their seventeenth and eighteenth century writings about old-old-age chieftains and medicine men, Hrdlicka took a closer look at these past claims.

Others who were in disagreement with Hrdlicka and Kellogg interpreted the foreign histories and past writings as exaggerations, miscalculations, and falsehoods, designed to attract future explorers and settlers.[6] The evidence for their argument came to them by observations made of modern aboriginal cultures, which showed very low incidences of longevity. In fact what had happened during the early- and mid-1900s was that the Native groups studied for this phenomenon had been centralized and modernized, thus causing them to have a shorter lifespan. The history of the Inuit provide the best chronology of this.

As the Inuit interacted with the British Whaling stations established near the MacKenzie Band during the late 1800s, the Inuit began to assist the British as trappers and hunters. This led to the overharvesting of game animals, resulting in a change from their traditional Caribou and Musk-ox sustenance patterns to a life more dependent on the British. One generation later, the Inuit were dependent on Hudson's Bay Company for food rations and medicines, leading ultimately to their near-total dependency on the Canadian social service agencies by the 1930s. Their changes in lifestyle and dietary habits which followed led to the onset of the first documented non-insulin dependent diabetes mellitus [NIDDM] developed by an Inuit around 1950 (Mouratoff et al. 1967; Hobart 1984; Tester and Kuchelski 1994 p. 23).

Throughout the early years of Inuit studies, Waldemar's study of Aleuts became the first to prove the detrimental

affects of acculturation on health, longevity and cultural knowledge (Waldemar 1933). Following up on the 1840s findings of Russian inhabitant Innocent Veniaminov, who while residing with the Unalaska Aleuts had documented their long-life patterns, Waldemar detailed their living style and life expectancy. Several subsequent studies sponsored at the newly settled Inuit and Aleutian settlement regions, gave further evidence to Veniaminov's conclusions,. This led subsequent researchers by the 1960s conclude that certain genetic features and/or life style were responsible for longevity and that "[t]he intellectual achievements of the Aleuts are related to their remarkably long lifespan." (Laughlin 1980 p. 10).

Waldemar's findings were immediately supported by observations published about Seminole (Hamlin 1933), Southwestern tribes (Hancock 1933), Athabascan-Nadene (Osgood 1936 pp. 46-47), and Navajo (Salsbury 1937). This led medical researchers to conclude that diabetes, the major disorder associated with this culture-based reduced-longevity syndrome, was of a universal nature in Inuit, Nadene, and Native American groups (Joslin 1940). Two decades later, as further details of this syndrome emerged were through the studies of Navajo (Salsbury 1947) and several southern groups (Cohen 1954), James Neel came to conclude that these traits were due a "thrifty genotype" trait evolved in order to prevent starvation, but since had become "less of an asset now than in the feast-or-famine days of hunting and gathering cultures" (Neel 1962 p. 360).

Throughout the 1960s, as further support of Neel's theory was documented and published [TABLE 1], what ensued were more detailed studies of this trait as it was borne by Pima Indians. By 1970 researchers demonstrated the existence of a twenty-fold increase in the likelihood that those indigenous to the Americas would experience obesity, diabetes, and various related maladies due to their acculturation (Reid *et al.* 1971; Knowler *et al.* 1978, 1981,

1983). This led medical anthropologist Kenneth Weiss to re-name this trait "New World Syndrome" in 1984, which he described as a cluster of metabolic disturbances of genetic and environmental nature capable of causing obesity, diabetes (and its related blindness and kidney failure), hypertension, gall bladder disease, intestinal problems (including cancer), kidney disease, and various forms of diet-induced chronic heart disease (Weiss 1984 p. 171).

The Discovery of Hyperlipoproteinemia

The recognition of New World Syndrome as a culturally-defined genetic trait was synchronous with the discovery of a genetic pathway responsible for life expectancies beyond the nonagenarian years. During the late 1960s and early 1970s, researchers were able to define the metabolic pathways responsible for atherosclerosis, a major cause for chronic heart disease and early death (Glueck et al. 1975, 1978; Day and Levy 1976; Kunau and Holman 1977). In 1968, a human geneticist speculated that "longevity assurance genes" were responsible for changes in aging noticed to take place within some people (Sacher 1968; Hayflick 1987 p. 15; Rowe 1988 pp. 6-7). Meanwhile, researchers in the Soviet Union discovered a syndrome which provided a possible explanation for longevity: the lack of atherosclerosis formation due to hyper-alpha-lipoproteinemia. Since the inheritors of this phenotype lacked the enzyme required for the conversion of fatty acids into very-low-, low- and high-density lipoproteins, their overconsumption of high fat, high-caloric foods led to the onset of obesity and atherosclerosis resulting in their greatly reduced longevity (Torkhovskaia *et al.* 1977).[7]

As this research continued into the early 1980s, an argument ensued within the medical anthropology world. One researcher posed the question "Is Longevity Inherited?" (Glasser 1981), which led to the publication of articles

arguing against this longevity trait proposal (Altman 1982; Heckers *et al.* 1982). Within just a few years however, international evidence emerged supporting Glasser's claims. To date, evidence for the natural selection of this longevity trait exists as studies performed of indigenous, traditionally ethnic, impoverished, or "fourth world" groups found to be residing around the world (TABLE 2).

Conclusion: the Consequences of Acculturation

Evidence for the presence of a longevity trait is recognized by sociologists (Kivnick 1986; Gutmann 1987 pp. 227-231), anthropologists (Topper and Schoepfle 1990), psychologists (Erikson 1959; Erikson 1980 p. 217; McAdams *et al.* 1993), biologists (Boyden 1992 p. 78), and physicians (Cohler and Galatzer-Levy 1990) who have numerous theories as to why it was produced and selected for as an autosomal dominant human trait, possibly linked to the female haplotype. (Smith 1990 pp. 49-50). However, the main issue at hand with the thrifty genotype-New World-Longevity Syndrome in regard to future world plans by UNESCO pertain to the issues of longevity in traditional cultures and possible impacts of the natural and cultural selections taking place against them due to acculturation. Although UNESCO and IUCN are not to blame for the changes in lifespans of indigenous elders, their MBP programs have facilitated the transition of these groups away from conditions which favor the selection of a longevity trait. Equally important is the fact that such cultural transitions are primarily the results of voluntary actions taken by native groups, which have included dietary modifications and the development of more sedentary lifestyles (Davidson 1993 pp. 157-159; King 1993 p. 295). As the longevity trait selected for in the traditional setting begins to diminish in frequency due to "westernization" we will begin to see a reduction in longevity and the increased incidence of

middle-age adults and old-age elders bearing chronic diseases in need of modern Western Allopathic medical attention (John 1985; Hennessy and John 1996 p. 276).

The apparent global distribution of a "longevity trait" has led many medical anthropologists and physicians to speculate that it was once ubiquitous trait and is still present in aboriginal cultures (Sargent and Marshall 1996). As debates about this longevity issue continue (Lynn 1991; Eysenck 1991; Miller 1991; Chiarelli 1994; de Benoist and Sunic 1994; Steini 1994; Turner 1994; Wood 1994), anthropologists and sociologists have begun to address concerns about the health and longevity of the remaining aboriginal groups undergoing similar acculturation processes (Gadacz 1978; Burley 1981; Szathmary *et al.* 1987; Young 1988; Weitz 1996; Last 1996; Marshall 1996; Sargent and Marshall 1996). The issues being addressed include the value of native or traditional diets (Jackson *et al.* 1985), the improvement of European and Euro-American diets being introduced by acculturation (Hobart 1984; Jackson 1986; Davis 1994; Quandt 1996 pp. 288-289), and questions about how fitness might be used to increase lifespan (Astrand and Grimby 1986; Bouchard *et al.* 1994; Schneider and Rowe 1996).

Through biological and cultural methods, longevity has produced a genetically-stable culture now being selected against through modernization. Without elders, these same indigenous groups would not have survived their past tragedies, nor might they have accomplished the various life changes they have had to go through this past century. Since an important part of aboriginal history and cultural survival is determined by the elders, whose knowledge often gives rise to the activities and behaviors which define or redefine cultures (Atmosoedarjo 1982 p. 240), the future impact of these changes could be devastating to both the aboriginal groups and to UNESCO due to the loss of survival traits and traditional knowledge (Schultes 1979 p. 234-235).[8] Whether or not these recent medical anthropological

conclusions benefit UNESCO's MBP anthropological programs remains to be seen. Its impact on the future of culture however appears less uncertain, as yet another change in biodiversity takes place through acculturation, modernization, and cultural evolution.

APPENDIX

TABLE 1. A CHRONOLOGY OF EPIDEMIOLOGY STUDIES WHICH LED TO THE DISCOVERY OF THRIFTY GENOTYPE-NEW WORLD SYNDROME

Region or Tribe	Researchers
Eastern groups	Hrdlicka 1908, 1925
Southwestern groups	Geare 1915
Aleut	Waldemar 1933
Seminole	Hamlin 1933 Mayberry and Lindeman 1963
Navajo	Salsbury 1937 Salsbury 1947 Hesse 1963 Brown and Christensen 1967 Saiki and Rimoin 1968
Pima	Parks and Washkow 1961 Reid *et al.* 1971 Knowler et al. 1978 Knowler et al. 1981 Knowler et al. 1983
Tecumseh	Napier 1962 Butler *et al.* 1982
Alabama-Coushatta	Johnson and McNutt 1963
Choctaw	Drevets 1965
Southwestern groups	Sievers 1966
Passamaquoddy	Ede 1966
Inuit	Mouratoff *et al.* 1967
Northern Paiute, Washoe	Bartha *et al.* 1973
Kickapoo and Shawnee	West 1974, 1978
Mandans, Aricak, Hidatsa	Brousseau *et al.* 1979
Montagnais	Gadacz 1979
Dogrib	Szathmary 1983
Ojibway-Cree	Delisle and Ekoe 1993
Algonkin groups	Gittlesohn *et al.* 1996

TABLE 2. A CHRONOLOGY OF EPIDEMIOLOGY STUDIES RELATED TO THE DISCOVERY OF THE LIPOPROTEIN-LONGEVITY SYNDROME

Region	Researchers
Soviet Union	Torkhovskaia *et al.* 1977
Scandanavia	Westlund and Nicholaysen
United States	Rao *et al.* 1983 Saito 1984
Russia	Ozerova *et al.* 1980 Gerasimova *et al.* 1980 Perova *et al.* 1980 Denisenko *et al.* 1981 Nikifarov *et al.* 1985 Kuzentsov and Missyul 1992
Israel	Raveh 1986
Germany	Herrmann *et al.* 1990 Miserez and Keller 1994
Denmark	Gerdes *et al.* 1992
The Netherlands	van Boven *et al.* 1994
Japan	Homma *et al.* 1994

TABLE 3. A CHRONOLOGY OF IMPORTANT EVENTS AND PUBLISHED VIEWPOINTS REGARDING ACCULTURATION, HEALTH, AND LONGEVITY

YEAR	INDIVIDUAL/EVENT
1908	Hrdlicka. Establishment of a Pro-Eugenic Physical Anthropology research group
1930s	Waldemar's discovery of longevity-traditional knowledge connection: several articles were published about Aleut, Inuit, Nadene and Native American acculturation diseases.
1940	Joslin noted "the Universality of Diabetes"
1950-60s	"Pan-Indian"/"Pan-Eskimo" movements
1954	First Eskimo/Inuit case of NIDDM noted
1962	James Neel defined the "Thrifty Genotype"
1967	Sacher described "longevity assurance genes"
1973	L.E. Wille and S. Aarseth's "Demonstration of Hyper-alpha-lipoproteinemia in three Diabetes Patients" is published.
1975	Glueck *et al.*: "Familial hyper-alpha-lipoproteinemia: studies in 18 kindreds."
1976-9	Lipoprotein pathways become better understood and are published in various compendiums and medical and chemistry research series.
1977	Torkhovskaia *et al.*, Soviet Union, published the discovery of a hyperalphalipoprotein-longevity syndrome.
1978	Glueck et al.: "Octagenarian Kindred: Hyper-alpha-lipoproteinemia."
	Extensive Inuit studies are published supporting earlier diet-obesity-diabetes-heart disease-longevity claims: Paul L. Jamison, Stephen L. Zegura, and Frederick A. Mila's *Eskimos of Northwestern Alaska*.
1979	Gadacz: "Acculturation as Paradigm in Historical Ethnology: The Montagnais Example."

1980 Laughlin's newly published text *Aleuts Survivors of the Bering Land Bridge* provides further documentation for these genetic-based disease-longevity claims.

1980-5 Numerous evidence supporting previous claims are published in the Soviet Union as a series of articles.

1981 "Is Longevity Inherited" published by Glasser

Trowell and Burkitt, (eds): *Western Diseases: Their Emergence and Prevention* notes Native American health problems

1982 Glasser's article is disputed by Altman. Heckers *et al.* publish an article entitled "Hyper-alpha-lipoproteinemia and hypo-beta-lipoproteinemia are not markers for a high life expectancy...".

1983 Stern *et al.*: "Does Obesity explain excess prevalence of Diabetes among Mexican Americans?"

1984 Weiss's "New World Syndrome" article is published

1985 M. Yvonne Jackson *et al.*: "Food and Nutrition Training for Tribal Cooks--Promoting Native American Health."

1986 M. Yvonne Jackson: "Nutrition in American Indian Health: Past, Present, and Future."

1987 Szathmary et al.: "Dietary Change and Plasma Glucose Levels in an Amerindian Population undergoing cultural transition."

1988 Leaf and Weber: "Cardiovascular Effects of n-3 Fatty Acids."

Beare-Rogers: "Nutritional Attributes to Fatty Acids."

Young: "Are Subarctic Indians undergoing the Epidemiologic Transition?"

The roles of Exercise in relation to these issues are scientifically addressed.

1990s International acceptance of this issue evolves due to matching indigenous-health-welfare histories in other countries:

--the Institute of Experimental Medicine, Russian Academy of Medical Science (1992);

--Kantonsspital Basel, Germany (1992, 1994);

--Department of Internal Medicine and Cardiology A, Aarhus County Hospital, Aarhus, Denmark (1992);

--Japan (Longevity study of centenarians) (1994);

--Leyden, The Netherlands (Longevity study related to Heredity antithrombin deficiency) (1994)

1990 Numerous aging theories, most focussing on free-radical issues, are published. i.e. Marcia G. Ory and Huber R. Warner (eds). *Gender, Health and Longevity. Multidisciplinary Perspectives.*

1995 Parsons: "Inherited stress resistance and longevity: a stress theory of ageing."

FOOTNOTES

1. As an example, consider the acculturation and extinction of the Shekomekos of New York. Originally a small band of around 100 Mohegans, they were converted to Christianity by Moravians between 1746 and 1748. As their lands were settled between 1720 and 1750 by colonists, significant social stresses resulted in their removal. They settled in Philadelphia for one winter, and then removed to the Allegheny Mountains, and finally to Muskogee, Ohio, where they settled, built cabins, tilled a garden, and changed their diets and behaviors to those more typical of European communities, i.e. the consumption of home garden vegetables and changes in physical activity to those dedicated to farming and dairy foodways. Continued intertribal, colonial, and military skirmishes upon the Shekomeko led to the loss of elders, children, and often entire families, along with cultural memories. This finally led to the extinction of Shekomeko culture due to trauma, illness, changes in physical activities and diet, and reduced longevity within a century of their removal from the Hudson Valley. In exchange, it was the word of the massive outdoor Christian Indian Revivals Shekomekos participated in with the Delawares which gave rise to the Revivals back in New York-New England by the late 1790s and Kentucky by 1805.

2. Innumerable examples exist of plants introduced to North America by colonial and post colonial settlers. The introduction of plantain (*Plantago major L.*) is possibly due to Viking settlement in the northern Atlantic maritime region, who referred to this as a medicinal plant of Iceland known as Wayblade; it was referred to as "White Man's Foot" by the Mi'kmaq whom they interacted with ca. 1000 A.D.. The Dandelion (*Taraxacum officinale* Weber), several daisies and many of the wild *Mentha* spp. except *Mentha arvensis* were introduced by the Dutch ca. 1620-1630. For extensive documentation of this part of North America's environmental history see Jonathan D. Sauer. 1988. *Plant Migration*. Berkeley: University of California Press.

3. For this paper, longevity refers to aging well beyond the expected norm. Other terms in use include mortality and morbidity. The difference between longevity and average mortality statistics for a given age or age-death rates is important to keep in mind. Mortality refers to death for a given place, age, etc., and its reduction doesn't imply increased longevity. Whereas mortality age-death rates refer to the entire population for members of a given age group for that

population, longevity typically refers to old-age (late sexegenarian, septagenarian and octagenarian), and old-old-age (nonagenarian, centenarian, and greater). Living beyond the sexagenarian years often results in a steady decline in mortality rate with each passing decade. Typical human biological lifespans for most people are very capable of reaching old-age status, depending upon environment, foodways, stress, lifestyle, etc. Old-Age longevity is the norm. Old-old-age status is unique, and is defined by the lack of normal aging problems such as atherosclerosis, the onset of heart and lung problems, stroke, etc. Old-age is natural for all organisms unless selected against genetically and extracorporeally. Old-old-age is due to the expression of a genotype that is a unique autosomal dominant trait. In Africa, the hemophilia is one such trait, selected for in regions where malaria can ensue due to a mosquito bite that might otherwise be fatal to the hemophiliac.

4. Alec Hrdlicka, a Bohemian emigrant, attended the Eclectic Medical College in New York City, and turned to medical anthropology and the research of Native groups (the Eclectics, as herbalists, learned significant amounts about Native American medicines). Hrdlicka joined the American Association of Physical Anthropologists, served on the American Eugenics Society, and wrote his 1928 article on dygenics--'a deterioration of genetic stock." His chief concerns included "race destruction" and "dilution of the physical as well as mental status by admixture of the poorer blood" and its relation to disease. Beginning 1906, he was active in the American Medical Missionary Board, founded by John Harvey Kellogg of the famous Kellogg health food company; this board was soon after renamed Race Betterment Foundation. In 1925, his book *Old Americans* provided a photographic history of old Americans with three generations of American descent. Biographical details about Hrdlicka are found on pages 246-249 in Roger Pearsons. "The Concept of Heredity in the History of Western Culture: Part One." *Mankind Quarterly* vol. 35(3), Spring 1995, pp. 229-266.

5. For example, the Old Swedes residing in the highlands of New Jersey written about by Peter Kalm (Benson 1937 I,166). Numerous examples of longevity are noted in the journals of missionaries and explorers. For example, Jacques Cartier met up with a young, newly married individual during his first voyage into Canada in 1534. Almost eighty years later this same person was noted by Joseph Jouvency of the Society of Jesus as *sagama* Membertou of the Souriquois in his *An Account of the Canadian Mission. From the year 1611 until the year 1613...* (Reprinted from The History of the Society of

Jesus records, Book xv, Part v. in Rome, 1710. See Thwaites (ed.) *Jesuit Relations*, vol. 1, pp. 75, 109; vol. 3, pp. 259). Membertou is noted as well in the writings of Champlain and associates between 1606 and 1611. Reverend Father Provincial Paul Le Jeune of the same Society wrote in his Relation of what occurred in New France in the year 1635... (Paris, 1636) (See Thwaites (ed.) *Jesuit Relations*, vol. 8) about Cape Breton, "One sees here old men of eighty and a hundred years..." (*Ibid*, p. 159).

6. For proof, review the numerous anthropological writings of Native groups published during the 1950s and 1960s, beginning with William S. Laughlin's documentation of changes in Aleutian longevity over a span of more than a century, and numerous articles published in *The Mankind Quarterly* since 1991.

7. Whereas the trait discussed in this paper is hyper-alpha-lipoproteinemia, numerous other longevity traits exist as well within the lipoprotein enzyme pathways. Abetalipoproteinemia, hypo-alpha-lipoproteinemia, and hyper-beta-lipoproteinemia produce similar increases in longevity and are autosomal dominant. The Dutch study cited in this text bears a unique genetic syndrome which evolved separately in recent years. Theories for the natural selection of these dominant longevity traits, which in western society cause disease, have included the increase in accumulated fats stores in order to improve winter survival in the sub-arctic (where this trait apparently evolved) and improve breast-feeding capabilities after pregnancy should starvation and malnourishment of the lactating mother ensue. Recent eugenic writers propose it has to do with the needs of the cerebrum during pensive problem solving activities in climates which require active and continuous problem solving skills (i.e. Arctic). Either of these genetically-driven sets of skills improve the chances for survival, and thus their purported representation as part of the matrilineal inheritance.

8. This importance of elders who live beyond the octagenarian years cannot be overstated. According to psychologists, philosophers, and theologians, an elder becomes capable of reaching a transcendental state of being after 60 years of age, a period in life difficult to achieve in when chronic degenerative disease becomes a social problem. For further information, see: K. Warner. "Intellectual Development in Adulthood." In James A. Birren and K. Warner Schaie, eds. 1996. *Handbook of the Psychology of Aging. 4ed.* (New York: Academic Press) pp. 266-286.

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