GEOGRAPHY, GENETICS AND GENERALIZATIONS: THE ABANDONMENT OF "RACE" IN THE ANTHROPOLOGICAL STUDY OF HUMAN BIOLOGICAL VARIATION

by

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Abstract

This thesis critically examines the nature of racial classification as traditionally used in physical anthropology through a discussion of the historical development of the concept of "race." Building on a theoretical framework that engages the philosophy of science and the social history of racial thought, the major emphasis is on developing alternatives to "race" and racial categories in the study of human biodiversity, with specific reference to the field of forensic anthropology. Through an osteological analysis of individual variants and population variance, practical methods for studying human variation are presented based on the anthropometric and anthroposcopic data obtained. The thesis discussion also incorporates recent advances in the study of molecular genetics.

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- INTRODUCTION -

"The most impressive aspect of the living world is its diversity. No two individuals in sexually reproducing populations are the same, nor are any two populations, species, or higher taxa. Whenever one looks at nature, one finds uniqueness" - Ernst Mayr, *This is Biology* (1997:124).

I began my research on "race" at the upper undergraduate level not because I wanted to disprove racial theories, although I certainly believed not just in human equality, but also in an equal relationship between humans, animals and environment. I suppose that this is based in some underlying functionalist notion that all life should be considered a fundamental and necessary part of a larger ecological system. My specific interests, based on my earlier study of aboriginal justice, criminology and criminal law, revolved around my childhood fascination with the sciences. These interests lead to my pursuing studies in the field of forensic anthropology, where I could use my knowledge and interest in human biology, cultural studies, criminal law and abnormal psychology.

During a summer course on the analysis and interpretation of human skeletal remains in 1998, one of the physical traits that struck me as an interesting topic for research was the connection between genetic and cultural factors effecting dental occlusion and their importance for the identification of an *individual* from skeletal evidence. While reviewing the relevant literature, I stumbled across two important but opposing articles[1] about the practice of "racial" classification in forensic anthropology. How could I ignore a good debate? These articles also led me to the extensive anthropological literature refuting scientific notions of "race," arguing that such categorization was socially constructed. Yet, many questions still remained in my mind. What was the nature of this larger debate; who was involved on each

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[1] For a more comprehensive discussion of these articles, see my *Science and Social Construction: A Critical Forensic Anthropological Analysis of Craniofacial Morphology and the Determination of Race in Human Skeletal Remains* (1999).

side; and why was no one presenting a practical solution? What may at first glance seem like a debate over the objective scientific existence of "race" in the human species, actually turns out to be a much more simple argument in the forensic context.

The first of the articles referred to above is Dr. Norman Sauer's 1992 article, "Forensic Anthropology and the Concept of Race: If Races Don't Exist, Why Are Forensic Anthropologists So Good At Identifying Them?," which appeared in the journal *Social Science and Medicine*. Dr Sauer poses a very provocative and controversial question regarding the role and duties of the forensic anthropologist in which he argues, "the successful assignment of race to a skeletal specimen is not a vindication of the race concept, but rather a prediction that an individual, while alive, was assigned to a particular socially constructed 'racial' category"(p. 107). Sauer thus suggests that anthropologists, at least in the forensic context, must adhere to the racialized discourse of law enforcement in order to accurately relay information relating to the identity of an individual. This issue became an intense academic debate with the publication of Dr. C. Loring Brace's 1995 rebuttal "Region Does Not Mean Race – Reality Versus Convention in Forensic Anthropology," in the *Journal of Forensic Sciences*.

Dr. Brace that it is the responsibility of science to ensure that its findings will not be used harmfully. He writes, "In the matter of 'race,' if 'there is something there,' as has been said, is it not our role to identify that 'something' first before we consider the social implications?"(p. 171). Here he suggests that those anthropologists who have rejected the notion of "race" have done so for reasons of social ideology as a result of the recent trend toward political correctness, not because of basic biology. Brace further explains, "My objection to the use of the concept of 'race' is not based on the social injustices that have been perpetrated in its name – however reprehensible those may be – it is rooted instead in basic biology ... it was biology that was behind the stance taken a generation ago by Huxley and

Haddon and by Ashley Montagu"(p. 171), referring to the strong anti-race positions that developed in early twentieth-century anthropology. Brace's statement reveals that this may not be a simple matter of political correctness (as has been suggested to myself numerous times), but a highly misunderstood area that is in need of considerable scientific enquiry.

The basis of both authors' arguments is the constructed nature of "race" and "racial" discourse – neither author makes a claim for the existence of fundamental biological divisions of humans. Certainly, this problem of dividing humans into racial subgroups has been an issue within the larger anthropological literature for decades. The issue, as it turns out, is based on much more pragmatic reasons, namely, on whether "race" is acceptable anthropological terminology (specifically within the practice of forensic anthropology) when referring to the categories of differentiation that are embedded in the social discourse. Dr. Kenneth Kennedy best summarises this problem in his 1995 article "But Professor, Why Teach Race Identification if Races Don't Exist?" appearing in the *Journal of Forensic Sciences*.

> Forensic anthropologists are keenly aware that neither the medical examiner, the judge, the attorney client nor the sheriff would appreciate a lecture on the history of the race concept in Western thought. These professionals want to learn if the skeleton on our laboratory table is a person of Black, White, Asian or Native American ancestry, or an individual of 'mixed blood.' So we play their game, and however carefully our statements in the forensic anthropologist's report are phrased, we find ourselves using these racial names. Thus we perpetuate a myth that human races are natural entities within our species (p.798).

It is from this problematic association of "race" and social reality that I represent the concept of "race" or "racial" difference in quotations. The effect of the quotation marks is (I hope) to denaturalise the terms, to designate them as sites of political debate (Butler 1994:170). I do not wish to belabour this assertion so I will endeavour to use the quotations sparingly past this introduction.

Reducing this debate to its basic elements, it is evident that the fundamental questions regarding the division and categorization of humans have been totally avoided. Sauer will continue to use "race" as part of his biological profile for forensic identification and Brace will continue to reject such categorisation due to his noble suggestion that the practice of "racial" categorization contradicts basic biology. So, where do we go from here? Sauer provides the simple suggestion that "perhaps we could avoid the term 'race' in our communications, substituting 'ancestry' or some other word that has less baggage than race"(1992:110), while Brace has taken a proactive stance against classical "racial" terminology and suggests using "a neutral geographic referent such as "eastern Asian" [instead of *Mongoloid* as is typically used]. Geographic terms can be further sharpened if need be by using adjectives such as 'northeastern,' 'southeastern,' 'central' and the like"(1995:171). Some of the questions that remain for anthropologists and society as a whole are these: how will this suggested substitution of terminology that both authors have provided help us to move past the idea of "race" and all of its negative connotations? Is this simply a matter of shifting discourse or are there larger questions to be addressed? Many other specific questions develop from this problem as well. How and why do humans differ? Which concept is more scientifically valid – ancestry or geographic origin? Why do the natural and medical sciences tell us that humans can be divided into distinct races while anthropologists say it cannot? What is the role of the anthropologist in the scientific debate on human variation? These questions are far from simple, and they cannot be answered from within a particular disciplinary framework. There are problematic theoretical and methodological issues to be overcome, as well as some contemporary philosophical concerns regarding the epistemological nature of both the social and natural sciences.

It is with these issues in mind that I have attempted to engage both social and scientific notions of "race" and human biological variation within the framework of physical or biological anthropology. This has also led me to broaden my interests from the specific field of forensic anthropology to the more general discipline of physical or biological anthropology. I suggest that this is a necessary transition as the current focus on technical specialization, the use of computer software,[2] and the expert-efficient approach leaves little room for the forensic practitioner to include his or her anthropology, which in its most basic sense is the study of ***humanity*** (rather than simply a legal or police science). This specialization is what has allowed the forensic anthropologist to overlook the theoretical issues when including "race" in a biological profile.

Out of both necessity and personal interest, this research project has developed from this basis into two seemingly different but essentially interrelated areas and I have divided this project into two distinct sections based on the following schematic. I will first begin by building a theoretical foundation upon which I will suggest the necessity of reinterpreting human biological variation in order to move beyond the dated (and false) conception of "race." Drawing from recent anthropological literature I hope to further problematize the dominant racial discourse by drawing upon socio-cultural theory and Franz Boas' (1948) *Race, Language and Culture*; Michel Foucault's 1976 lectures on "race" and institutionalized biopower as presented in Ann Laura Stoler's (1995) *Race and the Education of Desire: Foucault's History of Sexuality and the Colonial Order of Things*, the philosophy of science and historical deconstruction as elaborated by Thomas Laqueur in his (1996) *Making Sex*; Ian Hacking's (1999) *The Social Construction of What?* and Stephen Jay Gould's second edition (1996) of *The Mismeasure of Man.*

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[2] Such as the popular Fordisc 2.0 software, which predicts a biological profile by comparing observed metric and nonmetric traits and comparing them to its database of known population averages

This theoretical framework, supported by a historiography of scientific racism,[3] examining the fundamentals of the early classificatory schemes of Linnaeus, Buffon and Blumenbach, as well as Darwin, who, among others, are most often associated with "racial" science, will provide the conceptual basis for which to build the second section of this project – a practical reinterpretation of human biodiversity and variation.

The second section will elaborate the findings of an osteological analysis conducted from the collections at the Canadian Museum of Civilization, based on a comparison of skeletal remains from three distinct geographic regions of Canada (of a similar historic period) – Indigenous populations from the northwest coast of British Columbia as well as from the Canadian plains region; and a group of eighteenth-century European colonials from a Quebec City wartime prison.[4] The categorization of peoples as Indigenous, Aboriginal or Native may conceivably be problematic but I have used common ancestral terms here for the sake of simplicity; I will deal with this issue in detail in Chapters 4 and 5. I have divided the osteology into two subsections: 1) non-metric craniofacial analysis; and 2) anthropometric variation of the mid-face, cranial base and post-cranial skeleton. I have based my particular method on a synthesis of the methods presented in Gill & Rhine's (1990) edited volume, *Skeletal Attribution of Race*, with reference to Michelle Church's comprehensive article "Determination of Race from the Skeleton through Forensic Anthropological Methods" (1995). This research project began in September of 1999, and the skeletal analysis took place from January to April 2000, conducted under the joint supervision of Professor Derek Smith of the department of

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[3] Using the works of historians such as Nicolas Hudson (1996) and Londa Schiebinger (1990; 1994); anthropological explanations by Ashley Montagu (1964), Juan Comas (1960) and Jonathon Marks (1995); and original works such as Blumenbach's *Anthropological Treatises.* (1865).

[4] Prisoners from the war of the Austrian succession (1744-1748), held captive at Quebec City. See Cybulski (1991) "Skeletons in the Walls of Old Quebec;" Piédalue & Cybulski (1997) "Buried Prisoners in Eighteenth-Century Quebec."

Sociology and Anthropology at Carleton University and Dr. Jerome S. Cybulski, Curator of Physical Anthropology, Archaeological Survey of Canada, Canadian Museum of Civilization.

My intention in testing popular methodologies for determining "race" is to demonstrate that regardless of the conceptual issues surrounding the notion of "race" and racial classification, there are, in fact, observable anatomical differences between geographically distinct groups (populations) of humans. One of the main arguments put forth by those who oppose the concept of "race" is that it is unscientific to classify people of all areas of the world according to the classical three large ancestral-geographic groupings of *Caucasoid* (European), *Negroid* (African) or *Mongoloid* (Asian, Middle Eastern or North American Indian). "In particular, it makes no sense to try to study differences between races by subdividing a sample of North Americans. Yet a lot of existing literature on supposed racial differences offer to do just that. Structuring our samples using these chimerical racial categories often obscures the nature and causes of past and present human variation"(Cartmill 1998:659). Beyond this, my suggestion is that population-based research should not focus solely on genetic relationships, but on the morphological effects of a specific geographic origin, cultural and dietary practices, pathology and medical procedures as well as physical stress markers in order to identify *individuals* or distinct regional populations.

Essentially, my contention is that it is both scientifically and socially erroneous to study *difference* based on "racial" characteristics. Rather, we must work to develop an understanding of how humans adapt to their immediate environment in *similar* patterns, as these differences are often very subtle. What this subtlety allows us, however, is to determine the specific geographic ancestry of an individual much more accurately because the expressions of various physical traits are traditionally regionally identifiable. From this claim I suggest that those who argue that "race" is a static biological reality overlook the issues of adaptability and regional geographic variation, focussing on traits regarded as reflecting genetic and geographic isolation – even though such a degree of isolation has long since disappeared. It is through a reinterpretation of the nature of human biodiversity and a refocusing of empirical data based on physical evidence that I attempt to move beyond the idea of "race."

I have taken on this seemingly two-tiered research project because of a question asked of me when I first became interested in the concept of "race" and the anthropological methods of "racial" determination: "How do you expect to go about solving a philosophical problem scientifically?" This project is an attempt to demonstrate the inadequacy of viewing philosophy and science as two completely distinct fields of knowledge, and to articulate a number of problems associated with this disparity. The result of this discussion is my conclusion that science cannot be seen as producing absolute or objective knowledge. As students, we are taught that many facts are indisputable and that the scientific method is of utmost importance. What we are not taught is that science is as much a social and cultural project as any other form of knowledge acquisition.

The issue that many people fail to discover is that science and philosophy are, in actuality, so closely related that they cannot be separated. In this regard, evolutionary biologist Ernst Mayr (1997:35) asks: "Is there, perhaps, no demarcation at all between science and philosophy? The search for and discovery of facts is surely the business of science; but elsewhere there is a considerable area of overlap." I will argue, however, that the search for "facts" about the natural world formed the basis of early philosophy, and that such discoveries were and are inherently structured by the social-philosophical positioning of the scientist.[5] What must be undertaken in this respect is a reinterpretation of why and how we interpret

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[5] Early philosophical scientists writing on human diversity include Homer (800-700 BC), Herodotus (484-425 BC), Hippocrates (460-377 BC), Aristotle (384-322 BC), St. Augustine (354-430), Leonardo da Vinci (1452-1519) and Andreas Vesalius (1514-1564). See Bindon (1999) "History and the Concept of Race"; Marks (1995).

scientific knowledge as universal within the Western paradigm, and what this means in terms of socio-enculturation. Only from this can we attempt to build an effective scientific means for moving beyond "race." It is through this that I will begin with my reinterpretation of human biological variation and an attempt to transcend the lack of cohesion between theory and method (or practice) in the sciences, and particularly within physical and forensic anthropology.

GEOGRAPHY, GENETICS AND GENERALIZATIONS: THE ABANDONMENT OF "RACE" IN THE ANTHROPOLOGICAL STUDY OF HUMAN BIOLOGICAL VARIATION.

> Our greatest intellectual adventures often occur within us – not in the restless search for new facts and new objects on the earth or in the stars, but from a need to expunge old prejudices and build new conceptual structures. No hunt can have a sweeter reward, a more admirable goal, than the excitement of thoroughly revised understanding – the inward journey that thrills real scholars and scares the bejesus out of the rest of us. We need to make such an internal expedition in reconceptualizing our views of human genealogy and the meaning of evolutionary diversity.
>
> \- *The Mismeasure of Man*
> Stephen Jay Gould

- CHAPTER 1 -

A PHILOSOPHY AND HISTORY OF SCIENTIFIC RACISM

Theoretical Basis

Race and racism have been characterized by many anthropologists as the "problem of the 20th century," remaining the largest social and scientific problem of the current century, manifesting itself in new, historically specific ways (Harrison 1998:609). The ongoing debate surrounding the concepts of race and racial classification has also become one of the more contentious problems of contemporary cultural and physical (biological) anthropology, providing a complex and important theoretical challenge to anthropological scholarship as a whole and, in particular, to the science of human biology. In this chapter, I will critically address the social and academic problems of "race" and racial science, challenging the validity of such conceptions and discussing anthropological responses to them. In order to provide a solid basis for moving beyond racial typologies, we must examine the historical development of racial science and the current state of racial thought in contemporary anthropology. It is evident that although there has been a major theoretical rejection of the notion of race in anthropological literature, there is little evidence to demonstrate that this shifting discourse has been given significant attention within the practical confines of the anthropologist's classroom. It must therefore be the goal of the anthropologist to engage these issues from their theoretical and historical basis, and present them in an understandable and workable form – the objective of this project.

As a starting point, I will begin by discussing a recent article, "Introduction: Expanding the Discourse on 'Race'," by Faye V. Harrison, from the "Contemporary Issues Forum: Race and Racism" (September 1998) special edition of *American Anthropologist*. I will use this article as a starting point for elaborating my own ideas about the anthropological problem of "race" and how to move beyond, as Harrison quite accurately describes the current state of racial thought in anthropology, raising many critical issues and providing numerous valuable suggestions for working towards a total rejection of such notions. She suggests that in order for a dramatic change in the social and scientific conceptions of race and racism to occur, and "for anthropologists to effectively revive our discipline's race-cognizance and deploy it in strategic arenas of public debate, policy formation, social action, and other loci of democratic practice, we need to expand and refine our discourse on race to elicit perspectives from all of anthropology's subfields"(p. 610). However, she also proposes that "for this potential to be realized, we must overcome and offset the self-defeating fragmentation that has resulted from trends toward more narrowly specialized anthropologies, increasingly disengaged from disciplinewide webs of communication that permit the production of a more integrated and comprehensive knowledge"(p. 610). In "Anthropology's Native Problems," Louis Sass (1986) outlines the identity crisis in anthropology that has resulted from the "postmodern turn." He explains that the discipline of anthropology as a whole has been struggling to find legitimacy and, according to more traditional anthropologists, that the breakdown of disciplinary boundaries will lead to its demise. This fear of a unified social science has led to the specialized areas of anthropology that Harrison urges must be reformed into a holistic study of humanity.

With these statements, Harrison places heavy emphasis on an interdisciplinary approach, which she refers to as "cross fertilising," incorporating all methods and modes of study from the sciences to the humanities. In order to move beyond the fragmentation she describes, Harrison asserts that by communicating ideas between one another, it will be possible to develop a common body of knowledge that would be much more effective both socially and scientifically than single-minded (biased by personal experience) interpretations. Harrison asserts that more progressive anthropological study can be undertaken with the adoption of a postmodern philosophy based in interdisciplinary research, deconstruction, and an emphasis on multiple voices.

Harrison contextualizes the issue of race in its modern form by stating: "there is no theoretical, methodological, or political consensus shared across any of the subdisciplines on how to interpret and explicate the social realities that constitute race" (p. 610). Certainly, no single view of the race concept is universally accepted (Kennedy 1995:799). Here Harrison presents an extremely important argument, since she explains that much of the problem associated with the perpetuation of racial categorization and racism derive from numerous inconsistencies and a multitude of subjective interpretations and re-interpretations of the problem. Historically, "race" has been highly contested as a concept, and as specifically applied to physical and paleoanthropology. Although there has yet to be any consensus in the matter of race, Harrison believes that the fact that anthropologists have increasingly been engaging with race-related issues represents a dramatic shift in anthropological discourse.

In order to make genuine progress in the study of human biodiversity, there is an implicit need for anthropologists to move past the use of racial terminology, in order to shift the dominant anthropological discourse, moving away from the traditional value-laden classifications to which our discipline has adhered. In this regard, Harrison explains that "as we devise anthropologically informed strategies for intervening more effectively in the 'culture of racism,' we should be reminded of the need to penetrate beneath the surface of ignorance and knowledge to educate and enculturate against the very cultural logic of the manner in which ordinary people feel, think, speak, and live their everyday lives in this increasingly multiracial and multicultural society and the world"(p. 612). While Harrison provides a useful analysis of the current state of "race" in anthropology, this passage demonstrates the fundamental problem of the persistent racial discourse, from which Harrison is unable to escape. How can one refute the idea of human races while referring to society as "multiracial?"

The question that lies herein is this: how can the postmodern focus on language as the fundamental boundary to human knowledge acquisition be utilized to effectively remove popular racial terminology from our academic discourse without alienating our goal of engaging these issues and articulating them in our often convoluted academic terms, while keeping our work accessible to the general public? Perhaps a plausible explanation for Harrison's inadvertent use of the term "multiracial" is that she is referring to our (the anthropologist's) ability to affect "ordinary people," which exposes the problem of moving past linguistic constraints when the general public is bound by popularized terminology, demonstrating the difficulty of bridging the gap between academic and general audiences. It is clear that most anthropologists have, in some way, moved beyond "race," but social practice has been slow to follow, working within a much different (generally less critical or progressive) epistemological framework.

Beyond Harrison's problematic language and the theoretical issues identified thus far that lie within the linguistic turn, another major problem arises. "Even when we accept the premise that biological races do not exist, we cannot afford to be blinded to, intellectually confused about, or afraid to address the malleable and persistent realities of racism, both here at home and around the world"(p. 613). Although we can argue that races do not exist, racism remains a real social problem. This is perhaps the underlying problem that persists within the anthropological study of biological variation, as popular social perceptions are often based upon misinterpretations of these contrasting views. Many anthropologists, beginning early in the twentieth century with Franz Boas, have claimed that human "races" do not exist in nature, while many psychologists and medical scientists insist that they do – constantly reinforcing the traditional and historic belief in a race-based society. In this regard, an important conceptual distinction that Harrison makes is that she moves from the idea of "social construct" to that of "scientific construct," a concept that seems to be underestimated in most of the literature on race and racism. A "scientific construct" as used here can be defined as the knowledge produced by the interaction of social influence and empirical science.

It is important to elaborate the cyclical nature of the interaction of social and scientific constructs and how they serve to perpetuate one another. The focus of the second section of this chapter is on this relationship between society at large and the scientific community and the social and historical development of racial science. Within the framework of a historical interpretation of the development of biological thought, Harrison explains that

> Racial meanings, signalling the social salience of superficial phenotypic differences, did not crystallize until the eighteenth century, and by the nineteenth century the relatively new folk ideology became the preoccupation of a modern 'science,' which elevated the folk naturalization of difference to one of society's most powerful legitimating realms … at that juncture, race took precedence over religion, ethnic origin, education, class, occupation and language (p. 621).

What Harrison is missing here is that race did not necessarily take precedence over these other forms of differentiation, but it synthesized all of the negative views of each category and incorporated them into the physical body.

In her analysis of the social construction of "race" and racial thinking, Harrison cites anthropologists Lieberman and Jackson (1995) who make clear that "the interpretation of the data of biological variation is not neutral or immune from societal influences and included within 'societal influences' today is what appears to some social critics to be an organized agenda on the part of certain neoconservative foundations to promote research that seeks genetic determinants for upward mobility, IQ, and violence, among other things"(p. 614). An example of the importance of this point can be found with reference to the work of Dr. J. Philippe Rushton and his work comparing "intelligence" to genital size between "races." This body of work is one of the most socially and scientifically problematic current academic projects, believed by many to be perpetuating racist myths and (again) trying to gain credibility by presenting human differences as realities. On the other hand, Rushton also has a number of supporters ranging from colleagues who insist on academic freedom to neo-Nazi groups. Another issue arising from this is the question of who is funding this sort of scholarship? Each funding agency has its own agenda and chooses the types of research it will support and, presumably, this will benefit their own position.

For instance, Rushton's current work on Race, Evolution and Behaviour is sponsored by the Pioneer Fund Inc.,[1] an American conservative fundamentalist group, whose goal is "To conduct or aid in conducting study and research into the problems of heredity and eugenics in the human race generally and such study and such research in respect to animals and plants as they may throw light upon the heredity in man, and research and study into the problems of human race betterment with special reference to the people of the United States" (The Pioneer Fund 2000). One might suspect that this emphasis on "positive eugenics" as applied specifically to the United States is inherently racist and also raises the question of whether this policy excludes various immigrant groups from such "betterment." However, such controversial positions may also be seen as an important component of the structure and function of scientific advancement. Paul Feyerabend (1970), a philosopher of science, explains that "The idea that knowledge can be advanced by the struggle of alternative views and that it

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[1] Dr. J. Philippe Rushton provided this funding information via e-mail correspondence to the author, April 6, 2000.

depends on proliferation was first put forth by Presocratics...and it was developed into a general philosophy by Mill."[2]

Harrison concludes her article with a simple statement about the discipline of anthropology, followed by the question that lies at the root of this conceptual discontinuity. "Anthropological voices have long been part of a broader interdisciplinary discourse that extends far beyond the boundaries of academic departments and professional associations. Anthropological ideas have stimulated struggles to redeem racially subjugated people. Can they now inspire struggles to transcend "race" as we know it"(p. 623)? Each student of human variation must answer for him or herself this question. Hopefully the result will be a mobilization of academic and social practices toward a better understanding of human variation. According to Harrison, there must be a body of "comprehensive knowledge" formed to allow for the integration and interpretation of a variety of theorists. This requires the biological anthropologist not only to carry on their usual role as an expert in skeletal anatomy and evolution, but also to assume the role of social anthropologist, philosopher of science and historian in order to develop a workable (widely applicable) system for reconceptualizing human biodiversity. This should not be a problematic shifting of roles since in the social sciences, like the physical or natural sciences, "One must also make sure that the answer is true, or at least as true as available knowledge permits. This goal of the scientist is precisely also the objective of the philosopher of science"(Mayr 1997:46). It is with this in mind, and a desire to answer Harrison's final questions in the affirmative, that we should first engage in the theoretical issues before developing a social history of racial thought.

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[2] See John Stuart Mill, *On Liberty*. New York: Norton (1859).

Mobilizing Anthropology Against Race and Racism

Harrison's article opens up many ideas for shifting the anthropological discourse on "race," but in many respects, her ideas are abstract, failing to provide practical methods for putting thoughts into action. The idea of a "postmodern philosophy" must be further developed here in order to present a useful theoretical standpoint from which to work. Richard Rorty, one of the main philosophers traditionally associated with postmodernism, has recently suggested that "postmodern" is "by now a somewhat musty adjective" (1999:122). Nonetheless, while the word "postmodern" can elicit a number of reactions, the effectiveness of a postmodern position can only be realized when one fully understands the implications of this perspective. Postmodernity arose as a critique of modernist or Enlightenment thought; it can be characterized in its simplest form as a "critical attitude" (O'Neill 1995), most often associated with anti-metaphysical doctrines common to Nietzsche, Foucault, Heidegger and Derrida (Rorty 1999:120). Pauline Rosenau (1991:3-12) suggests that postmodernism, in its rejection of traditional epistemological assumptions, the refuting of methodological conventions, resistance of knowledge claims, and obscuring of all versions of truth, has led to two distinct factions; the *moderate* and the *extreme* postmodernists.

Extreme postmodernism, Rosenau explains, can by typified as taking a revolutionary stance, which radically dismisses the very core of what constitutes traditional social science and rejects any sense of an essential reality, claiming that all knowledge is constructed discursively. On the other hand, moderate postmodernism is based on the encouragement of innovation and substantive re-definition of terms, concepts and events. The commonality that lies between the two positions, which constitutes the basic premise of postmodernism as a whole, is the presentation of a challenge to established knowledge of the twentieth century. Rosenau also tells us that the two positions (extreme and moderate) can be easily distinguished from each other by the intensity of their opinion and the willingness to see their conviction taken to its most excessive conclusion, which may entail a disregard for the consequences or outcome. It is this extreme position that elicits such negative responses by many that have resisted the influence of postmodernity.

There is no solid definition of "postmodern," and many suggest that the dependence on or assumption of postmodernity and linguistic deconstruction as tools with which to find *the* answer to any specific question will lead to a "postmodern paralysis"(O'Neill 1995). This scepticism is based on a simple confusion between moderate and extreme postmodern positions – the belief that all postmodern thought is solely based on the rejection of any sense of an essential reality and the claim that all knowledge, emotions, personality etc. are discursively constructed. However, this simply is not the case. It must be asserted that in order to use postmodern critique effectively it must not be taken to this extreme, nor should it be regarded as a tool for finding the answer to a particular problem; this is because postmodern philosophy tells us that there can never be a single question to answer – there are always multitudes of questions.

Ian Hacking, in his *The Social Construction of What?*, poses the question of the postmodern: "Talk of social construction has become common coin, valuable for political activists and familiar to anyone who comes across current debates about race, gender, culture or science. Why?" (1999:2). Hacking explains that while the constructivist argument may be "wonderfully liberating," it has been largely misunderstood and overrepresented. Applying this line of thought to the topic at hand, Hacking's arguments suggest that while our ideas about "race" are certainly discursively constructed, the phenomenon of human biological variation is in some sense a reality. The majority of social and physical scientists who speak of "social construction" tend to apply this concept to practically everything – there must be a conscious separation of the object and our notions of perceiving the object for they are not the same (but this notion is consistently misconstrued by popular writers). What is to be done with these questions then? If we are to provide our own answers, must we necessarily revert to an empiricist (essentialist) ontology? Hacking claims that we do not. Essentialism is, like social construction, a largely misunderstood concept.

> Notice, however, that 'essentialism' is not purely descriptive. Most people who use it use it as a slur word, intending to put down the opposition. I cannot recall anyone standing up and saying, 'I am an essentialist about race.' Not even (as far as I know) Philippe Rushton, who presents book upon book of scientific arguments that race is an objective category that sorts human beings into three essential classes, color-coded as black, white, and yellow. He believes that members of each class tend to have a larger number of characteristics distinctive of the class of which they are members, such as levels of intelligence, sex drive, athletic prowess, sociability, and so on .... In short, races have what philosophers call essences. Nevertheless, although Rushton stands up and says the most amazing things in public, even he does not say, 'I am an essentialist about race.' (Hacking 1999:17-18).

According to Hacking, it would seem as if there has been a conceptual re-evaluation of the meaning of scientific objectivity in recent times, leading him to argue, "there need be no clash between construction and reality"(1999:29). But can this positive outlook transcend the larger objective/subjective debate that has raged in philosophy since Plato's protestation to Protagoras's statement, "Man is the measure of all things"(Rorty 1999:122)? While Hacking clearly rejects the (modern) notion of a discoverable "objective fact," he argues that the problems of doing science today are based in an overreliance on a strict constructivist or subjectivist analysis as well. The problem with this argument is that it really leaves us either everywhere or nowhere, and we would like to end up somewhere rather than where we are stuck now. If we reject the notion of objectivity and reject subjectivity as well, how can we discuss either epistemology or ontology? Hacking wonderfully illustrates these issues in the context of the "science wars," which he insists are not as problematic as popularly argued by both sides, but he fails to take his argument far enough.

The rejection of "objective fact" by critical social scientists and philosophers of science can be generally summed up by Stephen Jay Gould (1996b:39): "objective nature does exist, but we can converse with her only through the structure of our taxonomic systems." However, as Hacking has suggested, there is a problematic association between science and subjectivity as well, but he does not take up the challenge of elaborating it, revealing the basic flaw in his argument. "What is not so clearly stated in the work of Charles Taylor, Michel Foucault, and other postmodern theorists is that just as this theory enables one to avoid the category of pure objectivity, it must also, logically, allow one to argue that nothing can be purely subjective either. The category of subjectivity must become an equally false concept according to the postmodern conception of language" (Adell 2000:6). Adell takes this perspective further than Hacking, suggesting a way of conceptualizing the area that lies between what we have traditionally known as the objective/subjective debate.

> If language is a fundamentally social phenomenon, that functions 'inter-subjectively,'[3] or communally, and if it functions according to a set of rules of its own, then the individual's understanding of the world must always be at least partly shaped by the forces exterior to the individual. If one accepts this argument, it becomes possible to avoid narrowing one's field of study to the point at which one examines a single discursive formation since such a formation, in a manner similar to an individual subjectivity, is shaped as it comes into contact with other social phenomena (Adell 2000:7).

Thus with the postmodern focus on language constructing the individual, language as created by inter-subjective relations becomes an essential component of the social creation of the individual.

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[3] Adell credits Charles Taylor for this term and builds upon the argument presented by Taylor in *Human Agency and Language: Philosophical Papers, Vol. 1.* (1996).

While the theory of inter-subjectivity may not appear at first glance to be extremely useful in developing both a social and scientific argument against race and racial classification, it does allow us to reconsider how science can allow us to move past these loaded concepts. If the individual is to be understood as a social and cultural product, then the power relations and social movements affecting individual experience must inherently be part of the sciences. This also helps to explain the cyclical nature of social ideology in science that was raised earlier. Science is intrinsically affected by social convention, which is reified in science either consciously or inadvertently. The privileged position of scientific knowledge then becomes perpetuated in social ideology. The promotion and use of eugenics in Nazi Germany provides a very clear example of this process. But this does not rule out science as an "elevated" or superior way of understanding the world. This process can also work in the same way to a positive result – we do not necessary rule out the validity of scientific *fact*; our perceptions of these facts shape our perceptions of the world.

If one accepts that the individual is not a static entity, but is continually reconstructed with every single experience in life, then greater possibilities arise. Therefore, our thoughts, theories, actions and individual realities are always subject to change or revision. While we may never be able to discover the essence of "reality," whatever that may mean, we can move closer towards a relative truth by identifying problems in our own research created by our personal experience and consciously trying to identify them. Science as objective has traditionally been misunderstood in that it is assumed to provide access to a universal body of absolute knowledge; clearly, language is the limiting factor. But the creation of facts may still be a superior way of knowing when fact is understood not as absolute but as relative ontologically. Ernst Mayr explains, "Facts, then, may be defined as empirical propositions (theories) that have been repeatedly confirmed and never refuted" (1997:61). In terms of controversies such as the "race debate," the history of science demonstrates that such inconsistencies concerning a particular problem are resolved when one theory is generally acknowledged as being better than its competitors (Mayr 1997:81). In this respect, the knowledge produced by the scientific enterprise is endless, as the answers to our questions about the world are always changing, hopefully towards better approximations; and it is true that there is a special excitement surrounding a thoroughly revised understanding. It therefore seems only reasonable to suggest that adopting a holistic anthropological perspective as well as an interdisciplinary approach will maximize the potential for innovation, adopting a number of different perspectives and sparking a new creativity.

If we assume that differing experience can create the conditions for developing competing scientific explanations, and that eventually the best theory will overrule the weaker, we must still consider the way in which this form of knowledge is to be regarded epistemologically. Here, Adell (2000:9) suggests,

> If the extent of human epistemological capabilities lies in the ability to create meaning, and facts, only within the confines of a discursive framework, then the nature of a fact must include its being discursively, or socially, constructed .... At the same time, however, by asserting that the possibility of creating meanings, and thereby effecting change, within one's own social environment does exist, a space for human agency within discourse opens up. If people are capable of creating social constructions with limited meaning, then they must be capable of creating facts, if facts are also seen to have meanings limited to the discursive framework in which they are created.

These "facts" become scientifically validated only with repeated testing, preferably by a number of different investigators using a variety of methods. "Every confirmation strengthens the probability of the 'truth' of a fact or explanation, and every falsification or refutation strengthens the probability that an opposing theory is correct"(Mayr 1997:34). It is with this desire to understand human diversity and develop a new and scientifically acceptable model for reconceptualizing "race" that I present my descriptive analysis of the historical development of social and scientific conceptions of race, and attempt to build a "factual" basis for understanding humanity as an entirety and in its variations, in terms of biology, evolution, culture and society.

A Social Historical Analysis

Ancient Ideas About "Race"

The phenotypic differences of skin colour, hair texture and facial features most certainly intrigued our ancestors as early humans became increasingly mobile and spread throughout the world, contacting groups that had been isolated geographically for thousands, if not millions of years (see chapter 3). The first written evidence of this differentiation appears circa 1350 B.C. as the Romans, Greeks and Egyptians began large-scale explorations, recognizing various groups as "white," "black" and "yellow." This would seem like a natural distinction to draw between groups of people who appeared to be physically distinct to other groups who had never seen such people before. Certainly at this time, there was also a much-underdeveloped sense of human biology. There is little evidence to suggest that any of these colours or "types" of people were discriminated against because of their phenotypic constitution during this period. Historically, such discrimination has been based on differences in language, religion, culture, politics or class.

Ashley Montagu (1964:36) explains that, "The Greeks, as also the Romans, were singularly free of anything resembling race prejudice. A study of the cultures and literatures of mankind, both ancient and recent, shows us that the conception that there are natural or biological races of mankind which differ from one another mentally as well as physically is an idea that was not developed until the latter part of the eighteenth century." However, the development of "civilization" and the Greek city-states in the 700s B.C. sparked a newfound territoriality. The expansion of the Persian Empire in the 500s B.C. led to the battle of Marathon in 490 B.C., following which an internal rivalry developed between the Athenians and the Spartans, erupting into the Peloponnesian War of 431-404 B.C. It is with this focus on territoriality, between nations as well as internal city-states, developing out of governmental regulation and material ownership that humans began to develop deep-rooted biases for their own cultural and ethnic groups. It is also with the integration of religion and state power that a major class division emerged, with social class being directly related to birth rites and bloodlines.

Not until the institution of slavery in fourth-century Greece would there be an attempt to transform this classism and cultural bias into a biological or corporal entity. Unlike Plato (427-347 B.C), whose work *The Republic* provided a detailed blueprint for harmonious rule, Aristotle (384-322 B.C) claimed in his *Politics* that the captives were slaves "by nature" (Robinson & Groves 1998:21,27; Montagu 1964:34-35). Aristotle's view was not readily accepted at this time as the cultural prejudice proved sufficient to maintain the established hierarchy, and the science of the day was not sophisticated enough to incorporate human anatomy and intelligence in a manner that could sufficiently prove an innate destiny or dominance; this would remain the domain of the unrelenting religious-based classism. "The 'racial' interpretation is a modern 'discovery.' That is the important thing to grasp. The objection to any people on 'racial' or biological grounds is virtually a purely modern innovation. That is the basic sense in which modern group antagonism differs from that which prevailed in earlier times" (Montagu 1964:37). Even in the seventeenth century, "European explorers certainly imagined themselves as superior to all the peoples they encountered. But this sense of superiority was founded not on a race hierarchy, but on the belief that Europeans had achieved a level of civilization [urbanity and sophistication] unknown in other nations .... And this awareness of 'national' differences outweighed anything approaching a modern tendency to identify a particular skin-color or physiognomy with a 'race'"(Hudson 1996:250). Indeed, it was with the rise of Enlightenment thought and empirical science in the eighteenth century that the idea of a physical hierarchy based on intellectual and anatomic differences would become a major focus of the scientific endeavour.

The Invention of Race and Sex

With the rise of modern medicine in Western Europe during the early part of the eighteenth century, there was a general fascination with the idea of difference, from which a vast literature on both racial and sexual differences emerged by the end of the century. Although historians, anthropologists and sociologists have traditionally treated race and sex separately, it is important to discuss the fact that many anatomists at this time, who were interested in "racial" differences also investigated the biology of sexual difference.[3] "As anatomists and physical anthropologists sought to characterize and classify the races and the sexes, they faced a critical dilemma: where to rank the black man (the dominant sex of an inferior race) vis-à-vis the white woman (the inferior sex of the dominant race). It was these two groups – and not African women – who were contenders for power in eighteenth-century Europe"(Schiebinger 1990:388-9).

For Michel Foucault, racism is embedded in early discourses on sexuality, but not yet developed in its explicit form. In the making of a bourgeois "class" body in the eighteenth century, a field of discourse emerged with "body hygiene, the art of longevity, ways of having healthy children and of keeping them alive as long as possible" that "attest to the correlation of this concern with the body and sex to a type of 'racism' "(Foucault 1976:125). It is from

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[3] See especially Samuel Thomas von Soemmerring, *Vom Baue des menschlichen Körpers*. (1791-1796), 5 vols.

these problematic associations that Foucault, in 1976, gave a series of lectures at the Collège de France,[4] in which he referred to "race" as "sexuality's twin," emphasising the state's "biologizing" power to present visible differences in binary terms (Harrison 1998:618; Stoler 1995). With this statement, it can be argued that race, sex and gender can be considered as part of the same basic discourse of the biology of human difference. It is also from this notion that we can draw a number of examples, both abstract and specific, in order to illustrate the contemporary socio-biological issues such as race and gender, that were/are involved in the cultural construction of human identity from the Victorian period to the present.

On the issue of the construction of sex and gender, social historian Thomas Laqueur suggests that "the dominant, though by no means universal, view since the eighteenth century has been that there are two stable, incommensurable, opposite sexes and that the political, economic, and cultural lives of men and women, their gender roles, are somehow based on these 'facts' " (1990:6). He further explains this point, stating, "The physical 'real' world in these accounts, and in hundreds like them, is prior to and logically independent of the claims made in its name"(1990:6-7). The major point of emphasis here is that the scientific transformation from the idea that males and females possessed identical internal sexual organs that simply appear externally in different forms to the modern two-sex model that developed in the eighteenth century involved the assumption of an independent world. However, Laqueur argues that this was not, and can never be the case. "Thus, one might argue, new discoveries in reproductive biology came just in the nick of time; science seemed nicely in tune with the demands of culture" and "the more general shift in the interpretation of the male and

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[4] Foucault was to adapt these lectures into the sixth volume of his (in)famous *History of Sexuality*, but his premature death in 1984 came before he was able to compile the volume. At the time of writing, these lectures remained unpublished but appear partially transcribed in Stoler's *Race and the Education of Desire: Foucault's History of Sexuality and the Colonial Order of Things* (1995).

female bodies cannot have been due, even in principle, to scientific progress"(1990:8-9). This assertion implies that humans can only experience the physical world indirectly, since their empirical observations are always subject to language, preconception and biased interpretation. Therefore, observations of human differences, whether anatomical (functional) or phenotypic (observable features of biological inheritance), are incorporations of both the social and physical dimensions of the body.

The implications of the eighteenth century exploration of racial and sexual difference can best be understood by looking at how patterns of participation in science structured knowledge. The similarities between the study of blacks and women arose from the structure of the scientific community as the study of science was traditionally and exclusively a male domain. Thus, in the study of sex and race, the European male marked the standard of excellence (Schiebinger 1990:404). Even Carolus Linnaeus, the father of modern systematic taxonomy, taught that God gave men beards for ornaments that would distinguish them from women. Black men (to a certain extent), and especially men of the Americas, lacked the masculine "badge of honour" – the philosopher's beard (Schiebinger 1990:391). This focus on the European male as a particular *type* or *ideal*, and the interconnections of masculinity, national character and physical differentiation developed from, and would further perpetuate a view of science and the world that would have an incredible impact on the perceptions of future generations. Laqueur (1990) shows us how the dominant mindset of the time allowed for a belief in objective distinctions between *types* of humans, based on the notion of degeneration from an ideal form.

With Foucault's equation of the social and biological constructions of sex and race as intertwined with the hierarchy of class-based society, we can begin to deconstruct the political and social dimensions of the empirical science of human difference. Foucault's main focus in the discussion of biopower is to show how "in the West, a certain critical, historical, and political analysis of the state, of its institutions, and its mechanisms of power appears in binary terms," (Foucault 1990:68) which he argues materializes as a function of increasing nationalism throughout Europe between the seventeenth and nineteenth centuries. This conception of social relations as binaries emerges when state policies begin to manipulate race and sex, employing them as "tactic[s] in the internal fission of society into binary oppositions, a means of creating a 'biologized' internal enemies, against whom society must defend itself"(Stoler 1995:59). Thus, the concepts of race, sex and gender have become highly problematic in our modern class-based society, creating categories that are presented as binaries, such as man/woman, heterosexual/homosexual, black/white (with the added dimensions of Indian and Oriental etc.), deviant/non-deviant, and these oppositional relationships do not naturally exist – they have been created as mechanisms of social and population control. The issue of binaries is also larger than this since such opposition also creates a margin (Butler 1994) and within the context of racial classification, people of mixed ancestry become marginalized, which makes any typification of "race" or racial identity all the more arbitrary.

While some argue that "race" was systematically embraced by the seventeenth century, Foucault suggests that although there was a heightened classism at this time, racism had not yet emerged in its consolidated, purely somatic form (Stoler 1995:27). That is, the social conditions had developed, but it was not until Enlightenment thought produced a scientific legitimization of these views in the advancement of human anatomy and medicine that would further divide society. The eighteenth century brought sexual and racial anatomy to the forefront of medical discourse, but it was not until the nineteenth century that these ideas became fully entrenched in scientific thought and inquiry. Before engaging with these issues it is perhaps best to focus on the polarization of the social classes and sexism, which I have suggested formed the conditions in which biological differentiation became possible.

The Conditions for the Development of Human Differentiation

As we examine the development of human differentiation in Enlightenment science, the question we must ask is: why did this focus arise during this particular period? While there may be no singular answer to this question, the economic structure associated with the rise of industry at this time was a major factor. Karl Marx, in his work on capitalist production, explains that the industrial revolution brought the "separation of the intellectual powers of production from the manual labour, and the conversion of those powers into the might of capital over labour ... finally completed by modern industry erected on the foundation of machinery"(1970:423). It is from this emerging class polarization that the growing distinction between people of particular identities developed. Antonio Gramsci (1971:283) writes of the intellectual powers as becoming "luxury mammals" asserting that there existed "an enormous bulk of petty and middle bourgeoisie living on 'pensions' and 'rents', an economically unproductive stratum which not only exacts its own sustenance from the primitive labour of a specific number of peasants, but also manages to save."

In his critique of "Americanism" and American workers' unions, Gramsci (1971:286-7) argues, "The absence of the European historical phase, marked even in the economic field by the French Revolution, has left the American popular masses in a backward state. To this should be added the absence of national homogeneity, the mixture of race-cultures, the negro question." The wealth generated for the bourgeoisie through its ownership of the means of production, and its vested interest in social capital, led to the social regulation of the working class. "Medical advance, which has raised the average expectancy of human life, is making the sexual question increasingly important as a fundamental and autonomous aspect of the economic, and this sexual aspect raises, in its turn, complex problems of a 'superstructural' order"(Gramsci 1971:295-6). This "superstructure" becomes the site in which the social identities associated with class, sex and race are negotiated and constructed.

This economic need for social regulation produces its own means for legitimating the sexual division of labour and prescribing a particular mode of conduct to further suppress the social and sexual freedoms of the workers that may, otherwise, work against the economic structure. "The formation of a new feminine personality is the most important ethical and civil order connected with the sexual question. Until women can attain not only a genuine independence in relation to men but also a new way of conceiving themselves and their role in sexual relations, the sexual question will remain full of unhealthy characteristics and caution must be exercised in proposals for new legislation" (Gramsci 1971:296). From this, it can be seen that the legislation governing sexual practices and the consumption of alcohol had as its goal the creation of a new breed of worker, free from the distractions that may weaken their industrial performance. Gramsci suggests, however, "The truth is that the new type of man demanded by the rationalization of production and work cannot be developed until the sexual instinct has been suitably regulated and until it too has been rationalized"(1971:297). Thus, we see the intertwining of the economic structure with notions of class, masculinity, sexuality and moral regulation, which was recreated through social control in order for the ruling class to further invest in the social capital.

Foucault argues that such sexual repression actually serves to construct new notions of sexuality and sexual identity. He explains that state governments at this time did not perceive individuals or "people," but rather dealt on the level of "population" and its associated variables of birth and death rates, life expectancy, fertility, state of health, frequency of illness, patterns of diet and habituation (Foucault 1984b:308). Thus, the sexuality of individuals was transformed into a concerted economic and political behaviour. "In time these new measures would become anchorage points for the different varieties of racism of the nineteenth and twentieth centuries. It was essential that the state know what was happening with its citizens' sex, and the use they made of it, but also that each individual be capable of controlling the use he made of it. Between the state and the individual, sex became an issue, and a public issue no less; a whole web of discourses, special knowledges, analyses, and injunctions settled upon it"(Foucault 1984b:309). The result of this, Foucault argues, was not the "repression" of sexuality but, rather, a multitude of peripheral sexualities began to appear. Attempts to deal with these new forms of illicit behaviour subsequently became diverted from official codes of conduct to the medical system in the nineteenth century.

The notions of difference in the eighteenth century, as Laqueur has outlined, were gradually redefined with the medicalization of sex and sexuality. The study of criminality and deviance was linked to sexuality and race, and became a clear priority of scientific medicine. "The thing to note is that they went so far as to measure the brainspan, study the facial bone structure, and inspect for possible signs of degenerescence the anatomy of this personage who up to that moment had been an integral part of village life; that they made him talk; that they questioned him concerning his thoughts, inclinations, habits, sensations, and opinions"(Foucault 1984b:313). This transformation of the human body into a "medical and medicalizable object," brought with it a necessity for intense scientific inquiry and a systematic scheme for the classification of peoples according to human difference: race, sex, class, gender, deviance, criminality, etc. The ordering of nature set forth in Carolus Linnaeus' revolutionary taxonomy, described in the tenth edition of his *Systema Naturae* (1758), set the standard for such an ordering of humans, which at this point became scientifically validated

(Gould 1996a). According to Foucault, "The machinery of power that focused on the whole alien strain did not aim to suppress it, but rather to give it an analytical, visible, and permanent reality: it was implanted in bodies, slipped beneath modes of conduct, made into a principle of classification and intelligibility, established as a raison d'être and a natural order of disorder"(Foucault 1971b:323). It is at this historical moment that the ideas of recognisable difference and their importance became legitimated in the medical and scientific discourse and presented as objective fact – a process that I term the *discourse of difference.*

Degeneration and Moral Regulation

When Carolus Linnaeus introduced his binary nomenclature in *Systema Naturae*, he divided the species *Homo sapiens* into four varieties, defined primarily by geography and secondarily by skin colour, temperament and stance, according to what he believed were objectively observable differences. Interestingly, his order of his ranking system did not follow the emerging racist European conventions that Foucault outlines. Rather, he ranked the species in the order of *Americanus, Europaeus, Asiaticus* and *Afer.* Stephen Jay Gould (1996a) argues that in doing this, Linnaeus offered nothing at all original, but merely mapped humans according to the four geographic regions of conventional cartography that, aside from his focus on behaviour, was neither linear nor hierarchical. Although Linnaeus produced a seemingly value-neutral system of classification, his ideas would later become the basis of racial science when taken up by Johann Blumenbach. Blumenbach, considered the originator of scientific racial thought, has been the focus of the shift from geography to a hierarchical ordering as the basis of human diversity.

Blumenbach's ordering was built on a simple revision of the Linnaean system of human classification. To Linnaeus' four-region system, Blumenbach added a fifth "race" –

Malay, and described the skulls on which he had based his theories in terms of their physical beauty. This ranking was based on his own conception of aesthetic beauty – he did not attach any notion of intelligence or cultural superiority, but with his characterization of the "Caucasian" as the most beautiful of all human types, his ideas have been removed from their original historical and cultural contexts and turned into a system of generalized biological and intellectual hierarchy. He viewed all other races as having degenerated from this ideal by means of geographic influence (Blumenbach 1865; Gould 1996a). What he meant by this was that through environmental effects, the beauty that he attached to the morphology of the "Caucasian" skull deteriorated; he did not claim that this would have a functional effect. This provides a very interesting example of the subjective nature of science based on cultural bias and perpetuated in popular knowledge.

Although Blumenbach was an abolitionist, his idea of degeneracy was not based in physical or mental functioning but, again, simply arose from his own notions of beauty. However, with Blumenbach's idea of hierarchical ordering resting on aesthetics, it was manipulated into a belief in mental degeneracy, manifesting itself in the pseudo-science of phrenology as practised by Gall and Spurzheim. This practice was based on the belief that a person's mental and moral characteristics could be determined by examining the morphology of the head. Samuel Morton, the focus of Gould's *The Mismeasure of Man*, pioneered the science of craniometry in which he presented empirical evidence in 1839 for social ordering according to brain size. These ideas of intellectual and biological hierarchy were taken to an extreme in the late 1800s when Karl Pearson, influenced by the earlier works of Galton, placed heavy emphasis on the necessity of "positive eugenics" in order to advance the human race and eliminate physical and intellectual degeneracy.

In his article on Charles Darwin's ability to produce a convincing new science, Phillip Prodger writes: "To be effective, all scientists must convince an audience of the validity of their work, and must both attract and persuade their readership. These are substantial obstacles to the acceptance of any research development, but were particularly onerous to Darwin. The broad paradigmatic shift inherent in Darwinian evolutionary theory required significant cultural changes in Victorian Britain"(1998:144). While the influence of Darwinian theory has arguably created one of the greatest paradigm shifts in the history of science, it can be seen that the influence of the author, as Prodger suggests, has as much to do with the social and cultural conditions of his or her audience and of that audience's willingness to accept the information and interpret it a specific way. Originating in the works of Linnaeus and Blumenbach, these general social conditions of the time, with the focus on fundamental human differences, allowed for scientific works to be interpreted in a much different form than they were intended. This would have a profound effect on both academics and the general population, with the science of race creating reinforcement for the social ideology of difference, and vice versa.

When Darwin presented *The Origin of Species* in 1859, he argued for the evolution of animal species from a continuum of life, and that anatomical adaptation may facilitate certain forms of behaviour. This would then result in the selection of organisms with certain beneficial characteristics, these inherited behaviours being responsive to evolutionary pressures. Prodger claims that "Darwin was able to create a new scientific vocabulary, and in turn a new way of describing and perceiving nature. This may have facilitated the acceptance of Darwinian theory by establishing a neutral framework in which his observations could be considered"(1998:145). Unquestionably, Darwin's theories had an immediately profound effect on the way that human and animal biology are conceptualized, perhaps even more so than the works of Copernicus and Newton (Mayr 1967:vii). However, this new scientific vocabulary and focus on humanity as a species with equal abilities to adapt physically, culturally and intellectually to its immediate environments was still subject to the social and political climate of the time and was again manipulated or misconstrued to reinforce popular theories of racial superiority and hierarchical ranking based on the perceived notion of higher evolution.

The anthropological views of human variation, developed by Linnaeus, Blumenbach and Darwin, had consequences that would quickly become part of the discourses of comparative anatomy and medical science, which had become the authoritative body for the biological sciences and state-based health services. The ideas of modern medicine and the medicalization of the body have been a major focus of contemporary sociological and anthropological inquiry regarding the human body and experience. Thomas Osborne suggests that "Medicine is a generically perspectivist enterprise; the perspective it takes, what it values above all, is the individual body"(1997:201). But through this individualization of the body occurs the creation of a larger entity – the social body. The individual body becomes a categorizable entity that falls into a larger classificatory scheme, which in turn reconstructs this individual identity in a much larger and more abstract form according to social conventions. Osborne then asks: "If medicine is ... something like an anthropological universal, then this is not because there is some kind of universality inherent within the body. It is not the body that is primary but the fact of medicine; the very idea of the body, our very notion that there is a body to be cured, is the effect of the very universality of medicine itself, or at least of the universality of the fact that medicine is possible as a field of human activity"(1997:202).

Osborne derives his notions of the healthy body from the works of Nietzsche, Canguilhem and Foucault, in which there is a constant theme of silence and forgetting. "If

Nietzsche taught us nothing else, it was that forgetting has its uses. This is as true of the body as it is of anything else. What matters is not so much the body itself, but the ways in which the body is forgotten – body amnesia"(Osborne 1997:188). With this idea of bodily amnesia, or health in bodily silence, Osborne speaks of disability: "What is disability if not the feeling – whether subjective or the product of the perceptions of others – that one cannot forget about one's body?"(1997:197). Does this inability really affect only those labelled as "physically disabled?" What Osborne overlooks here is the existence of social disability – discrimination based on notions of race, sex, gender and class, which cannot allow an individual to forget that he or she is/has a particular *type* of body.

This medicalization of the body and multiple bodies begins as a function of state biopower, as Foucault suggests, through the enforcement of moral regulation by law and educational policy.[4] In his article on illicit sexuality in public education in late eighteenth and early nineteenth century Ontario, Bruce Curtis discusses the attempts to repress the sexual exploitation of children by adults through amendments to the Criminal Code, which served to sexualize a number of "normal" activities. "Even more remarkable are the related efforts at the bureaucratization of sexuality: attempts to map the domain of the sexual, to create a precise geography of the gesture, to define sexual spaces with a view to their control or elimination, and to specify rational criteria for the separation of the specifically "sexual" from the range of human expression"(Curtis 1994:103). This reformulation of behaviour as sexually deviant would have severe consequences in light of the fact that very little sexual education was being provided. Rather, textbooks and teachings focussed on the dangers of alcohol and tobacco as agents of destruction while information about puberty, sexuality, sexual organs and reproduction was largely ignored.

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[4] See Foucault, "The Politics of Health in the Eighteenth Century" (1984); Stoler (1995).

> After 1900 … the popular advice literature available to Canadians, while accepting the legitimacy of a moderate heterosexual expression within the bonds of monogamous marriage, was fixated by the spectre of social degeneration provoked by masturbation. Young people were provided with myths and horror stories hardly likely to conduce to an active and guilt-free sexuality or self-knowledge. This kind of message continued well into the 1920s (Curtis 1994:107).

This focus on social or moral and physical degeneration has, as will be shown, been the main focus of the construction of types and the transformation and continuous renegotiation of physical-social identities.

Alan Hunt's "The Great Masturbation Panic and Discourses of Moral Regulation in Nineteenth- and Early Twentieth-Century Britain" effectively illustrates the issue of state biopower in surveillance and the notion of physical and moral degeneration, demonstrating the underlying connections between classism, sexism and racism.

> It was precisely the expansion of surveillance, with the mushrooming of asylums during the eighteenth and early nineteenth centuries that allowed doctors to undertake systematic observation of large numbers of patients. From the fact that many of the incarcerated were found to masturbate with little or no inhibition, it was but a short step to the conclusion that this surprising and shocking revelation suggested that masturbation itself was the cause of insanity (Hunt 1998:593).

This perceived causal relationship between masturbation and mental illness later incorporated a homophobic discourse as it became seen as a societal evil. "The evil perceived in masturbation came to symbolize all forms of sexual indulgence. This expanding attack constitutes a shift between two of the 'great strategies' for the deployment of sexuality that Foucault identified: from the 'sexualization of children' to the 'regulation of population'"(Hunt 1998:604). In this way, the focus on sexuality and population became manifested in the larger social thought after the First World War.

The escalating concern with controlling the population in the post-war period took on a new scientific methodology based in Malthusian and Social Darwinian theory. The result of this would be a shift from the Social Darwinist notion of competition between individuals to a more nationalistic view of a struggle between nations and races that evolved into a focus on eugenic science:

> A new discourse of population emerged, urging the imperative of population expansion, increased birthrate, and a healthy and numerous population. There were distinct strands of the population concern. One concerned the state of the lower order and expressed itself as persistent apprehension about degeneracy. The other concerned the demographic position of the middle and upper classes, one of whose most frequent refrains was that the 'better classes' had too few children while the 'lower classes' had too many (Hunt 1998:610).

Hunt terms this change as "familial nationalism," with the discourse shifting to a larger focus on population, family and above all, the nation. Sexual practices became subject to the purity movement in order to protect the moral and biological integrity of the nation and Empire. The dangerous and degenerative practices of sexual and moral corruption were to be outlawed. "Thus anxieties about the empire and British dominance are constituted as questions of sexual order and sexual control that provided, at the same time, the core of the social purity version of the anti-masturbation discourses"(Hunt 1998:611).

The anti-masturbation discourse is a seemingly simple example, yet it provides a telling example of state biopower in action in an extremely complex form. Hunt's description uses this discourse to bring together the issues of gender, race, nation and class into an alliance between feminism and imperialism, and presents it as a racism and classism of the Victorian upper and middle classes. "In other words racial and imperial superiority could be assured only when sexual purity took the form of a self-denying and self-controlling chivalry linked to the biological reproduction of the middle and upper classes within marriage along with the valorization of motherhood as an imperial duty"(Hunt 1998:613). While Hunt's article provides a poignant example of the medicalization of the body and its relation to state power, this serves as only one manner in which such biopower is exercised by the state, and serves to construct various types and norms of people and behaviour, which have formed the basis of racial classifications.

New Perspectives on Human Variation

The social history of race presented in this chapter is only a single history; it should be acknowledged that as there are multitudes of questions opened up by postmodern analysis, and there are multitudes of histories. From this history, it can be deduced that "race" is not simply about colour; it is about power, domination and control, ownership, materiality and manifest destiny. The purpose of this discussion is to contextualize racial science as part of an immense social dynamic, consisting of politics and power struggles that we are all subject to, but often ignorant of. Foucault tells us (1970:56), "These and these alone are what constitute science, and even if we had read all the arguments of Plato and Aristotle ... what we would have learned would not be science, it appears, but history." Social theory and philosophies of science attempt to expose these relations of power that anthropologists have traditionally exploited (used to their benefit in their relationships with "primitive" groups) in their own work, often without notice, and it is therefore necessary to incorporate such thoughts and theories into any scientific endeavour if we are to develop new "facts" and further develop our scientific understanding of the world.

It seems clear at this point, by the very nature of this particular project, that the shifting of discourse away from contentious conceptions of "race" has begun. However, the question remains as to how effective anthropology has been in promoting this reinterpretation? Certainly, both biological and historical analyses of "race" and "racism" are not newly formed concepts in anthropology, or in any of the social or biological sciences. On this point, Alan Goodman (1997:21) asserts that "Race should have been discarded at the turn of the century when American anthropologist Franz Boas showed that race, language and culture do not go hand-in-hand, as raciologists had contended." Goodman claims that the majority of anthropologists today have acknowledged that biological races as historically defined simply do not exist (1997:21). The problem that does exist within anthropology, however, is that most authors, Harrison included, focus exclusively on the philosophical issues involved with the concept of "race," failing to tackle the practical dimensions of this issue and, most problematically, fail to offer viable alternatives. As a result, despite the overwhelming scientific evidence contradicting "racial" difference, the social acceptance of racial categorization persists in much of the world today and continually manifests itself in many new forms, as have been displayed very recently with "ethnic cleansing" campaigns in Eastern Europe.

Thus, the expanded discourse on race has not resulted in a paradigm shift as Harrison has claimed, but the potential is evident in some of the most influential publications in both cultural and physical (biological) anthropology. In 1951, United Nations Educational, Scientific and Cultural Organization (UNESCO) published their statement on race, insisting on scientific responsibility when researching the variations of *Homo sapiens*, which would mark the beginning of a new attentiveness of misconceptions of science by society. Based on this new awareness of the issues of "race," both the American Association of Physical Anthropologists (AAPA)(1996) and the American Anthropological Association (AAA)(1999) have more recently published official statements on "race." The AAPA's statement focused mainly on issues of biological importance, based upon the premise that "Popular conceptions of race are derived from 19th and early 20th century scientific formulations. These old racial categories were based on externally visible traits; primarily skin color, features of the face, the shape and size of the head and body, and the underlying skeleton. They were often imbued with nonbiological attributes, based on social constructions of race"(AAPA 1996:569). Beyond this perception, the AAA statement explains, "Evidence from the analysis of genetics (e.g., DNA) indicates that there is greater variation within [so-called] racial groups than between them. This means that most physical variation, about 94%, lies within so-called racial groupings. Conventional geographic 'racial' groupings differ from one another in about 6% of their genes"(1999:712; Templeton 1998).

The AAA statement (1999:712) then takes this argument in a different direction, explaining that "Today scholars in many fields argue that race as it is understood in the USA [as well as Canada, or any Westernized nation] was a social mechanism invented during the 18th century to refer to those populations brought together in colonial America: the English and other European settlers, the conquered Indian Peoples, and those peoples of Africa brought in to provide slave labour." This is further explained as a mode of classification with specific linkages to the colonization of North America by the Europeans, a tool to rationalize the growing ideology of inequality and the treatment of the conquered and enslaved. The result of this rationalization has manifested itself in the historical development of modern science. "Early in the 19th century the growing fields of science began to reflect the public consciousness about human differences. Differences among the racial categories were projected to their greatest extreme when the argument was posed that Africans, Indians and Europeans were separate species, with Africans the least human and closer taxonomically to apes"(AAA 1999: 712).

These statements must be regarded as a step in the right direction, as the authoritative organizations in the dominant subdisciplines of anthropology can be extremely persuasive. But we must not discard "race" simply because we are told that it is morally wrong to talk in racial terms. We must do it because it is inexplicably clear that race is perhaps the most misunderstood and misrepresented scientific concept ever imagined. The colour-coding of human populations attests to the absurdity of a racialized worldview; these "colours" demonstrate only one innate human quality – adaptability.

As I have attempted to demonstrate, racial thought has developed out of the clouded vision of a gendered science. It must be recognised that the human species cannot be characterized as "man" as has been the tradition, but nor do the majority of the feminist alternatives work either. The domination of a gendered view of species serves to limit our understanding of ourselves, and of nature. Humans are a single species, not to be distinguished by sex, gender, race, ethnicity or nationality – without these variations we could not continue as a species, continually reproducing and adapting to various environments as we and our hominid ancestors have for over five million years. While these problematic associations have been elaborated in anthropology for well over a century, racial discourse is still alive and well today in both academics and in general use. Many anthropologists have incorporated critiques of racial science into their curriculum, while a number still adhere to an "essentialist" biogenetic, sociobiological or evolutionary psychological theory of human nature. The other issue here is that in most cases, anthropologists have failed to utilize the works of their historian colleagues (this seems to be a reciprocal relationship), who in many cases have produced intriguing social and cultural histories that would surely benefit the understanding of the anthropologist. The following chapter will focus on a historical deconstruction of the scientific development of racial thought as proposed by Linnaeus, Buffon and Blumenbach, as well as more modern interpretations, for we cannot move forward without attempting to analyze where we went wrong. Only from reducing the fundamentals of racial science to their conceptual basis can we attempt to reconceptualize and reinterpret the nature of human biological variation and develop a meaningful and useful scientific model to replace "race."

- CHAPTER 2 -

RACE, VARIETY OR SUBSPECIES? THE TAXONOMIC CLASSIFICATION OF HUMANS

The Origin of Human Taxonomy

The study of natural history developed out of theology and philosophy as an autonomous branch of science in the sixteenth and seventeenth centuries through the work of great naturalists such as John Ray (1627-1705) and G.W. Leibniz (1646-1716), who sought to draw the kingdoms of plants, animals and humans into a single scheme of biological analysis.[1] The question arising out of these attempts was how would humans be placed in this classification in such a way that would not compromise their status as the highest, and only "reasonable," of all beings? It was thought at this time that "reason" was the essence of human biological superiority as humans were the most intelligent of species, and the only species capable of truly understanding the world around them. John Locke (1632-1704) argued in his *Essay Concerning Human Understanding* (1690) that "reason" was no more essential to the human species than any other attribute. Leibniz strongly defended the position that all humans, including the "Negroes, Chinese and American Indians," were divided from the rest of nature exclusively by "reason." In 1735, the understanding of natural history would dramatically change as Carl von Linné (Carolus Linnaeus; 1707-1778) presented the first edition of his *Systema Naturae.* In this, Linnaeus attempted to rectify the debate over reason and the position of the human species in nature, thus providing the basis for modern systematic taxonomy (Hudson 1996:253).

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[1] Ray was the first to recognize that plant and animal groups could be distinguished by their ability to reproduce with one another resulting in viable offspring, applying the classification of *species* and expanding this secondarily by *genus* in his three-volume *Historia Planatarum* (1686-1704). See Raven (1986) *John Ray, Naturalist; His Life and Works*

The first edition of *Systema Naturae* dealt with the plant, animal and mineral kingdoms and their relationships to each other, but this would only form a rudimentary basis for the Linnaean taxonomy. Linnaeus consistently revised and expanded *Systema Naturae*, which grew from its original size of twelve pages to a three-volume work of 2,400 pages in its twelfth edition in 1766. It was, however, the tenth edition of *Systema Naturae* in 1758 that would drastically change the way that humans see themselves in the grand scope of nature. Whereas earlier editions included humans as four-legged animals in the order *Quadrupedia* and family *Anthropomorpha*, Linnaeus presented binomial names [binary nomenclature], both generic and specific, to all known animals of the time – nearly 4,400 species (Schiebinger 1993:185), and in an attempt to improve his description of humans, introduced the terms *Mammalia* and *Primates*. He further classified humans as the species *Homo sapiens*, meaning "most wise,"[3] dividing this species into four distinct varieties (*Homo europaeus, Homo americanus, Homo asiaticus, Homo afer*), just as all other species were divided into varieties (Linnaeus 1735; Broberg 1994:175; Hudson 1996: 253). This would prove to be a daring move as many naturalists at the time believed that Linnaeus had gone too far by placing humans, the greatest of all species, into the natural kingdom of plants and animals (Hudson 1996:253).

The major problem with the taxonomy lay in placing humans in the order of *Primates*, thereby associating them with apes (Figure 1), although Edward Tyson, an English anatomist, had already done this in 1699. Nonetheless, because of its comprehensive nature and the general high esteem of its creator, the Linnaean taxonomic system would eventually become the

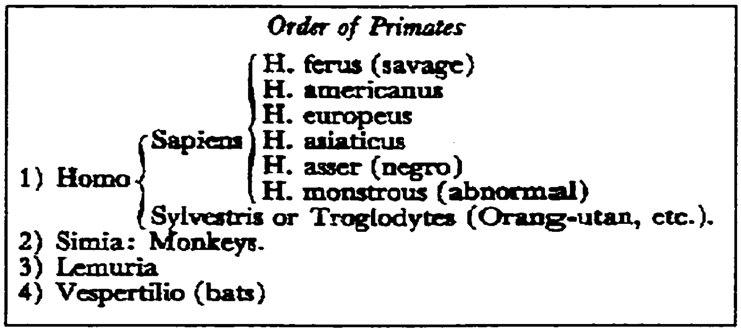

Figure 1 - *Homo sapiens in Linnaean taxonomy*
(From Comas 1960:13).

dominant means of placing all living forms into an orderly system of relations. With the acceptance of the Linnaean hierarchy, the differentiation and division of *Homo sapiens* into varieties also became the dominant way of distinguishing among the diverse *types* of humanity.

Like the majority of scientists of the time, Linnaeus had a precise understanding of *species* as distinguished from *varieties*. To him, species were distinct primordial forms dating to creation that remained fixed and unalterable throughout time. Varieties, on the other hand, could be characterized as groups within a species that had acquired superficial distinctions in their outward appearance by means of external factors – climate, temperature and other geographic factors (Smedley 1999:160-161). The division of *Homo sapiens* into four main varieties was delineated primarily by geography and secondarily by colour, temperament, stance and posture. In earlier editions, Linnaeus also included the bizarre varieties *Homo ferus* or savages, and *Homo monstrous* or abnormal, which many consider an exaggeration of the mentally ill or retarded. The problem with Linnaeus' classification was that it was based more on classical taxonomic theory than on his own observations; he was therefore unduly influenced by the greatly sensationalized stories of explorers, traders and missionaries (Smedley 1999:161). In dividing the varieties of humans, his separation by temperament was based on ancient and medieval theory that mood arises from that balance of the body's vital fluids [blood, phlegm, choler (yellow bile) and melancholy (black bile)]. Stephen Jay Gould (1996a:404) puts the Linnaean taxonomy of humans into its simplest perspective: "Four geographic regions, four humours, four races."

Throughout the editions of *Systema Naturae*, including the tenth edition, Linnaeus indiscriminately mixed physical and mental features that today are understood as external and cultural, which he listed as (Linnaeus 1758:20-24; Marks 1995:50; Smedley 1999:161):

> *Americanus:* Reddish, choleric, and erect; hair-black, straight, think; wide nostrils, scanty beard; obstinate, merry, free; paints himself with fine red lines; regulated by customs.
>
> *Asiaticus:* Sallow, melancholy, stiff; black hair, dark eyes; severe, haughty, avaricious; covered with loose garments; ruled by opinions.
>
> *Africanus:* Black, phlegmatic, relaxed; hair-black, frizzled; skin-silky; nose-flat; lips-tumid; women without shame, they lactate profusely; crafty, indolent, negligent; anoints himself with grease; governed by caprice.
>
> *Europeus:* White, sanguine, muscular; hair-long, flowing; eyes-blue; gentle, acute, inventive; covers himself with close vestments; governed by laws.

Not only did Linnaeus indiscriminately mix these characteristics, he also relied heavily on cultural effects in order to differentiate among his varieties, and only secondarily on actual physical characteristics. While this ordering of characteristics is rife with what we today consider to be misconceptions and value judgements that are undoubtedly based in the dominant European notion of cultural and intellectual superiority, Gould (1996a:405) argues,

> Nonetheless, and despite these implications, the overt geometry of Linnaeus's model is not linear or hierarchical. When we epitomize his scheme as an essential picture in our mind, we see a map of the world divided into four regions, with the people in each region characterized by a list of different traits. In short, Linnaeus uses cartography as a primary principle for human ordering; if he had wished to push ranking as the essential picture of human variety, he would surely have listed Europeans first and Africans last, but he started with Native Americans instead.

Perhaps Linnaeus found the Native Americans to be the most interesting or peculiar of all of the perceived varieties of man [*Homo sapiens*], but his bias for including them first in his ordering was most likely based on his acknowledgement of their great diversity.

Working at the same time as Linnaeus, although greatly opposed to his systematic classification, was Georges-Louis Leclerc, the Comte de Buffon (1707-1788), whose *Histoire Naturelle Générale et Particulière des Animaux* [*A Natural History, General and Particular*] (1749) is generally regarded as the beginning of true anthropological thought (Comas 1960; Marks 1995), as he urged a holistic understanding of the human species. Buffon argued,

> Nature proceeds with gradual, and often imperceptible steps; yet the intervals or marks of distinction are not always equal. The more dignified the species, they are always the less numerous, and separated by more conspicuous shades. The diminutive species, on the contrary, are very numerous, and make nearer approaches toward each other. For this reason, we are often tempted to erect them into families. But it should never be forgotten, that these families are of our own creation; that we have contrived them to case our memories, and to aid our imagination; that, if we cannot comprehend the real relations of all beings, it is our own fault, not that of Nature, who knows none of those spurious families, and contains, in fact, nothing but individuals (Buffon 1781[vol. III]:404-5).

Buffon did not divide the human species into four divisions as Linnaeus did since he rejected the notion that there exists a set number of subspecies or varieties (Marks 1995:51). However, Buffon was the first to use the term "race" in connection with the human species, a term which had already been in use with reference to the breeding of livestock. In applying "race" to humans, Buffon (1749) explained that:

> Among men, all the gradations of colour, from black to white, are exhibited. They likewise differ, by one half, in the height of stature, thickness, strength, swiftness, &c. But their mind is always the same. This latter quality, however, belongs not to matter, and ought not be treated of in this place. The others are the common variations of Nature effected by the influence of climate and food. But these differences in colour and dimensions prevent not the Negro and White, the Laplander and Patagonian, the giant and dwarf, from mixing together and producing fertile individuals; and, consequently, these men, so different in appearance, are all of one species, because this uniform reproduction is the very circumstance which constitutes distinct species (Buffon 1781 [vol. III]:407-8).[2]

Thus, for Buffon, the common variations of a constant nature are what constituted the human races. However, Buffon's perspective on the "races" was much different from Linnaeus's "varieties."

Buffon was more interested in explaining the changing variations of the species rather than classifying. Rejecting any methodology that reduced classification to a single criterion, Buffon argued that the whole "ensemble" of traits must be taken into account, focusing not

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[2] Buffon argued that a species is delimited by its ability to reproduce successfully and consistently, arguing that there was no further division of humans possible.

solely on skin colour, but by comparing stature, physiognomy, hair-type, intelligence, and the whole configuration of physical and mental features (Hudson 1996:254). He did, however, produce a six-race model that included the *Laplanders* or "Polar Race," *Tartars* or Mongolians, southern *Asiatics, Europeans, Ethiopians* and *Malays*. He argued that the colours of races were merely superficial, and that these variations were caused by the influence of food, air and the earth's topography, while structural differences (i.e. stature, body weight, height) in the races were produced secondarily by culture, habits, customs, beliefs and practices (Smedley 1999:162-3). In attempting to derive a historical relationship among the races by virtue of their resemblance to one another (Marks 1995:51), Buffon proposed a change in the study of man that would outline the divisions of modern anthropology, dividing the discipline into four distinct but complimentary subdisciplines: a) humans in general considered as a natural history subject throughout the ages; b) the races, their description, origin and miscegenation [interbreeding]; c) a physical and physiological comparison of man's characteristics with the other animals, and d) humanity's origin and place in the zoological scale. Rather than studying humans as collections of smaller populations or varieties, Buffon was interested in the entire species, and primarily the variations that occur between individuals, rather than between races (Comas 1960:17).

Buffon's work was very widely read and influential among the educated public, but his approach to the study of human variation was not the one that ultimately prevailed. Buffon's reputation among scientists was quite thoroughly eclipsed by that of Linnaeus. "But is was Buffon's new 'broad' use of 'race,' and his general hierarchy of species-race-nation, that most influenced later writers"(Hudson 1996:256). The result was that along with the recognition of a nested hierarchy in nature came an emphasis on classifying all creatures, at all taxonomic levels. As Linnaeus had done for the human species, putting genera into orders, species into genera, and sub-species into species, so too did his predecessors. In their works on the "races" or "varieties" of man, or more appropriately, humankind, both Buffon and Linnaeus consistently mixed cultural and biological data in their descriptions, and both included personal value judgements in assigning certain intellectual and moral characteristics to divisions of the species.

The fundamental differences were based on approach – Buffon chose a descriptive, experimental and analytical method while Linnaeus was strictly classificatory, and therefore seen as more scientific (Marks 1995:51-3). The effect that Buffon's theories had on the study of humanity would later form the basis of evolutionary thought, which was first suggested by his successor (who started as a tutor to Buffon's son), Chevalier de Lamarck (1744-1829), and later exacted and popularized by Darwin. An example is Buffon's (1749) suggestion that:

> If it be once admitted that there are families among plants and animals, that the ass belongs to the family of the horse, and differs from him only by degeneration; with equal propriety may it be concluded, that the monkey belongs to the family of man; that it is a man degenerated; that man and the monkey have sprung from a common stock, like the horse and the ass; that each family, either among animals or vegetables, has been derived from the same origin; and even that all animated beings have proceeded from a single species, which in the course of ages, has produced, by improving and degenerating, all the different races that now exist (Buffon 1781[vol. III]:402-3).

The study of human variation would take yet another dramatic turn in 1775, when Johann Friedrich Blumenbach (1753-1840) published his *De Generis Humani Varietate Nativa* [*On the Natural Variety of Mankind*]. Blumenbach, considered by most to be the father of modern physical anthropology, was inspired by both Linnaeus's classification and Buffon's analysis. He undertook to study the variations of humankind through comparative anatomy, using strictly anatomical features in order to define the races. Blumenbach, like his predecessors, undertook as his main goal to examine the so-called varieties of the human species in light of an arising monogenist/polygenist debate about human origins. The principle question of investigation in *De Generis Humani Varietate Nativa* was: "*Are men, and have men of all times and of every race been one and the same, or clearly more than one species?*" [emphasis in original], to which he replied, "The idea of the plurality of human species has found particular favour with those who made it their business to throw doubt to the accuracy of Scripture"(p. 98). Thus, Blumenbach professed the unity of the human species – all humans as descended from a single pair, Adam and Eve. Blumenbach, although influenced by Buffon and Lamarck, originally chose to define his varieties according to Linnaeus's four-region subspecies division of his classic taxonomy. He did explain, however, as Buffon had before him, that the varieties of humankind run into each other and therefore there could be no rigid limits between them. He further explained, "Very arbitrary indeed both in number and definition have been the varieties of mankind accepted by eminent men"(p. 99).

Blumenbach's main interest as an anatomist and anthropologist was in craniometry and variation in craniofacial morphology. In this regard, he stated, "for a considerable period of time singular shapes of the head have belonged to particular nations, and particular skulls have been shaped out, in some of them certainly by artificial means, it will be our business to look at these things a little more carefully, and to consider how far they constitute different varieties of the human race"(p. 114). Although his method of analysis was based more on the influence of Buffon, Blumenbach stuck to the four-divisions of the species that Linnaeus had given. In ascribing a cranial shape to a particular variety, he reasoned, "Let us follow nature herself, and we shall reckon up the various shapes of the head in various nations, according to the four varieties of mankind which we constituted"(p. 115).

The variations of humans were, to Blumenbach, caused by the same forces explained by Linnaeus and Buffon – the physical climate, "whose effects seem so great that distinguished men have thought that on this alone depended the different shapes, colour, manners and institutions of men"(p. 71). This was, in Blumenbach's view, the factor that caused degeneration away from the European physical form, which was seen as the image of creation, and hence, perfection. However, Blumenbach noted that climate as the causal factor of superficial physiological change was also subject to "the mode of life and bringing up"(p. 72). Blumenbach also observed the relationship of a number of plant and animal species to their immediate environments, concluding that climate and latitude were the main causes of differences in height: "That in hot countries bodies become drier and heavier; in cold and wet ones softer, more full of juice and spongy, is easily noticed"(p. 101).

In the third edition of *De Generis Humani Varietate Nativa* (1795),[3] Blumenbach explained this process by claiming that "the air, affected by climate, decomposes in the lungs and travels through the blood to the organs, later arising in modification to these organs"(p. 197), thus his classification was generally based on physical geography. Beyond the climatic effects on the stature and bodily constitution of the "varieties of man," Blumenbach focused on skin colour in only a cursory manner. While he explained that "There seems to be so great a difference between the Ethiopian, the white, and the red American, that it is not wonderful, if men even of great reputation have considered them as forming different species of mankind"(p. 105), he argued that "varieties" were not separate species, nor were they subspecies. "It is scarce worth while to notice the well-known difference which occurs in the inhabitants of one and the same country, whose skin varies wonderfully in colour; according to the kind of life they lead"(p. 108). Thus, Blumenbach claimed in his third edition that there were three distinct stimuli, which resulted in the degeneration into the known "varieties of man:" diet, mode of life and hybrid degeneration.

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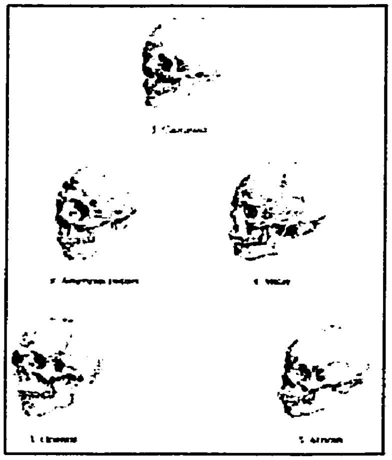
[3] Both the first and third editions of *De Generis Humani Varietate Nativa* appear in *Anthropological Treaties of Johann Friedrich Blumenbach* (1865); to which all page citations refer.

As mentioned in the previous chapter, it was also in the third edition of *De Generis Humani Varietate Nativa* that Blumenbach made another dramatic break from the classic Linnaean classification, borrowing from Buffon, by adding a fifth variety – *Malay*. Blumenbach gave great credit to Linnaeus, but explained:

> It is one of the merits of the immortal Linnaeus, that more than sixty years ago, in the first edition of his *Systema Naturae*, he was the first, as far as I know, of writers on natural history, who attempted to arrange mankind in certain varieties according to their external characters; and that with ***sufficient accuracy considering that then only four parts of the terraqueous globe and its inhabitants were known*** [emphasis mine]. But ...when a more accurate knowledge of the nations who are dispersed far and wide over the islands of the Southern Ocean had been obtained by the cultivators of natural history and anthropology, it became very clear that the Linnaean division of mankind could no longer be adhered to; for which reason I, in this little work, ceased like others to follow that illustrious man, and had no hesitation in arranging the varieties of man according to the truth of nature (p. 150).

Therefore, Blumenbach's departure from the Linnaean four-race classification was not based on a conceptual basis, but rather it was a simple revision based on more advanced knowledge of the subject. Based on the reports and sketches of explorers and his personal collection of 82 skulls (see Appendix A), Blumenbach explained (see Figure 2; enlargement in Appendix B),

Figure 2



> I have allotted the first place to the Caucasian, for the reasons given below, which make me esteem it the primeval one. This diverges in both directions into two, most remote and very different from each other; on the one side, namely the Ethiopian, and on the other, the Mongolian. The remaining occupy the intermediate positions between that primeval one and these two extreme varieties; that is, the American between the Caucasian and Mongolian; the Malay between the same Caucasian and Ethiopian (p. 265)

However, Blumenbach acknowledged that there are innumerable varieties of humankind, which run into one another by insensible degrees. He clearly states, "no variety exists, whether of colour, countenance, or stature, &c., so singular as not to be connected with others of the same kind by such an imperceptible transition, that it is very clear that they are all related, or only differ from each other in degree"(p. 264). Blumenbach justifies his ordering and division of the varieties by explaining, "As, however, even among these arbitrary kinds of divisions, one is said to be better and preferable to another; after a long and attentive consideration, all mankind, as far as it is at present known to us, seems to me as if it may best, according to natural truth, be divided into the five ... varieties"(p. 264). Blumenbach thus acknowledged that just as the Linnaean classification had to be updated with the advancement of knowledge, so too would his five-race model of the human varieties be subject to the same forces of scientific advancement.

According to Blumenbach's scale, the varieties of humankind could be distinguished by the following characteristics (p. 265-266):

> *Caucasian variety*. Colour white, cheeks rosy; hair brown or chestnut coloured; head subglobular; face oval, straight, its parts moderately defined, forehead smooth, nose narrow, slightly hooked, mouth small. The primary teeth placed perpendicularly to each jaw; the lips (especially the lower one) moderately open, the chin full and rounded. In general, that kind of appearance which, according to our opinion of symmetry, we consider the most handsome and becoming. To this first variety belong the inhabitants of Europe (except the Lapps and the remaining descendents of the Finns) and those of Eastern Asia, as far as the river Obi, the Caspian Sea and the Ganges; and lastly, those of Northern Africa.
>
> *Mongolian variety*. Colour yellow; hair black, stiff, straight and scanty; head almost square; face broad, at the same time flat and depressed, the parts therefore less distinct, as it were running into one another; glabella flat, very broad; nose small, apish; cheeks usually globular, prominent outwardly; the opening of the eyelids narrow, linear; chin slightly prominent. This variety comprehends the remaining inhabitants of Asia (except the Malays on the extremity of the trans-Gangetic peninsula) and the Finnish populations of the cold part of Europe, the Lapps &c. and the race of Esquimaux, so widely diffused over North America, from Behring's straits to the inhabited extremity of Greenland.

> *Ethiopian variety*: Colour black; hair black and curly; head narrow, compressed at the sides; forehead knotty, uneven. malar bones protruding outwards; eyes very prominent; nose thick, mixed up as it were with the wide jaws; alveolar ridge narrow, elongated in front; the upper primaries obliquely prominent, the lips (especially the upper) very puffy; chin retreating. Many are bandy-legged. To this variety belong all the Africans, except those of the north.
>
> *American variety*: Copper-coloured; hair black, stiff, straight and scanty; forehead short; eyes set very deep; nose somewhat apish, but prominent; the face invariably broad, with cheeks prominent, but not flat or depressed; its parts, if seen in profile, very distinct, and as it were deeply chiselled; the shape of the forehead and head in many artificially distorted. This variety comprehends the inhabitants of America except the Esquimaux.
>
> *Malay variety* [South-sea Islanders]: Tawny-collared; hair black, soft, curly, thick, and plentiful; head moderately narrowed; forehead slightly swelling; nose full, rather wide, as it were diffuse, end think; mouth large, upper jaw somewhat prominent with the parts of the face when seen in profile, sufficiently prominent and distinct from each other. This last variety includes the islanders of the Marianne, the Philippine, the Molucca and the Sunda Islands, and of the Malayan peninsula.

Not only did Blumenbach's description of the human varieties expand on the Linnaean system, but it took on a purely somatic or physiological form, based particularly on observations of the skull.

Analyzing the Classificatory Criteria

The classifications of humankind as presented by Linnaeus, Buffon and Blumenbach differ in many respects but are also linked by numerous common factors: mainly geography (cartography) and religion. Linnaeus's division of the varieties of humankind were based upon the existing knowledge of the time. There were many areas of the world yet to be discovered and understood, and as a result, he appreciated only the gross physical differences that existed because of continental division. Buffon also drew upon the relationship between geography and physical features. Although both Buffon and Linnaeus consistently intermixed physiological features with social and cultural behaviours in delimiting the varieties or races of the human species, Buffon eventually developed a rudimentary understanding of the effects of culture on the physical body that would be more adequately developed by Blumenbach. Both Buffon and Blumenbach recognized that there were great regional variations within the continents, but the preoccupation of the day with the continental division of humanity restrained them from identifying certain national or religious groups, such as Anglo-Saxons, "Aryans," or Jews as distinct races. They did, however, frequently refer to nation and nationality in their descriptions of the human variations.

The concepts of "nation" and "nationality" as internal to race or variety became popularized when David Hume published his influential essay "Of National Characters" in 1748. In this, he refuted the ancient belief (which was reinforced by Linnaeus) that the character and appearance of different nations varied according to climate and other factors. Hume argued that many people with a similar appearance differed significantly in temperament, thus the "national character" must be caused by outside factors, which he called "moral" causes (culture and society – government, economy, diplomacy, profession)(Hume 1748; Hudson 1996:255-6). This separation of the social from the physical was not immediately reflected in the sciences. Hume himself argued, "I am apt to suspect ... the negroes, and in general all the other species of man (for there are four or five different kinds) to be naturally inferior to whites"(Hume 1748; Smedley 1999:181). Although he believed in social influence and morality, he still believed that European nationalities were by far the most civilized. It was only with the rise of anthropological thought originating with Buffon that would allow for movement beyond this perspective, toward a greater understanding of both the cultural and biological diversity of humans and led to the rejection of a rigid taxonomy for the species. But it was not until the work of Blumenbach that the notions of biology and culture would be detached completely, allowing for a more specialized knowledge of the biological processes involved in shaping the structure of the human body. In this view, only race constituted a real difference embedded in nature (Hudson 1996:256). It should be noted, however, that in all of the descriptive or classificatory schemes of the Enlightenment, there emerged from the general confusion between "variety" and "race" a reliance on nationality in order to draw distinctive boundaries between groups comprising the perceived races. Therefore, what has been seen as a purely geographic subdivision is also subject to political, cultural and linguistic barriers at a regional level.

Fundamentally attached to the concept of nationality is that of religion. Linnaeus, Buffon and Blumenbach all upheld the unity of species based on their monogenist views and opposition to the polygenist argument that the races were created separately, a position that was slowly gaining popularity. Linnaeus was able to break free from the concept of the Great Chain of Being, which presented species in terms of a linear hierarchy (see Figure 3). He explained that the chain had a horizontal component rather than strictly vertical, thereby viewing all species as equal but related by genus, order and class, the broadest divisions of plant and animal kingdoms. However, Linnaeus saw the varieties of humanity as forming subspecies, but in his mind, this would be simply a more specific means of classification below the species level, within which there often were great

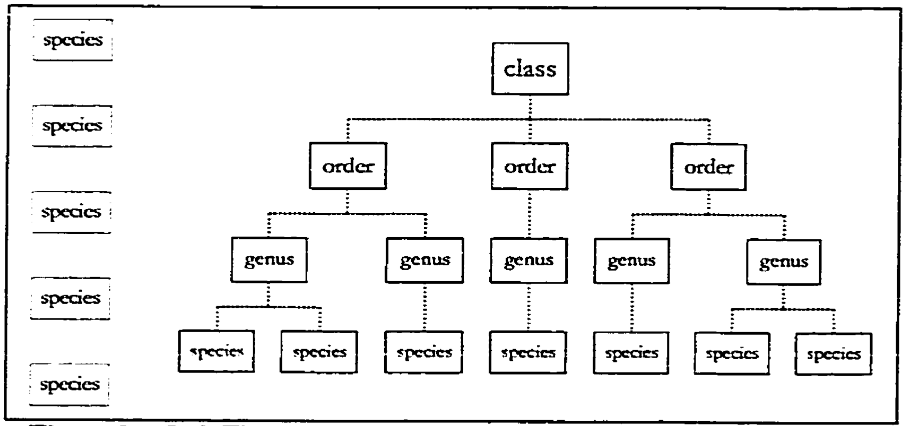


Figure 3 – *(Left) The one-dimensional Great Chain of Being. (Right) Linnaeus's two-dimensional nested hierarchy* (adapted from Marks 1995:7).

variations. Until late in his life, Linnaeus held on to the belief that all species of life were created in their present forms, but he eventually realized that new species would result if certain species were allowed to hybridize.

On the other hand, Buffon did not view the varieties as subspecies, nor did he believe in hybridization. He claimed that species were the lowest level of classification found in nature, that they were in fact static, and had been so since creation (Marks 1995:9). Interestingly, Buffon did argue that through the process of degeneration, environmental conditions caused the populations to become distinct, and this change was entirely superficial. Blumenbach defended the idea of unity of species, and in elaborating this he used the terms "variety" and "race" interchangeably, but he used these terms in the subspecies context, as Linnaeus had with "variety." Based on the rudimentary understanding of the processes leading to such degeneration or change, Blumenbach saw his own classification as revisable and arbitrary, and he used it simply out of convenience in order to describe the climatic effects on the body. Therefore, it can be seen that Blumenbach's break from the Linnaean and Buffonian classification of humans marks a fundamental conceptual change regarding the place of human populations in relation to each other, taking on a purely physical form, although it was still subject to the mentality of European superiority that prevailed throughout the eighteenth century.

The argument to this point, as elaborated in Chapter 1, has been that scientific racism arose out of the sexism and classism brought about by the capitalist enterprise. But there is a deeper question to be drawn out of an analysis of scientific taxonomy and human biodiversity: what is the underlying epistemological basis that human differentiation arises from? Certainly, discrimination against various types of humans pre-exists any form of structured capitalism or industrialization, and the equation of inequality with industrialization appear to be an easy scapegoat for modern socialists. At this point, this argument should be slightly refined. It can be demonstrated by an analysis of eighteenth century science that racism and sexism are deeply rooted within religious practice, but they appear in a consolidated form only with the rise of class polarization due to economic factors and the European push for expansion, all of which become manifested in the science of the Enlightenment. This is not to say that (Western) religion is inherently sexist or racist, but that these social inequalities have arisen from politically motivated interpretations of the scripture (such as the justification of colonization and slavery; the sexual division of labour)(Smedley 1999:80-89; Montagu 1964:37-39; Schiebinger 1994). Although the Christian religion, the dominant secular influence during the Enlightenment, is based on the notion of one people under God, the underlying factor leading to the hierarchical ordering of humans in the *scala naturae* is the idea that the original (and therefore) perfect form of human creation is that of the European. Not just any European, though – it was the European male.

Although popularly misunderstood and misconstrued throughout history, Blumenbach's classification provides a poignant example of how Enlightenment science set in motion the institutionalization of the modern biological form of racism. His *Anthropological Treatises* were written from an entirely European viewpoint, and in the works of Linnaeus, Buffon and Blumenbach, it is clear that they were written specifically for a European audience. Before Blumenbach, the study of the peoples of the world was based mainly on the accounts of explorers, and during the period of European expansion and manifest destiny, these accounts were greatly exaggerated and eventually reflected in science. The confusion of "culture" and "nation" led to many descriptions of people of various areas of the world being considered "primitive" or "uncivilized" as compared to the Europeans, and the behaviour of various cultural or ethnic groups was typified as being "racial." At this time, the African slave trade to America was rapidly increasing. It was believed at the time that slavery was fully sanctioned by the Bible, "for what could be more godly than to deliver poor Negroes from heathen darkness and the certainty of damnation, by carrying them to a land where they would receive the 'blessings of Christianity'"(Jacks 1942:137-8). The idea of varieties or races that arose in the eighteenth century were not explicitly intended as racist, they were simple attempts at explanation that were unfortunately riddled with Eurocentrism.

When Blumenbach began to develop a more advanced notion of degeneration, his intention was to bridge the gap between species change while still maintaining his monogenist, yet egalitarian viewpoint. Gould argues that "By moving from the Linnaean four-race system to his own five-race scheme, Blumenbach radically changed the geometry of human order from a geographically based model without explicit ranking to a double hierarchy of worth, oddly based upon perceived beauty and fanning out in two directions from a Caucasian ideal"(1996a:403). But Blumenbach was a true egalitarian; he professed the social superficiality of racial variation and defended the mental and moral unity of all peoples, particularly black Africans and white Europeans (Gould 1996a:408). The fault of Blumenbach's system was that it was based on subjective criteria, although it is certain that he did not see it this way. He chose the skull of a female from the Caucasus Mountains of Russia as the most beautiful form, but aside from the obvious sexual differences, he must have considered himself, a German, not to be of this perfect form.

The problem that exists in a study of the origins of scientific classification and the placement of humans in taxonomy is that these works must be viewed as part of a historical moment, as all knowledge is historically and socially situated (as suggested in Chapter 1). The idea of degeneration that Buffon and Blumenbach adhered to was much different from the modern sense of deterioration. Rather, taken literally, "degeneration" means departure from an initial form. One must keep in mind that this was in the pre-Darwinian era. What was considered as degeneration was the inverse of the process of evolution that Darwin would propose in 1859. While Darwin suggested that organisms could change to adapt to their environments, degeneration was based on the idea of degradation due to environmental effects. Darwin was able to conceptualize change in a non-hierarchical or aesthetic manner only because of his rejection of the of the dominant creationist mindset. In social thought at this time, however, the focus of moral degeneracy would become attached to the physical body through the politics of population regulation (see Chapter 1), and it was then that a popular misunderstanding of moral and physical degeneration as related processes would appear.

Race in the Darwinian Era

It has often been argued that Darwin created the greatest scientific revolution in history when he published *On the Origin of Species* in 1859. Darwin suggested that all species were not static, but shared a common ancestry, thus rejecting the notion of biological fixity that had dominated the science of classification of Linnaeus and Buffon. The theory of evolution and natural selection was based on the notion that new species were created through adaptation to the environment, becoming increasing specialized. These acquired traits would then become biologically selected, making these new species more reproductively successful. Like Blumenbach, Darwin was a true egalitarian. As he moved beyond the idea of degeneration, he also separated the notions of evolution and progress – he believed that "primitive" races were so by social circumstance (not biological) and were therefore capable of moral and intellectual improvement (Marks 1995:11-12). Darwin professed that all species have their own distinctions and peculiarities, but none are better or worse than any others.

Naturally, Darwin was interested in the human "races" and he included in his *The Descent of Man* (1871), a complete chapter titled "On the Races of Man."

Darwin's interest in human variation was focused largely on observing and elaborating the causes and effects of climate on the body. He begins "On the Races of Man" with the statement: "It is not my intention here to describe the several so-called races of men; but I am about to enquire what is the value of the differences between them under a classificatory point of view, and how they have originated." It is clear from this introduction that Darwin was sceptical of the categorization of humans into subspecies in classical taxonomy or races or varieties as separate species as the polygenists had contended. But in moving away from the creationist perspective of human (biological) origins, he did not abandon the possibility of a single origin. He argued "Even the most distinct races of man are much more like each other in form than would at first be supposed." Darwin chose to address the issue of the races by playing the "devil's advocate," attempting to elaborate the strengths and weaknesses of the dominant views on human variation. While he suggested that, "if the races of man had descended, as is supposed by some naturalists, from two or more species, which differed from each other as much, or nearly as much, as does the orang from the gorilla, it can hardly be doubted that marked differences in the structure of certain bones would still be discoverable in man as he now exists," he also explained that "although the existing races of man differ in many respects, as in colour, hair, shape of skull, proportions of the body, &c., yet if their whole structure be taken into consideration they are found to resemble each other closely in a multitude of points. Many of these are of so unimportant or of so singular a nature, that it is extremely improbable that they should have been independently acquired by aboriginally distinct species or races"(1871).

Darwin followed the early classifiers in their explanation of climate as the factor that alters the external characteristics of the body. He argued that as humans spread throughout various regions of the world, their bodies slowly began to adapt to the environments in which they settled (either long term or permanently). "The spreading of man to regions widely separated by the sea, no doubt, preceded any great amount of divergence of character in the several races; for otherwise we should sometimes meet with the same race in distinct continents; and this is never the case." Darwin felt it best to summarize the results of his enquiry into human variation by elaborating the relationship between the antiquity of particular forms of variation (racial traits), and to clarify his position with respect to a single origin of life.

> Whether primeval man, when he possessed but few arts, and those of the rudest kind, and when his power of language was extremely imperfect, would have deserved to be called man, must depend on the definition which we employ. In a series of forms graduating insensibly from some ape-like creature to man as he now exists, it would be impossible to fix on any definite point where the term 'man' ought to be used. But this is a matter of very little importance. So again, it is almost a matter of indifference whether the so-called races of man are thus designated, or are ranked as species or sub-species; but the latter term appears the more appropriate. Finally, we may conclude that when the principle of evolution is generally accepted, as it surely will be before long, the dispute between the monogenists and the polygenists will die a silent and unobserved death (Darwin 1871).

The advancement in scientific knowledge achieved by Darwin was centred in shifting the focus of taxonomy away from a hierarchical scale and explaining the fundamental equality of all species. This conceptual shift would completely change the very core of scientific thought. Although he rejected divine creation as the beginning of life, he maintained that all life arose from a single origin, and with respect to the Linnaean taxonomy, he was the first to fully understand that each category of life (class, order, genus, species) blended completely into the next. This new perspective would eventually become the dominant scientific mindset and would greatly influence all of Darwin's predecessors.

While Darwin maintained a similar perspective on the varieties of humankind that was similar, if not more liberal than Blumenbach's, he was not interested in building a system of classification. Therefore, his theories were not heavily influenced by the biases of the earlier biological sciences. The problem that arose out of Darwinian theory was that the notion of natural selection became known as "survival of the fittest." Herbert Spencer, an early evolutionist who introduced the phrase "survival of the fittest" in 1852,[4] bastardized Darwin's evolutionary view, forming the basis of *Social Darwinism*. Social Darwinism attempts to apply the theory of natural selection to society in order to explain differences in achievement and wealth among people. Therefore, individuals or groups must compete with one another in order to survive. Spencer's ideas were well established before Darwin published on natural selection, but Darwin's elaboration of the evolutionary process formed the basis of Spencer's well-known works *First Principles* (1864) and *Principles of Ethics* (1895-98)(Hofstadter 1964). The principles of natural selection favour the survival of the fittest members of society; individuals or groups must adapt successfully to the social environment, while those who are unfit fail to do so. The "survival of the fittest" argument provided much needed support for the slavery that accompanied the manufacture of cotton in the southern United States. In this regard, Comas (1960:165) argues,

> It is unfair to level at Darwin – as many have done – the reproach that he fathered this hateful and inhuman theory. The truth is that when colored groups became potential competitors in the labor market claiming the social advantages regarded as exclusively the heritage of the whites, the latter were obviously in need of some disguise for their economic materialism which led them to deny 'inferior' peoples any share in the privileges they themselves enjoyed. For that reason they welcomed with satisfaction Darwin's biological thesis and then by over-simplification, distortion and adaptation of it in conformity with their own particular interests, transformed it into the so-called 'Social Darwinism' on which they based their right to their social and economic privileges; it bears no relationship to Darwin's purely biological principles.

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[4] See Spencer, "A Theory of Population, Deduced from the General Law of Animal Fertility" (1852).

Thus, the gains made by Darwin's theory of evolution in the understanding of biological processes and the fundamental equality of all life was widely misrepresented and used to serve specific purposes.

As the shift in scientific thought brought about by Darwinian theory caused a widespread re-evaluation of human diversity, social perceptions of racial superiority continued to flourish. With Darwin's move away from the dominant secular view of speciation, Social Darwinism was transformed into a polygenist theory of the so-called human races as separate species, and therefore unequally evolved. In order to reconcile this social manipulation of Darwin's biology, Franz Boas (1848-1952) brought a new perspective to anthropological study. Boas established American anthropology at the end of the nineteenth century, and he did so by employing a holistic approach, incorporating cultural anthropology (ethnography), physical anthropology, prehistory and linguistics as a means of protecting and preserving endangered cultural or ethnic data. He asserted that culturally, value judgements cannot be placed on cultures from outside of the culture; cultures can only be judged from within. The emerging school of American anthropology was thus based on two major conceptions: historical particularism and cultural relativism.

> Thus Boas brought cultural theory to its logical culmination in the 20th century. Darwin had undermined the biology of anthropocentrism and made it no longer possible to assert that the human species is 'better' than a species of mole, for they are simply divergent offshoots of a common ancestor. So, too, Boas destroyed the underpinnings of ethnocentrism by which western society saw itself as superior to other lifeways – it was different all right, but value judgements were ultimately based on arbitrary criteria. Western and non-western societies were simply examples of the diverse ways of being human (Marks 1995:21).

Boas worked extensively throughout Western and Central Canada and the United States and became preoccupied with "races" and native culture. Although still working within the dominant racial framework, Boas widely questioned the nature of variation and the rigidity of such classification. He published a number of articles on cultural and biological diversity, which were later published in the collection *Race, Language and Culture* (1948). He is best known for anthropometric study of first-generation American schoolchildren, and the perceived "half-bloods" and "hybrid races." He argued against "racial" conceptions in his 1910-1913 study, *Report on Changes of the Bodily Form of Descendants of Immigrants*, showing quite conclusively that children who were born and raised in the United States were larger and heavier than their parents, due to improved living conditions and nutrition. (Boas 1948; Cybulski 1991; Smedley 1999). These findings contrasted the notion of permanence of racial types and demonstrated the plasticity of the human skeleton. Boas refocused the anthropological study of human variation on environmental and cultural effects of physical morphology, which the Social Darwinists had ignored, as they had focused exclusively on inherited traits and biological determinism. Boas also challenged the idea of "averages" as a means for describing whole populations or types, explaining that averages do not compare to the overlapping of traits. "His works and those of his students and colleagues paved the way for the eventual recognition of the limits to the meaning and interpretation of anthropometric data as a way of describing racial populations. Although not all scholars may have been fully aware of it then, such findings were also an early first step in challenging certain components of the folk idea of race in anthropology"(Smedley 1999:298).

Unfortunately, despite Boas's attempt to reinforce the increased understanding of human diversity that Darwin's evolutionary theory provided through his rigorous style of anthropology, there developed a major split in racial ideology. Although many biologists and anthropologists followed the notions of cultural and physical plasticity, much of the dominant western ideology of rigid classification and division by "types" persisted in the early 1900s. With the emergence of population genetics, many scientists continued emphasizing the belief in the heritability of innate abilities and characteristics. Developing out of such deterministic notions was the phrenology of Francis Gall, the craniometry of Samuel Morton, and science of eugenics, fostered by Francis Galton and Karl Pearson.

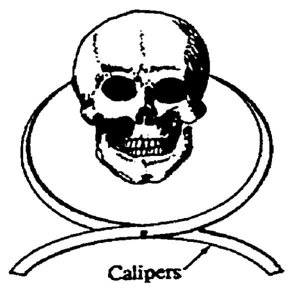
Race and Physical Anthropology in the Twentieth Century

The early twentieth century saw the rise of genetics and heritability as explanations for the passing of traits from individual to individual and group to group. This advanced knowledge would lead to an increased understanding of reproductive science, but it also allowed eugenics to develop into a brutal ideology of eliminating the perceived biologically inferior. Most anthropologists, headed by Franz Boas, began to seriously problematize scientific racism in light of the misuse of eugenics in Nazi Germany. As anthropologists attempted to build a better understanding of the processes that have caused humans to develop physiologically in the manner that they have, such as blood groups, genotypes and phenotypes, many still felt the need to classify humans. Therefore, during the twentieth century, many attempts were made to re-classify the human "races" terms of the actual genetic causes of human variability.

In 1900, Joseph Deniker's *The Races of Man* presented a classification of twenty-nine races, which were divided into six groups, using hair as the main distinguishing characteristic. Alfred C. Haddon followed suit in 1924 in his work also called *The Races of Man.* Haddon used hair texture as the primary variable as Deniker had, but also used height, cephalic index and nasal index as secondary variables in his description of nine varieties of humankind. Perhaps the most important racial anthropologist of the first half of the twentieth century was Ernest A. Hooton (1887-1954). Hooton first published his "Methods of Racial Analysis" in the January 1926 issue of the journal *Science.* He explained that "race" is often used indiscriminately, implying a range of characteristics from skin pigmentation to religion, linguistics, temperament or geographical position. Hooton relied heavily on anthropometric analysis, and suggested that in conducting such an examination, the anthropologist must take the approach that "Races are great groups and any analysis of racial elements must be primarily an analysis of groups, not of separate individuals. One must conceive of race not as a combination of features which gives to each person his individual appearance, but rather as a vague physical background, usually more or less obscured or overlaid by individual variations in single subjects, and best realized in a composite picture"(1926:790).

In his *Up From the Ape* (1931), Hooton provided a highly progressive system of racial categorization in which he described "composite races" as developing from the hybridization of "primary races." Due to the anti-racial arguments of the Boasian school as well as a number of international events bringing wide publicity to the "race problem," Hooton published "Plain Statements on Race" in *Science* (1936:512), in order to clarify his study of human populations. In it, he claims, "under these circumstances, a physical anthropologist, who has devoted most of his research activity to the study of race for nearly a quarter of a century, desires empathetically to disassociate the finding of his science from the acts of human injustice which masquerades as 'racial measurements' or 'racial movements' or even 'racial hygiene.'" However, while Hooton wanted to clarify that his work in no way reflected any socially racist views, he was still heavily influenced by population biology and eugenics, which he felt could be used to better the species. He explained that eugenics should be limited to use on the diseased, criminal and insane in order to promote families with "sound physiques, good mental elements and demonstrable social and economic capability"(1936:513). Clearly, there was a widespread belief that eugenics could be used for the enhancement of the species as a whole in the period preceding World War II.

With the finding of fossil specimens throughout Africa and Asia, paleoanthropology became a specific focus of many physical anthropologists and, in this spirit, Hooton incorporated the study of human antiquity into his work on the races. Using modern and paleoanthropolocial data, Hooton revised his classification in the 1947 edition of *Up From the Ape*. Most of the earlier classifiers presented simple visual methods of analysis for determining racial type. In contrast, Hooton provided an extensive appendix describing how anthropometrics were to be conducted on both living humans and on skeletal remains. He also developed new procedures for calculating cranial capacity adapted from Karl Pearson, moving beyond the traditional method set forth by Morton, which measured by displacement.[5] During this period, anthropologists and anatomists focussed on craniometry because they felt that it held the key to understanding the evolutionary differences between humans and apes, and among the races. Hooton detailed the average cephalic index[6] (see Figure 4) for each race and, based on a composite of anthropometric and anthroposcopic features produced the following classification of races (Hooton 1947:575-661; Comas 1960:592-3):



Measuring cephalic index. Calipers are used.

Figure 4 – *Cephalic Index*
(From Klass & Hellman 1971:32).

PRIMARY RACES

I. *White* (European, Eur-African, Caucasoid)
    Primary subraces: 1) Mediterranean; 2) Ainu; 3) Keltic; 4) Nordic; 5) Alpine; 6) East Baltic.
    Composite subraces:
        7) Armenoid (Classic Mediterranean + Alpine + Indo-Afghan).
        8) Dinaric, (Upper Palaeolithic + Alpine + Armenoid + Nordic)

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[5] Displacement refers to the determination of volume by filling the empty skull with sand or various types of shot or pellets, which would then be measured by volume or weight. For an analysis of the inadequacy of such measures and data manipulation by Morton, see Stephen Jay Gould, *The Mismeasure of Man* (1996).

[6] Cephalic index is calculated by dividing the head breadth by the head length and multiplying by 100. A cephalic index below 75 indicates that a skull in considerably longer than it is broad (Klass & Hellman 1971:33). See Hooton (1964) pp. 501-502; 735-739.

II. *Negroid*
  Primary subraces: 1) African Negro (Negritian, Forest Negro); 2) Nilotic Negro; 3) Negrito (Pygmies).

III. *Mongoloid*
  Primary subraces: 1) Classic Mongoloid; 2) Arctic Mongoloid (Eskimoid).

COMPOSITE RACES

A. Predominantly White.
   1. Australian (Archaic White + Tasmanian + recent minor fraction of Melanesian-Papuan).
   2. Indo-Dravidian (Classic Mediterranean + Australoid + Negrito + minor fractions of Armenoid, Nordic, Mongoloid).
   3. Polynesian (Indonesian + Mongoloid + Melanesian-Papuan).
   4.

B. Predominantly Mongoloid.
   1. American Indian (Mongoloid + Armenoid + Australoid + very small Negritoid element). Morphological types: Brachycephals and Dolichocephalism.
   2. Indonesian-Mongoloid or Indonesian-Malay (Mongoloid + primitive Mediterranean + Ainu + Negrito).

C. Predominantly Negroid.
   1. Melanesian-Papuan or Oceanic Negroid (Negrito + Australoid + convex nosed Mediterranean + minor fractions of Malay and Polynesian).
   2. Bushman-Hottentot (Negrito + Palaeolithic Boskop + minor fractions of Bantu. Negro and Hamitic Mediterranean in Hottentots).
   3. Tasmanian (Negrito + Australian).

Hooton's classification was typical of many others of the time that interpreted the paleoanthropological evidence as supporting the notion that there evolved from Africa only three primary geographical types or populations, acknowledging the admixture of these populations in more recent times. Juan Comas argued in his landmark 1960 textbook, *Manual of Physical Anthropology*, "Until sufficient data have been accumulated on the genetic makeup of the various human groups, it is pointless to think of establishing a definitive classification and kinship scheme. The simplest classifications are the best ones, and Hooton's does not seem to fall within that category"(p. 593). Nonetheless, although most anthropologists have adhered to a three or four-race system of classification due to its simplicity, Hooton's work popularized the terms *Caucasoid, Mongoloid* and *Negroid.* His analysis also set the standard for applying physical anthropology to human biodiversity in the twentieth century, detailing the methods of both anthropometric and anthroposcopic analyses to be employed in human morphology.

As Hooton's methods of racial analysis were gaining popularity among physical anthropologists, students of Franz Boas, lead by Ashley Montagu, began pushing for "race" to be removed from anthropological discourse. Montagu was known for attacking his colleagues both verbally and in print regarding many of the contentious issues of the time, and persistently challenged Hooton's notion of the human races throughout the 1940s. Montagu's critical attitude and social conviction would make him one of the most respected anthropologists of the century, and he was invited to draft the first UNESCO statement on race in 1950 (Marks 2000:111-12). However, Montagu's social awareness did little to change the methodology of physical anthropology at the time, as numerous authors continued to publish on methods of racial analysis.

Carleton Coon, Stanley Garn and Joseph Birdsell published *Races: A Study of the Problems of Race Formation in Man* in 1950, in an attempt to synthesize the data on genetics that Comas claimed was necessary in order to build a definitive classification. Moving beyond the typical recognition of between three and six races, they presented their "functional classification" (1950:115-5; Comas 1960:596-7) according to three basic criteria:

1. Evolutionary status as reflected in differences in tooth and jaw size, skull thickness, browridge size and the presence or absence of other archaic features.
2. Body build as reflected in special adaptations to environment, (deserts, mountains, heat, cold).
3. Special surface feature, such as black skin, flat faces, hair distribution, etc., which appear to be adaptations to heat, light and cold.

According to these specific criteria, the authors built a classification of thirty distinct micro-races:

1. Murrayian (S.E. Australia)
2. Ainu
3. Alpine
4. Northwest European
5. Northeast European
6. Lapp
7. Forest Negro
8. Melanesian
9. Negrito
10. Bushman (Boskop)
11. Bantu
12. Sudanese
13. Carpentarian (N. and S. Australia)
14. Dravidian
15. Hamite
16. Hindu
17. Mediterranean
18. Nordic
19. North American Negro
20. South African Negro
21. Classic Mongoloid
22. North Chinese
23. Southeast Asiatic
24. Tibeto-Indonesian Mongoloid
25. Turkic
26. Marginal Amerindian
27. Central Amerindian
28. Ladino
29. Polynesian
30. Neo-Hawaiian

This classification was based on geographical zones inhabited by distinct or heterogeneous populations (geographic or micro-races), encompassed by six larger "racial stocks": *Negroid, Mongoloid, White, Australoid, American Indian* and *Polynesian.*

After the publication of *Races*, Stanley Garn and Carleton Coon began to differ in ideology regarding the origin and antiquity of human races. As result, Garn and Coon (and Birdsell) ceased collaborating. Garn continued to work on analyzing the "geographic races" while Coon produced much more controversial research, which is discussed in Chapter 3. Garn revised the original classification of six racial stocks and thirty micro-races to nine "local" geographic racial stocks (see Appendix C), with thirty-two subdivisions (Figure 5), adding two more to the original scheme and further adjusted these micro-races (Garn 1971:168-78):

I. LARGE LOCAL RACES
    1. Northwest European
    2. Northeast European
    3. Alpine
    4. Mediterranean
    5. Iranian
    6. East African
    7. Sudanese
    8. Forest Negro
    9. Bantu
    10. Turkic
    11. Tibetan
    12. North Chinese
    13. Extreme Mongoloid
    14. Southeast Asiatic
    15. Hindu
    16. Dravidian

II. AMERINDIAN GROUPS OF LOCAL RACES
  17. North American
  18. Central American
    a) Caribbean
  19. South American
  20. Fuegian

III. PUZZLING, ISOLATED, NUMERICALLY SMALL LOCAL RACES
  21. Lapp
  21. Pacific Negrito
  22. African Pygmy
  23. Eskimo

IV. LONG-ISOLATED MARGINAL LOCAL RACES
  24. Ainu
  25. Murrayian
  26. Carpentarian Australian
  27. Bushmen and Hottentots

V. HYBRID LOCAL RACES OF RECENT ORIGIN
  28. American Negro
  29. South African Negro
  30. Ladino
  31. Neo-Hawaiian

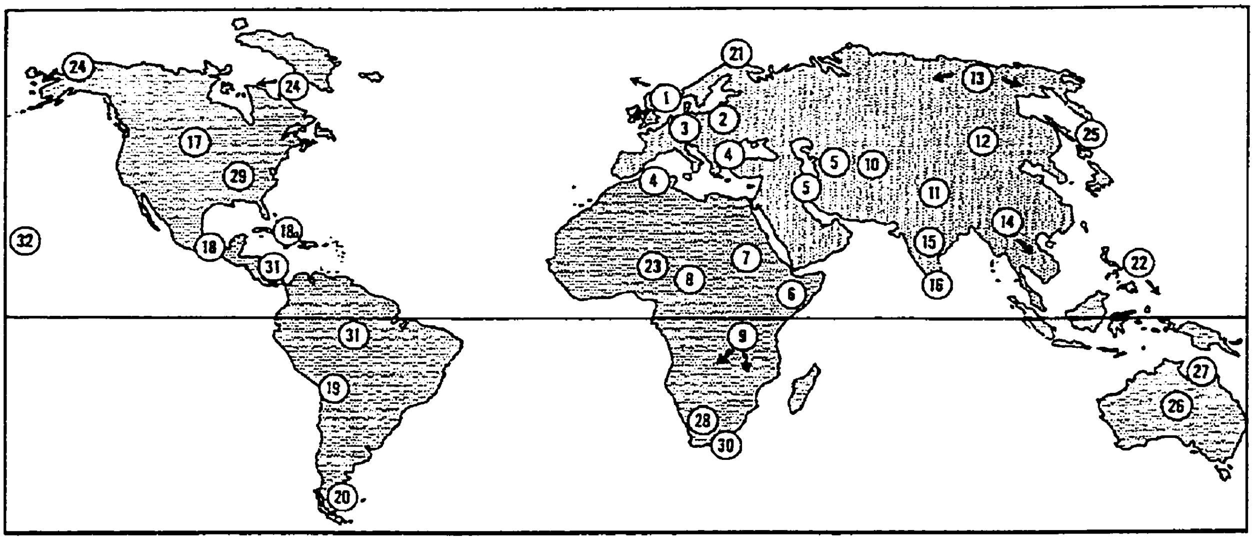


Figure 5 – *Stanley Garn's 32 Local Geographic Races* (from Garn 1971:170).

Garn's mapping of geographical races offers an interesting insight into the geographic distribution of human variation, although still working from within the "racial" framework. Most anthropologists have, however, continued to use the simplest methods of classification –

generally the three-race model, and occasionally the four, six or nine-race models – whichever provides the most accurate determination.

With the great advancement of genetics and cultural anthropology in the twentieth century, a split in perspective has developed out of a general discourse of human equality. The use of genetics for the improvement of the species in general was manipulated and used for political purposes before and during World War II, largely to the dismay of more progressive anthropologists such as Franz Boas. Even with the most reprehensible actions against humans arising out of this scientific racism, many anthropologists still found using a framework of racial classification to be a matter of convenience in understanding the natural variation of humankind. As anthropologists attempted to disassociate their research on the races from hateful social actions, the continued use of a racialized vocabulary further legitimized the cultural and now biological superiority posited by the Social Darwinists and polygenists, who felt that humanity was comprised of separate species following somewhat similar but unequal evolutionary paths. With attempts at understanding the geographical nature of human biodiversity in the latter half of the twentieth century, even following the discovery of DNA and a wide range of fossil evidence, there were scientists who reverted to the strongly biased theories of the eighteenth and early nineteenth centuries. Hence, the split between Garn and Coon.

From his interest in paleoanthropology, Coon (1962) began to develop his own theories of human evolution and race, which caused great controversy and claims of outright racism. In reaction to Coon's work on the races, Ashley Montagu would join forces with geneticist Theodosius Dobzhansky to challenge such scientific racism, "which held the social, economic, and political oppression of dark-skinned peoples to be a biological consequence of their having evolved into *Homo sapiens* more recently than Eurasians, and which was being avidly embraced by segregationists, with the author's blessing" (Marks 2000:111-12). A discussion of Coon's theories of brain size, race and intelligence, and the modern development of paleoanthropology, human evolutionary theory and the "antiquity of race" will be topics discussed in the following chapter.

- CHAPTER 3 -

PALEOANTHROPOLOGY AND THE ANTIQUITY OF HUMAN "RACES"

The question of human races has long been a problematic issue in the study of human origins. Most anthropologists today reject the idea that *Homo sapiens* can be partitioned into biologically defined races on the basis of phenotypic features of modern humans, which grade gradually over geographic distance with climatic changes in the environment. Theories of the antiquity of human "races" based on fossil evidence have become polarized into two scientific camps on the origins of modern humans: the "Multiregional Continuity" hypothesis and the "Out of Africa" hypothesis. Combined with these lines of thought are theories of the more recent migration of Native Americans into North America and the "racialization" of human remains, which has become an intensely political issue in recent times. Expanding on Matt Cartmill's description of *Homo erectus* and scientific racism in his article "The Third Man," this chapter will address contemporary notions of human biological variation and "racial" thought in anthropology in light of the fossil record and the competing accounts of the origins of modern humans.

In recent times, the study of paleoanthropology has become one of the most interesting but problematic disciplines within both the natural and social sciences, as it underlies all fields of study. Confronted with endless political and moral-ethical dilemmas, based upon numerous conceptual, methodological and epistemological differences, the search for human origins is a major site for debate over the idea of "racial" variation, manifesting itself most recently in the political and legal "Kennewick Man" issue. When found, the 9300-year-old

Figure 6 – *Kennewick, Washington State.*

Kennewick remains almost instantly became a great source of excitement among paleoanthropologists, archaeologists as well as palaeontologists when they were uncovered in the Columbia River in Washington State (Figure 6) in July of 1996. This find was particularly important to the study of the peopling of the North American continent, as it was to be the most complete finding of such antiquity on the entire continent. However, what was to come from the study of the remains was a major legal battle over the ownership of both the physical remains and the knowledge of Native American ancestry and the re-emergence of the debate over the origin of the so-called "races."

According to Dr. James Chatters, the archaeologist who excavated and conducted the initial analysis of the "Kennewick Man" remains, "The completeness and unusually good condition of the skeleton, presence of *Caucasoid* [emphasis mine] traits, lack of definitive Native-American characteristics [see Figure 7], and the association with an early homestead led me to suspect that the bones represented a European settler"(1997). This information would lead to an incredible backlash by a number of Native American groups in Washington state. Many groups claimed that the archaeologists and anthropologists involved would only compromise the knowledge of their own ancestry as the original inhabitants of the continent since time immemorial. But the problem runs much deeper here. Aside from the contemporary issues of race and racism, is it really appropriate for an anthropologist or archaeologist to describe the remains of early humans in racial terms? What were Dr. Chatter's criteria for identifying Caucasoid traits? Must we politicise the evolutionary record as well? The reality here is that the study of human evolution is, and always has been a highly political endeavour. For example, the race to find the "missing link" between human and ape lead to Charles

Figure 7 – *An illustration of the "Kennewick Man" skull.*

Dawson's 1911 Piltdown hoax and great debate later arose over the physical relationship of Neanderthal and Cro-Magnon fossil remains in relation to modern populations. The problem is that historically, there has been such a heavy emphasis placed on human difference as existing in a hierarchical manner – certain species and races being more "progressive," (i.e. more evolved/successful/intelligent/advanced) than others. The basis for much of this thought has become manifested in the interpretation of the fossil record of human evolution.

The Kennewick Man controversy provides a rather appropriate example of the problem of the racialized view of human evolution because it refers to both a recent find and to the most recent large-scale event affecting human biodiversity; that being the migration of humans into North America. The issues here, however, are as old as the study of human biology and natural history. For over a century, the remains of *Homo erectus* have been the focus of much of the scientific inquiry into the meaning of race, being regarded even in competing evolutionary theories as the original species that became subdivided into races (Cartmill 1997). Eugene Dubois' 1891-92 discovery of a human thighbone and skullcap in Java, Indonesia, was immediately considered to be the "missing link" as its long legs and upright posture, along with a brain casing measuring fifty percent larger than that of a large gorilla showed signs of the physical and intellectual transition from ape to human about one million years ago. Dubois thus named his find *Pithecanthropus erectus*, meaning upright ape-man. He estimated the individual's brain size at around 940 ml. in volume, comparing it to the average modern *Homo sapiens* volume of approximately 1400 ml. In 1931, eleven more skulls were discovered at Ngandong, not far from the Trinil site in Java where Dubois made his initial discovery. These skulls looked even less primitive (more closely related modern humans) than Dubois' find although they generally had very thick cranial bones, heavy browridges, receding foreheads and small braincases, averaging around 1100 ml. (Cartmill

1997; Tattersall 1995; Foley 1997). It should be noted that at this time, much of the focus on human evolution was on cranial capacity as a measure of intelligence, which was seen as the main factor in the successful adaptation of human populations.

With *Pithecanthropus* showing very little evolutionary change through the fossil record, it was not until Davidson Black's work with the remains of "Peking Man" at Zhoukoudian in China that the full significance of these finds was starting to be realised. Between 1929 and 1937, fourteen partial craniums, eleven lower jaws, many teeth, some skeletal bones and large numbers of stone tools were discovered at Zhoukoudian. Davidson Black did most of the study on these fossils until his death in 1934, when he was replaced by Franz Weidenreich, who studied the fossils until leaving China in 1941. Black assigned the taxonomic name of *Sinanthropus pekinensis*, meaning "Chinese person of Peking," to these remains. The importance of the *Sinanthropus* finds were immediately recognized since they showed a great resemblance to the Java fossils. Typically, however, the *Sinanthropus* braincases were steeper than those of *Pithecanthropus* and had a slighter larger brain capacity. Although there were marked differences in the fossil evidence from the two sites, Black was intrigued by the similarities that existed between them. Nonetheless, Black considered the fossils too distinct to classify within the same genera. Black considered *Sinanthropus* to be a more advanced form that occupied a transitory position between *Pithecanthropus* and the Neanderthals (Tattersall 1995:59-67). The current interpretation of this relationship is that both *Pithecanthropus* and *Sinanthropus* are simply regional variants of the larger genus *Homo*, belonging specifically to the species *Homo erectus*, who existed between 1.7 million and 250,000 years ago (see Figure 8). From the time of Dubois and Black through to today, most scientists have embraced *Homo erectus* and its regional offshoots as our direct ancestors. However, there exists a group of scientists that have continuously dismissed this interpretation regarding *Homo erectus* as merely a "retarded cousin,"

Figure 8

Pithecanthropus erectus ***Sinanthropus pekinensis*** ***Homo erectus***

(Left) the "Java Man" skullcap superimposed over a more recent Pithecanthropus, "Turkana Boy," found in 1984 at Nariokotome near Lake Turkana in Kenya; (Centre) a composite by Franz Weidenreich of the Sinanthropus findings from Zhoukoudian; (Right) a more typical Homo erectus skull.

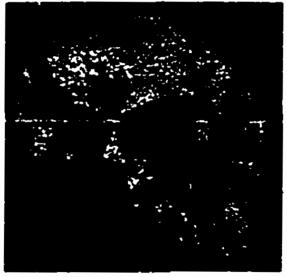
believing that our ancestors must have had larger brains (Cartmill 1997). Thus, *Homo erectus* has become a very important component of the argument towards the antiquity of race and the focus on intelligence and behaviour by a number of controversial authors.

The basic notions of human evolution are well established at this point in history based on the ever-increasing fossil record (see Appendix D). The genus *Homo* evolved in Africa somewhere around 2.5 million years ago from the smaller-brained, but bipedal, *Australopithecus*. The emergence of rudimentary stone tool technologies during this time period is likely to be connected to this evolutionary process, with the change towards bipedalism allowing for the manipulation of tools in the hands, which in turn affected the structure of the brain and the development of structured thought and language. The two earliest species of *Homo* to evolve at this time were *Homo rudolfensis* (Figure 9) around 2.4 million years ago and *Homo habilis* (Figure 10) 1.9 million years ago, with the best fossil examples of these being discovered in Koobi Fora, Kenya and Olduvai Gorge, Tanzania respectively. Between 1.9 and 1.8 million years ago, there appear two new hominid species in the South and Eastern areas of Africa, *Paranthropus boisei* (Figure 11), an Australopithecine

Figure 9

Homo Rudolfensis

Figure 10



Homo Habilis

Figure 11

Australopithecus boisei

Figure 12

Homo ergaster

offshoot now considered to be *Australopithecus boisei*, and *Homo ergaster* (Figure 12), which is the first hominid with an essentially modern anatomical form. Thus, this evidence suggests strongly that there were at least four species inhabiting the same general continental area at the same time, later joined by a fifth, *Homo erectus*, around 1.8 million years ago. (Cartmill 1997; Foley 1997; Lemonick & Dorfman 1999; Tattersall 2000, 1995; Wolpoff & Caspari 1997). The arrival of this new *Homo* form would result in a dramatic change, anatomically and technologically.

Homo erectus, as compared to his competitors on the African savannah, was an extremely well adapted creature. *H. erectus'* brain was on average twenty percent larger than that of *H. habilis*, but it was in proportion to an overall larger body size, which was approaching the height of modern humans. With the manipulation of more artful and efficient stone tools of the Acheulian industry, *H. erectus* also held another distinct advantage over other species – the production and control of fire. The use of such technologies necessitated a much more elaborate system of social and cultural interaction. As well, the reduced sexual dimorphism of *H. erectus* may be an indication of another necessity for complex social relations rather than interspecies competition, with anatomical changes such as the narrowing of the female pelvis affecting the birthing process, requiring greater infant development after birth, which necessitated an increase in familial relationships. Many paleoanthropologists suggest that evidence of large building structures and mass burials of animal bones

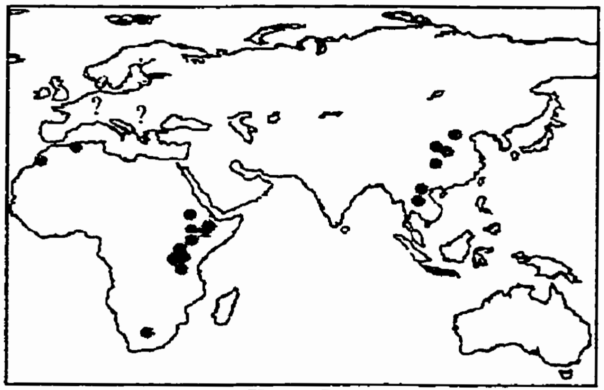


Figure 13 – *Known Homo erectus sites.*

allows us to draw the specific conclusion that dozens of people would have had to work together in order to accomplish such organized building and hunting. Perhaps the most important innovation is the fact that the Java and Zhoukoudian fossils discovered by Dubois and Black were the first of the prehistoric species to be found outside of the African continent. It is believed that the migration of *Homo erectus* out of Africa occurred between one million and 700,000 years ago, spreading across the warm temperate zones of Europe and Asia. By 300,000, *H. erectus* had moved to the north as well into Germany and possibly as far as Britain (see Figure 13 and Appendix E; Shreeve 1995:19-20).

Although *H. erectus* was much closer to modern humans both intellectually and technologically than earlier hominid forms, Matt Cartmill suggests, "all in all, *H. erectus* fits the familiar stereotype of the chinless, thickheaded, beetle-browed, bullnecked caveman. It must have been a fearsome competitor for the earlier *Homo* types, which disappeared some 300,000 years after *erectus* arrived on the scene"(1997). It would seem that *erectus* was far advanced in comparison with its competitors, who were unable to measure up to the increased mobility, intelligence and technology of *Homo erectus*. With the movement across Asia and Europe, *H. erectus* continued to adapt and evolve to the environmental conditions that were encountered. There was an increase in average brain size to approximately 1200 ml. and the resulting regional variations have been the subject of debate over their proper taxonomic descriptions. Some called the *H. erectus* variations archaic *Homo sapiens*, while others insisted that they were simply advanced *Homo erectus*. Still others claimed that the new forms constituted a separate species appearing around 600,000 years ago, *Homo heidlebergensis* (Figure 14), which formed its

Figure 14

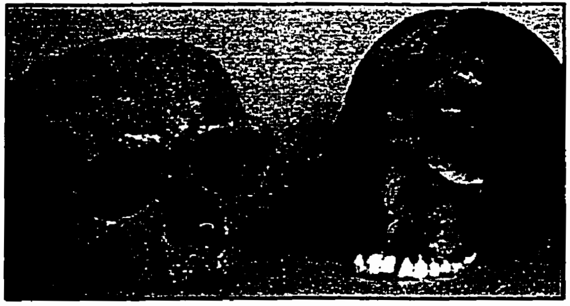
Homo Heidlebergensis

Figure 15

Homo Neanderthalensis

own larger-brained and distinctively robust variant in Europe, *Homo neanderthalensis* (Figure 15), emerging about 200,000 years ago. From this vast increase in evolutionary forms – physically, intellectually and technologically – and increased competition for territory and resources, *Homo erectus* disappears form the record 250,000 years ago, and Neanderthal fades 30,000 years ago, leaving only one species – the modern from of *Homo sapiens* (Figure 16), which appeared in the Middle East around 90,000 years ago (Cartmill 1997; Tattersall 2000).

Figure 16 – *Homo sapiens.*



The evolution of hominid forms from the Australopithecines to modern *Homo sapiens* seems like a fairly straightforward progression, but when it comes to the topic of human races and their antiquity, the numerous interpretations of the fossil record have led to a major ideological polarization among paleoanthropologists. Although it seems certain that we evolved from earlier *Homo* forms, the precise evolutionary relationship between *H. heidlebergensis, H. neanderthalensis* and *Homo sapiens* – whether they were direct ancestors or related types – remains a major source of contention. The two dominant evolutionary theories, the "Multiregional Continuity" and the "Out of Africa" hypotheses provide the basis for interpreting the nature of human biodiversity, including the features that were classified as "racial" variations.

The "Multiregional Continuity Hypothesis," developed by Milford Wolpoff at the University of Michigan and first presented in 1984, claims that the origin of local human populations ("races") began with the migration of *Homo erectus* out of Africa two million years ago. *Homo erectus* then split into a number of different groups as they trekked into the unknown territory of North-Western Africa, Asia and Europe. Through the process of gradual environmental adaptation, the various *H. erectus* groups were able to adjust biologically to their immediate environments and climates, thus developing a number of morphological variations from the original *erectus* form. These multiple new forms of *erectus*, as they began to evolve into *H. heidlebergensis* and *H. neanderthalensis* and eventually into *Homo sapiens*, became the early ancestors of modern races. According to Wolpoff, fossil evidence supports the notion that modern human races did not evolve from Africa, but from ancestors occupying the same general region as the modern populations for millions of years. Therefore, modern Asian populations resemble only those ancient humans found on that continent – *Homo erectus* and *Homo heidlebergensis*, while Caucasians are the result of evolution from the Neanderthal form. Perhaps the best evidence to support this hypothesis are a number of skulls ranging in age from one million years ago until the emergence of modern *H. sapiens*, which were found in Australia and Indonesia, and show a number of traits that are characteristic of modern indigenous populations (Shreeve 1995:71-78; Wolpoff and Caspari 1997). This model explains that what have been considered as different hominid species, from the Australopithecines through *Homo habilis*, *H. erectus*, *H. heidlebergensis* and *H. neanderthalensis*, were simply intermediate forms (with slight regional variation) of the progression towards modern *Homo sapiens*. Appendix F illustrates the geography of the fossil finds. Note the concentration of all forms of Hominid species in three particular continental areas: Europe, Eastern Africa and South-eastern Asia, which Wolpoff derives his argument for racial antiquity.

On the other hand, the "Out of Africa Hypothesis" suggests that modern human (geographically distinct) populations had a much more recent ancestor. According to this theory, the earliest of the modern sapien forms spread out across the African continent and into Europe and Asia, appropriating the territory of existing hominid species in two or three waves beginning around 100,000 years ago and reaching Asia around 60,000 years ago. These replacements of hominid species ultimately lead to the extinction of the earlier forms. Figure

17 shows the proposed migratory routes out of Africa and through Europe and Asia from the emergence in Eastern Africa about 120,000 years ago. Thus, erectus populations were replaced by the spread of *H. heidlebergensis* populations, including the Neanderthals, and all were eventually replaced by the most recent wave of migration out of Africa, the fully modern *Homo sapiens* (Cartmill 1997; Wong 1998). This theory has caused numerous debates about the nature of this population replacement: were earlier species simply outcompeted for resources and not yet evolved enough to be able to adapt to environmental changes, or were they the victims of mass warfare? The current understanding of this evolutionary scheme is that some archaic *Homo* populations appear to have survived longer than previously thought. This would mean that in some areas, both modern and archaic *Homo* forms existed at the same time, offering evidence that they did not intermix (Cartmill 1997; Shreeve 1995:71-73). These questions remain only peripheral to the intense debate over which of the multiple or single origin theories of hominid evolution is most plausible based on the fossil evidence.

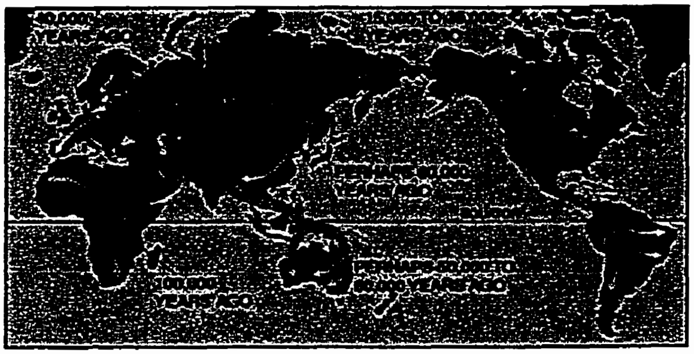


Figure 17 – Hominid Migration Out of Africa (From Wong 1998).

The "Out of Africa Hypothesis" has become subject to much scepticism in light of some recent hominid fossil finds and the invalidating of a 1987 genetic study showing that all living peoples had a common ancestor, "Eve," who lived in Africa 200,000 years ago. Some major flaws with the statistical manipulation of the DNA evidence used in this study resulted in the theory being debunked. However, more recent mitochondrial DNA (mtDNA) evidence does suggest that modern human populations (geographic "races") cannot be any older than

200,000 years, but this technology is too new to draw specific conclusions about the validity of this date (Wong 1998). Matt Cartmill (1997) asserts that the genetic evidence in this respect does not fit into the picture of a gradual, million-year evolutionary process of *H. erectus* into *H. sapiens* as suggested by Wolpoff. Rather, it seems conducive to a more recent spread from a central location as the "Out of Africa Hypothesis" claims. However, this does not necessarily exclude the multiregional hypothesis, which still allows for a common African ancestor. The biggest problem with the single origin hypothesis is that it is extremely difficult to distinguish between early *Homo* species as many fossils, particularly *H. ergaster*, could easily be interpreted as falling between *H. erectus* and *H. heidlebergensis*, and could be easily placed in either category depending on who is examining the specimen.

In December 1997, the complete skeleton of a four year old child dating to 24,000 years ago was unearthed from a modern styled burial in western Portugal. Paleoanthropologist Eric Trinkaus concluded from his examination of the remains that there was a surprising combination of modern *Homo sapiens* craniofacial morphology with Neanderthal limb proportions. In Trinkaus's opinion, this could only be the result of intermixing between Neanderthals and modern humans. But Chris Stringer, who is one of the main proponents of the out of Africa hypothesis, argues that this may simply represent cold-adaptive features and is not a significant find (Stringer 1996; Wong 1998). As can be seen with these arguments, at this point in time it is still very difficult to come to a specific conclusion as to which hypothesis is best developed from the fossil record.

More recent fossil finds such as the cranial bones of two *H. erectus'* from Dmanisi in the Republic of Georgia are helping to shed light on the interpretation of the fossil record. The two individuals have been dated to at least 1.7 million years ago, slightly younger than a 1.8 million year old *Homo erectus* skull discovered in Indonesia in 1994. The findings of the fossils at Dmanisi are very close in form to African *Homo erectus*, and may even belong to *Homo ergaster*. Since modern Homo sapiens are believed to be descended from *H. ergaster*, the discovery of these remains in Eurasia may suggest that our species evolved outside of the African continent, thus providing support for Wolpoff's hypothesis (Lemonick 2000a).

Genetic evidence is also changing our perception of the human evolutionary scale. Two recent DNA studies by Dr. Richard Klein of Stanford University and Dr. A Silvana Santachiara-Benerecetti of the University of Pavia in Italy independently concluded that the most recent common (African) ancestor of modern populations lived between 60,000 to 40,000 years ago. These results are helping to build a better understanding of the evolutionary time frame, since previous studies suggested that a common African ancestry was shared only about 100,000 years ago (Wade 1999). This evidence provides great support for the "Out of Africa Hypothesis" since it demonstrates that modern populations originated in Africa much later than earlier presumed, and therefore the migration from Africa must have occurred quite rapidly. This also raises many questions about the Neanderthals and how they fit into the evolutionary scheme, and whether their genes are still among us. The fact of the matter is that the fossil record is far from complete, and the interpretation of the finds will vary greatly with each researcher as a result. While each new find can potentially shed new light on either side of the modern human origins debate, there always remains more evidence to be discovered. Therefore, these hypotheses will remain hypothetical – unprovable models of our evolutionary past.

Ian Tattersall presents one of the most interesting and informed versions of the human evolutionary scheme in an attempt to move beyond the polarization of the multiple and single origin theories. He explains that in the 1970s, the tendency of paleoanthropologists was to downplay the number of species found in the fossil record and to group together numbers of distinctive finds into single species categories, such as "archaic *Homo sapiens*." The reality here is that human evolution cannot be reduced to such narrow categories, "It is marked by diversity rather than by linear progression"(2000:58). In this view, the prevalent single origin perception that *Australopithecus africanus* evolved into *Homo erectus* who in turn evolved into *Homo sapiens* is based on linear thinking that dramatically underestimated the diversity shown in the fossil record. Tattersall asserts: "My own view, in contrast, is that the 20 or so hominid species invoked ... represent a minimum estimate. Not only is the human fossil record as we know it full of largely unacknowledged morphological indications of diversity, but it would be rash to claim that every hominid species that ever existed is represented in one fossil collection or another. And even if only the latter is true, it is still clear that the story of human evolution has not been one of a lone hero's linear struggle"(2000:60-1). This focus on the biological and cultural mosaic of human existence provides a new perspective on the somewhat rigid dominant evolutionary formulations.

> Instead it has been the story of nature's tinkering: of repeated evolutionary experiments. Our biological history has been one of sporadic events rather than gradual accretions. Over the past five million years, hominid species have regularly emerged, competed, coexisted, colonized new environments and succeeded-or failed. We have only the dimmest perceptions of how this dramatic history of innovation and interaction unfolded, but it is already evident that our species, far from being the pinnacle of the hominid evolutionary tree, is simply one more of its terminal wings (Tattersall 2000:61).

Tattersall's view of human evolution (see Appendix G) as a non-linear process of trial and error is based upon Eldridge and Gould's (1972) model[1] of "punctuated equilibria," which emphasises the importance of microevolution. This model proposes that evolution progresses slowly in large populations and very rapid changes occur in small peripherally isolated founder populations (Mayr 1997:172). Therefore, we see the twenty or so different species occurring as

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[1] This model was first developed by Ernst Mayr in his "Change of Genetic Evolution and Environment" (1954), but has been revised and popularized by Eldridge and Gould more recently.

adaptive offshoots of a direct ancestor, and the adaptive success of modern *Homo sapiens* through advanced technology and language. However, the debate remains as to how the competition met its demise. Were species absorbed through widespread interbreeding? Certainly, by the time of the emergence of archaic *Homo sapiens* 40,000 years ago, there is evidence for greatly improved tool technology and trade networks. This trade presumably could be the basis of friendly relations between species, which may have led to mass intermixing. At this time, there still is not enough evidence to support such a claim, however. But at the heart of these questions is the question of why anthropologists are so concerned about the origin and demise of species?

> Why should any of us care whether we're descended from late surviving archaic humans, or from equally primitive types who lived somewhat earlier and somewhere else? The electricity surrounding these issues flows partly from the clash of scientific egos and partly from the sheer fascination of stories about things long ago and far away. But it also flows out of the long, sordid history of scientific racism (Cartmill 1997).

The emphasis on linearity that Tattersall attempts to move beyond has been the basis of the nineteenth century European notions of native colonial peoples of Africa, Australia and North America as living fossils, directly related to the lesser, unintelligent earlier evolutionary stages.

The colonization process of the early to mid-nineteenth century was legitimated by the idea of modernizing the "savage" indigenous populations. This dominant discourse of biological differentiation became deeply entrenched with scientific evolutionary thought as well. The principal notions of human evolution at these times followed the same general ideas of the colonial discourse – only the strong survive (i.e. Social Darwinism) With the appropriation of land and resources through the European expansion, theorists began believing that earlier hominid species could not compete with the modern *Homo* form just as the indigenous populations were losing control to the Europeans. In the late 1940s, many leading textbooks portrayed the more "primitive" forms of the *Homo* lineage as failed offshoots of the highly evolved European form of modern *Homo sapiens*. After the ideas of racial hierarchy had come to a head with the holocaust in Nazi Germany during World War II and the collapse of European empires in Asia and Africa, scientific thought began to shift throughout the 1950s. The interpretation of the fossil record as linear progression leading to a modern hierarchy of races became increasingly regarded as absurd, and with the perception that Europeans could be directly linked to the Neanderthals, the idea that African and Indigenous peoples in the new world could be directly related to early hominid forms was rejected (Cartmill 1997). Theories of race and racial science were re-evaluated, and by the end of the 1950s, the majority of anthropologists had begun to reject the notion of the antiquity of race in human evolution.

In 1962, Carleton Coon's *The Origin of Races* marked the return of racial science. Coon divided humans into five different races: Caucasoid, Mongoloid (Asian and American Indian), Australoid, Negroid and Capoid, claiming that these subspecies were each separated by a million years of evolution. With this classificatory scheme, Coon returned to the earlier focus on *Homo erectus* as the common ancestor of all subsequent *Homo* species, which evolved regionally. He argued that *Homo erectus* first evolved into white Europeans and thus were more highly evolved than the other four races. Many anthropologists were critical of this view (see especially Montagu & Dobzhansky 1947; Marks 1995:57-60), arguing that five subspecies of *Homo erectus* could not actually be identified, but Coon adhered to his view of evolution, revising the theories he originally formulated in his 1939 book *The Races of Europe*. In this, Coon (1939:2-3) states:

> The present races of Europe are derived from a blend of food-producing peoples from Asia and Africa, of basically Mediterranean racial form with the descendants of interglacial and glacial food-gatherers, produced in turn by a blending of basic *Homo sapiens* related to the remote ancestor of the Mediterraneans [*Homo erectus* based populations], with some non-sapiens species of general Neandertaliod form. The actions and interactions of

> environment, selection, migration and human culture upon the various entities within this algorithm, have produced the white race in its present complexity

Placing "whites" at the top of Coon's racial hierarchy, he suggested that the evolution from *Homo erectus* to *Homo sapiens* occurred at different times for each of his five races – Caucasoids (whites) first, as he explains above, the Mongoloids next and finally Africans and Australian aborigines. Coon argued that this late evolution meant these races were intellectually and physically inferior. With the outrage that Coon's racial classification produced, his view of multiregional evolution became seen as inherently racist (Cartmill 1997).

It should be noted here that Milford Wolpoff's theory of multiregional evolution differs greatly from that of Coon's, although it has been mistakenly associated with Coon's theories (Wolpoff & Caspari 2000). "Carleton Coon believed that the races of mankind actually evolved from *erectus* in isolation of each other ... That is not what we are saying at all, and it makes me very angry when people misrender our arguments into sounding like Coon's"(Wolpoff as interviewed by Shreeve 1995:73). Wolpoff based his theory on the belief that racial distinctions between geographically distinct populations of *Homo sapiens* may extend deep into the past, but not in isolation. Concerning this regional variation and its conceptual connection to Coon's earlier work, Wolpoff explains: "Call it race if you like. But at the same time, the species as a whole has been connecting and interbreeding and cooperating and evolving into one great family for hundreds of thousands of years. I wouldn't do research on this issue if I thought it would be useful to a racist. I'd quit and go work on australopithecines"(Wolpoff as interviewed by Shreeve 1995:109). Even with Wolpoff's denial of any form of social racist ideology attached to his theories, other controversial theories have been produced in the not so distant past following Coon's ideology

J. Philippe Rushton, an outspoken evolutionary psychologist, became the centre of controversy when he presented a paper titled "Evolutionary Biology and Heritable Traits

(With Reference to Oriental-White-Black Difference)" at the 1989 American Association for the Advancement of Science conference. In this paper, he argued that there exists a tri-level hierarchy of races in terms of brain size and intelligence, which is based on economic, cultural, familial and environmental factors, but also on the inheritance of ancient, evolutionary factors. Rushton proposed a gene-based life history known as the *r-K* scale to explain racial differences in behaviour. The *r* strategy emphasizes high reproductive strategy while the *K* strategy involves high levels of parental investment in the development of personality and intelligence. Rushton's hypothesis was that Mongoloid people were on average more *K*-selected than Caucasoids, who were more *K*-selected than Negroids. Rushton also hypothesised that the *r* strategy had an inverse relationship to the racial hierarchy. In terms of the evolutionary scheme, Rushton (1998:31-32) explains:

> Humans evolved in Africa sometime after 200,000 years ago, with an African/non-African split occurring about 110,000 years ago, and a Mongoloid/Caucasoid split about 41,000 years ago. The farther north the populations migrated 'out of Africa,' the more they encountered the cognitively demanding problems of gathering and storing food, gaining shelter, making clothes, and raising children successfully during prolonged winters. As these populations evolved into present-day Europeans and Asians, they did so by shifting towards larger brains, slower rates of maturation, and lower levels of sex hormone with concomitant reductions in sexual potency and aggression and increases in family stability and longevity.

Rushton synthesised his evolutionary perspective in his highly contentious 1995 book *Race, Evolution and Behaviour*. The resulting hostile response after the publication of this book saw Rushton's work being widely discredited as "racist," and a call for his removal as professor of psychology at the University of Western Ontario. Rushton's response was to release his statement on race to the media:

> A race is what zoologists term a variety or subdivision of a species. Each race (or variety) is characterized by a more or less distinct combination of inherited morphological, behavioural, physiological traits. In flowers, insects and non-human animals, zoologists consistently and routinely study the process of

> racial differentiation. Formation of a new race takes place when, over several generations, individuals in one group reproduce more frequently among themselves then they do with individuals in other groups. This process is most apparent when the individuals live in diverse geographic areas and therefore evolve unique, recognizable adaptations (such as skin colour) that are advantageous in their specific environments. But differentiation also occurs under less extreme circumstances. Zoologists and evolutionists refer to such differentiated populations as races (1996).

While this explanation of the evolutionary development of "racial" differences actually follows the single origins hypothesis of human variation and the antiquity of race, it must be acknowledged that this is pseudo-evolutionary theory. Most reputable evolutionary scientists reject the notion of a measurable intelligence or population differences in cognitive abilities, therefore, anthropologists generally do not concern themselves with measures of intelligence or "sexual potency" as Rushton does, and conversely, Rushton does not base his work on an analysis of the fossil remains of early human populations. It is, however, within this return of a hierarchical ordering of humanity similar to what Coon had proposed that we return to an inherently biased view of human evolution and race.

Where does this leave us in the search for an answer to how human beings, as *Homo sapiens sapiens*, differ in terms of "race?" It is obvious from the problems associated with the dominant views of human evolution is that it is non-linear and marked by diversity, as Tattersall has asserted. While the fossil record cannot be easily placed into objective or even generally agreed upon categories, neither can modern populations. There is, however, a linear element to patterning of evolutionary adaptation. It is evident that humans are subject to great geographical variation as they adapt to the local environment, and this happens in a linear pattern according to latitude and longitude. The problem here is that the physical geography of the earth's surface does not follow this same pattern. Patterns of variability are, in essence, "punctuated" by bodies of water and mountains, as well as areas that are prone to extreme temperatures. But this theoretically linear pattern of human diversity does not incorporate any notion of intelligence or genetic conception of behaviour. What can be deduced from this model is that if it were not for geographically influenced breaks from the gradation of morphological and physiological traits in modern humans, these traits would evenly grade. Therefore, it seems arbitrary if not illogical to attempt to assign a subspecies or population a label such as "race." But whether this holds true for the fossil record remains to be seen. The current evidence simply does not allow us to make a definite interpretation of the nature of evolution as it pertains to population biology.

Cartmill suggests that the social and scientific concern over "race" and institutionalized inequality should not become an issue of paleoanthropology: "The truth of racial egalitarianism hinges on the facts about living people. Their genealogies are irrelevant"(1997). This de-emphasis on human differentiation and a renewed interest in our origins as a unique progression from our distant ancestors will help us to refocus on the process of evolution as an unknowably complex biological function.

It can easily be understood why Native American groups would be so concerned about the study of the Kennewick Man remains when we see the inherent racism of the colonization process and its manifestation in the evolutionary science of the time. "A lot of that uneasiness [about human evolution] springs from a mistaken notion that deep down, underneath all the cultural varnish, we are still what our ancestors were – that if we're descended from apes, we must somehow be apes, and have a licence to behave like apes whenever we feel like it. We aren't, and we don't"(Cartmill 1997). These words are filled with great wisdom, for the dominant evolutionary theories have traditionally arranged the human lineage into hierarchical lines, allowing us to discriminate between human "types" or "races" and, furthermore, against the animal kingdom and natural environment. It must be recognised that the existence of the human species was a chance occurrence, an evolutionary anomaly.

The ability to speak and produce conscious thought does not make us any less of an animal, nor does it make us immune to the evolutionary modification and changing environments that have resulted in the extinction of previous species.

- CHAPTER 4 -

MODERN PHYSICAL ANTHROPOLOGY AND HUMAN VARIATION – A PRACTICAL OSTEOLOGICAL ANALYSIS

Since Franz Boas began to question the anthropological significance of racial classification at the turn of the twentieth century, many of his students, including such well-known anthropologists as Margaret Mead, Ruth Benedict and especially Ashley Montagu, consistently warned of the dangers of racial typology through the middle of the century. More recently, there have been many volumes produced on each of the topics covered in the first half of this thesis: the history of scientific racism, systematics and racial taxonomy, paleoanthropology and the evolution of the "races." Unfortunately, even with such a vast quantity of interesting and innovative anti-"race" and anti-racist literature, most people continue to see the world according to a racial classification template, perpetuated by both cultural and biological inaccuracies.

The main problem that exists is that science in general, and particularly the medical sciences, still adhere to the notion that humans can be divided into distinct races. The anti-"race" literature to this point has been almost exclusively historical, cultural, sociological or philosophical, or a combination of any or all of these disciplines. In order to make significant progress, there must be a practical means for studying human biodiversity from within the sciences without adhering to the notion of race. This can be done by exploring the measurable variations that exist in the human anatomy, while basing such a study on a solid theoretical background. This chapter is an attempt to move beyond the social science approach of studying scientific racism toward a biological study of the human skeleton in order to evaluate the methods of racial analysis, and use the results to provide suggestions for reconceptualizing human variation.

There have been several methods of racial analysis presented by physical anthropologists in the past two hundred years, as discussed in Chapter 2. In this chapter, the focus will be on forensic methods and the determination of race as part of a biological profile, used to identify an individual through the analysis of skeletal remains. Forensic anthropology has become one of the main sites of debate surrounding the use of racial categorization in contemporary times.

This analysis was conducted using skeletal collections at the Canadian Museum of Civilization (CMC), all of known provenience and previously catalogued and documented. All of the remains were originally recovered from various regions within Canada, and represent populations of differing ancestral origin. Based on our earlier examination of systematics and taxonomy (Chapter 2), it was suggested that the main causal factors of human variation were climate, physiography, altitude and latitude, which are geographically determined. Therefore, three distinct geographical areas representing Euro-American and aboriginal North Americans within Canada were selected in order to represent the diversity of landscape and its effects on its indigenous and non-indigenous inhabitants. Three regional groupings from British Columbia (B.C Pacific [Queen Charlotte Islands], B.C. Coastal and B.C. Interior) comprise the Western Canadian assemblage, two groups from Manitoba and Ontario represent central and eastern Canada, and a single assemblage from a Quebec City historic prison population has also been added. All of the remains are known to be individuals that inhabited their respective regions during the sixteenth to nineteenth centuries, and are therefore contemporary with each other. The remains of the Quebec City collection are all of European descent, while the British Columbia, Manitoba and Ontario remains are all Amerindians. I use the terms "aboriginal" or "Amerindian" to refer to these assemblages as they are all individuals who, in a recent evolutionary perspective (30 - 15 thousand years), are indigenous to the North American continent. Amerindian is the preferred terminology used in this project.

Dr. Jerome S. Cybulski, Curator of Physical Anthropology at the Canadian Museum of Civilization, has previously studied the British Columbia and Quebec City remains used in this project. I chose not to review the published literature on these collections previous to my examination, electing to conduct the analysis with minimal information (only location, timeframe and ancestral affinity), in order to minimize observer bias in interpreting the collected data, especially when collecting the non-metric data. However, Cybulski's studies were used as a type of debriefing following my analysis.

Craniofacial Analysis

Non-Metric Trait Analysis

It is generally acknowledged among physical and forensic anthropologists that the face and skull offer the most accurate estimation of ancestral relation or "race," and that such determination can be made relatively quickly, easily and accurately by means of non-metric analysis, which does not require any tools or special equipment beyond a trained eye (Rhine 1993:54; Goodman 1997:22, Church 1995:7). The method of non-metric analysis used in this study was adapted from Stanley Rhine's chapter "Non-Metric Skull Racing" in *Skeletal Attribution of Race* (Gill & Rhine 1990), in which Rhine attempts to synthesize the standard Harvard-Peabody Museum list of traits developed by E.A Hooton[1] with William Bass'[2] human osteological methods. This method was chosen because of its comprehensive list of traits (100 variables of 45 discrete traits; see Rhine 1990:19-20)[3] and detailed explanation of how each

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[1] See Hooton's *Up From the Ape* (1946), Pp. 742-744.
[2] See Bass' *Human Osteology, 3rd Edition* (1987).
[3] Many of these traits are also indicated in Appendix K according to the trait numbers used by Rhine.

trait was is to be observed.[4] Rhine's original sample included 87 skulls from five linguistic or phenotypic categories, synthesized into three major "races" as indicated in Table 1. Although each group or population in both studies were initially organized by sex, which was determined in the present study according to non-metric craniofacial criteria (White 1991:321-323) and confirmed by observing the subpubic angle (Moore & Dalley 1999:334) where available, the results presented in this chapter represent both male and female results combined, following Rhine's method, unless otherwise indicated.

Table 1 - *Skulls Used in Rhine's (1990:9) "Non-Metric Skull Racing."*

Race	Male	Female	Totals	
Anglo	40	13	53	
Hispanic	13	2	15	= 68 Caucasoid
Modern Amerind	3	0	3	
Prehisoric Amerind	9	0	9	= 12 Mongoloid
Black	5	0	5	
Black Casts	2	0	2	= 7 Negroid
Totals	**72**	**15**	**87**	

The total number of remains analyzed in this project was 113 adult individuals, which belong to the following sub-groups: Western Canada, 47 (Gust Island, 10; Coastal B.C., 20; Interior B.C., 17); Central Canada, 41 (Manitoba, 13; Ontario, 28); Quebec City, 25 (see Table 2). A rough estimate of age was determined by observing a combination of the eruption of the third molars and closure of the cranial sutures (Helmuth 1998:91-110), which allowed for a simple determination of adult or juvenile age. All juvenile individuals were then eliminated from the study, as the expression of some traits may be influenced by age.[5] The total number of remains analyzed was limited by time and availability, and only the most complete specimens were included in this study. Table 3 gives the mean results observed for each of the

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[4] See "Appendix A" in Rhine (1990), Pp. 19-20.

[5] See Hauser & De Stefano (1989), P. 9.

Table 2 - *Total Specimens Used from the CMC Collections.*

Location	Male	Female	Totals	"Race"
WEST				
B.C. Pacific	5	5	10	
B.C Coastal	8	12	20	
B.C Interior	8	9	17	
CENTRAL				
Manitoba	8	5	13	
Ontario	18	10	28	
Group Totals	47	41	88	"Indian"
QUEBEC	25	0	25	"Anglo"
Total Assemblage	72	41	113	

six regional groups studied, allowing for a comparison of means obtained for all of these variables for all groups. The results of the analysis have been colour-coded to represent the range of percentages achieved: all scores of 50% occurrence or lower are in black; 50-79% in blue; 80-99% in red; and 100% occurrence in green.[6] The number of specimens observed for each group is indicated by *n*, and the percentages obtained were calculated by dividing the number of occurrences per group by the number of specimens in which the traits were observable, thus eliminating the skewing of the results by partially incomplete specimens.

Table 4 presents the averages of the Quebec remains (which were all male, as determined by Cybulski 1991:66), representing the "Anglo" or "American Caucasoid" grouping as used in Rhine's original study (despite the questionable nature of their categorization), and the combined means for the Amerindian assemblages, which represent the "Indian" or "Southwestern Mongoloid" categories also used by Rhine. In order to compare the results of the present study with those obtained by Rhine, the scoring system

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[6] The selection of these percentages was based on those presented as statistically significant by Rhine (1990). However, the percentages used here are higher values, representing increased significance for ancestral determination.

Table 3 – *Percentages of Trait Expressions of Regional Assemblages from CMC Collections.*

	Trait %		B.C. Pacific	B.C Interior	B.C. Coastal	Manitoba	Ontario	Quebec
		n	10	17	20	13	28	25
1.	Keeling		60.0	70.6	50.0	84.6	82.1	0.0
2.	Post-Bregmatic Depression		0.0	0.0	15.0	7.7	21.4	54.2
3.	Inion Hook		40.0	35.3	40.0	33.3	67.9	70.8
4.	Longus Capitus Depression		100.0	94.1	95.0	90.9	88.9	91.3
5.	Base Chord:	short	10.0	31.3	0.0	18.2	3.7	17.6
		medium	70.0	56.3	75.0	72.7	81.5	70.6
		long	20.0	12.5	25.0	9.1	14.8	11.8
6.	Base Angle:	high	60.0	81.3	45.0	100.0	38.5	41.7
		low	40.0	18.8	55.0	0.0	57.7	58.3
7.	Venous Markings		60.0	22.0	35.0	46.2	46.4	4.0
8.	Major Sutures:	simple	70.0	76.5	80.0	69.2	39.3	24.0
		medium	30.0	23.5	20.0	30.8	60.7	76.0
		complex	0.0	0.0	0.0	0.0	0.0	0.0
9.	Wormian Bones		10.0	0.0	15.0	15.4	17.9	12.0
10.	Inca Bone		10.0	0.0	0.0	8.3	0.0	0.0
11.	Os Japonicum		0.0	0.0	0.0	0.0	3.6	0.0
12.	Other Ossicles		40.0	11.8	25.0	15.4	17.9	16.0
13.	Metopic Trace		0.0	0.0	5.0	7.7	7.1	8.0
14.	Orbital Shape:	rounded	90.0	94.1	100.0	100.0	92.9	12.0
		rectangular	0.0	6.0	0.0	0.0	0.0	0.0
		sloping	10.0	0.0	0.0	0.0	7.1	88.0
15.	Nasal Opening:	narrow	20.0	17.6	25.0	7.7	10.7	54.5
		medium	40.0	64.7	60.0	46.2	21.4	40.9
		wide	40.0	11.8	15.0	46.2	64.3	9.1
16.	Nasal Depression:	deep	0.0	0.0	10.0	15.4	3.6	63.2
		slight	0.0	22.0	40.0	46.2	42.9	36.8
		straight	100.0	70.6	50.0	46.2	50.0	0.0
17.	Nasal Form:	tower	10.0	6.6	0.0	0.0	0.0	76.9
		tented	88.9	93.3	100.0	100.0	100.0	23.1
		quonset	0.0	0.0	0.0	0.0	0.0	0.0
18.	Nasal Overgrowth		100.0	66.6	100.0	100.0	100.0	0.0
19:	Nasal Spine:	small	28.6	44.4	76.5	28.6	47.4	100.0
		large	71.4	55.5	23.5	71.4	52.6	0.0
20.	Nasal Sill:	deep	0.0	0.0	25.0	0.0	0.0	33.3
		shallow	14.3	7.1	0.0	33.3	0.0	94.4
		blurred	85.7	92.9	62.5	66.7	100.0	0.0
		guttered	0.0	0.0	0.0	0.0	0.0	0.0
21:	Zygomatic Projection:	retreating	0.0	0.0	0.0	0.0	0.0	0.0
		vertical	0.0	0.0	0.0	0.0	0.0	0.0
		projecting	100.0	100.0	100.0	100.0	100.0	100.0
22.	Malar Tubercle		44.4	56.3	76.5	91.7	55.6	13.3
23.	Zygomatic Posterior Tubercle		100.0	68.8	88.2	100.0	89.3	82.4
24.	Canine Fossa		0.0	25.0	10.5	23.1	7.1	47.6
25.	Prognathism:	moderate	70.0	0.0	5.0	7.7	34.6	26.1
		slight	30.0	100.0	80.0	69.2	65.4	73.9
		none	0.0	0.0	15.0	23.1	0.0	0.0
26.	Incisal Shoveling:	double	0.0	0.0	0.0	0.0	0.0	0.0
		pronounced	11.1	0.0	25.0	11.1	28.6	0.0
		medium	33.3	0.0	37.5	44.4	42.9	5.9
		slight	55.6	0.0	37.5	22.2	42.9	5.9
		none	0.0	0.0	0.0	22.2	0.0	88.2

Table 3 (Continued).

	Trait %		B.C. Pacific	B.C. Interior	B.C Coastal	Manitoba	Ontario	Quebec
		n	10	17	20	13	28	25
27.	Incisal Rotation		66.7	0.0	100.0	61.5	75.0	8.0
28.	Enamel Extensions:	LM1	0.0	20.0	77.8	10.0	25.0	0.0
		LM2	28.6	85.7	50.0	11.1	57.1	0.0
		LM3	40.0	100.0	28.6	20.0	50.0	0.0
		RM1	0.0	40.0	63.6	10.0	21.4	0.0
		RM2	22.2	85.7	55.6	14.3	57.1	0.0
		RM3	50.0	100.0	33.3	25.0	7.1	0.0
29.	Buccal Pits:	LM1	0.0	0.0	0.0	0.0	0.0	5.9
		LM2	0.0	0.0	0.0	0.0	0.0	0.0
		LM3	0.0	0.0	0.0	0.0	0.0	0.0
		RM1	0.0	0.0	0.0	0.0	14.3	0.0
		RM2	0.0	0.0	0.0	0.0	0.0	0.0
		RM3	0.0	0.0	0.0	0.0	0.0	0.0
30.	Carabelli's Cusp:	LM1	12.5	0.0	12.5	10.0	7.1	46.7
		LM2	14.3	0.0	0.0	0.0	7.1	20.0
		LM3	0.0	0.0	0.0	0.0	0.0	6.7
		RM1	25.0	0.0	0.0	0.0	7.1	4.0
		RM2	0.0	0.0	0.0	0.0	0.0	0.0
		RM3	0.0	0.0	0.0	0.0	0.0	0.0
31.	Molar Crenulations		0.0	0.0	0.0	0.0	0.0	0.0
32.	Palatine Torus		0.0	11.1	10.0	7.7	7.1	15.0
33.	Dental Arcade Shape:	parabolic	0.0	31.3	0.0	0.0	0.0	66.7
		elliptic	100.0	68.8	100.0	100.0	100.0	20.8
		hyperbolic	0.0	0.0	0.0	0.0	0.0	12.5
34.	Shape of Chin:	bilobate	0.0	0.0	0.0	0.0	0.0	9.1
		blunt	90.0	36.4	0.0	90.9	75.0	45.5
		pointed	10.0	63.6	100.0	9.9	25.0	45.5
35.	Profile of Chin:	vertical	50.0	81.8	33.3	18.2	33.3	9.5
		prominent	50.0	18.2	66.7	81.8	33.3	90.5
36.	Low. Border Mandible:	straight	100.0	100.0	91.7	81.8	50.0	42.9
		rocker	0.0	0.0	0.0	18.2	33.3	14.3
		undulating	0.0	0.0	5.0	0.0	16.7	37.5
37.	Ascending Ramus:	pinched	90.0	100.0	100.0	80.0	91.7	100.0
		wide	10.0	0.0	0.0	20.0	8.3	0.0
38.	Ascend. Ramus Profile:	vertical	0.0	9.1	33.3	10.0	8.3	0.0
		slanted	100.0	90.9	66.7	90.0	91.7	100.0
39.	Gonial Angle:	inverted	30.0	18.2	27.3	30.0	16.7	0.0
		straight	10.0	27.3	54.5	20.0	41.7	4.8
		everted	60.0	54.5	18.2	50.0	41.7	95.2
40.	Mandibular Torus		100.0	27.3	0.0	100.0	0.0	28.6
41.	Ext. Auditory Meatus:	round	0.0	17.6	30.0	0.0	42.9	60.0
		elliptic	100.0	82.3	70.0	100.0	57.1	32.0
42.	Oval Window Visible		10.0	0.0	15.0	7.7	21.5	48.0
43.	Inferior Collar		100.0	88.2	100.0	100.0	89.3	100.0
44.	Palatine Suture:	straight	70.0	20.0	5.0	92.3	35.7	65.2
		bulging	30.0	73.3	95.0	7.7	64.3	34.8
45.	Zygomaticomaxillary Suture:	curved	20.0	6.3	5.0	0.0	10.7	38.9
		angled	80.0	93.8	95.0	100.0	89.3	61.1

Table 4 – *Results from CMC Assemblages Compared with Rhine's (1990) Results.*

	Trait	%	Quebec (n=25)		Aboriginal (n=88)	
			"Anglo"		**"Indian"**	
			American Caucasoid		*Southwestern Mongoloid*	
1.	Keeling		0.0		71.8	x*
2.	Post-Bregmatic Depression		54.2		11.0	
3.	Inion Hook		70.8	xx*	44.1	xx
4.	Longus Capitus Depression		91.3	xx*	92.2	xx
5.	Base Chord:	short	17.6		13.3	xx*
		medium	70.6		71.4	
		long	11.8	xx*	15.4	
6.	Base Angle:	high	41.7		66.2	*
		low	58.3	xx*	32.9	xx
7.	Venous Markings		4.0		37.4	
8.	Major Sutures:	simple	24.0	xx*	66.3	xx
		medium	76.0	x	33.8	x
		complex	0.0		0.0	*
9.	Wormian Bones		12.0		12.1	x*
10.	Inca Bone		0.0		2.1	
11.	Os Japonicum		0.0		0.9	
12.	Other Ossicles		16.0		17.5	*
13.	Metopic Trace		8.0	xx*	5.0	x
14.	Orbital Shape:	rounded	12.0		96.8	x*
		rectangular	0.0		1.5	x
		sloping	88.0	xx*	1.8	x
15.	Nasal Opening:	narrow	54.5	x*	15.3	
		medium	40.9	x	48.1	x
		wide	9.1		34.3	xx*
16.	Nasal Depression:	deep	63.2	x*	7.3	
		slight	36.8	x	37.8	xx*
		straight	0.0		54.2	x
17.	Nasal Form:	tower	76.9	xx*	1.7	
		tented	23.1	x	98.3	xx*
		quonset	0.0		0.0	x
18.	Nasal Overgrowth		0.0		91.7	*
19:	Nasal Spine:	small	100.0	xx	49.2	xx*
		large	0.0		54.9	
20.	Nasal Sill:	deep	33.3	*	6.3	
		shallow	94.4	xx	10.9	
		blurred	0.0		81.6	xx*
		guttered	0.0		0.0	
21:	Zygomatic Projection:	retreating	0.0	*	0.0	xx
		vertical	0.0	xx	0.0	
		projecting	100.0		100.0	x*
22.	Malar Tubercle		13.3	x	70.0	x*
23.	Zygomatic Posterior Tubercle		82.4	xx	86.6	xx*
24.	Canine Fossa		47.6	xx*	16.4	xx
25.	Prognathism:	moderate	26.1		11.8	xx*
		slight	73.9	xx*	78.7	
		none	0.0	x*	9.5	
26.	Incisal Shoveling:	double	0.0		0.0	
		pronounced	0.0		16.2	x*
		medium	5.9		31.2	x*
		slight	5.9	x	31.6	x*
		none	88.2	xx*	5.6	

Table 4 (Continued).

Trait	**%**	Quebec (n=25) **"Anglo"** *American Caucasoid*		Aboriginal (n=88) **"Indian"** *Southwestern Mongoloid*	
27. Incisal Rotation		8.0		59.1	xx*
28. Enamel Extensions:	LM1	0.0	x	33.2	xx*
	LM2	0.0	x	51.0	xx*
	LM3	0.0		49.7	xx*
	RM1	0.0	x	33.8	xx*
	RM2	0.0	x	53.2	xx*
	RM3	0.0		41.4	xx*
29. Buccal Pits:	LM1	5.9	x	0.0	xx*
	LM2	0.0		0.0	xx*
	LM3	0.0		0.0	
	RM1	0.0	x	3.6	xx*
	RM2	0.0		0.0	
	RM3	0.0		0.0	xx*
30. Carabelli's Cusp:	LM1	46.7	x*	7.4	x
	LM2	20.0		1.8	
	LM3	6.7		0.0	
	RM1	4.0	x*	1.8	x
	RM2	0.0		0.0	
	RM3	0.0		0.0	
31. Molar Crenulations		0.0		0.0	
32. Palatine Torus		15.0		9.0	
33. Dental Arcade Shape:	parabolic	66.7	x*	7.8	
	elliptic	20.8	xx	92.2	xx*
	hyperbolic	12.5		0.0	
34. Shape of Chin:	bilobate	9.1	x*	0.0	
	blunt	45.5		50.6	xx*
	pointed	45.5		49.6	
35. Profile of Chin:	vertical	9.5		41.7	xx*
	prominent	90.5	xx*	50.0	
36. Low. Border Mandible:	straight	42.9		80.9	xx*
	rocker	14.3		12.9	
	undulating	37.5	xx*	5.4	x
37. Ascending Ramus:	pinched	100.0	xx*	92.9	x
	wide	0.0		7.1	xx*
38. Ascend. Ramus Profile:	vertical	0.0		15.2	xx*
	slanted	100.0	xx*	84.8	x
		0.0			
39. Gonial Angle:	inverted	0.0		23.1	
	straight	4.8	*	35.9	x
	everted	95.2	xx	41.1	xx*
40. Mandibular Torus		28.6		31.8	x
41. Ext. Auditory Meatus:	round	60.0	x*	22.6	
	elliptic	32.0	xx	77.4	xx*
42. Oval Window Visible		48.0	xx*	11.1	x
43. Inferior Collar		100.0	xx	94.4	xx*
44. Palatine Suture:	straight	65.2		38.3	x*
	bulging	34.8	xx*	60.1	x
45. Zygomaticomaxillary Suture:	curved	38.9	xx*	5.5	xx*
	angled	61.1		94.5	x*

Rhine's Intervals	
x	30% or more
xx	50% or more
*	expected

used by Rhine is presented beside the current result for comparison (x = 30% or more, xx = 50% or more, * = expected).[7] Rhine rationalizes these percentage cut-offs by claiming:

> One might be inclined to believe that any characteristic that appears only half the time in a particular population would not be very useful in race assessment. However, we are not dealing with unmixed populations. Not only is there a great deal of systematic populational variability (racial variability), there is a considerable amount of idiosyncratic variability as well. One tends to see many common features in the members of a large family, for example, but also a number of facial features that seem to have arisen from genes unexpressed in the parents (Rhine 1990:13).

Table 5 lists the traits that can be considered typical of each group (European and Amerindian) according to the results of both the current study and Rhine's original study. The results display the traits that occurred in more than 70% of the CMC regional assemblages, and more than 50% occurrence and/or expected in Rhine's study,[8] with Table 6 containing

Table 5 - *Common Group Traits from CMC Assemblages.*

Trait #	TRAIT	Trait #	TRAIT
	Quebec - "Anglo" (14)		**Aboriginal - "Indian" (13)**
3	Inion Hook	1	Keeling
4	Longus Capitus Depression	4	Longus Capitus Depression
14	Orbital Shape: Sloping	14	Orbital Shape: Rounded
17	Nasal Form: Tower	17	Nasal Form: Tented
19	Nasal Spine: Small	18	Nasal Overgrowth
20	Nasal Sill: Shallow	20	Nasal Sill: Blurred
23	Zygomatic Posterior Tubercle	21	Zygomatic Projection: Projecting
25	Prognatism: Slight	23	Zygomatic Posterior Tubercle
26	Incisal Shoveling: None	33	Dental Arcade Shape: Elliptic
35	Profile of Chin: Prominent	36	Lower Border of Mandible: Straight
37	Ascending Ramus: Pinched	41	External Auditory Meatus: Elliptic
38	Ascending Ramus Profile: Slanted	43	Inferior Collar:
39	Gonial Angle: Everted	45	Zygomaticomaxillary Suture: Angled
43	Inferior Collar		

Table 6 - *Unexpected Results from CMC Assemblages as Compared to Rhine's (1990) Results.*

8	Major Sutures: Medium	25	Prognathism: Slight
21	Zygomatic Projection: Projecting	37	Ascending Ramus: Pinched
		38	Ascending Ramus Profile: Slanted

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[7] See Rhine (1990), Pp. 16-17.

[8] Rhine has based these expected traits on previous studies using the "Harvard List." See Rhine (1990), p. 13.

unexpectedly high results. Of the 14 expected traits for the CMC European or "Anglo" assemblage and 13 expected traits for the aboriginal "Indian" assemblage, three traits occur with similar high frequency in both groups (longus capitus depression, zygomatic posterior tubercle and inferior collar) and should therefore not be considered precise indicators for group differentiation. If these three traits are removed from the results of this study, the expected traits (or particular trait grades) for "Anglo" and "Indian" are reduced to 11/100 and 9/100 variables respectively, while Rhine's results show 29/100 expected variables for "Anglo's" and 43/100 expected variables for "Indian." Rhine (1990:18) explains that "the distribution of characteristics by race upholds the contention that *Homo sapiens* is a highly variable form," and the results of the current project certainly support this. The traits showing an unexpectedly high expression in the CMC assemblages (Table 6) indicate that these traits should be given closer attention in future research. The current results can be explained by one of two factors: 1) much more variation exists in the expression of these traits than earlier studies would indicate; or 2) observer error in the present study results from the subjectivity of criteria used in assessing these traits.

Non-metric data collected from the CMC assemblages were further analysed by comparing the standard deviation (STDEV) of the Amerindian groups with the standard deviation of the combined sample (Amerindian + European),[9] and further compared with the regional group means that were calculated previously (see Table 7). This comparison allows for an examination of each trait between Amerindian groups – the lower the deviation, the more significant the trait for determining "racial" characteristics of a given population. In

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[9] The standard deviation for the European assemblage is not included here as the results are based on a single population while the Amerindian means are based on the averaging of the five regional groups. Therefore, the standard deviation calculated for the Quebec European assemblage would not represent the same measure of variability.

Table 7 – *Standard Deviation and Regional Group Percentages of Non-Metric Variants from CMC Assemblages.*

			STDEV		%	
	Trait %		**Amerindian**	**Total**	**Amerindian**	**Quebec**
1.	**Keeling**		**14.65**	**31.24**	**71.8**	**0.0**
2.	**Post-Bregmatic Depression**		**9.40**	**20.34**	**11.0**	**54.2**
3.	Inion Hook		14.06	16.86	44.1	70.8
4.	Longus Capitus Depression		4.25	3.94	92.2	91.3
5.	Base Chord:	short	12.51	11.37	13.3	17.6
		medium	9.30	8.32	71.4	70.6
		long	6.28	5.91	15.4	11.8
6.	Base Angle:	high	25.57	24.77	66.2	41.7
		low	24.62	24.11	32.9	58.3
7.	Venous Markings		14.23	20.04	37.4	4.0
8.	Major Sutures:	simple	16.13	22.72	66.3	24.0
		medium	16.13	22.72	33.8	76.0
		complex	0.00	0.00	0.0	0.0
9.	Wormian Bones		7.12	6.37	12.1	12.0
10.	Inca Bone		5.05	4.76	2.1	0.0
11.	Os Japonicum		1.61	1.47	0.9	0.0
12.	Other Ossicles		11.15	10.27	17.5	16.0
13.	Metopic Trace		3.75	3.74	5.0	8.0
14.	**Orbital Shape:**	rounded	**4.46**	**34.28**	**96.8**	**12.0**
		rectangular	2.68	2.45	1.5	0.0
		sloping	**4.79**	**34.79**	**1.8**	**88.0**
15.	Nasal Opening:	narrow	7.01	16.84	15.3	54.5
		medium	17.22	15.57	48.1	40.9
		wide	22.06	22.47	34.3	9.1
16.	**Nasal Depression:**	deep	**6.74**	**24.20**	**7.3**	**63.2**
		slight	19.32	17.49	37.8	36.8
		straight	**22.62**	**32.84**	**54.2**	**0.0**
17.	Nasal Form:	tower	4.70	4.22	1.7	4.0
		tented	3.35	38.71	98.3	12.0
		quonset	0.00	0.00	0.0	0.0
18.	**Nasal Overgrowth**		**14.94**	**40.37**	**91.7**	**0.0**
19:	**Nasal Spine:**	small	**19.97**	**28.54**	**49.2**	**100.0**
		large	**19.60**	**28.45**	**54.9**	**0.0**
20.	Nasal Sill:	deep	11.18	15.28	6.3	33.3
		shallow	13.83	36.25	10.9	94.4
		blurred	16.35	36.37	81.6	0.0
		guttered	0.00	0.00	0.0	0.0
21:	Zygomatic Projection:	retreating	0.00	0.00	0.0	0.0
		vertical	0.00	0.00	0.0	0.0
		projecting	0.00	100.00	100.0	100.0
22.	**Malar Tubercle**		**17.40**	**29.51**	**70.0**	**13.3**
23.	Zygomatic Posterior Tubercle		12.75	11.74	86.6	82.4
24.	Canine Fossa		10.68	17.00	16.4	47.6
25.	Prognathism:	moderate	29.28	26.21	11.8	26.1
		slight	25.57	22.96	78.7	73.9
		none	10.82	10.17	9.5	0.0
26.	**Incisal Shoveling:**	double	0.00	0.00	0.0	0.0
		pronounced	13.16	13.50	16.2	0.0
		medium	21.01	21.43	31.2	5.9
		slight	21.36	21.81	31.6	5.9
		none	**9.93**	**35.33**	**5.6**	**88.2**

Table 7 – (Continued).

			STDEV		%	
	Trait %		**Amerindian**	**Total**	**Amerindian**	**Quebec**
27.	**Incisal Rotation**		42.52	43.35	**59.1**	**8.0**
28.	**Enamel Extensions:**	LM1	30.21	29.12	**33.2**	**0.0**
		LM2	30.74	35.05	**51.0**	**0.0**
		LM3	31.35	34.15	**49.7**	**0.0**
		RM1	25.29	25.16	**33.8**	**0.0**
		RM2	29.38	34.83	**53.2**	**0.0**
		RM3	35.37	36.20	**41.4**	**0.0**
29.	Buccal Pits:	LM1	0.00	2.41	0.0	5.9
		LM2	0.00	0.00	0.0	0.0
		LM3	0.00	0.00	0.0	0.0
		RM1	6.40	5.84	3.6	0.0
		RM2	0.00	0.00	0.0	0.0
		RM3	0.00	0.00	0.0	0.0
30.	**Carabelli's Cusp:**	LM1	**5.40**	**18.19**	**7.4**	**46.7**
		LM2	**3.55**	**8.71**	**1.8**	**20.0**
		LM3	0.00	2.74	0.0	6.7
		RM1	10.83	9.74	1.8	4.0
		RM2	0.00	0.00	0.0	0.0
		RM3	0.00	0.00	0.0	0.0
31.	Molar Crenulations		0.00	0.00	0.0	0.0
32.	Palatine Torus		4.33	5.02	9.0	15.0
33.	**Dental Arcade Shape:**	parabolic	**14.00**	**27.67**	**7.8**	**66.7**
		elliptic	**13.95**	**32.29**	**92.2**	**20.8**
		hyperbolic	0.00	5.10	0.0	12.5
34.	Shape of Chin:	bilobate	0.00	3.72	0.0	9.1
		blunt	39.45	35.68	50.6	45.5
		pointed	39.29	35.17	49.6	45.5
35.	**Profile of Chin:**	vertical	24.28	25.73	**41.7**	**9.5**
		prominent	25.40	28.10	**50.0**	**90.5**
36.	**Low. Border Mandible:**	straight	20.79	25.24	**80.9**	**42.9**
		rocker	15.08	13.59	12.9	14.3
		undulating	**7.24**	**15.01**	**5.4**	**37.5**
37.	Ascending Ramus:	pinched	8.30	8.05	92.9	100.0
		wide	8.30	8.05	7.1	0.0
38.	Ascend. Ramus Profile:	vertical	12.49	12.22	15.2	0.0
		slanted	12.49	12.22	84.8	100.0
						0.0
39.	**Gonial Angle:**	inverted	6.50	11.55	23.1	0.0
		straight	17.62	18.98	35.9	4.8
		everted	**16.35**	**25.22**	**41.1**	**95.2**
40.	Mandibular Torus		51.02	46.15	31.8	28.6
41.	**Ext. Auditory Meatus:**	round	**18.79**	**23.98**	**22.6**	**60.0**
		elliptic	**18.79**	**26.40**	**77.4**	**32.0**
42.	**Oval Window Visible**		**8.05**	**16.79**	**11.1**	**48.0**
43.	Inferior Collar		6.17	5.82	94.4	100.0
44.	Palatine Suture:	straight	35.96	33.25	38.3	65.2
		bulging	34.93	32.21	60.1	34.8
45.	**Zygomaticomaxillary Suture:**	curved	**7.52**	**14.15**	**5.5**	**38.9**
		angled	**7.53**	**14.16**	**94.5**	**61.1**

contrast, a higher deviation calculated for the entire sample also indicates a higher value of the particular measure itself. Therefore, in comparing the standard deviations for the Amerindian groups with the standard deviation for the entire CMC assemblage, traits that show little deviation among the Amerindian regional assemblages but high variability overall when the European group is added can be confirmed as the most reliable indicators of ancestral group affinity (indicated by bold type in Table 7). These results can be confirmed with a comparison to the regional group averages, which appear in the right-hand column of Table 7. Table 8 lists the eleven traits that are most common to either Europeans or Amerindians (least amount of internal variation; see also Plates 1 & 2) according to the standard deviation by regional population, which, when compared with the standard deviation for the entire assemblage (European + Amerindian), show a variation of at least half of the total variance (of the entire assemblage). These eleven traits are therefore the most useful for determining the ancestral group relation of an individual, according to the present results and supported by the original data provided by Stanley Rhine's original study.

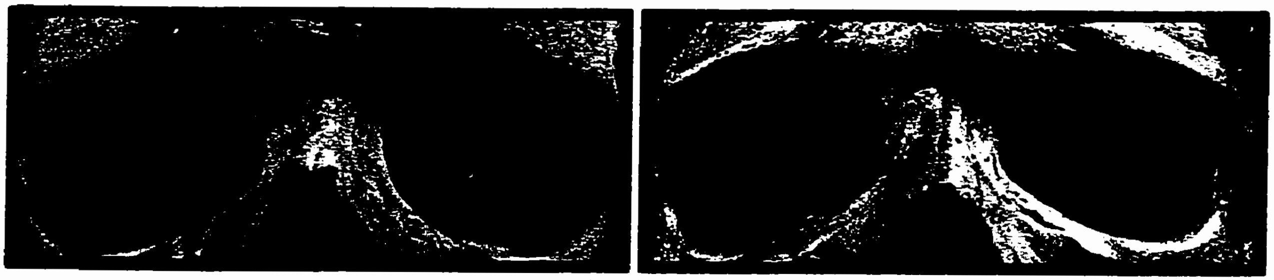
Table 8 - *Typical Ancestral Traits Determined by Standard Deviation and Trait Expression Percentage.*

TRAIT	**"Anglo"**	**"Indian"**
stdev 0-5		
Orbital Shape	sloping	rounded
Nasal Form	tower	tented
stdev 5-10		
Nasal Depression	deep	straight
Incisal Shoveling	none	medium-pronounced
Post-Bregmatic Depression	y	n
Zygomaticomaxillary Suture	curved	angled
Oval Window	visible	not visible
stdev 10-20		
Keeling	n	y
Nasal Overgrowth	n	y
Malar Tubercle	n	y
Dental Arcade Shape	parabolic	elliptic

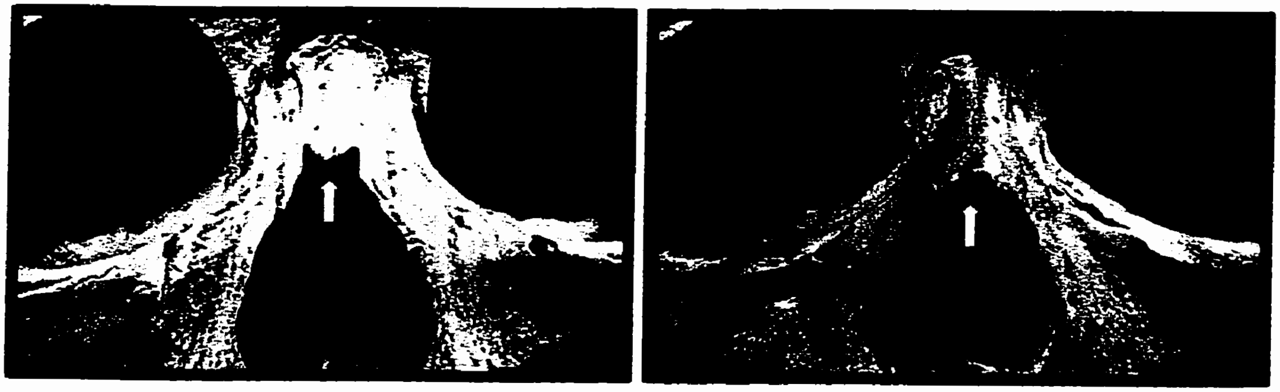
Plate 1

Most Reliable Traits for Ancestral Determination

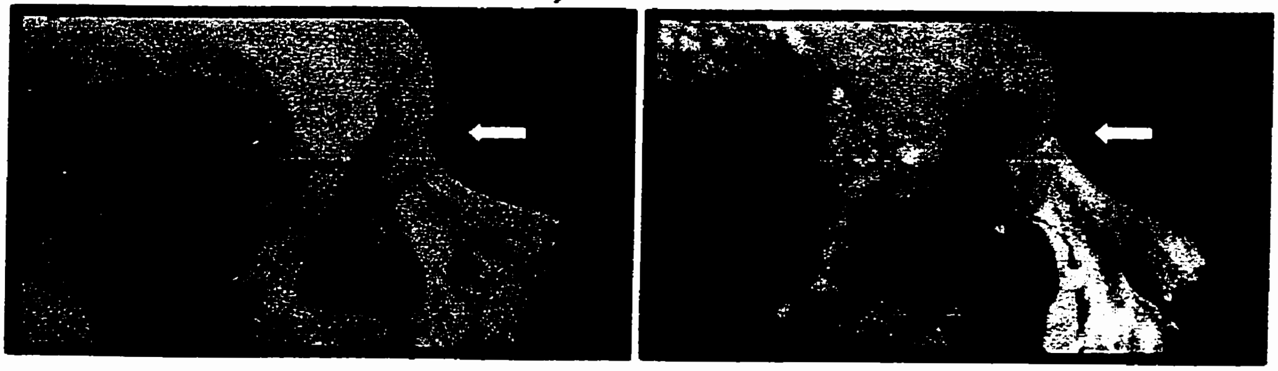
EUROPEAN ABORIGINAL



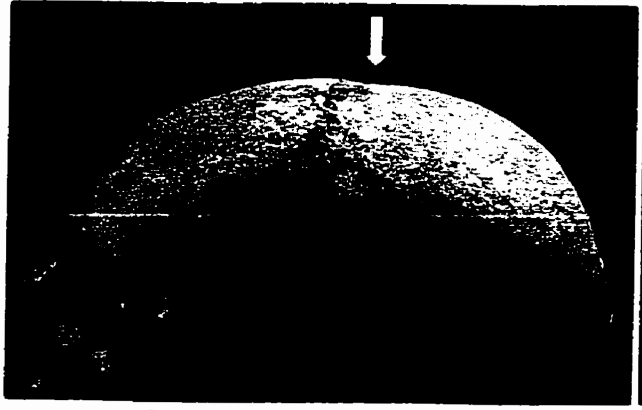
Sloping a) Orbital Shape *Rounded*



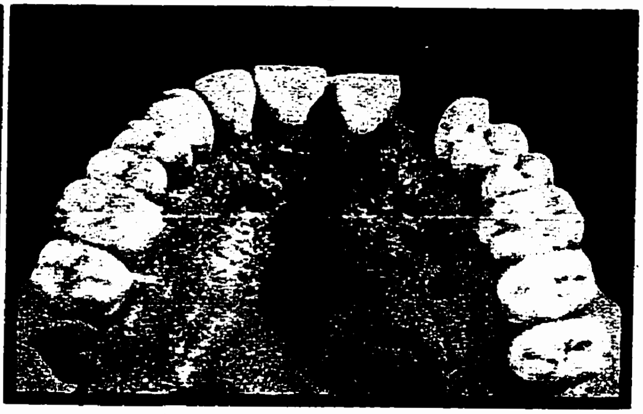
Tower b) Nasal Form *Tented*



Deep c) Nasal Depression *Straight*



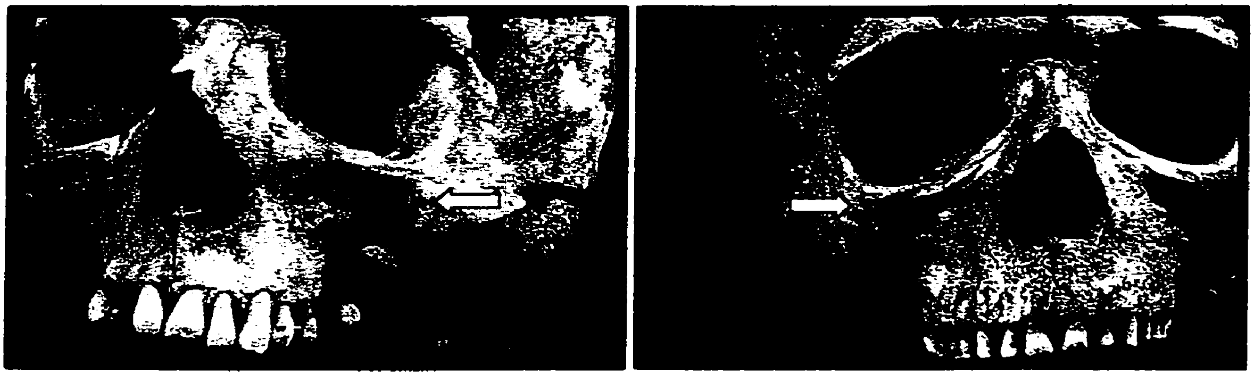
d) Post-Bregmatic Depression



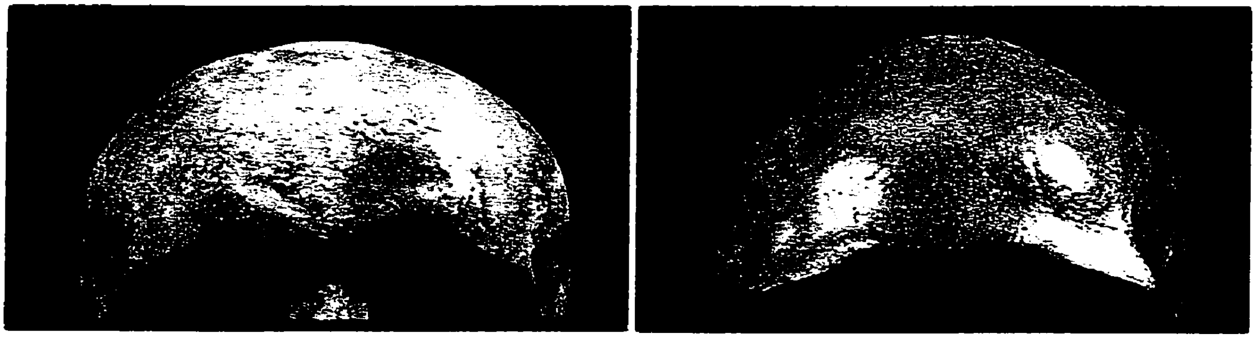
e) Shovel-Shaped Incisors

Plate 2

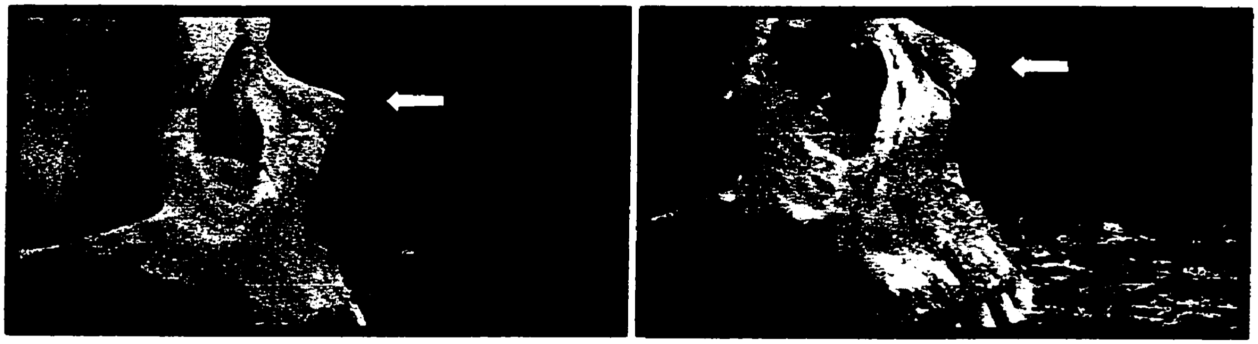
EUROPEAN ABORIGINAL



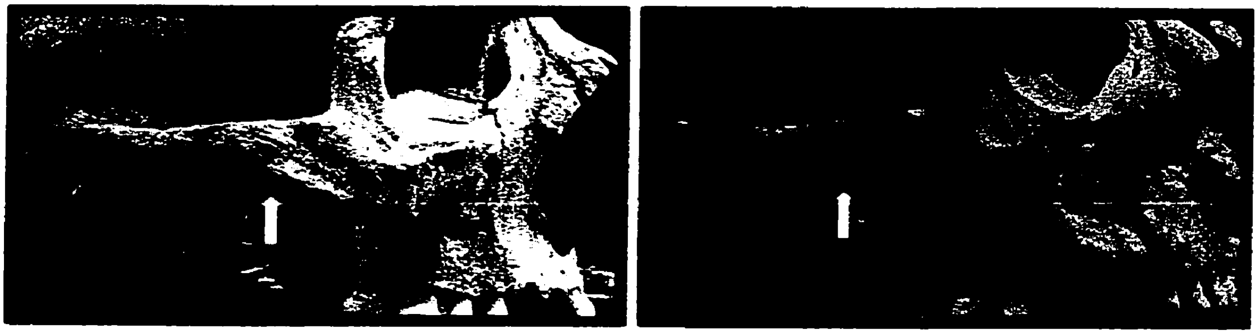
Curved f) Zygomaticomaxillary Suture *Angled*



Rounded g) Keeling *Keeled*



No Overgrowth h) Nasal Overgrowth *Overgrowth*



No Tubercle i) Malar Tubercle *Tubercle*

Simply using percentages provides a great deal of important information as to ancestral relation. In this study, there was a very low percentage of expression of the Inca Bone or Os Japonicum among the entire Canadian Amerindian assemblage – 2.1% and 0.9% respectively. Both of these traits are known to occur with low frequency in some African, Asian and North and South American indigenous populations, but are rarely if ever found in Europeans (Ossenberg 1976; Rhine 1990), and no expression of these traits was noted within the Quebec assemblage. Also of interest are enamel extensions of the molars, which show great variation between Amerindian groups, but no expression within the Quebec European prisoner population. Unfortunately, due to the conditions of burial and/or a number of other factors (antemortem tooth loss etc.), much of the dentition was missing or the enamel was damaged, therefore the results shown are only a representation based on minimal data, but they are consistent the results of Rhine's study.

Aside from Rhine's "Non-Metric Skull Racing," there are a number of non-metric traits that are included in Rhine's study that are treated separately by other authors in Gill & Rhine's *Skeletal Attribution of Race* (1990). Madeline Hinkes' article "Shovel-Shaped Incisors in Human Identification" (1990:31-26) demonstrates that the shoveling of incisors occurs in approximately 8% of American-Europeans and 12% in American-Africans, while a moderate to high degree of shoveling (85-100%) is common among the indigenous populations of North America. The data of the present study are consistent with these findings when the results for pronounced, medium and slight shoveling are combined (79%).

Visibility of the oval window in the middle ear is given separate treatment by Michelle Napoli and Walter Birkby (1990:30), whose results demonstrate that the oval window was visible in 94% of "Caucasoids," 13% of "Mongoloids" and 69% of "Caucasoid/Mongoloid" mixed ancestry in their study. The results for the CMC assemblages show that this trait is much more common in the Quebec European population (48%) than Amerindians (11.1%), but further and more careful study would have to be conducted in order to determine how useful this trait is for determining ancestral relationships.

Finally, the third trait to receive separate attention is the posterior edge of the ascending mandibular ramus, as discussed by J. Lawrence Angel and Jennifer Kelley (1990:33-39). In the present study, 95.2% of the Quebec European assemblage showed eversion of the ramus, as compared with 41.1% of the Amerindian assemblage, whereas the Angel and Kelly study obtained results of 70% of "Whites," 55.5% of "Indians" and 5% of "Blacks"(1990:33).

Metric Analysis of the Midface – "Interorbital Features"

Using the method developed by George Gill and B. Miles Gilbert in "Race Identification from the Midfacial Skeleton: American Blacks and Whites" in *Skeletal Attribution of Race* (1990), metric analysis was carried out on the entire CMC assemblage used in the non-metric analysis. The "Interorbital Features Method" of Gill & Gilbert requires the calculation of three separate indices, based on six measurements of the midface (see Appendix H) in comparison with Gill & Gilbert's calculated sectioning points:

	Sectioning Value Index
1. Maxillofrontal Index	40
a) Naso-maxillofrontal subtense	
b) Maxillofrontal breadth	
2. Zygoorbital Index	38
a) Naso-zygoorbital subtense	
b) Zygoorbital breadth	
3. Alpha Index	60
a) Naso-alpha subtense	
b) Alpha cord	

The calculation of each of the three indices is accomplished by dividing the a) measurement for each index by the b) value and multiplying the result by 100. According to Gill & Gilbert

(1990), the sectioning values allow the determination of "race" by comparing the calculated value to the sectioning value – "Indian/Black" results are typically less than the sectioning point while "White" results are generally greater than the sectioning points. The authors conclude that if at least two of the three calculated indices give values less than the sectioning values, the specimen is most likely "Black" or "Indian" (although this method does not allow researchers to distinguish between these two groups) and, conversely, two of three scores higher than the sectioning value indicates a "White" individual.

The results of the present study are shown in Table 9 by regional population as well as by larger "racial" group ("Indian" and "White"). Means of measurements by regional group are represented by the "x" column and are measured in millimetres. An obvious problem with the data obtained is that they do not at all resemble the results obtained in Gill & Gilbert's original study (see foot of Table 9), and all of the results for the CMC assemblages lie well above Gill & Gilbert's sectioning points. Previous employment of this method has given similar problematic results (see Billinger 1999). These disparities, as well as the high values of inter-group deviation show Gill & Gilbert's methodological criteria to be problematic, largely based on the subjective nature of the landmarks used for the metric analysis (particularly the Alpha index). In comparing the aboriginal ("Indian") totals with the Quebec European ("White") results from the CMC collections, the means for the regional assemblages fall well within the standard deviation of all groups combined, and are therefore not at all useful for determining ancestral relationship in the assemblages under study.

Table 9 – *Results of Basicranium Measurements from CMC Assemblages.*

Group	Maxillofrontal Index		Zygoorbital Index		Alpha Index	
	x	stdev	x	stdev	x	stdev
B.C Pacific	67.86	4.57	61.98	8.55	72.69	3.66
B.C. Coastal	69.30	4.96	62.61	5.40	71.26	4.65
B.C. Interior	68.75	5.69	62.05	3.07	75.93	3.74
Manitoba	72.22	5.81	64.82	5.70	79.18	5.34
Ontario	70.09	9.20	61.89	5.43	79.03	11.70
"Indian" Mean	**69.64**	**1.65**	**62.67**	**1.23**	**75.62**	**3.61**
QUEBEC "White"	**70.04**	**6.22**	**66.98**	**4.12**	**79.60**	**7.40**
Sectioning Values	40.00		38.00		60.00	
Orignal Results (Gill & Gilbert 1990:49)						
Whites	46.59	8.97	42.89	5.49	68.15	8.67
Blacks	34.00	8.00	35.00	9.00	49.00	9.00
Amerindians	33.64	5.74	34.00	4.33	51.30	7.46

Metric Analysis of the Cranial Base

The second metric test utilized in the present study was developed by T.D. Holland (1986), and is reproduced in Michelle Church's "Determination of Race from the Skeleton through Forensic Anthropological Methods"(1995). This method offers five regression models between actual and projected values for measurements of the cranial base, which are often the best-preserved regions of skull, allowing for "race" determination from fragmentary cranial remains (Church 1995:17). Eight possible measurements (below) are used in this method and are multiplied by the regression equations for each, as calculated by Holland (see Church 1995:17):

1. Length of (Left) Occipital Condyle
2. Width of (Left) Occipital Condyle
3. Minimum Distance Between Condyles
4. Maximum Distance Between Condyles
5. Max. Interior Distance Between Condyles
6. Length of Foramen Magnum
7. Width of Foramen Magnum
8. Length of Basilar Process

Table 10 gives the means per population of the raw data for each of these eight measurements in the CMC assemblages. Differences lying outside of the standard deviation of these means are observable from the raw data in measurements 1, 2, 3 and 6 when comparing the Quebec European group to the mean results of the Amerindian populations. Measurement 5 shows a significantly larger difference in this trait (38.6 mm – 43.5 mm), as well as a low standard deviation (.75 mm). In order to test these results, the "racial" means were multiplied by Holland's regression equations (Table 11).[10] This method uses five regression equation configurations according to the number of available measurements (given in brackets), depending on the state of preservation. According to Church (1995:17-18), the sum of each column, when added to Holland's calculated constant value, can be used to determine the "race" of the individual according to a sectioning value of 0.5. "Whites" should score less than the sectioning values, while "Blacks" should score above the sectioning values. The CMC data

Table 10 - *Group Averages of Basicranium Measurements from CMC Assemblages.*

GROUP	MEASUREMENT (mm)							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
B.C. Pacific	25.65	16.95	19.95	54.85	43.90	35.60	29.25	65.00
B.C Coastal	26.26	14.50	18.18	54.29	43.87	35.53	30.97	63.71
B.C. Interior	24.81	15.00	18.09	53.57	42.13	35.00	30.33	62.78
Manitoba	26.23	16.23	16.14	55.27	43.59	36.50	31.05	65.05
Ontario	26.42	15.94	18.10	55.48	43.81	37.07	31.19	67.83
Quebec	**27.08**	**13.42**	**16.55**	**54.27**	**38.59**	**33.67**	**30.83**	**64.04**
Amerindian Mean	**25.88**	**15.72**	**18.09**	**54.69**	**43.46**	**35.94**	**30.56**	**64.87**
stdev	0.66	0.98	1.35	0.78	0.75	0.83	0.80	1.90

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[10] In compiling the data for this study, the results obtained from the regression equations were highly variable. Subsequently, rather than averaging the results of the regression equations for each regional group, the group means of the raw data were inserted into the regression equations, which also demonstrate the high variability of the results.

Table 11 – *CMC Regional Group Means as applied to Holland's (1986) Regression Equations.*

Aboriginal "Indian"

	Equation Number -		1	2	3	4	5
	Number of Measurements -	(mm)	[6]	[5]	[5]	[4]	[3]
1.	Length of (Left) Occipital Condyle	**25.88**	-0.5797	-	-0.2459	-1.0870	-
2.	Width of (Left) Occipital Condyle	**15.72**	-	-	-	1.2670	-
3.	Minimum Distance Between Condyles	**18.09**	0.6241	0.6114	0.6277	-	0.4324
4.	Maximum Distance Between Condyles	**54.69**	-1.2907	-1.7993	-0.3445	-	-
5.	Max. Interior Distance Between Condyles	**43.46**	-0.6997	-0.6910	-1.8601	-	-2.3295
6.	Length of Foramen Magnum	**35.94**	-	-	-	1.0207	-
7.	Width of Foramen Magnum	**30.56**	-0.5654	-0.6112	-0.6143	-1.9864	-
8.	Length of Basilar Process	**64.87**	5.0404	4.9042	-	-	4.6187
	Sum (columns)		2.5290	2.4141	-2.4370	-0.7856	2.7216
	Constant		0.669	0.706	2.870	1.480	0.425
	Total (sum + constant)		**3.20**	**3.12**	**0.43**	**0.69**	**3.15**

Sectioning Point: 0.05

Quebec "White"

	Equation Number -		1	2	3	4	5
	Number of Measurements -	(mm)	[6]	[5]	[5]	[4]	[3]
1.	Length of (Left) Occipital Condyle	**27.07**	-0.6064	-	-0.2572	-1.1369	-
2.	Width of (Left) Occipital Condyle	**13.42**	-	-	-	1.0817	-
3.	Minimum Distance Between Condyles	**16.55**	0.5710	0.5594	0.5743	-	0.3955
4.	Maximum Distance Between Condyles	**54.27**	-1.2808	-1.7855	-0.3419	-	-
5.	Max. Interior Distance Between Condyles	**38.59**	-0.6213	-0.6136	-1.6517	-	-2.0684
6.	Length of Foramen Magnum	**33.67**	-	-	-	0.9562	-
7.	Width of Foramen Magnum	**30.83**	-0.5704	-0.6166	-0.6197	-2.0040	-
8.	Length of Basilar Process	**64.04**	4.9759	4.8414	-	-	4.5596
	Sum (columns)		2.4681	2.3852	-2.2961	-1.1030	2.8868
	Constant		0.669	0.706	2.870	1.480	0.425
	Total (sum + constant)		**3.14**	**3.09**	**0.57**	**0.38**	**3.31**

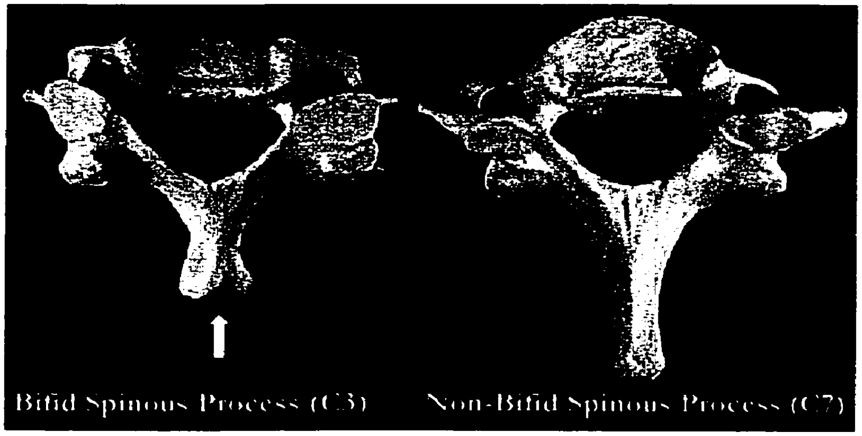
obtained in the present study do not entirely support this presupposition. Equation numbers 1, 2 and 5 do not fall anywhere near the sectioning value for either group. Equations 3 and 4 do produce closer results, although they also do not support the 0.5 sectioning. However, they do demonstrate that there may be a significant difference ancestral between Amerindians and European or European-descendants in terms of the size and morphology of the cranial base, although the patterns of such variation are not clear from the results obtained from the CMC assemblages.

Postcranial Analysis

Bifidity of the Cervical Vertebrae

A method of determining ancestry using the cervical vertebrae is through the observation of bifidity in the morphology of the spinal process. This feature has not received a great deal of attention in previous studies and has only been included as a point of interest in the present study. It is therefore necessary to explain the significance of this trait in more detail. The spinal process is the projection originating from the vertebral arch at the junction of the laminae and projecting both posteriorly and inferiorly, overlapping the spinous process of the vertebra below. The spinal processes from the third (C3) to the seventh (C7) cervical vertebrae are short and typically bifid in "Caucasoids," but generally are not bifid in "Negroids"(Moore & Dalley 1999:433-5). The term bifid refers to the splitting of the spinous process into two distinct projections, as shown by the arrow in Figure 18. In a study of 359 American "Negroids" and "Caucasoids" (using equal numbers of males and females for each ancestral group), Duray *et al.* (1999:937) found that there are "clear and consistent differences of bifidity of cervical spinous processes" between ancestral groups, particularly at C3 through C6.

Figure 18 - *Spinous Process of Cervical Vertebra (Superior View).*

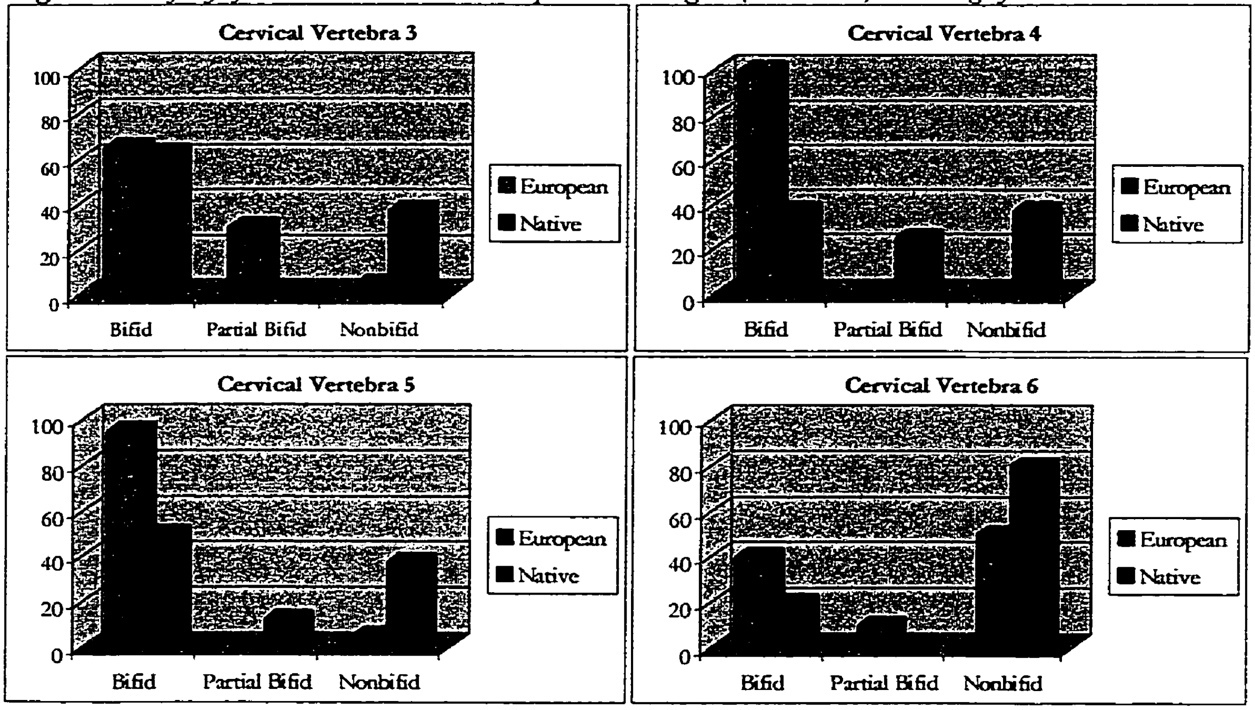


The main anatomic function of the spinous processes of the cervical region is to serve as series of insertion points for the deep muscles of the back (see Appendix I) – the splenius capitis, semispinalis cervicis, semispinalis thoracis, mutifidus, rotatores and interspinalis as well as the superficial trapezius muscle and the interspinous ligament and ligamentum nuchae. The spinous process of the C2 vertebra also serves as the origin of insertion for the rectus capitis posterior major and the obliquus capitis inferior, and the C6 vertebra may (but not always) attaches with the rhomboid minor. Bifidity in the spinous processes is the result of the development of two secondary ossification centres during development. The significance of bifidity in the morphology of the spinous process of the cervical vertebrae is unknown and probably of little or no functional importance, but it represents population specific (epigenetic) variance (Duray *et al.* 1999).

The results of the Duray *et al.* study, which classified each cervical vertebra as bifid, partially bifid or nonbifid, show that at the second cervical vertebra (C2), 91% of all specimens show bifidity. In contrast, at the seventh vertebra (C7), bifidity was quite rare among in the entire sample (98%). Of most use for the determination of ancestral background are the results from the third (C3) and fourth (C4) cervical vertebra, in which "Caucasoids" display significantly higher incidences of bifidity in both sexes (C3, 44.6 - 69.2%; C4, 73.6 - 81.3%). Based on this evidence, and in reference to forensic applications, the data suggests that an individual that possesses the trait of bifidity at both the C3 and C4 level will have a high probability of being European or of European descent ("Caucasoid"). Conversely, those who do not show any bifidity at these levels are most probably in the "Negroid" grouping (of African descent).

At the time of writing, there were no known studies dealing with bifidity of the cervical vertebrae in Amerindian samples. Therefore, this study should be regarded as only an

Figure 19 – *Bifidity of the Cervical Vertebra in European and Aboriginal (Amerindian) Assemblages from CMC Collections.*



attempt to expand upon the Duray *et al.* study and to shed some light on the applicability of this method to determine European or Amerindian descent. Figure 19 graphically represents the results obtained from the CMC regional assemblages, which included 21 vertebral columns from the Quebec population (males), representing the European category, and eight representing the Amerindian populations (6 from B.C. Coastal and 2 from B.C. Interior). Unfortunately, the majority of specimens in the collections used for the cranial analysis in this study did not include complete vertebral columns. Therefore, only a very small number of individuals of both sexes from the Amerindian collection have been included in this study.

In the present study, 100% of the entire CMC assemblages were nonbifid at the C1 level, but at the C2 level, 95% of the European remains were partially bifid (the remaining 5% were nonbifid) while 50% of the Amerindian remains were bifid, with the remaining 50% showing partial bifidity. The results support the original findings of Duray *et al.* that bifidity at the C3 (65%) and C4 level (100%) is a common feature of European ancestry. Bifidity in the

European assemblage was also noted at the C5 level (95%). In terms of the Amerindian assemblage, there was a similar occurrence of bifidity at the C3 level (62.5%), but no occurrence of partial bifidity. At the C4 level, there was a relatively even mixture of expression (bifid – 37.5%, partial bifid – 25%, nonbifid – 37.5%). The result for C5 shows bifidity in 50% of the Amerindian populations, and at the C6 level, 80% of the vertebrae were nonbifid. 100% of the Amerindian sample was nonbifid at the C7 level. From these data, there is no clear pattern that would allow for the distinguishing of Amerindian ancestry from the cervical vertebrae, although the results are consistent with the Duray *et al.* study, which found that a high level of bifidity was characteristic of European ancestry.

Metric Analysis of the Femur

The method used for metric analysis of the femur was adapted from two separate studies included in Gill & Rhine's (1990) *Skeletal Attribution of Race*: measurement of the intercondylar notch of the distal femur[11] and the platymeric index (subtrochanteric anterior-posterior and mediolateral diameters).[12] Also added to this method were the standard measurements of femur length and femoral head diameter (Iscan & Cotton 1990:90). Due to time constraints, only a small number of femora were used in this analysis: Quebec "European," 17; and aboriginal "Indian," 19.[13]

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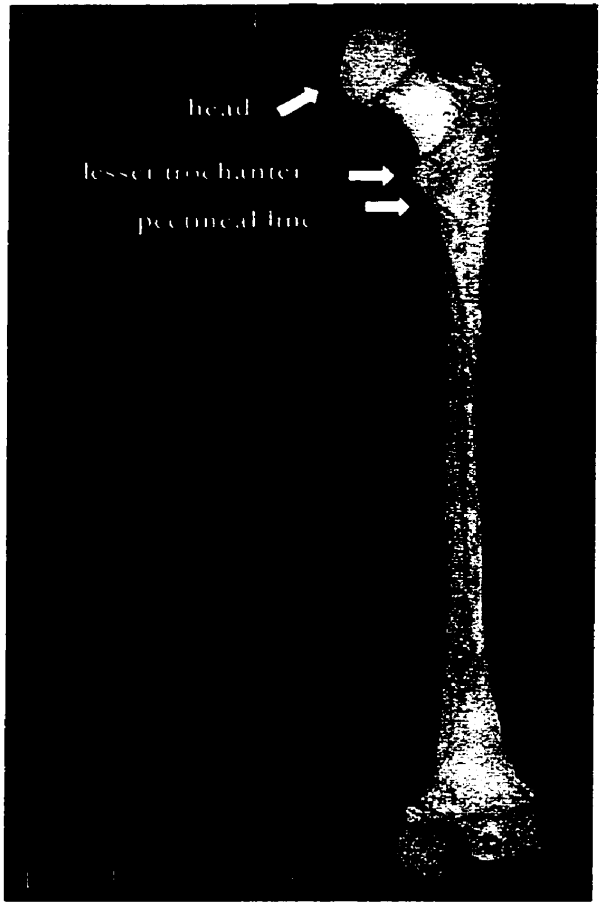
[11] See Baker, Gill & Kieffer (1990), "Race and Sex Determination from the Intercondylar Notch of the Distal Femur."

[12] See Gilbert & Gill (1990), "A Metric Technique for Identifying American Indian Femora."

[13] The total of 19 femora comprising the "Indian" group include 15 femora from the Ontario Amerindian population and the total represents the addition of 4 femora from the B.C. Interior population, which were limited by availability. If racial categorizations as used by Baker, Gill & Kieffer and Gilbert & Gill are to be shown as reliable, averages for the Ontario Amerindian population should remain relatively constant even with the addition of the femora from the B.C. Interior population, since the averages should represent typical results that are characteristic of all Amerindian populations.

Much of the research on ancestral differences in the postcranial skeleton has focused on the femur, perhaps because it allows for a determination to be made not only between individuals of European and African ancestry, but also considers Amerindians. A study of proximal femoral shaft diameters by Gilbert & Gill (1990) was undertaken in order to quantify visual differences in the femur between groups of different ancestry. The differences that can be observed are an oval or flattened cross-section below the lesser trochanter of the femur, a medial or lateral ridging, and a general angularity of the region, which are typical of Amerindians (Gilbert & Gill 1990). The lesser trochanter of the femur provides the distal attachment the iliopsoas muscle at the pectineal line of the femur (Figure 20), which allows for adduction and hip flexion, as well as in stabilisation of the hip joint. In order to quantify these observations, Gilbert and Gill utilised the subtrochanteric anterior-posterior diameter and the mediolateral diameter of the femur.

Figure 20 – *Posterior View of Right Femur*
(From Kappelman *et al.* 2000).



The subtrochanteric anterior-posterior diameter is measured on the femoral shaft just below the lesser trochanter while the mediolateral diameter can be taken simply with a ninety-degree rotation (in the same position) of the calipers used for measuring the anterior-posterior diameter. The results of this study suggest an accuracy in ancestral determination of 78-85%. Table 11 presents the results from the CMC study, in which both measurements are shown separately, as well as the average values for the platymeric index, which is calculated by dividing the mediolateral diameter into the anterior-posterior diameter and multiplying the resulting value by 100. The results show very little variation in the actual measurements, occurring within the range of standard variation. The values for the platymeric index show a more distinctive pattern between the European and Amerindian assemblages, but stay within the range of the standard variation of the Amerindian populations. Therefore, these results should be considered inconclusive on the basis of the CMC study.

One of the most newly recognised postcranial traits in which a determination of ancestry can be made is through the intercondylar notch of the distal femur, which has generally been overlooked. An introductory study by Baker, Gill & Kieffer (1990) was undertaken to determine ancestry through metric observation of the intercondylar notch, but also to investigate the possibility of a proposed pathological relationship between some types of intercondylar notch shapes and a propensity for injuries to the anterior cruciate ligament. This technique requires only a very simple measurement of the maximum height of the intercondylar notch by placing the condyles of the distal femur on the flat surface of a table and measuring the vertical distance from the tabletop to the deepest point of the notch (see Figure 21). Although Amerindians were not included in Baker, Gill & Kieffer's original study, the authors found that "Negroids" generally have a measurement above 33.2 mm, while "Caucasoids" usually measure under 30.4 mm, with measurements falling between these sections being inconclusive. The authors claim an accuracy of 76.0-82.5% in determining ancestry using this technique. The results of the present study show that all of the means obtained for each of the three regional groups were similar (30.6 mm – 31.2 mm), falling within the range of standard deviation for the entire assemblage.

The differences that exist in the intercondylar notch of the distal femur can be attributed to at least two different morphological conditions. The first is the overall size of the femur, which increases the intercondylar height proportionally with the size of the bone. The measures of femoral length and head diameter that are included in Table 11 demonstrate a lack of significant variation between the Quebec European population and the Amerindian populations, with very little difference in the average and low standard deviations. Interestingly, the means for femoral length in the Ontario Amerindian assemblage changed quite dramatically with the addition of only four more femora from the B.C. Interior assemblage, demonstrating great regional variation in stature and limb proportions among aboriginal populations in Canada.

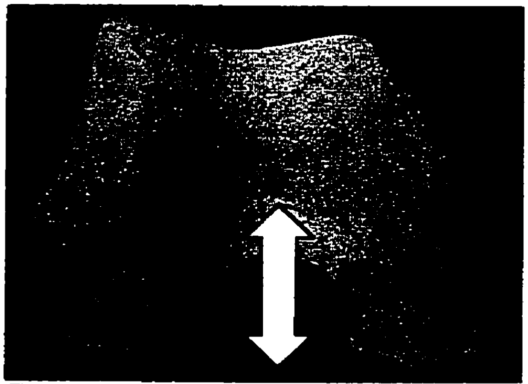


Figure 21 – *Intercondylar Notch of the Distal Femur* (From Kappelman *et al.* 2000).

Discussion

From the results of both the non-metric trait analysis and the anthropometric studies, clear advantages can be claimed from the observation of discrete (non-metric or non-adaptive) traits. Through the study of trait expression, the anthropologist is, in most cases, able to quickly gather a great deal of information from the skull of an individual – sex, age and ancestry (Rhine 1990:9). But in this respect, ancestry and "race" are not words that are simply interchangeable. Referring to the results of the non-metric trait analysis as presented in Table 3, it can easily be seen that the expression of most traits varies widely between regional or micro-geographic groups, often even more so than between groups that have traditionally been considered "races." It has long been contended that most physical variation (approximate 94%) lies within so-called racial groupings, while conventional geographic "racial" groupings only differ from one another in about 6% of their genes (AAPA 1998, Templeton 1998). Therefore, ancestry refers not only to the relation of an individual or micro-geographic group to larger geographical grouping (typically considered "races"), but to the relationship and distance of the micro-geographical groups to each other, drawing a much more accurate picture of the spread of human diversity by geographic distance as well as social factors.

In order to draw significant conclusions about the use of non-metric variants, a true appreciation for their meaning must first be developed. A distinction must be made between traits that are principally determined by natural selection (through sexual reproduction) and those genetic indicators that are shared because of regional proximity (Brace *et al.* 1993:18). Non-metric variants are valuable indicators of ancestral relation and biological distance between populations because they allow for a measure of "divergence in the details of inherited but adaptively trivial features between populations that ultimately stem from the same source [that] will be strictly proportional to the time that has elapsed since they shared a common ancestor" (Brace *et al.* 1993:4). Although these genetically determined variants are most often labelled as non-metric, discrete or discontinuous, they can be best represented by the term "epigenetic." Epigenetic refers to these "intrinsically innocuous minor skeletal variants" that are determined by a number of genes acting additively. The genotypic distribution leads to the manifestation of phenotypic alternatives or variants, rather than a continuously distributed character (Hauser & De Stefano 1989:1). It should also be noted that few sex differences have been demonstrated in occurrences of discrete traits (Hauser & De Stefano 1989:9; Cybulski 1992:121), whereas adaptive traits differ greatly by sex according to overall body proportions.

From the results given in Table 2, there is high variability between Amerindian groups in the expression of a number of epigenetic traits: venous markings (22.0% – 60.0%), malar tubercle (44.4% - 91.7%), zygomatic posterior tubercle (68.8% - 100%), incisor shoveling[14] (0% - 100% [all grades of shoveling combined]), incisor rotation (0% - 100%) and the zygomaticomaxillary suture (0% - 20.0% curved, 80.0% - 100% angled). These variations are often as interesting to the researcher if not more significant than the comparison of averages between larger geographical groupings such as Amerindians and Europeans or European descendants.

In addition to the notable variations in epigenetic traits by populations according to biological distance, qualitative analysis also allows for the observation of numerous other important indicators of group identity beyond genetic influence, such as paleopathology and cultural alterations. Observations of paleopathology such as tooth wear patterns may provide a telling indicator of health status, which often reflects upon social status (see Plate 3c). In reference to the entire CMC assemblage used in the non-metric analysis of this study, heavy dental wear was typical of Amerindian groups resulting from a diet including large amounts of grit and grains. Such wear may also be the result of using the teeth as a "tool" for holding, carrying, working furs etc. In his study of British Columbia Amerindian remains, Jerome Cybulski observed that "occlusal wear was generally advanced .... It was not uncommon for individuals to show attrition with secondary dentin response, crowns almost completely worn, or functional roots. In 42 of 712 teeth (5.9%), rapid and severe wear had exposed the pulp chambers" (1992:130). This heavy dental wear is due mainly to the continual reliance on the traditional staples of foods high in proteins and low in carbohydrates, such as meat and fish.

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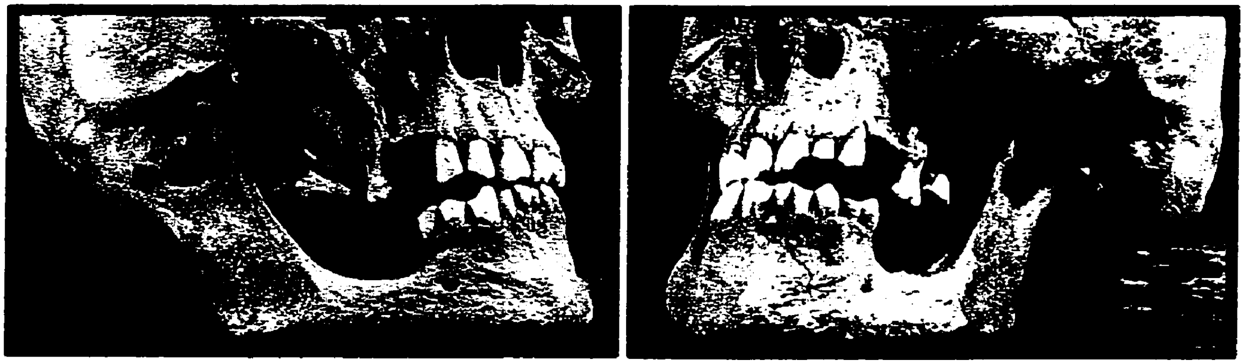
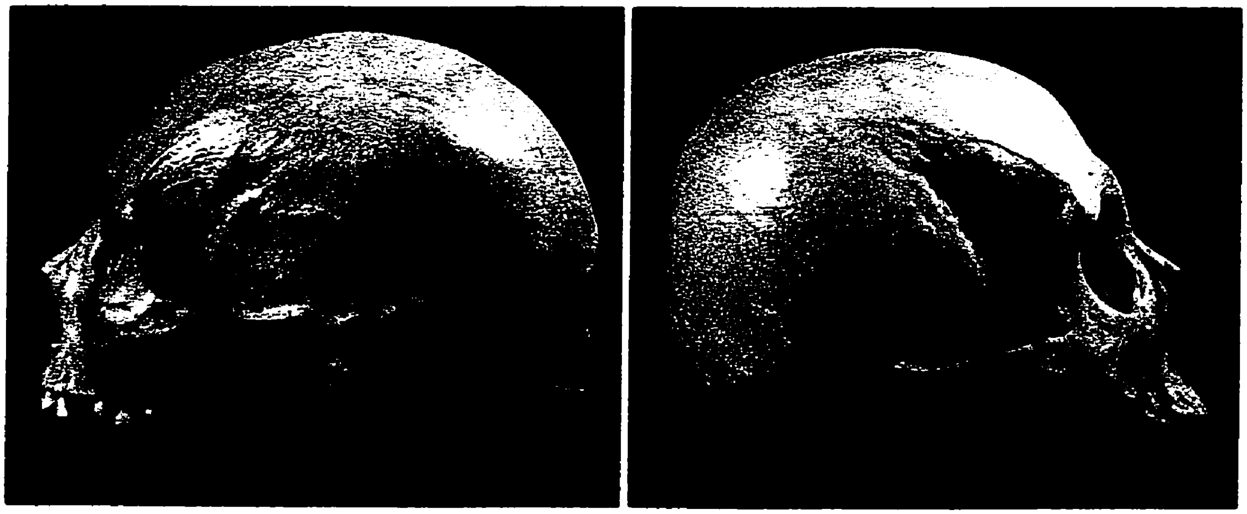
[14] While "incisal shoveling" was used following Rhine (1990) in the craniofacial analysis section of this chapter, the preferred terminology is "incisor shoveling," which will be used from this point forward.

Plate 3

Cultural Alterations



a) Pipesmoker Toothwear



Normal Occipital Protrusion b) Cranial Deformation *Occipital Flattening*

c) Dental Wear Patterns

On the other hand, Cybulski (1991:68) reported that the European remains showed heavy crowding of the teeth, congenitally missing or impacted teeth or teeth reduced in size or peg shaped. In Cybulski's study of the Quebec remains, over 90% of 45 individuals with intact dentition had decayed or missing teeth, or alveolar abscesses (Cybulski 1991:71). Thus, paleopathology can be a very useful indicator of specific ethnic or ancestral affiliation, when considered along with morphological features.

Among the most recognizable of culturally influenced deformations are those of the crania, which include flattening of the occipital protrusion caused by cradleboarding (see Plate 3b), or annular wrapping, which results in a conical shape of the skull. The Quebec remains also showed physical alteration of the dentition due to habitual practices, mainly pipesmoker toothwear (see Plate 3a; Cybulski 1991:78). Although pipesmoker Toothwear is not exclusive to Europeans or European descendants, such alterations may provide valuable evidence for particular ethnic group affiliation. Cybulski (1999:5) also explains that intentional "trauma provides more social and cultural information about earlier populations than other forms of skeletal pathology ... It is vital that the investigator consider potential patterns of occurrence based on anatomical distribution, age at death and sex, as well as non-osteological findings in the archaeological environment." Thus, considering paleopathology, cultural alterations and skeletal morphology together can give a more accurate account of how an individual may fit into a given population.

Appendix J includes a small number of research notes containing general comments collected while analysing the non-metric sample. These notes show that there are a number of easily observable traits that can be used to differentiate specific populations from larger groups in terms of micro-geographic groupings beyond the traits recorded using Rhine's method. With many traits being specific to certain geographic, cultural and ancestral groups (in this case, aboriginal nations), a simple question of racial categorization is: does classifying a person in terms of a broad and highly variable scheme races actually provide any useful information? Particularly in the forensic context, it would seem highly illogical and inaccurate to label an individual or group by "race" when there may be specific indicators of local geographic or ethnic affiliation.

Adaptive traits also allow experienced anthropologists to gain an appreciation of the larger geographic ancestry of an individual through simple observation. The overall shape of the skull may be due in large part to the changes in the midface caused by diet (which is traditionally a correlate of climate and geography) and cold or heat adaptation (directly effecting the size of the sinuses and nasal opening), resulting in marked differences nasal form, prognathism and the nasal sill, the shape and profile of the chin, mandible and dental (palatal) arcade, orbital shape and may also be a factor in the keeling of the skull in Amerindians. These traits, however, show great variation as well among regional groups, particularly over geographic distance. As a result, it may be difficult to place one or a number of traits in a specific category or grade of expression. When analysing many of the Amerindian remains in this study, it was difficult to determine at times whether the orbit shape was rounded or sloping and whether the dental arcade shape was elliptic or parabolic. Even Rhine (1990:18) states:

> In many regards, nonmetric analysis may be seen as less satisfactory than metric. The definition of a trait is always a difficult matter. At what point along a continuum of variation does palatal shape become 'elliptic' rather than 'parabolic' or 'hyperbolic?' Indeed, a recent paper suggests that this criterion in isolation is a weak one (Curran and Byers 1987)[15]. Of course, traits should not be used singly ... Moreover, does observer B evaluate those shapes in precisely

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[15] Rhine is referring to a paper by Bryan Curran & Steven Byers, "Determination of Race from Dimensions of the Maxillary Dental Arcade," presented at the 39th annual (1997) meeting of the American Academy of Forensic Sciences in San Diego, California.

> the same way as observer A? It would seem that the surest way to impart the limits of any category is by directed experience.

A particular problem with Rhine's method, however, is that when dealing with the shape of the orbits, "sloping" and "round" are not alternative variants of shape. Similarly, the shapes used by Rhine to describe palatal shape do not necessarily follow those of other popular methodologies.

Again, it should be emphasized that these adaptive traits can give a very good general impression of geographic origin to a skilled anthropologist when taken as a whole, but it is the epigenetic and cultural indicators that can lead to a positive identification by much more specific criteria. However, it should be recognized that the presence of both genetic and cultural indicators must also be considered as a whole (traits should not be considered singly) – simply providing pieces of a puzzle. These traits must also be placed within the specific context of the archaeological burial or forensic crime scene. An individual can then be placed within a specific cultural or occupational group within a larger geographical framework.

Adaptive traits can be measured empirically through metric analysis, which serves to quantify both inherited and adaptive affects on skeletal anatomy due to inherited and environmental factors. There is little to be said about the results of the metric analyses in this study, since they were in most part inconclusive. That is, no specific patterns were noticeable from the results and the calculations obtained generally did not match those of the original studies. The results of the interorbital features method do not allow for any determination of ancestry, nor do they show any specific patterns of variability, as the results for each measurement were very similar for all groups. Rhine (1990:18) also notes that the subjective method of non-metric trait analysis is also typical of anthropometrics: "working from unfamiliar landmarks, one may miscalculate an index in which one lacks experience. Even with well established landmarks and well defined criteria, the potential for measurement error due to environmental conditions and interobserver error has been clearly demonstrated." Using the interorbital features method, problems were experienced when attempting to locate and measure the alpha cord. Another problem may be due to the suggestion of the authors that the measurements be taken with a sinometer, which was unavailable for the present research project. The measurements were taken with regular sliding calipers with the expectation that similar results could still be obtained.

Measurements of the cranial base do show a specific pattern. The results given in Table 10 demonstrate that the Quebec remains had an average occipital condyle length of 27.1 mm, whereas the measurements for the Amerindian groups in the study ranged from 24.8-26.4 mm (25.9 mm average). On average, the Amerindian remains showed a larger width of occipital condyle, minimum distance between condyles, maximum distance between condyles, length of foramen magnum and the largest difference exists between mean measurements of the maximum interior distance between condyles (43.5 mm) and those of the Quebec European sample (38.6 mm). What can be deduced from these results is that on average, Amerindians posses wider and broader occipital condyles and a longer foramen magnum. However, when these measurements were inserted into Holland's (1986; Church 1995) regression equations, highly variable results were obtained, leading to the suggestion that such equations were not useful.

The assessment of bifidity in the cervical vertebra offers a non-metric method for studying epigenetic variation of the spinal column. The result confirmed that bifidity was a common feature in European descendants at the C3, C4 and C5 levels. However, no significant pattern was observed that would allow for an assessment of ancestry beyond the exclusion from European ancestry due to the high expression of bifidity at C3-C5.

The results of the metric analysis of the femoral area as presented in Table 11 demonstrate that there are observable differences in this area of the anatomy. However, it should be noted that the differences in femoral head diameter seen between the Amerindian and the European remains vary only slightly, but proportionately with femoral length – the greater the length of the femur, the larger the diameter of the femoral head. The relationship between femoral length and platymeric index is unknown, as the results for this measure were quite interesting when compared to overall femoral length. The insertion of four specimens from the B.C. Interior group, which had a relatively short femoral length and relatively high platymeric index, served to reduce the average femoral length of the sample from 462.8 mm to 454.7 mm and the platymeric index increased from 72.7 to 73.8. The results of the measurement of the intercondylar notch demonstrate that femoral curvature, regardless of overall length, remains relatively stable amongst local ancestral groupings. The difference in results for this measurement between each of the regional Amerindian groups and the total Amerindian assemblage demonstrates this stability, but the results of the entire sample (Amerindian total – 31.2 mm, European – 30.6%) do not suggest that a particular sectioning point for determining ancestral relation can be established.

Estimates of stature of the Quebec remains were determined from the long bones by Jerome Cybulski (1991:69), using 30 males that were sufficiently complete for measurements of long bone length. The males ranged in height from 159.5 cm to 185.5 cm, with an average of 173.3 cm. Although all of the individuals in this collection were of European descent, and determined to have a prevalence of "Caucasoid" traits (Cybulski 1991:61, 67-8), the 26 cm range in height estimates can be largely attributed to a geographic diversity within the European boundaries. The Quebec assemblage consists of New England Protestant prisoners held by the French between 1746 and 1747, following the outbreak of war between England

and France known as the War of the Austrian succession (1744-1748)(Cybulski 1991:61-4). The prisoners were mainly of English, Scottish, Irish and Dutch descent, with one Portuguese, one Norwegian and possibly one German among the deceased in the collection.[16]

Comparing the CMC Amerindian assemblages used in the metric analysis, the Ontario remains had an average femoral length of 462.8 mm, which is comparable with the European average of 461.7 mm. However, the standard deviation of the femoral length of the Ontario Amerindian sample was 15.8 mm, approximately half that of the Quebec European remains. Stature estimates have not been obtained for the Ontario Amerindian group, but according to the proportionality of femoral length as compared to the European sample, the average stature should be comparable to the 173.3 cm (1732.6 mm) European average. Significant variation in the overall Amerindian assemblage can be seen with the addition of the four femora from the B.C. Interior sample, which had a mean length of 424.3 mm and a standard deviation of 22.3 mm. Cybulski's (1992:114) data on male stature in historical Amerindian skeletal samples from the Northwest coast of British Columbia gives an estimate of stature of 163.3 cm with a standard deviation of 4.4 cm. It can be seen that while the Ontario Amerindian remains were of similar stature to the European remains, the coastal British Columbia remains were significantly shorter. When the B.C. Interior remains were added to the Ontario sample, the overall Amerindian average became 454.7 cm, which does not represent a true result.

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[16] According to Piédalue and Cybulski (1997:124), "The eventual discovery of a diary written by Captain William Pote, a prisoner at Quebec between March 1746 and July 1747, provided us with the most credible hypothesis as to the origin of the remains. Three similar diaries, kept by other prisoners, were subsequently found."

Summary and Conclusions

Perhaps the most important critique of anthropometric methods of "racial" analysis that have been used in this study is that they primarily provide the physical anthropologist with a means of determining between "Whites" and "Blacks" in a forensic context. It becomes increasingly clear through osteological analysis that these ideal categories do not exist, and yet at the same time they exclude an understanding of the variation between even the other so-called races (i.e. Asian or "Mongoloid," Australian Aborigine or "Australoid," and North American aboriginal or "Amerind"). While it is true that humans can be divided into generalized groups according to geography, the fact remains that anthropologists tend to use the broadest criteria to divide humans into a very small number of groups. Even though Stanley Garn provided a model in which humans could be divided into nine races by geographic distribution (see Chapter 2), most anthropologists that adhere to racial categorization will use the three to six-race models – the smaller the number of races used, the greater the accuracy in determination of ancestral origins. This suggests that the observation of "race" in skeletal materials is an artefact of classificatory schemes.

The results of this osteological analysis demonstrate that human variation is largely misunderstood. Non-metric variation can be a very useful indicator of ancestry, both on a larger geographic scale and in terms of local groups. However, being skilled at this type of analysis comes only from dealing with a wide range of skeletal remains from various parts of the world in order to appreciate the true diversity of human. From this understanding, the physical anthropologist can then specialize on a particular area of the world, in which they may be able to provide specific information about local groups in a given geographic area (e.g. Jerome Cybulski's studies of Amerindian groups of the Northwest coast of British Columbia). Metric analysis is yet another issue. The results obtained here for the measure of the midface were highly variable and inconclusive, and from this I draw fault in the method. In order for a particular methodology to be usefully employed and provide valuable information about the specimens that are being studied, any researcher must be able to replicate it easily. Using highly subjective skeletal landmarks only serves to decrease the value of a particular method, as the results will vary substantially by researcher. Also, the results of any metric measure can be greatly manipulated by a number of different discriminant functions and regression equations. Some of these calculations can be useful, but on the most part the raw data or the calculation of simple indices should make significant patterns of variation self-evident if they exist, rather than through the manipulation of data which may serve to overemphasize certain variables.

Sample or assemblage size is of the utmost importance in attempting to provide population statistics. For example, Rhine's non-metric analysis was based on a sample size of 87, with 68 (78%) of the sample representing the "Caucasoid" grouping. Such a small sample can hardly represent all of the diversity of any population, large or local. Regardless of sample size, however, if large geographical or "racial" comparisons are to be made, they must first be presented in their local context in order to demonstrate the extent of variability within larger groups. The failure of this particular study to provide conclusive results is based on such things as the sample size and the small number of regional groups. In order for future research to reveal particular patterns of ancestral relationship and geographic adaptation, numerous and diverse populations will have to included, with statistically significant numbers of individuals for each regional population. Such future research will be pursued at the doctoral level.

Interpreting the results of this analysis raises a number of questions concerning population-based studies and human variation. First, if there are adaptive traits that allow the anthropologist to determine geographical origin, then why should we abandon racial classification? In this regard, there are a number of shared traits that are observable through non-metric analysis, which give an indication of genetic ancestry. However, through time, expanding gene pools and more extensive geographic group interbreeding introduce new traits and decrease the frequency of expression of existing traits. Also, selective forces are constantly changing the morphology of the human body. Therefore, it must be acknowledged that populations should be studied in specific reference to local groups and temporal periods, as both work to alter the common features of larger geographic groups. As large and small populations have changed and adapted to diverse climates since the emergence of *Homo sapiens*, these large geographic groups have become far too variable to be considered "races." Adaptive traits that are distributed in conjunction with the graded intensity of their controlling selective forces are poor indicators of population relationship (Darwin 1869; Brace 1993). This is because, as asserted by Frank Livingstone (1962:269), "There are no races, only clines."

- CHAPTER 5 -

REDEFINING RACE – MODERN GENETICS AND HUMAN DIVERSITY: A SYNTHETIC APPROACH

Building upon the arguments presented in the previous chapters, which focused on the historical development of scientific racism and popular social thought about "race," and demonstrating the problematic nature of traditional anthropometric and anthroposcopic methods, this chapter will focus on modern interpretations of human variation. An appropriate place to begin such a discussion is with what "race" has come to mean scientifically. That there is no agreeable definition of what constitutes a "race" is most likely based on the problematic etymological nature of the word itself. When Buffon first introduced the word into human taxonomy in 1749, he made a direct comparison between the controlled breeding of livestock and human reproduction. On breeding and viewing humankind as analogous to a domesticate, Darwin (1871) argued,

> Those naturalists, on the other hand, who admit the principle of evolution, and this is now admitted by the majority of rising men, will feel no doubt that all the races of man are descended from a single primitive stock; whether or not they may think fit to designate the races as distinct species, for the sake of expressing their amount of difference. With our domestic animals the question whether the various races have arisen from one or more species is somewhat different. Although it may be admitted that all the races, as well as all the natural species within the same genus, have sprung from the same primitive stock, yet it is a fit subject for discussion, whether all the domestic races of the dog, for instance, have acquired their present amount of difference since some one species was first domesticated by man; or whether they owe some of their characters to inheritance from distinct species, which had already been differentiated in a state of nature. With man no such question can arise, for he cannot be said to have been domesticated at any particular period.

It seems improbable that humans have ever fit within even historical definitions of either "race" or "breed," which have been used to refer to familial relationship, class, language and national origin, as well as to the notion of controlled or selective mating. As discussed in

Chapters 1 and 2, there has long been great confusion about the relationship of biology, class, religion and nation, morality and intelligence, generally regarded as "civilization." These definitions can be further problematized by the argument that the mating in historic and prehistoric times was largely limited by geographic boundaries, but humans have traditionally relied on their mobility for survival. According to the Milford Wolpoff's "multiregional hypothesis" of human evolution, there has always been some degree of genetic exchange between large geographic groups through interbreeding. Therefore, ancestral groups created by geographic separation throughout early human (pre)history, cannot be considered exclusive, as they were almost certainly connected by gene flow through interbreeding wherever possible.

Progressive definitions of "race" in modern scientific dictionaries recognize the term as having different meanings according to scientific discipline. For example, the *Academic Press Dictionary of Science and Technology* (2000) defines "race" in biological terms as a subspecies, but the anthropological definition is based on observable geographic variability, and recognizes that it is "now a disputed term that is not regarded as technically precise." However, the same dictionary also defines "breed" in genetic terms as "artificially maintained." In 1932, geneticist Lancelot Hogben argued that in order to understand the concept, "race" must be discussed in terms of its multiple meanings:

> Geneticists believe that anthropologists have decided what a race is. Ethnologists assume that their classifications embody principles which genetic science has proved to be correct. Politicians believe that their prejudices have the sanction of genetic laws and the findings of physical anthropology to sustain them. It is therefore of some importance to examine how far the concepts of race employed by the geneticist, the physical anthropologist, and the social philosopher correspond (p. 472)

One must come to an appreciation of the problems of the historical notion of "race" that have persisted to the present day and the inherently political nature of human differentiation, the basis for numerous conceptual interpretations in the social and pure sciences, as well as within popular discourse. George Gaylord Simpson (1953:268) provided one of the most appropriate explanations for the persistence of racial discourse: "A word for which everyone has a different definition, usually unstated, ceases to serve the function of communication and its use results in futile arguments about nothing. There is also a sort of Gresham's Law for words; redefine them as we will, their worst or most extreme meaning is almost certain to remain current and to tend to drive out the meaning we might prefer."

The paradigmatic shift that occurred with the acceptance of Darwinian theory and the rise of Mendelian genetics in the late nineteenth and early part of the twentieth century led to a re-evaluation of Linnaean taxonomy, and the result of this "evolutionary synthesis" (combining natural selection and genetics) was the "new systematics." The greater interest in infraspecific categories that resulted from the new systematics led to numerous works on the concepts of subspecies and geographical races (Ehrlich & Holm 1964), which Ernst Mayr (1942:106) defined as follows: "the subspecies, or geographic race, is a geographically localized subdivision of the species, which differs genetically and taxonomically from other subdivisions of the species." It would become clear in the 1950s however, that "subspecies" were not necessarily evolutionary units, and were of a more subjective nature. Darwin's work has shown that classificatory thought does not work in a temporal dimension. Classification provides a relatively static and rigid system of ordering organisms that does not account for evolutionary change. Authors such as Stephen Jay Gould (1992) have attempted to reconcile this disparity by arguing that the species designation is in fact an objective categorization, clearly definable at any moment of time and "like higher taxa, subspecies are also partly objective but partly based on human decision"(Gould 1992). However, the inability to reconcile how humans fit in this scheme was best elaborated by von Haller in 1768: "Nature has linked her kinds into a net, not into a chain; men are incapable of following anything but a chain since they cannot express in words more than one thing at a time" (English translation from Ehrlich & Holm 1964:507)

This problem of language is a basic characteristic of the arbitrary nature of classification. Not only is language the limiting factor to how we interact with each other and our understanding of the world, on a much smaller scale, the misuse of terminology leads to great confusion and inaccuracy in the sciences. In terms of modern human diversity and the recent advances in molecular genetics, "An extensive refinement of terminology is required if the classifications of physical anthropology are to be brought into harmony with genetic principles, and this will necessitate a more modest estimate of the theoretical conclusions deducible from purely anatomical data"(Hogben 1932:476). In the mid nineteenth century, with the evolutionary synthesis and the rise of eugenics in light of Nazi Holocaust and World War II, Ashley Montagu emerged as the champion of the anti-race movement in the sciences. He argued,

> the indictment against the older, or classical, anthropological conception of 'race' is that: (1) it is artificial, (2) it does not correspond with the facts, (3) it leads to confusion and the perpetuation of error, and finally, (4) for all these reasons it is meaningless, or rather, more accurately, such meaning as it possesses is false. Based as it is on unexamined facts and unjustifiable generalizations, it were better that the term 'race,' being so weighted down with false meaning, be dropped altogether from the vocabulary (1964:71).

But "race" has not been dropped from either the scholarly or popular vocabulary. Despite numerous attempts by anthropologists and geneticists to provide a clear definition of what race is, how racial classification is arbitrary and humans are fundamentally equal, race persists as the dominant means for discrimination against certain groups of people. "Race implies difference, difference implies superiority, and superiority leads to predominance"[1] (Ehrlich & Holm 1953:495). While difference does not necessarily imply unequal social relationships, it forms the basis from which such relationships develop.

"Race" in the Age of Population Genetics

The concept of race has long been regarded as non-existent from a genetic standpoint. Many geneticists (Cavalli-Sforza *et al.* 1994; Cavalli-Sforza & Cavalli-Sforza 1995; Dunn & Dobzhansky 1946; Erlich & Holm 1953; Hiernaux 1956; Hogben 1941; Templeton 1998) have provided valuable criticisms of the methods of physical anthropology and racial taxonomy that serve to perpetuate the notion that humans fall into objective racial categories. The standard conclusion of these geneticists is that "genetics shows us that [racial] typology must be completely removed from our thinking if we are to progress"(Washburn 1963:523). The dramatic increase in the human population from as few as five million people before the rise of agriculture to the six billion people currently inhabiting the earth is not due to evolutionary progress, but to technology. According to Washburn (1963), the conditions under which the "races" evolved no longer exist, having been replaced by new causes of mutation, new kinds of selection, vast migration and interaction (see Cavalli-Sforza *et al* 1994; Cavalli-Sforza & Cavalli-Sforza 1995). The great increase in population numbers and distribution is thus the result of cultural changes.

If the current populations of the world are the result of cultural groups settling in particular geographic areas, connected by migrating splinter groups, then the processes that anthropologists and geneticists analyse are not evolutionary (macro-evolution) as typically

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[1] This quote was taken from a speech given by Benjamin Disraeli to the British House of Commons on February 1, 1849.

considered, but micro-evolutionary. This is an important distinction to make because we are not conceptualizing a large-scale biological adaptation that causes substantial structural change, such as speciation. Rather, the process of micro-evolution is a small-scale adaptation to a specific environment – something like a biological "fine-tuning." These are the differences, both discrete and continuous, that anthropologists and geneticists seek to classify within racial taxonomy. But these classifications rely on the calculation of average measurements and trait expressions; the problems of such averaging was explained by geneticists Dunn and Dobzhansky (1946:97) in relation to the classification scheme of Nordic, Alpine and Mediterranean types:

> The averages may describe very well the ideal Nordic or Alpine, but ideals and averages are abstractions, and it is just a luck accident if the person whose race we wish to determine happens to have all his traits coincide exactly with the averages for any one race...If we make many measurements and calculate averages for all of them [Nordic, Alpine, and Mediterranean] we may find ourselves in the predicament that no actually existing man or woman of any race anywhere conforms to the race ideal.

This is consistent with the conclusions that were reached with the analysis of human skeletal remains in Chapter 4.

In response to the criticisms of "pro-race" physical anthropologists by geneticists during the mid-twentieth century, W.M. Krogman, a prominent physical anthropologist retorted in 1943 (p. 104):

> The term race as we use it today is a recognition that group differences do in fact exist, it does not imply, scientifically and biologically, homogeneity such as demanded by geneticists. When our knowledge of human heredity enables us to classify the peoples of the worlds genotypically we will gladly accept that classification – we will substitute it for the one we now have. Until then, and with full and complete recognition of all of its many inadequacies we will use the system at hand.

A major problem with this is that as genetic explanations of human diversity become more complex and complete, there has been little appreciable change in the methodology of the anthropological study of populations. With the advancements of genetics in the early part of the last century, the taxonomies that were developed out of convenience are no longer convenient, but only serve to perpetuate inaccuracies and prejudice.

The basic genetic understanding of human diversity at the middle of the century was based upon three main principles (Ehrlich & Holm 1953:503):

1. There is geographic variation in numerous human phenotypic traits.
2. The geographic variation has a largely genetic basis.
3. Variation in many instances cuts across cultural lines.

Within these principles, there are two main factors that determine the characteristics of an individual: heredity and environment. In this strictly genotypic view of variation, phenotypic constitution is disregarded as including non-inherited and non-transmittable environmentally influenced traits. Jean Hiernaux (1964:487) explains the problems of phenotype in anthropological taxonomies:

> Suppose two groups of people have identical gene pools, but differ phenotypically because of the imprint of different environments. Would it be useful to call them races A and B, knowing that by reversing the environmental conditions race A would become race B and vice versa? A negative answer seems evident to me as to many others: in order to be useful, a concept of race must be genetical.

Ashley Montagu (1964:74) thus attempted to use the "genetical theory of 'race'" to redefine racial taxonomy by emphasizing ethnic group differences rather than continuing to use traditional terminology. Montagu presented four fundamental postulates to support his new system:

1. that the original ancestral species population was genetically relatively homogenous;
2. that by migration away from this original ancestral group, individual families became dispersed over the earth;
3. that some of the groups thus dispersed became geographically isolated from one another and remained so isolated for more or less considerable periods of time;
4. that upon all these isolated groups several of the following factors came into play as conditions leading to evolutionary change:

a) the genetic drift or inherent variability of the genotypic materials composing each individual member of the group and,
b) physical change in the action of a gene associated, in a partial manner, with a particular character, that is, gene mutation.

Although it is not unproblematic, using ethnicity as a means for identifying humans by specific population rather than by large geographic ancestral groups or "races" may be useful in developing alternative methods of categorization, as ethnicity can be characterized as any population with shared communal characteristics: linguistic, ancestral, regional, religious, etc. (Bullock, Stallybrass & Trombley 1988:285). These are the causal factors of distinctive identity at the regional or micro level. Even though Montagu's focus on ethnic groups seemed in tune with the understanding of genetics of the day, it failed to gain momentum, and few anthropologists followed suit, continuing to see diversity through the persistent racial template.

Genes and Natural Selection

Studies of molecular genetics in the latter half of the twentieth century has brought us much closer to understanding the nature of human variability. It is still believed that there are three factors that make populations distinct, but much more specific approximations have been developed in recent times. The three factors, ***mutation***, ***natural selection*** and ***chance***, dictate the way that all populations (plant and animal) adapt to their local environments. Mutations can have three effects on the genetic structure: they can be harmful, causing a negative alteration; neutral, having no effect; or beneficial, improving an organisms ability to adapt to their specific environment. The harmful or beneficial effects of mutation are examples of natural selection, which have great effects on the ability to reproduce and the inheritance of genes (Cavalli-Sforza & Cavalli-Sforza 1995:92). These mutations either can be produced by environmental effects, such as chemical alteration of the genes, or may happen purely by chance (*genetic drift* for example), and these beneficial mutations become the basis for the adaptive processes of microevolution.

Kenneth Kennedy, anthropologist and population biologist, suggests that "living populations do not retain for long their ancestral phenotypic constitution because of the relentless, continuous operation of the selective and random processes which, if adaptive, enhance survival and lead to morphological and physiological changes"(1995:797). It is unknown exactly at what rate and to what degree these adaptive processes occur, but many recent studies show that an appreciable change in continuous traits occurs very rapidly. Jerome Cybulski's study of an eighteenth-century Quebec prison population comprised of European descendants, which was discussed in the previous chapter, demonstrates that the average male height of 173.3 cm was substantially larger than the average of 166.5 cm recorded for men of a contemporary (1752) French garrison. Piédalue and Cybulski (1997:126) explain: "we suspect that this difference might have resulted from the fact that some or most of the prisoners were born in the American colonies rather than in Europe. Some studies on the British-American military of the eighteenth century have shown that soldiers born in America were significantly taller than their Old World counterparts, perhaps due to better living conditions including healthier nutritional intake during formative years." Similar results were presented in Franz Boas's famous work, "Changes in Bodily Form of Descendant of Immigrants"(1910-1913).[2]

Alain Corcos, in *The Myth of Human Races* (1997), explains the issues of environment and geographic adaptation in terms of height, as observed in Boas and Cybulski's results.

> One wonders how many other 'racial' traits are the result of environmental influence. For example, height, a noticeable physical feature, has been considered to be a racial trait, because some humans are taller than others ... It is highly possible that a large genetic component accounts for these differences in height; but one should be cautious about making such generalizations.

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[2] See Boas's collection, *Race, Language and Culture* (1948), pp. 60-75.

> Height should not be considered a 'racial' trait for it undoubtedly has a very large environmental component, as witnessed by the fact that in recent years there has been a rapid increase in average stature all over the world. This rapid change which occurred in two or three generations, was most likely brought on by improved nutrition and acquired immunity to diseases during childhood by vaccination or other means (p. 47).

This brings up many important issues regarding adaptive variations in which humans are actively, and somewhat rapidly, becoming more suited to their immediate environment.

A second example from Corcos is his suggestion that the majority of populations around the world typically have dental overbites; but it is noted that most Eskimo dentitions display the trait of an edge-to-edge meeting of the incisors. He explains,

> This was long assumed to be a 'racial' feature of the Eskimos. It was, therefore, a shock to anthropologists to discover that young Eskimos in the twentieth century had an overbite. The overbite is a very recent development. The edge-to-edge bite was common among our remote ancestors and persisted in England until the eleventh century. It seems, therefore, that the difference between the overbite and the edge-to-edge bite is not hereditary at all but due entirely to the way our teeth are developing (1997:47).

Therefore, it should be recognized that human populations are subject to rapid change, and such geographical influenced selection may also play a role in reshaping non-adaptive traits.

The History and Geography of Human Genes

Homo sapiens is a highly variable species, as were its hominid predecessors. Whether *H. erectus* is a direct ancestor of our present species, as proposed by the "Multiregional Continuity Hypothesis," or whether successive waves of hominids emerged from Africa assimilating or conquering the less-evolved forms, which the "Out of Africa Hypothesis" proposes, it is evident that the result of each scenario is the single origin and high variability of the species. In both evolutionary schemes, a single ancestral form can be traced back to Africa (Brace *et al.* 1993:4), and a subsequent migration spread hominids throughout Europe and Asia, and eventually into Australia and North America, which saw numerous adaptations to a diverse and immense geography. Where genetic drift and mutations did not act quickly enough for natural selection to adapt the body to climate, the advancement of language and culture led to artificial adaptation.

The rules of variation developed by Bergmann and Allen[3] represent a pattern of genetic diversity that is commonly referred to as a "cline." Clinal variation is the graded intensity of adaptive traits according to geographic distance. Thus, genetic distance and geographic distance are highly correlated (Figure 22). Because of the mobility of *Homo sapiens* though evolutionary (pre)history, the selective genetic adaptations to various environments, which were transmitted rapidly due to the *founder effect* and small group size, began to diversify with the increase of overall population and range of habitation on the earth. As humans traversed the globe and populations began to increase exponentially with the development of domesticated crops and livestock, ancestral groups continuously splintered, occupying and adapting (culturally and biologically) to more diverse regional and continental areas, while still maintaining constant gene flow through interbreeding with neighbouring groups (see Cavalli-Sforza & Cavalli-Sforza 1995:106-125).

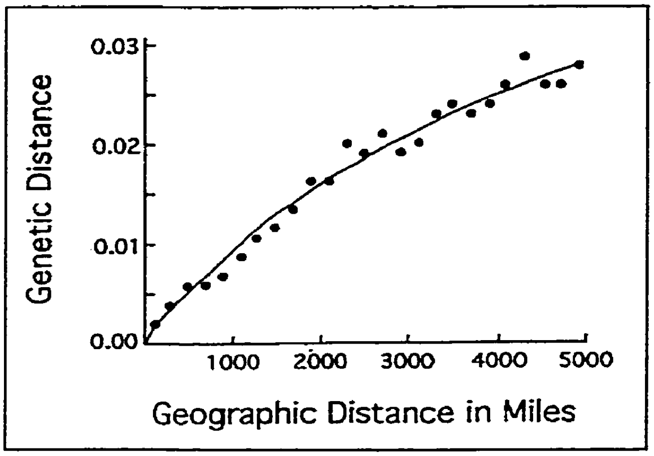

Figure 22 – *Genetic distance and isolation by geographical distance in Human Populations* (from Templeton 1998:639).

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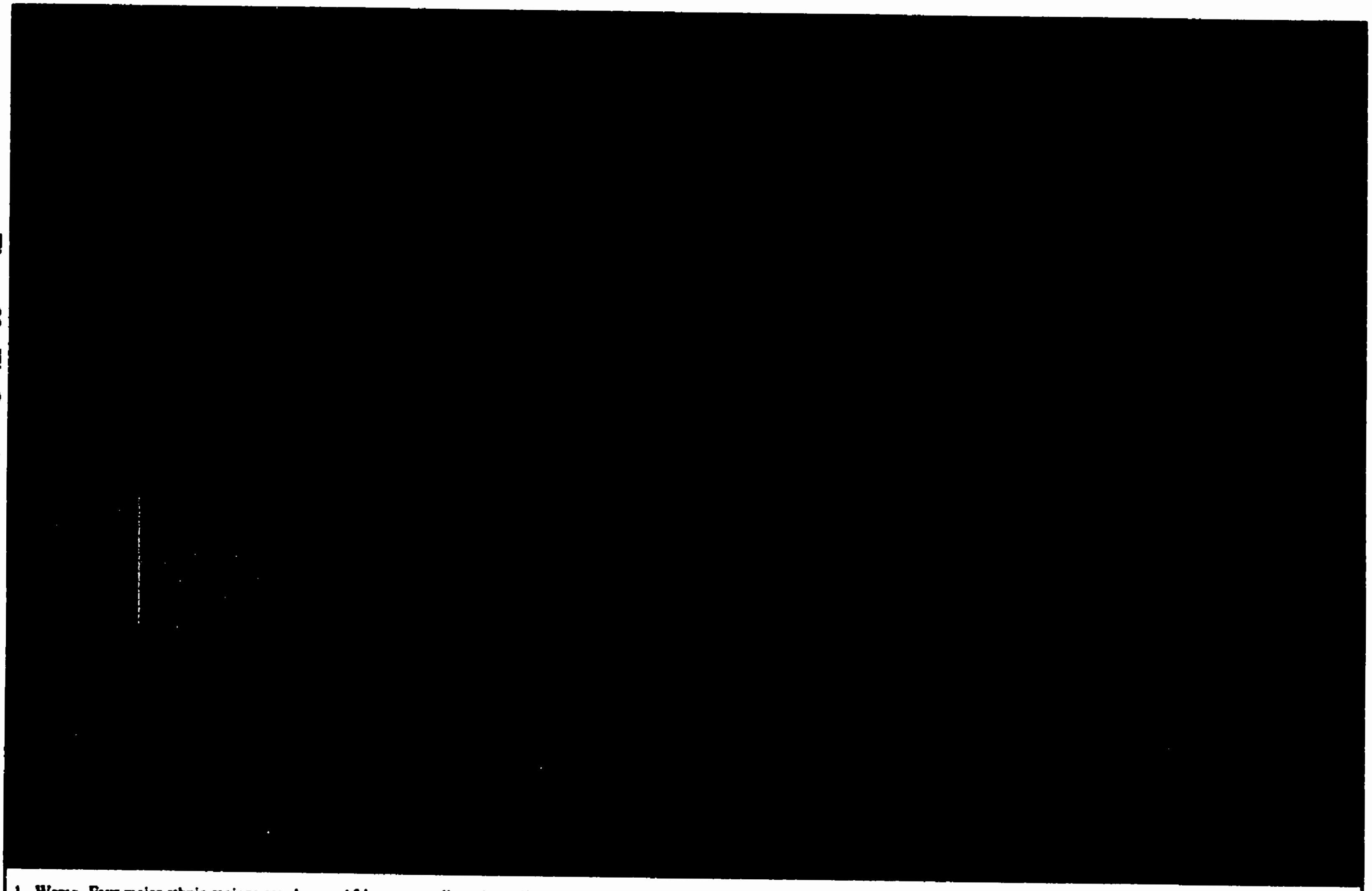
[3] Bergmann's rule explains that in warm-blooded species, as groups move geographically towards more polar (northern) regions, overall body mass is expected to increase. Similarly, Allen's rule explains that as groups move towards warmer (equatorial) geographic areas, the length of the extremities increases. In recent human groups, this clinal variation shows a very strong negative correlation (-.60) between body mass and mean annual temperature. See Holliday & Falsetti (1999); Marks (1995).

In the comprehensive *History and Geography of Human Genes* (1994), population geneticists Luca Cavalli-Sforza, Paolo Menozzi and Alberta Piazza present evidence that there are no notable discontinuities in human genetics that would allow for an accurate classification of the human species into distinct groups (see Figure 23). Featuring more than five hundred maps of numerous allele frequencies from genetic samples of individuals from nearly two thousand communities, the authors presents numerous manipulations of data which confirm four basic premises of human variation (Cavalli-Sforza *et al.* 1994; Subramanian 1995):

1. Individual variation is much larger than group variation.
2. In combination with the fossil record, it can be confirmed that Africa was the birthplace of humanity. Gene frequencies indicate a large genetic difference between present-day Africans and non-Africans.
3. All Europeans are thought to be hybrid populations, with approximately 65% Asian and 35% African genes (attesting to the greater antiquity of African and Asian populations).
4. Indigenous North American populations were found to be divisible into three distinct groups by blood type, representing three separate migrations from Asia.

However, the surprising result of these genetic analyses was that the map of world genetic variation shows Africa on one end of the spectrum and Australian aborigines at the other (Figure 24). What this tells us is that patterns of adaptation do in fact follow the models of clinal variation, with Australian aborigines showing the greatest genetic distance from Africans, but the most similarity in terms of phenotypic constitution. The authors suggest that this is the simple product of generally similar climates in sub-Saharan Africa and the traditional territory of the Australian Aborigines.

The problem that the results of these genetic frequencies create for physical anthropologists is that it they do not match the population distances derived from anthropometric data. Data collected by Harvard anthropologist William W. Howells have been used to test the results of the Cavalli-Sforza *et al.* genetic study (Cavalli-Sforza *et al.* 1994:72; Cavalli-Sforza & Cavalli-Sforza 1995:116-8). Howells consistently grouped Australians and



1. WORLD. Four major ethnic regions are shown. Africans are yellow, Australians red, and Caucasoids green. Mongoloids show the greatest variation retaining some similarities with Europeans on one side (a light brown greenish tinge in middle Siberia) and with Australians on the other (a pinkish color in parts of America and on the way to it). The extensive gradients due to admixtures between Africans and Caucasoids in North Africa, and between Caucasoids and Mongoloids in middle Asia, are clearly visible. (See chapter 2.)

Figure 23 - *The Geographical Distribution of Human Genes.*
(Reproduced with permission from Cavalli-Sforza *et al.* (1994:545).

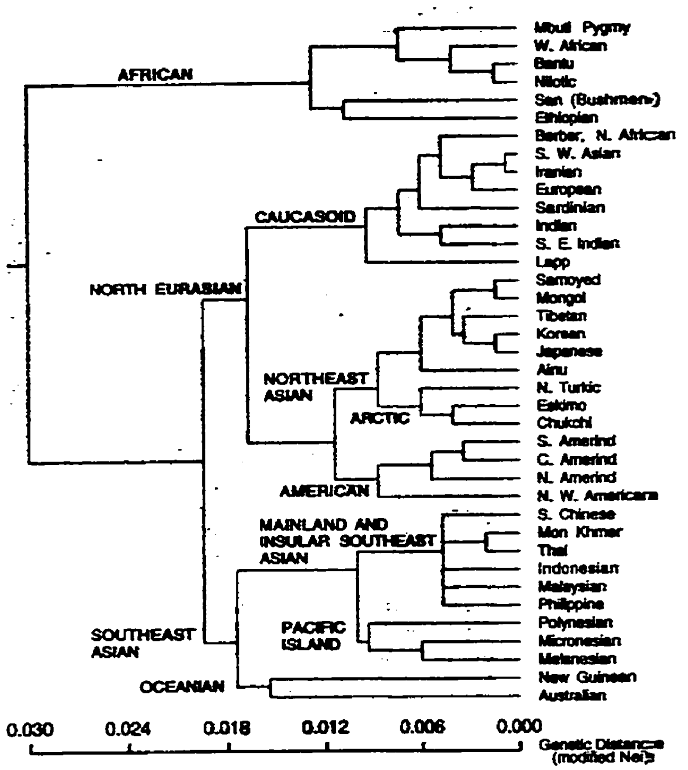


Fig. 2.3.2.A Average linkage tree for 42 populations, with 5 populations grouped as Europeans as in Cavalli-Sforza et al. (1988). The abscissa shows the genetic distances (modifed Nei) calculated on the basis of 120 allele frequencies from the following systems: *A1A2BO, MNS, RH, P1, LU, KEL, FY, JK, DI, HP, TF, GC, LE, LPA, PEPA, PEPB, PEPC, AG, HLAA* (12 alleles), *HLAB* (17 alleles), *PI, CP, ACP1, PGD, PGM1, MDH1, ADA, PTC, CHE1, SOD1, GPT, PGK1, C3, SE, ESD, GLO1, KM, BF, LDH, CHE2, IGHG1G3,* and *PGM2.*

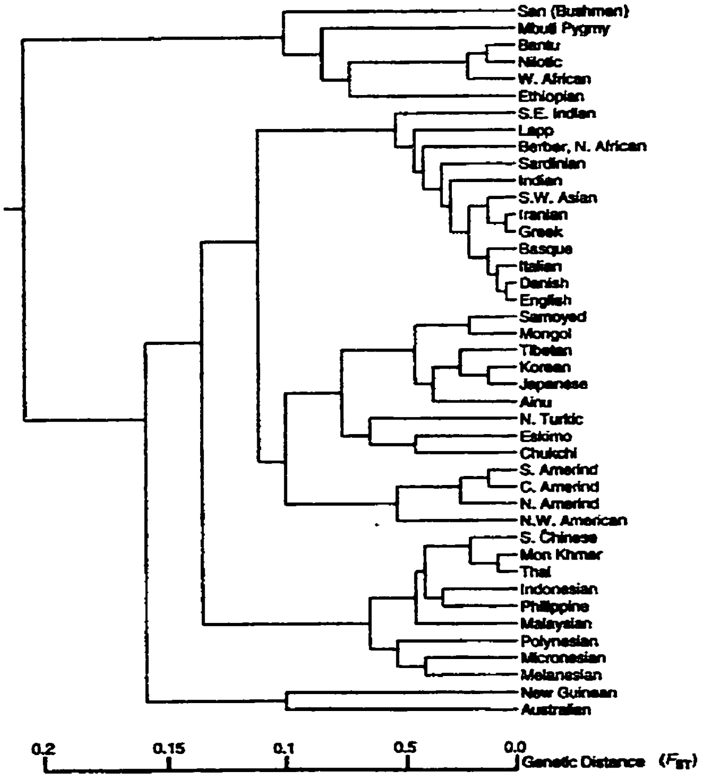


Fig. 2.3.2.B Average linkage tree for 42 populations. The abscissa shows the genetic distances (F_{ST}) calculated on the basis of 120 allele frequencies from the systems listed for Fig. 2.3.2.A. The five European populations form a single cluster and are pooled in Fig. 2.3.2.A. They are not clustered here and are kept separate.

Figure 24 – *Mapping the Genetic Distance of Human Populations.*
(Reproduced with permission from Cavalli-Sforza *et al.* (1994:78); [Fig. captions refer to the original source]).

Africans as closely cognate populations based on cranial measurements (see Figure 25). These results are not surprising since the human body adapts to climate more readily than genetic change allows, and anthropometrics provide some indication of these adaptations. Again, this problem of conflicting results leads us back to the anthropological view of human variation versus the genetic view. Popular anthropological methods have failed to embrace the advances of molecular genetics and very few anthropologists have been working towards more innovative methodologies, although many acknowledge that "races" simply do not exist. However, there is hope that anthropologists and geneticists can work in close collaboration, sharing their evolutionary perspectives and creating new ideas about the evolution of all species as we move closer to the decoding of the human genome. Does this advanced genetic/genomic knowledge threaten to make physical anthropology obsolete? Not likely. Integrating both methods of study can solve the disparity between the methods of genetic analysis and the investigation of selective forces that prevented the symbiosis of molecular genetics and anthropology in the middle of the twentieth century.

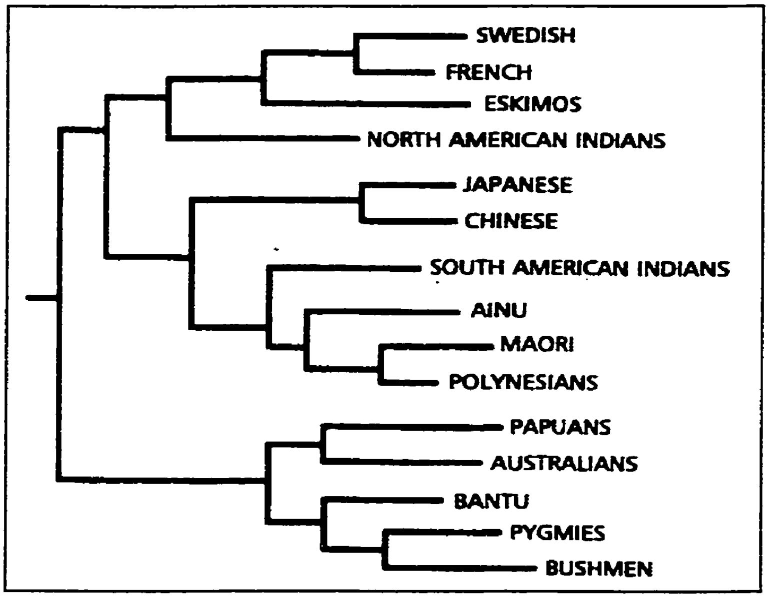


Figure 25 – *W.W. Howells tree of world populations based on cranial measurements* (from Cavalli-Sforza & Cavalli-Sforza 1995:117).

Clines, Clusters and Population Analysis

Cluster analysis has long been a main strategy of analysis within molecular genetics, allowing for an approximation of genetic distance between populations. Determining genetic distance based on allele frequencies and blood types as Cavalli-Sforza *et al.* have recently done allows for the reconstruction of the evolutionary paths of various populations that share a recent (or distant) common ancestry. This type of analysis can be used to produce comparative data regarding numerous local groups or micro-geographic populations in relation to each other, as well as to larger ancestral groups. Jean Hiernaux suggested in 1964 that cluster analysis would undoubtedly be favoured in America because of the vastly different origins of its current inhabitants, but the "races" so defined on a continental basis would lose much of their originality when introduced into the world picture. More specifically, Hiernaux (1964:491) explains,

> Following the above procedure [cluster analysis] would there emerge something resembling the classical subdivision of mankind into three main groups: Whites, Blacks, and Yellows (or whatever more sophisticated terms are used)? I doubt it. We know of so many populations that do not fit into that picture! Adding more 'oids' to this three-fold primary subdivision would not improve it. The subdivision into nine geographic races (i.e. 'the taxonomic unit immediately below the species') proposed by Garn (1961) [see Chapter 2] is no more satisfactory: it only shifts the problem to a lower level. Just as Indians could not be classed with the Black or White races of the ternary system, numerous populations are unclassifiable in a nine-fold subdivision because they are peripheral to several geographic races. It seems highly probable to me that the more races we create the more unclassifiable populations there would be at fewer and fewer levels of differences, until we should reach a state of subdivision close to an enumeration of all existing populations, i.e., the units to be classified.

Thus, cluster analysis treats populations as unique entities (which they are), and only serves to draw limited relationships with surrounding populations. According to Hiernaux, "Unclassifiability seems to me inherent in the modalities of human variability"(1964:491).

Using Euclidean Distances to produce branching diagrams, or dendrograms (such as those in Figures 23 and 24), the question of genetic proximity of a given individual or population can easily be mapped according to common (anthropometric) variables, where a named branch of the cluster tree provides a graphic display of the biological distance of each group studied in relation to each other (Brace *et al.* 1993:9). While adaptive variables can be used to build a representation of a basic geographic relationship between populations, they are only sufficient in that they can be used to place an individual or group within a large geographic framework, although it has been shown that similarities may exist in different areas of the world (e.g. sub-Saharan Africa and Australia). These variables do not generally allow for a determination of specific geographic location, which would be necessary in order to build a useful system of classification. Whereas most anthropologists have relied heavily on anthropometric data in the past, this provides only one aspect of a population-based investigation. In order to build a valuable methodology for exploring human diversity, one must cross-reference data on continuous traits with yet another dendrogram based on a battery of discrete traits.

This "numerical taxonomy" (Sokal & Sneath 1963) can be viewed as a taxon that is continuously broken down into progressively distant taxa. Various methods of applying nomenclature to the dendrograms can be employed, but the distinction of each "kind" or "species" may be achieved through any of a number of cluster analyses. It is important to realize that the clusters obtained in this particular type of analysis are based primarily upon resemblances in the particular characteristics evaluated and are not based upon genetic or phylogenetic hypotheses – they comprise the basic data set upon which such hypotheses may be constructed (Ehrlich & Holm 1953:499).

Non-metric variables have been used successfully to construct numerical relationship dendrograms by Cybulski (1992:125-6) among others, giving single estimates of biological distance based on discrete trait expression. In most cases, it should be expected that the geographic distance obtained by compiling continuous traits is relatively similar to the genetic distance determined by using non-metric variables due to the gradual spread of human migrants through prehistory. However, the usefulness of such data if they do not match only increases. By comparing the results for continuous traits with data of known ancestral populations, patterns of climatic adaptation can be understood and explained. From these data, cross-referencing the non-metric trait expressions can allow for the determination of direct ancestral relation within the already determined geographic area, which, in turn, may allow researchers to name the individual in question as a member of a specific cultural or ethnic group, or if it is a population in question, to identify the population. These variables can potentially provide useful data if used in isolation, but only provide a more accurate picture if used in conjunction with each other.

Losing the "Race"

Anthropologists have known for well over a century that no human population fits into the category of subspecies, and that in regarding them as such, "classification itself does not produce any new knowledge concerning individual things: it is only a mental operation performed on existing knowledge. If the things are not such to allow their grouping into classes, the failure to classify them may be felt as frustrating, but it does not imply any loss of knowledge. For some things are not necessarily of a nature to permit classification"(Hiernaux 1964:489). The variation of humans, as with most species, is one of genetic and geographic diversity and, for the most part, these qualities are dependent upon each other. While there have been innumerable criticisms of racial taxonomy from a social and genetic standpoint, as from within physical anthropology itself, racial science continues to prosper. A fundamental problem, as is the case with attempting to define "race," is centred in language. Traditional attempts to critically evaluate racial conceptions most often fall victim to the language of race, attempting to explain the arbitrary nature of classification due to the gradation of physical traits, yet reinforcing the racial template by adhering to its traditional terminology.

It seems clear from the results of the skeletal analysis presented in Chapter 4, and from the wealth of anthropological data of many prominent anthropologists and geneticists that "Caucasoids," "Mongoloids" and "Negroids" do not exist in "nature," nor do they exist under any other name. Human migration, natural selection and gene flow have made the idea of biological types or subspecies completely inadequate means of viewing the human species. Ernst Mayr (1997:128) explains, "Darwin conclusively refuted the notion that species are constant. The studies of geographic variation and particularly the analysis of local population samples confirmed that species are composed of populations which vary from location to location and whose individuals vary within a given population. Types or essences [or colours] do not exist in living nature."

In order to avoid the reification of racial terminology, the simple solution, as Ashley Montagu claimed almost forty years ago, is to drop "race" entirely from the vocabulary of the sciences and humanities. According to C. Loring Brace, the leader of the American anti-race anthropologists, "The pragmatic solution to the problem of designation is best dealt with by the use of simple geographic terms .... Not only is there no invidious loading involved, but the focus can be expanded or contracted in simple and efficient fashion as, for example, by specifying direction such as Northwest Europe, Central Europe, West Africa, Southeast Asia, and the like"(Brace *et al.* 1993:19). These geographical referents can be determined by clustering either anthropometric (which Brace has successfully applied to ancient Egypt) or non-metric data independently but, as suggested, a much more accurate approximation can be obtained with the clustering of both sets of data in comparison with each other.

Geneticists have traditionally called these clusters "populations," and this terminology has been used in this project as well because it is sufficiently ambiguous to describe a number of kinds of human groupings: cultural, linguistic, religious and ancestral. These clusters may form in a certain geographic location because local (or micro-geographic) populations have traditionally had significantly higher levels of inbreeding (within the group) than intermixing.

> Where human traits have adaptive significance, their distributions are determined by the distribution of the controlling selective forces and 'there are no races, only clines.' Where traits have no adaptive significance, neighbours will share traits with neighbours and the analysis of adjacent samples will show that they cluster together .... Neighbouring populations share trivial traits with each other to the extent that they form clusters based on relationships and strictly in proportion to breeding distance (Brace *et al.* 1993:26).

The ambiguity of the term "population" allows anthropologists to avoid falling into the essentialism of typologies, which are epistemological rather than ontological categories.

Methodologically, there must be a set of standard measures to be employed by anthropologists in their population studies. A common set of variables should then facilitate the sharing of data between researchers, allowing for larger sets of genetic relationships to be explored based on data that would generally be unavailable without primary study. Perhaps the best volume on anthropometric techniques currently available is that of William Bass, presented in his *Human Osteology: A Laboratory Manual and Field Manual of the Human Skeleton* (1987). An attempt at developing a manual of standard osteological methods was presented in 1994 by Jane Buikstra and Douglas Ubelaker, *Standards for Data Collection from Human Skeletal Remains*, but this volume was hastily constructed and is in need of major revisions in order to be useful.

The overall significance of non-metric variation is best assessed using a battery of traits in order to build relationships of genetic distance. The techniques of non-metric analysis employed in Chapter 4 represented only a basic set of variables, adopted from those used by Stanley Rhine, a number of which were also discussed in detail by other authors in the manual *Skeletal Attribution of Race* (1990). With greater understanding of epigenetic variance in humans, the number of discrete traits that are considered should increase. Hauser and DeStefano's *Epigenetic Variants of the Human Skull* (1989) is perhaps the most comprehensive volume on non-metric variation, including eighty-four epigenetic variables (see Appendix K)[4] as well as full explanations of the genetic significance of each trait and the grades of expression, with numerous photographic examples of each. One of the most valuable anatomical areas in which data on adaptive and epigenetic forces can be recorded simultaneously is through an analysis of dentition. While dental anthropology has become a specialized subfield of physical anthropology, it remains a study of very high value to all physical anthropologists. Dental reduction since the end of the Middle Pleistocene is proportional to the antiquity of technology used in the preparation of food. The time depth of this reduction varies in different parts of the world, resulting in a spectrum of tooth-size difference among modern human populations (Brace 1995; Brace *et al.* 1993). Food preparation practices contribute to dental wear patterns, as do cultural behaviours. An analysis of paleopathology can provide valuable information in both of these respects, allowing the researcher to build specific conclusions regarding health, nutrition, and social status. Such information may allow for the determination of an individual's identity, as well as providing valuable information about the population to which the individual belonged.

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[4] The methods of non-metric analysis adapted from Rhine (1990) in Chapter 4 only use nine of these eighty-four points of variance.

Dental anthropologist Christy Turner has found that an analysis of crown and root traits in the dentitions of populations support the results of the geographic mapping produced by Cavalli-Sforza *et al.*, as discussed in the previous section (Figure 26). Turner, along with G. Richard Scott, have premised their work on three bases: first, all human dentitions are principally the same; secondly, patterned geographic variation is evident in both the tooth morphology and crown size in recent human populations; and finally, in hominid fossil localities and recent archaeological sites, teeth are often the best represented remains (Scott & Turner 1997:2). Turner thus claims an ability to classify dentition into five large geographical groupings in 90% of cases, with further subdivision into ethnic/linguistic (or micro-geographic) groups 50% of the time.

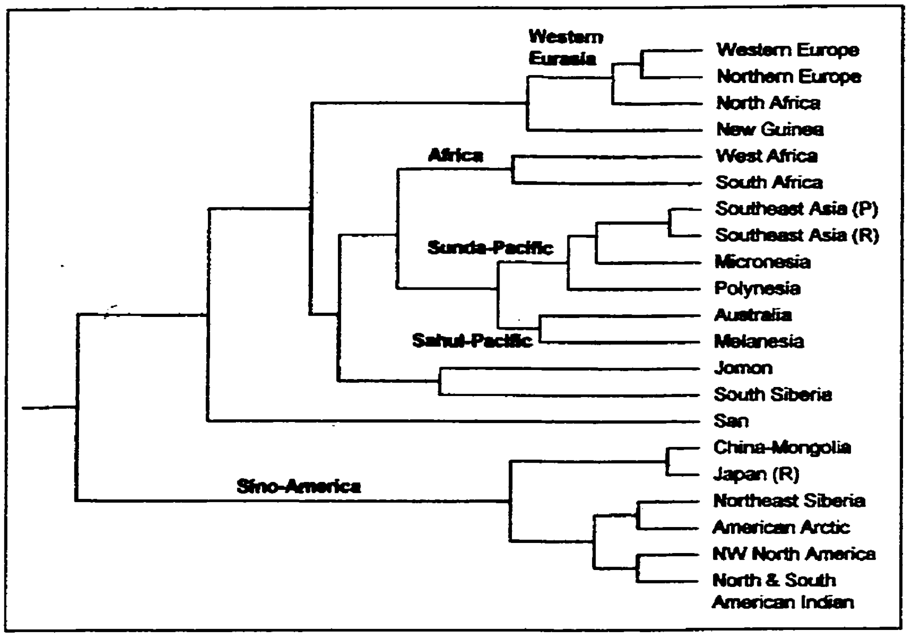

Figure 26 – *Genetic distance dendrogram based on an analysis of 23 crown and root traits in 21 regional groups* (from Scott & Turner 1997:289).

> We are optimistic that the ever-expanding world database on crown and root trait variation will one day allow dental researchers to determine the ethnicity of isolated human remains with more precision. The geographic differences in dental frequency and expression are often pronounced .... When these differences [and similarities] are assessed through advanced methods of classification (e.g. discriminant function analysis, Bayes' theorem, neutral networks), it will be possible to transcend educated guesses and calculate the probability that an individual belonged to a particular ethnic group (Scott & Turner 1997:317).

Geneticists have conducted population studies for over fifty years without adhering to a racial framework. Very few anthropologists have yet to follow suit because an understanding of the genetic processes involved in geographic variation is relatively new, and exceedingly complex. Many (see particularly Brace *et al.* 1993; Cybulski 1992) osteological analyses have displayed results in terms of genetic distance, particularly those dealing with regional groupings of ancestral groups, such as North American Aboriginal populations. However, these have not been used to replace racial terminology with geographical, cultural or linguistic references, but the continued use of racial terminology serves to confuse the epistemological categories of racial discourse (popular conceptions of "race") with ontological categories of human physical variation. C. Loring Brace *et al.* (1993) have attempted to use genetic distancing as a means for eliminating racial categorization when dealing with ancient Egyptian remains. Based on the results of the Egyptian study, Brace *et al.* explain,

> For our own part, we should recognize how presumptuous it is to assign our own primitive racial labels to them [Egyptian populations] or to anyone else. These not only prevent us from dealing with human biological variation in an adequate fashion, but they also lend themselves to the perpetuation of social injustice. The 'race' concept did not exist in Egypt, and it is not mentioned in Herodotus, the Bible, or any of the other writings of classical antiquity. Since it has neither biological nor social justification, we should strive to see that it is eliminated from both public and private usage. Its absence will be missed by no one, and we shall all be better off without it. R.I.P. (1993:26)

The move towards conducting population studies in terms of geographical gradients of epigenetic and adaptive characteristics that can be analysed using distance mapping allows for the abandonment of traditional racial terms for ancestral groups, which have dispersed and adapted to most parts of the earth.

What must occur in relation to the study of populations, however, is an appreciation for what the collected data actually represent. The fundamental aspect that sets physical anthropology apart from genetics is that it incorporates a study of humanity in terms of both culture and biology. The question that must first be asked of population studies is this: what is the role of population dynamics in the (re)construction of past human behaviour (Lazenby 2000)? This question is of great importance to the study of human evolution and adaptation because behaviour is a major factor in the clustering of populations. According to Clyde Snow, "there is a brief but very useful and informative biography of an individual contained within the skeleton, if you know how to read it"(M.S.U. 2000). The study of individual variants within populations has been characterized by Frank Saul (1972) as "osteobiography." Variants, as opposed to variance, are important aspects of individual biology that are not independent of population averages. While is it impossible to diminish the importance of population level analyses when dealing with culture and biology, individual level variants provide the basis for spatial and temporal comparative studies of populations. "But submerging *individuals* into singular measures of central tendency and dispersion seems like a great loss of insight into how *populations* actually cope, develop and change" (Lazenby 2000). The concept of osteobiography seems to be much more in tune with some of the theoretical issues raised in the first two chapters of this project regarding gender as behaviour, social class, construction of the body, sexuality and agency from archaeological and recent forensic remains.

As emphasized in Chapter 4, the study of pathology is a necessary component of the osteobiographical analysis, revealing both auto- and allo-mutilations such as trauma or culturally oriented alterations, as well as disease, metabolic or nutritional disorders (Lazenby 2000). These pathologies allow for a hypothetical reconstruction of social conditions, which play a crucial role in the adaptation and survival of populations, such as ethnic enclaves. We know that various pathologies are induced by occupational stress as well as nutrition (or lack of nutrition), such as rickets and scurvy. In a historical context, intentional alterations such as medical intervention (from dental procedures to trepanation to healed fractures) allows for an individual profile to be developed. Referring to the previous chapter and the notes presented in Appendix J, often the most interesting finds in population studies are at the individual level.

The most interesting find that came out of my analysis in the Canadian Museum of Civilization (CMC) collections was the discovery of an individual in the Ontario population with a severe pathology of the cranium, a zigzagging (for lack of a better descriptor) of thickened bone running from the frontal bone to the occipital protrusion (see Plate 4). While the cause of this pathology is unknown (possibly trauma or syphilitic infection), this type of pathological lesion provides a very explicit example of how population-based analyses can be reduced to the individual level. "We have to recognize that population data are nothing less than a summation, averaging and extrapolation of each individual's datum. Certainly many individuals will be comfortably described and adequately represented by the population – they are the population, in a sense"(Lazenby 2000). Although an examination of these pathological markers may allow for a reconstruction of the individual's biological history, when such data is included in a population-based study, a single occurrence of a particular pathological condition becomes expressed as an average, although it may in no way be related to any other individuals in that population. It must always be kept in mind when relating individual variants to population variance that averages can be greatly affected by the addition of each individual from outside of the normal range of variability. This was demonstrated in the postcranial analysis in Chapter 4.

At the macro-geographic level, population data become highly obscured; traits that are expressed highly or exclusively in particular micro-geographical populations become greatly reduced averages for the entire larger grouping. This simply does not support the observed regional variations. Therefore, treating data to racial classification only serves to

Osteobiography

Distinctive cranial deformation resulting from an unknown trauma or pathology.
Determining the cause of these lesions may provide valuable information about the individual's activities during life.

mystify and obscure the data. As observed in Chapter 4, North American Aboriginal groups can show great variation within a relatively small geographic area. In determining ancestral relation or individual identity in respect to these populations, a racial classification if of no use. If population-based data are to be of use to the anthropologist, they must always be reduced to the smallest possible elements, and through distance analysis, the biological tree can be a means in which to narrow the results into a reasonably workable form.

While it is of the utmost importance to utilize techniques of population-based analysis that do not adhere to the traditional rigid nature of systematic taxonomy, and to acknowledge such important factors as osteobiography, the most important innovation must be in the use of terminology. Despite modern anti-race arguments, racial taxons are still widely used in popular and academic discourse, particularly within medical teaching, practice and research. Witzig (1996) explains, "although race groupings are not biologically or anthropologically relevant, some may argue, 1) that they should stay intact for the sake of continuity; and, 2) that ethnic identification is unnecessary and is simply done to achieve political correctness. Evidence from scientific and ethical viewpoints shows that this view is incorrect and that medical interpretations of race fortify popular societal usage." This medicalization of racial terminology serves to accelerate the reification of the race concept in popular usage, as medical science has been held in the highest esteem due to its universal focus on understanding and healing the human body. As with the imprecise use of "race" as applied to the human species, human diversity is inconsistently taught in medical schools and erratically presented in medical texts (Witzig 1996). Even as anthropologists and geneticists have attempted to provide solid critiques of racial taxonomy, their arguments have been generally weakened by the difficulty or inability of working outside of a racial framework, because the medical discourse maintained the use of racial terminology. Instead, many tried to explain what the concepts actually mean biologically and in relation to popularly misconstrued social usages, but this continual use of race labels left the concept of human variation still almost entirely misunderstood.

Recently, in an announcement that the researchers involved in the Human Genome Project have finally completed an initial decoding of the DNA strand, Francis Collins, the director of the American contribution (National Institute of Health) to the project stated that in the project the researchers had used the genes of five different people, representing the "races" of humans. He further suggested that the collection of samples by "race" was done to represent the diversity of humans in the United States.[5] Such statements are irresponsible, can only serve to reinforce the notion that biological types are discoverable and observable entities, and are readily visible in individuals, contradicting much of the earlier population analyses of geneticists.

"Race" is a concept that should not be applied to humans. It is a term used in the breeding of animals under controlled or artificial environments, and is also widely used in zoology and botany. The environments that create these "races," varieties or subspecies do not exist in the same fashion so as to be applied to *Homo sapiens*. It is a problematic term that was originally used strictly as a biological concept, but soon became a largely social concept. In contrast to "race," ethnicity is a concept that is not based on perceived differences in biological constitution. Instead, it incorporates social, cultural, religious, linguistic, dietary and other variables in order to differentiate individual persons and populations. Ethnic boundaries are highly dynamic and imprecise, and this must be acknowledged in order to understand that humans are diverse in many more ways than we are able to elaborate without using inclusive

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[5] Taken from footage of a news conference held by American President Bill Clinton to announce the decoding of the genome, CBC News Ottawa, June 26, 2000.

terminology. Racial categories refer to large geographic groupings such as "Asian, "African," "American" and "European" (although with much more politically charged labels), which encompass hundreds of diverse ethnic groups and are too broad to be medically or statistically significant (Witzig 1996).

Does the answer lie in using ethnicity as a concept for categorizing humans rather than "race?" Will it be used for the same political purposes as "race?" Why did it have so little effect when Ashley Montagu suggested dropping "race" altogether in favour of ethnic labels? The answer does not lie in using ethnicity alone; we must also rely on progressive methods for analysing relationships of populations, such as the suggested methods of clinal and cluster analysis. Following World War II, when Ashley Montagu first proposed ridding the general and scientific vocabularies of race, these ideas of human races or subspecies were so deeply entrenched in scientific thought and social politics that society in general was not ready to accept a critical view of the science of human diversity. Montagu's suggestions came at a time when anti-race arguments were starting to gain momentum but remained greatly opposed by the conservative political right. Genetics was increasing our knowledge of diversity at a molecular level while anthropology was based on a traditional method born in the age of racial enquiry.

The increased knowledge of the process of evolutionary adaptation has shown that there are many factors that have caused humans to change gradually over time according to geographic origin and migratory status, housing and employment patterns, dietary preferences or availability, cultural and environmental factors and genetic ancestry. These variables can only be accounted for by the use of broad-ranging and non-temporally specific terminology. "Ethnicity" allows all such factors to be accounted for. Ethnicity refers to social relationships that have genetic and adaptive consequences through selective mating and geographical location; thus, a biological relationship based on social factors. "Race," on the other hand, refers to a misinterpretation of biology that has become part of popular discourse, and has been continuously perpetuated and reified in science. However, "ethnicity" has become a problematic means of categorizing human populations in modern times as well, leading to discrimination and inequality, and providing yet another means of social differentiation. A simple change in terminology can lead to a major conceptual shift, and an understanding of the role of ethnicity as a social factor in reproduction (how and why particular mates are chosen and what this means to our diversity) should form the basis of such a shift, which is long overdue, but it cannot be used in isolation.

Ethnic labels should not be used in isolation because the language of human differentiation is inherently political. Using ethnic terminology will inevitably have political consequences. The political nature of such terminology is based largely on its popular usage – "race" and other terms of differentiation continually reinforce the notion that there are essential biological types. There are no "types" of humans, and the scientific language should reflect this. The use of cluster analysis allows anthropologists to group individuals together based on resemblances that are influenced by geography and ethnic (social) factors, and this numerical taxonomy allows us to assign categories according to whatever criteria provides the best description, without necessarily adhering to traditional essentialist labels. In this regard, and in respect to the fundamentals of the early classificatory schemes discussed in the first two chapters of this thesis, perhaps the most appropriate solution lies in the use of neutral geographic referents as Brace (1995) suggests, since the fundamental aspect of human biodiversity is geography (climate). However, to move beyond the problematic association of "race" and geographic origin, such a system must be sharpened considerably in order to represent the great regional diversity of the continents and their inhabitants, to which the clustering of populations attest.

- CHAPTER 6 -

CONCLUDING REMARKS

The argument set forth in the introduction of this thesis was that in order to move beyond "race" as a means of conceptualizing human biodiversity, we must attempt to understand how the concept itself has developed in social and scientific vocabularies. While "race" and racism are clearly not the same, the focus of this research has been on the scientific usage of racial categories and how they have been appropriated by the general population, which is in turn reflected in science. The osteological analysis conducted for this thesis demonstrates that humans are diverse, and differ according to any of a number of variables, which are genetically, geographically and culturally influenced. However, the methods of analysis employed by physical anthropologists are outdated and reflect the racial mindset of previous generations, thereby ignoring the means by which our species has diversified. What becomes evident when this research is taken as a whole is that the problem of "race" is inherently connected to the ways in which we think of human diversity in modern times – difference as undesirable and evolution as progressive. Although not expressed in a purely racist form, the problematic nature of "race" has its roots in early classificatory thought, and has since been manifested in language.

Arguments against racial classification are by no means a recent development. Great naturalists such as Linnaeus, Buffon and Blumenbach even acknowledged the highly arbitrary nature of their classificatory systems. Yet, as we continue to argue that "race," as it is conventionally understood, is like any classificatory scheme, an epistemological fiction, it becomes increasingly clear that the mythical qualities of the concept itself are based in our use of language. By virtue of being a word itself, "race" does exist, although this by no means gives it any essential ontological biological validity. The simple existence of a particular classificatory term is inextricably connected to a conceptual definition that, whether precise or convoluted, becomes part of a discursive structure and exists in the minds and practices of those who use it. However, it is through an investigation of the use of racial terminology that we can determine that its interpretation has become too widely applied to retain any significant biological meaning. When "race" was first used by Buffon to describe human ancestral relations, it ceased to have an accurate conceptual definition.

By adopting a moderate postmodern perspective, characterized by the method of critical analysis, a focus on language as the fundamental factor in human understanding introduces a more diverse means by which to understand problematic social and scientific issues, with race falling into both of these areas. The language of "race," as examined throughout this thesis, persists because the conceptual basis of the terminology continues to be used with uncritical acceptance by a large portion of society. The notion that humans can be placed into specific objective categories with discoverable innate qualities is based on a traditional belief that the scientific method produces irrefutable results. We now believe that this simply is not true – science is bound by language just as any form of communication is, and it is a product of social and cultural dynamics. The example of Thomas Laqueur's *Making Sex*, which was introduced in the first chapter, demonstrates that the conceptual shift from a belief that men and women shared the same internal organs to the focus on viewing men and women as fundamentally different in their biological makeup was not due to a change in human biology, but rather to the means by which it was conceptualized. Human evolution tends to be seen in much the same way – it is most often taken for granted that human beings have constantly been progressing biologically and intellectually. The belief that all "races" of humans share a common ancestry should logically be followed by a belief in human equality and egalitarianism. However, such thought was soon replaced by the idea that differing evolutionary lineages caused by geographic separation were all subject to different rates of evolutionary progress and, therefore, some races (particularly European) were more highly evolved than others ("Blacks" or "Indians"). The separation of the races, and the sexes, has wide political implications that have become a vital component of maintaining the economic structure of capitalism, as power and domination (as inscribed in language) became the main promoters of human differentiation.

The idea of progress as applied to evolution would eventually become manifested in notions of "civilization," which were centred on differences in technology, language and morality, all assumed to be functions of intelligence. Thus, the study of human evolution incorporated the anthropometric determination of cranial capacity, which served to measure intelligence. This equation between brain size, intelligence and "race" functioned to perpetuate the idea of evolutionary progress as leading to races or subspecies that are more successful than others. However, by re-examining the fundamentals of evolutionary theory from the critical perspective, we can suggest, as Gould (1996c) does, that,

> Darwin's theory of natural selection doesn't make any reference to any notion of progress, or development or increasing complexity. It's only a theory about adaptation to changing environments. There are as many ways to adapt to local environments by becoming less complex as by becoming more complex, but for reasons of our history and our biases and our preferences, we very much want to spin doctor that theory and make it appear as though the history of life is a predictable rise to increasing complexity and progress so that we can validate ourselves as the crown of creation.

This line of thought was initially proposed to set all humans apart from the apes, seen as dirty and savage animals, but it would soon become the means by which certain groups would be considered much closer to the apes than other more evolved and civilized "races."

Through a critical lens, we can now see that the whole idea of progress in evolution is false. Humans have traditionally considered themselves as the most advanced and complex of all the species, yet more modern interpretations tell us that evolution is simply a game of chance. While it is true that human relations, culture and technology have become increasingly complex since the branching off of the australopithecines from the great apes somewhere around five million years ago, this complexity does not imply biological progress as such.

> Evolution is a process of constant branching and expansion. Life began three and a half billion years ago, necessarily about as simply as it could be, because life arose spontaneously from the organic compounds in the primeval oceans. You couldn't begin by precipitating a giraffe out of this primordial soup, so here began the history of life with the simplest possible form of cellular life, namely bacteria. And since there is no way of getting any simpler as life expanded, every once in a while you get something more complex because that's the only direction open, but if you look at the full range, rather than falsely and myopically concentrating on the history of the most complex thing through time, what you see is that the most outstanding feature of life's history is the constant domination of bacteria (Gould 1996c).

Thus Gould conceptualizes the evolution of all species as a random movement away from a necessary beginning at maximal bacterial simplicity – bacteria have had the longest lifespan on the earth and no other species even compares in terms of numbers, yet humans tend to believe that complexity is the key to evolutionary success.

Throughout human prehistory and history, culture has been the dividing line between groups of people. "Intelligence" is at least as much social and cultural as it is biological, if not more so. Anthropologists have traditionally endeavoured to evaluate cultures in terms of the complexity of their interactions, their signs and symbols, language and behaviour, social organization and governance etc. Whereas we regard technology (being a cultural product) as progress, many such technological progressions have had adverse consequences, such as chemical pollution and even health problems caused by social factors such as stress, hypertension and even depression. Perhaps those cultures that are regarded as simplistic from the western perspective are actually better suited for survival, free of many of these environmental problems. If so, this is the product of purely cultural factors, not biological. Yet we still commonly believe that technology is progress and that those societies with the most economic capital, which is invested in the production of technology, are better able to survive because they can fund scientific research such as the Human Genome Project. The belief here is that technology can be used to fix the problems that earlier technology created. These issues raise some very important questions about the interface of culture, society and biology and how anthropologists study such processes.

As the social and natural sciences work towards developing new and innovative methods of inquiry, there remains a major economic factor underlying the focus of research. The Human Genome Project is on the verge of completely decoding the 3.1 billion chemical "letters" that make up human DNA (Lemonick 2000b), which brings up many ethical issues. We can argue that races do not exist and that they have never existed, but will they exist in the future? The decoding of the genome will invariably lead to great moral dilemmas. The focus of this research is of major value to the pharmaceutical industry, who wish to use knowledge of genetic-based diseases as a means of customizing medication for individuals based on their genetic structure. This could conceivably lead to a refocusing of science on individual biology rather than population biology. However, with the vested interest of large companies such as pharmaceutical and insurance companies, there is a risk that we will see a return to genetic determinism and/or germline modification in order to breed stronger individuals. We can only hope that eugenics is a thing of the past and that we have learned from the atrocities conducted in the name of biological progress.

Critical inquiry into the nature and structure of scientific knowledge allows us to try to understand the way that ontology is represented as "fact," exposing some of the contingent social nature of scientific "objectivity." In relation to human evolution and ancestry, it is becoming increasingly acknowledged that our conceptual models of diversity are not solely based in objective observation. Henry Gee (1999:2) explains,

> We *invent* these stories, after the fact, to justify the history of life according to our own prejudices .... Fossils are never found with labels or certificates of authenticity. You can never know that the fossil bone you might dig up in Africa belonged to your direct ancestor, or anyone else's. The attribution of ancestry does not come from the fossil; it can only come from us. Fossils are mute: their silence gives us unlimited licence to tell their stories for them, which usually take the form of chains of ancestry and descent. These stories are like history, of events leading to other events; of succession and defeats; change and stability. Such tales are sustained more in our minds than in reality and are informed and conditioned by our own prejudices, which will tell us not what really happened, but what we think *ought* to have happened. If there are 'missing links', they exist only in our imaginations.

An understanding of the history and philosophy of science can only serve to improve our knowledge of both social and natural forces that shape our world. But is it a contradiction to dismiss the notion of evolutionary progress and to speak of progressive knowledge? Certainly, the major factor here is testability; the limiting factor then is time frame. Evolution works outside of any truly conceivable time frame, which Gee (1999) refers to as "Deep Time," in which time is only seen on a geological scale. Short-term scientific theories can be tested, and better approximations can de developed. If knowledge changes through a recordable span of history, producing continuously more complex understandings, then it may be seen as progressive.

The study of human diversity must necessarily, in order to be considered progressive, incorporate all areas of academic study, particularly the disciplines of history, philosophy and the medical sciences (genetics, anatomy, pathology) with both cultural and physical anthropology. More theoretical models of diversity and evolution have even incorporated mathematical models of probability and computer networking systems. However, in anthropology, there has been a distinct split between types of anthropology, much like the differentiation of types of people. Both of these subdisciplines must have significant overlap, for the cultural anthropologist is at a great disadvantage without a solid grounding in human evolutionary theory and conversely, physical anthropologists must acknowledge the biological consequences of culture. A most important factor is that the blurred boundaries of all disciplines must allow for a shared discourse, rather than the exclusive definitions of key concepts that have become typical of many disciplines. Cross-disciplinary research has created a fertile ground from which to study the traditional in a critical manner, and this intellectual fertility has opened academic discourses to new ideas and ways of conceptualizing past and present knowledge that are more conducive to accelerated change in the social and physical sciences.

Following more innovative linguistic analyses of the social and natural sciences, the introduction to this project was written relatively informally. The purpose has been to employ a reflexive method, allowing the audience to come to an understanding of the motivating factors for this research. We now understand that science cannot be totally free of observer bias, just as philosophy is shaped by the philosopher's life experience. An elaboration of the epistemological dynamics of a particular body of research can help to expose these underlying factors, and can only serve, arguably, to strengthen the overall argument and focus of the research and text.

I do not believe that races do exist, nor do I believe that they have ever existed. The research conducted for this project supports the presupposition that our conceptions of humanity's place in nature are thoroughly distorted. Although we have laid claim to the highest of all species, there is no evidence to suggest any such natural hierarchy of life exists, and we may never know how we fit into the biological world. It should be understood that no individual or population has an intrinsic value beyond the fact that they exist as part of an ecosystem. Humans take pride in their membership in certain groups, such as "race," (which are based in geography, linguistics and/or nationality), but there is no pride to be derived from social and biological forces that are beyond the control of the individual, for creation pre-exists consciousness and society creates the categories in which we become immersed. We feel, as a nation or other such group, part of a collectivity that is entirely constructed by political processes, which very broadly link us in a cultural sense, but are of no greater unifying nature than any other social relationship. People who are related by continental geographic origin, nationality, hair colour or shoe size are no more or less related than two people possessing the lightest shade of skin and the darkest pigmentation. Cultural and national pride should transform into a simple respect for the world as a whole, as we can never really understand our place in it. Only by moving away from "race" and towards alternative explanations of human diversity, particularly at the elementary level, can we instil such values in the youth of future generations, exposing them to critical perspectives that explain the contradictory nature of racial classifications and explore further possibilities. This will be the most important factor in moving beyond racial thought.

We are a diverse species, but all evidence suggests that our species arose from a single common ancestor or small ancestral group, and has branched out in patterns of rapid expansion with advances in technology. This exponential increase in overall population, and the ability to rapidly adapt to environments can only have been the product of continuous genetic exchange, and the diversity of environment can only serve to strengthen the adaptive ability and successes of the species as a whole. By no means can *Homo sapiens* be divided into subspecies – geographical isolates among humans simply do not exist. If they did exist at one or at a number of points in our evolutionary history, the expansion of the species beyond the primitive geographical boundaries certainly recombined the species into a single whole. Ancestral or ethnic groups exist in clusters, which are strictly cultural, and physical traits vary in clines, which are strictly biological; neither effect exists independently of temporal space.

Thus, the refocusing of anthropology as a holistic endeavour can only serve to strengthen our understanding of human origins and evolution, and this study can be used in a complementary fashion with the natural and medical sciences. With this integration of knowledge (inter-subjective relations), a shared discourse should be encouraged, and "race" should not remain part of this discursive formation. While postmodernism may not be the answer to the problem of scientific objectivity, it has opened our understanding to some of the social structures of science, and has created a critical intellectual environment that might finally be equipped to move beyond the traditional notions of "race" and racial classification. Ashley Montagu was on the right track, but the world was not quite ready to accept it. Hopefully a rethinking and revision of Montagu's ideas will allow us to finally abandon "race," dropping the concept altogether. Although we may need to reconsider the ways in which we have traditionally thought biological evolution to be progressive, moving beyond "race" may be the fundamental factor in achieving social progress.

Appendix A

Excerpt from Blumenbach's Notes on His Collection of Specimens

(See Blumenbach 1865:155-61 for complete index)

INDEX OF THE AUTHOR'S ANTHROPOLOGICAL MATERIALS, WHICH HE MADE MOST USE OF IN ILLUSTRATING THIS EDITION.

There are three special reasons why I have thought it worth while to insert here this index. First, that my learned and candid readers may know the quantity and the quality of the assistance taken from nature itself, with which I have succeeded at last in publishing this book. Secondly, that a testimony of my gratitude may remain for the noble munificence which my patrons and friends have thus far shown in enriching my materials for the extension of anthropological studies. Lastly, that what I am still in want of may be known, which those same friends may further enrich me with, if they have a good opportunity and are still so disposed.

SKULLS OF DIFFERENT NATIONS.

Of this collection, which in number and variety is, so far as I know, unique in its kind, since the similar collections of Camper and John Hunter cannot in these respects be compared to it, I have published a selection, which I have described most fully in three decades, and illustrated with the most accurate engravings, and there I have given an account of the time and the way in which each skull came into my possession. And I always keep together with these treasures a collection of autograph letters, by which documentary evidence the genuine history of each is preserved. Those which seem to be in any way doubtful or ambiguous, I put in a separate place.

EXPLANATION OF THE PLATES.

Plate IV below corresponds to Figure 2.2 and Appendix B in this text.
(From Blumenbach 1865:162)

PLATE IV.

Five very select skulls of my collection, to demonstrate the diversity of the five principal human races.

Fig. 1. A Tungus, one of those commonly called the Reindeer Tungus. His name was Tschewin Amureew, of the family of Gilgegirsk. He lived about 350 versts from the city Bargus; and cut his own throat in 1791. Schilling, the head army-surgeon, was sent thence by Werchnelldinski, to make a legal inquiry as to the cause of his death; he brought back the skull with his own hand, and gave it to Baron de Asch.

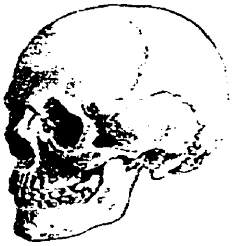
Fig. 2. The head of a Carib chief, who died at St. Vincent eight years ago, and whose bones, at the request of Banks, were dug up there by Anderson, the head of the royal garden in that island.

Fig. 3. A young Georgian female, made captive in the last Turkish war by the Russians, and brought to Muscovy. There she died suddenly, and an examination was made of the cause of death by Hiltebrandt, the most learned anatomical professor in Russia. He carefully preserved the skull for the extreme elegance of its shape, and sent it to St Petersburg to de Asch.

Fig. 4. .The skull of a Tahitian female, brought at the request of Banks by the brave and energetic Captain Bligh, on his return from his famous voyage, during which he transported with the greatest success stocks of the bread-fruit tree from the Society Islands to the East Indies.

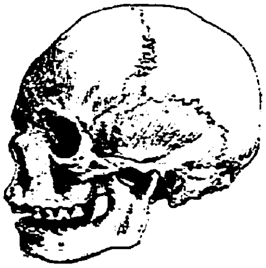
Fig. 5. An Ethiopian female of Guinea; the concubine of a Dutchman, who died at Amsterdam in her 28th year. She was dissected by Steph. Jo. Van Genns, the learned professor at Utrecht.

Appendix B



3. Caucasian

2. American Indian



4. Malay

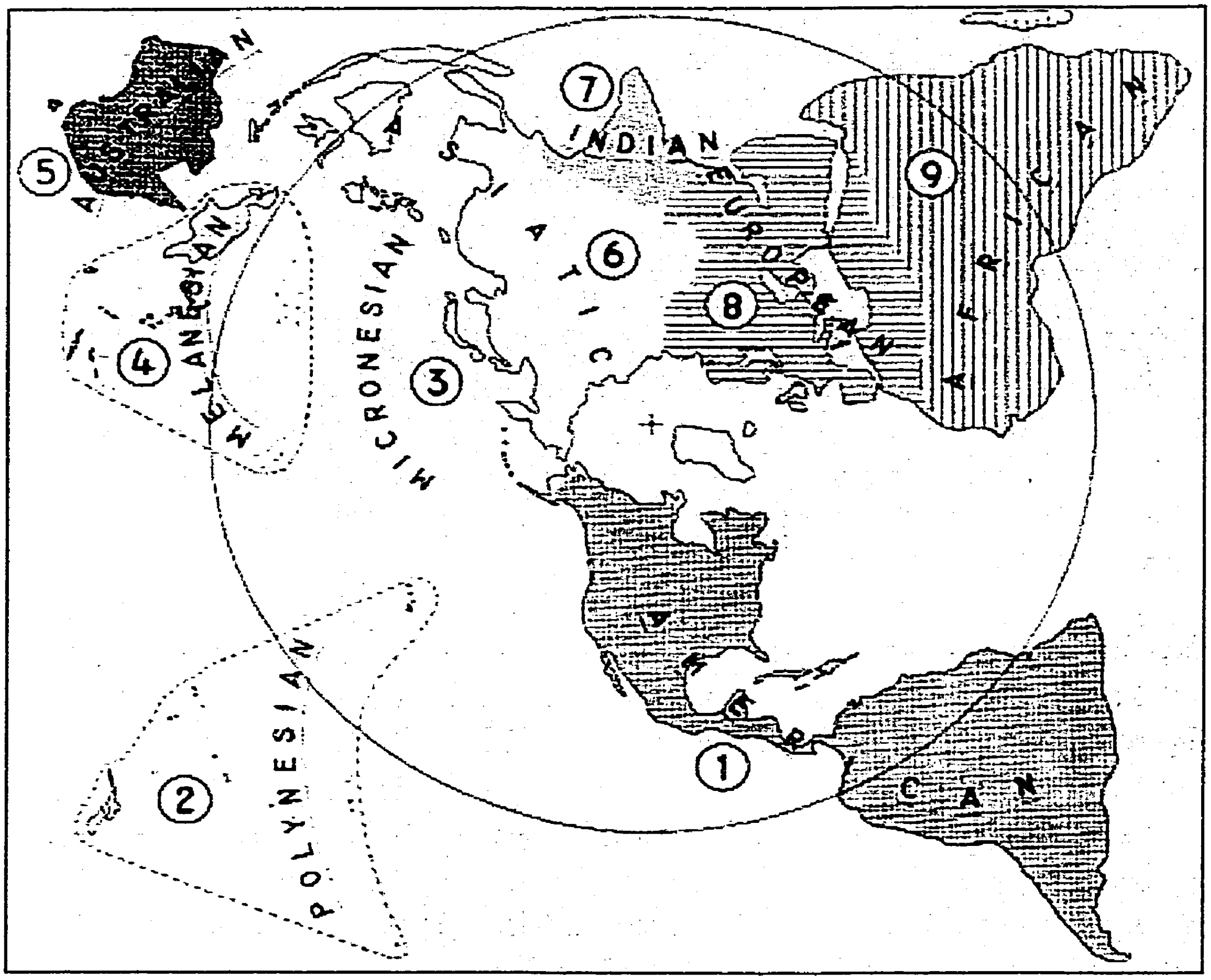
1. Oriental

5. African

Blumenbach's racial geometry with two lines of "degeneration" extending out through intermediary stages from a central Caucasian "ideal." From *Anthropological Treatises*, J. F. Blumenbach, 1865.

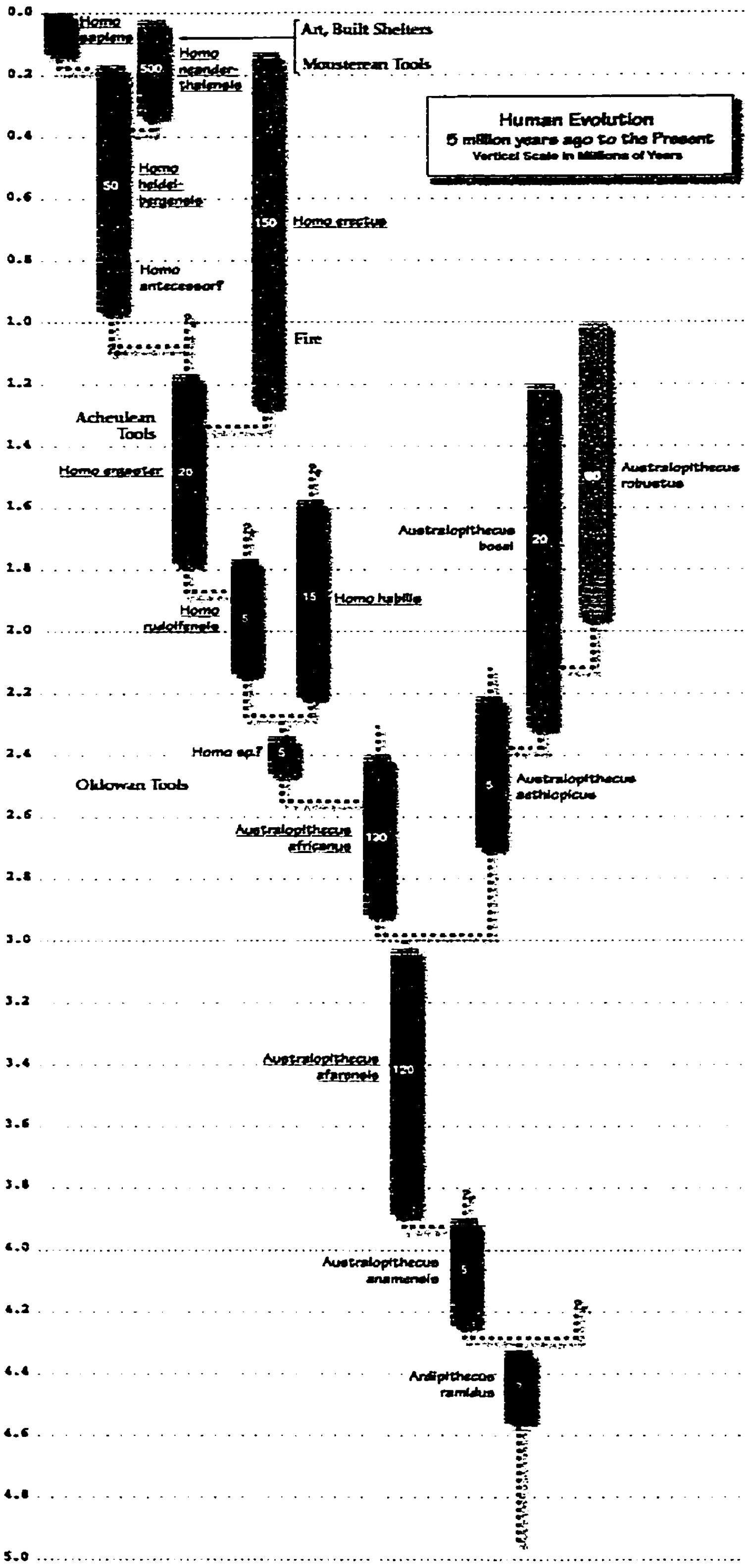
Blumenbach's Racial Geometry
(From Gould 1996a:409)

Appendix C



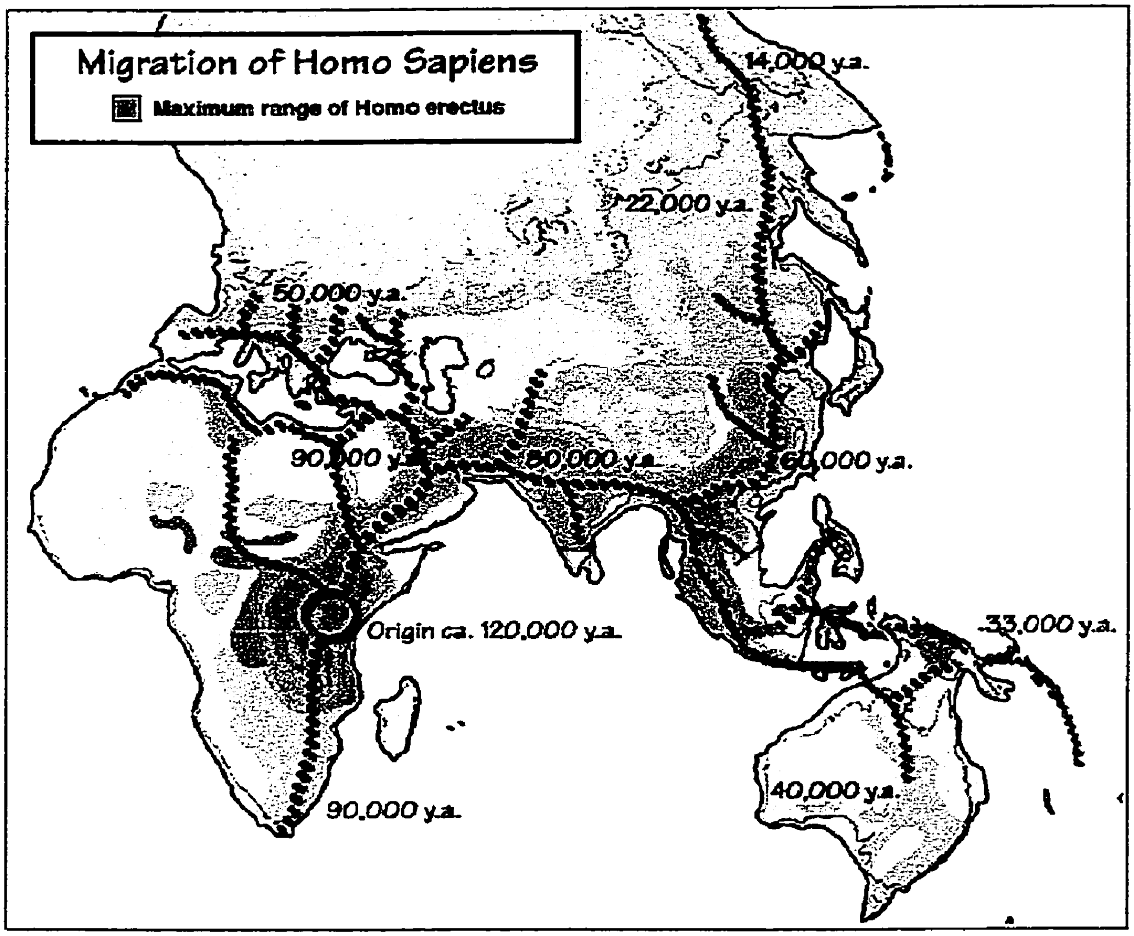
Stanley Garn's Nine Geographical Races
(From Garn 1971:155).

Appendix D



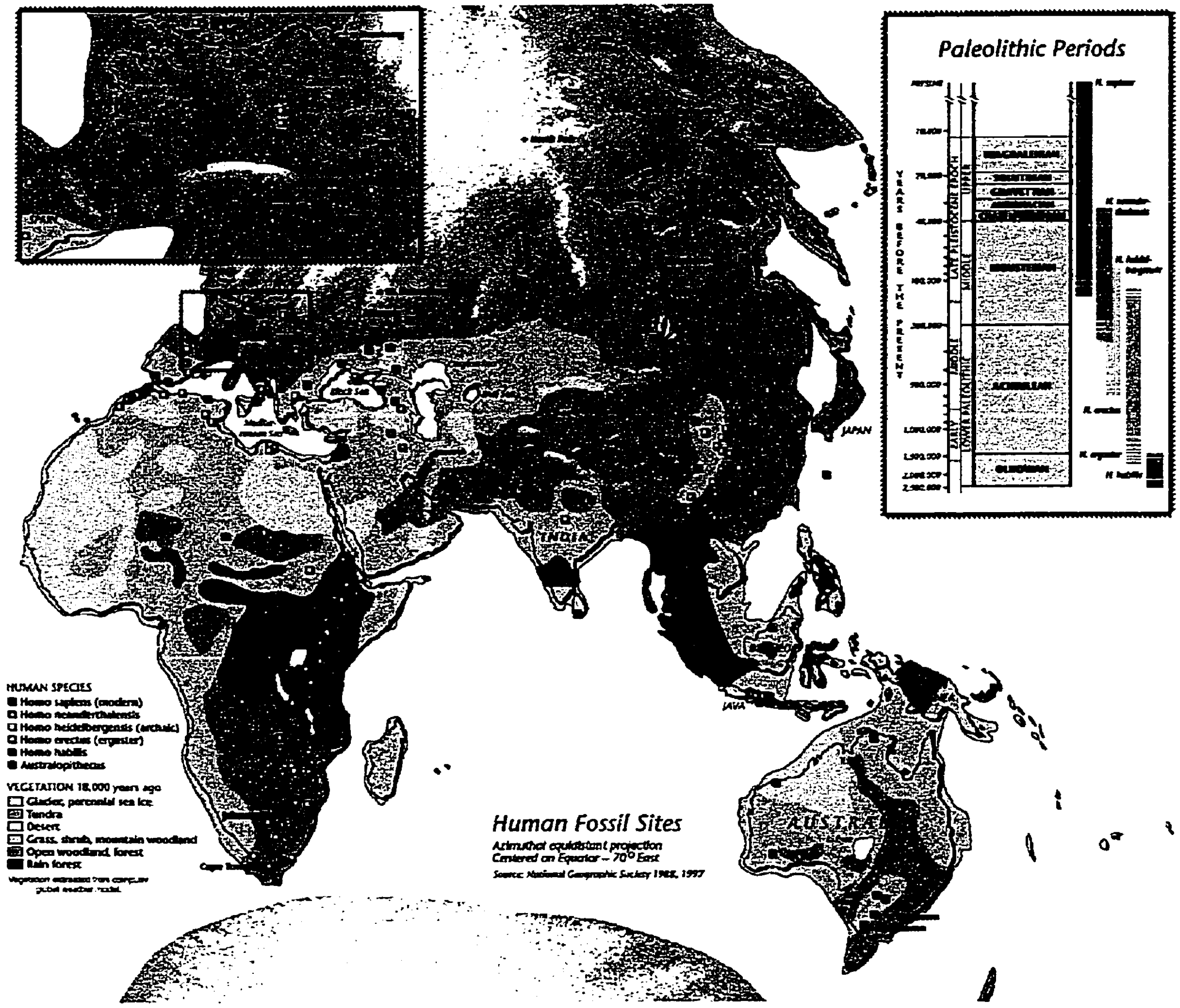
Human Evolution
(From Handprint 2000)

Appendix E



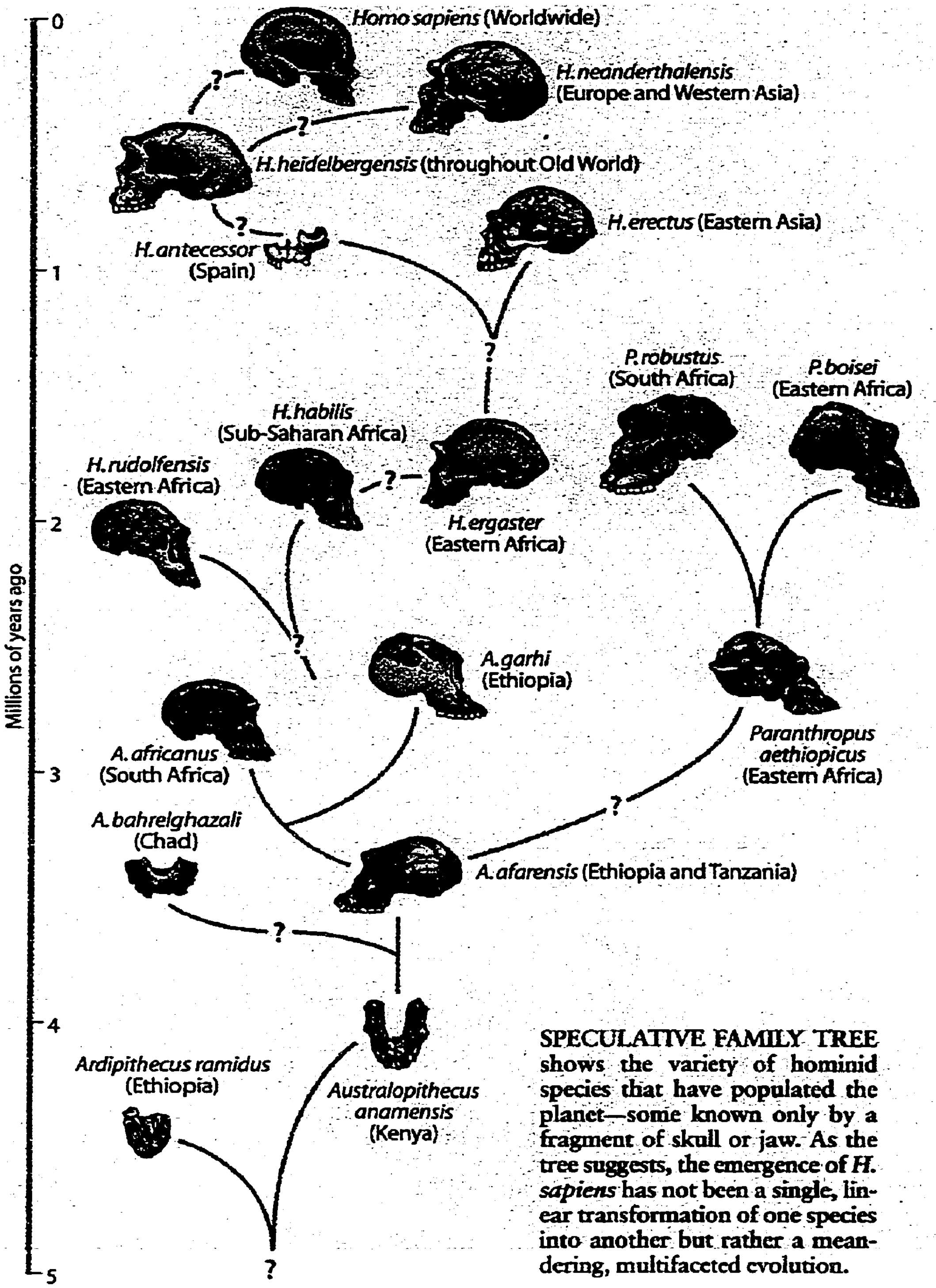
Migration of *Homo sapiens*
(From Handprint 2000)

Appendix F



Human Fossil Sites
(From Handprint 2000)

Appendix G

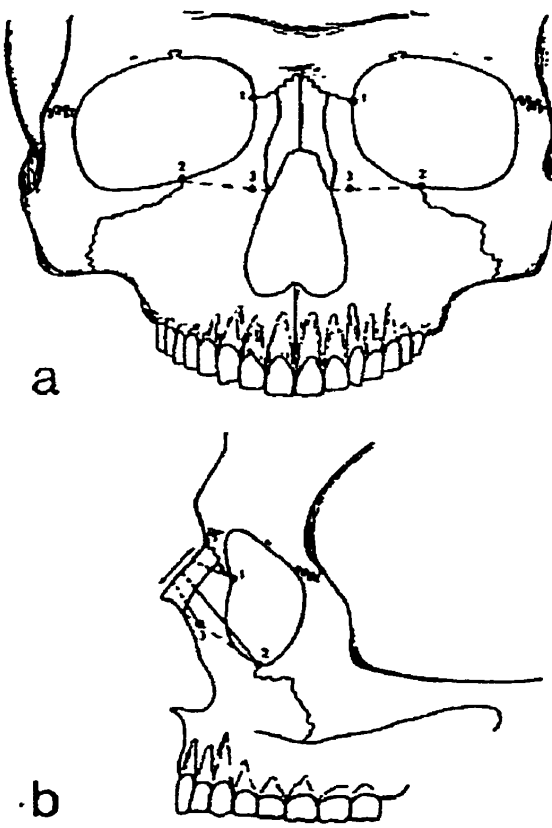


SPECULATIVE FAMILY TREE shows the variety of hominid species that have populated the planet—some known only by a fragment of skull or jaw. As the tree suggests, the emergence of *H. sapiens* has not been a single, linear transformation of one species into another but rather a meandering, multifaceted evolution.

Non-Linear Model of Human Evolution

(From Tattersall 2000:60)

Appendix H



1 ***Maxillofrontal breadth***—breadth between maxillofrontale left and right (often called interorbital breadth).

Maxillofrontale is defined by Bass (1987:60) as the intersection of the fronto-maxillary suture and "anterior lacrimal crest, or the crest extended (medial edge of the eye orbit)". See points 1 in Figure a.

Naso-maxillofrontal subtense — projection, or subtense, from the maxillofrontal points to the deepest point on the nasal bridge. This is not a precise point, but is the point at which a minimal reading is obtained on the vertical scale of the simometer. Note the line from point 1 to the nasal bridge (Fig. b).

2 ***Mid-orbital breadth*** — the breadth between zygoorbitale left and right.

Zygoorbitale is defined by Howells as "the intersection of the orbital margin and the zygomaxillary suture" (Howells 1973:170). Occasionally the suture meanders along the orbital border; then its most medial location is chosen as zygoorbitale (See points 2, Fig. a).

Naso-zygoorbital subtense — subtense (projection) from the zygoorbital points to the deepest point along the nasal bridge. The deepet point is again instrument determined. Note the line from point 2 (Fig. b)

3 ***Alpha cord*** — the breadth between the alpha points right and left.

Point alpha is the deepest point, left and right on the maxilla along a line from zygoorbitale to the point where the naso-maxillary suture meets the nasal aperture (note points 3, Fig. a). To determine alpha, a straight line is pencilled connecting the above two points, and the skull tilted until the profile of a straight-edge and the pencilled line are clearly visible. The deepest point is then marked along the pencilled line. The deepest point usually coincides with a depression or "break" where the maxilla begins to rise anteriorally toward the nasal aperture. When a definite break or depression is not visible along the pencil line, but instead the concavity forms a long gradual shallow depression in profile, a deepest point is difficult to determine. Then the mid-point along the pencilled line is chosen.

Naso-alpha subtense — projection (sustense) from the alpha points to deepest point on the nasal bridge. The deepest point here is instrument determined also. Note the line from point 3 (Fig. b).

Definitions adapted from the following:

Bass, William M.
1987 Human Osteology. Missouri Arch. Society, Columiba, MO.

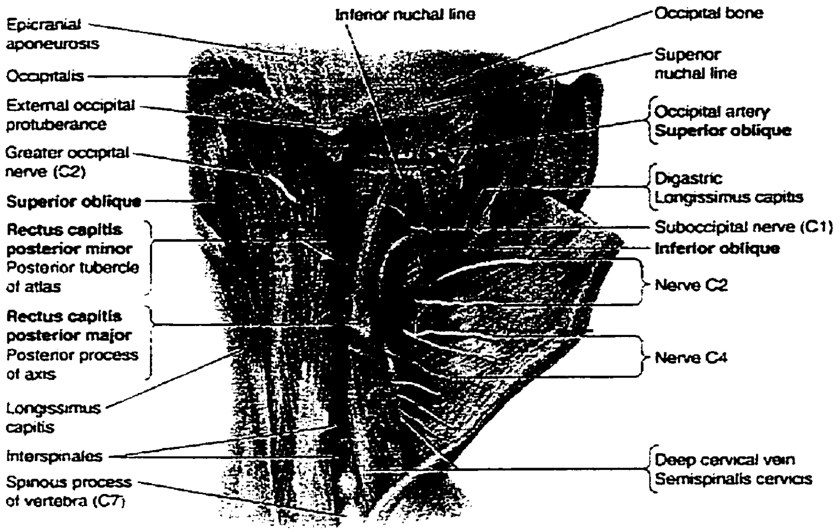
Gill, George W.
1984 A Forensic Test Case for a New Method of Geographical Race Determination. In Rathbum, T. & J. Buikstra, eds., Human Identification. Charles C. Thomas, Springfield, Ill.

Gill, George W., Susan S. Hughes, Suzanne M. Bennett and B. Miles Gilbert
1988 Racial I.D. from the Midfacial Skeleton.... Journal of Forensic Science, 33.

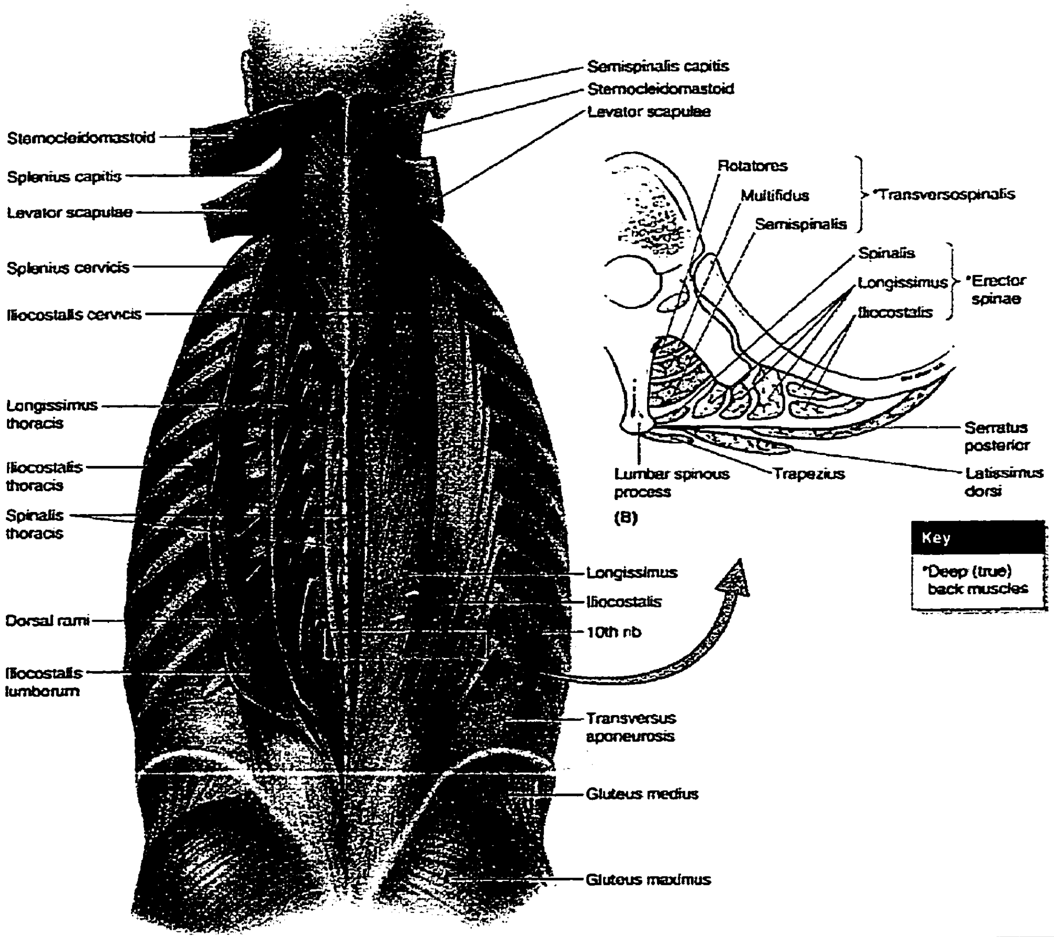
Howells, W.W.
1973 Cranial Variation in Man. Papers of the Peabody Museum of Archaeology & Ethnology., Harvard University, 67.

Interorbital Features Measurements
(From Gill & Gilbert 1990:53)

Appendix I



A) *Muscles of the Neck.*
(From Moore & Dalley 1999:475)



B) Deep Muscles of the Back
(From Moore & Dalley 1999:469)

Appendix J

Notes on Analysis

GUST ISLAND

- Approximately half show an uncommonly small second premolar
- Metopic trace not common, but the presence of a thickening of bone and sutural lines slightly superior to nasion is common.
- Thick ridge on the inside on mandible.

B.C. INTERIOR

- Dentition very worn, but straight and spaced.
- Very high base angle.
- Depressions at pterion.
- Some have a deep groove in nasal bones inferior to nasion (not nasal depression).

MANITOBA

- Metopic trace not common, but the presence of a thickening of bone a sutural lines slightly superior to nasion is common.
- Many of the specimens display a rounded frontal bone but flattened parietal bones leading to the sagittal crest – keeling.
    - Thickening of bone at bregma.
- Thick ridge on the inside on mandible.

ONTARIO

- Specimen XIII-F:150 has an extremely deformed frontal bone (trauma? syphilis?)
  Specimen XII-F:427 has metopic trace, Os Japonicum, apical bone and lambdoid ossicles.

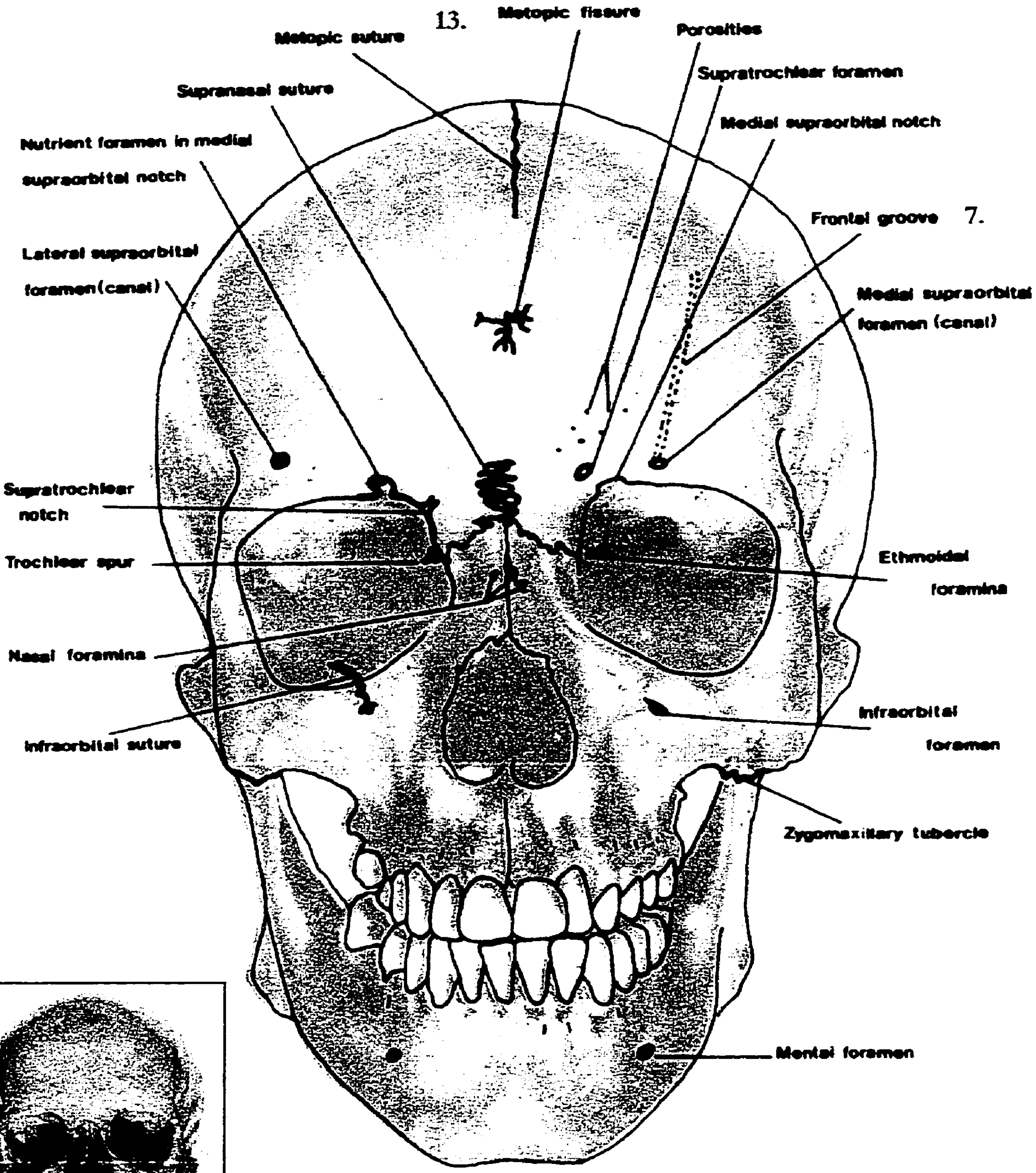
QUEBEC CITY

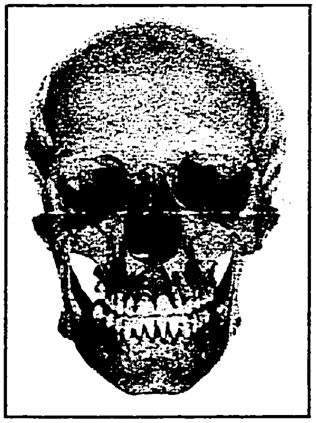
- Very high angle of ascending ramus.
- Very slight post-bregmatic (or at bregma) depression is typical.
- Many specimens have an unfused suture on maxilla inferior to nasal sill.

Appendix K

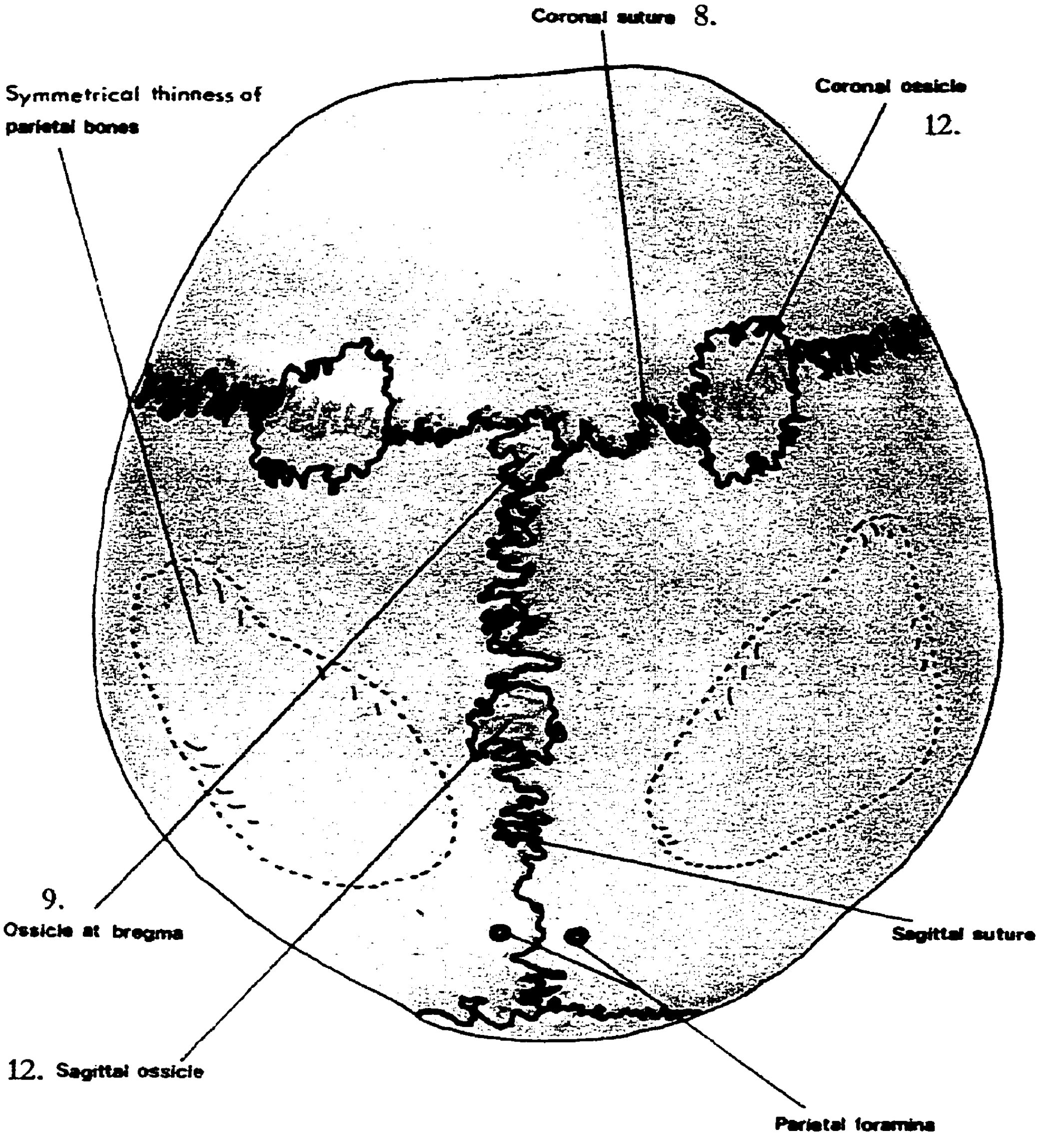
Epigenetic Variants of the Skull

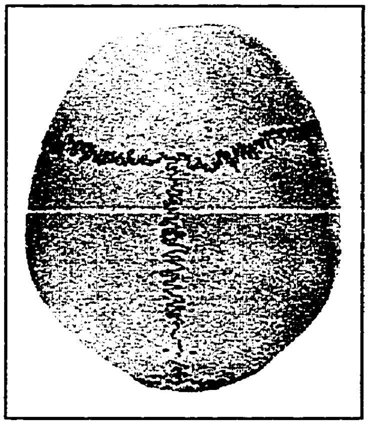
(Reproduced with permission from Hauser & De Stefano 1989:22-27)

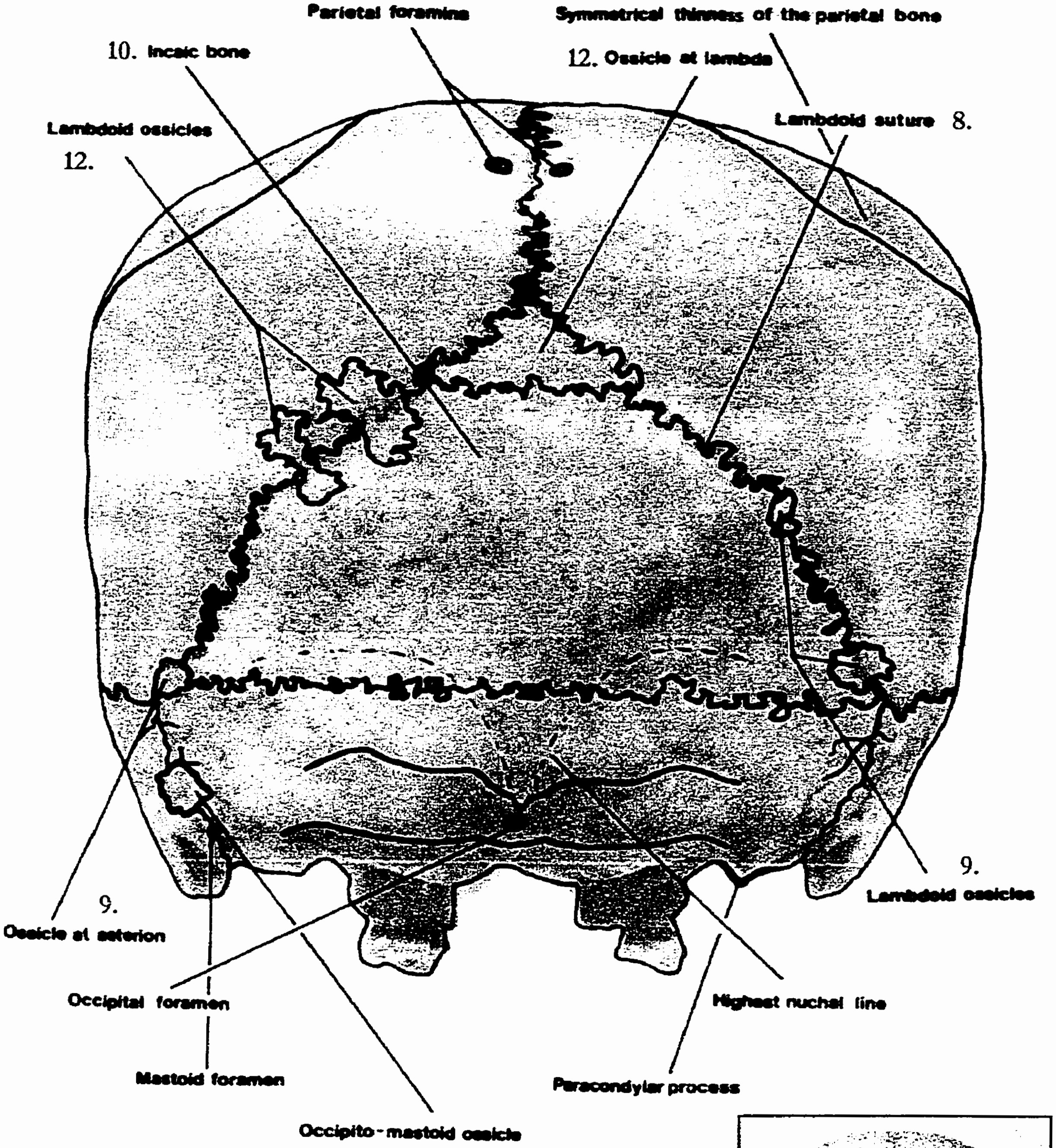


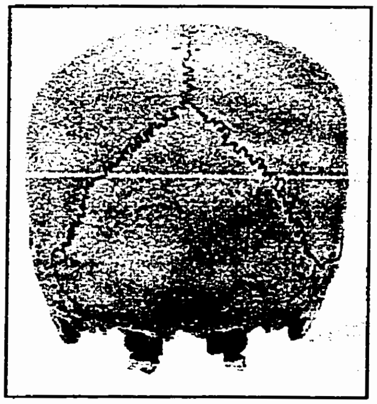


The numbers appearing in green print correspond to Rhine's (1990) non-metric traits. Please note the minor variations in terminology.

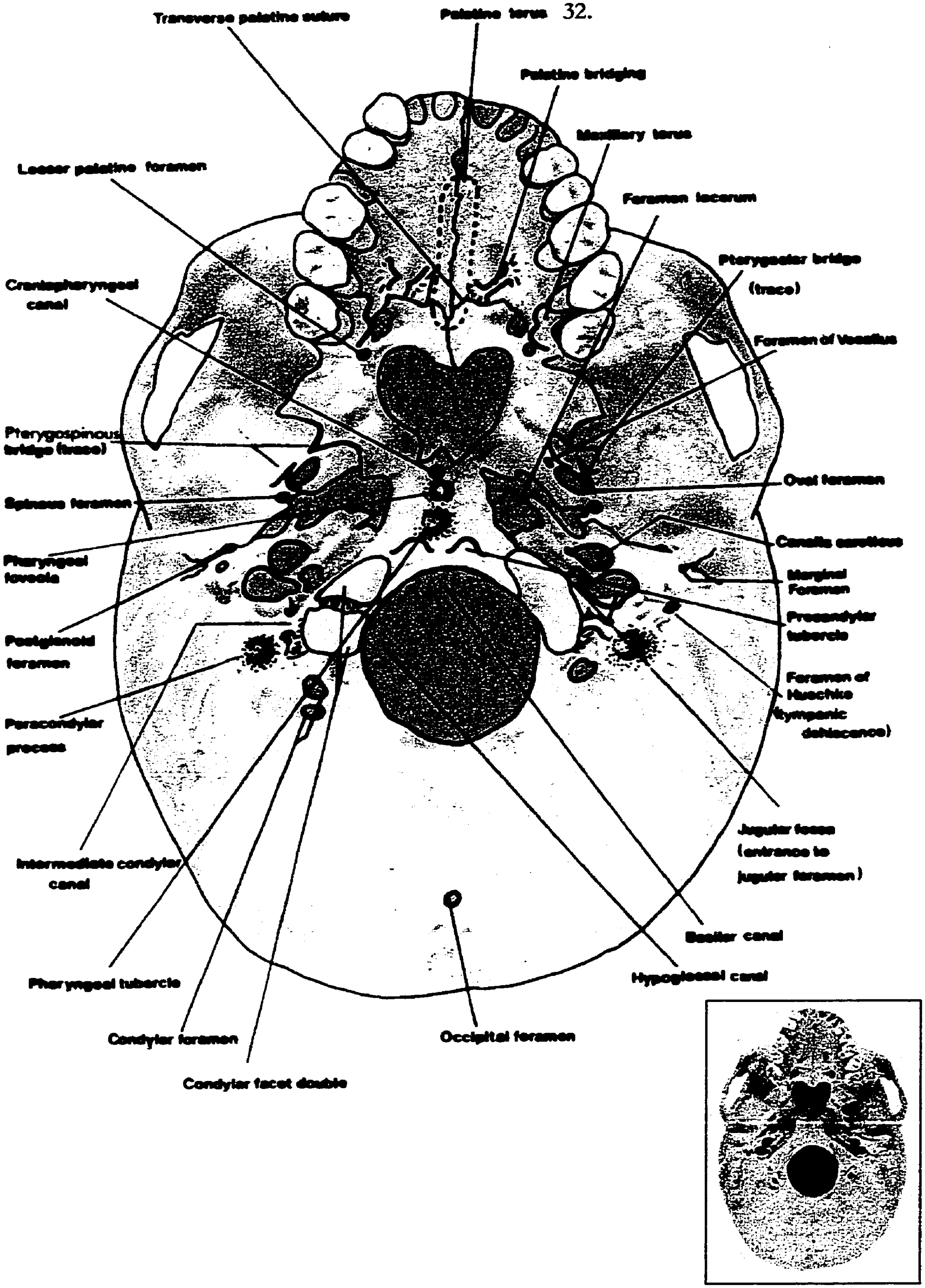

Coronal suture 8.
Symmetrical thinness of parietal bones
Coronal ossicle
12.
9.
Ossicle at bregma
Sagittal suture
12. Sagittal ossicle
Parietal foramina

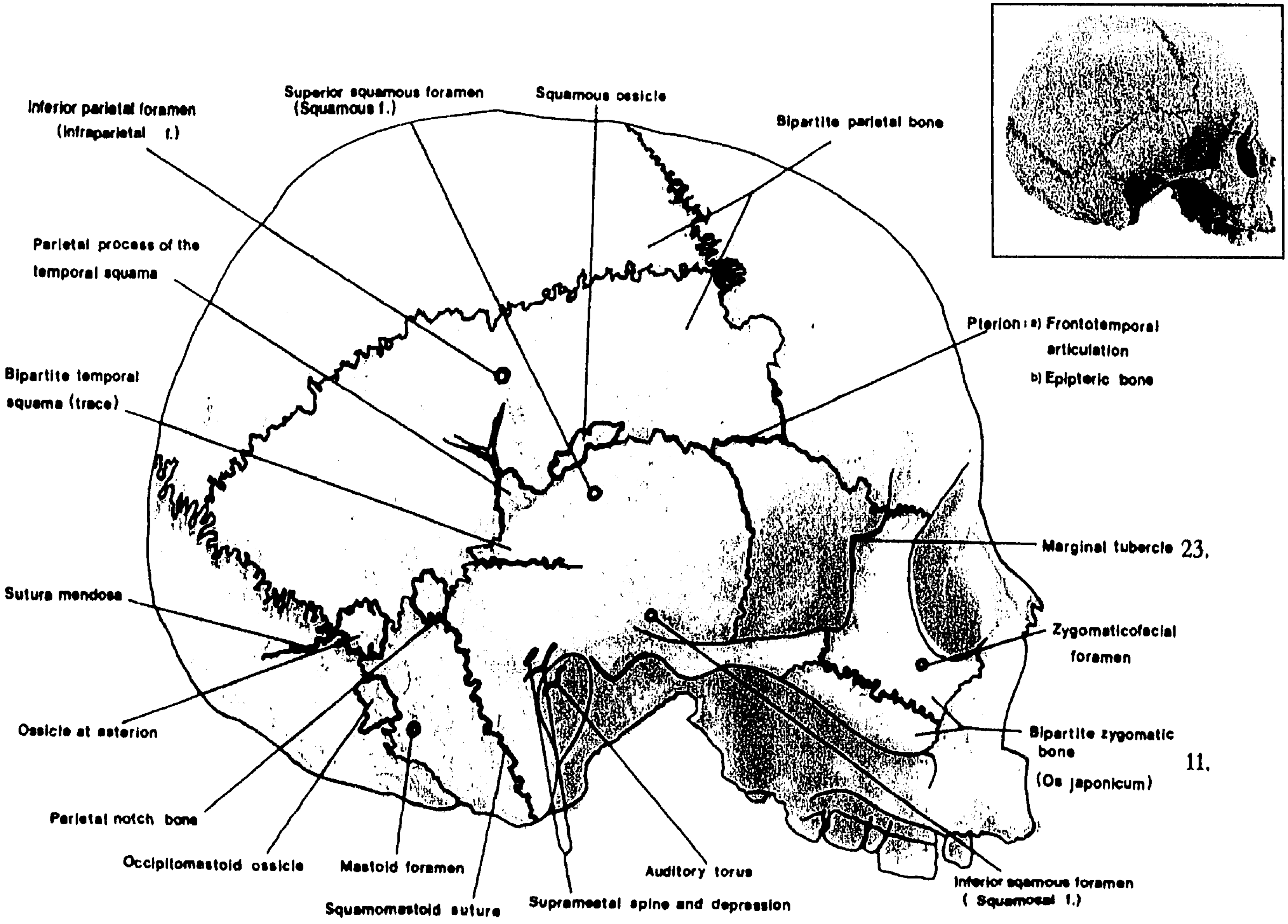



Parietal foramina
Symmetrical thinness of the parietal bone
10. Incaic bone
12. Ossicle at lambda
Lambdoid ossicles
12.
Lambdoid suture 8.
9.
Lambdoid ossicles
9.
Ossicle at asterion
Occipital foramen
Highest nuchal line
Mastoid foramen
Paracondylar process
Occipito-mastoid ossicle



32.


Transverse palatine suture
Palatine torus
Palatine bridging
Maxillary torus
Lesser palatine foramen
Foramen lacerum
Pterygoalar bridge (trace)
Craniopharyngeal canal
Foramen of Vesalius
Pterygospinous bridge (trace)
Oval foramen
Spinous foramen
Canalis caroticus
Pharyngeal fovea
Marginal Foramen
Precondylar tubercle
Postglenoid foramen
Foramen of Huschke (tympanic dehiscence)
Paracondylar process
Jugular fossa (entrance to jugular foramen)
Intermediate condylar canal
Basilar canal
Hypoglossal canal
Pharyngeal tubercle
Condylar foramen
Occipital foramen
Condylar facet double


Inferior parietal foramen (Infraparietal f.)
Superior squamous foramen (Squamous f.)
Squamous ossicle
Bipartite parietal bone
Parietal process of the temporal squama
Pterion: a) Frontotemporal articulation b) Epipteric bone
Bipartite temporal squama (trace)
Marginal tubercle
23,
Sutura mendosa
Zygomaticofacial foramen
Ossicle at asterion
Bipartite zygomatic bone (Os japonicum)
11,
Parietal notch bone
Occipitomastoid ossicle
Mastoid foramen
Auditory torus
Inferior squamous foramen (Squamosal f.)
Squamomastoid suture
Suprameatal spine and depression

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