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The evolution of shovel shaping: Regional and temporal variation in human incisor morphology

Crummett, Tracey Leigh, Ph.D.

The University of Michigan, 1994

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THE EVOLUTION OF SHOVEL SHAPING: REGIONAL AND TEMPORAL VARIATION IN HUMAN INCISOR MORPHOLOGY

by

Tracey Leigh Crummett

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Anthropology)
in The University of Michigan
1994

Doctoral Committee:

Professor Milford H. Wolpoff, Chair
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Professor John D. Speth
Assistant Professor Carroll-Ann Trotman

In memory of my mother,
Robin Berez,

for making me promise before I ever started this
that I would finish it.

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CHAPTER I

INTRODUCTION

> "There remains the problem of the supposed 'regional' characters....There is a great need for comprehensive critical reviews of these characters, their precise definition, variation and regional significance....It is evident that, for regional analyses to be effective, the characters chosen must be clearly defined, homologous, and additionally it must be demonstrated...that the characters are indeed especially characteristic of the particular 'lineage' chosen" (Stringer, 1992:16).

For nearly a century, shovel shaping of human maxillary incisors has been recognized as a regional marker and has been used to test hypotheses of genetic relationships, both within modern humans and between modern and fossil populations. Shoveling has long been involved in debates of human origins, but invocations of this character have often been contradictory. On one hand, shoveling has been taken as evidence of continuity between fossil and modern populations, and on the other, it has been used as evidence of discontinuity. Most recently, the significance of shoveling as a regional character has been dismissed altogether, and also, therefore, the utility of the trait in examining evolutionary questions. In order to clarify the utility of shovel shaping in testing hypotheses of relationship, it is clear that, following Stringer's (1992) suggestion, a detailed study of this morphology is necessary, including a critical evaluation of shovel shaping, its definition, variation, and regional significance.

Specific questions addressed in the present study include: 1) What is shovel shaping and how can it be recognized? 2) How does shoveling vary in modern populations and does this variation distribute regionally? and 3) What shoveling variation exists in the human fossil record and can shoveling be used to test theories of modern human origins as evidence of continuity or discontinuity between populations?

What is shovel shaping?

Shovel shaping, the presence of a distinct concavity on the lingual surface of the incisor, has been the subject of intense research and many assertions have been made regarding its significance. Shoveling is generally acknowledged as a "clear" racial trait for forensic identification (Hinkes, 1990). Asians and Native Americans have shovel-shaped teeth while this morphology is supposedly not seen elsewhere in the world (Carbonell, 1963; Dahlberg, 1963; Hellman, 1928). Shovel shapes are also found throughout the human fossil record. The presence of shovel shapes in fossils from Zhoukoudian and other Pleistocene Chinese sites is often taken as "evidence" of continuity between these prehistoric peoples and modern Asians (Frayer *et al.*, 1993). In the Near East, shoveling in some specimens and not others may be seen as "clear" evidence of two different kinds of hominid inhabiting the region (Trinkaus, 1992). Shovel shaping in Mesolithic North Africans, however, denies that this features distributes regionally (Stringer, 1992). Shoveling in early *Homo erectus* indicates that the morphology is primitive and provides no information about ancestry (Walker, 1993).

The above statements regarding shoveling are contradictory, in part due to different understandings of what shapes are shovel shaped. All statements regarding the importance of shoveling are based on a single assumption: that all shovel shapes are the same, perhaps differing in degree of development, but representing a single morphology with a simple genetic basis. But are all shovel shapes the same?

A review of the literature on shovel shaping clearly suggests that all shovels are not the same and that several separate aspects of incisor morphology are responsible for the ultimate shape of the shovel. In order to understand the importance of this morphology, it is necessary to have a definition by which all incisor variants, fossil and modern, may be validly compared. Therefore, a new definition for shovel shaping is proposed which will allow for greater resolution in studying the variation and evolution of shovel shaped morphologies.

Variation and regional distribution of shoveling

Dozens of studies have been undertaken on the frequencies of shoveling in modern and prehistoric populations, yet regionality of shoveling distributions is still debated. Many published frequencies conflict with those from other studies and others simply cannot be compared due to different quantification methods. Recently the presence of shoveling in non-Asian populations has been used to argue that shoveling does not actually distribute regionally (Stringer, 1992). Disparate conclusions regarding the regionality of shovel shaping make it impossible to use this morphology to address questions of relationship. With a precise definition of shovel shaping, which can be applied to both fossil and modern populations, it is possible to newly investigate the variation and regional distributions of this shape.

In the present study, several specific questions regarding variation of shoveling in modern humans will be asked: First, are there significant differences between regions in incisor morphology? Second, are some regions more similar to each other than they are to others? Do morphologies distribute in a predictable pattern? Finally, can a numeric function that uses the morphologies contributing to shoveling discriminate regions? The answers to these questions regarding the regional distribution of shoveling are critical to the utility of this character in testing hypotheses of relationship, both modern and fossil. It is essential to know the distribution of shovel shapes if they are to be used as evidence of genetic relationship.

Variation in shovel shapes in the human fossil record

Once recent regional distributions of shovel-shaped incisors are described, it is possible to ask, what is the significance of shoveling in human evolution? From the beginning of this century, incisor shape in fossil humans has been used as evidence of genetic connection between fossil and modern populations. Weidenreich (1937) proposed shovel shaping as evidence that *Homo erectus* from Zhoukoudian was ancestral to modern Chinese; shovel shaping in Neandertals, on the other hand, he saw as an indication that the morphology was lost over time in the European evolutionary line. Shovel shapes have been identified throughout the human fossil record and have been interpreted to indicate a variety of different relationships. But what do these shapes mean, if anything?

For the fossil material, questions to be addressed include: Do incisor shapes distribute regionally in human evolution? Is shoveling, in fact, characteristic of the lineages it is claimed to be, and not of other lineages? How do shovel shapes change over time and what evidence do these morphologies hold for modern human origins?

Two major models currently compete to explain the origins of modern humans: the "Multiregional Evolution" model, which proposes that the human lineage extends back at least a million years and that modern humans arose mosaically throughout the world, and the "Recent African Origin" model which posits that modern humans arose in a single location, between 50,000 and 200,000 years ago, and spread throughout the world replacing all previous populations. Each model of modern human origins makes explicit predictions regarding the nature of the morphologies seen in the fossil record and the connection between fossil forms and those seen in modern peoples. These models are discussed below, their predictions for incisor shape distribution laid out, and these predictions tested as hypotheses. There are two ways to examine predictions. First, modern morphologies and fossil morphologies in each region can be compared for similarity or difference, asking whether regional morphologies are established early in human evolution. This question can be examined through a simple examination of the available data and through cluster analyses. Second, if shapes are different, can a continuous pattern be traced from prehistoric to modern populations or is there an interruption in pattern? Can modern and fossil populations be linked using incisor morphology as evidence?

Summary

Shovel shaping has been used to elucidate population relationships for nearly a hundred years, and this shape will probably continue to be used in the future. However, to do so it is necessary that all researchers discuss the same morphology. Previous workers subsumed all shovels under a single definition, a practice which may explain conflicting opinions regarding the distribution and significance of this trait, both in recent populations and in the human fossil record. Only with a precise definition of shoveling and a survey of its variation and regional distribution can the significance of this morphology be understood.

CHAPTER II

BACKGROUND

Shovel shaping of human incisors is in many ways the most classic trait in human dental morphology. First noted in the middle of the last century (Carabelli, 1851) and intensively studied since the beginning of this one, there is an extensive literature on what constitutes shoveling, how to quantify it, and the frequencies of this morphology in populations both living and dead. Shovel shaping is a morphology that has been defined and redefined, studied in nearly a dozen different ways, and one which is commented on in almost every discussion of human dental morphology.

This chapter discusses the history of shoveling studies and why this morphology still poses a problem after so much work. Research on shoveling has been reviewed several times (Hrdlička, 1920; Carbonell, 1963; Mizoguchi, 1985) with each review bringing new information and a new perspective to the subject. I again review some of this literature, particularly those aspects that relate to the problems involved in the present study: how shoveling is defined, what morphologies compose the shape, and what information can be taken from the distribution of these shapes to interpret the human fossil record. The present review is divided into two sections: first, a general study of shoveling and how it is scored, and second, the various interpretations of shoveling in the human evolutionary record.

History of shoveling

The presence of a basin or fossa on the lingual surface of some human incisors was first noted by Carabelli (1844), who illustrated a lateral incisor and noted the hollow on the inner surface of the tooth. It is generally accepted that although he did not use the term "shovel shaped," or its German equivalent, *Schaufel,* this was the earliest recognition of this morphology in print. However, Carabelli left it at this – a note on the shape of the incisors, with no discussion of its significance.

The first published use of "shovel" as a term to describe incisor shape was by Mühlreiter (1870), who noted that the lingual surface of the maxillary incisors is hollowed out, resembling a chisel or shovel. He described eight different forms that upper incisors may take noting that both the marginal ridges of the incisors (*limbus dentis*) and the basal tubercles contributed to the morphology. He made, however, no attempt to study the significance of these different features or their distributions. In reference to the marginal ridges, Mühlreiter noted that these borders were seldom totally absent (1870, cited in Hrdlička, 1920). This treatment was like Carabelli's, a simple description of the appearance of human upper incisors, without any reference to distribution or significance of the variants described.

Tomes (1876) in his classic *Manual of Dental Anatomy* noted shoveling as well and commented specifically on the development of the tubercle at the base of the crown. Wortman (1886) stated that the lingual surface of human incisors was generally flat, but was occasionally concave, a morphology that could be "augmented" by the presence of marginal ridges, but is not dependent upon them. Wortman's view is important, as it is an early recognition that the lingual fossa, or shovel shape, may not be dependent on the development of the marginal ridges of the tooth. Black (1889) described the boundaries of the fossa as made up of the cutting edge of the tooth, the marginal ridges, and the linguo-gingival ridge or cingulum, but he attributed this morphology to *all* human maxillary incisors. Black also noted that the ridge was sometimes elevated into a tubercle, and that the concavity of the lateral incisors was highly variable.

Zuckerkandl (1891) defined the concavity of the lingual surface as created by elevated borders (the *crista dentalis,* in his terminology) and the development of the lingual tubercle. He stated, "the depth of the concavity, thickness of the rim and size of the tuberosity are subject to many variations which give rise to a series of forms that deserve a closer attention" (1891: 35, translation by Hrdlička, 1920: 435). Zuckerkandl went on to describe and illustrate seven different forms that showed varied degrees of both tubercle and ridge development, from the extremes of no development of either morphology, to strong development of both, including the development of one morphology or the other. All of these morphologies were variants on the same theme, that of a basin on the lingual surface of the tooth.

To summarize the state of recognition of shovel shaping through the last century, various morphologies of the lingual surface of the maxillary incisors were noted and described. All references to the shape, however, were simply descriptions of the incisor morphology with no attempt to explain variants, to collect data on distribution, or to discuss significance of the differences. The term "shovel shape" was coined to describe the fossa or basin on the lingual surface of the incisor. The depth and presence of this fossa, however, could be due to the development of several features on the incisor, including the marginal ridges and the basal tubercle – elaborations of the enamel and the cingulum on the lingual surface of the incisor. Nearly all incisors were thought to show some variant of shovel shaping.

The understanding of shovel shaping changed with the work of Hrdlička in the early part of this century. He approached the topic with a very different intent. Rather than simply describing the lingual surface of the incisors, Hrdlička was interested in the distribution of variation, particularly racial differences in frequency of expression. Shovel shaping was a theme in his descriptions of the dentition of Native American populations, regularly commented on in his writings beginning in 1907 (Hrdlička, 1920). He noted the difference in the morphology shown by Native American incisors compared with that seen in other populations around the world, stating:

> The type of human denture can be said to be to-day, with a few exceptions, radically everywhere the same. About the greatest of these exceptions concerns the form of the upper permanent incisors, which in one respect are radically different in the Indians from what they are in the whites, negroes, and at least some other races. The upper and particularly median upper permanent incisors of the Indian are...peculiarly and pronouncedly concave on the buccal [sic] surface (Hrdlička, 1911: 412). [1]

The difference between Native American incisors and those of Europeans or other racial groups was due to the extraordinary development of the marginal ridges of the incisors of the former. Hrdlička noted that occasionally a cusp also developed at the point of convergence of these ridges but did not consider this important in defining the basin on the lingual surface of the tooth. In 1920, he finally produced a formal definition of shovel shaping while conducting research on racial differences in the distribution of this morphology. Shovel shaping was due only to the development of the marginal ridges of the incisors.

> The character in question consists of a peculiar, pronounced hollow of the lingual surface of the teeth, bounded laterally or surrounded by a well-defined elevated enamel border. Such teeth resemble more or less an ordinary coal shovel, in consequence of which they were termed 'shovel shaped' incisors (Hrdlička, 1920: 429).

By emphasizing contribution of marginal ridges to the appearance of the basin on the lingual surface and by dismissing the lingual tubercle and other morphologies, Hrdlička's definition reduced all the contributing anatomical variants of incisor morphology to a single shape. As his definition was accepted, shovel shaping became the resemblance

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[1] In the same work, Hrdlička cited a similar statement from a previous article, acknowledging that, although he had stated "buccal" surface previously, he had meant to refer to the lingual face. This correction appears to apply to this statement as well.

only to a coal shovel, and all other shovels were left by the wayside. The hollowness of the surface became less important in defining the shovel than the presence of marginal ridges. This is not to say that Hrdlička ignored the development of the lingual tubercle. He discussed lingual tubercle development and noted that this modified cingulum may also appear with non-shoveled incisors and displayed a wide variation of forms.

> It may be absent; it may be represented by some thickening between the meeting enamel welts, or by a small pearl-like tubercle, a little vertical ridge, a pair of tubercles, a low to pronounced tuberosity, or finally a more or less free and marked cusp, the summit of which may in turn be single, cleft in two or subdivided into several points, (Hrdlička, 1920: 447-448).

Although tubercle development was considered noteworthy, Hrdlička didn't think that this morphology contributed to shovel shaping. Hrdlička's change of the meaning of "shovel shaped" from all shovels to just those with marginal ridges was due in part to his research agenda. His primary interest was in showing how Native American and Asian incisors were different from European teeth, not in detailing the full range of variation of shapes.

Hrdlička's (1920) seminal work not only offered a definition of a recognized dental morphology, but also an indication of why it might be significant. He noted that shoveling had characteristic forms in different races, common in the "yellow-brown" races and less common or rare in other racial groups. Further, he quantified this observation so that there would be no confusion. Hrdlička illustrated some of the possible forms that incisors might take, defined several degrees of development for shoveling – none, trace, semi-, and shoveled – and provided frequencies of these grades of development in populations of different racial history.

According to Hrdlička (1920), human groups differed in degree of shoveling, height of the ridges, and in the percentage of the population showing these ridges. He reported that American whites displayed very low frequencies of shoveling, and that the observed shovels were primarily trace forms. African-Americans showed slightly higher frequencies of shoveling, especially of the greater degrees of development. High frequencies were seen in Hawaiians, but highest frequencies of shoveling occurred in Chinese, Japanese, and Native Americans, who showed nearly 100% shovel-shaped teeth, primarily of the higher shoveling grades.

Hrdlička's explanation of this variation was twofold: both genetic and adaptive factors affected the distribution of shoveling. He suggested that the development of marginal ridges of the tooth were most likely due to selection to produce a stronger incisor: "An incisor of this form, all other things being equal, must on mechanical principles be considerably stronger than a flat-surfaced tooth" (Hrdlička, 1920: 464-465). Hrdlička also noted that while there was likely a functional component, shovel shaping quite possibly also carried information regarding racial heritage. Clear racial, or geographic lines could be drawn based on shoveling and its distribution. As a carrier of information both on adaptation and populational history, he suggested that shovel shaping very likely would be useful in the examination of human evolution.

Once presented with a definition of the morphology and the indication that shovel shaping showed racial differences in its development and distribution, dental anatomists and anthropologists began in earnest to study its distribution across the world. Previous studies of the morphology can be lumped into three categories: 1) studies that discussed how shoveling should be examined or quantified; 2) studies that presented the frequency of shoveling in a population or set of populations; and 3) studies that examined the genetics of shoveling as well as its association with other dental morphologies. The present review will discuss the literature within each of these topics. Some studies occupy more than one of these categories and will therefore be covered in more than one discussion.

Quantifying shovel shaping

As mentioned above, in addition to providing a definition for shoveling, Hrdlička (1920) also provided a way to quantify this shape. He proposed a four-grade scale for recognizing the different degrees of shoveling, including absence of the morphology. Although he did not illustrate this scale, he gave explicit descriptions of each grade:

> Under the term 'shovel shaped' are included all incisors whose lingual surface showed the enamel rim with the enclosed fossa well developed. The term 'semi-shovel' was applied to all teeth in which the enamel rim was distinct, but the enclosed fossa was shallow. The term 'trace' covers all those teeth in which there were distinct traces of the enamel rim, but which could not be classed as yet as 'semi-shovel.' Finally as 'no-shovel' were recorded all those incisors in which there was either no perceptible trace of rim and fossa, or in which traces of these were so faint or imperfect as not to deserve a special characterization (Hrdlička, 1920: 449).

Hrdlička's categorical method for examining shoveling became the standard to which all subsequent work has been compared.

Lasker (1950) pointed out that studies of dental morphologies, such as shoveling, have utility in determining relatedness, but also have difficulties:

> Most obvious to one who would make such a study, for instance, is the problem of determining what constitutes a trait, and of clustering the observations made into a classificatory system that has some meaning beyond convenience in presenting the data (Lasker, 1950: 191).

Shoveling is often reported by Hrdlička's scale even if this is not the way in which the shape is actually quantified in the particular study (e.g., Carbonell, 1963, who measured the absolute depth of the lingual fossa, but reported these depths according to Hrdlička's categories). The lack of illustration of grades, however, has remained an important problem. Although descriptions of incisor morphologies were available, it was difficult to standardize frequencies between different observers because descriptions are subject to differing interpretations. Pedersen (1949) provided illustrations to match Hrdlička's grades but it is unclear whether they were exactly as Hrdlička would have imagined them. In addition, many workers quantified shoveling in some other manner and then reported frequencies in Hrdlička grades. Thus, shovel shaping scores could not be accurately compared between studies. "Definitions of degrees of shovel shape vary from worker to worker, and interpretation of degree on living subjects is especially open to question," noted Dahlberg (1951: 141), who decided to provide a solution to this problem.

Measuring shovel shapes

One way to increase replicability of scores is to create a comparative standard or plaque, a three-dimensional physical replica of categories or grades to be used by all workers studying a morphology. Dahlberg (1956) developed the first of these for shoveling, presenting it as part of a set of comparative standards on dental morphologies. This preliminary plaque (he felt that these were subject to change as need arose), "P1," showed eight forms of incisor morphology – three of which could be used in the scoring of shovel shaping. The tooth cast for stage "a" showed no shoveling, "c" the semi-shovel shape, and "g" the shovel shape, as Hrdlička had described them. Dahlberg provided representations of varying developments of this character in the hope of ensuring that future scores would be more comparable.

As is so often the case, however, people were dissatisfied with the first system, and even Dahlberg quite quickly abandoned the method (Dahlberg *et al.*, 1956). At first plaques were abandoned in favor of measuring the actual depth of the lingual fossa, the depth of the shovel, with a modified Boley Gauge (Dahlberg *et al.*, 1956; Carbonell, 1963; Barnes, 1969). It was thought that this was a more accurate measure of the shovel than visual evaluations of the degree of development, although "not entirely definitive of the character in its multiple associations" (Dahlberg *et al.*, 1956: 386). Even using this method, however, variation was often divided up into ranges of depth, and incisors finally assigned to one of the Hrdlička shoveling categories. Measurements greater than 1 mm were considered to denote a shovel, 1 mm itself a semi-shovel, less than 1 mm a trace shovel; and zero depth denoted no shovel (Carbonell, 1963).

Dahlberg was not the last to approach shoveling in this manner. Rothhammer *et al.* also measured the depth of the lingual fossa directly. The technique he utilized is described as follows:

> In order to quantify the shovel shape character, we measured the thickness of each superior incisor at the site of maximal depth in the palatal face, and the lateral ridges at the same level. An index was obtained using the difference between the values of the mean lateral thickness and the central one (1968: 163).

Resulting index scores were presented, as well as Hrdlička equivalencies for ranges of scores. Rothhammer *et al.* (1968) expressed their hope that this method would add precision to studies of shovel shaping, precision that would be useful in later studies of the genetics underlying shoveling. A similar method was used by Blanco and Chakraborty (1976) who reported shoveling by an index determined in a similar manner: an index less than or equal to 0.3 mm, was considered "not shoveled"; any other tooth was considered "shoveled".

Hanihara *et al.* (1970) dismissed comparative plaques because of subjectivity involved when scoring a tooth that falls between two categories. They provided their own method of objective measure; a dial gauge accurate to 0.01 mm was used to take "the largest depth of the lingual fossa measured from a chord between the mesial and distal marginal ridges" (Hanihara *et al.*, 1970: 91). However, the depths used to provide equivalencies to Hrdlička categories differed from those used in other studies which measured depth of the fossa. In their system, 0-0.49 mm was not shoveled, 0.50-0.99 mm encompassed both trace and semi-shoveled categories, and 1 mm or more was considered shoveled. In a later study by Hanihara (1973), the Hrdlička scale was dropped in favor of reporting presence or absence only, in which case any measure above 0.50 mm was considered shoveled (Hanihara, 1973).

Similar measurement of the lingual fossa was made by Campusano *et al.* (1972) who took the "measurements of the lateral crest...from the pit in the bucco-lingual dimension at the union of the gingival and medial thirds of the teeth" (p. 140). These authors reported only presence and absence of the morphology, absence considered any measurement less than 0.30 mm.

The scoring of shoveling by comparison to a standardized plaque was revived with the research of Scott (1973). The rationalization for the return to the use of plaques was that "trait variation in form, prominence, position, etc., makes it difficult to objectively define the landmarks for measurement" (Scott, 1973: 21). He rejected absolute measurement for these reasons, and also rejected previously developed plaques because he felt that they did not provide a high enough level of resolution amongst heavily shoveled teeth. Scott therefore proposed a new plaque system that divided shoveling into eight progressive stages of development. The expansion to eight stages, he thought, increased discriminatory power among Asian or Asian-derived populations, as well as providing more informative sample frequency distributions. Following Scott (1973), the majority of later quantitative studies scored shoveling by comparison to a standardized plaque rather than by the absolute measure of the fossa. A few, like Aas and Risnes (1979a, 1979b) returned to the measurement of the lingual fossa directly through the use of a specially designed caliper, taking measurements of the lingual fossa to the nearest 0.1 mm.

It is clear that two basic approaches have developed to study shovel shaping of the incisors: one can either measure the depth of the lingual fossa directly or make a visual observation of the degree of shoveling based on a description or a comparative plaque. Differences between methods lie in the details of the measurement or of the comparative standard. Most studies of shovel shaping use one of the two approaches to report frequencies in and across populations. Occasionally both methods are used: teeth are measured directly and reported categorically.

The trouble with shoveling

When the results of shoveling studies are compared, however, the question arises as to whether the methods are equivalent. Even while claiming that the measurement of the lingual fossa directly was the most ideal way in which to study shovel shaping, Aas noted that the fossa measurement did not strictly correspond to shoveling (1982a, 1982b). Other studies examining both lingual fossa depth and shovel shaping scored by a more subjective method also found that shoveling and lingual fossa depth were not strictly correlated and that direct measurement might be compromised by other characters of the incisor besides the marginal ridges (Lasker, 1950; Suzuki and Sakai, 1966; Dahlberg, 1968; Hanihara *et al.*, 1970; Bang and Hasund, 1971; Kirveskari and Alvesalo, 1981; Aas, 1982a; Mizoguchi, 1985a). As Dahlberg *et al.* (1956) explained, "metrical description of the depth of the sulcus is more accurate and is preferred to the past visual evaluations, but it is not entirely definitive of the character in its multiple associations." Several factors that contributed to the shape of the lingual surface included:

> (1) the degree of prominence of the mesial and distal marginal ridges, (2) markings and eminences in the sulcus between the ridges, (3) the size of the tooth, (4) the proportions of the tooth and (5) the character of its gingival portion (cingulum) (Dahlberg, *et al.*, 1956: 386).

Hanihara *et al.* (1970) also concluded that shoveling was a complex morphology. They explained the source of some of these differences:

> The expression of the shovel shaped character is determined by several structural components such as concavity of the lingual fossa, development of the marginal ridges, overall size of the incisor teeth and so forth. In view of this fact, the depth of the lingual fossa measured by the proposed method represents only a small part of the structure (Hanihara *et al.*, 1970: 96).

Raw measurement of the depth of the lingual fossa reports not only on the marginal ridges of the incisor, but also the curvature, the size of the tooth, and the presence of a cingulum or tubercle. Each of these other features will influence any attempt to directly measure the lingual fossa.

Due to the problem of non-compatability between lingual fossa depth and shoveling, Scott (1973) was the first of several to reject the absolute measurement of the lingual fossa as a reasonable strategy for studying shovel shaping. Recognizing that the measurement of the lingual fossa and shovel-shaping scores were substantively different, he returned to scoring the morphology by comparison to a standardized plaque.

Although many of the above studies recognized that shoveling and lingual fossa depth were not equivalent and that shoveling was a complex character, shovel shaping was still treated as a single morphology. Shoveling, however, could not be measured directly. Several other characters were repeatedly identified as significant in creating this shape, as by Dahlberg *et al.* (1956) and Hanihara *et al.* (1970), cited above. Suzuki and Sakai (1966) also noted the complexity of the shovel, stating that "shovel shape of front teeth is not an independent characteristic but final pheno-type caused by the relative or absolute degree of development or the morphological variation of many characteristics present in the lingual surface of the front teeth" (1966: 218). While Suzuki and Sakai (1966) noted that there were other characters involved in the composition of shoveling, these authors did not specify which characters these were.

Most frequently cited among the characters that contribute to the shape of the incisor are the curvature of the occlusal edge, or concavity of the lingual surface (Hanihara *et al.*, 1970; Nichol *et al.*, 1984) and the development of the lingual tubercle (Mizoguchi, 1978, 1985a; Kharat *et al.*, 1990; Smith *et al.*, 1981). These features can be identified in Adloff's (1937) description of a basal incisor morphology, from which all shapes derive. Adloff's basal form was created by heightened side ridges, a concave surface, and a tubercle. He stated that this form might be modified in many ways, leaving just a concave surface, or just ridges, or just a lingual tubercle. Marginal ridges, tubercles, and concavity have been studied separately but never together as a set of features responsible for the final form of the incisor.

Other elements of incisor shape

Each of the other aspects of incisor morphology – curvature, and tubercles – has a history of study of its own, although in the case of curvature, it is a short one. Although concavity of the lingual surface has been noted, especially in Neandertals (Gorjanović-Kramberger, 1906), incisor curvature has rarely been studied and has only quite recently been systematically quantified. Nichol *et al.* (1984) proposed a standardized plaque by which to score variants in curvature. Their original description of "labial convexity" focused on curvature as a measure of the labial surface of the incisor; however, curvature does not affect only the labial surface of the tooth. Labial convexity is usually concomitant with lingual concavity, and both are scored by examining the curvature of the incisal edge. Therefore, in the recent description of labial convexity, it has been renamed as curvature of the incisor (Turner *et al.*, 1991). It is scored by examining the arc at the median point of the incisal edge of the tooth. Scoring in this manner reduces the influence of other morphologies, such as the development of marginal ridges or of double shoveling, on the score taken (Turner *et al.*, 1991).

The lingual tubercle has a much longer history of study, as it was noted repeatedly as an interesting variant in the writings of the last century (Mühlreiter, 1870; Tomes, 1876; Wortman, 1886; Zuckerkandl, 1890) and has continued to be noted and quantified. The development of the lingual tubercle, or elaboration of the cingulum, was seen as an integral part of the morphology of shoveling until divorced from the shape by Hrdlička (1920). Afterwards, the character was often noted and quantified but generally was not thought to be involved with shoveling, *sensu stricto.* In the tubercles most extreme manifestation, as an independent cusp, it is occasionally known as a talon cusp (Davis and Brook, 1985, Sawyer *et al.*, 1976b).

Hrdlička (1920, 1921) described the presence of lingual tubercles in Native American teeth as did Wissler (1931), Nelson (1938), and Dahlberg and Mikkelsen (1947). In Native Americans, tubercles were considered rare, and possibly aberrant. Tubercles have also been noted in Chinese (Montelius, 1933), Tasmanians (Abrahams, 1950), ancient Mesopotamians (Carbonell, 1963), eastern Indians (Pal, 1964), Peruvians (Goaz and Miller, 1966), New Zealanders (Taylor, 1969), and many other populations.

Tubercle development has occasionally been quantified, although as Turner *et al.* (1991) point out, no attempt has been completely satisfactory and there is large both within and between observer variation in scoring this shape. Frequencies have been presented by simple presence or absence; by the development of each of the ridges that make up the tubercle; by whether the cusp is single or double, small or large; and by progressive stages of development, from faint ridging to the presence of a strong independent cusp (Hrdlička 1920, 1921; Carbonell, 1963; Barnes, 1969; Turner and Cadien, 1969; Kirveskari, 1973; Mizoguchi, 1978, 1985a; Smith *et al.*, 1981; Kieser and Preston, 1981; Lukacs and Hemphill, 1991; Turner *et al.*, 1991). Each method produced somewhat different frequencies of tubercle development and it is unclear whether any are comparable.

Observations or frequencies concerning tubercles were usually accompanied by notes on marginal ridges. Some studies suggested that the two shapes were related while others specifically stated that they were not. Hrdlička (1920,1921) originally noted the occasional combination of the two features. He described several degrees of tubercle development and noted its apparent independence from shovel shaping. Pedersen (1949) noticed the presence of the tubercle among the East Greenland Eskimo and commented that although the tubercle and shovel shape may coincide, one had nothing to do *per se* with the other. Moorrees (1957) confirmed the independence of tubercles and marginal ridges in the Aleut, mostly due to the absence of tubercles in this population. Carbonell

(1963) further confirmed independence of tubercles and shoveling with teeth from Mesopotamia, which commonly had lingual tubercles but very rarely showed shoveling.

Other research suggested that marginal ridges and tubercle development might be interrelated. Lasker (1950) observed that prominent marginal ridges might obscure the presence of a lingual tubercle. Tratman (1950) also observed that the two morphologies often appeared together, and commented that the elevation of the cingulum might, in fact, produce a deeper lingual pit than in its absence. Dahlberg *et al.* (1956: 386) thought that the medial ridges or lingual tubercle and the marginal ridges were interrelated and that "variations in the cingulum tend to occur more frequently and to be of greater prominence in teeth manifesting the shovel shaped trait."

Disagreements about whether lingual tubercles and marginal ridges were associated continued through time. It was clear that both morphologies were fairly common, and the conclusion reached about association probably depended upon the exact morphological composition of the teeth in the particular population under examination. If a population showed both morphologies, the conclusion was usually that the characters were associated; if a population showed only one of the morphologies, the characters were thought not to be associated. This issue was addressed by Scott (1977b) and in greater detail by Mizoguchi (1978, 1985).

Mizoguchi (1985), in research on Japanese incisor morphologies, investigated shoveling, lingual tubercles, and the component characters of each. That is, he looked at each of the ridges which contributed to shoveling, and the individual spines that made up the lingual tubercle. He treated all as separate characters, as well as part of the complex of shoveling or tubercle development and scored all by comparison to standardized plaques for degree of development. He concluded that the lingual tubercle and shoveling did not significantly correlate (1978). However, all the separate ridges and spines contributed to what was known as shovel shaping. He stated:

> Shoveling is a composite character which is produced by differences in development between the component characters on the lingual surface of the tooth crown. In particular, the component characters are the marginal ridges and the central ridge. They intensively, but inversely, influence the expression of shoveling (Mizoguchi, 1985: 9).

The results of his research indicated that marginal ridges and tubercle development are two characters that may be considered independent. However, both features contribute to shoveling, as a broader term referring to the shape of the lingual surface of the incisor.

Genetics of shoveling

Shovel shaping gained importance in anthropology because even with disparate results from differing definitions of shoveling, it was evident that this morphology showed racial or geographic patterns of distribution. Besides the phenotypic differences in frequencies of shoveling between populations, many studies examined the genetic sources of these differences. Inheritance of shoveling and its detailed morphologies has direct bearing on the interpretation of the character's distribution. If these shapes are strongly influenced by environment or development, then patterns of distribution must be reevaluated.

Nearly all studies that have examined inheritance of shovel-shaped incisors were concerned exclusively with the genetics of marginal ridge development. Only those that examine the interaction of shoveling with tubercles even mention the inheritance of other characters, and usually just as a passing comment. Therefore, this summary of what is known about the inheritance of shoveling primarily concerns the heritability of marginal ridge development and does not refer to the other morphologies which contribute to the shovel.

There are many ways to investigate the inheritance of shovel shaping. Studies of shovel variation within and between populations may examine the expressivity of the trait, sex differences in its expression, or its distribution. Studies of individuals reared in a different location than their geographic origin investigate the influence of environment on the development of shovel shaping. Admixture studies and family studies both examine the degree to which shoveling is passed from generation to generation. There have also been investigations of sex differences in the expression of shovel shaping, and there are studies of shoveling in individuals with genetic anomalies. All such studies contribute to our understanding of the underlying genetic, developmental, and environmental factors which influence the manifestation of the shovel shape.

Population studies of inheritance

Hrdlička (1920) assumed that shovel shaping was inherited and therefore could be used to examine questions of relationship. However, the nature of this inheritance was not investigated until the 1940's when studies began to explore the geographic distribution of shoveling, and family and population studies were used to examine patterns of inheritance.

Dahlberg (1945) noted that the highest frequencies of shoveling were in China, with decreasing frequencies of the morphology radiating out from this center. He interpreted these different rates of shoveling to mean that isolation of populations determined the geographic pattern of distribution. Differences in degree of shoveling were due to modification of a primary incisor type, by loss of the marginal ridges, or modification of other characters (Dahlberg, 1951). He stated:

> All human dentitions are basically the same. The differences between individuals are in the number and extent of the primary and secondary characters of the tooth groups, which in turn are the reflections of the genetic constitution of the individual....The shovel shape is a primary character of the incisors. There may or may not be associated characters with it (Dahlberg, 1951: 140).

In this interpretation, the presence of marginal ridges is a primary character or ancestral shape, while the absence or any change in the development of these ridges is secondary.

Details of the inheritance of these shapes were investigated by Dahlberg *et al.* (1956). Due to variation seen in shoveling and multiple factors involved in its manifestation, these authors concluded that shoveling was most likely controlled by multiple alleles at a single locus.

Later Dahlberg (1968) found that multiple loci were a better explanation for manifestation of shoveling. He thought that this shape and many other dental traits were built up over time by many genes. Because of polygenic inheritance and the environmental influence on shoveling development, he stated that shoveling would be difficult to study but would also carry a great deal of information about evolution and adaptation.

Turner (1967) also concluded that shoveling had a complex mode of inheritance. Using Hrdlička's categories, he examined population differences in shoveling in Native Americans and found nearly continuous variation in the morphology. He found strong evidence of inheritance but thought that he could not adequately quantify the heritability due to the methods used to examine the shape. Discrete classification categories, he thought, were insufficient for quantifying shoveling. Turner (1967) concluded that models of inheritance looking at more than two alleles would fit data from large populations better if shoveling were divided into more classes of development.

Devoto *et al.* (1968) also concluded that a hypothesis of single gene inheritance did not fit distributions of permanent tooth shoveling. These authors tested the distribution of shovel shaping in a native Argentinian population against a Hardy-Weinberg distribution, assuming a single gene, two allele inheritance. The distribution of these characters did not fit this model. This was evidence, they concluded, that shoveling had a polygenic inheritance.

Portin and Alvesalo (1974) examined shoveling in a Finnish sample and ruled out a single dominant autosomal or single recessive gene as the mode of inheritance, but identified several other possible inheritance modes:

> The hypothesis of a single intermediate autosomal gene is acceptable. The hypothesis of one locus with more than two alleles involved and the polygene hypothesis would be equally compatible and cannot be ruled out (Portin and Alvesalo, 1974: 62).

Another attempt to determine the mode of inheritance was by Lee (1977) who examined shoveling and several other dental characters. He concluded:

> ...simple Mendelian inheritance seems unacceptable to explain these common dental traits, due to the wide discrepancies shown in the inheritance patterns. It appears that these traits are infinitely variable, not falling into separate well-defined categories, and therefore are likely to be inherited in a multifactorial way (Lee, 1977: 26).

Mizoguchi's (1977a, 1977b) studies of the Japanese resulted in the same conclusions. He noted that polygenic inheritance should be assumed due to continuity in expression of shoveling. He also stated, however, that heritability estimates varied depending on whether shoveling was observed metrically or by comparison to a standard. Shoveling observed metrically yielded a heritability estimate of 0.52, but non-metric observations yielded an estimate of only 0.22. These results led him to conclude that, "the character called shoveling does not strictly correspond to the character called depth of the lingual fossa," (Mizoguchi, 1977a: 55). He also found, as did previous researchers, that the central incisor was less variable than the lateral. Mizoguchi thought that this difference, contra Sofaer *et al.*(1972), was not due to a greater environmental effect on the lateral incisor, but to greater genetic variability. Further work by Mizoguchi (1985) supported these results. He noted that based on the continuity of its expression, shoveling is most likely inherited polygenically. Mizoguchi (1985) also found no significant sexual dimorphism of shoveling when scored either metrically or non-metrically.

Baume and Crawford (1980) addressed the genetics of shoveling by examining asymmetry in the trait within Maya populations. They noted that non-metric dental traits under genetic influence may manifest themselves as continuous variables. The presence of the trait was due to crossing a developmental threshold. If there is a strong genetic component to shoveling, they reasoned, there would be a high frequency of bilateral expression, while environmental influences would result in high asymmetry. In this study, rates of asymmetry for the central incisors were between 2% and 10% while those for the lateral incisors were between 10% and 21%. Baume and Crawford thus concluded that the lateral incisors were more influenced by environment than were the central teeth.

Aas (1982b) also investigated asymmetry of shoveling. He concluded that observed distributions of shovel shaping and correlation between sides were most compatible with an explanation of polygenic inheritance. He found neither population nor sex differences in asymmetry.

Overall, studies from 1945 to 1982 lead to the conclusion that the inheritance of shoveling is not simple. Most concluded that simple Mendelian inheritance was not an adequate explanation of observed distributions of shoveling nor of the continuity of expression of the trait. Instead, polygenic inheritance provided a better explanation both of the manifestation of shovels, a continuity of forms from trace to very shoveled, and of the distribution of these shapes within populations.

Same genes, different environment

Another fruitful research path explored differences in shoveling in populations with a single geographic or racial origin, raised in different environments. Lasker (1945) undertook one such study to examine how development and environment affected shovel shaping, by comparing Chinese reared in China and in the United States. He hoped to ascertain how much of the morphology was due to genetic background and how much to environment. Lasker's research showed virtually no difference in the expression of shoveling shown in the two groups. He concluded that, like other dental characteristics which showed few differences between genetically related individuals in different environments, shoveling was a good genetic marker and therefore would be useful for studies of human evolution.

Goose (1963) examined Chinese living in Liverpool in order to investigate the similarity and differences between their tooth morphology and that of other Asian groups, and of the local European population. This study found no significant difference between shoveling manifestation in this Liverpool-raised Chinese population and Chinese raised in China.

A similar analysis was undertaken by Lee and Goose (1972). Based on their research and the problems they identified in classifying shoveling, these researchers concluded:

> Simple Mendelian models seem unacceptable for these common dental traits and it appears necessary to look again carefully at them....It appears therefore that it would make better sense to assume these traits are really continuous and not discrete and therefore are likely to be inherited in a multifactorial way (Lee and Goose, 1972: 338).

The studies summarized above indicate that environment has little effect on the manifestation of shoveling providing that genetic makeup is kept constant.

Admixture

Several workers have examined admixture in order to investigate inheritance of shoveling. Abrahams (1949) examined a mixed population in South Africa, the Cape Malays. He identified this group as a mix of Javanese, Ceylonese, Chinese, Indian, Arab, and European. Because the population was a complex mix, he thought that it would be a good group for checking the inheritance of shovel shaping. By examining shoveling along genealogies, he concluded that shoveling was a recessive character and the Cape Malays were developing the normal, dominant tooth from the ancestral shovel shaped incisor (Abrahams, 1949). This "normal" tooth was like that of the European, with little detailed morphology. This study was among the first not only to note that shoveling was inherited but to try to understand the nature of its inheritance.

Turner (1967) examined shoveling in "hybrid populations of European-Mongoloid union," Eskimo and American white mixed individuals. In these people, he concluded that shoveling frequencies were not "proportionately diluted" by admixture, indicating that the presence of shoveling, in whatever gene or set of genes, was a dominant trait.

Hanihara (1963) and Hanihara and Hanihara (1989) studied Japanese-American children to evaluate the influence of admixture on the frequencies of dental traits. These studies considered an unique population of F1 generation children: mothers were Japanese, while fathers were either white or black American soldiers. These two studies discovered frequencies for shoveling which were neither as low as would be expected of either the American black or white populations, or as high as the native Japanese populations, but were intermediate between the two. The authors stated that such a result indicated either blending of genes or polygenic inheritance. Both studies concluded that shoveling was primarily genetically determined, although it was subject to nongenetic factors. They also concluded that shoveling was a dominant trait, rather than recessive as suggested by Abrahams (1949).

The above studies all concluded that shoveling was heritable and suggested that manifestation of the trait was dominant over the lack of it. In mixed populations, shoveling frequencies were somewhat less than they were in pure Asian samples, but not in direct proportion to the input of Asian genes. Mixed Asian-European populations did not reflect frequencies of shoveling halfway between the two, but showed higher frequencies and greater scores than would be expected by pure blending.

Family studies

Studies within families follow the inheritance of a trait from generation to generation. The degree of similarity in shoveling between parents and children or between siblings provides the best information on inheritance without identifying the genes themselves.

Lasker (1950) used twin data to examine both the inheritance of shoveling and its association with other dental morphologies. He found that degree of shoveling was highly concordant between twins, suggesting that shoveling was only slightly influenced by development. In addition, Lasker noted that the central incisor showed less variation in degree of shoveling than did the lateral; however the morphology of these two teeth were highly correlated. As a sidenote, Lasker also examined the lingual tubercle, and concluded that the distribution and inheritance of shoveling did not appear to be related to the lingual tubercle.

Hanihara *et al.* (1970) examined heritability by looking at twins (both monozygotic and dizygotic) and non-twin siblings. For over 100 pairs of siblings, significant correlations of shoveling between sibling pairs were found. Monozygotic twins showed the highest correlations ($r=0.93$), followed by dizygotic twins ($r=0.80$). Non-twin siblings showed a shoveling correlation of 0.39, also significant. "This fact apparently suggests that the shovel-shaped character is in large part under the control of genes," (Hanihara *et al.*, 1970: 96). Heritability was estimated using Holzinger's formula, $G=(rm-rd)/(1-rd)$, where rm is the correlation coefficient between monozygotic twins, and rd that for dizygotic twins. The heritability derived, 0.66, suggested that 66% of the variability in the morphology was due to genetics and 34% to non-genetic factors.

Familial inheritance patterns were also investigated by Sofaer *et al.* (1972a). Examining Melanesian families, these researchers found significant correlations between central and lateral incisor shoveling, but did not find significant correlation in degree of shoveling between family members. For the central incisors, correlation coefficients were $r=0.17$ for siblings and $r=0.20$ for parents and offspring. For the lateral incisors, coefficients were even smaller. Results contrast strongly with those of Hanihara *et al.* (1970); Sofaer *et al.* (1972a) instead concluded that there was a large environmental component to the expression of shoveling, especially in the lateral incisor. However, when shoveling was treated as a binary character, either present or absent, the concordance between family members was 0.99. Sofaer *et al.* (1972b) concluded that:

> The actual mode of genetic control of these characters has yet to be established, though there have been attempts to support the suggestion that particular human dental morphological variants are controlled by single autosomal loci....many dental morphological characters behave as quasi continuous variables....[and] the accepted model of quasi-continuous variation is that there is an underlying scale of continuous variation of some attribute (a combination of all the genetic and environmental factors involved) that is immediately related to the development of the character (Sofaer *et al.*, 1972b: 357).

Shoveling, these authors concluded, was a useful indicator of genetic differences but its use must be viewed "with cautious optimism" as the degree of environmental contribution to the variation was unknown.

In a further study of inheritance, Hanihara *et al.* (1974) found high correlations in shovel shaping manifestation between family members. Studying members of 41 families, significant correlations were found between all pairs of relations except mothers and daughters. Correlation coefficients ranged between 0.24 (mothers and daughters) to 0.53 (male siblings). Correlations of shoveling between twins were particularly strong. Heritability estimates ranged from 0.49 to 0.86. Due to high correlation between male siblings, and a lack of significant correlation between mothers and daughters, the authors stated that it was possible that shoveling may be a sex linked trait, but that further research was necessary to substantiate that possibility.

Blanco and Chakraborty (1976) undertook a similar study to that of Hanihara *et al.* (1974). In their Chilean samples they found significant correlations between most family members; however, their results differed from Hanihara *et al.* (1974) in that the worst correlations in this study were between father and son, and between sisters, rather than between mother and daughter.

Dahlberg *et al.* (1982) conducted family studies among the Pima Indians of the South-Western United States. This study found that shovel shaping in children was intermediate between that seen in the parents, and varied primarily by one or two stages of the Hrdlička system. In particular they examined children of semi-shoveled parents; the majority of these children were also semi-shoveled.

The above studies concluded that the degree of shoveling shown by an individual was primarily genetically determined but was also influenced by the environment. Heritability was estimated to be between 49% and 86% and higher heritability estimates were nearly always achieved for the central than for the lateral incisors. Sofaer *et al.* (1972a: 812) stated, "the environmental component of variation....includes not only a contribution from the environment of the animal as a whole but also a possibly more important contribution from the local environment around the developing tooth." Environmental influence was greater on the lateral incisor than the central. Overall, it was clear that the presence of shoveling was inherited although the degree of shoveling might be modified by the developmental environment.

Sexual dimorphism

Whether or not shovel shaping frequencies differ between the sexes is a point of great contention. Since Hrdlička's description in 1920 it has been claimed that males show great frequencies of shoveling, that females show greater frequencies of shoveling, or that there are no significant differences between the sexes. Some of these results have been discussed above. Hanihara *et al.* (1970) obtained ambiguous results regarding sex linkage of shoveling while in later work, Hanihara *et al.* (1974) suggested that shoveling may in fact be sex linked, based on low correlations between mothers and daughters and high correlations between male siblings. Portin and Alvesalo (1974) reported that shoveling was not, in fact, a sex-linked character. Blanco and Chakraborty (1976) and Sawyer *et al.* (1976a) also found no significant differences between the sexes in degree of shoveling. Harris (1980) undertook a cross-populational study of sex differences in shoveling and found significant differences in some populations but not in others. Shoveling was more common in females than males in Caucasians, Asians, native Americans, and Pacific Islanders, but not significantly different among sexes in American blacks. These results, however, were for samples combined from other studies, and many of the individual studies which contributed to these results did not show significant sexual dimorphism in shoveling within the populations examined. Only 29% of the component samples showed significant differences in shoveling frequencies between the sexes.

A summary of results of some studies comparing shoveling frequencies between males and females appears in Table 2.1. About a third of studies on sexual dimorphism concluded that females were more shoveled than males, another third concluded that males were more shoveled, while the final third concluded that there were no significant differences between the sexes in shovel shaping. It is unclear as to whether there are, in fact, significant sex differences in the manifestation of shoveling or if the reported differences were simply dependent on the samples used. It is obvious, however, that even if sex differences are real, they are not cross populational and vary due to specific factors influencing specific populations.

Table 2.1. Results of studies examining sex differences in shovel shape frequencies, listed in temporal order.

	Study population	Female > Male	Female < Male	Female = Male
Pinto-Cisternas and Figuroa, 1968	Chile		√	
Blanco and Chakraborty, 1976	Chile			√
Moorrees, 1957	Eskimo		√	
Aas, 1982	Eskimo	√		
Hrdlička, 1920	Native American			
Kieser and Preston, 1981	Paraguay			√
Kirveskari, 1973	Finland			√
Aas and Risnes, 1979a	Norway			√
Pal, 1964	India		√	
Kaul and Prakesh, 1981	India		√	
Rami Reddy *et al.*, 1982b	India	√		
Mizoguchi, 1978	Japan	√		
Mizoguchi, 1985	Japan			√
Barnes, 1969	Uganda	√		

Genetic anomalies

Some of the more interesting studies on the genetics of shovel shaping are those that consider the development of shoveling in individuals with genetic disorders. Cohen *et al.* (1970) studied shoveling in 50 individuals with Down's syndrome. Shoveled teeth were identified in nearly 27% of 200 teeth. The control sample which consisted of dental students and trainees, had 9% shoveled teeth. However, racial backgrounds of these individuals and family rates of shoveling were not given, leaving it unclear if the control sample accurately reflected the percentage of the population expected to be shoveled.

Kirveskari and Alvesalo investigated shoveling in 47,XYY males (1981) and 45,X females (Turner's Syndrome) (1982). The study of XYY males showed higher levels of shoveling in the thirteen subjects than in their relatives, differences that were significant for the lateral incisors but not for the centrals. The study of the Turner's syndrome females found just the opposite result. The 54 females with the syndrome showed less shoveling than did their relatives, again significantly so for the lateral incisors but not for the central teeth. Kirveskari and Alvesalo concluded that shoveling was a size-independent character and differences were due to the chromosomal anomalies and associated aberrant development. Contrasting rates of shoveling between normal individuals and the ones with the syndrome were due primarily to development and not genetics, as evidenced by the greater effect on the lateral incisors. The addition or subtraction of the chromosome was not the proximate explanation of different shoveling rates, but rather the ultimate explanation, as increased shoveling was due to developmental changes brought about by the chromosomal anomaly.

Based on the results of the studies of anomalies, it would appear that developmental disturbances affect shoveling significantly. Anomaly studies suggest that it is the developmental milieu and not genetics which affect incisor shoveling in these cases. Such studies serve to remind us that development is extremely important in the manifestation of traits and that shoveling should not be assumed to carry strictly genetic information.

Summary of shoveling genetics

All the studies cited above examined shoveling and aspects of its development and inheritance in order to judge its utility as a racial trait. It is clear from the frequencies presented and the work done on inheritance, that shovel-shaped incisors have a strong heritable factor, although estimates vary greatly. Even the highest published heritability estimate of 0.86 (Hanihara *et al.*, 1974) leaves a lot of room for development and for environmental influence on shovel shaping.

What is evident from family line and anomaly studies is that shoveling is inherited, at least to a strong degree, and that different human populations show varying frequencies of this morphology. A broad and common description of the contrasting frequencies is that Asian and Native American populations are shoveled while everyone else is not, but clearly such a statement sweeps aside substantial variation in the frequencies of shovel shaping, even within Asia or the Americas.

What is not as clear from a review of the literature is the exact mode of inheritance of shoveling or its aspects. It is generally thought that shoveling is a polygenic trait with high heritability, but is also influenced in its degree of development by the environment and other growth factors. Whether shoveling in people with genetic anomalies is due to the genes themselves or the associated developmental milieu is unclear. There does not appear to be significant sexual dimorphism in shoveling. Questions of shoveling inheritance still need to be addressed. Family studies continue to be necessary, in both populations with high and low degrees of shoveling, as each type produces somewhat different results regarding shoveling frequencies and inheritance.

Shoveling is a complex trait, both morphologically and genetically, yet it has often been oversimplified. It has been treated as a single trait, often described simply as present or absent in an individual, inherited in a simple way. Understanding that shoveling is not simple is essential to understanding its variation, distribution, and meaning for both micro- and macro-evolutionary questions, questions of populational relationships and of human evolution.

Populational variation in incisor morphologies

The primary reason any aspect of incisor shoveling is interesting is not because it exists but because it varies systematically among populations. Understanding racial variation in shovel shaping was the goal of Hrdlička's (1920) original study and that goal has remained the focus of much subsequent research. Due to recognized differences in the degree and frequency of shoveling, the character has been scored by almost everyone studying of the teeth of a human population. It is part of the "standard battery" of dental traits that make up a description of dental morphology in a population (Scott and

Dahlberg, 1982). Frequencies of shoveling have gained great importance in anthropology, as they help us examine populational relationships and histories.

As is clear from the preceding discussion, however, quantification of incisor morphology has been undertaken by many different means, none necessarily equivalent. Adding to the confusion, each scoring method may be reported in a variety of ways. Tables 2.2 to 2.15 present frequencies for shoveling, based on a number of different methods, gathered from the literature. Tables 2.16 to 2.17 present similar information for deciduous incisor shoveling. Several previous works have compiled data similar to these tables (Carbonell, 1963; Cadien, 1972; Mizoguchi, 1985; Rami Reddy, 1986) but each has been limited to a single method of quantification. Carbonell (1963), for example, reported only frequencies given in Hrdlička categories. In some cases, reporting in this manner has meant translating published frequencies based on different quantification methods into Hrdlička frequencies (Rami Reddy, 1986). Tables 2.2 to 2.15 provides the first compilation of shoveling data presenting all frequencies as they were published rather than by assuming all methods to be equivalent.

Tables 2.2 to 2.15 illustrate most obviously the sheer volume of data that have been gathered on shovel shaping. It is also clear that not all shoveling frequencies are equivalent. When different scoring systems are used radically different frequencies may be obtained. Even when using the same scoring system, the frequencies for a single region may vary significantly according to study. For example, if frequencies for Chinese populations are examined, reported by Hrdlička's four shoveling categories and just for the stage "shoveled" (see Table 2.2), it is clear that all studies did not examine the same thing in the same way. Jien (1970) gave frequencies for "shoveled" of approximately 85% for Chinese in Taipei while Stevenson (1940, cited in Carbonell, 1963) found a frequency of just 8% for North Chinese. Each researcher has a different interpretation of shoveling, what it is composed of, and how to score it. Therefore, one must be extremely careful when comparing shoveling frequencies between studies, ensuring not only that the authors are using the same method to report shoveling, but that they are referring to the same morphology. Only when it is clear that these two criteria are fulfilled can one compare shovel shaping scores from different studies.

When shoveling frequencies are reported in any manner besides the actual categories by which they are collected, greater incompatability results. One major problem results from collapsing categories of shoveling. For example, European incisor shoveling have been reported at frequencies anywhere between 4% and 91% (Brabant, 1968; Koski and Hautala, 1952) depending on what degree of development is considered shovel shaped. A maximal shovel frequency includes trace, semi-, and shoveled teeth (91% for recent Finns), while a minimal shoveling frequency includes only those teeth that fit into the "shoveled" category (4% in Neolithic Belgium). (See Tables 2.2 and 2.14.)

Comparative frequencies for tubercle development are presented in Tables 2.18 to 2.24. Turner *et al.* (1991) have noted that there is as yet no satisfactory way to score these data currently and this problem is evident in these tables. Table 2.18 presents simple presence/absence data for tubercles. A present/absent dichotomy is probably a clearer classification for tubercles than it was for marginal ridges, yet it is not clear that all researchers have the same understanding of the meaning of "tubercle." Other methods of reporting tubercle frequencies include examination of the cusp as a complete structure, as several spines that together produce the structure, and by the degree of ridging. Frequencies obtained from these various methods are presented in Tables 2.19 to 2.24. It is difficult to garner any conclusion from these data regarding the distribution of lingual tubercles.

Incisor curvature is the one character that produces reasonably comparable data. This is primarily due to the fact that curvature has been explicitly noted only recently, and because most of the research on its distribution has been by a single set of researchers –

those people trained in the Arizona State University Dental System. Frequencies of curvature observed in human populations are shown in Table 2.25.

Thus, all three primary aspects of incisor morphology have been subject to considerable research. However, comparing results between studies can be extremely problematic. Each researcher has a different concept of the morphology and even attempts to standardize scores have not been completely satisfactory. The collection of frequencies of incisor morphologies as taken from the literature exemplifies these problems. Only by providing data which are truly comparable and studying shovel shaping over its entire range of variation can we understand the actual regional distributions and significance of shoveling.

Table 2.2. Frequencies of central incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Europe					
American white female	70.4	21.8	5.2	2.6	Hrdlička, 1920
American white male	66.5	24.5	7.6	1.4	Hrdlička, 1920
Belgium, Medieval	59.5	21.2	16.5	2.7	Brabant and Twiesselmann, 1964 cited in Brabant 1968
Finnish Lapps	74	13	11	1	Carbonell, 1963
Finns	9.0	76.4	10.9	3.8	Koski and Hautala, 1952
France, Neolithic	56.8	13.7	25.2	4.2	Brabant *et al.*, 1961 cited in Brabant, 1968
France, Megalithic	58.0	11.0	25.4	5.4	Brabant and Twiesselmann, 1964 cited in Brabant 1968
Hungarians	26.8	55.8	14.6	3.2	Tóth, 1990
Romano-British	96	3	1	0	Carbonell, 1963
Sweden	83	11	6	0	Carbonell, 1963
Switzerland, Neolithic	61.6	17.6	18.5	2.1	Hrdlička, 1920*
UK, Welsh	33.4	50.9	14.3	0.2	Goose and Roberts, 1982
White	68	23	6	2	Hrdlička, 1920
Africa:					
Africa, Bantu	65	18	15	2	Carbonell, 1963
American black	55	33	8	4	Hrdlička, 1920
American black female	56.0	32.6	8.0	3.6	Hrdlička, 1920
American black male	54.5	33.0	7.6	4.9	Hrdlička, 1920
Uganda, Teso			9.9	1.8	Barnes, 1969
South-West Asia					
Afghanistan, Pashtuns	61.8	26.5	10.3	1.5	Sakai *et al.*, 1970 cited in Ohno, 1986
Afghanistan, Tajiks	76.2	23.8	0	0	Sakai *et al.*, 1970 cited in Ohno, 1986
Cochin	53	40	7	0	Rosenzweig and Zilberman, 1967

Table 2.2, cont. Frequencies of central incisor shovel shaping as reported by the Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
India, Eastern	64.5	18.0	14.2	3.3	Pal,1964
India, Andhra Pradesh Male	45.4	34.3	10.7	1.4	Rami Reddy *et al.*, 1982b
India, Andhra Pradesh Fem.	51.1	28.1	18.1	5.6	Rami Reddy *et al.*, 1982b
India, Andhra Pradesh	49.9	31.0	14.7	3.7	Rami Reddy *et al.*, 1982b
India, Chittor District	92.9	3.6	1.8	1.7	Rami Reddy *et al.*, 1982b
India, Gulbarga, Karnataka	71.2	18.5	8.4	2.0	Rami Reddy 1983b
India, Haryana	8.3	19.4	63.3	8.3	Bhasin *et al.*,1979
India, Haryana, Jats	8.3	19.4	63.3	8.3	Bhasin *et al.*, 1979
India, Haryana, Jats, male	18.0	36.8	26.5	18.7	Kaul and Prakash, 1981
India, Haryana, Jats, female	6.9	24.7	46.8	21.6	Kaul and Prakash, 1981
India, Ladakhi	26	40	34	0	Ohno, 1986
India, Northern	64.4	22.1	10.6	2.9	Ohno, 1986
India, Pattusalis	50.6	31.0	14.7	3.7	Rami Reddy *et al.*,1982a
India, SE Andhra Pradesh	92.9	3.6	1.8	1.7	Rami Reddy *et al.*,1982b
Israel, Bedouin	58.5	34.7	6.8	0	Rosenzweig and Zilberman, 1969
Nepal, Sherpas	9.4	59.4	21.9	9.4	Ohno, 1986
Pashtuns	61.8	26.5	10.3	1.5	Sakai *et al.*, 1985
Yemen	53	40	7	0	Rosenzweig and Zilberman, 1967
North-East Asia					
Chinese	7	2	22	69	Hrdlička, 1920
Chinese	0	0.8	29.1	70.1	Goose, 1963
Chinese female	3.8	1.0	12.5	82.7	Hrdlička, 1920
Chinese male	7.8	1.8	23.4	66.2	Hrdlička, 1920
Chinese, American born	2.2	10.9	67.4	19.6	Lasker, 1945
Chinese, Cantonese	12.5	12.5	62.5	12.5	Lasker, 1945
Chinese, Canton immigrants	1.1	11.0	73.6	14.3	Lasker, 1945
China, East		14.6	66.7	18.8	Lasker, 1945
Chinese, Hawaiian born		20	80		Lasker, 1945 - extremely small sample

Table 2.2, cont. Frequencies of central incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
China, mixed interregional	5.3	10.5	52.6	31.6	Lasker, 1945
China, North	5.0	20.0	40.0	35.0	Lasker, 1945
Chinese, northern	18.2	19.7	53.9	8.3	Stevenson, 1940 cited in Carbonell, 1963
China, Southeast	5.9	17.6	58.8	17.6	Lasker, 1945
Chinese, Taipei, male	0	4.0	20.1	75.9	Jien, 1970
Chinese, Taipei, female	0	1.5	13.2	85.3	Jien, 1970
China, West and Central		13.3	73.3	13.3	Lasker, 1945
Japanese	2.4	24.3	33.0	40.3	Sakai *et al.*, 1985
Japanese	2.4	24.3	33.0	40.3	Ohno, 1986
Japanese female	11.2	25.1	31.4	32.3	Suzuki and Sakai, 1966
Japanese female	2.3	14.9	44.8	37.9	Mizoguchi, 1978
Japanese male	4.0		18.0	77.9	Hrdlička, 1920
Japanese male	10.0	22.9	26.7	40.4	Suzuki and Sakai, 1966
Japanese male	1.1	18.1	44.3	36.4	Mizoguchi, 1978
Kazakhs	18.3	19.1	35.1	27.5	Zubov, 1972 cited in Tóth, 1990
Korean	4.9	34.6	48.2	12.4	Ohno, 1986
Mongolian		8.5	29.0	62.5	Hrdlička, 1920
Mongols	1.6	14.5	46.7	38.3	Zubov and Zolotarieva, 1980 cited in Tóth, 1990
Tuvins, Southern Siberia	26.3	16.3	51.2	6.2	Bogdanova and Haldeeva, 1908 cited in Tóth, 1990
Oceania					
Australia, S-East Queensland	54	46	0	0	Smith *et al.*, 1981
Cape Malays	50	29.5	19.2	9.0	Abrahams, 1949
Easter Islands	12.7	59.3	24.6	3.4	Turner and Scott, 1977
Hawaii	12	7	42	39	Chappel, 1927
Hawaii	14.3	4.8	38.1	42.9	Dahlberg, 1945
Hawaiians	40.3	27.4	27.4	4.8	Sakai *et al.*, 1985
Melanesia, Nasioi	26.6	55.1	16.5	1.8	Bailit *et al.*,1968
Micronesia	38.8	30.6	20.4	10.2	Sakai *et al.*, 1985
New Guinea, Gadsup	69.2	24.6	6.2	0	Barksdale,1972

Table 2.2, cont. Frequencies of central incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
New Guinea, Auyana	73.7	21.1	5.3	0	Barksdale,1972
New Guinea, Awa	48.6	48.6	2.7	0	Barksdae,1972
New Guinea Tairora	61.2	31.3	7.5	0	Barksdale,1972
Nicobar Islands	39.2	25.0	21.6	14.1	Ganguly,1960
Polynesia	24	33	24	19	Suzuki and Sakai, 1964
New World					
Argentina, La Puna	0	16	35	49	Devoto *et al.*, 1968
Atacama Indian, Chile	0	0	37	63	Devoto and Arias, 1967
Chile, Pewenche Indians	4.6	20.0	44.6	30.7	Rothhammer *et al.*, 1968
Coastal AK Eskimo	26.7	53.3	17.8)	2.2	Bang and Hasund, 1971
Eskimo		15.0	47.5	37.5	Hrdlička, 1920
Indian Knoll			16.0	84.0	Dahlberg and Snow cited in Dahlberg and Mikkelsen, 1947
Inland AK Eskimo	14.8	36.1	42.6	6.5	Bang and Hasund, 1971
Makiritare,Venez.	0	47.9	39.1	13.0	Brewer-Carias *et al.*,1976
Paraguay, Lengua	0	0	4	96	Keiser and Preston, 1981
Pecos Pueblo	2.2	8.3	15.4	74.1	Nelson, 1938
Peru, Ica	4.7	42.9	9.5	42.9	Sawyer *et al.*, 1976a
Peru, Colonial	0	52.9	41.2	5.9	Sawyer *et al.*, 1976a
Peru, Huari	0	22.2	22.2	55.6	Sawyer *et al.*, 1976a
Peru, Nazca	0	33.3	66.7	0	Sawyer *et al.*, 1976a
Peru, Paracas	28.7	28.6	4.8	38.1	Sawyer *et al.*, 1976a
Pima Indian female		1.0		99.0	Dahlberg, 1951
Pima Indian male		4.0		96.0	Dahlberg, 1951
Pima Indians		3.0		97.0	Dahlberg and Mikkelsen, 1947
Pueblos Indian			19.0	81.0	Dahlberg, 1951

Table 2.2, cont. Frequencies of central incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Queckchi Indian female	57.2	8.3	0.0	34.5	Escobar *et al.*, 1977
Queckchi Indian male	47.7	18.4	0.8	33.1	Escobar *et al.*, 1977
Yanomama,Venez.	0	12.8	28.1	59.1	Brewer-Carias *et al.*, 1976

Table 2.3. Frequencies of lateral incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Europe					
American white	55	33	8	1	Hrdlička, 1920
American white female	59.6	29.9	7.4	1.0	Hrdlička, 1920
American white male	50.0	36.4	8.8	1.4	Hrdlička, 1920
Finnish Lapps	43	30	25	2	Carbonell, 1963
Finns	7.1	73.3	16.7	2.9	Koski and Hautala, 1952
Hungarians	21.6	46.8	26.8	4.7	Tóth, 1990
Romano-Brtish	88	11	1	0	Carbonell, 1963
Sweden	64	22	14	0	Carbonell, 1963
Africa					
African, Bantu	47	29	21	2	Carbonell, 1963
American black female	47.5	35.1	11.1	3.8	Hrdlička, 1920
American black male	42.1	38.0	12.8	4.5	Hrdlička, 1920
American black	45	36	12	4	Hrdlička, 1920

Table 2.3, cont. Frequencies of lateral incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
South-West Asia					
Afghanistan, Pashtun	50.0	34.3	14.3	1.5	Sakai *et al.*, 1970, cited in Ohno, 1986
Afghanistan, Tajik	81.8	18.2	0	0	Sakai *et al.*, 1970, cited in Ohno, 1986
Cochin	77.0	23			Rosenzweig and Zilberman, 1967
Eastern India	41.8	37.3	18.9	2.0	Pal, 1964
India, Andhra Pradesh	49.9	31.0	14.7	3.7	Rami Reddy *et al.*, 1982a
India, SE Andhra Pradesh	93.8	2.6	1.8	1.6	Rami Reddy *et al.*, 1982b
India, Andhra Pradesh male	46.8	34.5	10.8	1.4	Rami Reddy *et al.*, 1982a
India, Andhra Pradesh female	51.8	28.1	18.1	5.6	Rami Reddy *et al.*, 1982a
India, Ladakhi	10	50	30	10	Ohno, 1986
India, Northern	48.0	31.4	17.7	2.9	Ohno, 1986
India, Jat, Haryana, male	29.1	28.7	23.1	19.1	Kaul and Prakash, 1981
India, Jat, Haryana, female	19.2	40.9	23.7	16.3	Kaul and Prakash, 1981
India, Chittor District	93.8	2.6	1.8	1.6	Rami Reddy *et al.*, 1982b
India, Karnataka, Gulbarga	70.5	19.2	8.5	1.8	Rami Reddy 1983b
Israel, Bedouin	60.7	33.3	6.0	0	Rosenzweig and Zilberman, 1969
Nepal, Sherpa	6.5	22.6	51.6	19.4	Ohno, 1986
Pashtuns	50.0	34.3	14.3	1.4	Sakai *et al.*, 1985
Yemen	79	21			Rosenzweig and Zilberman, 1967
North-East Asia					
Chinese, Taipei male	0	8.0	22.5	69.5	Jien, 1970
Chinese, Taipei female	0	7.3	21.5	72.1	Jien, 1970
Chinese	9	1	24	64	Hrdlička, 1920
Chinese female	3.4	1.0	13.5	68.8	Hrdlička, 1920
Chinese male	9.5	1.5	24.0	56.9	Hrdlička, 1920
Japanese	6.7	22.6	34.6	36.1	Sakai *et al.*, 1985
Japanese	6.7	22.6	34.6	36.1	Ohno, 1986
Japanese female	8.1	18.4	42.5	31.0	Mizoguchi, 1978

Table 2.3, cont. Frequencies of lateral incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Japanese male	4.0		20.3	72.7	Hrdlička, 1920
Japanese male	1.1	23.6	42.7	32.6	Mizoguchi, 1978
Kazakhs	17.5	25.9	38.2	18.3	Zubov, 1972, cited in Tóth, 1990
Korean	6.2	23.5	53.1	17.3	Ohno, 1986
Mongolian			25.0	75.0	Hrdlička, 1920
Mongol	0.0	6.1	36.1	56.3	Zubov and Zolotarieva, 1980, cited in Tóth, 1990
Tuvins, Southern Siberia	20.3	15.9	42.5	21.8	Bogdanova and Haldeeva, 1908, cited in Tóth, 1990
<u>Oceania</u>					
Australia, S E Queensland	77	23	0	0	Smith *et al.*, 1981
Auyana, New Guinea	40.0	50.0	10.0	0	Barksdale,1972
Awa, New Guinea	26.2	69.0	4.8	0	Barksdale,1972
Cape Malay	50.0	26.9	15.4	7.7	Abrahams, 1949
Easter Islands	6.5	65.3	24.2	4.0	Turner and Scott, 1977
Gadsup, New Guinea	49.5	43.9	6.6	0	Barksdale, 1972
Hawaii	8	7	34	52	Chappel, 1927
Hawaiians	39.0	36.4	19.5	5.2	Sakai *et al.*, 1985
Micronesia	31.4	37.3	19.6	11.8	Sakai *et al.*, 1985
Nasioi, Melanesia	34.6	50.0	14.6	0.9	Bailit *et al.*,1968
Nicobar Islands	43.8	21.3	24.8	10.1	Ganguly, 1960
Polynesia	27.6	29.9	25.3	17.2	Suzuki and Sakai, 1964
Tairora, New Guinea	53.7	38.8	7.5	0	Barksdale, 1972
<u>New World</u>					
Aleut		2.9	31.4	65.7	Moorrees, 1957
Chile, Pewenche Indians	12.0	32.0	43.0	8.0	Rothhammer *et al.*, 1968
Coastal AK Eskimo	16.3	46.9	32.7	4.1	Bang and Hasund, 1971
Eskimo			43.0	57.0	Hrdlička, 1920
Indian Knoll			17.0	80.0	Dahlberg, 1951*

Table 2.3, cont. Frequencies of lateral incisor shovel shaping as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Indians	1.0	6.0	17.0	76.0	Hrdlička, 1920
Inland AK Eskimo	10.2	30.5	52.5	6.8	Bang and Hasund, 1971
Makiratare	4.4	80.9	13.2	1.5	Brewer-Carias *et al.*, 1976
Makiritare, Venez.	4.4	80.9	13.2	1.5	Brewer-Carias *et al.*, 1976
Paraguay, Lengua	2.0	0	0.7	97.2	Keiser and Preston, 1981
Pecos Pueblo	1.4	9.3	17.4	72.0	Nelson, 1938
Peru, Paracas	40.0	26.7	33.3	0	Sawyer *et al.*, 1976a
Peru, Nazca	0.0	50.0	50.0	0	Sawyer *et al.*, 1976a
Peru, Huari	0	20	40	40	Sawyer *et al.*, 1976a
Peru, Ica	0	30	50	20	Sawyer *et al.*, 1976a
Peru, Inca	0	100	0	0	Sawyer *et al.*, 1976a
Peru, Colonial	0	35.9	23.1	23.1	Sawyer *et al.*, 1976a
Pima Indian female		7.0		81.0	Dahlberg, 1951*
Pima Indian male	1.0	13.0		81.0	Dahlberg, 1951*
Pima Indians	9.0	9.0		82.0	Dahlberg and Mikkelsen, 1947*
Pueblos Indians			14.0	81.0	Dahlberg, 1951
Queckchi Indians, Guatemala	54.5	9.9	0.4	35.2	Escobar *et al.*, 1977
Yanomama	5.9	45.2	34.3	14.6	Brewer-Carias *et al.*, 1976
Yanomama, Venez.	5.9	45.2	34.3	14.6	Brewer-Carias *et al.*, 1976

* remaining percentage anomalous

Table 2.4. Frequencies of shovel shaping for central and lateral incisors combined as reported by Hrdlička's (1920) scale and divided by region of world.

Population	None	Trace	Semi	Shovel	Reference
Europe					
Crete, Middle Minoans	8.0	19.0	46.0	27.0	Carr, 1960
Sweden, Westerhus male	75.9	24.1			Gejvall, 1960 cited in Carbonell, 1963
Sweden, Westerhus female	61.4	38.5			Gejvall, 1960 cited in Carbonell, 1963
Africa					
Africa, Bantu	83.4	1.5	8.3	6.8	Shaw, 1931
Sudan, Wadi Halfa	22	56	11	11	Greene *et al.*, 1967; Greene and Armelagos, 1972
North-East Asia					
Chinese, American born	2.2	13.0	66.2	18.6	Lasker, 1945
Oceania					
Indonesia	7	57	36	0	Riesenfeld, 1956
Micronesia	22	43	31	4	Riesenfeld, 1956
Polynesia	21	45	26	8	Riesenfeld, 1956
Fiji	52	34	12	2	Riesenfeld, 1956
New Guinea	51	45	4	0	Riesenfeld, 1956
Ralum	81	13	6	0	Riesenfeld, 1956
Solomon Islands	59	32	9	0	Riesenfeld, 1956
Melanesia	50	50			Riesenfeld, 1956
Australia	36	51	13	0	Riesenfeld, 1956

Table 2.5. Frequenices of shovel shaping reported by lumping Hrdlička's(1920) categories – Trace and Semi-shoveled categories lumped together

Population	None	Trace-Moderate	Marked	Reference
Centrals				
American White	65.5	29.8	4.8	Hanihara *et al.*, 1970
American White	55.0	45.0		Lasker and Lee, 1957
Japanese	4.6	40.5	54.9	Hanihara *et al.*, 1970
Amerindians	1.7	27.5	70.8	Hanihara *et al.*, 1970
East Greenland Eskimo	1.7	14.7	82.6	Pedersen, 1949
Laterals				
American White	50.0	50.0		Lasker and Lee, 1957
Chinese, Northern	4.1	85.9		Stevenson, 1940

Table 2.6. Frequencies of shovel shaping reported by lumping Hrdlička's(1920) categories – Moderate and Marked categories lumped together.

Population	None	Trace	Moderate - Marked	Reference
Centrals				
France, Matelles, Bronze age	56.8	13.7	29.3	Brabant *et al.*, 1961 cited in Brabant, 1968
Chinese			85	Lasker and Lee, 1957
Nicobar Islands	41.5	23.2	35.3	Ganguly, 1960
Canadian Eskimo	0.8	0	99.2	Oschinsky and Smithurst, 1960
Early Texas Indian	0	4.9	95.1	Goldstein, 1948

Table 2.7. Frequencies of shovel shaping reported by lumping Hrdlička's(1920) categories – None and Trace categories lumped together.

Population	None - Trace	Semishovel	Shovel	Reference
<u>Centrals</u>				
Uganda, Teso, male	89.7	8.8	1.5	Barnes, 1969
Uganda, Teso, female	85.1	12.3	2.6	Barnes, 1969
Uganda, Teso	88.3	9.9	1.8	Barnes, 1969
Japan, Ishigaki Island	4.7	47.2	48.1	Kimura *et al.*, 1978*
Japan, Toyo	10.2	54.5	35.2	Kimura *et al.*, 1978*
<u>Laterals</u>				
Aleut	3	31	66	Turner, 1969
Prehistoric Koniag	0	24	76	Turner, 1969
Prehistoric Aleut	3	36	60	Turner, 1969
Hopi	9	43	48	Turner, 1969
Prehistoric Hopi	7	37	56	Turner, 1969

*Unclear which categories are lumped due to differences in terminology. Here the middle category is assumed equivalent to Hrdlička's semi-shovel.

Table 2.8. Frequencies of shovel shaping for the central incisors reported as -, +, or ++.

Population	-	+	++	Reference
Ainu	27.1	48.6	24.3	Hanihara, 1992a
Australian	29.6	59.3	11.1	Hanihara, 1992b
Chinese	9.1	27.3	63.6	Hanihara, 1992a
Doigahama	9.8	33.3	57.1	Hanihara, 1992a
Early Thailand	26.9	65.4	7.7	Hanihara, 1992b
Guam	28.8	54.2	16.9	Hanihara, 1992a
Hirota	43.4	52.2	4.4	Hanihara, 1992b
Japanese	9.2	41.3	49.5	Hanihara, 1992a
Jomon	17.3	43.2	39.5	Hanihara, 1992a
Kanenokuma	8.4	47.2	44.4	Hanihara, 1992a
Marquesas	26.1	56.5	17.4	Hanihara, 1992a
Micronesia	28.8	54.2	16.9	Hanihara, 1992b
Nansei Islands	15.0	48.1	36.9	Hanihara, 1992b
Negrito	33.3	42.9	23.8	Hanihara, 1992a
Polynesia	15.0	68.5	16.5	Hanihara, 1992b
Tokunoshima	16.2	46.9	36.9	Hanihara, 1992a
Yayoi	9.8	33.3	57.1	Hanihara, 1992b
Nubia	28.6	42.8	28.6	Anderson, 1968

Table 2.9. Frequencies of central incisor shovel shaping reported as proposed by Moorees (1957) – Hrdlička (1920) categories with the addition of "Marked."

Population	None	Trace	Semi	Shov	Marked	Reference
Goroka,PNG	63.6	18.2	18.2	0	0	Doran, 1977
Lufa,PNG	75.8	10.4	13.8	0	0	Doran, 1977
New Guinea, Eastern Highlands	63	31	6	0	0	Barksdale, 1972
New Guinea, Gadsup	69.2	24.6	6.2	0	0	Barksdale, 1972
New Guinea, Tairora	61.2	31.3	7.5	0	0	Barksdale, 1972
New Guinea, Auyana	73.7	21.1	5.3	0	0	Barksdale, 1972
New Guinea, Awa	48.6	48.6	2.7	0	0	Barksdale, 1972
Pari,PNG	0	31.1	51.1	17.8	0	Doran, 1977
Wewak,PNG	53.2	43.7	0	3.1	0	Doran, 1977
Bhutan	12.8	25.6	12.8	17.9	30.8	Prakesh *et al.*, 1979
Kainantu	62.8	31.4	5.9	0	0	Doran, 1977
Alaska Coast Eskimo	0	26.7	53.3	17.8	2.2	Bang and Hasund, 1971†
Alaska Eskimo	0	19.8	43.4	32.1	4.7	Bang and Hasund, 1971†
Alaska Inland Eskimo	0	14.8	36.1	42.6	6.5	Bang and Hasund, 1971†
Aleut	0	2.7	34.7	57.3	5.3	Moorrees, 1957
East Aleut	0	2.9	37.1	48.6	11.4	Moorrees, 1957
West Aleut	0	4.6	31.8	63.6	0	Moorrees, 1957

† Frequencies also divided by sex in original report

Table 2.10. Frequencies of lateral incisor shovel shaping reported as proposed by Moorees (1957) – Hrdlička (1920) categories with the addition of a "Marked."

Population	None	Trace	Semi	Shov	Marked	Reference
Goroka,PNG	60.6	18.2	18.2	0	0	Doran, 1977
Lufa, PNG	51.7	34.5	13.8	0	0	Doran, 1977
New Guinea, Eastern Highlands	50	44	6	0	0	Barksdale, 1972
New Guinea, Gadsup	62.3	31.9	5.8	0	0	Barksdale, 1972
New Guinea, Tairora	53.7	38.8	7.5	0	0	Barksdale, 1972
New Guinea, Auyana	40.0	50.0	10.0	0	0	Barksdale, 1972
New Guinea, Awa	26.2	69.0	4.8	0	0	Barksdale, 1972
Pari,PNG	0	34.1	47.7	18.2	0	Doran, 1977
Wewak,PNG	53.1	37.5	9.4	0	0	Doran, 1977
Kainantu	49.5	43.9	6.6	0	0	Doran, 1977
Alaska Coast Eskimo	0	16.3	46.9	32.7	4.1	Bang and Hasund, 1971†
Alaska Eskimo	0	13.0	38.0	43.5	5.5	Bang and Hasund, 1971†
Alaska Inland Eskimo	0	10.2	30.5	52.5	6.8	Bang and Hasund, 1971†
Aleut	0	2.9	31.4	55.7	10.0	Moorrees, 1957
East Aleut	0	3.3	33.3	46.7	16.7	Moorrees, 1957
West Aleut	0	0	40.9	50.0	9.1	Moorrees, 1957

† Frequencies also divided by sex in original report

Table 2.11. Frequencies of shovel shaping reported as proposed by Scott (1973) – ASU Dental System equivalencies.

Population	0	1	2	3	4	5	6	7	Reference
<u>Central incisors</u>									
Ainu	21.0	29.4	39.2	17.6	3.9	5.9	2.0	0	Turner and Hanihara, 1977
Baluchistan, Pakistan	16.0	32.0	28.0	20.0	4.0	0.0			Lukacs and Hemphill, 1991
Jomon	0	25.9	44.4	25.9	3.7	0	0	0	Turner, 1979
Melanesia, New Britain	43.5	37.0	13.0	6.5	0	0	0	0	Turner and Swindler, 1978
Taiwan, Bunun	1.1	3.2	18.9	27.4	24.2	21.1	4.2	0	Manabe *et al.*, 1991
<u>Lateral incisors</u>									
Ainu	3.6	28.6	41.1	14.3	7.1	5.6	0	0	Turner and Hanihara, 1977
Baluchistan, Pakistan	50.0	29.2	37.5	12.5	4.2	4.2			Lukacs and Hemphill, 1991
Jomon	0	38.5	26.9	26.9	7.7	0	0	0	Turner, 1979
Melanesia, New Britain	52.5	39.1	6.5	0	2.2	0	0	0	Turner and Swindler, 1978
Taiwan, Bunun	3.2	6.3	22.1	23.2	32.6	7.4	2.1	3.2	Manabe *et al.*, 1991

Table 2.12. Frequencies of shovel shaping reported as Dahlberg (1956) equivalencies.

Population	1- None	2- Trace	3- Semi	4- Shovel	5- marked	6- Peg	7- Barrel	Reference
<u>Central incisors</u>								
Taiwan, Ami male	2.51	25.94	14.23	54.81	2.51	0	0	Liu, 1977
Taiwan, Ami, female	2.44	7.32	19.51	65.85	4.88	0	0	Liu, 1977
Taiwan, Atayal male	2.13	2.13	22.34	64.89	8.50	0	0	Liu, 1977
Taiwan, Atayal female	0	4.76	14.29	72.62	7.14	0	1.19	Liu, 1977

Table 2.12, cont. Frequencies of shovel shaping reported as Dahlberg (1956) equivalencies.

Population	1- None	2- Trace	3- Semi	4- Shovel	5- marked	6- Peg	7- Barrel	Reference
<u>Lateral incisors</u>								
Taiwan, Ami male	0.87	14.72	20.78	59.31	1.73	1.30	1.30	Liu, 1977
Taiwan, Ami, female	0	11.27	.45	61.97	7.04	2.82	8.45	Liu, 1977
Taiwan, Atayal male	2.11	0	11.58	72.63	5.26	1.05	7.37	Liu, 1977
Taiwan, Atayal female	0	2.28	4.76	77.38	3.57	1.19	10.71	Liu, 1977

Table 2.13. Mean lingual fossa depth of incisors.

Population	Mean	Reference
<u>Central incisors</u>		
American white	0.41	Hanihara, 1968
Finnish Skolt Lapps	0.54	Kirveskari, 1973
Kasakh	0.71	Zubov, 1970, cited in Aas, 1979
Norwegian Lapps	0.44	Aas, 1979
Norwegians	0.51	Aas and Risnes, 1979a
Russian	0.42	Zubov, 1970, cited in Aas, 1979
Japanese	0.99	Hanihara, 1968
Japanese-white Hybrid	0.78	Hanihara, 1968
Japanese-black Hybrid	0.93	Hanihara, 1968
Australian Aborigine	0.81	Hanihara, 1973
American black	0.53	Hanihara, 1968

Table 2.13, cont. Mean lingual fossa depth of incisors.

Population	Mean	Reference
Ainu	0.87	Hanihara, 1968
Eskimo	1.13	Hanihara, 1973
Peruvian Indian	1.0	Goaz and Miller, 1966
Pima	1.2	Dahlberg and Mikkelsen, 1947
Pima Indian	1.21	Hanihara, 1968

Table 2.14. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Europe			
American white	27.7	Hanihara,1989a	
American white	28	Hanihara and Hanihara, 1989	
American white	45	Lasker and Lee, 1957	
American white	14	Lasker, 1950	
American white	4.2	Takehisa, 1957 cited in Mizoguchi, 1985a	Semi- and shoveled
Azerbaidjans	10.9	Ghadzhiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Baltic	37.1	Haeussler and Turner, 1992	Stages 1-6 ASU Dental System, or stages 1-3 Zubov
Belgium, Neolithic	3.7	Brabant, 1962 cited in Brabant, 1968	Shovel only - not trace or semi
Caucasian	27.7	Hanihara K, 1973	Measured with a depth gauge, anything 0.51 mm
Caucasus	13.5	Haeussler and Turner, 1992	Stages 1-6 ASU Dental System, or stages 1-3 Zubov
England, South East	9.4	Berry, 1976	
England, North-West	20.6	Berry, 1976	
England, Orkney, Modern	8.7	Berry, 1976	

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
England, Orkney, Ancient	21.0	Berry, 1976	
Finland, Skolt Lapps male	41.1	Kirveskari, 1974 cited in Mizoguchi 1985a	
Finland, Skolt Lapps female	51.9	Kirveskari, 1974 cited in Mizoguchi 1985a	
Finland, Skolt Lapps	50.7	Takehisa, 1957 cited in Mizoguchi 1985a	
Finns, Helsinki	5.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Germany, Bonn	53.0	Berry, 1976	
Germany, Heidelberg	46.9	Berry, 1976	
Gruzhins, Tbilisi	2.7	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Hungarians	17.8	Tóth, 1977 cited in Tóth, 1981	Semi-and shoveled
Komi, Izhma (former USSR)	17.1	Aksjanova, 1978	Semi- and shoveled
Komi, Kola Peninsula (former USSR)	11.4	Aksjanova, 1978	Semi- and shoveled
Lapps, Kola Peninusla	24.3	Aksjanova, 1978	Semi- and shoveled
Nenets, Timan Tundra (former USSR)	67.2	Aksjanova, 1978	Semi- and shoveled
Nenets, Malozemelskaja Tundra (former USSR)	52.9	Aksjanova, 1978	Semi- and shoveled
Russians, Pizhma river	12.4	Aksjanova, 1978	Semi- and shoveled
Russians, Vologda region	2.2	Aksjanova, 1978	Semi- and shoveled
Russians	3.6	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Shetland, Modern	11.9	Berry, 1976	
Tadjiks	15.9	Zubov *et al.*, 1979 cited in Tóth, 1981	Semi-and shoveled
Ukrainians	10.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Uzbekhs	23.1	Zubov *et al.*, 1979 cited in Tóth, 1981	Semi-and shoveled
Africa			
American black	37	Hanihara and Hanihara, 1989	
American black	37.2	Hanihara, 1989a	
Egypt	14.4	Kharat *et al.*, 1990	Trace+, with or without tubercles

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Southwest Asia			
Afghanistan, Tajik	15.0	Beynon, 1968	1 individual with strong shoveling, 4 others with slight shoveling
Bali, Bronze Age	55.5	Jacob, 1987	
Bangladesh	47.4	Pal, 1964 cited in Rami Reddy, 1986	
Burma	13.3	Turner, 1987	Stages 3-7, Scott 1973
Early Malay Archipelagao	29.6	Turner, 1987	Stages 3-7, Scott 1973
East Malay Archipelago	8.3	Turner, 1987	Stages 3-7, Scott 1973
Ganga Valley	67	Lukacs and Hemphill, 1991	Anything above 0
Inamgaon	92	Lukacs and Hemphill, 1991	Anything above 0
India, North, Himachal Pradesh	66.7	Bhasin *et al.*, 1985	
India, North, Punjab	63.3	Bhasin *et al.*, 1985	
India, North, Haryana Jats	55.4	Bhasin *et al.*, 1985	
India, North, Haryana Ahirs	70.6	Bhasin *et al.*, 1985	
India, North, Uttar Pradesh	58.8	Bhasin *et al.*, 1985	
India, North, Rajsthan Udaipur	20.0	Bhasin *et al.*, 1985	
India, West, Maharashtra Nagpur	72.9	Bhasin *et al.*, 1985	
India, West, Maharashtra Thane	51.1	Bhasin *et al.*, 1985	
India, East, West Bengal	46.5	Bhasin *et al.*, 1985	
India, South, Tamil Nadu	69.2	Bhasin *et al.*, 1985	
India, East - Oraons	58.4	Zubov, 1973 cited in Tóth, 1981	Semi- and shoveled
India, East - Munda	56.4	Zubov, 1973 cited in Tóth, 1981	Semi- and shoveled
India, East - Santals	57.0	Zubov, 1973 cited in Tóth, 1981	Semi- and shoveled
India, North - Gudjars	5.5	Zubov, 1973 cited in Tóth, 1981	Semi- and shoveled
India	9.3	Kharat *et al.*, 1990	Trace+, with or without tubercles
India, Karnataka	28.2	Rami Reddy, 1986	
India, Northern Neolithic	22.2	Basu and Pal, 1980 cited in Rami Reddy 1986	
Jordan	4.5	Kharat *et al.*, 1990	Trace+, with or without tubercles

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Kazakhs	62.6	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Khantis, Davidova	54.8	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Komi-Zyrians, Ishem	17.0	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Komi-Zyrians, Southern	20.2	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Lezghin-Samours, Daghestan	25.3	Ghadzhiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Mansis, Davidova	52.5	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Mehrgarh, Baluchistan, Pakistan - Chalcolithic	84	Lukacs and Hemphill, 1991	Anything above 0
Mehrgarh, Baluchistan, Pakistan - Neolithic	89	Lukacs and Hemphill, 1991	Anything above 0
Nepal	20.0	Turner, 1987	Stages 3-7, Scott 1973
Pakistan	7.0	Kharat *et al.*, 1990	Trace+, with or without tubercles
Palestinian	5.6	Kharat *et al.*, 1990	Trace+, with or without tubercles
Recent Indomalaysia	24.4	Turner, 1987	Stages 3-7, Scott 1973
Sarai Khola	33	Lukacs and Hemphill, 1991	Anything above 0
Saudi Arabia	7.8	Saini *et al.*, 1990	
Saudi Arabia	7.9	Kharat *et al.*, 1990	Trace+, with or without tubercles
Sudan	16.3	Kharat *et al.*, 1990	Trace+, with or without tubercles
Syria	2.3	Kharat *et al.*, 1990	Trace+, with or without tubercles
Tadjiks from Tshusts	20.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Timaragarha	74	Lukacs and Hemphill, 1991	Anything above 0
Uzbeks from Namangan	21.9	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Yemen	14.1	Kharat *et al.*, 1990	Trace+, with or without tubercles
North/East Asia			
Ainu	81.4	Hanihara, 1973	Measured with a depth gauge, anything 0.51 mm
Ainu, Japan	75.0	Hanihara, 1989b	
Ainu	72.9	Hanihara, 1989a	
Amur	68.7	Turner, 1987	Stages 3-7, Scott 1973
Central Asia	66.6	Haeussler and Turner, 1992	Stages 1-6 ASU Dental System, or stages 1-3 Zubov
China	72.0	Turner, 1992	
Chinese	90.9	Hanihara, 1990	

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Chinese male	72.2	Wissler, 1931	Semi- and shoveled
Chinese female	78.0	Wissler, 1931	Semi- and shoveled
Chinese, female	100	Liu, 1977	Trace to marked
Chinese, male	98.8	Liu, 1977	Trace to marked
China, Peking Prison	66.5	Liang cited in Lasker, 1945	
China, south	74.4	Turner, 1987	Stages 3-7, Scott 1973
Daghestan	30.4	Haeussler and Turner, 1992	Stages 1-6 ASU Dental System, or stages 1-3 Zubov
Hong Kong	63.8	Turner, 1987	Stages 3-7, Scott 1973
Japan, Aogashima	65.3	Hanihara, 1989b	
Japan, East Kofun	91.9	Matsumura, 1990	Stages 2-3, semi and shoveled
Japan, Jomon	70.6	Matsumura, 1990	Stages 2-3, semi and shoveled
Japan, Recent Ainu	65.4	Matsumura, 1990	Stages 2-3, semi and shoveled
Japan, Recent Japanese	97.6	Matsumura, 1990	Stages 2-3, semi and shoveled
Japan, Sakhalin Ainu	74.1	Hanihara, 1990	
Japan, Tokunoshima, Jomon	83.3	Hanihara, 1990	
Japan, Tokyo	81.2	Hanihara, 1989b	
Japan, West Kofun	96.6	Matsumura, 1991	Stages 2-3, semi and shoveled
Japanese, Tokyo male	76.3	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Tokyo female	83.7	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Okinawa male	71.9	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Okinawa female	92.3	Mizoguchi, 1985a	Semi- and shoveled
Japanese	95.6	Hanihara, 1973	Measured with a depth gauge, anything 0.51 mm
Japanese	96	Hanihara and Hanihara, 1989	
Japanese	95.1	Hanihara, 1989a	
Japanese	59.9	Takehisa, 1957 cited in Mizoguchi, 1985a	Semi- and shoveled
Japanese	91.2	Kikuchi, 1954 cited in Mizoguchi, 1985a	Semi- and shoveled
Japanese (Kanto)	49.4	Aoyagi, 1967 cited in Mizoguchi, 1985a	Semi- and shoveled
Japanese-African American	69	Hanihara and Hanihara, 1989	
Japanese-American White	69	Hanihara and Hanihara, 1989	
Jomon	25.7	Turner, 1987	Stages 3-7, Scott 1973
Korean male	81.0	Wissler, 1931	Semi- and shoveled
Korean female	87.5	Wissler, 1931	Semi- and shoveled

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Lake Baikal	92.3	Turner, 1987	Stages 3-7, Scott 1973
Mongols (Mongolia and Zolotaryeva)	90.4	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
N China- Mongolia	84.0	Turner, 1987	Stages 3-7, Scott 1973
Northeast Asia	100	Haeussler and Turner, 1992	Stages 1-6 ASU Dental System, or stages 1-3 Zubov
NE Siberia	62.4	Turner, 1992	
NE Siberia	61.4	Turner, 1987	Stages 3-7, Scott 1973
Okinawa, Japan	81.7	Hanihara, 1989b	
Osset-Digors	8.7	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Osset-Dzhava	1.8	Kotshiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Osset-Irons	2.0	Kotshiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Post-Jomon Japan	66.0	Turner, 1992	
Recent Japan	66.0	Turner, 1987	Stages 3-7, Scott 1973
Sakhalin Ainu	29.4	Suzuki and Sakai, 1957 cited in Mizoguchi, 1985a	
<u>Southeast Asia/Oceania</u>			
Australia, Haast's Bluff	84.6	Richards and Tefler, 1979	
Australia, Kalumburu	90.0	Richards and Tefler, 1979	
Australia, Anson Bay	57.1	Richards and Tefler, 1979	
Australia, Lower Murray River	60.0	Richards and Tefler, 1979	
Australia, Yuendumu	85.2	Richards and Tefler, 1979	
Australia-Tasmania	15.9	Turner, 1992	
Australian aborigines	89.8	Hanihara, 1973	Measured with a depth gauge, anything 0.51 mm
Australian aborigines	89.8	Hanihara, 1989a	
Early Mainland Southeast Asia	32.3	Turner, 1987	Stages 3-7, Scott 1973
Early SE Asia	30.5	Turner, 1992	
Melanesia	9.3	Turner, 1992	
Melanesia (Bougainville) male	38.4	Lombardi 1975 cited in Mizoguchi, 1985a	Trace+
Melanesia (Bougainville) female	49.4	Lombardi 1975 cited in Mizoguchi, 1985a	Trace+

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Melanesia (Rotokas, Bougainville) male	57	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Rotokas, Bougainville) female	78	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Eivo, Bougainville) male	67	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Eivo, Bougainville) female	78	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Simeku, Bougainville) male	71	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Simeku, Bougainville) female	76	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Uruava and Torau, Bougainville) male	79	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Uruava and Torau, Bougainville) female	96	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Nasioi, Bougainville) male	74	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Melanesia (Nasioi, Bougainville) female	71	Harris, 1977 cited in Mizoguchi, 1985a	Trace+
Philippine Negritos	66.7	Hanihara, 1989a	
Phillipines	5.8	Kharat *et al.*, 1990	Trace+, with or without tubercles
Phillippines	42.7	Turner, 1987	Stages 3-7, Scott 1973
Polynesia	76.0	Suzuki and Sakai, 1964	
Prehistoric Taiwan	59.1	Turner, 1987	Stages 3-7, Scott 1973
Recent SE Asia	46.2	Turner, 1987	Stages 3-7, Scott 1973
Recent SE Asia	34.9	Turner, 1992	
Recent Thailand	37.0	Turner, 1987	Stages 3-7, Scott 1973
<u>New World</u>			
Aleuts	100.0	Moorrees, 1957	
Apache	61.3	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Eskimo	100.0	Hanihara, 1973	Measured with a depth gauge, anything 0.51 mm
Guatamala, Palencia	33.0	Mauricio, 1971 cited in Escobar *et al.*, 1977	
Guatemala, Casillas	38.9	Mauricio, 1971 cited in Escobar *et al.*, 1977	
Guatemala, P.N. Viñas	16.5	Mauricio, 1971 cited in Escobar *et al.*, 1977	
Guatemala, Queckchi	48.5	Escobar *et al.*, 1979	

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Guatemala	38.9	Casillas, 1971 cited in Escobar *et al.*, 1979	
Guatemala	33.0	Kepfer 1971 cited in Escobar *et al.*, 1979	
Hopi	44.8	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Hopi, 1st mesa	29.6	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Hopi, 2nd Mesa	39.5	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Hopi, 3rd Mesa	36.4	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Inuit (Eskimo Hall Beach) male	72.7	Mayhall, 1979 cited in Mizoguchi, 1985a	Semi- and shoveled
Inuit (Eskimo Hall Beach) female	53.1	Mayhall, 1979 cited in Mizoguchi, 1985a	Semi- and shoveled
Mapuche Indians	56.9	Munoz, 1936 cited in Campusano, *et al.*, 1972	
Mari, Upland	20.0	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Mari, Meadow	21.8	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Mexico, Tlaxcaltecan, Cuanalan	88.0	Baume and Crawford, 1978	Anything above 0 - 5 stage system where highest stages are Barrel and Double
Mexico, Tlaxcaltecan, Saltillo	68.1	Baume and Crawford, 1978	Anything above 0 - 5 stage system where highest stages are Barrel and Double
Mexico, Tlaxcaltecan, San Pablo	82.5	Baume and Crawford, 1978	Anything above 0 - 5 stage system where highest stages are Barrel and Double
Mexico, Tlaxcaltecan, Tlaxcala	73.9	Baume and Crawford, 1978	Anything above 0 - 5 stage system where highest stages are Barrel and Double
Mixed indians	85	Wissler, 1931	Marked and semi-shoveled

Table 2.14, cont. Frequencies of central incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Mohave	64.6	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Navajo, Tuba City	45.9	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Navajo, Keams Canyon	62.9	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Navajo, Ramah	44.9	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Navajo	53.7	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Papago	97.3	Sofaer *et al.*, 1972	All stages of shoveling
Papago	50.9	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Peru	100	Goaz and Miller, 1966	
Pima	97.5	Sofaer *et al.*, 1972	All stages of shoveling
Pima Indian	99.1	Hanihara, 1973	Measured with a depth gauge, anything 0.51 mm
Pima Indian	99.1	Hanihara, 1989a	
Sioux	100	Goldstein, 1948	
Tewa	47.6	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Texas Indians	100	Goldstein, 1948§	
Yuma	64.2	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.
Zuni	94.4	Sofaer *et al.*, 1972	All stages of shoveling
Zuni	47.4	Scott and Dahlberg, 1982	Grades 0-3 of Scott (1973) not shoveled, grades 4-7 shoveled.

Table 2.15. **Frequencies of lateral incisor shovel shaping reported as present or absent, with definition of presence when known.**

Population	Presence	Reference	What is Presence?
Europe			
American white	50	Lasker and Lee, 1957	
American white	21.6	Takehisa, 1957 cited in Mizoguchi, 1985	Semi- and shoveled
American white	14.0	Ward, 1951 cited in Pinto-Cesternas and Figuroa, 1968	
American white	40.7	Takehisa, 1957 cited in Pinto-Cesternas and Figuroa, 1968	
England, South East	7.1	Berry, 1976	
England, North-West	15.5	Berry, 1976	
England, Orkney, Modern	17.1	Berry, 1976	
England, Orkney, Ancient	25.0	Berry, 1976	
Finns, Helsinki	5.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Germany, Bonn	53.0	Berry, 1976	
Germany, Heidelberg	42.5	Berry, 1976	
Gruzhins, Tbilisi	16.8	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Hungarians	31.1	Tóth, 1977 cited in Tóth, 1981	Semi-and shoveled
Khantis, Davidova	69.1	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Komi-Zyrians, Ishem	12.8	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Komi-Zyrians, Southern	37.7	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Lezghin-Samours, Daghestan	24.1	Ghadzhiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Mansis, Davidova	75.8	Aksianova, 1979 cited in Tóth, 1981	Semi-and shoveled
Mari, Upland	28.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Mari, Meadow	34.4	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Osset-Digors	20.2	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Osset-Dzhava	0.9	Kotshiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Osset-Irons	8.8	Kotshiyev, 1979 cited in Tóth, 1981	Semi-and shoveled
Russians	5.4	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Shetland, Modern	25.2	Berry, 1976	
Tadjiks	22.5	Zubov *et al.*, 1979 cited in Tóth, 1981	Semi-and shoveled

Table 2.15, cont. Frequencies of lateral incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Ukrainians	13.0	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Uzbekhs	35.2	Zubov *et al.*, 1979 cited in Tóth, 1981	Semi-and shoveled
Africa			
Egypt	34.1	Kharat *et al.*, 1990	Trace+, with or without tubercles
Sudan	22.8	Kharat *et al.*, 1990	Trace+, with or without tubercles
Southwest Asia			
Ganga Valley	74	Lukacs and Hemphill, 1991	Anything above 0
Inamgaon	68	Lukacs and Hemphill, 1991	Anything above 0
India	14.8	Kharat *et al.*, 1990	Trace+, with or without tubercles
Indian female	87	Wissler, 1931	All marked
Indian male	82	Wissler, 1931	All marked
India, East, West Bengal	30.2	Bhasin *et al.*, 1985	
India, East - Oraons	48.4	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
India, East - Munda	56.4	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
India, East - Santal	47.2	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
India, North, Himachal Pradesh	33.3	Bhasin *et al.*, 1985	
India, North - Gudjar	6.6	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
India, North, Punjab	15.0	Bhasin *et al.*, 1985	
India, North, Haryana Jats	35.1	Bhasin *et al.*, 1985	
India, North, Haryana Ahirs	47.1	Bhasin *et al.*, 1985	
India, North, Uttar Pradesh	23.5	Bhasin *et al.*, 1985	
India, North, Rajsthan Udaipur	13.3	Bhasin *et al.*, 1985	
India, South, Tamil Nadu	30.8	Bhasin *et al.*, 1985	
India, West, Maharashtra Nagpur	31.4	Bhasin *et al.*, 1985	
India, West, Maharashtra Thane		Bhasin *et al.*, 1985	
Jordan	6.1	Kharat *et al.*, 1990	Trace+, with or without tubercles
Kazakh	56.5	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled

Table 2.15, cont. Frequencies of lateral incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Mehrgarh, Baluchistan, Pakistan - Chalcolithic	88	Lukacs and Hemphill, 1991	Anything above 0
Mehrgarh, Baluchistan, Pakistan - Neolithic	84	Lukacs and Hemphill, 1991	Anything above 0
Pakistan	11.4	Kharat *et al.*, 1990	Trace+, with or without tubercles
Palestinian	8.3	Kharat *et al.*, 1990	Trace+, with or without tubercles
Sarai Khola	22	Lukacs and Hemphill, 1991	Anything above 0
Saudi Arabia	10.0	Saini *et al.*, 1990	
Saudi Arabia	10.0	Kharat *et al.*, 1990	Trace+, with or without tubercles
Syria	6.8	Kharat *et al.*, 1990	Trace+, with or without tubercles
Tadjiks from Tshusts	24.2	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Timaragarha	57	Lukacs and Hemphill, 1991	Anything above 0
Uzbeks from Namangan	33.7	Zubov, 1973	Semi-and shoveled
Yemen	26.6	Kharat *et al.*, 1990	Trace+, with or without tubercles
North/East Asia			
Chinese male	71.0	Wissler, 1931	Semi- and shoveled
Chinese female	75.4	Wissler, 1931	Semi- and shoveled
Japanese	87.3	Takalusa, 1957 cited in Mizoguchi, 1985a	
Japanese	90.3	Kikuchi, 1954 cited in Mizoguchi, 1985a	Semi- and shoveled
Japanese	69.9	Takehisa, 1957 cited in Mizoguchi, 1985a	Semi- and shoveled
Japanese, Okinawa male	71.9	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Okinawa female	80.1	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Tokyo male	72.3	Mizoguchi, 1985a	Semi- and shoveled
Japanese, Tokyo female	73.1	Mizoguchi, 1985a	Semi- and shoveled
Mongols (Mongolia and Zolotaryeva	98.6	Zubov, 1973 cited in Tóth, 1981	Semi-and shoveled
Southeast Asia/Oceania			
Australia, Haast's Bluff	77.5	Richards and Tefler, 1979	
Australia, Kalumburu	92.5	Richards and Tefler, 1979	

Table 2.15, cont. Frequencies of lateral incisor shovel shaping reported as present or absent, with definition of presence when known.

Population	Presence	Reference	What is Presence?
Australia, Anson Bay	66.6	Richards and Tefler, 1979	
Australia, Lower Murray River	60.0	Richards and Tefler, 1979	
Australia, Yuendumu	66.4	Richards and Tefler, 1979	
Bali, Bronze age	54.8	Jacob, 1987	
Phillipines	6.5	Kharat *et al.*, 1990	Trace+, with or without tubercles
Polynesians	76.0	Suzuki and Sakai, 1966 cited in Pinto-Cesternas and Figuera, 1968	
New World			
Aleut	100.0	Moorrees, 1957	
Chile, Diaguitas Indians	80.3	Campusano *et al.*, 1972	
Chileans, Valparaíso	45.7	Pinto-Cesternas and Figuera, 1968	
Early Atacama Indians	63.0	Devoto and Arias, 1967	
Inuit (Eskimo Hall Beach) male	50.0	Mayhall, 1979 cited in Mizoguchi, 1985a	Semi- and shoveled
Inuit (Eskimo Hall Beach) female	45.2	Mayhall, 1979 cited in Mizoguchi, 1985a	Semi- and shoveled
Mapuche Indians	93.6	Muñoz, 1936 cited in Campusano, *et al.*, 1972	

Table 2.16. Frequencies of shoveling in the deciduous incisors reported by Hrdlička (1920) categories.

Population	None	Trace	Semi	Shov	Reference
Central incisors					
White	50.0	50.0	0.0	0.0	Hanihara, 1963
African American	80.0	10.0	10.0	0	Hanihara, 1963
India, Jat male	86.1	13.9	0	0	Kaul and Prakash, 1981
India, Jat female	84.4	6.3	9.4	0	Kaul and Prakash, 1981
India, Gulbarga, Karnataka	91.0	7.6	1.4	0	Rami Reddy, 1983a
Japanese	0.0	23.4	76.6	0.0	Hanihara, 1963
Japanese-American white	7.7	55.4	36.9	0.0	Hanihara, 1963
Japanese-African American	0.0	42.9	57.1	0.0	Hanihara, 1963
Lateral incisors					
India, Jat male	85.9	14.1	0	0	Kaul and Prakash, 1981
India, Jat female	85.4	12.5	2.1	0	Kaul and Prakash, 1981
India, Gulbarga, Karnataka	92.6	6.9	0.5	0	Rami Reddy, 1983a

Table 2.17. **Frequencies of shovel shaping of deciduous incisors reported as present or absent, with definition of presence when known.**

Population	Presence	Reference	What is Presence?
Central incisors			
American white	0.0	Hanihara, 1967	unstated
American black	10.0	Hanihara, 1967	unstated
Japanese	76.6	Hanihara, 1967	unstated
Pima Indian	61.6	Hanihara, 1967	unstated
Eskimo	50.0	Hanihara, 1967	unstated
Lateral incisors			
American white	0.0	Hanihara, 1967	unstated
American black	15.0	Hanihara, 1967	unstated
Japanese	93.3	Hanihara, 1967	unstated
Pima Indian	64.3	Hanihara, 1967	unstated
Eskimo	60.0	Hanihara, 1967	unstated

Table 2.18. Frequencies of lingual tubercles reported as present or absent, with definition of presence when known.

Population	Presence	Reference	Definition
<u>Central incisors</u>			
Early Mainland Southeast Asia	27.4	Turner, 1987	
Early Malay Archipelagao	32.1	Turner, 1987	
East Malay Archipelago	23.1	Turner, 1987	
Phillippines	22.4	Turner, 1987	
PNG, Pari	50	Doran, 1977	
Recent Indomalaysia	28.1	Turner, 1987	
Recent SE Asia	23.5	Turner, 1987	
Recent Thailand	19.5	Turner, 1987	
Burma	11.5	Turner, 1987	
India, Jat male	40.7	Kaul and Prakash, 1981	Presence of a grooved cingulum
India, Jat female	26.4	Kaul and Prakash, 1981	Presence of a grooved cingulum
India, Eastern male	47.9	Pal, 1964	
India, Eastern female	29.4	Pal, 1964	
Indian	33	Turner and Cadien, 1969	
Nepal	22.2	Turner, 1987	
Amur	11.1	Turner, 1987	
Hong Kong	19.1	Turner, 1987	
Jomon	23.9	Turner, 1987	
Lake Baikal	25.0	Turner, 1987	
N China- Mongolia	19.1	Turner, 1987	
NE Siberia	32.8	Turner, 1987	
Prehistoric Taiwan	14.3	Turner, 1987	
Recent Japan	15.5	Turner, 1987	
S China	11.4	Turner, 1987	

Table 2.18, cont. Frequencies of lingual tubercles reported as present or absent, with definition of presence when known.

Population	Presence	Reference	Definition
White female	1.0	Hrdlička, 1921	Readily discernable cusps
White male	2.0	Hrdlička, 1921	Readily discernable cusps
Black female	2.8	Hrdlička, 1921	Readily discernable cusps
Black male	1.6	Hrdlička, 1921	Readily discernable cusps
Aleut	12	Turner and Cadien, 1969	
American Indians	3.2	Hrdlička, 1921	Readily discernable cusps
East Greenland Eskimo	4.3	Pedersen, 1949	
Eskimo	47	Turner and Cadien, 1969	
Lateral incisors			
PNG, Pari	33.3	Doran, 1977	
Arab	21	Carbonell, 1963	
East Greenland Eskimo	18	Barksdale, 1972	
India, Jat male	23.4	Kaul and Prakash, 1981	Presence of a grooved cingulum
India, Jat female	11.4	Kaul and Prakash, 1981	Presence of a grooved cingulum
India, Eastern male	17.1	Pal, 1964	
India, Eastern female	5.7	Pal, 1964	
East Greenland Eskimo	14.3	Pedersen, 1949	
White male	5.0	Hrdlička, 1921	Readily discernable cusps
White female	5.6	Hrdlička, 1921	Readily discernable cusps
Black male	3.9	Hrdlička, 1921	Readily discernable cusps
Black female	5.8	Hrdlička, 1921	Readily discernable cusps
American Indians	7.6	Hrdlička, 1921	Readily discernable cusps

Table 2.19. Frequencies of lingual tubercles, as reported by scored by various methods.

Population	Absent	Bulge	Tubercle	Reference
Central incisors				
Australian, South East Queensland	36	36	28	Smith *et al.*, 1981
Lateral incisors				
Australia, South East Queensland	55	27	18	Smith *et al.*, 1981

Population	Smooth	Trace	Moderate	Cusp	Reference
Central incisors					
Paraguay, Lengua	95.0	3.5	2.5	0	Keiser and Preston, 1981
Lateral incisors					
NS, Paraguay, Lengua	38.5	11.9	25.4	24.2	Keiser and Preston, 1981

Table 2.20. Frequencies of median lingual ridges scored in categories by Lukacs and Hemphill (1991).

Population	0	1	2	3	4	5	Reference
Central incisors							
Baluchistan, Pakistan	44.0	20.0	8.0	12.0	8.0	8.0	Lukacs and Hemphill, 1991
Lateral incisors							
Baluchistan, Pakistan	70.0	0.0	8.3	16.7	0.0	4.2	Lukacs and Hemphill, 1991

Table 2.21. **Frequencies of *Tuberculum dentale* of the central incisor scored in Kirveskari categories.**

Population	0 - none	1 - single small	2-double small	3-Single large	4-Large and small	5-Double large	6-Multiple	Reference
Finns	43	23	24	1	3	1	5	Kirveskari, 1973
Skolts	42	21	23	3	4	2	4	Kirveskari, 1973
Swedes	43	23	20	3	3	1	7	Kirveskari, 1973

Table 2.22. **Frequencies of *Tuberculum dentale* as scored by progressive degrees of development.**

Population	0 - none	1 - faint ridging	2-Trace ridging	3-Strong ridging	4-Pron. rdging	5-Weak cuspule	6-Strong cusp	Reference
Central incisors								
Ainu	43.5	45.6	6.5	2.2	2.2	0	0	Turner and Hanihara, 1977
Jomon	0	52.2	32.0	8	8	0		Turner, 1979
Melanesia	41.3	39.1	10.9	8.7	0	0	0	Turner and Swindler, 1978
Taiwan, Bunun	38.6	8.0	23.9	21.6	5.7	2.3	0.0	Manabe *et al.*, 1991
Lateral incisors								
Ainu	3.6	28.6	41.1	14.3	7.1	5.6	0	Turner and Hanihara, 1977
Jomon	37.0	22.2	0	37.0	3.7	0		Turner, 1979
Melanesia	65.2	21.7	6.5	0	2.2	4.3	0	Turner and Swindler, 1978
Taiwan, Bunun	75.3	10.8	9.7	3.2	0	0	1.1	Manabe *et al.*, 1991

Table 2.23. Frequencies of various forms of the cingulum on the lingual surface of the central incisors.

Population	Smooth	Finger Pattern	Cusped	Notched	Reference
Central incisors					
Uganda, Teso, Male	78.2	17.7	2.4	1.7	Barnes, 1969
Uganda, Teso, Female	64.2	27.6	2.7	1.7	Barnes, 1969
Uganda, Teso	75.2	20.5	2.5	1.7	Barnes, 1969
Peru		70.1			Goaz and Miller, 1966

Table 2.24. Frequency of levels of development of the central lingual tubercle spine.*

Population	None	Elevated	Bud	Cusp	Reference
Central incisors					
Japanese male	86.1	13.9	0	0	Mizoguchi, 1978
Japanese female	80.9	19.1	0	0	Mizoguchi, 1978
Lateral incisors					
Japanese male	91.9	4.0	4.0		Mizoguchi, 1978
Japanese fzemale	94.8	2.6	2.6		Mizoguchi, 1978

*Mizoguchi separates the lingual tubercle into three separate spines, what some might call the fingerlike projections. This table reports only the frequency of the central spine. The other spines occur at higher frequencies than does the central.

Table 2.25. Frequency of levels of development of central incisor curvature, based on ASU Dental System plaques.

Population	0	1	2	3	4	Reference
Irish	43	46	11			Nichol *et al.*, 1984
White, South Africa	17	63	19	1		Nichol *et al.*, 1984
White, Arizona	28	65	6			Nichol *et al.*, 1984
Asiatic Indians, S. Africa	8	65	23	4		Nichol *et al.*, 1984
Chinese, San Francisco	27	75	2			Nichol *et al.*, 1984
Chinese White Hybrids	44	52	4			Nichol *et al.*, 1984
Hawaii	33	57	10			Nichol *et al.*, 1984
Micronesia (Yap)	29	58	13			Nichol *et al.*, 1984
Solomon Islands	14	72	13	1		Nichol *et al.*, 1984
Nubian	9	66	22	4		Nichol *et al.*, 1984
South Africa, Bantu	6	60	30	4		Nichol *et al.*, 1984
South Africa, Bushmen	3	36	43	11	6	Nichol *et al.*, 1984
Arizona, Papago	36	61	3	1		Nichol *et al.*, 1984
Arizona, Navajo	30	65	6			Nichol *et al.*, 1984
Arizona, Prehistoric Hopi	36	59	5			Nichol *et al.*, 1984
Eskimo, Canada	16	72	8			Nichol *et al.*, 1984
Eskimo, Kodiak	34	61	4	1		Nichol *et al.*, 1984
Mexican American	20	65	15			Nichol *et al.*, 1984
Mexico, Casas Grandes	48	51	2			Nichol *et al.*, 1984
New Mexico, Gran Quivera	41	51	6			Nichol *et al.*, 1984

Shovel shaping in the human fossil record

Shovel shaping was first recognized in the human fossil record nearly a century ago by Gorjanović-Kramberger (1906) when he described the incisors from the Middle Paleolithic site of Krapina in Croatia. Commenting that the shape of the incisors was one of the most unique aspects of the Krapina teeth, he noted shoveling and particularly the development of lingual tubercles as peculiar. Adloff (1908, cited in Hrdlička, 1920) noted that the same morphologies appeared in modern Europeans, but as anomalies, rather than as regular forms as observed in the Krapina Neandertals. Adloff thus became the first to attempt to compare the shapes of modern and fossil humans.

Since Gorjanović-Kramberger's (1906) description, shovel-shaped teeth have been repeatedly identified throughout the human fossil record. Nearly every time shovel shapes were recognized in fossil hominids, these incisors were used to test hypotheses of genetic relationship, of how the fossil samples were related to one another and how they were related to modern people. Hrdlička (1920) in his original paper on shoveling, commented that incisor shapes should be useful in examining human evolution. He thought that shovel shaping should functionally strengthen the incisors and therefore stated that, "we should also expect to find a large proportion of shovel-shaped teeth in our early historic and prehistoric ancestors, with a gradually increasing proportion as we proceed backward" (p. 465).

Weidenreich (1937) went a step further and proposed a specific evolutionary link. Teeth of *Homo erectus* from the Chinese site of Zhoukoudian were distinctly shoveled which Weidenreich interpreted as evidence of an evolutionary connection between the fossil and recent Chinese (1935, 1937). He interpreted shovel shapes of Neandertals somewhat differently, however:

> ...while this formation seems not to have been transmitted from at least the European type of Neanderthal man to the European races of recent Mankind, it may have passed from Sinanthropus to the recent Mongolian race (Weidenreich, 1935: 440).

Adloff (1937) disagreed with Weidenreich on the interpretation of shoveling as evidence of an evolutionary link between archaic and recent Chinese, primarily due to a different interpretation of the definition of shovel shaping. Adloff thought that the term shovel shape should be reserved for those teeth which showed only a high degree of marginal ridge development, following his interpretation of Hrdlička's definition (1920). According to Adloff, if the tooth had a tubercle as well, it was not shovel shaped, and must be called something else. Such teeth he termed tubercle-shaped, or "Höckerform." Shovel shaped, or "Schaufelform" teeth, were therefore exclusively present in modern humans, and were the result of the loss of the tubercle (Adloff, 1937). Moreover, Adloff (1937) thought that only if these incisor forms were separated could shovel shaping be used as a racial character or as an indicator of relationship between fossil and modern populations.

Weidenreich countered that "the existence of typical shovel-shaped central and lateral *Sinanthropus* incisors according to Hrdlička's definition is not a matter of interpretation but a fact" (1937: 23). Whether or not there were tubercles, these teeth were shovel shaped. Although the central incisors of Neandertals and the Zhoukoudian sample were similar, the laterals showed distinct differences. The lateral incisors of Neandertals, he stated, were more similar to modern Europeans than to modern Asians. Further, the essential point to be made about shovel shaped teeth was that, although they may be seen in all human populations, the frequency in Asia was near 100%, and that the same could be said for *Sinanthropus*:

> Hence there can not be the slightest doubt as to the existence of a closer relation of this fossil hominid to the Mongols of today than to any of the other recent races. In the presence of this fact all other details are of secondary importance (Weidenreich, 1937: 23).

He provided two possible explanations for the presence of shoveling in Neandertals and its absence in modern Europeans. The first was that the morphology was lost in the evolution of the recent Europeans, and the second possibility was that Neandertals were not the ancestors of modern Europeans.

Since the descriptions of the Zhoukoudian teeth by Weidenreich (1935, 1937), incisor forms have been used as evidence to argue for or against many ideas regarding modern human origins. Weidenreich used incisor form to support an evolutionary connection between the people of Zhoukoudian and modern Chinese. Chang (1962) provided an illustration of different shovel shapes from throughout the Chinese fossil record to show how these shapes were similar, and have changed through time (redrawn in Figure 2.1). He saw evidence of continuity in these shapes, contrasting this interpretation of the fossil record with that of Woo and Cheboksarov (1959, cited in Chang, 1962) that shoveling was not, in fact, useful in determining such relationships. According to Chang (1962), Woo and Cheboksarov dismissed the utility of incisor shapes due to the occurrence of shovels in other fossil humans that could not reasonably be considered ancestral to later Asians (Chang, 1962). Chang, on the other hand, agreed with Weidenreich (1937) that the persistence of shoveling in China, although not absolutely conclusive, was certainly remarkable and likely indicative of some populational continuity in the region. He concluded that the evidence for continuity...

> ...must not be taken to mean that human development in China was a completely closed and self-sufficient process. It simply means that there probably was a central nucleus of interrelated genes that was transmitted from the early hominids in this area to its present inhabitants. Moreover, it does not mean that the origin of the Mongoloid race has been pinpointed, either in time or in space. It is to be realized that modern races are significant only at the contemporary time level as categories of population and that "races" of man in a past period must be categorized in their own right. Instead of looking for origins of the modern Mongoloid race, one might more feasibly try to explain the modern distribution of races in the light of racial differentiation of the fossil man population (Chang, 1962: 759).

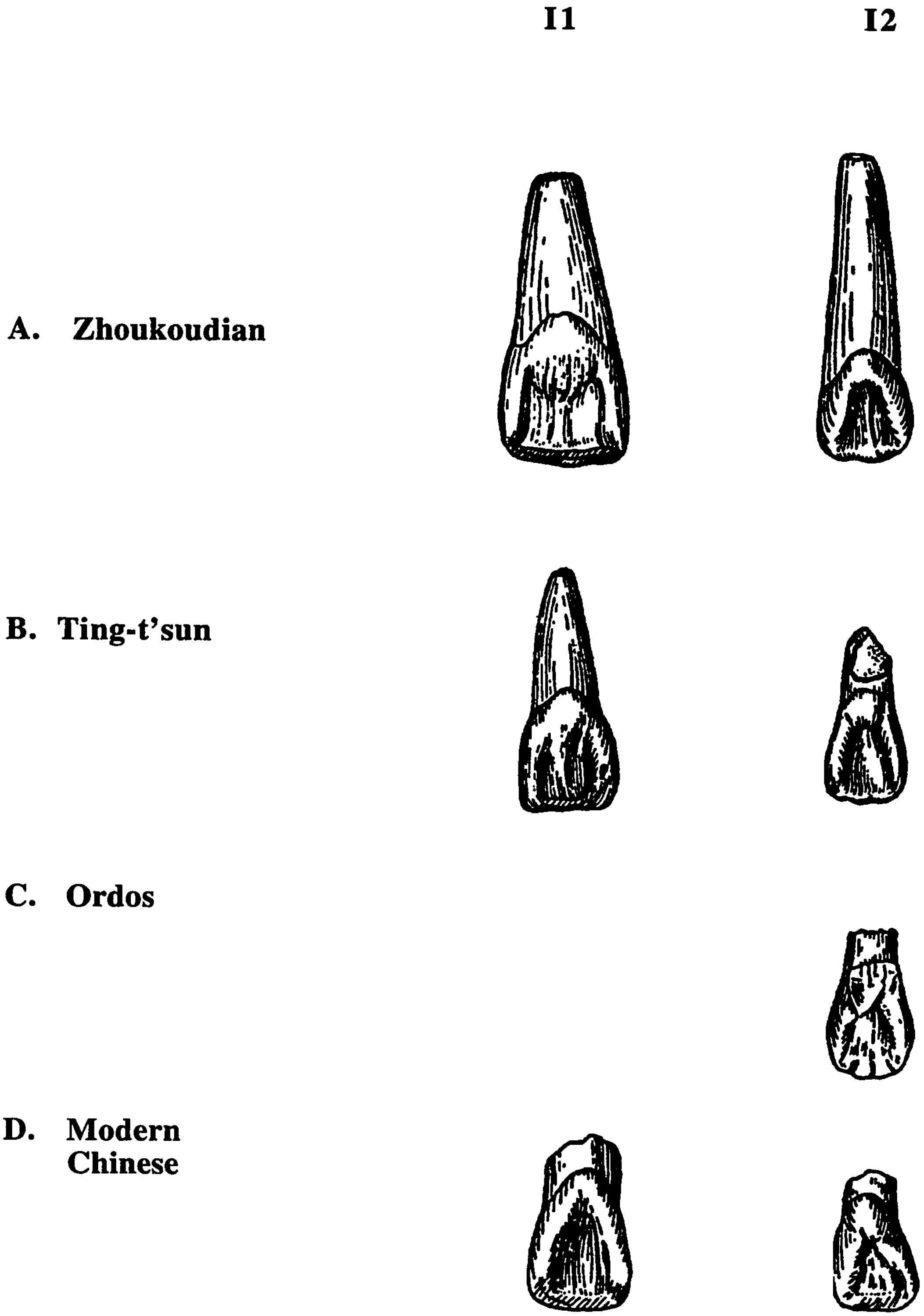


Figure 2.1 Chinese incisors, illustrating change through time in incisor form, redrawn from Chang (1962).

Traditional interpretations of shoveling in recent human populations lead directly into the uses of shoveling in today's arguments over modern human origins, in which shovel shaped teeth are an important piece of evidence. Advocates of two primary models of modern human origins – the "Recent African Origin" model and the "Multiregional Evolution" model – use shovel shaping to support and refute theories, sometimes in contradictory manners.

The Recent African Origin model of modern human origins, also known as the Replacement or Out-of-Africa hypothesis, proposes that anatomically modern humans arose in Africa between 50,00 and 200,000 years ago and spread from there throughout the world replacing indigenous populations with little or no intermixing (Aiello, 1993; Stringer and Andrews, 1988). This model "posits a major change in populations relationships at the appearance of modern humans, with a break in patterns of regional continuity outside of Africa" (Stringer, 1992: 11). According to this model, for a character such as shovel shaping, any continuity of features that does exist within regions should be interrupted by appearance of an African morphology at the time of replacement by modern humans. Shoveling in Neandertals and its absence in later Europeans would be evidence of discontinuity and therefore replacement in Europe. Another approach to shovel shaping by proponents of replacement however, is to dismiss the regionality of shoveling altogether, and therefore its utility in examining questions of human origins. The occurrence of shoveling in 70% of incisors from Jebel Sahaba and Wadi Halfa has been taken as an indication that shoveling does not, in fact, have regional significance, and is therefore not relevant to arguments about origins (Stringer, 1992).

Multiregional evolution presents a different model for human origins. This model traces all populations back to when humans first colonized the Old World, and proposes that populations evolved through interconnected lineages. Modern human features originated at different times and in different places and spread throughout the world (Thorne and Wolpoff, 1992; Frayer *et al.*, 1993). At the same time, Multiregional

Evolution implies that certain features distinguishing modern populations developed very early in their regional histories (Frayer *et al.*, 1993). Shovel shaping has been used as key evidence of continuity supporting Multiregional Evolution since Weidenreich (1937) first suggested that incisor morphology could be used as evidence of an evolutionary connection between *Homo erectus* at Zhoukoudian and recent Chinese (Wolpoff *et al.*, 1984). Supporters of Multiregional Evolution have even recently stated that shovel shaping within China is "perhaps the most inarguable indication of regional continuity," (Frayer *et al.*, 1993: 25).

In order to evaluate arguments regarding modern human origins, it is necessary to know which teeth are being called shovel shaped, what definition of shoveling is being used, and what forms these teeth display. Shovel-shaped incisors have been identified throughout the human fossil record, yet the numbers of incisors in which morphology can be evaluated is actually fairly low. As Carbonell (1963) pointed out, "fossil hominid upper incisor teeth are very rare, and the number with characteristic shoveling is extremely small covering a time period of about 1,000,000 years and representing many world populations," (p. 222). Add to this the heavy wear seen on many incisors, and the available sample for examining shoveling becomes even smaller. The record of shovel-shaped teeth will be presented by region, and by time within region and will be limited to teeth within the genus *Homo.*

Africa

The African fossil record of hominid incisors includes teeth from *Homo habilis*, early *Homo erectus*, and a few late Pleistocene humans – a fairly scant record for two million years of evolution. Within *Homo erectus*, shoveling has been identified in all individuals with fairly unworn incisors. Earliest *Homo erectus*, represented by the Nariokotome skeleton, shows a moderate shovel shape (Brown and Walker, 1993; Walker, 1993) and have been described as very similar in overall morphology to *Homo* *erectus* from China (Brown and Walker, 1993), with moderate marginal ridge development and a lingual tubercle. Similar shapes are described in other early *Homo* teeth from South Africa (Grine, 1993) and East Africa (Wood, 1991).

Rabat, from the late Pleistocene of Morocco, also shows moderately shoveled incisors (Vallois, 1960). Its teeth are not as heavily shoveled as is seen in either modern Asians or Sinanthropus (Vallois, 1960; Carbonell, 1963), showing only lightly developed marginal ridges but substantial lingual tubercle development (Thoma and Vallois, 1977). From the Mesolithic of Africa there are several sites which repeatedly are cited for the presence of shovel shaped incisors. These include Wadi Halfa and Jebel Sahaba in the Sudan (Greene *et al.*, 1967; Anderson, 1968), and Afalou, in Algeria (Arambourg *et al.*, 1934).

Europe

Europe provides a sample of incisors from pre-Neandertals through the Upper Paleolithic, all of which have been called shovel shaped. The earliest teeth that might fit this description are from Atapuerca, in Spain, and Biache, in France. The teeth from Atapuerca show very strong shoveling, with large lingual tubercles (Bermúdez de Castro, 1993). Biache is yet undescribed, but has been observed in the course of this study and the single lateral incisor is distinctly shoveled.

Later in time are samples of Neandertals. As noted above, some of the first fossil incisors to be recognized as shoveled were from Krapina, in Croatia. The Krapina teeth show a very heavily built morphology with both large ridges and lingual tubercles (Gorjanovič-Kramberger, 1906). Teeth of a child from the site of Ehringsdorf display a morphology very similar to the teeth from Krapina, distinctly shoveled with small cusps on both the central and lateral incisors (Hrdlička, 1930). Teeth from La Quina and Le Moustier, both Neandertals from the Würm glaciation, also display distinctly shoveled incisors (Hrdlička, 1930). Le Moustier, illustrated by Weidenreich (1937), shows a moderate lingual tubercle but little marginal ridge development on the central incisor. The lateral tooth is similar but with a much larger basal tubercle. Other Neandertal teeth which have also been described as shoveled include Monsempron (Vallois, 1952) which has both a central and lateral incisor (specimens c and h), Châteauneuf 2 (Tillier, 1979) with central and lateral incisors, Combe Grenal, and an unerupted central incisor from Subalyuk. From the late Middle Paleolithic or early Upper Paleolithic are hominids from St. Césaire, from the Châtelperonnian in France (Lévêque and Vandermeersch, 1981), and from Aurignacian levels at Vindija (specimens 289,290), in Croatia (Wolpoff *et al.*, 1981). Teeth from both of these sites are heavily shoveled, although Vindija shows a more moderate morphology. Solidly in the Upper Paleolithic are incisors from the humans at Dolní Věstonice, in Czechoslovakia.

East Asia

The fossil record for incisors from East Asia includes several sites in China and Indonesia. The Chinese *Homo erectus* material consists of several teeth from Zhoukoudian (Weidenreich, 1935; 1937) two incisors from Yuanmou (Chang, 1977), and an isolated incisor from Longgudong cave in Yunxian county, Hubei Province (Wu and Dong, 1985). The Yuanmou teeth are the least shoveled of these teeth, yet show evident marginal ridge development, and a well developed lingual tubercle. Teeth from Zhoukoudian and Longgudong show moderate to heavy marginal ridge development and moderate lingual tubercle development(Weidenreich, 1935; Wu and Dong, 1980).

More recent shoveled teeth include an upper central incisor from Xujiayao, in Hebei province (Wu, 1980), a central incisor form Tongzi, Guizhou province, and both a central and a lateral incisor from Dingcun, Shanxi province, China (Wu and Wu, 1985). The specimens from these three sites are attributed to early *Homo sapiens* and all are described as showing both marginal ridges and prominent lingual tubercles with finger-like projections (Wu and Wu, 1985).

Much later sites in China with incisors include Ordos, in Inner Mongolia, and Ting-t'sun, in Shansi province. Ordos yielded a single upper left lateral incisor, essentially unworn, from late Pleistocene or Holocene deposits (Chang, 1977; Wolpoff, 1980). It is typically shovel shaped, with a small but prominent lingual tubercle (Licent *et al.*, 1927). Chang (1962) described the incisors from Ting-ts'un, a late Pleistocene site from southern Shansi, as shoveled, although the central approximates the Neandertal form. The lateral displayed a shape more like *Sinanthropus* or modern Mongoloids. Chang (1962) cited Woo's (1958) interpretation of the morphology of Ting-t'sun as an indication that the individual represented was between Sinanthropus and modern humans in morphology, and was closely related to other Asians.

From southeast Asia, a small number of incisors are known. There are a few incisors of *Homo erectus* from the late early Pleistocene site of Sangiran in Java, Indonesia, which are described as shoveled (Grine and Franzen, in press). These teeth show marginal ridges and lingual tubercles. Indonesia also provides one recent specimen, a moderately-shoveled tooth from Lida Ajer Cave in Sumatra, possibly 40,000 years of age (deVos, 1983; 1985).

Southwest Asia

Southwest Asia provides a sample of both Neandertals and early modern humans. Southwest Asian Neandertals with shovel shaping include Amud (Suzuki and Takai, 1970) and Tabūn (McCown and Keith, 1939) in the Near East, and Teshik Tash in Uzbekistan (Weidenreich, 1945). Incisors from all of these sites have been described as shoveled and therefore used as evidence that the Neandertals were not ancestral to modern Europeans (Stringer, 1992) and that Neandertals and modern humans inhabiting the Near East during the late Pleistocene were two different populations (Trinkaus, 1992).

Original descriptions of modern human teeth from the Near East also noted shovel shaped incisors. McCown and Keith (1939) described teeth from both Skhūl and Tabūn as shovel shaped, although to different degrees. Skhūl showed very light marginal ridge development, but Tabūn, on the other hand, showed very prominent shoveling. On the few incisors from Tabūn, the lingual tubercle is manifested as an independent cusp. McCown and Keith (1939) saw shoveling degree as evidence that Tabūn was more closely related to Neandertals while Skhūl was more like modern humans.

Amud, from the Middle to Upper Paleolithic of Israel, also has shovel shaped teeth (Suzuki and Takai, 1970). In this case, shoveling has been used to support the Neandertal affinities of this individual. Although teeth of Amud are heavily worn, they were described as possessing both lingual tubercles and marginal ridges, although to a lesser degree than is seen in a typical Neandertal.

In his description of the teeth of the Teshik Tash child from Uzbekistan, Weidenreich (1945) used these same morphologies of the incisors to support conclusions regarding its relationship to other Paleolithic fossils. Referring to shovel-shaped teeth and other anatomical characteristics, he stated that the Teshik Tash child was more like the people from Skhūl than it was like the European Neandertals. This similarity, he stated, was due to the presence of Mongoloid racial traits in the Teshik Tash skull.

Material from Qafzeh (Vallois and Vandermeersch, 1972) was described as lacking shovel shaping, a feature used to argue that these individuals were morphologically modern. It was noted by Mizoguchi (1985a), however, that this characterization of the teeth is not entirely accurate. From photographs Mizoguchi estimated that the shoveling on the incisors of at least one of the Qafzeh individuals fell within either the trace or semi-shoveled categories of Hrdlička's (1920) scale. He noted that this shoveling was clearly not as developed as in Neandertals, but that shoveling was present.

All fossil teeth discussed above have been called shovel shaped, yet just as with modern shovels, many differences may be seen amongst them. Although shovel shaped incisors in the human fossil record have been used to support any and all ideas about human evolution, it is not clear exactly what information incisor shapes really carry regarding human evolution. In order to understand the importance of shoveling, it is necessary to follow the suggestion of Stringer, who calls for, “comprehensive critical reviews of these [regional] characters, their precise definition, variation and regional significance" (1992: 16). He states that for any analyses of shoveling or any other regional characters to be effective, the features used must be clearly defined and homologous.

A new definition of shoveling

Clearly, there are varied ideas on what shoveling is, who has it, and to what degree. Much of the variation in opinion is due to the confluence of various characters on the lingual surface of the tooth and the difficulty in separating them when discussing incisor morphology. Shoveling is not equal to lingual fossa depth, and both are dependent on the presence and development of not only the marginal ridges but also the contributions of several other morphological characters. This conclusion has been reached by several other researchers over time. Researchers, however, have always returned to the classic definition of shovel shaping, even while understanding that it does not fully describe the morphologies called shoveled. It is clear from the work summarized here that the definition of shoveling given by Hrdlička nearly 75 years ago is not adequate to describe the range of shapes that may occur.

I propose a new definition for the set of morphological features usually called "shoveled." Shovel shaping is the occurrence of a basin on the lingual surface of the incisor caused by the development of three features of the tooth: marginal ridges, basal tubercles, and curvature, either alone or in combination. Different kinds of shovels may be identified by the relative development of these three features. As long as there is a resultant fossa, whether created by a single one of the three features or a combination of them, an incisor may be considered shoveled.

All previously developed plaques and methods score shovel shaping as a single character (e.g., Scott, 1973; Turner *et al.*, 1991). In doing so, such methods cannot take into account the relative contributions of several different factors. When separating them, it is important that the scores for each constituent character are not influenced by the presence or absence of the other characters. Therefore, in the next chapter, I describe a new method for examining shovel shaping, one that provides comparative standards for each of the three contributing characters and tries, when quantifying each one, to eliminate the influence of the others on the resultant score.

Summary

There is some question regarding how to quantify shoveling and the degree of development which may be termed "shoveled." And, of course, there is disagreement as to what the presence of the morphology ultimately means, both in modern and fossil peoples. From this review of the literature, one can at least determine that many have studied shoveling and that different opinions abound. Modern humans display shovel-shaped incisors; some populations show a greater frequency of these shapes than others, although the details of these differences have been debated. Shovel shaping has a strong genetic component and is highly heritable; therefore it should be a useful character in asking questions about population relationships.

Shoveling of incisors is also common in the human fossil record. The character is ubiquitous among the European Neandertals and is seen in some Near Eastern fossils, both "Neandertal" and "modern human." Shovel-shaped incisors also occur in fossil Asian populations, evident throughout the Chinese fossil record, as well as in Pleistocene Java.

Validity of interpretations of shoveling in the fossil record, however, is debatable. In order to understand what information shovel-shaped teeth carry regarding population relationships and human evolution, it is necessary to provide a clear definition of the complete morphology and a way to quantify it. A study of the presence of shoveling in modern populations is then necessary to understand the details of its distribution. Finally, a re-examination of the fossil incisor record is needed. A new definition of shoveling will provide a way to re-interpret the shapes in the fossil record and identify the similarities and differences between them. If shovel shapes are to be used as evidence in the debates on modern human origins, it is necessary to understand the varied morphologies and distributions at a more refined level than is currently available.

CHAPTER III

METHODS AND MATERIALS

The present study examines variation in human incisor morphology, both past and present, using a new definition of shovel shaping. This definition considers that several features contribute to the shovel shape, whereas traditionally shoveling has been treated as a simple morphology. In order to investigate the variation in incisor forms, it is necessary to have a way to quantify shape by its components rather than as a single form. The components – marginal ridges, lingual tubercles, and mesial-distal curvature – have all been quantified in the past by comparison to standardized plaques or in descriptive stages. Never have these three traits been considered together to create the shovel shape, however. A method to examine these morphologies, both as independent traits and as part of a set, is developed for this study and will be presented. This method will be compared to other ways of quantifying shoveling.

Then, in order to investigate the regional significance of shoveling, large samples from Old World populations were collected. The details of data collection are outlined including a variable list, inclusion criteria and examination procedure. An error analysis based on repeated observations is presented. Finally, the sample collected, both modern and fossil, and its sources are detailed.

Quantifying 3-D shoveling

Over the century that shovel shaped incisors have been studied by anthropologists, many different methods have been used to examine variations in the shapes that the teeth assume. Much of the history of the study of shovel shaping has been presented in the previous chapter. The present study differs from previous ones in its approach to shovel shaping in that it examines the relative contributions of three separate characters to the ultimate shape of the tooth. To separate the components of shoveling, it is necessary to examine the methods by which shoveling has previously been quantified, rethink how the morphologies are scored, and to consider if the systems presently available are adequate for present purposes.

Several methods for quantifying the three incisor shapes have been used in previous studies. As mentioned previously, scoring systems fall into two basic categories: those that attempt to measure the morphology directly and those that examine the shape by comparison to standardized forms. The previous chapter concluded that direct measurement of the lingual fossa does not actually measure the morphology called shovel shaped. Therefore, although some researchers are not entirely satisfied with standardized plaques, scoring by comparison to standard forms seems the more appropriate method by which to examine incisor morphology.

Previous plaques

Standardized comparative plaques have a long history of use in the study of shovel shaping. Hrdlička's four stages were first given three dimensional representation by Dahlberg (1956) in preliminary plaques "P1" and "P2" for the permanent central and lateral incisors, respectively. Plaque "P1" showed various degrees of shovel shaping of the central incisor, as well as several other variations in the lingual aspect of the incisor. Preliminary plaque "P2" illustrated variation in lateral incisor morphology, including shovel shaping, peg and barrel shape teeth, and provided a category for lateral incisor agenesis. Dahlberg's plaques were modified through time to ones which only considered shovel shaping. The other morphologies were for the most part relegated to other plaques or neglected. Dahlberg eventually developed a plaque with four stages, matching those proposed by Hrdlička (1920). This plaque, due to its wide distribution, became the temporary standard by which to study shovel shaping and discuss its variations.

Dahlberg's system was modified and used in a variety of ways. Moorrees (1957) first modified the plaque by adding a stage and Scott (1973) expanded shoveling scores into a seven stage system. This latter plaque is well known today as part of the ASU Dental System for studying dental morphology (Turner *et al.*, 1991). These plaques are not, however, used in a consistent manner by all workers. Some studies retain the early Dahlberg plaque, the Moorrees plaque, or a combination thereof. All of these plaque systems are still in use, although the most commonly used shoveling plaque is that of the ASU Dental System (Turner *et al.*, 1991).

For the other aspects of incisor morphology which make up shoveling, reference plaques are fairly new. Since the end of the nineteenth century variation in the development and morphology of the lingual tubercle has been noted (Zuckerkandl, 1891) but without a consistent way to quantify differences in its shape. Turner *et al.* (1991) noted that, of the several attempts to score lingual tubercle morphology, none has been completely satisfactory. In particular, within and between observer variation is great. Dahlberg's (1956) P1 plaque illustrated several variations of lingual tubercle development, yet this plaque only represented a few of the possible manifestations of this feature in modern as well as prehistoric humans. The ASU Dental System plaque for the *tuberculum dentale* exhibits variation in degree of development of what are sometimes called finger like projections at the base and lingual surface of the incisor (Turner *et al.*, 1991).

Curvature, a third feature of incisor morphology, has had a standardized plaque for comparison for less than ten years (Nichol *et al.*, 1984). Since this character has been systematically studied only a short time, there is a single plaque for scoring this morphology. This plaque scores the mesial-distal curvature of the tooth from an occlusal view.

New comparative standards

Each of the existing plaques examines a single character or scores shoveling as a single feature, although several components lead to its expression. None of these plaques explicitly separate the different morphologies under investigation. In order to examine shoveling in several dimensions, it is important to distinguish the different contributing factors. Another attribute desirable in a scoring system for a study such as this one is that the plaques exhibit the entire range of variation seen in both modern and fossil humans

Only one of the previously existing plaques, the ASU Dental System plaque for curvature (Nichol *et al.* 1984, Turner *et al.*, 1991), is retained for the present study. The ASU plaques for tubercle development and for marginal ridges are rejected due to the lack of separation of the different morphologies and due to their lack of coverage of the variance seen. For the purposes of examining variation in both modern and fossil individuals, the ASU Dental System plaque for tubercle development codes too few of the possible variations in the morphology. The "shoveling" plaque is problematic because it was designed for only the central or lateral incisors, so that the scores of these teeth are not comparable and that these scores do not strictly correspond to marginal ridge development. New plaques are therefore created to study marginal ridge and lingual tubercle development. These plaques are developed in order to minimize interaction of traits on teeth used for standard comparison and to display the whole range of morphologies seen in both modern and prehistoric humans.

In order to create new comparative plaques, a study of the variation in modern incisors was undertaken at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. Teeth were examined for their morphologies and a large selection of fairly unworn, well preserved teeth were molded using the dental molding compound Reprosil©. This compound has a shrinkage rate of 0.03% after 48 hours, less than the time between molding and casting. The shape of the mold remains fairly constant, however, even after 48 hours. The teeth were then cast in high resolution epoxy at the Preparation Laboratory, University of Michigan, Museum of Paleontology.

Teeth chosen as models were seriated based on increasing development of the shapes investigated. For each study character, representative teeth were chosen, when possible, which showed only one of the relevant morphologies and not the others. For example, teeth with tubercles were rejected from inclusion in the plaque for marginal ridge development, in order to make certain that the presence of another morphology on the comparative plaque would not influence the scoring of the one of interest. Teeth were then chosen for the plaques in order to represent the entire range of morphologies seen in the character, as well as to divide the variation into, hopefully, equitable categories. Models were assembled into plaques which were then molded and cast in epoxy. Even after two levels of molding and casting, the teeth in the plaques retained high resolution and detail of morphology, in some cases, the surface perikymata of the teeth were even visible.

Tables 3.1 and 3.2 describe the stages of development for each tooth in each of the plaques and provide approximate equivalencies to other scoring systems for the marginal ridge and tubercle plaques respectively. Stages of development of curvature are described in Turner *et al.* (1991). These new plaques, as well as the ASU curvature plaque, are illustrated in Figure 3.1. To score "3-D shovel shaping", a tooth is compared to the new plaques for both marginal ridge development and for tubercle development and to the ASU Dental System plaque for curvature. For each character, a tooth gets the score assigned to the example whose shape it most closely approximates. A tooth's shoveling score is composed of the separate scores for these three variables.

Table 3.1. Description of stages of marginal ridge scores, corresponding to the example teeth on the comparative plaque, and approximate equivalencies to other methods.

Stage	Description	Equivalency
0	No indication of marginal ridge development	ASU 0 Hrdlička none
1	Slightest degree of marginal ridge development, ridges may not always reach incisive edge	ASU 0-1 Hrdlička none
2	Semi-shovelled, ridges readily visible, but not extremely prominent	ASU 1-3 Hrdlička trace
3	Pronounced ridges surrounding a deep fossa	ASU 3-5 Hrdlička semi
4	Extremely prominent marginal ridges enclosing a true basin	ASU 5-6 Hrdlička shovel
5	Marginal ridges meet at the base of the crown and are extremely prominent; these ridges surround a pit rather than a basin	ASU 5-6 Hrdlička shovel Moorrees shovel-marked

Table 3.2. Descriptions of Lingual tubercle scores, corresponding to the example teeth on the comparative plaque, and approximate equivalency to ASU *Tuberculum dentale* plaque.

Stage	Description	Equivalency
0	No tubercle development	
1	Slight nodule at the base of the lingual surface of the crown.	
2	The presence of finger like projections, no matter the elevation of these from the lingual surface.	All stages of ASU plaque fall within this category
3	Presence of a tubercle of significant size, separated slightly from the lingual surface although not independent	
4	Slightly more developed than the previous stage tubercle; a separate cusp, although still attached to the center of the crown of the incisor	
5	A free standing cusp on the lingual surface of the tooth, sometimes referred to as a talon cusp	

A. New plaque for scoring marginal ridge development.

B. New plaque for scoring lingual tubercle development.

C. Plaque for scoring curvature, from ASU Dental System (Turner *et al.*, 1991).

Figure 2.1. Comparative plaques for scoring the three components of incisor morphology.

Comparisons between plaque systems

New plaques were developed in order to score the three characters of shoveling as independent characters and in their entire ranges of variation. Approximate equivalencies to existing plaques can be identified, but how equivalent are they? As seen in Table 3.1, for marginal ridge scoring, the new plaque and the ASU Dental system shoveling plaques are similar but not identical. Stages 4-5 of the new system are both approximately equivalent to stages 5-6 of the ASU Dental system. Stages are progressively more "shoveled" in each method, but the way in which shoveling is examined is different in each. The new plaque attempts to recognize only the height of the marginal ridges from the lingual surface of the tooth while the ASU system primarily recognizes the depth of the lingual fossa. Such differences in objective lead to differences in scoring between the two systems.

In order to systematically compare these methods, all teeth scored for this study were also scored by the ASU system plaques for I1 shoveling and *Tuberculum dentale*. Since all stages of the ASU tubercle plaque fall within a single score on the new plaques, this scoring system provides an elaboration on the new scale but does not provide comparative information. For marginal ridges, however, the scores for the two methods may be compared. For the right central incisors, scores assigned by the new plaque and the ASU plaque correlate at $r=0.94$. For the left central incisors the correlation coefficient is $r=0.96$. For the lateral incisors, the correlation coefficient on both sides is $r=0.94$. These correlation coefficients are significantly different from 0, at $p < 0.001$.

Both methods produce highly correlated scores for marginal ridge development and shoveling. These results might be interpreted to mean that a new plaque was not, in fact, necessary for this study. However, a high correlation between the two methods does not negate the possible interaction of the different morphologies and the effect they may have on scoring these teeth. The new system is preferred as it specifically attempts to control for this interaction. The present study hopes to investigate the relative contributions of each of the three characters to the ultimate morphology of the tooth, something that may be lost in using the traditional plaques.

Data Collection

Data were collected for this study from museum skeletal collections of recent populations of the Old World. These data were collected at several large museums in the hope that adequate regional sampling could be accomplished. Incisors are often missing, broken, worn down, or culturally modified, thus limiting the possible sample. Very large samples need to be examined to get even small data sets. Data collection procedures are detailed below with inclusion criteria, a list of measured variables, and a description of the examination procedure. The sources of the samples are then provided. The following discussion applies to scoring all teeth, modern and fossil.

Scoring

Teeth were scored by comparison to the new standardized plaques, illustrated in Figure 3.1. For modern collections, teeth had to be present in the jaw or able to be refitted into the appropriate alveolus to be used. No loose teeth were examined, even if they were kept with the skull, unless they could be positively shown to belong with a particular individual. Rejection of individuals in this way obviously was not practical for fossil samples, where all incisors were examined. If at least one incisor could be scored for these shapes, the individual was included in the sample, even if the other teeth in the jaw could not be scored. Only teeth that could be accurately scored for all three features were included.

Teeth were initially examined at the shelf or cabinet where they were stored. Many were eliminated from examination at that stage due to an inability to accurately score the morphologies because of wear, breakage, or cultural modification. Either occlusal or lingual wear could exclude an individual from the sample. Only approximately 1 in 30 skulls examined at the shelf was then taken to the workspace. At this point the teeth were examined more closely and many more individuals were rejected. Only individual that passed both evaluations of wear and breakage were scored.

Variables were examined in the following order: marginal ridge development, tubercle development, curvature, ASU shovelling, and ASU tubercles. Each morphology was examined on all teeth in an individual before proceeding to the next morphology. Scoring was done by holding the comparative plaque next to the teeth and choosing the most similar stage of development. Teeth were examined always from right I^2 to left I^2. Mesial-distal length and labial-lingual breadth for each tooth were then measured to the nearest 1/10 mm.

Anomalies such as peg-shaped teeth or agenesis were noted but anomalous teeth were not scored. One individual had a supernumerary lateral incisor on one side. In scoring the lateral incisor, the tooth with the greater development of the morphology was included in the analysis while the score for the other was noted, but not included in the analysis. As both teeth were fully developed and approximately the same size, it was impossible to designate one as the lateral incisor and one as the supernumerary.

Error analysis

A sample of teeth were rescored for error analysis. The error study included 61 individuals and 144 teeth, chosen randomly from the original data set to be rescored and photographed. These rescores took place on the last research day at a museum, two days to two weeks from the original scoring of the tooth. A list was made of the individuals to be examined in order to more easily collect the sample from the collections. The individuals on this list were then taken from the shelves without reference to the original score. These teeth were then scored in the same manner as originally done.

The scores for the retest sample, and the differences between the original and retest scores, appear in Appendix E. Average differences are calculated by feature and by tooth. The magnitudes of between-score differences are given in Tables 3.3 and 3.4. Table 3.3 provides frequencies of the absolute differences between original and retest scores for each category of tooth and character. The great majority of scores were the same on original and retest, while a small percentage differed by one or two stages on the plaques.

Table 3.3. Distribution of absolute differences between original and retest scores.

	0	1	2
Marginal Ridges			
Central	87%	13%	
Lateral	72%	28%	
Tubercles			
Central	90%	4%	6%
Lateral	87%	13%	
Curvature			
Central	74%	26%	
Lateral	64%	36%	
ASU Shoveling			
Central	85%	15%	
Lateral	67%	31%	2%

Original and retest scores differed by more than one stage only on a very small percentage of the central incisor tubercle scores and on the lateral incisor ASU shoveling scores. For the central incisor tubercle scores this discrepancy can be explained in part by the circumstances under which this error is typically made. Cases in which a lightly developed tubercle was not very elevated but displayed fingerlike projections were extremely difficult to score. Such teeth are generally scored as either no tubercle (0) or as a slight tubercle (2), because of apparent discontinuity in the plaque. A lightly developed tubercle with fingerlike projections will never be scored as a 1 but could be mistakenly scored as a 0. In the case of the lateral incisor ASU shoveling scores, the discrepancy could be due in part to the fact that the central incisor ASU shoveling plaque was used to score both central and lateral teeth.

The character which showed the least consistency between original and retest scores was the plaque for curvature. The same score was attained in only 74% of the central incisors and 64% of the laterals, illustrating the difficulty in picking the appropriate curvature stage. However, curvature scores were never more than one stage different between the two scoring events.

Overall average differences between the two scoring events are provided in Table 3.4 and are low for most characters. The greatest average differences are for the ASU tubercle scores. But, as above, results illustrate good consistency between scoring events and the average error is low.

Table 3.4. Average differences of scores attained between original and retest, by incisor feature and tooth.

	Marginal ridges		Tubercles		Curvature		ASU shoveling		ASU tubercles	
	AVG	SD	AVG	SD	AVG	SD	AVG	SD	AVG	SD
All incisors	0.21	0.41	0.16	0.45	0.31	0.46	0.25	0.45	0.43	0.50
Lateral incisors	0.28	0.45	0.15	0.40	0.36	0.48	0.34	0.51	0.67	0.58
Central incisors	0.13	0.34	0.16	0.50	0.26	0.44	0.15	0.36	0.38	0.49

Overall, these measures of incisor morphology show fair consistency and replicability. It should be remembered that these methods of scoring by comparison to a standardized plaque are subjective and therefore are expected to display some error between scoring events, but as all scores are done by a single observer, and over a short period of time, this level of error should be considered low.

Modern Sample

Samples of modern human teeth were collected at the following locations: National Museum of Natural History, Smithsonian Institution, Washington DC;

American Museum of Natural History, New York; Sackler Faculty of Medicine, University of Tel Aviv, Ramat Aviv; Universitá della Studi, Rome; Croatian Natural History Museum, Zagreb; Hungarian National Natural History Museum, Budapest; Vienna Natural History Museum, Vienna; Senkenberg Institute, Frankfurt; Musée de l'Homme, Paris; and the British Museum (Natural History), London. These sources were chosen for their large collections of modern human teeth, and availability of samples representing many geographic areas. All scores on modern human teeth were done by the author.

Source of material was recorded to the limit of geographical precision available in each museum's catalogue or records. Most of the material could be pinpointed geographically to modern or recent geo-political divisions, although some localities were specified in greater detail. When date of origin was available, that information was also recorded. Samples less than 3,000 years of age were designated as "recent." Samples from earlier periods appear in the time-dependent analyses only. Each source and location was recorded with its own "population" number. Appendix A lists these "populations," their known geographical origin, and the museum in which they were collected.

Regional definitions

For analyses in the following chapters, "populations" were lumped into countries, and then into a variety of larger geographical regions. Regions are defined broadly at several levels. The smallest fully applicable level is that of country, a modern geo-political region, but one which is known for most of the sample. Countries are then lumped into small regional groups and then larger groups in order to examine variation in morphology at different regional levels. Details of regional assignment are given in Figure 3.2. Sample sizes for these regions are also given in the figure, listed below the region name. Only Region I.10, Arabia, is not represented in the sample gathered for the study, but it has been given a regional category for later data collection. The smaller and the more inclusive regional groupings are based on geography without reference to the incisor morphologies.

Fossil Sample

Fossil human incisors were scored on the original specimen whenever possible, on casts if the original was not available, and from photographs when it was impossible to score either original or cast. Nearly all fossils are scored by the author, the exceptions being the Dolní Věstonice sample from Czechoslovakia, Combe Grenal, from France, Rabat from Morocco, and an incisor from Lida Ajer Cave in Sumatra scored by M.H. Wolpoff. Details of the composition of this sample will be given in Chapter V.

Country	Region Level I	Region Level II
England Scotland Ireland	United Kingdom (1) (N=162)	**North and West Europe (N=276)**
Baltic States Denmark Finland Iceland Norway Sweden	Scandinavia (2) (N=17)	
Belgium Germany Netherlands	Central/North Europe (3) (N=64)	
France Portugal Spain	Western Europe (4) (N=33)	
Austria Italy Switzerland	Central/South Europe (5) (N=355)	**Central and South Europe (N=733)**
Czech Republic Slovakia Hungary Poland	Eastern Europe (6) (N=260)	
Albania Bosnia Bulgaria Croatia Greece Rumania Serbia	Central Europe (7) (N=100)	
Russia	Russia (8) (N=18)	

Figure 3.2. Distribution of countries into regional groupings.

Country	Region Level I	Region Level II
Armenia	West Asia (N=163) (9)	**South and West Asia (N=259)**
Cyprus		
Georgia		
Iraq		
Israel		
Jordan		
Lebanon		
Turkey		
Bahrain	Arabia (10)	
Oman		
Qatar		
Saudi Arabia		
United Arab Emirates		
Yemen		
Afghanistan	Iran/Afghanistan (N=8) (11)	
Iran		
Bangladesh	Indian Subcontinent (N=88) (12)	
Bhutan		
India		
Maldives		
Nepal		
Pakistan		
Sri Lanka		
Siberia	N. Asia (N=8) (13)	**North and East Asia (N=164)**
China	E. Asia (N=66) (14)	
Korea		
Mongolia		
Taiwan		
Japan	Japan (N=62) (15)	
Burma	Southeast Asia (N=28) (16)	
Kampuchea		
Laos		
Thailand		
Vietnam		

Figure 3.2. Distribution of countries into regional groupings (cont.).

Country	Region Level I		Region Level II
Indonesia Malaysia Philippines	Malaysia (N=62)	(17)	**SE Asia, Oceania (N=264)**
Australia Tasmania	Australia (N=19)	(18)	
Fiji Bismarck Arch. Melanesia Papua New Guinea Solomon Islands Vanuatu	Melanesia (N=111)	(19)	
Micronesia	Micronesia (N=11)	(20)	
Polynesia	Polynesia (N=53)	(21)	
New Zealand	New Zealand (N=8)	(22)	
Algeria Mali Mauritania Morocco Niger Tunisia	North/West Africa (N=67)	(23)	**North and West Africa (N=300)**
Chad Egypt Libya Sudan	North/East Africa (N=147)	(24)	
Benin Cape Verde Gambia Ghana Guinea Liberia Nigeria Senegal Togo	West Africa (N=61)	(25)	
Cameroon Congo Gabon Zaire Zambia	Central Africa (N=25)	(26)	

Figure 3.2. Distribution of countries into regional groupings (cont.).

Country	Region Level I	Region Level II
Burundi Ethiopia Kenya Rwanda Somalia Tanzania	East Africa (27) (N=60)	**East and Southern Africa (N=94)**
Angola Botswana Malawi Mozambique Namibia South Africa Zimbabwe	Southern Africa (28) (N=34)	
Madagascar	Madagascar (29) (N=21)	**Madagascar (N=21)**

Figure 3.2. Distribution of countries into regional groupings (cont.).

CHAPTER IV

MODERN HUMAN INCISOR MORPHOLOGIES AND THEIR DISTRIBUTION

Shovel shaping of the upper incisors has been studied extensively in order to understand both the relationships of modern people to each other and to those who preceded them. It is the regional distribution of shoveling which gives it utility in discriminating between different populations. Over the last century many studies of the variation, distribution, and development of shoveling have been undertaken by many different authors using different methods to examine the morphology. Nearly all agree that worldwide populations show different frequencies of shovel shaping, and that Asian and Native American populations show greater frequencies of shovel shaping, as well as stronger development of the morphology, than do populations from other areas of the world. The specific results of previous studies, however, are highly variable. There is disagreement as to exactly what constitutes shovel shaping as well as how to score it and what degree of development of the morphology counts as shoveling. Methodological differences can make it difficult to compare frequencies of shovel shaping between studies. In addition, nearly all studies examine only a single feature of the incisor – most often the degree of development of the marginal ridges as defined by Hrdlička (1920).

The present study examines regional distributions of shovel shaping but with a different underlying premise. Instead of studying a single feature of the incisors, this study recognizes several components of incisor morphology, each of which contributes to the appearance of the shovel shape. These components are the development of the marginal ridges, the development of the lingual or basal tubercle, and the mesial-distal curvature of the incisor. The three are examined in order to study the distribution of the features independently as well as their joint distribution.

This chapter tests the null hypothesis that incisor shape does not vary regionally; the alternate hypothesis is that regions differ in distribution of incisor shapes. Several subsidiary hypotheses regarding the nature of distribution will also be tested. First, as this study examines three features of the incisors, it is imperative to establish that these morphologies can be studied as independent characters and that they are not related to tooth size. Covariance of these features will affect results of any analyses treating them independently. It has been asserted in the past that these features are independent, but this fact has never been tested. Second, I test the hypothesis that these morphologies, defined by three features on the lingual surface of the tooth, distribute in regional patterns, i.e. that different regions show different distributions of the morphologies under investigation. If this is refuted, then the utility of shovel shaping in characterizing regional populations must be questioned. If not refuted, the third hypothesis, that geographically closer regions will show more similar incisor morphologies, can be tested. Modern regions which share a close evolutionary history should show more similarities in their incisor morphologies than regions that are further separated in space or whose populations are more distantly related. Finally, it is hypothesized that each region can be characterized and discriminated by the relative development of the three features in combination. The implications of these results for understanding the distribution of these morphologies and examining the fossil record will then be discussed and a summary of the results presented.

Methods

In order to test hypotheses regarding the distribution of incisor morphologies it was necessary to examine large samples of recent populations from throughout the Old World.

Ultimately, 2111 individuals, from 100 modern countries, or political units, were included in the modern human sample. This constitutes less than 5% of the collections examined in the course of the study; the remaining 95% or more were rejected due to wear, breakage, cultural modification, or lack of incisors.

Statistical analysis

There has been some question as to whether shoveling characters should be analyzed using parametric or non-parametric statistical methods. Each approach entails different assumptions regarding normality and the shape of the underlying distribution. Shovel shaping shows an underlying continuous variation, as does each of its component features. Through comparison to standard plaques, however, this variation is divided in a non-continuous manner, and it is not clear what would constitute equitable divisions of the feature into stages. Classic shovel shaping, the development of the marginal ridges, therefore, has often been treated as a ranked or categorical variable and analyzed through non-parametric statistics. As these techniques do not make the assumption of a normal distribution, or that the stages are equally different, it is likely that they are more appropriate statistical methods, although not as statistically powerful as parametric statistics may be.

However, parametric statistics have advantages over non-parametric analyses for some types of descriptive techniques. Although clearly non-parametric statistics are more appropriate for the analysis of incisor shapes, the question remains, can parametric techniques be applied? The scoring plaques for the three incisor morphologies were created for easy discrimination between stages, not for equitable division of the categories. Is the difference between setting up the plaques in this manner and dividing the stages in an equitable fashion significant enough to dismiss use of parametric techniques altogether? To examine whether there are significant differences between the analyses of incisor form by parametric and non-parametric methods, results from both approaches will be compared. If results from the two statistical methods are similar, I will assume that use of the divisions on the plaques does not violate assumptions of parametric statistics and that it may be possible to treat these data as continuous and enjoy the greater statistical power afforded by parametric methods. Even if it is shown that results are similar between parametric and non-parametric methods, however, it should be understood that use of parametric statistics is on tenuous grounds and results should be viewed with caution.

The hypotheses investigated in this chapter are tested through comparisons of distributions of the morphologies between regions. Central and lateral incisors are treated separately throughout most of these analyses. For the univariate tests, these comparisons may be accomplished through by using the non-parametric Mann-Whitney U Rank Sum test or the parametric t-test or ANOVA. Multivariate tests include a Multivariate Analysis of Variance (MANOVA) for continuous data, and for categorical data, the equivalency of distributions is tested through a maximum likelihood estimation of a contingency table, similar to a Chi-square test. In the tables presented here, the results for both tests will be presented together, with the results from the non-parametric test in the cell above that for the parametric test.

Analyses are performed using both SPSSWIN© versions 5.0 and 6.0 on a DOS PC and SAS© versions 6.07 and 6.08 on MTS, the Michigan Terminal System. Where the same tests were performed using both statistics packages, results were compared to see if the two programs were using the same algorithms. In each case, the results from the two programs were the same.

Independence of incisor characters

A first step to investigating the relative development of the three features of shoveling is to ask are they independent? Do marginal ridge development, tubercle development, and curvature vary independently of each other or do they covary? As non-continuous data come in two types – nominal, those data which are simply categories, and ordinal, data in ranked categories – there are two ways to examine independence of characters: first, a Pearson Chi-square test for independence for nominal data or a Mantel-Haenszel test of linear association for ordinal data.

Results for both Mantel-Haenszel and Chi-square tests are given in Table 4.1. These tests were done on the entire sample of teeth: 1167 central incisors and 1185 lateral incisors. The Mantel-Haenzsel tests of independence for ordinal (ranked) data return significant p-values for pairs of ridges and tubercles and tubercles and curvature, yet not for ridges and curvature for the central incisors. For the lateral incisor characters, only ridges and tubercles return a significant p-value for the ordinal test of independence. Pearson Chi-square tests of independence for nominal (categorical) data are significant for all three characters on the central incisors but are significant only for tubercles and curvature for the lateral incisors.

Table 4.1. P-values for tests of independence of incisor characters.

	Central incisor characters			Lateral incisor characters	
	Ridges	Tubercles		Ridges	Tubercles
Tubercles	**<0.01** **<0.01**		Tubercles	**<0.01** 0.07	
Curvature	0.86 **0.03**	**<0.01** **<0.01**	Curvature	0.12 0.53	0.95 **<0.01**

Mantel-Haenzsel test for ordinal data on the upper line, Pearson Chi-square for nominal data below. Significant p-values ($\alpha=0.05$) in bold face.

For both methods, expected cell frequencies in all tests are less than 5 for at least 30% of the cells, rendering the results questionable. For all these characters, the low cell frequencies are for higher scores for the characters. Frequencies for these high scores can be lumped in order to do tests of independence which are statistically more sound, but do not actually test the analytical units of study. Categories were lumped as follows: stages 3 to 5 for marginal ridge scores, stages 3 to 5 for tubercle scores, and stages 3 and 4 for curvature. Other counts remain the same. Results from tests of independence for lumped categories are in Table 4.2. These results are extremely similar to those for raw scores. Central incisor curvature and ridges are not independent by the ranked test, although they are by the categorical test, while for the lateral incisors, curvature and tubercles are not independent by the Mantel-Haenszel test while they are by the Pearson Chi-square test.

Table 4.2. P-values for tests of independence for incisor characters with categories lumped.

Central incisor characters			Lateral incisor characters		
	Ridges	Tubercles		Ridges	Tubercles
Tubercles	**<0.01** **<0.01**		Tubercles	**<0.01** **<0.01**	
Curvature	0.97 **0.01**	**<0.01** **<0.01**	Curvature	**<0.01** **<0.01**	0.71 **<0.01**

Mantel-Haenzsel test for ordinal data on the upper line, Pearson Chi-square for nominal data below. Significant p-values (α=0.05) in bold face.

Overall, central incisor ridges and tubercles, and tubercles and curvature appear to be independent. By the ranked test, however, central incisor curvature and ridges are not independent, although these characters are if the data are treated as nominal. Lateral incisor characters are not clearly independent. By either statistical method, curvature and ridges are not independent looking at the raw data, although independence is statistically significant when the higher categories are lumped. Lateral incisor tubercles and ridges are independent by the lumped categories, and by the ranked test of the raw data, but results are not consistent. Tubercles and curvature are only significantly independent by nominal tests of either the raw or the lumped data, not by ranked tests. Independence of these two characters is unclear.

Shoveling and tooth size

Another question relevant to the distribution of incisor morphologies is whether these shapes are more developed or less developed as tooth size varies. If larger teeth necessarily had more developed morphologies, or smaller teeth showed less developed shapes, it would be necessary to scale data collected on incisor shape to incisor size in order for data to be comparable. The significance of incisor shape as a population marker would also come into question if these shapes were simply tracking tooth size. Scoring by comparison to a standardized plaque rather than measuring the morphology absolutely should remove some of the effect of tooth size on shoveling scores, but it remains necessary to investigate if these shapes are associated with tooth size.

In order to test the null hypothesis that scores for the three characters of shoveling are not associated with tooth size, analyses of variance were calculated to test the hypothesis that different scores for the morphologies showed the same mean tooth size. Paired Bonferroni t-tests are used to calculate which pairwise comparisons are significantly different. First, for central incisor scores, tests for comparisons with mesial-distal length are shown in Table 4.3 and for buccal-lingual breadth appear in Table 4.4.

Central incisors with marginal ridges tend to be longer mesial-distally that those teeth without marginal ridges (Table 4.3). Otherwise, although means are larger with increasing ridges, scores "1" and "3" show significantly different incisor lengths, but no other marginal ridge scores are significantly different in average incisor length. Mean length for different tubercle scores are only significant for scores of "0" and "2" and "1" and "2". Score "2" also shows the largest mean mesial-distal measures. Mean length for curvature scores significantly differ only for scores of "0" and "2" and "1" and "2". Curvature score "2" also has the largest average length.

Table 4.3. Results of Bonferroni t-tests of equal means of central incisor mesial-distal tooth length and shoveling morphology categories.

	Marginal Ridges (overall*)							Tubercles (overall*)							Curvature (overall*)					
	Mean	0	1	2	3	4		Mean	0	1	2	3	4		Mean	0	1	2	3	4
0	8.0						0	8.1						0	8.1					
1	8.2	*					1	8.1						1	8.2					
2	8.3	*					2	8.4	*	*				2	8.4	*	*			
3	8.6	*	*				3	8.4						3	8.3					
4	8.8	*					4							4						

*Significant at $p<0.05$

Buccal-lingual breadth (Table 4.4) does not differ significantly between any curvature scores. Tubercle scores, however, do show significantly different mean breadths for some pairs of scores. The score of "0", or no tubercle, shows a lower mean incisor breadth than any score of tubercle presence. Otherwise, tubercle scores do not have significantly different breadths. Marginal ridge buccal-lingual means differ overall, but contrast significantly between scores "2" and both "0" and "1", and between score "3" and "0", "1", and "2". Marginal ridge score "3" has the highest mean breadth.

Table 4.4. Results of Bonferroni t-tests of equal means of central incisor buccal-lingual tooth breadth and shoveling morphology categories.

	Marginal Ridges (overall*)							Tubercles (overall*)							Curvature					
	Mean	0	1	2	3	4		Mean	0	1	2	3	4		Mean	0	1	2	3	4
0	6.9						0	6.9						0	7.0					
1	6.9						1	7.1	*					1	7.0					
2	7.1	*	*				2	7.1	*					2	7.0					
3	7.4	*	*	*			3	7.3	*					3	7.0					
4	7.2						4							4						

*Significant at $p<0.05$

Mean length and breadth are also compared between morphology scores for the lateral incisors. Mesial-distal length means and character scores for the laterals are in Table 4.5. Mesial-distal length does not differ significantly between any curvature scores. Average length does show some significant differences between marginal ridge and tubercle scores, but size does not increase or decrease consistently with score. For the marginal ridges, length is increasingly larger to a marginal ridge score of "4", but then smaller with marginal ridge score of "5". For tubercles, length is largest with a tubercle score of "5", but the next greatest mean length is seen with a tubercle scores of "2".

Although there are significant differences in mean length and morphology scores, these are not consistent.

Lateral incisor buccal-lingual mean breadths for each morphological score appear in Table 4.6. Results are very similar to that for lateral incisor mesial-distal length. There are some significant differences between means for tubercle scores and marginal ridge scores, but not for curvature. But there is neither a consistent increase nor a consistent decrease in breadth with increasing marginal ridge score.

Table 4.5. Results of Bonferroni t-tests of equal means of lateral incisor mesial-distal tooth length and shoveling morphology categories.

	Marginal Ridges (overall*)							Tubercles (overall*)							Curvature					
	Mean	**0**	**1**	**2**	**3**	**4**		**Mean**	**0**	**1**	**2**	**3**	**4**		**Mean**	**0**	**1**	**2**	**3**	**4**
0	6.0						**0**	6.2						**0**	6.3					
1	6.2	*					**1**	6.4	*					**1**	6.2					
2	6.4	*	*				**2**	6.8	*	*				**2**	6.2					
3	6.8	*	*	*			**3**	6.5	*					**3**	5.9					
4	7.2						**4**	6.4						**4**	5.9					
5	6.2						**5**	6.9												

*Significant at $p<0.05$

Table 4.6. Results of Bonferroni t-tests of equal means of lateral incisor buccal-lingual tooth breadth and shoveling morphology categories.

	Marginal Ridges (overall*)							Tubercles (overall*)							Curvature					
	Mean	**0**	**1**	**2**	**3**	**4**		**Mean**	**0**	**1**	**2**	**3**	**4**		**Mean**	**0**	**1**	**2**	**3**	**4**
0	6.0						**0**	6.1						**0**	6.2					
1	6.1						**1**	6.3	*					**1**	6.2					
2	6.3	*	*				**2**	6.5	*					**2**	6.2					
3	6.5	*	*	*			**3**	6.6	*	*				**3**	6.9					
4	7.0						**4**	6.6						**4**	6.3					
5	6.2						**5**	6.4												

*Significant at $p<0.05$

Overall, there does not appear to be an association of curvature and tooth size, for either central or lateral incisors. There are possible associations of marginal ridge and tubercle scores with tooth size, but the sizes associated with increasing morphological score are not always increasingly larger. Although there are mean differences between scores, they are not consistently directional. Therefore, scores will be treated here as unassociated with tooth size, although this relationship should continue to be investigated.

Region Level I vs. Region Level II

Two regional levels were defined in the previous chapter based on geography, but it can and should be asked, do regional subdivisions show the same morphologies or have they been lumped inappropriately? To test the null hypothesis that Region Level II divisions are composed of Region Level I divisions with the same distributions, Chi-square tests of homogeneity were calculated on Region Level I pairs, within each Region Level II division. The results of these tests are presented in Table 4.7 for the central incisors and Table 4.8 for the lateral incisors.

With a few exceptions for single characters, the null hypothesis of the same distribution in the component regions cannot be rejected. Within Region Level II divisions, there are no Region Level I subdivisions which are consistently different in overall incisor morphologies. Due to the nature of statistical tests, in multiple testings of the null hypothesis, some of the tests are likely to give spurious results. If the null hypothesis is true in all cases, a proportion of the tests are likely to falsely reject the null hypothesis. These cases of false significance are in proportion to the level of significance used and the number of tests calculated. In the case of these Region Level I comparisons, 294 Chi-square tests were performed. At a significance level of $\alpha=0.05$, if the null hypothesis of no difference between regions was true in all cases, 15 of these tests would be expected by chance to return significance falsely. The actual number of significant comparisons is 36. This is more than would be expected by chance, indicating that some of these comparisons in actuality indicate differences in distribution between Region Level I divisions. However, the facts that many of these comparisons could be falsely significant and that in no case are two regions consistently different from one another, suggest that, overall, Region Level II subdivisions show similar distributions of the three features, and that regions with disparate morphologies are not being inappropriately lumped together. Analyses will therefore examine the regions based on Region level II, the broader definition.

Table 4.7. P-values for Chi-square tests of independence of central incisor characters for Region Level I samples, shown grouped by Region Level II.

NORTH/WEST EUROPE

Marginal ridges

	U.K. 1	Scandinavia 2	C/N Europe 3	West. Europe 4
2	0.75			
3	0.13	0.53		
4	0.59	0.33	0.16	

Tubercles

	1	2	3	4
2	0.27			
3	0.52	0.38		
4	0.57	0.13	0.32	

Curvature

	1	2	3	4
2	0.99			
3	0.29	0.67		
4	0.57	0.40	0.14	

CENTRAL/SOUTH/EAST EUROPE

Marginal ridges

	C/S Europe 5	East. Europe 6	Central Europe 7	Russia 8
6	0.40			
7	0.34	0.19		
8	0.19	0.38	0.03	

Tubercles

	5	6	7	8
6	**<0.01**			
7	0.81	**<0.01**		
8	0.88	0.06	0.87	

Curvature

	5	6	7	8
6	**<0.01**			
7	0.10	0.71		
8	0.10	0.21	0.34	

Significant p-values (α=0.05) in bold face.

Table 4.7 (cont.). P-values for Chi-square tests of independence of central incisor characters for Region Level I samples, shown grouped by Region Level II.

SOUTH/WEST ASIA

Marginal ridges

	Mid East 9	Iran/ Afghan 11	Indian Sub. 12
11	0.21		
12	**<0.01**	0.14	

Tubercles

	9	11	12
11	0.96		
12	0.43	0.85	

Curvature

	9	11	12
11	0.08		
12	0.23	0.24	

NORTH/EAST ASIA

Marginal ridges

	N. Asia 13	E. Asia 14	Japan 15	SE Asia 16
14	0.59			
15	0.42	0.49		
16	0.91	0.12	0.11	

Tubercles

	13	14	15	16
14	0.35			
15	0.58	0.57		
16	0.41	0.33	0.71	

Curvature

	13	14	15	16
14	0.24			
15	0.30	0.70		
16	0.35	0.42	0.93	

Significant p-values (α=0.05) in bold face.

Table 4.7 (cont.). P-values for Chi-square tests of independence of central incisor characters for Region Level I samples, shown grouped by Region Level II.

SE ASIA, OCEANIA AND MADAGASCAR

Marginal ridges

	Malaysia 17	Australia 18	Melanesia 19	Micronesia 20	Polynesia 21	New Zealand 22	Madagascar 29
18	**<0.01**						
19	**<0.01**	0.94					
20	0.16	0.40	**0.02**				
21	0.04	0.41	0.22	0.46			
22	**<0.01**	0.46	0.74	0.43	0.77		
29	0.29	0.27	**0.02**	0.73	0.36	0.26	

Tubercles

	17	18	19	20	21	22
18	**0.02**					
19	**<0.01**	**<0.01**				
20	0.21	0.30	0.32			
21	**0.01**	**0.05**	0.34	0.67		
22	0.72	0.65	0.27	0.39	0.52	
29	0.12	0.69	0.07	0.19	0.21	0.85

Curvature

	17	18	19	20	21	22
18	0.16					
19	0.80	0.33				
20	0.48	0.06	0.50			
21	0.74	0.24	0.67	0.36		
22	0.78	0.14	0.84	0.88	0.68	
29	0.46	0.25	0.48	0.32	0.86	0.62

Significant p-values (α=0.05) in bold face.

Table 4.7 (cont.). P-values for Chi-square tests of independence of central incisor characters for Region Level I samples, shown grouped by Region Level II.

NORTH/WEST AFRICA

Marginal ridges

	NW Africa 23	NE Africa 24	West Africa 25	Central Africa 26
24	0.74			
25	**0.05**	**0.03**		
26	0.12	0.16	0.86	

Tubercles

	23	24	25
24	0.28		
25	**0.02**	0.43	
26	0.42	0.65	0.36

Curvature

	23	24	25
24	0.77		
25	0.40	0.21	
26	0.27	0.52	0.42

EAST/SOUTH AFRICA

Marginal ridges

	East Africa 27	South Africa 28
28	0.90	

Tubercles

	27	28
28	0.96	

Curvature

	27	28
28	0.31	

Significant p-values (α=0.05) in bold face.

Table 4.8. P-values for Chi-square tests of independence of lateral incisor characters for Region Level I samples, shown grouped by Region Level II.

NORTH/WEST EUROPE

Marginal ridges

	U.K. 1	Scandinavia 2	C/N Europe 3	West Europe 4
2	0.91			
3	**0.04**	0.30		
4	0.17	0.22	**<0.01**	

Tubercles

	1	2	3	4
2	0.20			
3	**0.02**	0.74		
4	0.40	0.19	0.55	

Curvature

	1	2	3	4
2	0.77			
3	0.78	0.54		
4	0.73	0.92	0.50	

CENTRAL/SOUTH/EAST EUROPE

Marginal ridges

	C/S Europe 5	East. Europe 6	Central Europe 7	Russia 8
6	0.40			
7	0.26	0.30		
8	0.28	0.30	0.29	

Tubercles

	5	6	7
6	0.41		
7	0.76	0.67	
8	0.93	0.73	0.82

Curvature

	5	6	7
6	**<0.01**		
7	0.68	**<0.01**	
8	0.50	0.98	0.43

Significant p-values (α=0.05) in bold face.

Table 4.8 (cont.). P-values for Chi-square tests of independence of lateral incisor characters for Region Level I samples, shown grouped by Region Level II.

SOUTH/WEST ASIA

Marginal ridges

	Mid East 9	Iran/ Afghan 11	Indian Sub. 12
11	0.41		
12	**<0.01**	0.90	

Tubercles

	9	11
11	**0.05**	
12	0.70	0.14

Curvature

	9	11
11	**0.05**	
12	0.38	0.12

NORTH/EAST ASIA

Marginal ridges

	N. Asia 13	E. Asia 14	Japan 15	SE Asia 16
14	**0.02**			
15	0.14	0.58		
16	**<0.01**	0.09	0.04	

Tubercles

	13	14	15
14	0.23		
15	0.71	0.72	
16	0.08	0.20	0.17

Curvature

	13	14	15
14	0.55		
15	0.55	0.37	
16	0.69	0.50	0.89

Significant p-values (α=0.05) in bold face.

Table 4.8 (cont.). P-values for Chi-square tests of independence of lateral incisor characters for Region Level I samples, shown grouped by Region Level II.

SE ASIA, OCEANIA, AND MADAGASCAR

Marginal ridges

	Malaysia 17	Australia 18	Melanesia 19	Micronesia 20	Polynesia 21	New Zealand 22	Madagascar 29
18	**<0.01**						
19	**<0.01**	0.53					
20	**0.02**	0.39	0.26				
21	**<0.01**	0.76	0.78	0.37			
22	0.06	0.58	0.68	0.46	0.75		
29	0.30	0.14	**0.02**	0.24	0.15	0.32	

Tubercles

	17	18	19	20	21	22
18	0.15					
19	**0.04**	0.60				
20	0.74	0.52	0.73			
21	0.62	0.48	0.08	0.74		
22	0.06	0.19	0.04	0.29	0.44	
29	**0.02**	**0.05**	**<0.01**	0.11	0.06	0.38

Curvature

	17	18	19	20	21	22
18	0.30					
19	0.51	0.12				
20	0.90	0.71	0.54			
21	0.65	0.46	0.37	0.79		
22	0.48	0.54	0.61	0.43	0.35	
29	0.90	0.70	0.89	0.79	0.67	0.69

Significant p-values (α=0.05) in bold face.

Table 4.8 (cont.). P-values for Chi-square tests of independence of lateral incisor characters for Region Level I samples, shown grouped by Region Level II.

NORTH/WEST AFRICA

Marginal Ridges

	NW Africa 23	NE Africa 24	West Africa 25	Central Africa 26
24	0.25			
25	0.14	0.10		
26	**0.04**	0.14	0.31	

Tubercles

	23	24	25
24	0.77		
25	0.70	0.63	
26	0.09	**<0.01**	0.42

Curvature

	23	24	25
24	0.41		
25	0.79	0.39	
26	**0.03**	0.41	0.05

EAST/SOUTH AFRICA

Marginal ridges

	East Africa 27	South Africa 28
28	0.43	

Tubercles

	27	28
28	0.72	

Curvature

	27	28
28	0.44	

Significant p-values (α=0.05) in bold face.

Region level II sample statistics

Before examining hypotheses of regional difference in shovel shaping, basic summary information regarding the sample is presented. The entire sample is listed in Appendix B, but the basic sample size information as well as character distribution summaries appear below in Tables 4.9 to 4.15. Sample sizes for each region are presented in Table 4.9. These are sample sizes for each character as well, as only those individuals who could be scored for all characters are included in the dataset.

Table 4.9. Sample sizes for central and lateral incisors, by Region Level II divisions.

Region	Centrals	Laterals
North/West Europe	173	248
Central/South Europe	426	652
South/West Asia	122	226
North/East Asia	138	100
Southeast Asia/Oceania	233	125
North/West Africa	154	270
East/South Africa	44	88
Madagascar	16	16

A first step to examining the variation and regional distributions of incisor characters is to explore the actual distributions of each feature within each population. Distributions are presented below in Tables 4.10 to 4.15. These simple distribution tables provide the first indication that incisor morphologies distribute regionally, and give an indication of the directionality of these differences. The east Asian regions, for example, have higher marginal ridge scores, for both central and lateral incisors, than do other regions. Similarly, North/West Africa shows somewhat higher curvature scores than do other regions.

Approximate regional distributions of the incisor morphologies are illustrated on maps in Figures 4.1 to 4.3 for central incisor characters and Figures 4.4 to 4.6 for the lateral incisor features. These distribution maps show the frequency of a trait in each region and provide a preliminary examination of the distribution of incisor shapes across space. All expressions of the trait scoring greater than 1 contribute to the percentage of individuals showing a trait, so that the least development of the trait was excluded. Examination of these maps by themselves or in combination shows differences between the seven geographic regions. Marginal ridges on both central and lateral incisors (Figures 4.1 and 4.4) show the highest frequencies in North/East Asia; lower frequencies are seen as distance increases from this region. Tubercles show the highest frequencies in Africa, with lesser frequencies to the North and East (Figures 4.2 and 4.5). Curvature shows the highest frequencies in Africa, with frequencies lowering as distance from Africa increases (Figures 4.4 and 4.6). Each of these individual morphology maps suggests a clinal distribution for the incisor feature it illustrates; the clinal distributions of the three features are, however, different. The regional differences suggested by distributions of morphologies and maps are preliminary. The analyses that follow will test the significance of regional differences in distribution suggested by these examinations of incisor shape.

Table 4.10. Central ridge distributions by region, in percent.

	Score				
Region	0	1	2	3	4
NW Europe	**51.4**	39.9	8.1		0.6
CS Europe	**47.7**	**35.2**	14.6	2.3	0.2
SW Asia	**33.6**	**36.1**	25.4	4.9	
NE Asia	1.0	13.0	**52.0**	30.0	4.0
SE Asia/Oceania	9.6	**34.4**	**43.2**	12.0	0.8
NW Africa	**33.1**	**36.4**	29.2	1.3	
SE Africa	**29.5**	**40.9**	27.3	2.3	
Madagascar	6.3	12.5	**62.5**	18.8	

Table 4.11. Central tubercle distributions by region, in percent.

	Score			
Region	0	1	2	3
NW Europe	**66.5**	13.3	19.7	0.6
CS Europe	**58.3**	4.2	35.8	1.6
SW Asia	**60.7**	4.1	35.2	
NE Asia	**77.0**	7.0	16.0	
SE Asia/Oceania	**46.4**	24.0	**28.8**	0.8
NW Africa	**48.7**	12.3	**37.7**	1.3
SE Africa	**50.0**	6.8	43.2	
Madagascar	**50.0**	6.3	37.5	6.3

Table 4.12. Central curvature distributions by region, in percent.

	Score			
Region	0	1	2	3
NW Europe	39.3	**52.0**	8.1	0.6
CS Europe	**33.7**	**48.5**	16.4	1.4
SW Asia	24.0	**58.7**	16.5	0.8
NE Asia	**63.0**	29.0	8.0	
SE Asia/Oceania	**46.4**	**44.8**	8.0	0.8
NW Africa	24.7	**45.5**	**27.9**	1.9
SE Africa	36.4	**50.0**	13.6	
Madagascar	**37.5**	**43.8**	18.8	

The cell or cells with the highest frequencies, constituting the majority of the sample, are in bold face.

Table 4.13. Lateral ridge distributions by region, in percent.

	Score					
Region	0	1	2	3	4	5
NW Europe	26.2	**50.4**	21.8	1.2		0.4
CS Europe	25.5	**44.2**	**27.0**	3.2	0.2	
SW Asia	23.0	**47.3**	**27.0**	2.7		
NE Asia		15.9	**63.8**	17.4	0.7	2.2
SE Asia/Oceania	15.0	**31.3**	**45.5**	8.2		
NW Africa	22.2	**48.1**	**26.7**	3.0		
SE Africa	20.5	**50.0**	**27.3**	2.3		
Madagascar	6.3	**37.5**	**37.5**	18.8		

Table 4.14. Lateral tubercle distributions by region, in percent.

	Score					
Region	0	1	2	3	4	5
NW Europe	**74.6**	23.0	0.8	1.2	0.4	
CS Europe	**64.0**	32.6	1.4	1.8	0.2	
SW Asia	**73.1**	22.0	0.4	4.0	0.4	
NE Asia	**77.5**	21.0	0.7		0.7	
SE Asia/Oceania	**64.4**	32.2		2.1		1.3
NW Africa	**55.2**	35.2	4.8	4.1	0.7	
SE Africa	**54.5**	34.1	5.7	4.5	1.1	
Madagascar	**87.5**	6.3	6.3			

Table 4.15. Lateral curvature distributions by region, in percent.

	Score				
Region	0	1	2	3	4
NW Europe	**41.5**	**48.0**	9.3	0.8	0.4
CS Europe	36.6	**56.2**	7.0	0.2	
SW Asia	31.7	**53.3**	14.1	0.9	
NE Asia	**48.6**	**44.9**	.5		
SE Asia/Oceania	**44.6**	**44.6**	10.3		0.4
NW Africa	33.3	**51.5**	13.3	1.1	0.7
SE Africa	31.8	**58.0**	9.1		1.1
Madagascar	43.8	**50.0**	6.3		

The cell or cells with the highest frequencies, constituting the majority of the sample, are in bold face.

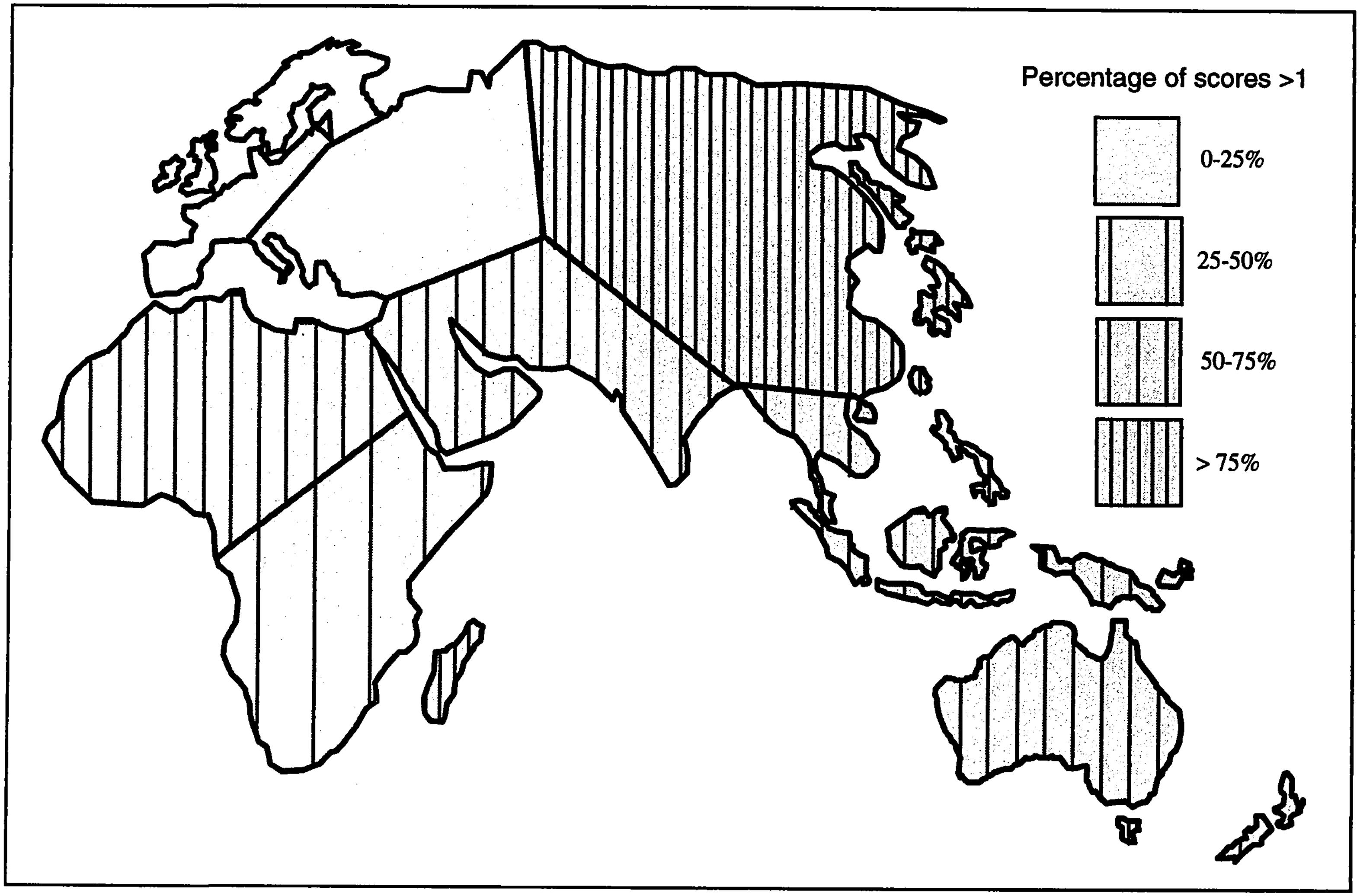


Figure 4.1. Approximate geographic distribution of central incisor marginal ridge scores.

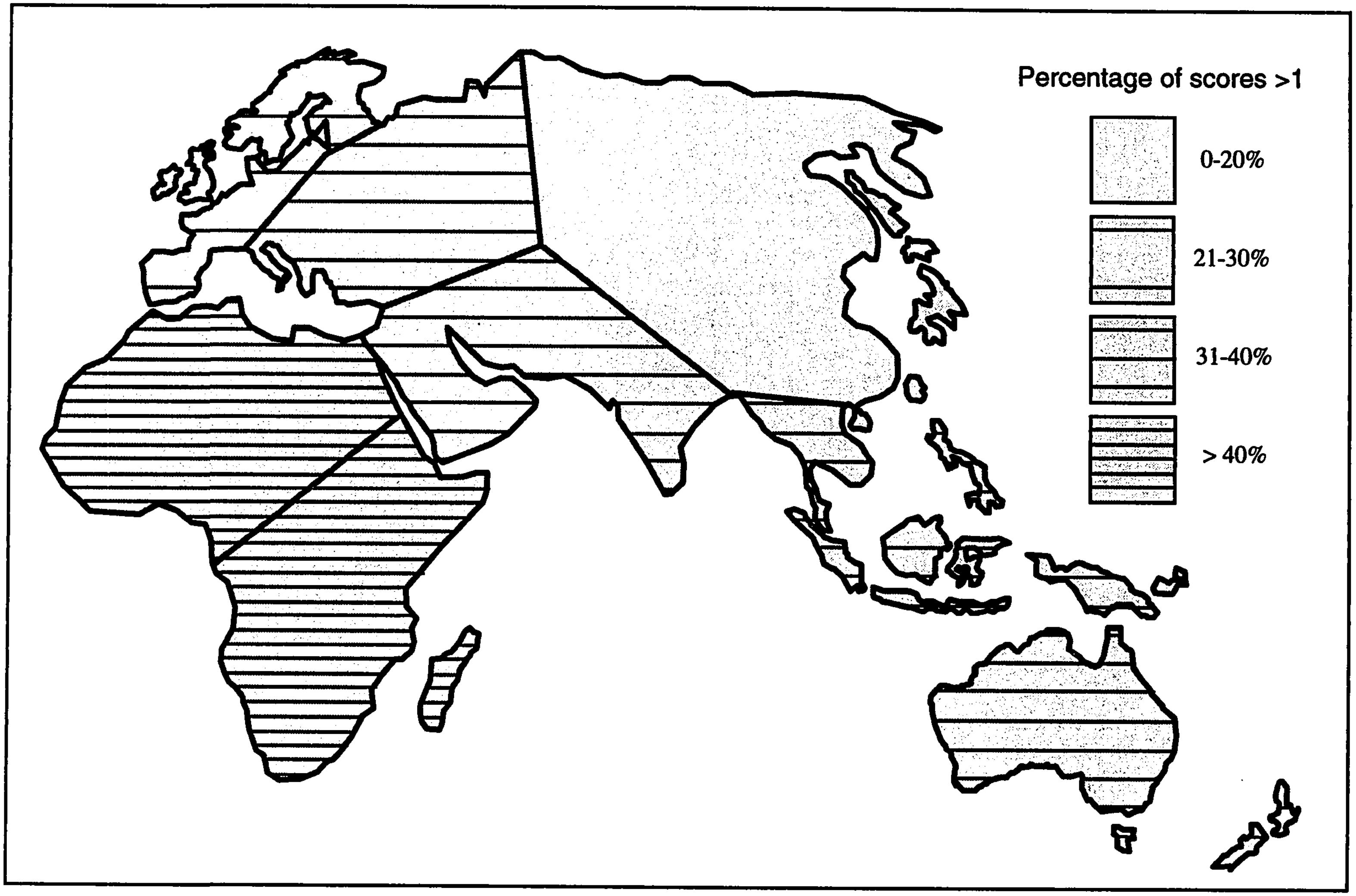


Figure 4.2. Approximate geographic distribution of central incisor tubercle scores.

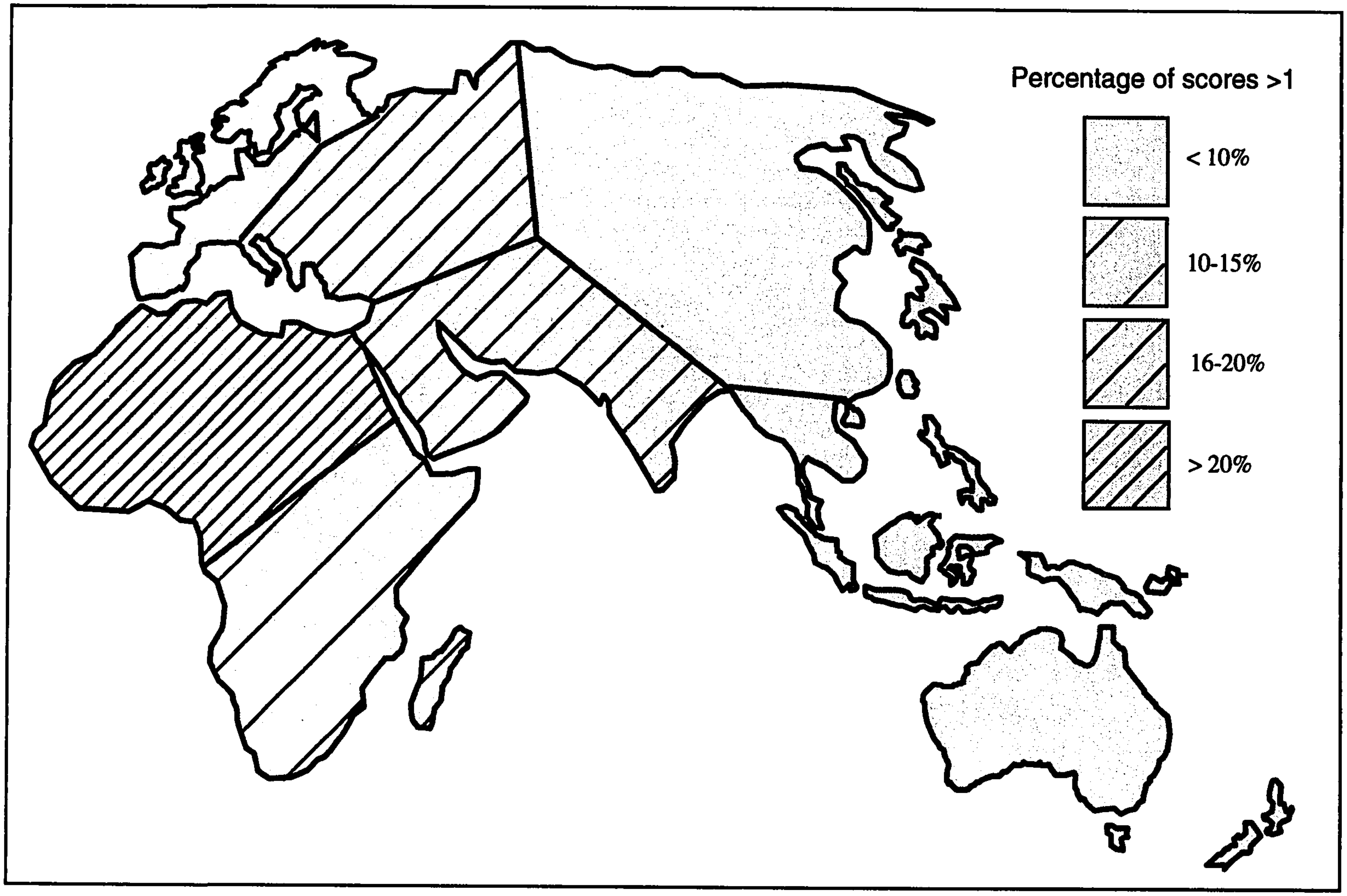


Figure 4.3. Approximate geographic distribution of central incisor curvature scores.

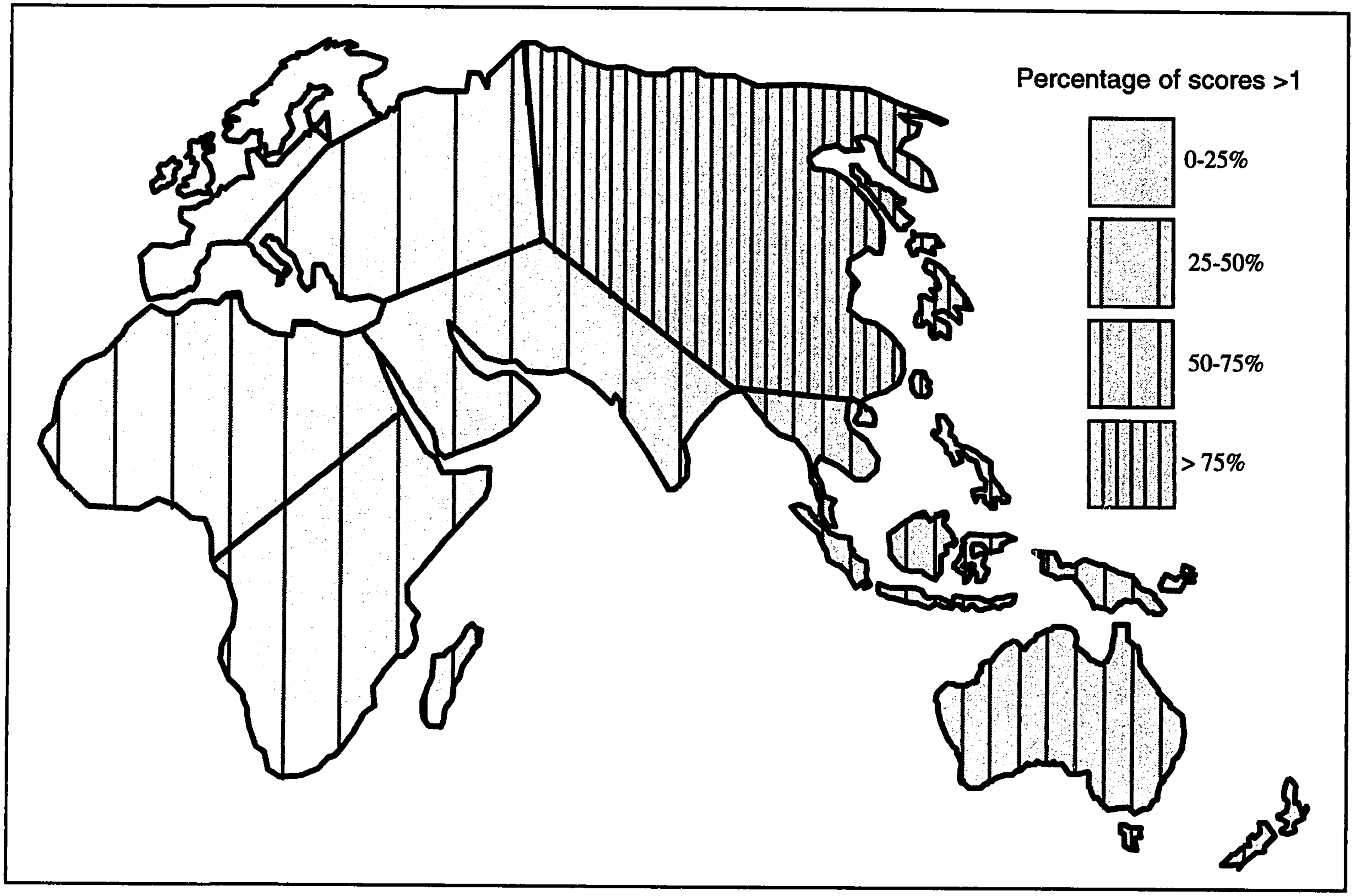


Figure 4.4. Approximate geographic distribution of lateral incisor marginal ridge scores.

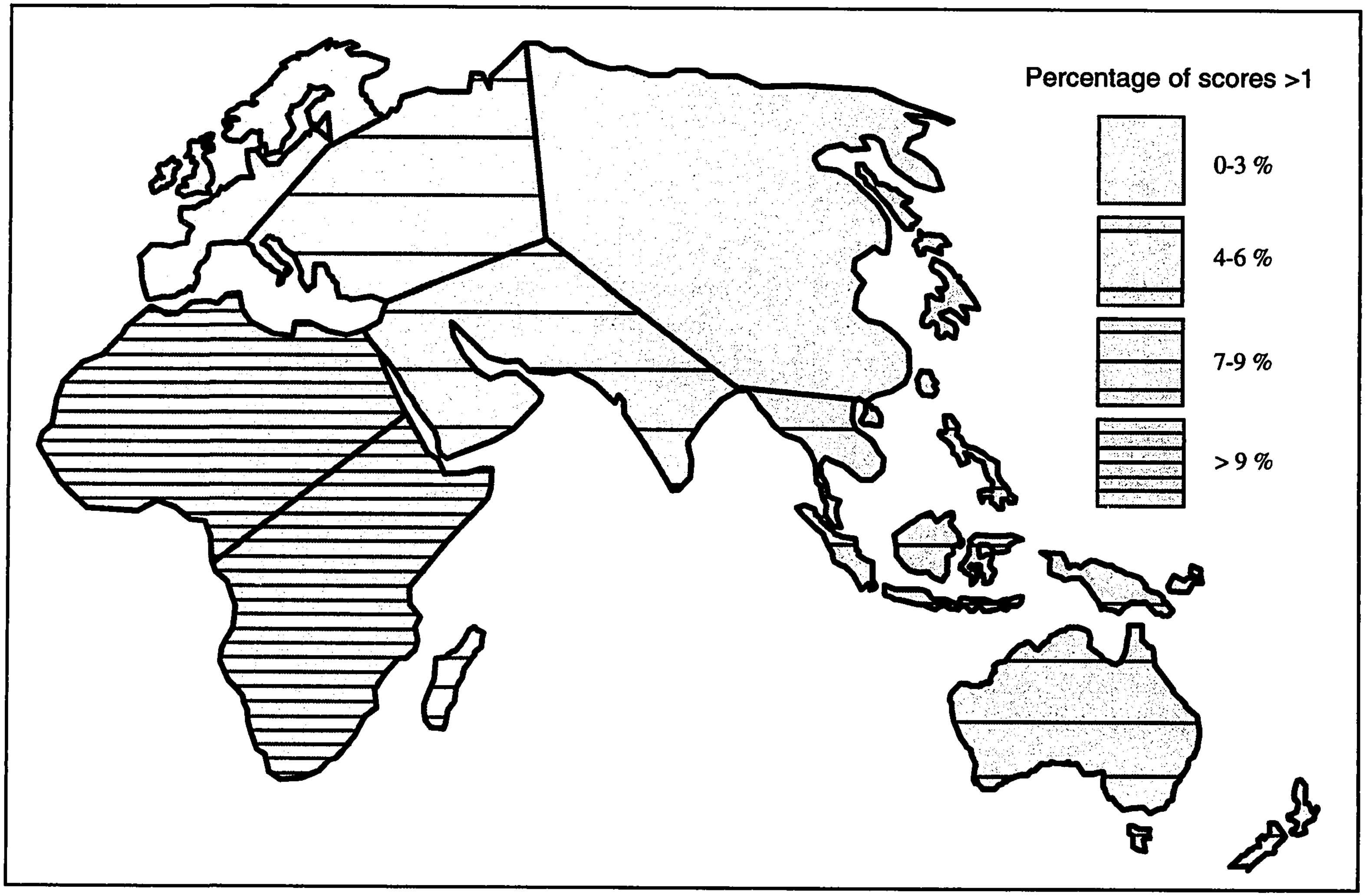


Figure 4.5. Approximate geographic distribution of lateral incisor tubercle scores.

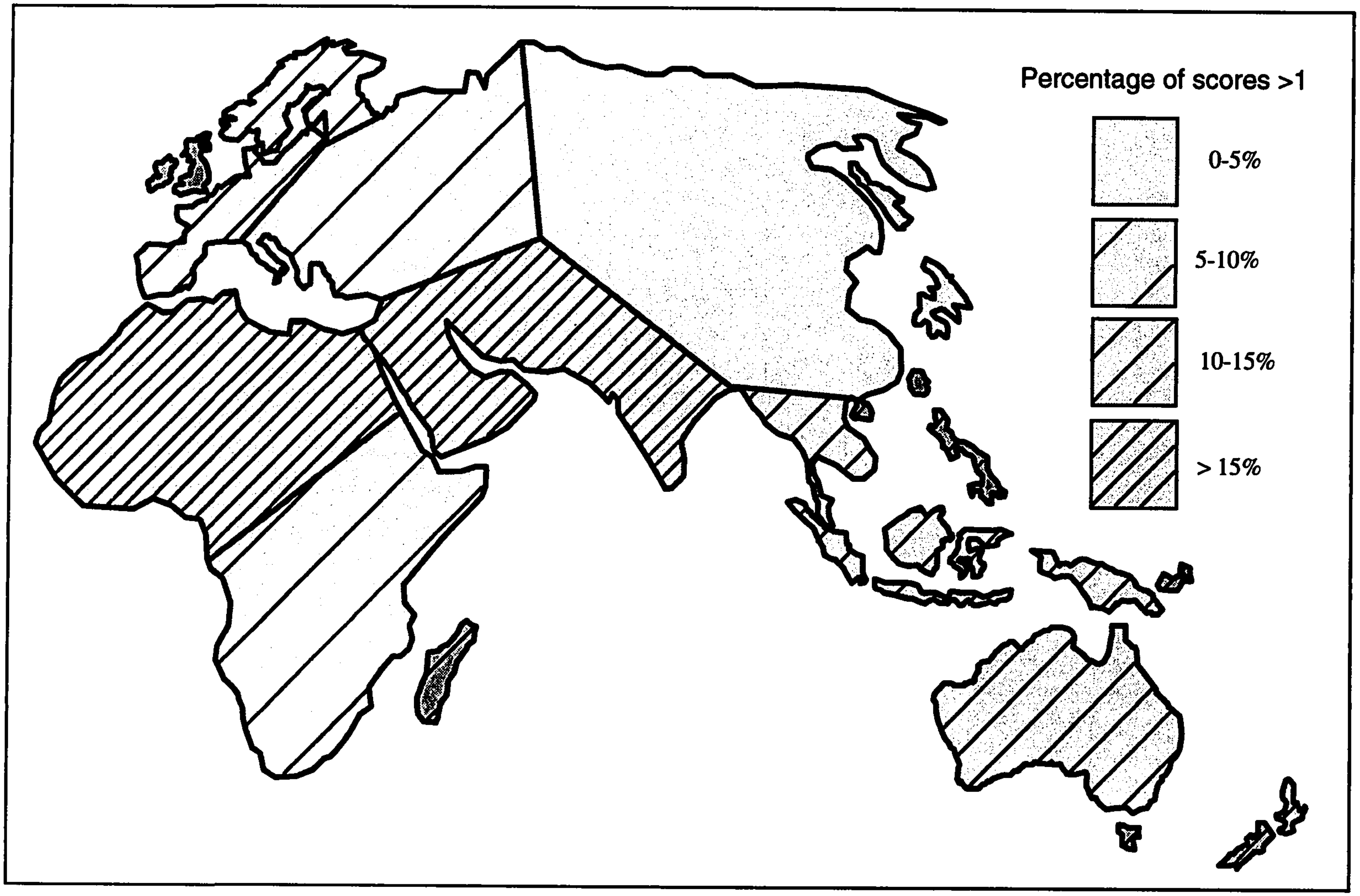


Figure 4.6. Approximate geographic distribution of lateral incisor curvature scores.

Regional differences

The first hypothesis to test regarding the distribution of incisor morphologies is whether these shapes distribute regionally; the null hypothesis is that regions do not show different shoveling distributions, while the alternate hypothesis is that regions are different in distributions of incisor shapes. A multivariate analysis of variance (MANOVA) is used to test the hypothesis that all regions show the same incisor morphology. Subordinate categorical maximum likelihood estimations of contingency tables (CATMOD in SAS 6.01) and multivariate analyses of variance are used to test the null hypothesis of same mean and distribution for pairs of regions. Mann-Whitney U Rank Sum tests, ANOVAs or t-tests are used for testing hypotheses for single characters and regional pairs.

When all three morphologies of both central and lateral incisors are considered simultaneously, the MANOVA tests of difference return p-values of <0.01 for all regions, indicating significant differences between regions in distribution of incisor morphologies. Results from iterative region by region comparisons are presented in Table 4.16. Only a few regional pairs are not significantly different at the $\alpha=0.05$ level, when all three morphologies on both central and lateral incisors are considered simultaneously; the exceptions are both East Asian regions from Madagascar, and the two divisions of Africa from one another. In all other cases, comparison between regional distributions returns a significant difference. Analysis of all the morphologies at once, however, does not provide much information about what factors are contributing to differences. Therefore central and lateral incisors will be analyzed separately, and for each component morphology. Analyses for central incisors will be presented first followed by those for the laterals.

Table 4.16. P-values for multivariate tests of regional difference, both central and lateral incisor morphologies.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**<0.01**						
South/West Asia	**<0.01**	**<0.01**					
North/East Asia	**<0.01**	**<0.01**	**<0.01**				
SE Asia/ Oceania	**<0.01**	**<0.01**	**<0.01**	**<0.01**			
N-W Africa	**<0.01**	**<0.01**	**0.03**	**<0.01**	**<0.01**		
E-S Africa	**<0.01**	**<0.01**	**0.03**	**<0.01**	**<0.01**	0.08	
Madagascar	**<0.01**	**<0.01**	**<0.01**	0.35	0.37	**<0.01**	**<0.01**

All regions p<0.01

Significant p-values (α=0.05) in bold face.

Central incisors

For central incisors, results of categorical tests of difference and MANOVAs between pairs of regions are presented in Table 4.17. Overall, results show significant differences between regions and those which are geographically furthest from them, but in some cases not from nearest neighbors. Considering only the categorical tests, North/West Europe does not differ from South/West Asia, Southeast Asia/Oceania, or East/South Africa in incisor shape, while Central/South Europe is significantly different from all other regions. The distribution of incisor shapes seen in South/West Asia contrasts with all other regions except North/West Africa and North/West Europe. North/East Asia differs from all other regions except East/South Africa. Southeast Asia/Oceania shows a different incisor shape distribution from all regions but North/West Europe and Madagascar. The two divisions of Africa are not significantly different from one another. North/West Africa differs from Central/South Europe, North/East Asia and Southeast Asia/Oceania, while East/South Africa contrasts with Central/South Europe, South/West Asia and Southeast Asia/Oceania. Madagascar, whose autochthonous populations are derived from those of Indonesia with some mixing from people of East

Africa (Linton, 1943; Vérin, 1986) does not differ significantly from Southeast Asia/Oceania or the two Africa divisions in incisor morphology. Parametric tests return similar but not identical patterns of difference. Results for multivariate analyses are mostly as would be predicted if incisor morphologies were distributing in a regional manner.

Table 4.17. P-values for multivariate tests of regional difference for central incisor morphologies.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**<0.01** **<0.01**						
South/West Asia	0.55 **<0.01**	**<0.01** **<0.01**					
North/East Asia	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**				
SE Asia/ Oceania	0.83 **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**			
N-W Africa	0.83 **<0.01**	**<0.01** **<0.01**	0.26 0.20	**<0.01** **<0.01**	**<0.01** **<0.01**		
E-S Africa	1.00 **0.03**	**<0.01** 0.09	**<0.01** 0.25	0.26 **<0.01**	**<0.01** **<0.01**	0.06 0.15	
Madagascar	**<0.01** **0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	0.53 0.26	0.60 **<0.01**	0.81 **<0.01**

All regions p<0.01

Categorical tests shown in top row, parametric tests shown in lower row.
Significant p-values ($\alpha=0.05$) in bold face.

Univariate tests (Mann-Whitney U and ANOVA) of the components of shovel-shaping can be used to explore which characters are contributing to observed regional differences. Results of tests for each character are presented in Tables 4.18 to 4.20. Marginal ridge distributions differ significantly between most pairs of regions, but not all (Table 4.18). The African divisions do not contrast significantly with one another, nor does either one from South/West Asia. Madagascar does not differ from either of the East Asian divisions, and the two European divisions do not contrast significantly from one another. Parametric tests return results similar to the non-parametric tests, with a single additional case of significance.

Table 4.18. P-values for regional comparisons of central incisor marginal ridge distributions.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	0.11 **0.05**						
South/West Asia	**<0.01** **<0.01**	**<0.01** **<0.01**					
North/East Asia	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**				
SE Asia/ Oceania	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**			
N-W Africa	**<0.01** **<0.01**	**<0.01** **<0.01**	0.92 0.77	**<0.01** **<0.01**	**<0.01** **<0.01**		
E-S Africa	**<0.01** **<0.01**	**0.01** **0.02**	0.87 0.97	**<0.01** **<0.01**	**<0.01** **<0.01**	0.82 0.80	
Madagascar	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	0.21 0.16	0.09 0.13	**<0.01** **<0.01**	**<0.01** **<0.01**

All regions
p<0.01

Categorical tests shown in top row, parametric tests shown in lower row.
Significant p-values (α=0.05) in bold face.

Regional comparisons of tubercle distributions do not reveal as many regional contrasts as do the marginal ridges, yet there are several regions which differ significantly from one another (Table 4.19). North/East Asia differs from all other regions in its distribution of tubercle scores. In addition, North/West Europe contrasts with North/West Africa. North/East Asia and North/West Europe are the most peripheral regions, followed by North/West Africa. None of the more central regions differ from one another in development of this character. In all cases, results from parametric tests return similar p-values to results from non-parametric tests.

Table 4.19. P-values for regional comparisons of central incisor lingual tubercle distributions.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**<0.01** **<0.01**						
South/West Asia	0.90 0.88	0.56 0.58					
North/East Asia	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**				
SE Asia/ Oceania	0.09 0.22	0.18 0.32	0.27 0.42	**<0.01** **<0.01**			
N-W Africa	**0.02** **0.03**	0.18 0.24	0.12 0.14	**<0.01** **<0.01**	0.59 0.50		
E-S Africa	0.17 0.18	0.39 0.43	0.26 0.27	**<0.01** **<0.01**	0.64 0.56	0.93 0.92	
Madagascar	0.30 0.27	0.46 0.45	0.35 0.33	**0.01** **0.05**	0.65 0.50	0.80 0.74	0.84 0.82

All regions $p<0.01$

Categorical tests shown in top row, parametric tests shown in lower row. Significant p-values ($\alpha=0.05$) in bold face.

Curvature scores (Table 4.20) show significant differences in distribution, when all regions are considered at once. For the paired regional comparisons, North/East Asia contrasts significantly with all other regions. Southeast Asia/Oceani,a on the other hand, differs from all but Central/South Europe, East-South Africa, and Madagascar. South/West Asia differs significantly from Central/South Europe and both East Asian divisions. In addition, North/West Europe differs from East/South Africa, Madagascar, and Central/South Europe. South Central Europe also contrasts significantly with North/West Africa. This is also the only one of the three incisor characters for which the two African divisions differ in distribution. In all but one case, South/West Asia and North/West Europe, non-parametric and parametric analyses identify the same regional contrasts as significant.

Table 4.20. P-values for regional comparisons of central incisor curvature distributions.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**0.03**						
	0.01						
South/West Asia	**0.04**	0.16					
	0.06	0.25					
North-East Asia	**<0.01**	**<0.01**	**<0.01**				**All regions**
	<0.01	**<0.01**	**<0.01**				**p<0.01**
SE Asia/ Oceania	**<0.01**	0.78	**<0.01**	**0.02**			
	<0.01	0.76	**<0.01**	**0.04**			
N-W Africa	**<0.01**	**<0.01**	0.16	**<0.01**	**<0.01**		
	<0.01	**<0.01**	0.15	**<0.01**	**<0.01**		
E-S Africa	0.81	0.54	0.15	**<0.01**	0.20	**0.02**	
	0.74	0.47	0.15	**<0.01**	0.23	**0.02**	
Madagascar	0.98	0.84	0.45	**0.04**	0.34	0.21	0.88
	0.99	0.81	0.47	**0.04**	0.32	0.20	0.85

Categorical tests shown in top row, parametric tests shown in lower row. Significant p-values ($\alpha=0.05$) in bold face.

Univariate data analyses allow examination of the contribution of individual characters to overall regional differences. All three features contribute to the ultimate differences seen between regions. It is evident from the results in Tables 4.18 to 4.20 that each of the incisor characters is distributing in a slightly different manner. The data on distribution of the features in Tables 4.10 to 4.15 can be used to examine differences in detail – that is, which regions show higher or lower scores for each character. Regional morphologies are discussed below and contrasted with the morphologies shown in other regions. Some examples of regional shovel shapes are illustrated in Figure 4.7.

The two divisions of Europe differ significantly from each other in two of the three features under examination: tubercles and curvature. Both divisions, however, are significantly different from all other regions in marginal ridges. Both show nearly the same pattern of differences from the remaining regions in curvature and in tubercles, even though they are also different from one another. North/West Europe shows a morphology with very low marginal ridge development, low to moderate tubercle development, and a high frequency of slight curvature (Figure 4.7, a). Central/South Europe shows more evenly distributed curvature scores, as well as more of the high curvature scores, higher frequencies of tubercles and low marginal ridge development (Figure 4.7, b). When all characters are considered, North/West Europe is significantly different from all other regions, while Central/South Europe shows a morphology significantly different from all other regions except for East/South Africa.

South/West Asian incisor morphology is similar to that seen in both European divisions, but has significantly different levels of both marginal ridge development and curvature. Tubercle development shows approximately the same distribution as in Europe. Incisors in South/West Asia are more curved and more heavily ridged, but show similar tubercle development to that seen in either European division. They differ from North/East Asia in having significantly higher curvature and tubercle development and much lower marginal ridge scores. South/West Asia differs from Southeast Asia/Oceania with higher curvature and lower marginal ridges. South/West Asia differs from Madagascar only in marginal ridge development and is not significantly different from either African region in any of the characters.

North/East Asia shows distributions of incisor morphologies significantly different from all other regions. Individual traits distributions differ from all but Madagascar in marginal ridge development, and differ from all other regions in tubercles and curvature. North/East Asia incisors have very heavy marginal ridges and very low development of both other morphologies (Figure 4.7, c).

Southeast Asia/Oceania differs from all other regions except Madagascar in overall morphology. Incisors show moderate to high marginal ridges, moderate tubercle development, and low curvature; they differ from both European divisions, South/West Asia, and North/West Africa in ridges and curvature, and from East/South Africa only in ridges. Southeast Asia/Oceania shows significant differences from North/East Asia, both African divisions and Madagascar in tubercle development.

The two African regions are not significantly different from one another in the multivariate tests, although they differ in curvature considered alone. They are both different from all other regions when the three characters are considered simultaneously. North/West Africa displays some marginal ridge development, fair tubercle development, and moderate curvature. This region contrasts with all but South/West Asia and the other African division, its nearest neighbors, in its marginal ridge distribution. North/West Africa differs only from the furthest regions, North Asia and NW Europe, in tubercle development, and from all but East/South Africa and Madagascar in curvature. The other African division, East/South Africa, shows a nearly identical pattern of difference from the remaining regions. It is significantly different from all but the other African division and South/West Asia in marginal ridge development, from only North/East Asia in tubercle development, and from only North/East Asia and North/West Africa in curvature. The modal morphology displayed in this region is one of some marginal ridge development, light tubercle development, and slight curvature (Figure 4.7, e).

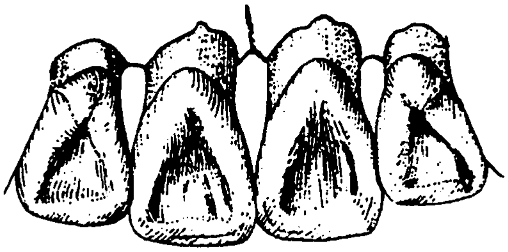
Madagascar's common morphology shows moderate to heavy marginal ridges, light tubercles, and slight curvature. It is significantly different from all regions but Southeast Asia/Occeania in its multivariate morphology. In individual characters, Madagascar differs from all but North/East Asia and South East Asia/Oceania in marginal ridges, but only North/East Asia in both tubercles and curvature.

A. Northwest Europe - Germany

D. Southeast Asia/Oceania - Australia

B. Central/South Europe - Bosnia

E. East/South Africa - Tanzania



C. North/East Asia - China

Figure 4.7 Illustration of some examples of regional incisor morphologies, in anatomical position. Line drawings are redrawn from Weidenreich (1937).

Lateral incisors

Similar regional comparisons can be made for the lateral incisors. Results of categorical tests of difference and MANOVAs between pairs of regions are present in Table 4.21. Mann-Whitney U and univariate ANOVA test results appear in Tables 4.22 to 4.24 for the individual incisor characters. Comparisons, when considered with the frequencies in Tables 4.13 to 4.15, can provide an indication not only of which regions are different in their overall incisor morphology but also in which characters and direction these differences are manifested. Results for multivariate tests (Table 4.21) show that most regions are significantly different from all others. Exceptions are North/West Europe with North/East Asia, South/West Asia with Southeast Asia/Oceania, South/West Asia with East/South Africa, North/East Asia with Madagascar, and Southeast Asia/Oceania with North/West Africa. The parametric tests, for the most part, return similar results to non-parametric tests, although there are a few exceptions. Overall incisor morphology appears to be distributed in a regional manner.

Table 4.21. P-values for multivariate tests of regional difference for lateral incisor morphologies.

REGION	NW Europe	CS Europe	South/West Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**<0.01** **0.03**						
South/West Asia	**0.01** **<0.01**	**<0.01** **0.03**					
North/East Asia	0.72 **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**				
SE Asia/ Oceania	**<0.01** **<0.01**	**<0.01** **<0.01**	0.78 **<0.01**	**<0.01** **<0.01**			
N-W Africa	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	0.35 **<0.01**		
E-S Africa	**<0.01** **<0.01**	**<0.01** **0.01**	0.09 **0.03**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** 0.38	
Madagascar	**<0.01** **<0.01**	**<0.01** **0.01**	**<0.01** **<0.01**	0.99 0.22	**<0.01** 0.53	**<0.01** **<0.01**	**<0.01** **<0.01**

All regions
p<0.01

Categorical tests shown in top row, parametric tests shown in lower row.
Significant p-values (α=0.05) in bold face.

Results for regional comparisons of each of the three characters separately are presented in Tables 4.22 to 4.24. Table 4.22 shows that lateral incisor marginal ridge distributions primarily contrast East Asia with the rest of the world. Regional comparisons of North/East Asia distributions with all other regions but Madagascar are significant. Similarly, Southeast Asia/Oceania contrasts significantly with all other regions except Madagascar, and Madagascar contrasts with all regions but the two East Asian divisions. There are no other significant regional contrasts for lateral marginal ridge development. Results of parametric and non-parametric tests are similar.

Table 4.22. P-values for regional comparisons of lateral incisor marginal ridge distributions.

<u>REGION</u>	NW Europe	CS Europe	South/West Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	0.13 0.14						
South/West Asia	0.50 0.58	0.82 0.89					
North/East Asia	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**				
SE Asia/ Oceania	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**			
N-W Africa	0.37 0.43	0.68 0.74	0.90 0.88	**<0.01** **<0.01**	**<0.01** **<0.01**		
E-S Africa	0.47 0.55	0.68 0.75	0.81 0.83	**<0.01** **<0.01**	**<0.01** **<0.01**	0.88 0.92	
Madagascar	**<0.01** **<0.01**	**<0.01** **<0.01**	**<0.01** **<0.01**	0.06 **0.05**	0.40 0.32	**<0.01** **<0.01**	**0.02** **<001**

All regions p<0.01

Categorical tests shown in top row, parametric tests shown in lower row.
Significant p-values (α=0.05) in bold face.

Regional comparisons for lateral incisor tubercle scores show several regional contrasts (Table 4.24). Both European divisions differ from North/East Asia and the African divisions. In addition, they differ from one another. Central/South Europe also is significantly different from Southeast Asia/Oceania. The two African divisions both differ significantly from all regions except one another. In all directions from South/West Asia, contrasts are strong, but not for this central region. South/West Asia only contrasts significantly with the two African divisions. Parametric tests return very similar results, with the exception of finding significant differences in the additional regional comparison of East/South Africa and Southeast Asia/Oceania.

Table 4.23. P-values for regional comparisons of lateral incisor lingual tubercle distributions.

REGION	NW Europe	CS Europe	South/West Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	**0.01**						
	<0.01						
South/West Asia	0.12	**0.03**					
	0.72	0.22					
North/East Asia	**0.01**	**<0.01**	0.28				**All regions**
	0.01	**<0.01**	0.10				**p<0.01**
SE Asia/ Oceania	0.45	**0.05**	0.07	**<0.01**			
	0.16	**<0.01**	0.23	**<0.01**			
N-W Africa	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**0.02**		
	<0.01	**<0.01**	**<0.01**	**<0.01**	**0.04**		
E-S Africa	**<0.01**	**0.03**	**<0.01**	**<0.01**	**0.05**	0.83	
	<0.01	**<0.01**	**<0.01**	**<0.01**	0.07	0.72	
Madagascar	0.11	0.07	0.24	0.42	0.08	**0.02**	**0.02**
	0.21	0.15	0.34	0.64	0.20	**0.05**	**0.05**

Categorical tests shown in top row, parametric tests shown in lower row.
Significant p-values (α=0.05) in bold face.

Regional comparisons for lateral curvature scores show significant comparisons for less than half of the regional pairs. Both European divisions differ significantly only from South/West and North/East Asia and North/West Africa. South/West Asia, additionally, differs from the other two Asian divisions. North/East Asia differs with all other regions except Southeast Asia/Oceania and Madagascar. Southeast Asia contrasts in curvature only with South/West Asia and North/West Africa. North/West Africa contrasts, as mentioned above, with both European divisions and both East Asian divisions in lateral incisor curvature, while East/South Africa differs significantly only from North/East Asia. Madagascar does not differ significantly from any other region in curvature. Results of parametric and non-parametric tests are similar.

Table 4.24. P-values for regional comparisons of lateral incisor curvature distributions.

<u>**REGION**</u>	NW Europe	CS Europe	South/West Asia	North-East Asia	SE Asia/ Oceania	N-W Africa	E-S Africa
CS Europe	0.53 1.00						
South/West Asia	**<0.01** **<0.01**	**0.02** **<0.01**					
North-East Asia	**0.02** **0.03**	**0.02** **0.03**	**<0.01** **<0.01**			**All regions p<0.01**	
SE Asia/ Oceania	0.23 0.45	0.51 0.14	**<0.01** **<0.01**	0.30 0.21			
N-W Africa	**0.01** **<0.01**	**0.03** **<0.01**	0.82 0.96	**<0.01** **<0.01**	**<0.01** **<0.01**		
E-S Africa	0.22 0.16	0.27 0.14	0.62 0.69	**0.01** **0.01**	0.09 0.11	0.75 0.68	
Madagascar	0.62 0.61	0.57 0.59	0.23 0.22	0.75 0.78	0.90 0.80	0.27 0.25	0.33 0.33

Categorical tests shown in top row, parametric tests shown in lower row. Significant p-values ($\alpha=0.05$) in bold face.

As with the central incisors, each of the three incisor morphologies shows a somewhat different distribution. Marginal ridges clearly distinguish Asia from the rest of the world, but the distributions of the other characters are not as clear. However, nearly all regions show a significantly different three dimensional morphology.

North/West Europe shows an average morphology of slight marginal ridge development, little tubercle development, and very low curvature (Figure 4.7, a). Central/South Europe shows slightly more marginal ridge development, as well as more tubercle development and more curvature (Figure 4.7, b). The morphologies shown in the two European divisions differ from all world regions (including each other) when all three incisor characters are considered at once. These two regions differ significantly from one another only in tubercle development. Both European regions differ from North/East Asia, Southeast Asia/Oceania, and Madagascar in marginal ridges and curvature, although neither differs from the remaining regions. North/West Europe contrasts with Central/South Europe, North/East Asia, and both African divisions in its tubercle scores, while Central/South Europe is different from all but South/West Asia and Madagascar.

The morphology seen in South/West Asia sample is one of slight ridge development, slight tubercle development, and slight curvature. This region differs from all samples when the regions are compared in multivariate space. Compared feature by feature, South/West Asia is significantly different from the other Asian populations in marginal ridges, although not from either European or African subdivision. For tubercles, this region presents its only significant differences with Africa. The curvature seen in South/West Asia lateral incisor sample is significantly different from both European divisions and from North/East Asia and Southeast Asia/Oceania, but not from Africa, or, interestingly, Madagascar.

The North/East Asia sample is unique in its three-dimensional incisor morphology, significantly different from all other samples except for Madagascar. This morphology is one with moderate to heavy marginal ridge development, little curvature, and little tubercle development (Figure 4.7, c). Feature by feature, this morphology is significantly different from all but Madagascar in ridge development, from both Europe and Africa in tubercle development, and from all but Southeast Asia/Oceania and Madagascar in curvature. Fewer differences in distributions are seen between the North/East Asia sample and other regions than were seen for the central incisors of this region.

Southeast Asia/Oceania, like Northeast Asia, contrasts with all other regions in its multivariate morphology, with the exception of Madagascar in its multivariate morphology. In terms of individual characters, Southeast Asia/Oceania contrasts with all but Madagascar in its ridge development, from Central/South Europe, North/East Asia and North/West Africa in tubercle development, and from South/West Asia and North/West Africa in curvature. The typical morphology displayed in Southeast Asia/Oceania includes moderate ridges, low tubercle development, and low curvature (Figure 4.7, d).

Lateral incisors of the two African divisions show similar but not identical patterns of differences from the other regions. Both regions are significantly different from all other regions except one another when the three features are considered simultaneously. For marginal ridges, both African regions differ from the far Asian samples, but not from either European division or South/West Asia. African regions contrast with all other populations in tubercle distributions (with the possible exception of a significant difference between East/South Africa and Southeast Asia/Oceania, where the categorical model produces a significant p-value while the parametric model does not). Curvature scores for North/West Africa differ significantly from all other subdivisions except SW Asia and Madagascar while the curvature scores for East/South Africa differ significantly only from North/East Asia. The modal morphologies for both show moderate ridge development and higher percentages of small tubercles than any other regions, as well as slight curvature (Figure 4.7, e).

Madagascar shows a morphology that is significantly different from all other regions except North/East Asia and Southeast Asia/Oceania. The Malagasy marginal ridge distribution shows the same pattern, differing from all regions but North/East Asia and Southeast Asia/Oceania. For tubercles, Madagascar is significantly different from the two African divisions, but not from the other regions. It does not differ from any region in curvature distribution. The morphology displayed is one of moderate to strong ridges, an extremely low frequency of tubercles, and slight curvature.

Discussion

Results for both central and lateral incisors refute the null hypothesis that incisor morphologies are the same across space. There are clear differences between geographic regions in the shapes that the incisors show, particularly when all the features contributing to the shape of the lingual surface of the tooth are considered. Each region demonstrates a distinctly different morphology. It is also clear that the method describing several features of shape provides more discriminating information than does the examination of a single shape. Each of the forms seen could be called shovel shaped, although they each manifest a slightly different aspect of shoveling.

Regions not only show geographic distributions but there appear to be patterns to these differences. Both the statistics presented in Tables 4.17 to 4.24 and the distribution maps in Figures 4.1 to 4.6 suggest that regions are less differentiated from others which are closer to them geographically than those which are further away. There seems to be a peripheral effect on incisor shapes. The central areas, South/West Asia and Southeast Asia are less consistently differentiated from other regions in their incisor morphology, while North/East Asia and North/West Europe consistently contrast with the rest of the world. Each of the incisor morphologies appears to be distributed in a clinal or geographic pattern.

One of the interesting results of these analyses of difference in shape across regions is that statistical significance does not appear to depend strongly on choice of analysis by categorical or parametric methods. In most cases the p-values produced by the two methods are nearly identical. Based on similarity of results between the methods, I will assume that the divisions on the plaques do not differ too far from assumptions of parametric statistics and that it is possible to treat these data as continuous. Although it is clear that non-parametric statistics are more appropriate for the analysis of these data on incisor shapes, using parametric statistics will allow a more powerful analysis regarding the implications of differences in shoveling characters both for modern distributions, and in evolution. Results from parametric tests, however, should be regarded with caution.

Geographic distribution of shapes

Results presented so far illustrate that regional groups do show contrasting incisor morphologies and suggest that these differences distribute clinally or regionally. To investigate whether this is the case, the null hypothesis that regions do not show geographic patterning will be tested using hierarchical cluster analyses. Cluster analyses ask which regions are closer to each other in their morphologies and which are more disparate. Average incisor morphologies for each region are calculated, and these clustered on squared Euclidean distance measures using average linkage between groups. Results are presented below by central and lateral incisor, followed by simultaneous consideration of both.

Clustering of central incisor average scores produces the dendrogram shown in Figure 4.8. There are two major clusters, one of Asia and one of Africa and Europe. South/West Asia and North/West Africa are most similar to each other in central incisor morphologies. The next group to join is East/South Africa followed by the European subdivisions, first Central/South Europe, and then North/West Europe. The other major cluster is of Southeast Asia/Oceania and Madagascar closest, with North/East Asia joining these further out. Regions that are closer to each other geographically group together in their morphologies, while those at a geographic distance join the cluster further out.

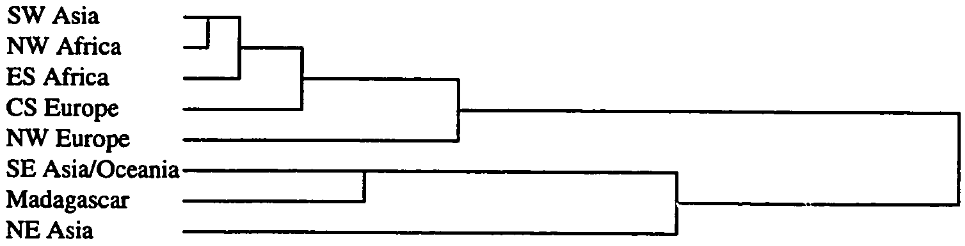


Figure 4.8. Squared Euclidean distance, average linkage dendrogram of central incisor average scores for the eight Region Level II divisions.

Cluster analysis of the lateral incisors, the dendrogram shown in Figure 4.9, also produces two primary clusters: one of the European regions, South/West Asia and Africa, and one of Southeast Asia/Oceania, North/East Asia, and Madagascar. Within the first of these clusters, the African divisions are most similar to each other, joining a cluster formed by South/West Asia and Central/South Europe. North/West Europe groups with this cluster to the exclusion of the East Asian samples. Southeast Asia/Oceania and Madagascar form a closer cluster than either do with North/East Asia.

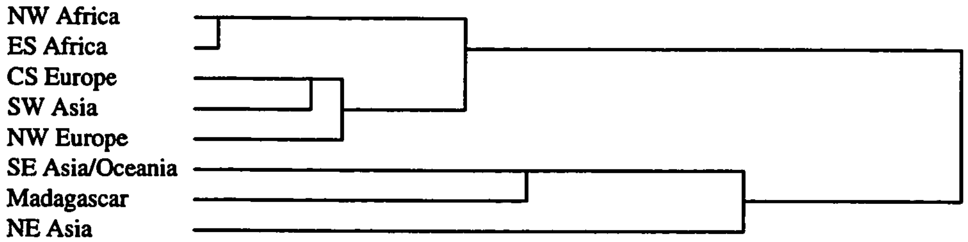


Figure 4.9. Squared Euclidean distance, average linkage dendrogram of lateral incisor average scores for the eight Region Level II divisions.

When a cluster analysis is run on the eight regions, considering both central and lateral incisor scores together, the resulting dendrogram is nearly identical to the trees resulting from clustering scores of either central or lateral incisors separately. Illustrated in Figure 4.10, there is a trichotomy of the African Groups and SW Asia, closely joined to Europe and well separated from the Asian cluster of SE Asia/Australasia, Madagascar, and North/East Asia.

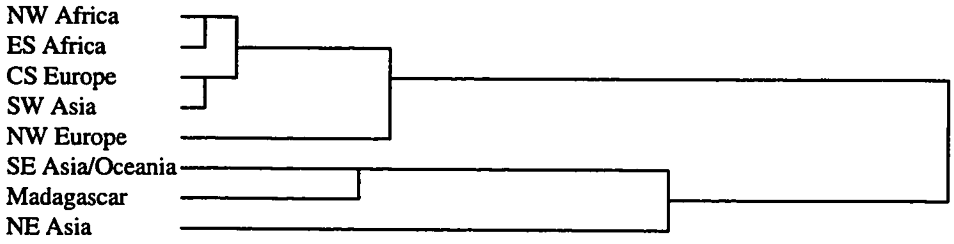


Figure 4.10. Dendrogram from squared Euclidean distance, average linkage analysis of central and lateral incisor scores for the eight Region Level II divisions.

The cluster analyses refute the hypothesis that incisor shapes do not distribute in regional patterns, and support results refuting the null hypotheses that the morphologies are the same. Cluster analyses show that regions that are closer geographically show more similar incisor morphologies. Exceptions to regional distributions are not consistent across the separate analyses, indicating that the teeth may be similar in some ways, but are not broadly so considering all aspects of their morphology. Thus, separate regional variants in shovel-shaped morphologies can be identified and studied. Different regions of the world can then be characterized by different kinds of shovel-shaping.

Discrimination and classification

Finally, a discriminant function analysis is applied to the data on incisor morphology to see whether an examination of both central and lateral incisor shapes can provide a useful function for discriminating different populations. Previous analyses have shown that the distributions in these populations are, in most cases, significantly different, but how well can a discriminant function or a set of functions distinguish between regions? Discriminant function analysis has two aspects: a graphic or algebraic description of populations that reduces the data to few dimensions and separates the populations as much as possible, and the classification of other observations into resulting groups (Johnson and Wichern, 1988). The present discussion treats the two aspects separately.

Discrimination

Discriminant function analysis is performed on a total of 923 individuals which had scores for both central and lateral incisors. Results of analysis considering both central and lateral incisor morphologies are presented in Tables 4.25 to 4.27. Mathematical functions are produced which combine scores for the three incisor features for both central and lateral teeth. Two of these functions together account for 93% of the variance in the sample, with $p < 0.01$ (see Table 4.25). A third function contributes an explanation for an additional 3.5% of the variance, and is also significant at $p < 0.01$. Remaining functions produced by the analysis do not substantially increase the amount of variation accounted for, each contributing less than 5% of the remaining variance. The coefficients for the two primary functions are given in Table 4.26 and the correlations of these functions with the variables in Table 4.27.

The first function, or equation, accounts for 81% of the variance in the sample and has high coefficients for each of the central incisor features, with much lower loadings for the lateral incisor features (see Table 4.26). Highest correlations for this function are with the marginal ridges on both the central and lateral incisors (see Table 4.27). The second discriminant function explains an additional 12% of the variance in the sample. This function has moderate loadings for all variables, with the highest loadings again on both central and lateral marginal ridge scores. The highest correlations of the second function are with the lateral tubercles and the central curvature. Together, the first two functions explain nearly 93% of the variance in the sample and both are significant. These two functions are good discriminators or separators of the regions, and the centroids for each region as defined by the functions are good indicators of the average morphologies displayed within each.

Table 4.25. Canonical discriminant functions on central and lateral incisor morphologies.

Function	Eigenvalue	% of Variance	Cum %	Canonical Correlation	Wilks' λ	Significance
					0.6139	<0.001
1	0.4626	80.75	80.75	0.5624	0.8979	<0.001
2	0.0689	12.02	92.77	0.2539	0.9597	0.009
3	0.0200	3.50	96.27	0.1402	0.9790	0.078
4	0.0147	2.57	98.84	0.1204	0.9934	0.413
5	0.0038	0.67	99.50	0.0617	0.9972	0.271
6	0.0029	0.50	100	0.0534		

Table 4.26. Standardized canonical discriminant function coefficients, for Functions 1 and 2.

	Function 1	Function 2
Central Ridges	.8683	.5512
Central Tubercles	-.3214	.3295
Central Curvature	-.4217	.4308
Lateral Ridges	.1713	-.3738
Lateral Tubercles	-.0498	.4122
Lateral Curvature	.0295	.2199

Table 4.27. Pooled within-groups correlations between discriminating variables and canonical discriminant functions.

	Function 1	Function 2
Central Ridges	.8350	.4985
Central Tubercles	-.1329	.5067
Central Curvature	-.3349	.6046
Lateral Ridges	.5161	-.0047
Lateral Tubercles	-.1265	.5133
Lateral Curvature	-.1236	.3838

A graph showing "territories" for each region as defined by the first two discriminant functions, and ignoring the contribution of the remaining functions to the discrimination of groups, is illustrated in Figure 4.11. This territorial graph shows the discriminant space occupied by each region. Region 7, East/South Africa is not illustrated as having a separate territory, as it overlaps with the other African division.

Territories shown in Figure 4.11 illustrate graphically some of the results that have been shown throughout the present study. Different regions occupy different areas on this graph due to different incisor shapes. Around the edges of the graph are North/West Africa, Madagascar, North/East Asia, North/West Europe, and Central/South Europe, while in the center with intermediate scores are South/West Asia and Southeast Asia/Oceania. The distribution primarily reflects intermediate morphologies in the latter regions – some development of all characters, but not strongly weighted to any one character.

```
                        Canonical Discriminant Function 1
       -6.0      -4.0      -2.0        .0       2.0       4.0       6.0
          +---------+---------+---------+---------+---------+---------+
C    6.0 +                                   68                        +
a        |                                   68                        |
n        |                                   68                        |
o        |                                   68                        |
n        |                                   68                        |
i        |                                   68                        |
c    4.0 +                                  68                         +
a        |                                  68                       8 |
l        |                                  68                     884 |
         |                                  68                 8844    |
D        |                                  68               8844      |
i        |666                               68              88844      |
s    2.0 +22266666                         68             88444        +
c        |   222226666                     68           8844           |
r        |        222266666                68         8844             |
i        |            222226666           658       8844               |
m        |                 222266666   *  6558    8844                 |
i        |                     222226666*665 5*88844                   |
n     .0 +                         22*2*335* 584*4                     +
a        |                       22222*22335 54                        |
n        |               2222222221111111115 54                        |
t        |       2222222211111111         15 54                        |
         |222222211111111                 1554                         |
F        |1111111                          154                         |
u   -2.0 +                                  14                         +
n        |                                  14                         |
c        |                                  14                         |
t        |                                  14                         |
i        |                                  14                         |
o        |                                  14                         |
n   -4.0 +                                   14                        +
         |                                   14                        |
2        |                                   14                        |
         |                                   14                        |
         |                                    14                       |
         |                                    14                       |
    -6.0 +                                    14                       +
          +---------+---------+---------+---------+---------+---------+
       -6.0      -4.0      -2.0        .0       2.0       4.0       6.0
```

1= NW Europe
2= SC Europe
3= SW Asia
4= NE Asia
5= SE Asia/Oceania
6= NW Africa
7= ES Africa
8= Madagascar

Figure 4.11. Territory graph of regions, mapped by discriminant functions 1 and 2. Numbers indicate regions, the lines defined by the numbers indicate territories.

Classification

Results from discriminant analysis indicate that these functions are strong at distinguishing between regional morphologies. The next question is how successful it is at classifying individuals into the groups from which they came. Shoveling has been used previously as a forensic tool (Hinkes, 1990), but do shovel shapes distinguish between regional groups well enough to be used in such a manner? The null hypothesis is that individuals could not be classified to a source region using incisor morphology.

As each population shows a range of morphologies, regions contrast primarily in frequencies of different morphology. Because there are few regionally unique morphologies, but rather greater and lesser frequencies of different shapes, it cannot be expected that all of the sample would be classified correctly, or that even the majority might be. Therefore, it is not predicted that shoveling would serve well as a forensic tool for individuals.

Since there are eight regions, by chance 13% of individuals will be classified correctly using the discriminant function. The function actually correctly classified 35.43% of the individuals on which it was based. This is a substantial improvement over chance, but is not a classification rate that lends confidence to classifying individuals into regions by incisor shape. Classifications are broken down in Table 4.28 by actual region and the region classified by the discriminant function. The best classification rate overall was for North/East Asians, for which 68.9% of individuals were correctly placed. The worst rate is seen in Southeast Asia/Oceania with only 10.6% of individuals classified correctly.

Table 4.28. Classification results for discriminant function. Actual group membership, by predicted group membership, in percentages.

		Classified Group							
		1	2	3	4	5	6	7	8
	1	**42.1**	17.2	13.8	2.8	8.3	7.6	6.2	2.1
	2	30.5	**20.5**	8.6	4.6	5.2	15.9	8.4	6.3
Actual Group	3	26.7	8.9	**22.2**	5.6	5.6	14.4	5.6	11.1
%	4	2.7	1.4	4.1	**68.9**	6.8	0.0	2.7	13.5
	5	9.6	6.4	5.3	28.7	**10.6**	10.6	10.6	18.1
	6	12.9	13.7	14.5	5.6	5.6	**26.6**	10.5	10.5
	7	28.9	13.2	2.6	5.3	5.3	7.9	**26.3**	10.5
	8	0.0	0.0	9.1	27.3	0.0	0.0	9.1	**54.5**

Frequencies of correct assignment of individuals in bold face.

Most misclassifications place the individual in a neighboring region. For Europeans, the highest fraction is classified correctly, with lower fractions classified as either from South/West Asia or North/West Africa. Error rates for Europeans classified into regions much further away are all extremely low. Similarly, North/East Asians are primarily classified correctly, with lesser proportions classified into the other Asian subdivisions, and very few cases classified into far regions.

Results in Table 4.28 are particularly interesting, as they provide frequencies of cases in each region that show the typical morphologies of other regions. For example, 2.7% of actual North/East Asians were classified as North/West Europeans, showing that the individuals so classified show the common morphology of North/West Europe. Classification results demonstrate extremely well how differences between regions are not in presence or absence of morphologies, but rather in frequencies of morphologies. Each region has individuals which show the typical morphology of other regions. This is especially true of regions which show primarily intermediate shapes; individuals in these regions show a wide range of shapes, but have a unique distribution.

One particularly odd result in examining the classification rates is that very few individuals are classified as belonging to Southeast Asia/Oceania, even those which actually come from the region. This might be because individuals in the region display a large variety of morphologies, or possess a moderate or intermediate morphology, which is not easily classified. The territory map in Figure 4.11 shows this region to fall in the middle of all the others based on its morphology, as well as having a rather small territory of its own. In this position, any morphology that strays from the average for Southeast Asia/Oceania is likely to be classified as belonging in a different region.

Discriminant results suggest that the function does a fair job of classifying the morphologies into regions, correctly classifying a substantially larger number of individuals into the regions they came from than would be expected by chance. But this rate of accuracy is not sufficient to suggest potential forensic use of shovel shapes in identifying the geographic origin of individuals. When classifying into an incorrect region, the function more frequently classifies into a geographically closer region than one further away. No region appears to display a single regionally unique morphology but rather each shows a regionally unique distribution of the morphologies. The functions produced in this analysis allow the separation of regions by means of two algebraic functions incorporating the morphologies seen on these teeth. One may also use these functions to classify individuals. This function does not necessarily classify an individual into the actual region from which it came, but rather classifies the case into the region which shows its morphology at the highest frequency.

Discussion and summary

The primary purpose of this chapter was to address hypotheses of regional difference in shovel shaping, based on the definition of shoveling considering three morphological variants to contribute to the shape. Hypotheses of regional difference were broken down into several subsidiary questions: 1) Can different regional shovel shapes be defined using three characters? 2) Do world regions differ in the incisor shapes displayed? 3) Which morphologies can be used to characterize each region? 4) What are the characteristics of these morphologies? 5) Can regions be distinguished based on incisor shapes? 6) Can the geographic origin of individuals be ascertained with any degree of certainty based on these morphologies?

The preceding analyses show definitively that there are, in fact, several different maxillary incisor morphologies that might be called shoveled. These morphologies can be characterized by the relative contributions of three different variables. Each of these variables distributes in regional patterns, and the three in conjunction can be used to describe individual and primary regional morphologies. In North Asia the regional morphology is the classic shovel-shape, referred to through over a century's work in dental morphology and physical anthropology (Carabelli, 1851), one which exhibits strong marginal ridge development, often developed to extremes, displays very little basal tubercle development and a very straight incisive edge. In South Asia and Oceania, the regional morphology is similar, but not as striking, with less pronounced marginal ridges, slight lingual tubercle development, and some mesial-distal curvature.

Madagascar, in all analyses, shows the morphology predicted by its population history. This island was populated by groups originating in Indonesia with some East African mixture (Vérin, 1986) and its incisor morphologies display this heritage. The morphology observed in Madagascar is typically not significantly different from Southeast Asia/Oceania or North/East Asia, while it is from both African subdivisions. Malagasy teeth show moderate marginal ridge development, slight tubercles, and some curvature of incisor. They are, admittedly, a little "Africanized" while retaining their Asian heritage.

Both subdivisions of Africa show similar morphologies, emphasizing curvature and tubercle development rather than marginal ridge development. European morphology, on the other hand, displays light development of both curvature and marginal ridges, and lesser tubercular development. South/West Asia displays a morphology intermediate between all the others. This shape has some development of all three features, but does not emphasize any single one.

The distributions of incisor shapes found in the present study are similar to those found in previous studies, although there are small differences in frequencies of morphologies between this study and others (compare Tables 2.2 to 2.25 and Tables 4.10 to 4.15). Marginal ridge scores in the present study, as in previous studies, are highest in North Asia, and lower in all other regions. However, results of the present study show overall higher rates of classic shoveling for African populations than did previous studies, as well as greater resolution of differences between Asian populations. Frequencies for tubercle development in the present study are very different from those found in previous studies, primarily due to the different standards applied. Results are mostly incomparable. Curvature scores are comparable, as they are measured by the same standards and show very similar results. The African populations are the most curved and the Asian, the least. Overall, frequencies of both marginal ridges and curvature are consistent with frequencies found in other studies. The differences between frequencies are, for the most part, minor, and reflect contrasting methodology; the patterns of difference, however, are the same.

Each region shows a range of morphologies, the main difference between regions being in the distributions of the variants. If one looks at a single aspect of these shapes, incisor morphologies tend to grade into one another, but when looking at all three morphologies, and both central and lateral incisors, the distributions of shapes within each region is unique, and the typical morphology is easily defined. This conclusion is evident from the results of the discriminant function analysis. Each region has a territory in discriminant space where individuals from that region are more likely to fall. Not all individuals of that region will fall within that territory, and not all the individuals within that territory will originate from that region. Discriminant territories encompass only the characteristic morphologies of a region, not all the variants. Thus, while the assignment of unknown individuals to a region is not terribly accurate, the functions do at least, assign individuals well within an area of the world. If an individual is placed in an incorrect region, it is more likely to be a neighboring region than one at great distance, supporting the inference of a regional, or clinal distribution of features. Populations, or samples, are more confidently classified using discriminant analyses than individuals are.

The results of this chapter suggest, however, that there are few regionally unique morphologies. Shovel-shaping, in the classic sense, is not restricted to Asia, it is simply more frequent there. The average shapes seen in Europe or in Africa are not unique to those regions, but merely predominate; the same shapes can still be found elsewhere. Because of variation, it is difficult to classify an individual into a regional group with any degree of certainty. Assuming a single tooth to show the average morphology of its population yields assignment to its proper region less than half the time.

Overall, analyses of modern incisors show that shoveling is a complex character, composed of the relative contributions of three morphologies: marginal ridges, lingual tubercles, and curvature. Shoveling shows regional differences in distribution and populations can be differentiated based on these shapes. With the regional significance of incisor shoveling determined, the next questions are how and when did modern human patterns become established.

CHAPTER V

THE EVOLUTION OF INCISOR MORPHOLOGY AND THE FOSSIL EVIDENCE

For almost as long as researchers have been discussing shovel-shaping and other incisor morphologies, the fossil evidence has been at issue. Fossils have been promoted and demoted from human ancestry based on incisor form, tooth shapes have been used to argue one or the other point of view as regards recent human ancestry, and most recently the utility of shovel shaping in investigating issues of human evolution has been dismissed outright. The present chapter addresses whether incisor shapes contain useful evidence on human evolution, particularly concerning the origins of modern humans. Incisor data have been used for nearly a century to support and refute hypotheses about human evolution. I will address here the validity of such uses as well as the kinds of information which may be gleaned from these data. Both fossil and recent samples will be used to test hypotheses regarding evolution of incisor morphologies and modern human origins.

First it must be asked, should incisor shapes be used at all in such arguments regarding human evolution and modern human origins? It has recently been claimed that shovel shaping is symplesiomorphic and therefore cannot be used in arguments about human evolution (Stringer, 1992; Brown and Walker, 1993; Walker, 1993). Second, even if these shapes change over time, can these changes be traced through examination of the three dimensional morphologies of the teeth? To address this question, samples from the last 10,000 years will be examined to see whether changes within regions can be traced over a short time period. If they can, results would lend credence to the use of the morphologies in tracing changes over a longer time period. If not, it is necessary to ask whether the inability to see changes over the short time span is due to a lack of significant changes in this time span or the inability of the method to see such changes.

After issues of short-term change are addressed, the Pleistocene fossil evidence will be considered. First, are there regional variations within the fossil record when regarded by itself, as there are when the modern data are examined? Second, are there temporal patterns to the distributions of shapes? Within the human evolutionary record, do regional characteristics persist from one broadly defined time period to the next? If both temporal differences and regional differences exist, it is appropriate to ask, can these data can be used to test the two major theories of modern human origins? Each theory has specific predictions about how the fossil incisors should be morphologically similar or different from modern incisors. For example, is there anything unique about the morphologies of the fossils in any region which tie those fossils in an evolutionary sense to the modern people inhabiting those same regions? Taking the contrary view, is there evidence for abrupt change in the tooth morphologies seen in any region, i.e. evidence of an influx of people with a different morphology? Results from these analyses will then be discussed and an attempt will be made to consolidate them into a coherent argument about variation in incisor morphology and its evolution.

Methods

Sample

Two sets of data are used to test predictions about change over time, one for questions of short-term change and one for long-term evolutionary change. The short-term sample consists of several samples from the Neolithic, Bronze and Iron ages, as well as modern samples from the same geographic areas; these are listed in Table 5.1. Short-term samples are primarily from Europe and Southwest Asia, spanning approximately

10,000 years. Scores for each of the individuals in these temporal samples appear in Appendix C.

Table 5.1. List of sources for short-term temporal sample.

Country	Population Designation	Time/ Period	Sample Size
Austria	Hainburg	Bronze Age	45
Austria	Poysdorf	Neolithic	1
Croatia	Sandalja	IronAge	1
Croatia	Veternica	Neolithic	2
Croatia	Vucedol	Bronze Age	4
Croatia	Bugojno	Bronze Age	9
Great Britain	English	Early/Neolithic	4
Great Britain	English	Bronze Age	41
Great Britain	English	Iron Age	7
Hungary		Neolithic	4
Hungary		Bronze Age	7
Hungary		Iron Age	2
Israel	Natufian	Natufian	26
Israel	Neolithic	Neolithic	2
Israel	Lachish	Bronze Age	21
Israel		Bronze Age	5
Italy	Sicily	Neolithic	1
Italy	Etruscan	Etruscan	3
Italy	Sardinia	Ancient	1
Italy	Rome	Ancient	2
Kenya	Elmenteita	Neolithic	4
Malta	Malta	Neolithic	1
Russia	Russia	Neolithic	5

The fossil incisor record is fairly limited and finding incisors that fit the criteria for scoring all three morphologies is a rare event. Attempts were made to include as many fossil incisors as possible. Some of the fossil incisors examined in the course of this study are discussed but not analyzed statistically because it was not possible to score the morphologies with confidence. This was due either to the wear of the tooth or to the inaccessibility of either the original, a good cast, or sufficiently accurate photographs in both lingual and occlusal views. The final sample includes incisors scored on the originals, on casts, and a few scored from photographs when neither the original nor a cast was available. Summary information for the sample is give in Table 5.2 and scores in Appendix D. This sample includes 44 individuals from 16 prehistoric sites, with a time span ranging from the earliest, the Nariokotome boy, at 1.6 million years ago, to the most recent, from Dolní Věstonice from about 25,000 years ago in Europe. Each specimen is described in turn, by region and time, based both on published descriptions of the material and on my examinations of these teeth.

Table 5.2. Fossil sample, including scoring method, and number of individuals represented.

Site	Age	Scoring Method	Number of Individuals	Region
Atapuerca	>300 kya	Photograph†	6	NW Europe
Biache	~150-200 kya	Original	1	NW Europe
Combe Grenal	~50-75 kya	Cast*	2	NW Europe
Dolní Věstonice	~25 kya	Original*	2	CS Europe
Krapina	~100-125 kya	Original	14	CS Europe
Lida-Ajer	~40 kya	Original*	1	SE Asia
Marillac	~50-75 kya	Original	1	NW Europe
Nariokotome	~1.6 mya	Cast	1	ES Africa
Qafzeh	~90 kya	Original	4	SW Asia
Rabat	~500-200 kya	Cast*	1	NW Africa
Sangiran	~500-830 kya	Original	3	SE Asia
St. Césaire	~35 kya	Original	1	NW Europe
Subalyuk	~40-60 kya	Original	1	CS Europe
Vindija	~40-60 kya	Original	2	CS Europe
Yuanmou	~500-800 kya	Cast	1	NE Asia
Zhoukoudian	~460-230 kya	Cast	3	NE Asia

* Scored by MH Wolpoff.

† Photographs in Bermudez de Castro, 1993.

There are a number of other fossils which are examined only on photographs. The Atapuerca dental remains are included in the analytical data set, as both occlusal and lingual views of the incisors were published. For the remainder of those examined on photograph, only a single view was available and therefore confidence is not as high that these are accurate scores (see Table 5.3). These individuals are not included in any of the statistical analyses but their morphology will be addressed in discussions of the fossil evidence when appropriate.

Table 5.3. List of fossil incisors examined only on photographs and therefore not included in analyses.

Fossil/Site	Number of Individuals	Region
Monsempron	1	NW Europe
Qafzeh (5)	1	SW Asia
Skhūl (5)	1	SW Asia
Tabūn (B, B1)	2	SW Asia
Teshik Tash	1	SW Asia
Longgudong	1	NE Asia
Ordos	1	NE Asia
Ting-t'sun	1	NE Asia

From East Africa, the most complete and best preserved individual is the Nariokotome *Homo erectus* boy, KNM WT 15000 (abbreviation for Kenya National Museum, West Turkana), from about 1.6 mya. The teeth of this specimen were described in great detail by Brown and Walker (1993) and were examined on high quality casts for the purposes of this study. This individual has all four upper incisors, all of which are barely worn. The centrals display a lingual tubercle or cingulum with fingerlike projections. The laterals show a slight tubercle, formed at the base of the crown by the two merging marginal ridges. Brown and Walker (1993) describe both central and lateral incisors as "distinctly shoveled." These authors do not mention the curvature of the teeth, which is very slight for the lateral incisors and moderate for the central teeth. Brown and Walker (1993) observe that teeth are very similar to those from Zhoukoudian (ZKD), although the Nariokotome incisors are much larger. This observation is only true in part; as published sizes for the central incisors ZKD 3 and 4 are as wide mesial-distally as those of the Nariokotome specimen, although not as large in buccal-lingual dimensions.

Lateral incisors are also very similar in size between the two sites. Closer examination, however, reveals differences between the teeth of Nariokotome and from Zhoukoudian that include greater development of the lingual tubercle on the laterals of Zhoukoudian, greater marginal ridge development on both central and lateral incisors in Zhoukoudian, and greater curvature of the central incisors in Zhoukoudian. Although these shovels are similar, they are by no means the same and should not be treated as such.

Brown and Walker (1993) also compare the Nariokotome teeth with others from the Pleistocene of East Africa including KNM ER 803, KNM ER 1590, and KNM ER 1813. KNM ER 803 has an extremely worn maxillary right central incisor. It appears to show similar morphology to that of Nariokotome, but is too worn to get an accurate impression. KNM ER 1590 is also compared to the Nariokotome teeth. The upper central incisor from this specimen is wide mesial-distally, and shows a somewhat prominent marginal ridge on the distal edge. The lingual fossa is extremely shallow. This specimen is assigned to *Homo* sp. indet. (Wood, 1991). This morphology is quite different from that seen in Nariokotome. KNM ER 1813 is described by Wood (1991) as showing well developed marginal ridges joining in the lingual cingulum, a morphology extremely similar to that seen in Nariokotome. Not discussed by Brown and Walker, but also from East Africa and also assigned to *Homo* indet. is KNM ER 808, an unerupted maxillary left lateral incisor (the entire crown is developed along with part of the root). Examination of photographs reveals prominent marginal ridges, a very slight lingual tubercle, and light to moderate curvature. The resultant lingual fossa is deep. Wood (1991) takes the shoveling of this specimen to indicate affinities with *Homo erectus*. In addition, from North Africa there is a lateral incisor from Rabat, in Morocco, from between 500 and 200 kya (Saban, 1975; Day, 1986). This tooth shows heavy marginal ridges and curvature, and a well developed tubercle.

South/West Asia provides a fair sample of fossil incisors, from the sites of Qafzeh and Tabūn. There are other incisors from this region but they are, for the most part, too worn to be scored, or even examined, for details of morphology. The Qafzeh sample consists of several individuals (Qafzeh 4, 9, and 10) while photographs of the two incisors from Tabūn are examined but not scored. The Qafzeh incisors show light to moderate marginal ridges, very slight curvature, and some light tubercle development. There are two incisors from Tabūn (B and B1) which show extremely heavy marginal ridges, large tubercles, and moderately curvature.

The North/West European fossil sample includes specimens from Atapuerca, Marillac, Biache, Combe Grenal and St. Césaire. Other individuals with incisors from this region that were not scored in the course of the present study include Monsempron, La Quina, and Le Moustier. Marillac, Biache, and St. Césaire have yet to be formally described, and therefore individual descriptions cannot be given here. The earliest material comes from the site of Atapuerca, in Spain, and the site of Biache, in France, both so-called pre-Neandertals. The Atapuerca material is some of the earliest human material found in Europe. This material is said to date to the Riss glaciation, greater than 200 kya (Bermudez de Castro, 1993). The French pre-Neandertal, Biache, has a slightly later dater in the Riss, between 159 and 196 kya (Aitken *et al.*, 1986). Teeth from both Atapuerca and Biache have a very robust or very shoveled incisor morphology with heavy marginal ridges, large tubercles and moderate curvature. Later material in North/West Europe includes Neandertals from the sites of Marillac, Combe Grenal and St. Césaire, all in France. Specimens from these sites show strong development of all three incisor morphologies. Marillac derives from the latest Mousterian, between the Würm I and Würm II glaciations, approximately 75-50 kya (Vandermeersch, pers. comm.); St. Césaire is from Châtelperronian deposits, between 30 and 35 kya (Day, 1986).

The Central/South European sample includes incisors from Krapina, Subalyuk, Vindija, and Dolní Věstonice. Krapina, in Croatia, dated to between 100 and 125 kya, provides an extremely large sample of incisors from fourteen individuals. These teeth are very robustly built, with large tubercles and marginal ridges, and very heavy mesial distal curvature. Another Neandertal incisor is from a child at the Hungarian site of Subalyuk; this tooth shows strong development of all three incisor morphologies, although it is less curved than is typical at Krapina. Two incisors, one central and one lateral, are known from Aurignacian levels at Vindija (specimens 289, 290) in Croatia. The central incisor shows a moderately developed lingual tubercle and marginal ridges, and strong curvature. The lateral incisor has a very strong lingual tubercle, expressed as nearly an independent cusp, heavy marginal ridges, and is very curved. Finally, the Upper Paleolithic is also represented by individuals from the Pavlovian site of Dolní Věstonice (numbers 14, 15) in the Czech republic. These teeth show slight marginal ridges, moderate lingual tubercles and moderate curvature.

The North/East Asian sample include two central incisors from Yuanmou and a small sample from Zhoukoudian. The Yuanmou incisors, from between 500 and 800 kya (Wu and Wang, 1985), show slight marginal ridges, slight curvature, and moderate tubercle development. Central incisors from Zhoukoudian, from between 460 and 230 kya (Wu and Dong, 1985), show moderate marginal ridges, lingual tubercles, and some curvature. Lateral incisors show marginal ridges and slight curvature but no tubercle development. Unscored incisors include ones from Longgudong cave, Ting-t'sun, and Ordos. These teeth show moderate to heavy marginal ridges but little tubercle development or curvature.

Incisors from Southeast Asia/Oceania include several from Sangiran, from between at about 500 and 830 kya, and a single incisor from the Sumatran cave of Lida Ajer, at about 40,000 ka (deVos, 1983; 1985). The Sangiran central incisors have moderate marginal ridges, tubercles, and moderate curvature; the laterals are heavily curved, with moderate marginal ridges and tubercles. The incisor from Lida Ajer is straight, with moderate marginal ridges, and no tubercle.

Analysis

Examination of changes through time follow the same principles as analyses of differences across space, but with an additional variable of interest. Instead of examining morphological variation simply in a spatial construct, both time and space are variants of interest. First, tests of short-term temporal change within regions are presented, then differences are examined across the middle to late Upper Pleistocene fossil record. Predictions are made about the morphologies seen in the fossil record based on the two major theories of human evolution and tested. All statistical analyses are performed using SPSSWIN©, version 5.02 or version 6.0.

The fossil record of hominid incisors, as shown above, is scant, and not all available incisors can be used in a study of the present sort. Sample size can be a particular problem since, as pointed out above, shoveling varies between populations not by presence or absence of morphologies but rather by the relative frequencies of the shapes. However, each modern geographic region does show typical morphologies, and if we treat the fossil samples as typical for their populations, it is possible to use these data to address questions about the relationships of fossils to one another and to modern peoples.

Due to small sample sizes, for statistical analyses to have any descriptive power, it is necessary to assume that the few data available are representative of the morphology displayed by their populations. This assumption is often made with regard to fossil human data, for if we did not make it, we would rarely be able to say anything about human evolution. Once the assumption of representation is accepted, statistical analyses may be used to describe the data. All results, however, must be taken as hypotheses about evolution that should be tested and retested as more data become available. Also, due to the limitations of the sample, many of the results presented are limited to interpretations of patterns of change without statistical support.

Shovel shaping as a symplesiomorphic character

It has recently been claimed by several authors that the character of shovel shaping is primitive for *Homo sapiens* and therefore use of this character to connect populations or populational histories in invalid (Brown and Walker, 1993; Stringer, 1992; Walker, 1993). In all likelihood, Walker (1993) and Stringer (1992) are referring specifically to the development of the marginal ridges of the tooth, the classic definition of shovel shaping. In order to accept a designation of symplesiomorphy, it is necessary to believe several things regarding evolution and symplesiomorphic characters.

Determination of symplesiomorphy for a trait is often determined by geological precedence. The earliest hominid included in these studies is the *Homo erectus* specimen from Nariokotome, East Africa. This individual shows central incisors with moderate marginal ridges (stage 2), a moderate tubercle (stage 2), and light curvature (stage 2). The lateral incisors show moderate marginal ridges (stage 2), a light tubercle (stage 1) and very slight curvature (stage 1). This morphology may be the primitive state, but is not the morphology displayed by Neandertals nor the classic shoveling that appears in modern humans. Classic shovel shaping, the emphasis of marginal ridges, without the development of either marginal ridges or curvature, is widely different from the morphology displayed by this *Homo erectus* individual, as are the morphologies displayed by *Homo erectus* at Zhoukoudian and Sangiran, and the shapes seen in any of the Neandertals. If early African *Homo erectus* is taken as the primitive state, then all later specimens must be considered derived because they show a different morphology. If geological precedence is used to determine the primitive condition, shovel shaping still may not be dismissed as useful for sorting out the relationships of fossil and recent humans.

Second, claims of symplesiomorphy for shovel shaping presuppose that populations show distinctive character states. It has been shown in the present study that the character of shovel shaping is one that appears in all populations today, simply in different frequencies. It is impossible to characterize a population or region as showing a single morphological type, and therefore a primitive or derived condition.

In a similar vein, Stringer (1992) claimed that the presence of high frequencies of shoveling in Mesolithic North Africans from the sites of Wadi Halfa and Jebel Sahaba, in the Sudan, indicated that shovel shaping did not show regional significance and that it was likely a primitive character. He cited the frequency of shoveling in these two populations as being greater than 70%. Actual frequencies of different shoveling categories are presented in Table 5.4. For the categories semi- and shovel together, the frequencies for these populations are actually less than 30%. The remainder of the small samples show either trace or no shoveling (Frayer *et al.*, 1993). In other morphologies, the teeth from Wadi Halfa are also reported to show some basal tubercle development (Greene *et al.*, 1967). Overall, teeth from these sites resemble modern Africans more than they do either modern Asian morphology or the primitive condition, as manifested by Nariokotome.

Table 5.4. Shoveling frequencies for Wadi Halfa and Jebel Sahaba, as originally reported.

	N	None	Trace	Semi	Shovel	Reference
Wadi Halfa	9	22.2	55.6	11.1	11.1	Greene and Armelagos, 1972
		-	+	++		
Jebel Sahaba	7	28.6	42.8	28.6		Anderson, 1968

It is not clear that claims that shoveling is symplesiomorphic accurately reflect the distribution of the morphology in its complexity. These claims result from a simplified definition of shoveling. The variation seen in shoveling cannot be summarized by saying that all Asians show the primitive condition, since they are not all like Nariokotome in their morphology, and if frequencies are used it must be clear that the frequencies being compared are similar.

Short-term analyses

Short-term changes in morphology (short-term meaning change within approximately the last 10,000 years) are examined by dividing the time period into categories and looking for significant differences in three-dimensional morphologies from one time period to the next. A multivariate analysis of variance is used to test the hypothesis that there is no variation across these time periods in incisor morphology. The alternate hypothesis is that regions show differences from one period to the next. Univariate analyses of variance are used to test for difference in individual incisor characters over time. For these short-term time analyses, the period from the Neolithic to the Recent is broken into four subdivisions: Neolithic, Bronze and Iron ages, and Recent. Region Level II divisions (as shown in Figure 3.1) are used to divide the sample spatially.

For central incisors, overall, there is a significant difference ($p=0.024$) between samples from the four time periods. The greatest contribution to the observed differences are in scores for ridges ($p=0.021$) and tubercles ($p=0.041$), but not for curvature ($p=0.382$). For the lateral incisors, no temporal differences were significant, either with all features considered together or with each character considered independently (all p-values > 0.15). Results for the central incisors refute the hypothesis of no change through time, while the lateral incisors fail to do so.

These results, however, are for all regions together. Time differences can be further examined within regions. Two regions provide sufficient short-term time depth to examine the distribution of incisor morphologies in detail: Europe and South/West Asia. Within Europe as a whole, significant differences are not seen for either central or lateral incisors across time. The same is true for the countries within the region. However, although they may not be significant, there are differences between the time periods as can be seen in Figure 5.1. Average scores for each region and time are given in Table 5.5. In some cases there is no consistent pattern to the differences but in other cases there is. For example, curvature of both central and lateral incisors decreases slightly from the Neolithic to recent peoples. For the central ridges the two later periods have greater average scores for marginal ridges than do the two earlier; for the lateral incisors, the Bronze and Iron Ages show higher average ridge scores, while the Neolithic and Recent samples are very similar in this character. Tubercles scores do not show any consistent pattern over the time periods. Overall, all three characters appear to lessen in degree of development over time, although there is only slight consistency to these patterns.

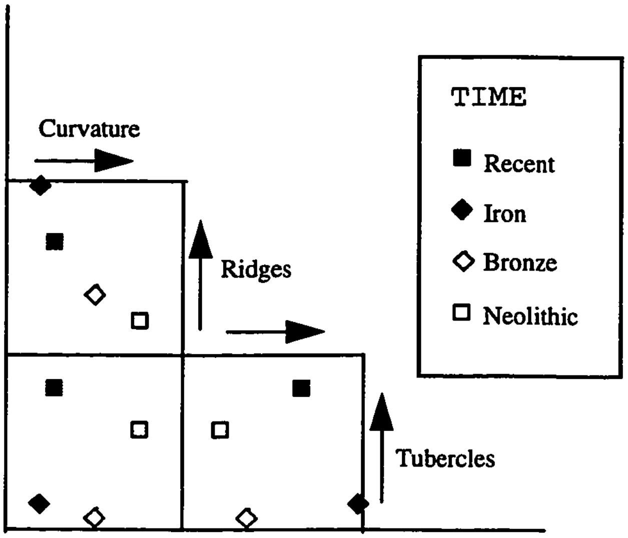


Figure 5.1. Matrix scatterplot of European central incisor scores. Each square provides the scores for two of the three incisor characters. Axis labels are listed on the diagonal; increase in scores for each axis is indicated by the arrows.

In South/West Asia, there is no significant difference in all central incisor features over time, or for tubercles or curvature considered independently. Central incisor marginal ridges, however, are significantly different between the time periods (p=0.034). The lateral incisors show significant (p=0.032) differences across the time periods in a multivariate analysis, but only marginal ridges are significant considered separately (p=0.043). Table 5.6 provides average scores for each character in South/West Asia region, showing that there is less marginal ridge development in the later samples than in the earlier. There is also less curvature of the lateral incisors and less tubercle development of the central incisors, although these differences are not significant.

Table 5.5. Average scores for incisor characters over time in Europe.

	Central			Lateral		
	Ridges	Tubercles	Curvature	Ridges	Tubercles	Curvature
Recent	0.73	0.83	0.81	1.07	0.40	0.71
Iron	0.89	0.56	0.78	1.33	0.22	0.78
Bronze	0.57	0.53	0.90	1.19	0.33	0.78
Neolithic	0.50	0.73	1.00	1.06	0.28	0.83

Table 5.6. Average scores for incisor characters over time in Southwest Asia.

	Central			Lateral		
	Ridges	Tubercles	Curvature	Ridges	Tubercles	Curvature
Recent	0.91	0.73	1.00	0.62	0.24	0.93
Iron	0.71	0.57	1.00	0.86	0.43	0.86
Bronze	0.73	0.64	1.09	1.13	0.21	0.63
Neolithic	1.45	1.10	0.95	1.13	0.65	1.06

Differences between time periods over the short span of the last 10,000 years would not necessarily be predicted, especially as each time period is only a few thousand years, yet these analyses show that there is at least the potential for tracking small changes of incisor shape within regions over time. Clearest differences in each of these regions are found between the morphologies displayed in the Neolithic and those seen in the recent past. Only a few are statistically significant, but patterns of change are evident. Results lend confidence to the ability to track incisor change through time.

Fossil evidence

The primary impetus for the present study of incisor morphology was the many, sometimes conflicting, statements in the literature regarding incisor shapes in the fossil record and how incisor shapes can or cannot be used in testing hypotheses about human evolution. Researchers have debated the meaning of shovel shaping and the information it brings to human evolution for almost as long as shovel shaping has been discussed at all. Weidenreich (1935,1937) and Adloff (1937) disagreed on the significance of these incisor shapes for evaluating the phyletic position of Neandertals relative to other fossil and modern humans, as well as the phyletic position of *Homo erectus* from Zhoukoudian. Most recently these data have been invoked on both sides of an argument concerning modern human origins. The significance of shovel shaping for human evolution is, however, still unclear.

Regional differences within the fossil record

The first hypothesis tested is whether fossil incisor morphologies vary regionally. Multiregional Evolution predicts that some regional morphologies become established early in human evolution. In this case, regions should be distinguished in prehistory as they are in modern populations. The null hypothesis is that this is not the case, that prehistoric incisor shapes do not differ across regions; the alternative hypothesis is that regional significance is established early and is evident in the fossil record. If incisor shapes do vary regionally in human evolution, an adjunct hypothesis follows, that regions closer geographically should exhibit greater morphological similarities, as is true of the modern human data. These hypotheses can be tested just as modern human distributions were tested for difference between regions and closeness of morphology between populations. All of the fossil data are categorized into one of the Region Level II divisions which are then analyzed by a multivariate analysis of variance (MANOVA) to test the null hypothesis that there is no difference in distributions of morphology scores in each region. Seven of the regions are represented by data: North/West Europe, Central/South Europe, South/West Asia, East/South Africa, North/East Asia, and Southeast Asia/Oceania. However, as the two African divisions are not significantly different in their three dimensional incisor morphologies, and there is such a small sample, they will be treated as one for these analyses. Table 5.2, the list of the fossil sample, includes regional designations for these data. All except Central/South Europe, which includes the large sample from Krapina, have small sample sizes. With such small samples, statistics do not have great descriptive power; only with the assumption that the few fossil incisors are representative of the population from which they come can these analyses be meaningful.

For the central incisors, the MANOVA of all morphologies indicates that regions differ in overall incisor morphologies ($p<0.01$). However, when individual tests are performed, the only variable that produces a significant difference is curvature ($p<0.01$). For lateral incisors, the MANOVA comparing regions produces a significant difference ($p<0.05$) and again, only curvature remains significant when considered alone ($p<0.01$). Thus, across the Old World in the Pleistocene, regions show different incisor morphology, especially in degree of curvature. Region-by-region comparisons might provide more information about how incisor morphologies distribute.

Results from multivariate analyses of variance appear in Table 5.7. Significant differences can be seen in the overall morphology of samples from North/West Europe and all other regions, and Central/South Europe with all three Asian divisions. No other significant differences are seen in the three dimensional morphologies.

Table 5.7. MANOVA p-values for Pleistocene regional comparisons of central incisor morphology.

REGION	NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania
Central/South Europe	0.48				
South/West Asia	**<0.01**	**<0.01**			
North-East Asia	**0.05**	**<0.01**	0.24		
SE Asia	**<0.01**	**<0.01**	0.61	0.76	
Africa	**0.01**	0.06	***	***	***

*** Sample sizes too small to test

The results for ANOVAs of individual characters in the Pleistocene samples are presented in Table 5.8. Although the two European divisions are not significantly different from one another in central incisor morphology, they differ from other regions in contrasting ways. Both European divisions are significantly different from all other regions but one another in curvature. However, North/West Europe does not otherwise differ from the other regions while Central/South Europe contrasts with South/West Asia in ridges and Southeast Asia/Oceania in tubercle development. A high degree of curvature in particular seems to characterize the Pleistocene European fossils. Table 5.8 also shows that marginal ridge development, which especially characterizes the Asian samples, differs only between North/East Asia and SW Asia, but not from any of the other fossil samples. Africa contrasts in morphology from the European divisions but not from the others.

Table 5.8. ANOVA p-values for Pleistocene regional comparisons of central incisor morphologies.

REGION		NW Europe	CS Europe	SW Asia	North-East Asia	SE Asia/ Oceania
Central/South Europe	R	0.60				
	T	0.18				
	C	0.93				
South/West Asia	R	0.12	**0.05**			
	T	0.81	0.18			
	C	**<0.01**	**<0.01**			
North-East Asia	R	0.63	0.91	**0.04**		
	T	0.42	1.00	043		
	C	**<0.01**	**<0.01**	0.24		
SE Asia	R	0.60	0.41	0.20	0.21	
	T	0.38	**0.05**	0.84	0.27	
	C	**<0.01**	**<0.01**	0.67	0.17	
Africa	R	0.71	0.56	0.49	0.42	***
	T	0.65	1.00	0.69	***	0.66
	C	**0.02**	**0.03**	0.27	1.00	0.33

*** Sample sizes too small to test. Significant (α=0.05) p-values are in bold. P-values are stacked in each cell, for marginal ridges on the first line, tubercles in the middle, and p-values for curvature on the third line.

A three-dimensional scatter plot of fossil central incisor scores is shown in Figure 5.2. In this scatter, although there is a large overlap in the morphologies, some differences between regional samples are apparent. At the top of the scatter the European Neandertal specimens cluster together, all scoring particularly high on curvature. Chinese fossil teeth are on the edge of this group with lesser tubercle and curvature scores, but similar scores for marginal ridge development. The Qafzeh sample displays an interesting distribution, with lower curvature scores than any of the European material but a range of scores for both tubercles and ridges. Very near to the center of the scatter is Nariokotome, the earliest *Homo* represented in the sample. The one individual that seems extremely out of place is the incisor from Lida Ajer in Sumatra. From approximately 40 kya, this incisor displays a shape much more like modern Southeast Asians than like archaic samples.

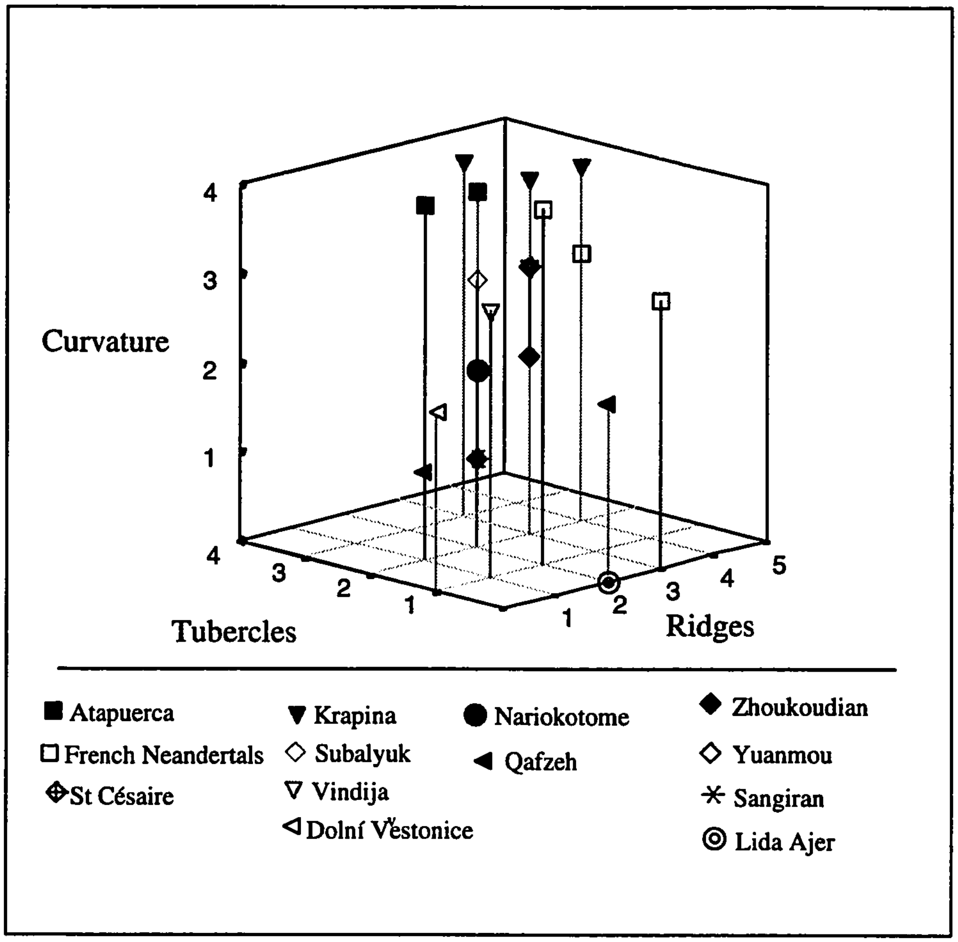


Figure 5.2. Three dimensional scatter of fossil central incisor scores.

Multivariate and univariate analyses are also performed on fossil lateral incisor data. As with the central incisors, many of the sample sizes are extremely small and the assumptions of normal distribution and representation of the average morphology must be made in order for the results of these analyses to have meaning. Table 5.9 presents the results of multivariate comparisons of lateral incisor shapes between regions; only a few of these are significant, and many cannot be calculated due to small sample sizes. The significant comparisons are between the European divisions and both South/West and North/East Asia.

Table 5.9. MANOVA p-values for Pleistocene regional comparisons of lateral incisor morphology.

REGION	NW Europe	CS Europe	South/ West Asia	North-East Asia	SE Asia/ Oceania
Central/South Europe	0.26				
South/West Asia	**0.03**	**0.04**			
North/East Asia	**0.01**	**0.01**	***		
SE Asia	0.27	0.19	0.84	***	
Africa	0.43	0.38	***	***	***

*** Sample sizes too small to test. Significant (α=0.05) p-values are in bold.

Analyses of variance for individual characters are presented in Table 5.10, and results are similar to those from multivariate tests with very few significant regional comparisons. Both European divisions differ significantly from South/West and North/East Asia in curvature; Central/South Europe contrasts with South/West Asia in tubercle development as well. Marginal ridge development does not differ significantly between any of these fossil samples.

Table 5.10. ANOVA p-values for Pleistocene regional comparisons of lateral incisor morphologies

<u>REGION</u>		NW Europe	CS Europe	South/ West Asia	North- East Asia	SE Asia/ Oceania
Central/South Europe	R	0.23				
	T	0.09				
	C	0.37				
South/West Asia	R	0.20	0.41			
	T	0.33	**0.03**			
	C	**<0.01**	**0.01**			
North-East Asia	R	0.94	0.63	0.33		
	T	0.94	0.37	***		
	C	**<0.01**	**<0.01**	***		
SE Asia	R	0.35	0.73	0.27	***	
	T	0.58	0.09	0.50	0.66	
	C	0.49	0.33	0.50	***	
Africa	R	0.61	0.87	0.29	0.67	0.42
	T	0.92	0.23	0.42	0.67	0.70
	C	0.11	0.17	0.77	1.00	0.42

*** Sample sizes too small to test., Significant (α=0.05) p-values are in bold. P-values are stacked in each cell, for marginal ridges on the first line, tubercles in the middle, and p-values for curvature on the third line.

A scatter plot of fossil lateral incisor scores is shown in Figure 5.3. As the statistical analyses showed, there is no clear separation of the different regions, although some differences between regions are suggested by the scatter. The European fossils tend to have larger tubercles and be more heavily curved than the Asian fossils. However, some of the Western European Neandertals do not fit this pattern and show much lower tubercle scores. The Asian samples, therefore, cannot be distinguished by morphology from the less shoveled Neandertals. The Qafzeh and Dolní Věstonice teeth show different morphologies from all the others – a less curved and somewhat less robust morphology. As before, Nariokotome is distant from all other fossils displaying a very lightly developed morphology with light marginal ridges and slight curvature and tubercle development. The significant character in discriminating between individuals is curvature more than any other morphology.

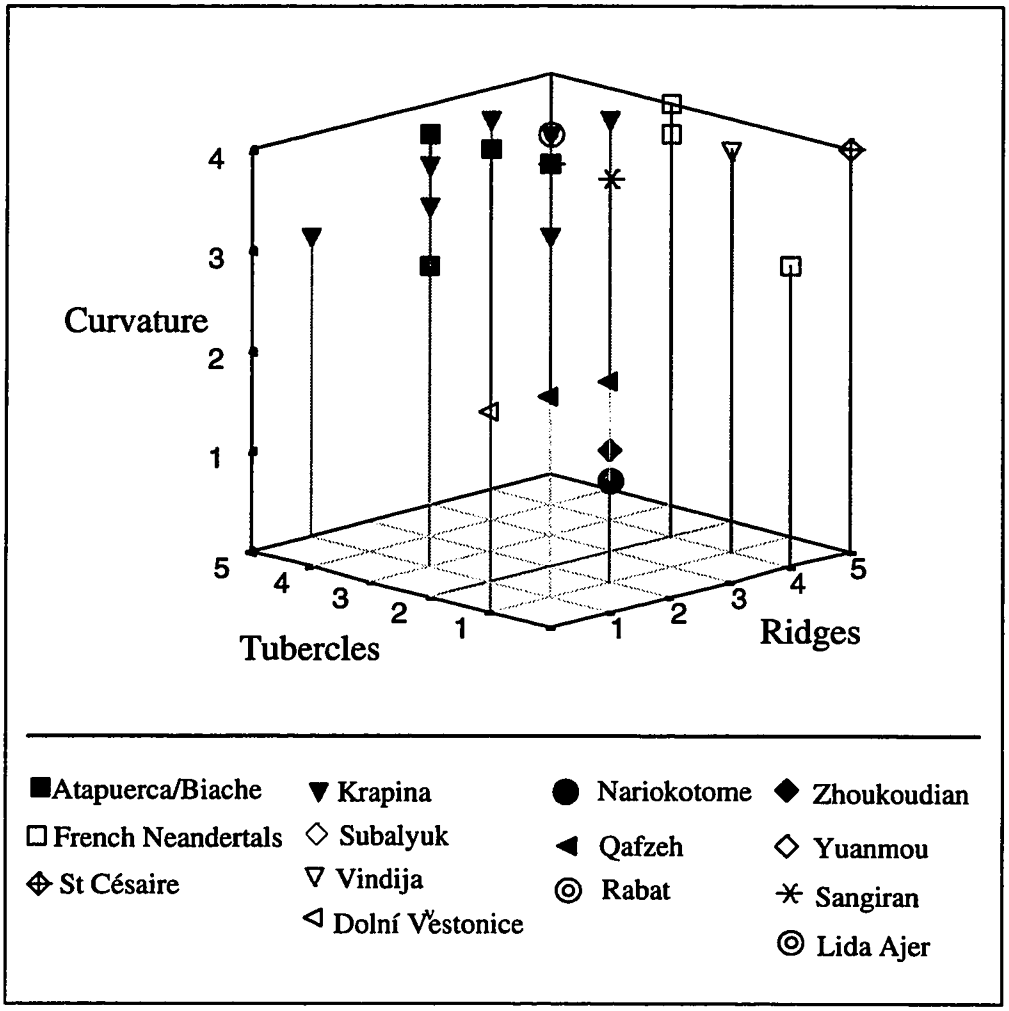


Figure 5.3. Three dimensional scatterplot of lateral incisor scores.

Tests of regional difference are not very powerful due to extremely small sample sizes, but it appears that these data, based on both statistical and graphical evidence, can be used to reject the hypothesis that all fossil incisors display the same morphology. It is not as easy to reject the null hypothesis that geographic regions are all the same. The statistical results are ambiguous regarding geographical differences and the scatter plots do not help resolve the question. However, it does appear that incisors from different regions have contrasting morphologies, whether statistically significant or not. The European incisors, especially the centrals, are more curved than those seen anywhere else.

However, neither marginal ridges nor tubercles seem to differ much from region to region within the fossil record.

Regional differences can be further explored by a cluster analysis of the scores for each region or site within a limited time period. The null hypothesis, that distribution of shapes is not geographical predicts that fossil incisors would not show any geographic pattern in the resultant cluster, while the alternate hypothesis predicts that geographically closer fossils would cluster more closely. A dendrogram for the central incisor scores (Figure 5.4) displays regional clusters. The two groups of European Neandertals cluster the most closely, and separate from all other divisions. Nariokotome clusters most closely with Zhoukoudian and Yuanmou, other *Homo erectus* specimens. Qafzeh and the Southeast Asian fossils form a third cluster, which although not clearly geographic, can be partly explained by the moderate morphologies displayed in these samples. The lateral incisor scores produce a different clustering pattern (Figure 5.5). In this analysis, Sangiran and Lida Ajer cluster most closely with the Western European Neandertals. The remainder of the Neandertals and the Chinese fossils join this group and form a cluster separate from that of Nariokotome and the Qafzeh teeth. There are some elements of regional distribution of morphologies displayed in these data, but nothing conclusive.

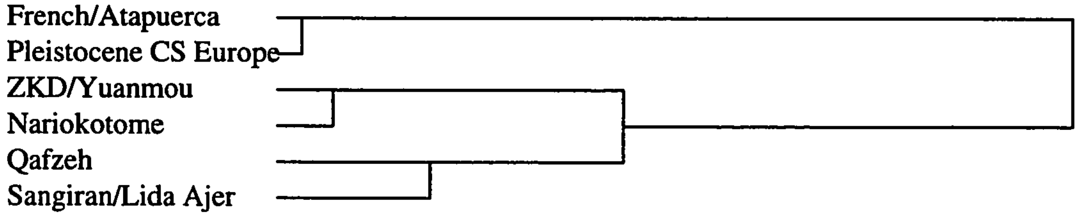


Figure 5.4. Dendrogram from squared Euclidean distance, between group cluster analysis of fossil central incisor scores.

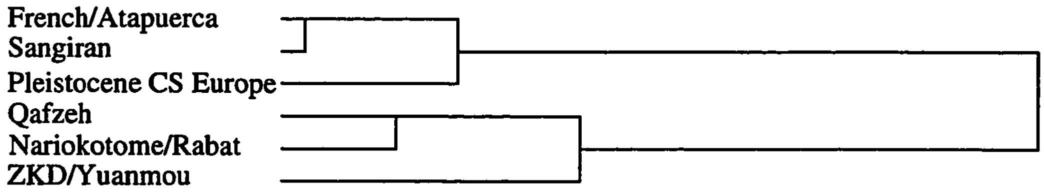


Figure 5.5. Dendrogram from squared Euclidean distance, between group cluster analysis of fossil lateral incisor scores.

Overall, although these data suggest the conclusion that there are, in fact, regional differences in Pleistocene incisor morphologies, there is not enough evidence to refute the hypothesis that geographic regions are uniform. Neither, however, is there enough evidence to refute the hypothesis that they are different. When time is taken out of the equation, there is no clear regional pattern to incisor shapes. There are, however, some consistent differences between regional morphologies that, while not statistically significant, are evident when the data are examined graphically. Differences are evident in the scatter plots for the teeth shown in Figures 5.2 and 5.3. Each region appears to have its own central tendency, but the individual scores overlap. Regional differences in incisor shape are not as clear in the Pleistocene as they are today, but it appears as if modern regional patterns may be beginning to be established. With regard to the theories of modern human origins, the prediction from Multiregional Evolution that the regional component of this morphology should be established early in human evolution is obviously not borne out by these incisor data. It is possible that regional morphologies may have begun to differentiate, but they are not clearly separate and do not show the regional patterns seen in modern humans.

Temporal Differences in Shape

The previous analyses examined shovel shaping in the human fossil record without reference to time, while this section explores hypotheses of change over time within regions. Each of the major theories of modern human origins predicts a different path for differences in incisor shapes within regions through time. Multiregional Evolution might predict that trajectories of change towards the modern condition could be detected within regional samples, each progressive time period changing towards the modern condition, while the direction of this trend would be different in each region. If it is accepted that Nariokotome displays the basal development of the morphology, then we can ask in addition, how do the fossils differ from this basal morphology? Multiregional Evolution would predict that the fossils would contrast with the basal morphology in the same direction of modern populations, although they may not have yet assumed the fully modern morphology. That is, if the modern morphology in NE Asia is straight teeth, with little tubercular development, and heavy marginal ridges, the fossil evidence from the area should progressively step toward this morphology. The same is true for the other regions. The Recent African Origin model, on the other hand, predicts that any regional patterns of change would be interrupted at the appearance of modern humans (Stringer, 1992).

These predictions may be taken as hypotheses for testing using the human fossil record. A time series within each region can be examined to test whether there is change over time or alternatively, an interruption of pattern at the appearance of modern humans. Continuity in several regions would refute Recent African Origin, while interruption of pattern would refute Multiregional Evolution. Not every region provides enough evidence in time depth for such an examination of pattern, but a best attempt will be made. Data from the previous time series analyses is used in order to expand the time depth to include modern peoples.

To test these hypotheses, the morphology of Nariokotome must be known. The central incisors are moderate teeth, with scores of 2 for all three features. This translates to a somewhat curved tooth, with moderate marginal ridge development and a light tubercle with fingerlike projections (as in Brown and Walker, 1993). It is hypothesized that within each region, the intermediate fossils will develop in the direction of the modern sample, from this basal form, with emphasis on the characters which are best developed in the recent peoples and lesser development of the other characters. Following are results of these tests for each region, looking both at the three dimensional morphologies and at the individual characters that compose them.

North/West Europe

The sample from North/West Europe includes pre-Neandertals from Atapuerca and Biache, a Neandertal from Marillac, and St. Césaire, from the Châtelperronian. A scatter plot of the average central incisor scores is shown in Figure 5.6. The lateral incisor scores are illustrated in Figure 5.7. Ignoring Nariokotome for the moment, both the central and lateral incisors show contrasting scores between the Neandertal and modern samples. For the central incisors (Fig. 5.6), the more modern samples all cluster together with extremely low scores for all three characters, while the Neandertals show high scores for all characters. Nariokotome fits squarely in the middle of these samples in three dimensions. The modern European incisor is one with very little development of any of the three morphologies. Since the primitive condition is for some development of all characters, to get to the modern condition, a decrease in all characters over time would be expected.

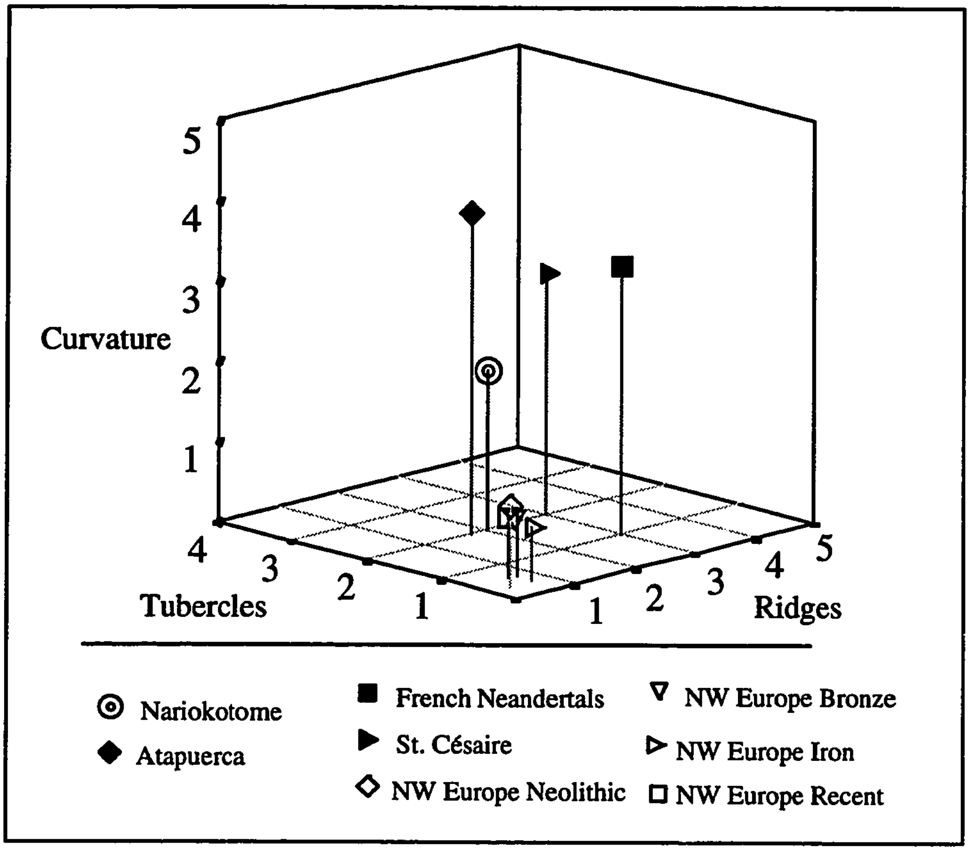


Figure 5.6. Scatter plot of central incisor scores from North/West European time series.

In lateral incisor scores, the French Neandertal and the Atapuerca - Biache scores are very different. The French Neandertal sample shows higher scores for both curvature and ridge development than does the primitive condition; the pre-Neandertal sample, on the other hand, shows a higher score only for curvature. In the other characters, the Atapuerca and Biache lateral incisors have the same tubercle score as the primitive condition, and the marginal ridges are, on average, less developed. The lateral incisors for all the North/West European fossils are extremely different from both Nariokotome and from the modern samples (Figure 5.7). Both Neandertals and pre-Neandertals have more robustly developed lateral incisors than either the primitive condition or the modern, yet this robustness is manifested in different ways. Both are highly curved, yet the French Neandertals have low tubercle scores and high ridges, while Atapuerca and Biache have low ridge scores and high tubercles.

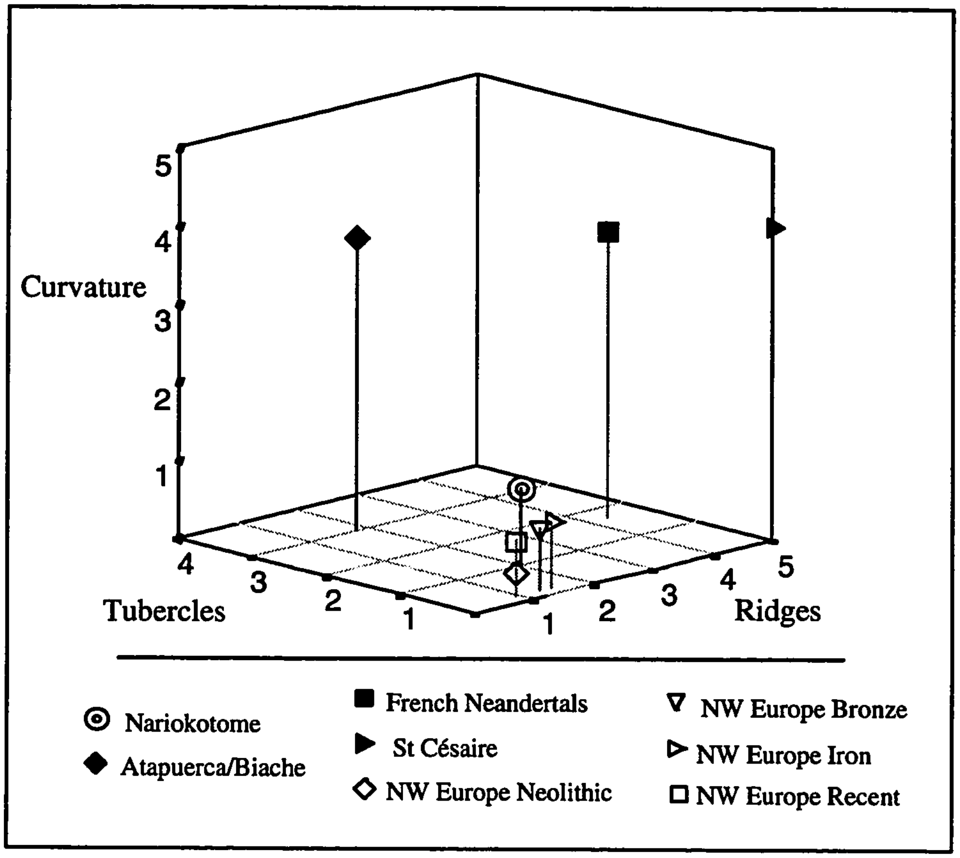


Figure 5.7. Scatter plot of lateral incisor scores from North/West European time series.

Monsempron, Le Moustier, and La Quina are other Neandertals sites which provide incisors although they were not included in the analytical sample. Monsempron, examined by photograph, shows a free-standing cusp on the central incisor, with heavy curvature and marginal ridges. Overall, incisors from all these individuals are very similar to the other Western European Neandertals, with heavy curvature, large lingual tubercles and strong marginal ridge development.

It appears that the Neandertals in North/West Europe do not show a morphological trajectory toward the modern European condition. There is not enough of a sample to be interpreted as a lack of pattern, or a refutation of Multiregional Evolution in this area, but neither can it be taken as support for this hypothesis. The morphologies displayed by the fossils vary from the path to the modern European condition. Both hypotheses stand or fall on what happens in the Upper Paleolithic and since there are no Upper Paleolithic incisors, there is also no support or refutation of the Recent African Origin theory in these data. More data from this area, particularly for early modern humans, is necessary in order to use shovel shaping as evidence in testing hypotheses of either theory.

Central/South Europe

Central/South Europe provides a good testing ground for the hypothesis of change over time as there are early Neandertals represented by Krapina and Subalyuk, the Vindija incisors, the Dolní Vĕstonice material as an Upper Paleolithic sample, as well as Neolithic, Bronze and Iron Age samples. A scatter plot of the central incisor average scores from each time period is presented in Figure 5.8. The earlier and later samples from this area in Europe contrast strongly, but there is also an evident trend to the differences. The most obvious difference from the Neandertals to the most recent samples is the loss in curvature of the teeth. The more modern samples are very straight, especially in comparison to the highly curved Neandertal teeth. There is also a trend for decrease in marginal ridge development and decrease in tubercle development. Of particular note, Dolní Vĕstonice appears to bridge the gap between the Neandertals and the Holocene samples. Vindija falls off the trend line from Krapina to modern groups as it appears that it has less curvature and less tubercle development than Krapina, while lacking decreased marginal ridge development. This trend, however, is not one that originates at Nariokotome. Krapina shows higher scores than Nariokotome on all three characters, Vindija on two characters (curvature and ridges), and Subalyuk on one (curvature). Dolní Věstonice has lower scores for both tubercles and ridges, yet higher scores for curvature.

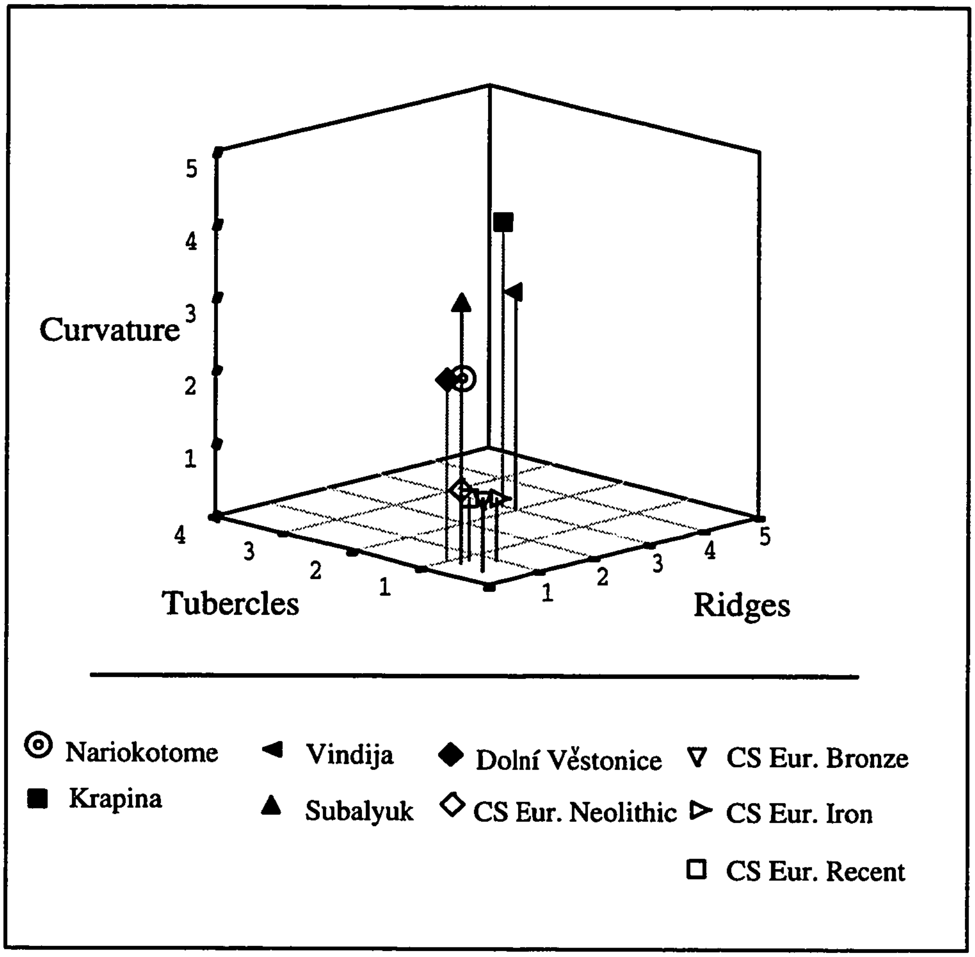


Figure 5.8. Scatter plot of central incisor scores from Central/South European time series.

There are two possible conclusions from data in Figure 5.8. Either there is a continuation of morphologies from an early Neandertal shape through that displayed in the Upper Paleolithic to the modern form, beginning at an incisor morphology unlike Nariokotome, or the Neandertals are, in fact, very different in their morphology. Either of these is plausible. The Recent African Origin model predicts an interruption of pattern, which is not evident, while Multiregional Evolution predicts a continuity from the Pleistocene to the modern samples, a pattern which does describe these data.

A scatter plot for the lateral incisors from Central/South Europe appears in Figure 5.9. The lateral incisors very clearly show that the modern samples show simple morphologies, while the incisors of the Neandertals, as well as Dolní Věstonice, are more heavily built. The Pleistocene and modern teeth contrast primarily in tubercle and curvature scores. The ridge scores decrease as well, but not to nearly the same degree. The lateral teeth do not show a clear evolutionary trend from the Neandertals to the modern samples. This is due in part to the morphology shown by Vindija, which appears as an outlier. Dolní Věstonice otherwise bridges the gap between Krapina and the Holocene teeth. If these two sites were lumped as a single Upper Paleolithic sample, they would clearly fall between the Neandertal and the modern sample. One could plausibly argue a trajectory of change from the morphology seen at Krapina through that seen at Dolní Věstonice to that seen in modern individuals, if one neglects Vindija and does not assume Nariokotome to display the primitive condition.

Recent African Origin is no better supported by these data. In case of Replacement, there should be a pattern of change from the morphology seen in Nariokotome to Dolní Věstonice to the modern sample, which there is not. The lateral incisors neither refute nor support regional continuity in the region, but they can be used to reject the hypothesis of replacement. Dolní Věstonice simply does not fit into the pattern predicted by this theory.

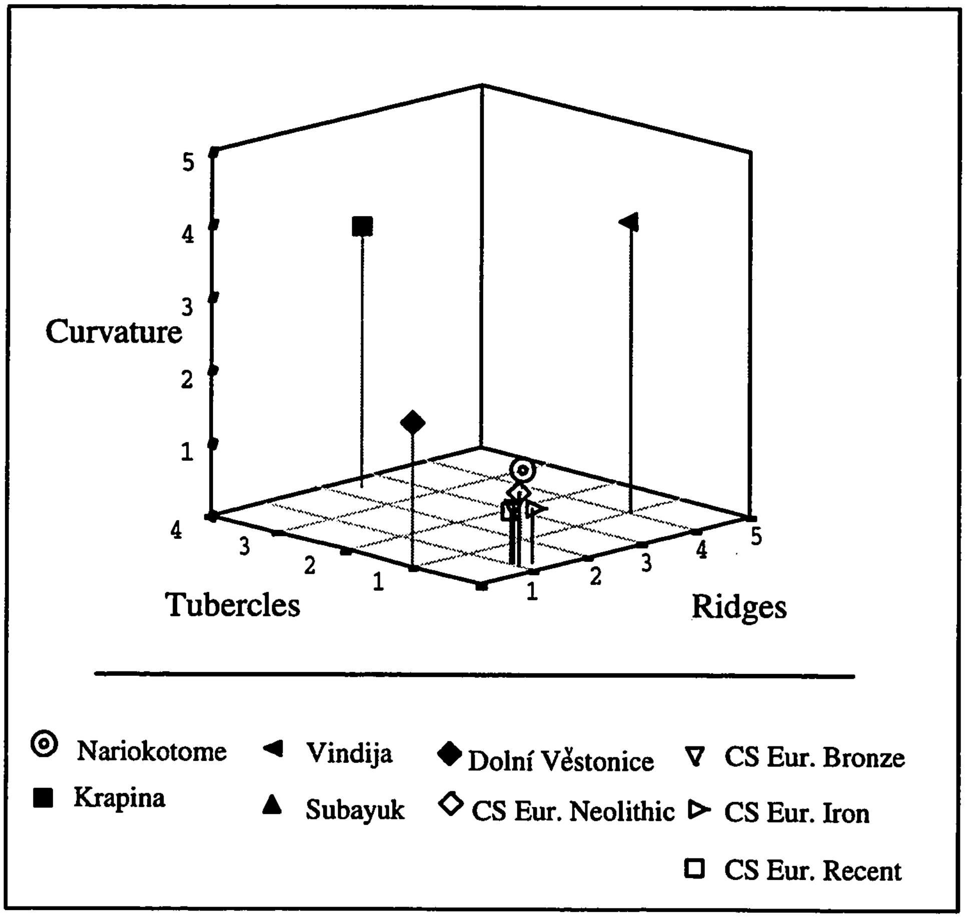


Figure 5.9. Scatter plot of lateral incisor scores from Central/South European time series.

<u>South/West Asia</u>

The South/West Asian sample is sparse, with only Qafzeh representing the fossil populations, and individuals from this site are generally recognized as early modern humans. The scatter plots for this region appear in Figures 5.10 and 5.11 for the central and lateral incisors, respectively. The central incisors from Qafzeh have slightly higher average scores on all three variables than do the modern samples but are otherwise extremely similar to them.

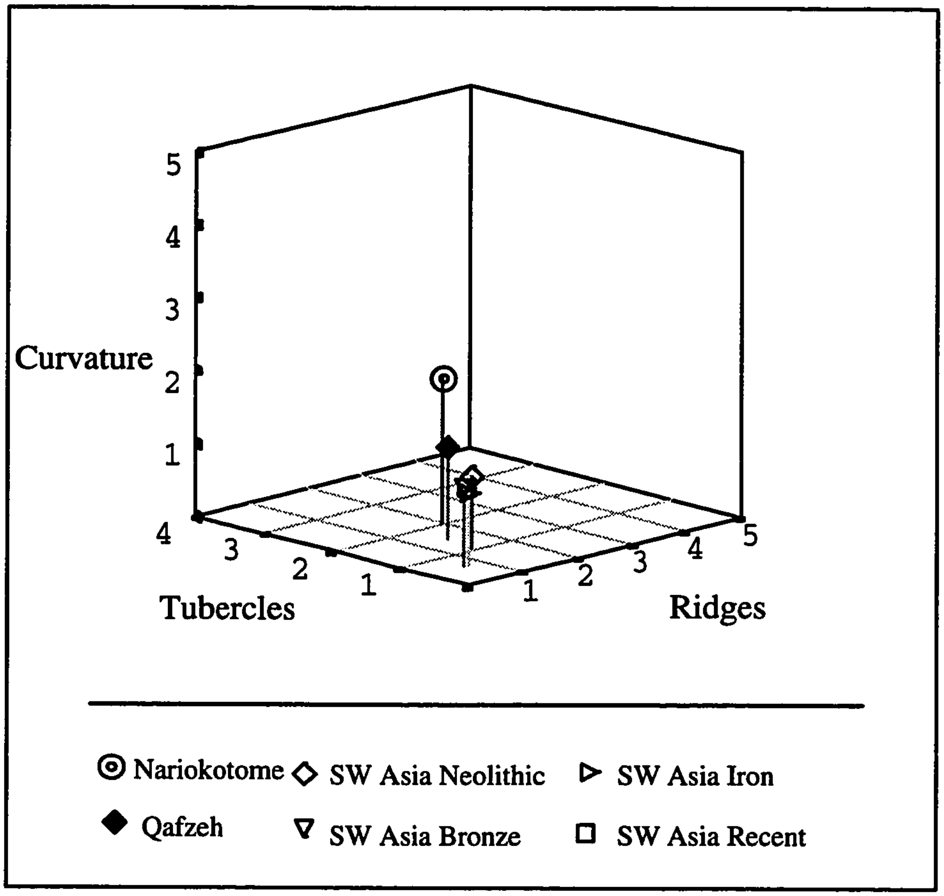


Figure 5.10. Scatter plot of central incisor scores from South/West Asian time series.

The lateral incisors (Fig. 5.11) contrast more strongly with the modern samples, showing higher scores on all variables, particularly in curvature. These fossils are not nearly as robust as the fossil samples from Europe, but they also stand slightly apart from the modern samples. Here, a trajectory of change from the condition shown from Nariokotome through Qafzeh to the modern sample is clear for the central incisors but not for the laterals.

In addition to the teeth mentioned above are incisors from Skhūl and Tabūn in Israel, and the incisors of Teshik Tash, in Uzbekistan. The teeth of Skhūl, an early modern human, are heavily worn but it is evident from what remains that these teeth were shoveled, with moderate marginal ridge development and a lingual tubercle. The teeth from Tabūn, which are often called Neandertal, show heavy marginal ridges and large lingual tubercles, but are very straight, in contrast to the European Neandertals. Teshik Tash, a Neandertal child from Uzbekistan, shows strongest marginal ridge development, with lesser tubercles, and moderate curvature. It shows a morphology between that seen in South/West Asia and that seen in North/East Asia.

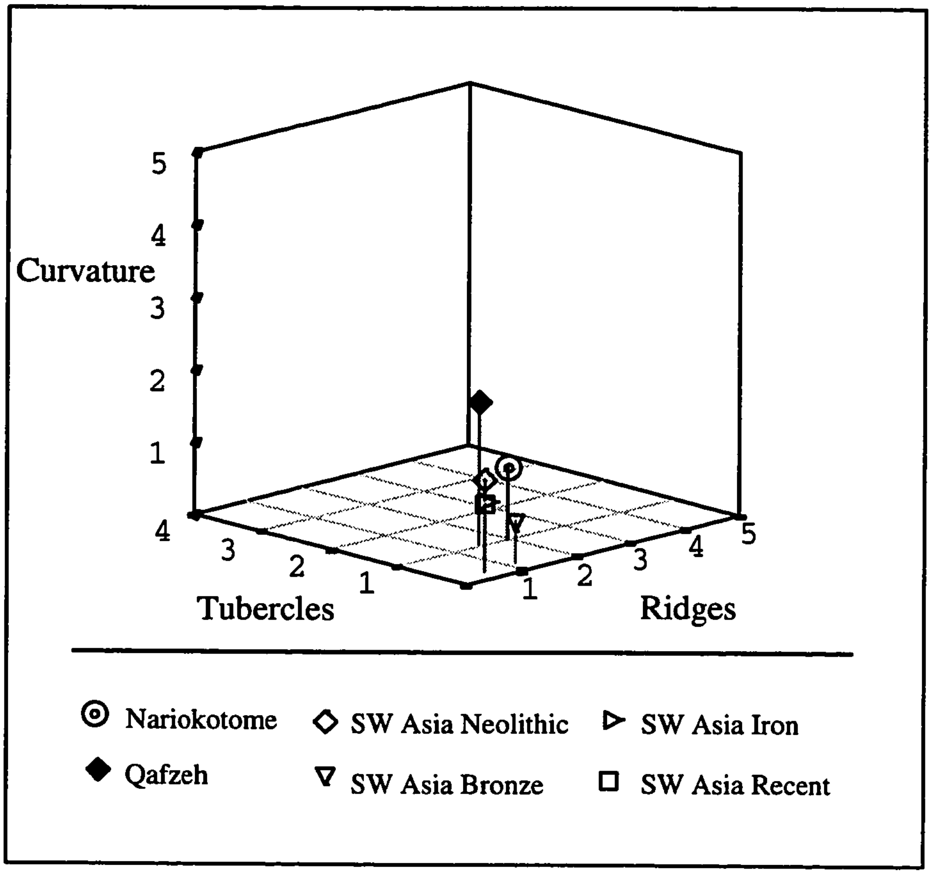


Figure 5.11. Scatterplot of lateral incisor scores from South/West Asian time series.

By either model of modern human origins, if Nariokotome represents the basal morphology from which later shapes derive, there should be a clear trajectory of change from Pleistocene East Africa to the modern condition. A trajectory of this sort is evident in the scatter for the central incisors from South/West Asia, but not for the lateral teeth. If the additional incisors from the region are considered, it becomes even more difficult to interpret. Both Skhūl and Tabūn show more robust morphologies than Qafzeh shows. Teshik Tash varies in the direction of the East Asian samples. Overall, these data for South/West Asia suggest continuity, but cannot be used to refute either model. Continuity in this region, with the present data, cannot be taken as a refutation of Recent African Origin, as Qafzeh is considered modern.

North/East Asia

The North/East Asian sample is particularly interesting, as this region is where the incisor features have most often been used to support Multiregional Evolution. There is some time depth to the fossil sample, although there are not several Holocene samples. Yuanmou provides the oldest material for the area, while Zhoukoudian is somewhat younger. The scatters for this material are presented in Figures 5.12 and 5.13 for the central and lateral incisors respectively. The direction of change predicted by Multiregional Evolution is maintenance of marginal ridge development and a decrease in both tubercles and curvature over time. All three fossil samples show approximately the same tubercle development. For the central incisors (Fig. 5.12) there is no obvious pattern. In comparison to the condition seen in Nariokotome, Yuanmou shows lesser curvature and ridge development and Zhoukoudian greater development of these same two characters. Zhoukoudian does not fall intermediate between Yuanmou and the Recent sample, as Multiregional Evolution might predict. Curvature is greatest in Zhoukoudian, lesser in Yuanmou, and least in the recent sample. Tubercles are about the same in Zhoukoudian and Yuanmou, and are much lower in the modern NE Asians. Where Yuanmou falls out of the pattern is in the marginal ridge score, as it shows a lower score than the modern average.

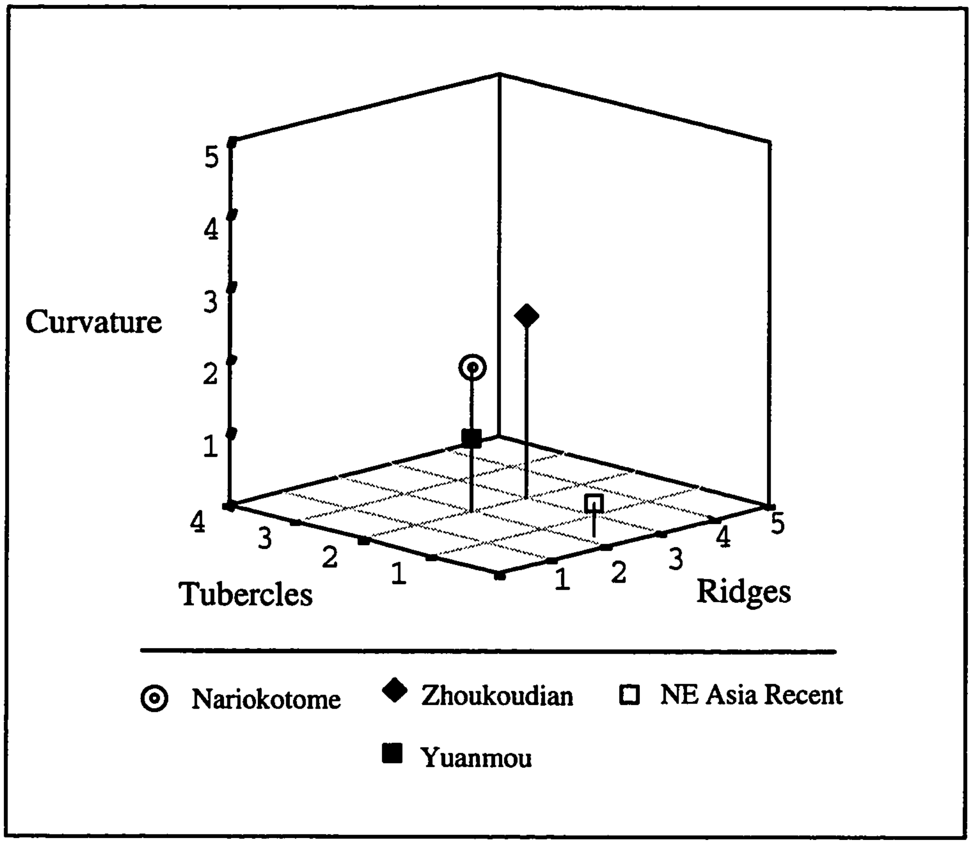


Figure 5.12. Scatter plot of central incisor scores from North/East Asian time series.

For the lateral incisors (Fig. 5.13), there are only two samples represented, that from Zhoukoudian and from the recent sample. The Zhoukoudian incisors show greater tubercle and ridge scores than does either Nariokotome or the modern incisors. Nariokotome and the Zhoukoudian tooth show the same degree of curvature. The average ridge score for the modern sample is higher than that for Nariokotome but less than that for Zhoukoudian. There are simply not enough data here to draw any conclusions about evolutionary patterns.

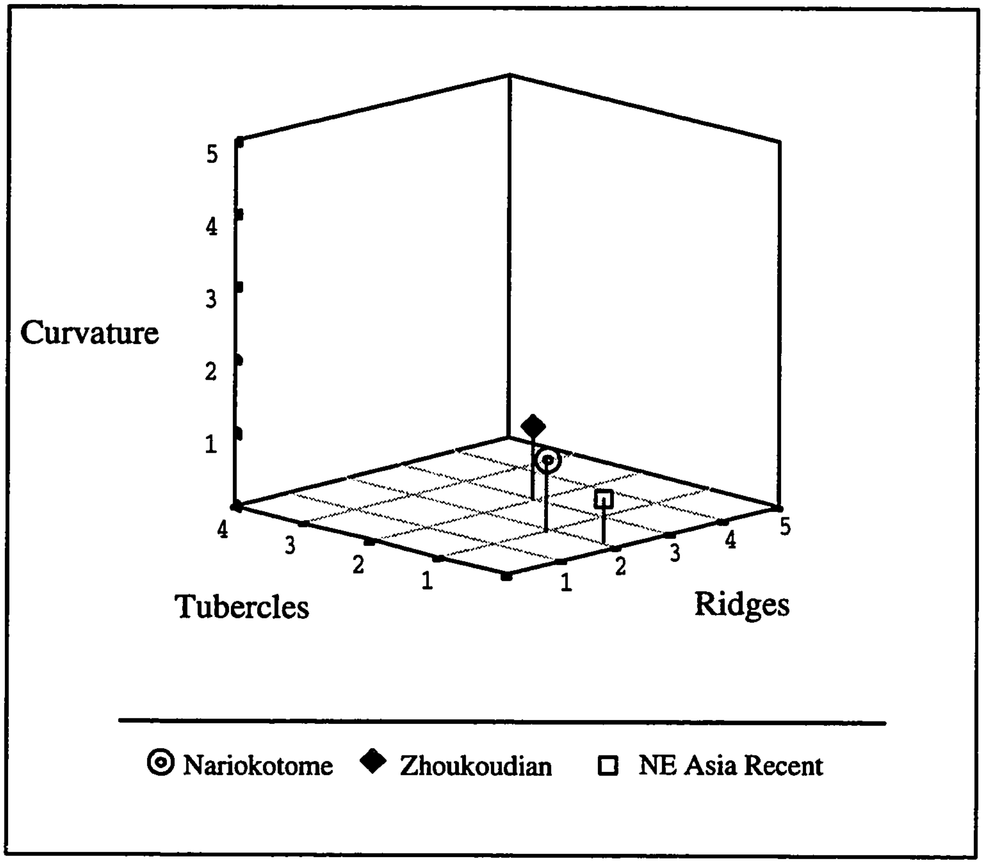


Figure 5.13. Scatter plot of lateral incisor scores from North/East Asian time series.

Additional incisors from North/East Asia include an upper central incisor of *Homo erectus* from Longgudong cave, and from the Late Pleistocene, central and lateral incisors from Ting-t'sun and a lateral incisor from Ordos. The Longgudong incisor is very gracile, with only very lightly developed marginal ridges, a small lingual tubercle, and very slight curvature. The central incisor from Ting-t'sun was not examined in the present study, but the lateral is very like the modern condition, with large marginal ridges, no lingual tubercle and a very straight edge. Ordos, a lateral incisor, also approximates the modern condition, with marginal ridges but neither of the other morphologies expressed.

South/East Asia

The South/East Asian sample provides similar time depth to that from North/East Asia. There is the Sangiran sample, at about 900,000 years ago, Lida Ajer cave at about 40,000, and then the modern sample. Figure 5.14 shows the central incisor scores, while Figure 5.15 shows the laterals. The plot for the central incisors would for a clear time series, if Lida Ajer and modern sample scores were reversed. In actuality, the modern samples shows a common morphology intermediate between that seen in Sangiran and at Lida Ajer with only modest differences between the Sangiran and modern samples.

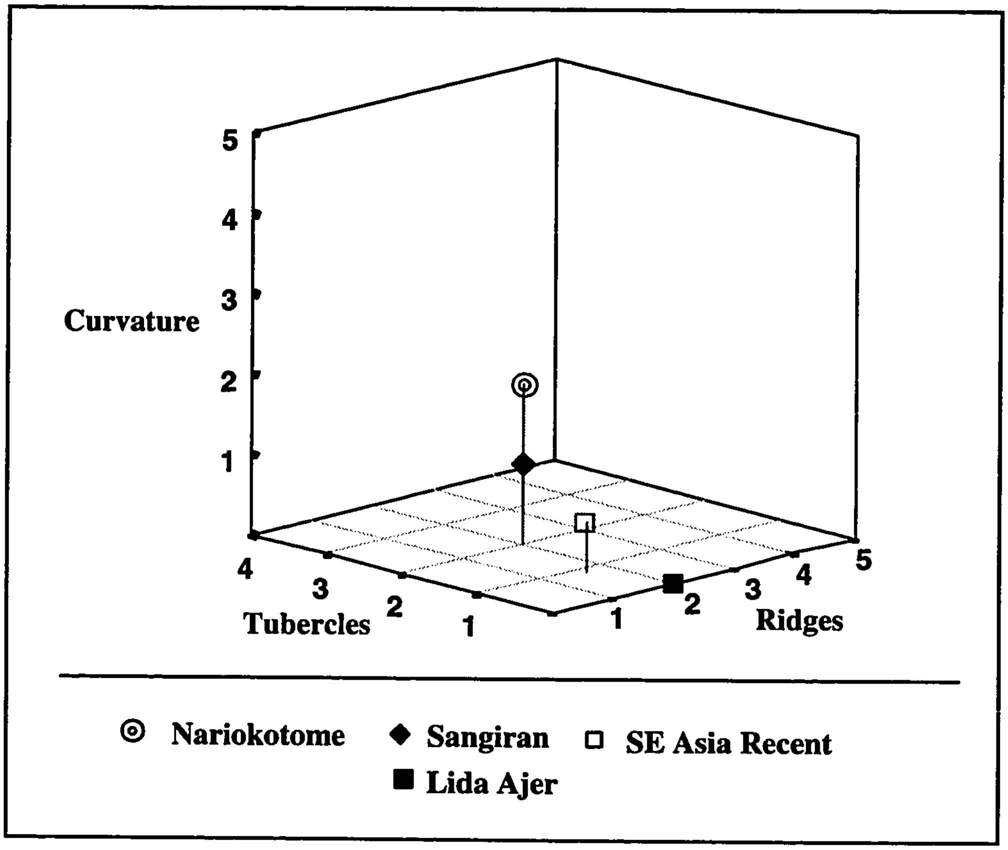


Figure 5.14. Scatter plot of central incisor scores from South/East Asian time series.

As the lateral incisors (Fig. 5.15) are represented by only the Sangiran and the modern samples, it is difficult to say whether or not there is a trend. However, these two samples contrast only in curvature. In both tubercle scores and marginal ridges, the modern sample is only slightly different from the sample from Sangiran. Nariokotome is more like the modern sample in curvature, but bears greater similarity to Sangiran in the other characters, with the same score on marginal ridges and a smaller tubercle score.

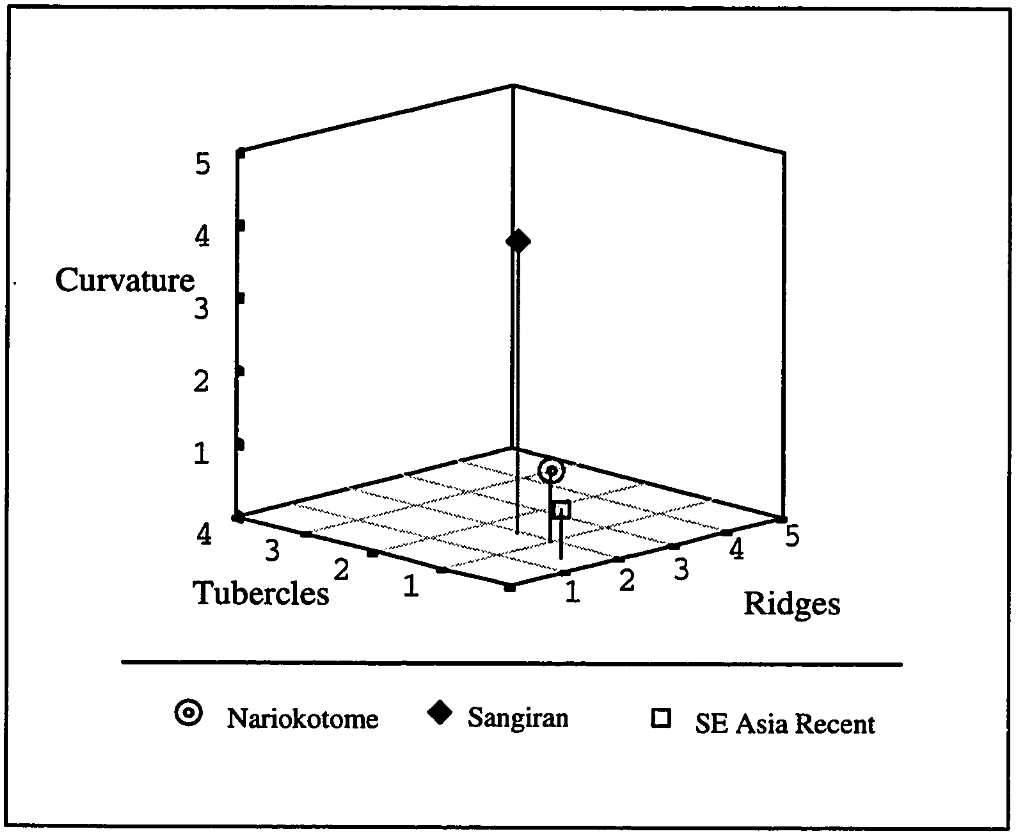


Figure 5.15. Scatter plot of lateral incisor scores from South/East Asian time series.

Africa

Africa is represented in this study only by Nariokotome, a lateral incisor from Rabat, and the Neolithic and modern samples. These are plotted out in Figures 5.16 and 5.17 for central and lateral incisors respectively. For both central and lateral teeth, there is neither a clear differentiation nor a clear pattern to the differences. For the central incisors (Fig. 5.16), the Neolithic sample is the most gracile, with the modern and

Nariokotome identical in two features, and different in curvature. For the lateral incisors, the clearest point is that Rabat is much more robust than either Nariokotome or the recent samples. The robustness of this specimen follows the trend seen in other regions for the Middle Pleistocene specimens to be the most heavily built, with the largest ridges, tubercles, and heaviest curvature. These results allow no conclusive refutation or support of either theory of modern human origins.

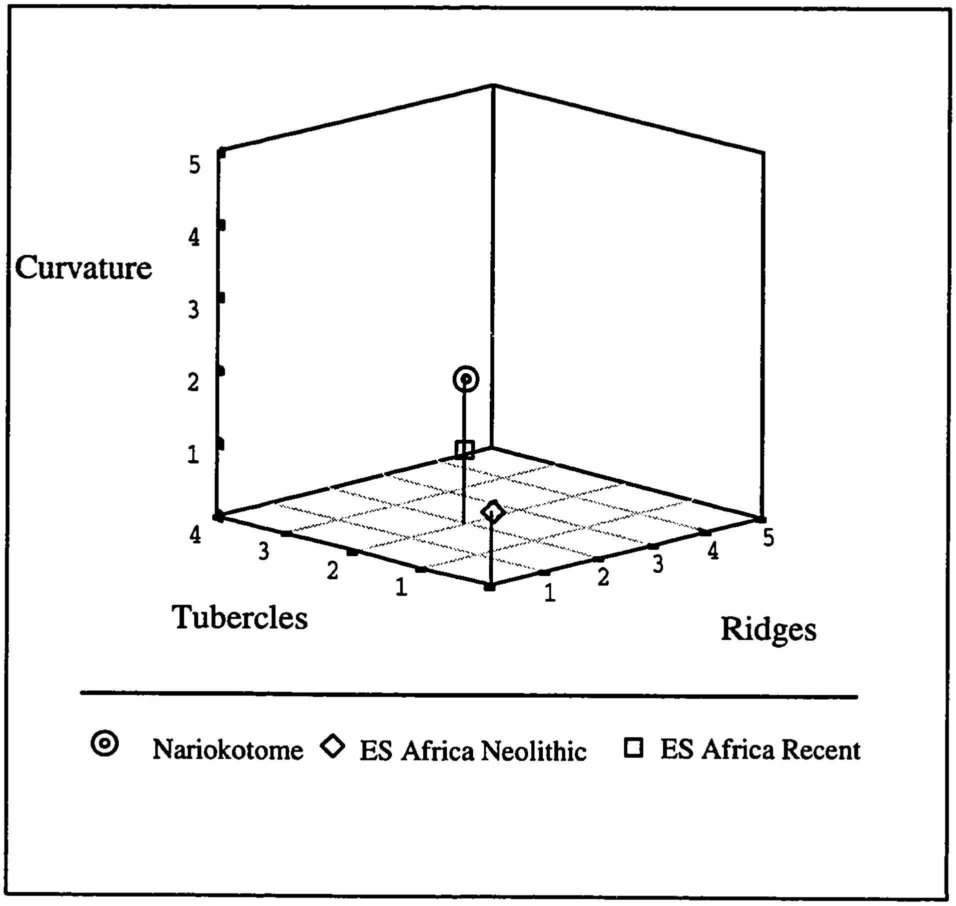


Figure 5.16. Scatter plot of central incisor scores from African time series.

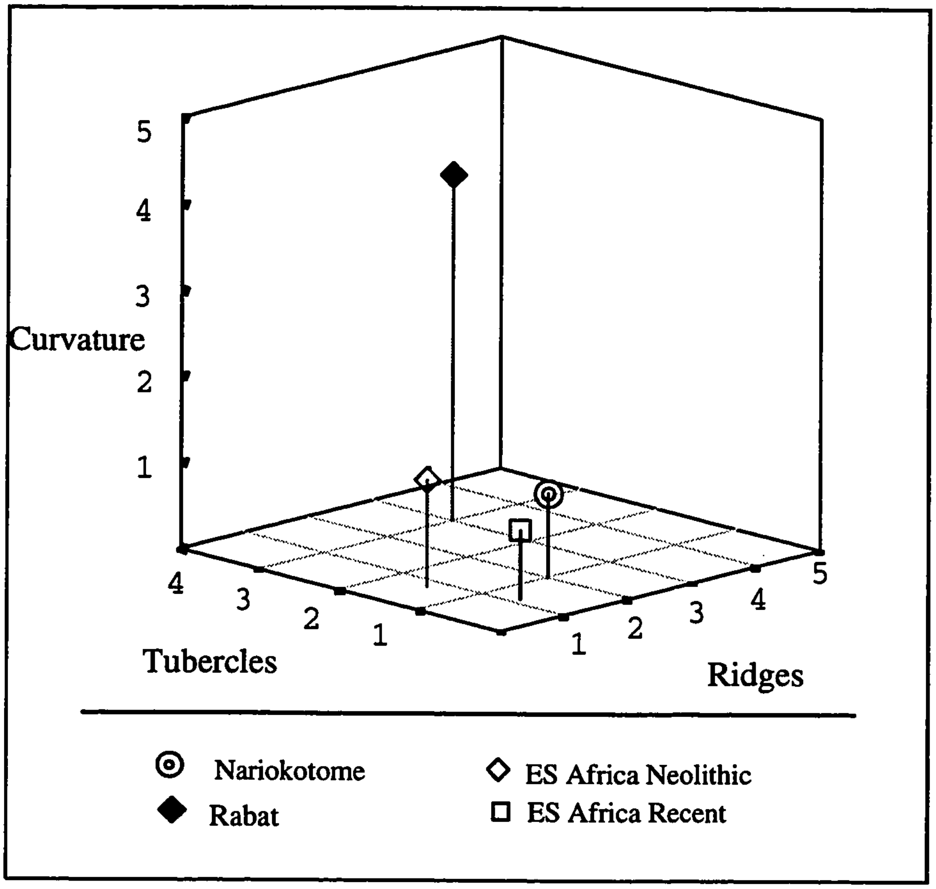


Figure 5.17. Scatter plot of lateral incisor scores from African time series.

<u>Temporal change within regions</u>

If one ignores Nariokotome for the moment, there does appear to be change within each region to the morphology seen in recent peoples. At least, it is impossible to refute the hypothesis that this change occurs. For the regions where the data are scarcer, change through time is not as clear. In South/West Asia a pattern is clear for both central and lateral incisors. For both South/East Asia and Central/South Europe, where there are intermediate samples, there appears to be good trajectory of change from the robust morphologies displayed by the early populations, through an intermediate morphology, to that seen in modern peoples. This change is also discernible in North/East Asia. North/West Europe, however, does not show any clear pattern. The Neandertals from

North/West Europe show a morphology extremely different from that seen in modern peoples, and without intermediate samples, it is impossible to draw a trend from one to the other. All patterns of change over time are more clear for the central incisors than for the laterals. In each case, the change from fossil to modern populations involves a simplification of the incisor shape, but each region simplifies the basic morphology in a different way.

The Recent African Origin model predicts that these patterns should not be found, and that there should be a sudden change in morphology at the appearance of modern humans. This prediction can be refuted in several regions. In South/East Asia (Figures 5.14 and 5.15), there is no clear break in morphological pattern from the earliest to the latest, and in fact, a good trend line can be drawn indicating an stabilization of moderate marginal ridges and a decrease in both curvature and tubercle development. Central/South Europe also produces a good trend line for the central incisors (Figure 6) from Krapina through Dolní Věstonice to the modern samples. This region shows a decrease in development of all three morphologies over time without an abrupt change in morphology. The trend seen in South/West Asia cannot be used to refute either hypothesis. North/West Europe cannot be used to refute either hypothesis, but might serve as support for the Recent African Origin model. In North/West Europe it is obvious that the recent populations are extremely different from the Neandertals, but without intermediate data, no firm conclusions can be drawn. The African samples show no trend, at least with the currently available data and therefore cannot be used to refute or support either hypothesis.

Another problem with interpreting these results, however, is in taking Nariokotome as the primitive condition. Other early *Homo sapiens* or *Homo erectus* included in the present study do not show the same morphology. If this is the primitive morphology, all other fossils, including those which are regarded as modern humans, should be considered derived as they are show a morphology more robustly developed than that seen in Nariokotome. It would have to be accepted that change occurred in a single direction, toward the more gracile, which, from these data, does not appear to be the case. If later Pleistocene humans showed a more robust morphology than do the early ones, as they appear to, then the morphology of Nariokotome is irrelevant to questions regarding human evolution from that point forward. Perhaps it would be wiser for Nariokotome to be used only in examining trends in Africa rather than treating it as the condition from which all else arose.

Clustering of fossil incisor morphologies

As was done with the modern data, a clustering algorithm is applied to the time samples in order to test hypotheses of change in time and space. Multiregional Evolution predicts that the fossil populations will be more similar to the modern populations in their incisor morphologies than they will be to other fossil populations if the regional morphologies were established at the earliest population of the outlying regions. In contrast, the Recent African Origin theory predicts that the fossil populations of all but earliest modern humans will cluster with each other to the exception of the modern people. Early modern humans, however, should cluster with the modern samples to the exclusion of the fossils. These predictions are taken as hypotheses for testing.

A dendrogram produced by cluster analysis using both central and lateral incisor morphologies appears in Figure 5.18. There are two major clusters produced by this analysis. One has the European Neandertals and pre-Neandertals, as well as the far Asian sample from Sangiran and Zhoukoudian, while the second major cluster contains all of the modern samples, all of the Neolithic, Bronze and Iron Age samples, and samples from Qafzeh, Nariokotome, and Dolní Věstonice. The prediction of the Multiregional Evolution theory is not borne out in this analysis. Nearly all the fossil incisors cluster apart from the recent samples; the fossils of modern humans, and Nariokotome, however, cluster with recent people. The prediction of the Recent African Origin theory, on the other hand, is consistent with the clusters seen. Early modern humans cluster with the recent samples, to the exclusion of the remaining fossils.

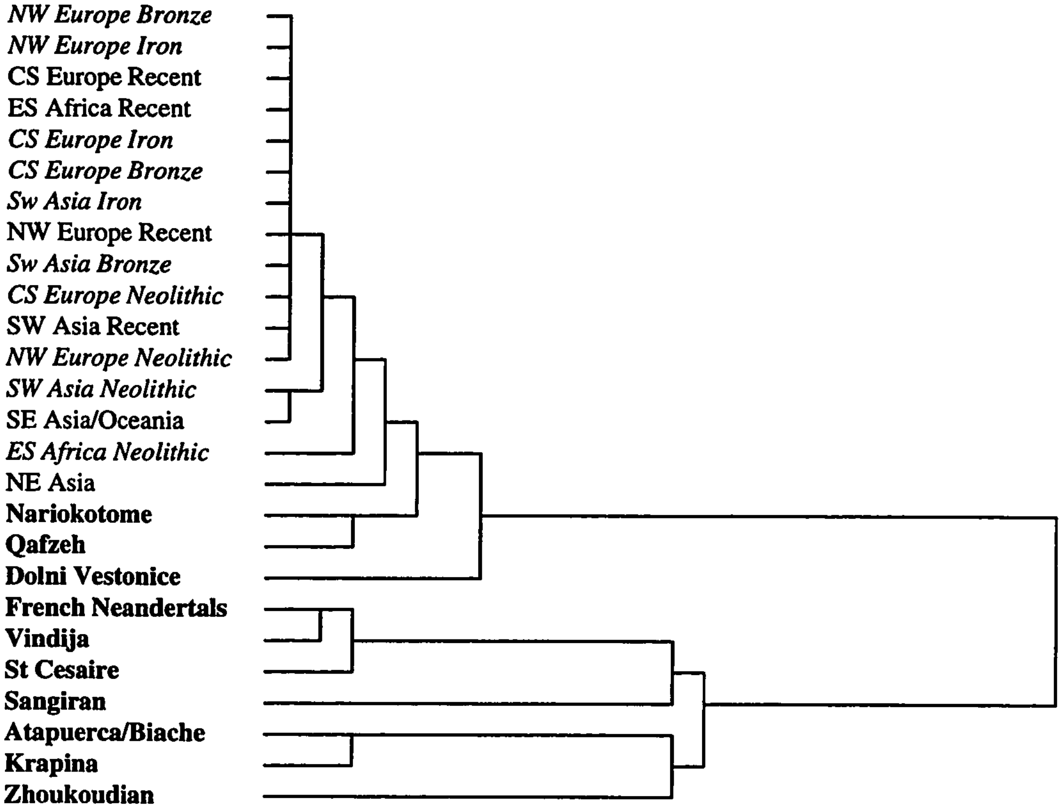


Figure 5.18. Dendrogram produced by squared Euclidean distance, between group cluster analysis of incisor scores for all regions and times. Fossil samples are in bold face, prehistoric samples in italics, and modern samples in regular type.

Examining all the data at once, however, ignores substantial information about the fossil record as any site or individual that is not represented by both central and lateral incisors is absent from the analysis. Cluster analyses are therefore performed on central and lateral incisors scores separately. Figure 5.19 shows a dendrogram for all areas and times for the groups represented by central incisors. This clustering analysis does not show the same distinction of fossil and modern as does the analysis where both central and lateral incisors are considered. In this analysis, all the fossil samples do not cluster together. One of the two major clusters in this analysis consists of fossils only. However, the second major cluster also includes several fossil individuals. Most notably, Sangiran and Yuanmou cluster with Nariokotome, Lida Ajer clusters with North/East Asia, and Qafzeh with recent Southeast Asia/Oceania and Neolithic South/West Asia. The grouping of Nariokotome with the East Asian *Homo erectus* is in contrast with its placement in the combined central and lateral analysis, where it is grouped with Qafzeh and the more recent samples; however, this grouping is logical in that these are all *Homo erectus*. The predictions of neither major model of human origins are borne out by this analysis. Neither do the fossil individuals cluster with modern individuals in the same regions as would be predicted by Multiregional Evolution nor do the fossils cluster separately from the modern humans as would be predicted by Recent African Origin.

Figure 5.20 shows a similar dendrogram for cluster analysis of lateral incisor scores. There is a cluster of the Neandertals and Sangiran and one of the other samples. All the European, Near East, and African samples cluster together to the exception of the Asian samples. The fossils within this larger cluster are Nariokotome and a cluster of Dolní Vĕstonice, Qafzeh, and the Neolithic East/South Africa sample. These results are similar to those from analysis of both incisors together and fulfils the predictions of the Recent African Origin model better than it fits the predictions of Multiregional Evolution.

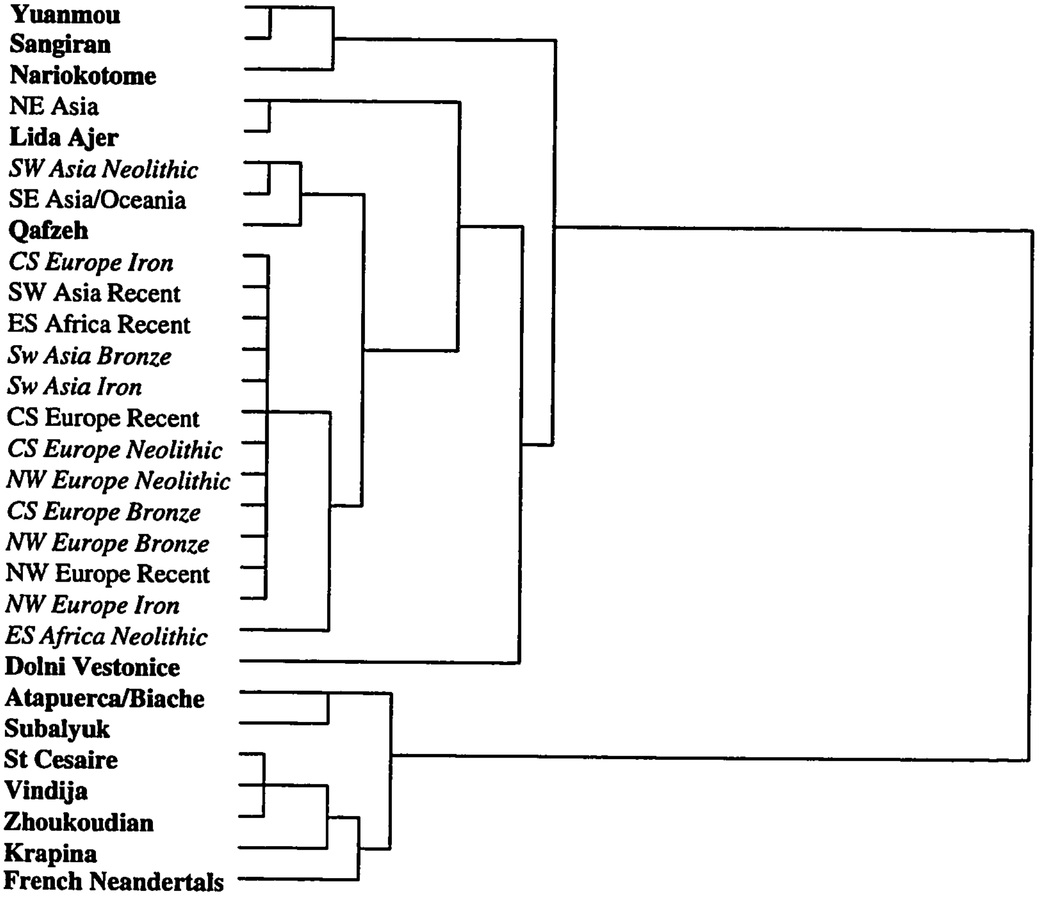


Figure 5.19. Dendrogram produced by squared Euclidean distance, between group cluster analysis of central incisor scores for all regions and times. Fossil samples are in bold face, prehistoric samples in italics, and modern samples in regular type.

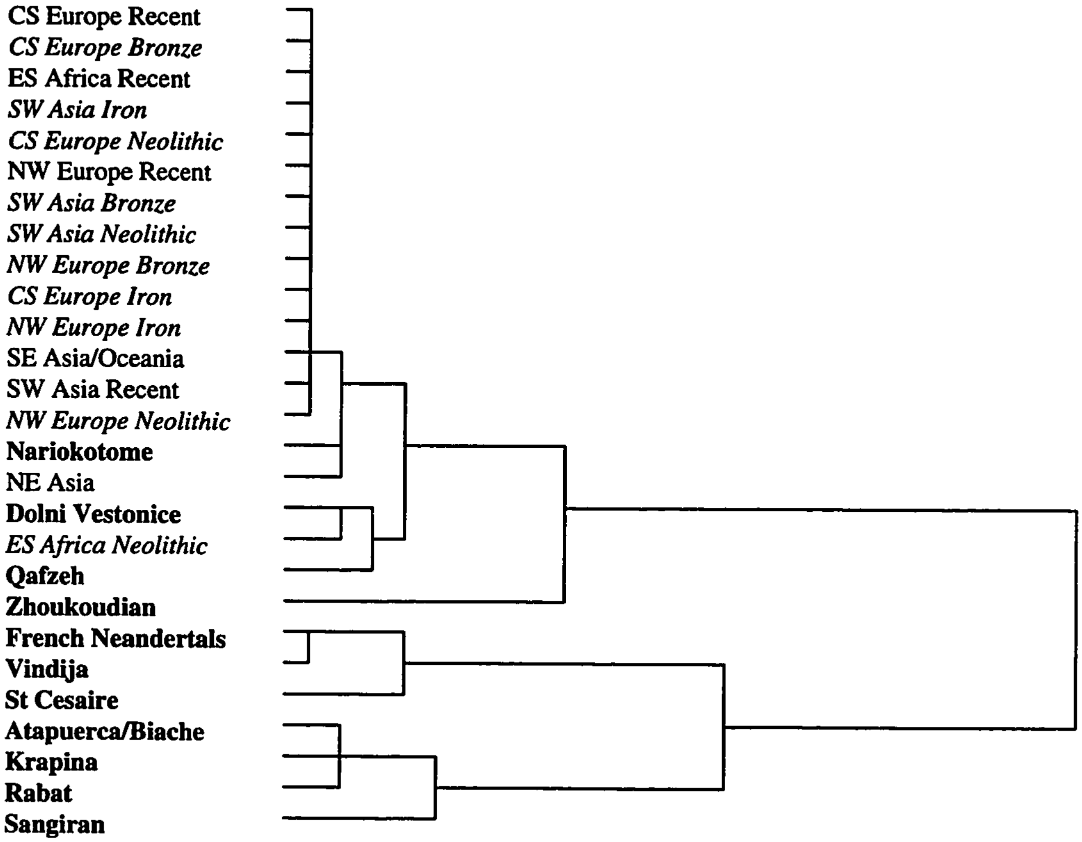


Figure 5.20. Dendrogram produced by squared Euclidean distance, between group cluster analysis of lateral incisor scores for all regions and times. Fossil samples are in bold face, prehistoric samples in Italics, and modern samples in regular type.

None of the cluster analyses provide strong evidence for either theory of modern human origins. None are consistent enough to be used in this way. These can be used, however, to glean some interesting information about the relationships and the morphologies of these samples. In all of these analyses there is a cluster of the Neandertals and Zhoukoudian as opposed to all other samples. These teeth are the most robustly built of the entire sample. Whereas the early samples, Nariokotome and Sangiran, show development of all three features of the incisors, all features are only moderately developed. No feature is emphasized and no feature either heavily or lightly expressed. All the later samples develop at least one, and more often two, of the features very strongly.

Selection on shovel shaping
Is incisor form more than a simple regional marker?

The present study has assumed, to this point, that shoveling was primarily a regional marker and that distributions of morphology were due to population history rather than to selection for different shapes. There is, however, no reason to expect that shoveling should be simply a genetic marker. Incisors serve many functions and it should be expected that their morphologies would be subject to selective pressures. Although shovel shaping of incisors in unlikely to be related to mate choice (Hanihara *et al.*, 1974), incisors are heavily involved in how humans interact with their environments. Incisors serve both in eating and as tools; shovel shaping modifies incisor morphologies and therefore changes the way incisors perform these functions.

It is reasonable, therefore, to expect that shovel shapes have been selected for at some point in human history, although perhaps not recently. Several different functional and selectional arguments for shoveling have been made, but none have been completely satisfactory. Mizoguchi (1977) has even suggested that the morphology of the lingual surface of the teeth was due to the amount of milk in the diet. Selective pressures for the development of shoveling features are unknown, but some hypotheses may be raised regarding the adaptive significance of incisor morphologies. Any behavior or diet which increases the stress or wear on the front teeth might select for a more robust incisor with greater functional strength and greater occlusal surface area. If the teeth were being heavily used, a tooth that is larger, stronger, and wear resistant might be selected for.

The fossil evidence makes it clear that there was probably selection for teeth with longer wear times. Heavy wear on the anterior teeth is seen in nearly all of the fossil incisors, and is especially prevalent among the Neandertals. There are many ways to build a bigger tooth; the three incisor morphologies that create shoveling are only some of these ways. Why, then, solve functional problems with these features? Each of the morphologies that contributes to shovel shaping may increase the amount of tooth area. The tubercle obviously adds bulk buccal-lingually, as do the marginal ridges, while the curvature of the tooth allows more occlusal surface in a set mesial-distal space. Each of these in turn would increase the strength of the incisor and the potential life span of the tooth under heavy wear.

Each of the three incisor features increases the tooth bulk, the incisive surface area without increasing mesial-distal length of the tooth. Changing tooth form and size in this manner would be important if there was a limitation to the extent that a tooth can expand mesial-distally. A limitation on the breadth of the incisor field makes some sense anatomically. I suggest that, if the incisor field gets expands beyond a certain point, it would require a remodelling of the entire face, with a resizing of all the portions in order to fit the larger teeth. This is a hypothesis regarding the incisor field and the face, and needs to be tested in a thorough manner, but may be examined briefly here. All humans and fossil humans have upper incisors that vary within a small range of sizes. For the incisors examined in this study, basic size statistics are presented in Table 5.11. Only 23 of the 1382 central incisors examined, or 1.7% were 10 mm or more in their mesial-distal size, while only 3 of 2174 lateral incisors, or 0.1% were over 9 mm. Even for the fossil humans the greatest length is not much larger than 10 mm, although the average length for the fossil incisors is much greater than the average for moderns. For 174 individuals the entire incisor field was measured; it ranges from 23.4 mm to 34.6 mm in length, with a mean of 28.9. This is a small range of values suggesting that there is a constraint on the size these teeth and the incisor field can attain.

Table 5.11. Summary statistics for incisor size measurements, both modern and fossil.

Mesial-Distal length

	Centrals				Laterals			
	N	Mean	Min.	Max.	N	Mean	Min.	Max.
Recent	1382	8.2	6.1	10.6	2174	6.3	3.7	9.2
Fossil	25	9.8	8.7	10.9	23	7.9	6.9	8.9

Labial-Lingual breadth

	Centrals				Laterals			
	N	Mean	Min.	Max.	N	Mean	Min.	Max.
Recent	1586	6.9	5.5	9.9	2436	6.2	4.4	9.2
Fossil	19	8.3	6.4	9.4	15	8.3	6.9	9.4

If, in fact, incisor tooth length is constrained and there were selective pressures for stronger and longer wearing teeth, the morphologies that we see in the Pleistocene fossil record could be ways solutions to the functional problems within the limitations on tooth length expansion. Selective pressures on stronger, more robust teeth could create the very heavily built teeth observed throughout the Pleistocene fossil record. The beginnings of regional distributions to shovel shaping may be the result of differing ways of solving the same problems, but the regional differences are also obscured by the sheer robusticity of all the teeth.

The modern distribution of shovel shapes, however, remains unexplained. Clearly, population history plays a leading role in the distribution of shovel shapes today, but selective pressures on incisor morphologies cannot be ignored. What is the relation of population history and selection in the modern distributions of incisor shapes? As technology and diet have changed in human evolution, selective pressures on incisor morphologies have probably also changed. There is no longer the need for the very heavily built morphologies seen in the human fossil record. Different morphologies are needed to deal with different selective pressures. In addition, as the face reduces in size, the larger teeth may be selected against and therefore these morphologies may reduce as well.

The discussion of selection on incisor morphologies presented here is meant not as a statement regarding selection, but rather as a hypothesis about why these morphologies may have come about and changed through human evolution. While the purpose of the present study was to examine the distribution of incisor shapes and the regionality of these distributions, questions of selection on incisor shapes are both an interesting and relevant path for future research if the significance of shovel shaping is to be fully understood.

Central vs. lateral incisors

In all analyses of incisor form, both in this chapter and in the previous, the central incisors have shown more consistent results than the lateral incisors. Results have been clearer both regarding modern human distributions of incisor form and fossil distributions of these shapes. These differences in results are due to greater variability in the form of the lateral incisor in all populations. Other studies of incisor form, as summarized in Chapter II, have also found that the lateral incisor is more variable in form, and the shape is less heritable than on the central tooth. This contrast follows from the field theory of dental morphology (Dahlberg, 1951; Krogman, 1967) which states that the teeth at one end of a field will be less variable than the teeth at the other periphery. For the incisor fields, the more stable morphology is seen in the lower lateral incisors, and more importantly for the present study, in the upper central incisors (Dahlberg, 1951).

Modern human origins

This chapter examined the regional significance of incisor morphologies in prehistory and asked whether changes in shovel shapes could be traced across space and through time in order to test theories regarding human evolution. Several methods were used to test these hypotheses of variation, without very conclusive results. Shovel shapes within the human fossil record show a variety of morphologies. The distribution of these shapes is not clearly regional, although there are some indications that there might be a regional component to shape distributions. Change may be traced through time within regions where there is a sufficient sample and patterns of change may be used to test predictions from the major models of modern human origins. Multiregional Evolution predicts that features will show continuity within regions through time, while the Recent African Origin model predicts an interruption in these patterns at the origin of modern humans. The ability to trace these patterns or interruption of pattern is, unfortunately, limited by scarce data.

Multiregional Evolution predicts the Pleistocene establishment of regional morphologies and the continuity of these morphologies within regions through time. Results of tests of Pleistocene establishment of regionality of incisor morphology are not clear. There are some differences seen in the morphologies among regions, but these differences are neither consistent nor strongly supported. There is a large overlap in the morphologies seen throughout the human fossil record. Results of examination of continuity are also not consistent. In several regions there are simply too few fossils to be sure of the existence of a pattern. Only in Central/South Europe is there any clear evidence of continuity from the earliest fossils to modern humans. South/East Asian evidence suggests such a pattern, but there are only a few incisors. Cluster analyses certainly do not fit the predictions of the Multiregional Evolution model. In none of these analyses do fossil incisor scores consistently cluster with modern incisor scores from the same region.

The major prediction of the Recent African Origin model is that any patterns of continuity that do exist in the fossil record will be interrupted when local populations are replaced by modern humans from Africa. This prediction appears to be refuted by the Central/South European sample, while, as with predictions from Multiregional Evolution, other regions are not clear. The only region in which an interruption of pattern might be a possibility is North/West Europe, where the fossil samples are radically different from the moderns and show little change through time in the direction of the modern shape. Other regions show neither a clear pattern nor a clear lack of pattern.

Multiregional Evolution and Recent African Origin are the only models tested here, yet are not the only models of modern humans origins. Others include the African Hybridization and Replacement model as put forth by Bräuer (1992) and the Assimilation model put forth by Smith and colleagues (Smith, 1992; Smith *et al.*, 1989). The Hybridization model posits that replacement was primary in the development of modern humans, but that there was likely a small amount of gene flow between archaic and modern humans and therefore some input from Neandertal and Asian archaic populations into the modern gene pool (Bräuer, 1992). The Assimilation model also posits that significant genetic change involved in the appearance of modern human form originated in a single location, but emphasizes gene flow and local continuity as important in the spread of new genes (Smith *et al.*, 1989). New genes are assimilated into existing gene pools, and sometimes old genes into new gene pools, but no replacement of entire gene pools. Whereas the Hybridization model posits that there was likely a small amount of gene flow, the Assimilation model sees gene flow as primary in the changes in gene pools. Both Hybridization and Assimilation could be seen as variants of the two major models of human origins, if these are not interpreted in their strictest meanings.

Hybridization is a variant of the Recent African Origin model, except that it allows for some gene flow between the archaic populations and the modern; the Assimilation model can be seen as a variation on Multiregional Evolution, while conceding that modern morphologies may have had a single origin (Aiello, 1993; Smith *et al.*, 1989).

Predictions of the Hybridization and Assimilation models are moderate versions of Multiregional Evolution and Recent African Origin, and may be tested using the same kinds of incisor data. In order to test hypotheses based on either Assimilation or Hybridization, however, it is necessary to know the morphology of the incoming modern humans, to set up a prediction of how much intermixing of populations would be expected, and to predict to what extent shoveling would be affected by admixture. Studies of genetics of shovel shaping have produced contradictory results regarding the dominance of shoveling or non-shoveling and what incisor form is shown by hybrid populations. If the modern human morphology is defined though, and the hybrid form predicted, then patterns of change based on these theories may be tested. Testing these intermediate models of human origins could provide an interesting future research path.

Discussion and summary

There are two major problems in using fossil incisor data to test hypotheses of regional distributions and of modern human origins. The first of these is the scarcity of data. There are very few incisors currently known, many of these are worn, and often incisors in the crucial time periods for testing specific hypotheses of origin simply don't exist. Even so, comparisons of regional incisor morphologies within the Pleistocene, cluster analyses of these regional shapes, and examinations of temporal differences in shape suggest continuity between archaic and recent populations within each region.

The other problem in examining the evolution of shovel shapes is that nearly all the fossil incisors are more robustly developed than any modern incisors. Marginal ridges are higher, tubercles are larger, and curvature is greater. In addition, nearly all fossil incisors from around the world are more developed than the primitive state as illustrated by *Homo erectus* from Nariokotome. The key to understanding change in these incisor shapes, I think, is in examining which features are emphasized in each region. Since all of the Middle Paleolithic teeth are heavily built any analysis examining both fossil and recent incisors is overwhelmed by the robusticity of the Pleistocene teeth, and therefore regional trends or the lack thereof may be obscured. However, if the relative development of each feature is examined, some of the same regional relationships which are seen today, can be seen in the past.

The combination of the three features in each modern region are the same as those which were emphasized in that region in the robust Pleistocene teeth. In fossil Asian teeth, the best developed of the morphologies is the marginal ridges, and these are the least curved of the fossil incisors. Modern Asian teeth also emphasize marginal ridges and have a very straight edge. Middle to Early Upper Pleistocene teeth from Europe, North Africa (Rabat) and some of the Levantine specimens (Tabūn, Skhūl) show marked curvature and tubercle development distinguishing these from the Asian incisors. (There are no data from Subsaharan Africa for comparison.) Today Africa is distinguished from the rest of the work in curvature and Europe from other regions, particularly Asia, by tubercle development. The remaining South/West Asia sample, from Qafzeh, show an intermediate incisor morphology amongst the fossils just as modern South/West Asians do among the recent samples. The difference between the recent incisors and the Pleistocene incisors in each region are in magnitude; the contrasts between the incisors in different regions is in morphology. Pleistocene regions showed the same morphological contrasts as they show today, the shapes were just bigger.

Reduction has occurred throughout the world in incisor morphology, but regionally of incisor shapes has remained. I posit the following scenario for how this has occurred. Reduction in facial size, associated with a changing diet and the decreased use of teeth as tools, would have selected for smaller incisors. Balanced with this reduction is the need to maintain some of the strength and occlusal surface area afford by shoveling. Incisor shape in each region changed through modification of the original morphology, continuing to emphasize the same components of shoveling. In doing so, the common combination of incisor shapes within each region remained constant through time, although the development of the three elements decreased. Regions maintained the same kinds of differences from one another while evolution gracilized incisors everywhere.

In these data on incisor morphologies, there are indications that shovel-shaped incisors have shown a regional aspect to their distribution for a very long time and that shoveling may be used to test theories of modern human origins. In many areas insufficient data exist for looking at continuity or interruption of continuity and therefore to test predictions of the major theories of modern human origins. However, some regions do provide evidence that Multiregional Evolution may work. Where there are sufficient data, change can be traced from the Pleistocene inhabitants of a region to recent populations in the region, without interruption at the appearance of modern humans. In addition, as noted above, the regions differ in the past in the same patterns as they do today. It must be remembered, however, that the data are scarce and although incisor shapes indicate continuity, shovel shaping currently cannot be treated as a center piece in the debate over modern human origins.

CHAPTER VI

CONCLUSIONS

For nearly a century shovel shaped incisors have been assumed to distribute regionally and incisor morphology has thus been used as evidence for genetic relationships between populations. Unfortunately, in some cases the relationships shown by shovel shaping have been contradictory. Whereas shovel shaping is often cited as evidence for regional continuity is Asia, it has also been cited as evidence against regional continuity in Europe, and as evidence that Neandertals and modern humans are separate populations in the Levant. That shoveling distributes regionally has even been questioned.

An investigation of the definition, variation, and regional significance of shoveling was undertaken to clarify the utility of this morphology as a population marker. Several specific questions asked were: 1) How can shovel shaping be defined to encompass all variants of the morphology? 2) How variable is shoveling and does this form distribute regionally? and 3) Can shovel shaping be used to test theories of modern human origins?

The meaning of the term "shovel shaped" was addressed first. One of the primary reasons that the presence of shoveling has been interpreted in so many different ways is that a clear definition of the morphology in its entire range of variation has been lacking. From the time the morphology was given a definition, many details of its shape were ignored. Shovel shaping was reduced to a simple shape, that of marginal ridges enclosing a basin. Yet, usage of the term "shovel shaping" did not explicitly follow the definition.

Teeth of many different forms were called shovel shaped. Varied definitions and usage of shovel shaping resulted in a huge literature on the topic, very little of which dealt with the same morphologies in the same ways.

In order to examine shovel shapes in their entire range of variation, shoveling was therefore redefined. Shovel shaping is the occurrence of a basin on the lingual surface of the incisor, caused by the development of any three features of the tooth: the marginal ridges, basal tubercles, and curvature, either alone or in combination. Different kinds of shovels may be identified by the relative development of these three features when considered together; as long as there is a resultant fossa, the tooth may be considered shoveled. This new definition of shoveling provides a single definition for all the variants of shoveling and, by dividing the morphology into discrete elements, allows for greater resolution in studying variation in incisor shapes.

The second major question to be addressed was whether shovel-shaped incisors distributed in a regional pattern, as has often been claimed. To investigate this question of regional variation, samples from the Old World were examined and incisor morphologies compared. Each of eight broadly defined world regions was shown to have a significantly different distribution of incisor shapes. Differences between regions were due to degree of development of the three characters, and frequencies of combinations of these morphologies. No populations showed exclusively shoveled or not shoveled incisors, but rather each region showed a different distribution of possible shapes, and a different average morphology. Shovel-shaping, in the classic sense, is not restricted to Asia, but rather was more frequent there. Shapes seen in Europe or in Africa are not unique, but merely predominate in those regions, with the same shapes being found elsewhere as well. Asian incisors emphasize marginal ridge development with lesser development of the other two features, African populations are primarily identified by the curvature of the incisors, and European populations show more tubercle development than they do the other two morphologies.

Following the identification of contrasting incisor morphology distributions in world regions, it was asked if there was a pattern to these regional morphologies. Regions did not differ randomly in incisor morphology, but the three component morphologies appeared to distribute in clinal patterns, with each character showing a slightly different distribution. Geographically closer regions showed more similar average incisor morphologies than those which were further separated geographically.

Finally, the hypothesis that a numeric function based on shovel-shaping morphologies could be used to discriminate regions was tested. Each region was discriminated by its incisor morphology. Each showed a significantly different distribution of shovel shapes, and a different average morphology, but there were few unique morphologies. Thus, the discriminant function could not accurately classify individuals into the regions from which they came. Although the function classified individuals at a rate greater than by chance, the overlap in ranges of variation between the regions makes it impossible to use the function to classify single cases accurately.

In sum, results of examinations of modern variation in incisor morphology make it clear that shoveling does, in fact, distribute regionally. Regions can be characterized by the combination of incisor morphologies shown most commonly. Shovel shaping has regional significance, but differences in shape are at the level of population rather than individual. Differences between regions are in distributions of shapes, not in the presence or absence of shoveling.

Once the regional distribution of incisor morphologies was established, incisors from the human fossil record were evaluated as evidence for human evolution. Shovel shapes have been cited in arguments for and against both major models of modern human origins – the Recent African Origin model, and the Multiregional Evolution model. In order to be used in such arguments, it was necessary to examine whether fossil incisors and modern incisors in each area of the world showed similar morphologies, whether incisor shapes distributed regionally in the Pleistocene, and whether the patterns of change within regions refuted the Multiregional Evolution model or refuted the Recent African Origin model.

Fossil incisors, although many have been described as shoveled, actually manifest a wide range of variation. When these morphologies were examined in detail, regional variants were identified, although all regions could not be shown to be significantly different statistically from all other regions. This is due, in part, to the very small sample sizes available. There were some indications that geographic patterns of distribution of incisor morphology were established in the Pleistocene. Based on cluster analyses, Pleistocene incisor morphologies cluster in similar patterns to modern incisor shapes. Different regions show characteristic incisor shapes. These regional morphologies appear to be characterized by the same combinations of morphologies in the past as they are today with incisors being more robustly built. While pattern of morphologies expressed stayed the same through time, while the magnitude of the expression of these shapes decreased.

Patterns of change within regions over time were investigated in accordance with predictions of the two major models of modern human origins. Multiregional Evolution could be refuted by an interruption in continuity over time within regions, whereas the Recent African Origin model would be refuted if continuity were evident in several regions. Results indicate that fossil incisor data refute the prediction of Recent African Origin in at least one area, South/Central Europe, where a continuity of pattern without interruption from Paleolithic to modern populations could be seen. There is no region where the data could be used to refute Multiregional evolution.

Similarities in shovel shaping within regions through time are obscured by the robusticity of Pleistocene incisors. All three morphologies are more heavily developed in fossil teeth than in recent. However, the relative development of the three morphologies is regional. Asian teeth emphasize marginal ridges, African teeth emphasize curvature, and European teeth emphasize tubercles. These emphases are evident in both fossil and modern teeth with the fossil teeth exhibiting these morphologies on a different scale. Reduction in incisors has occurred throughout the world, while incisors in each region maintained the same combination of features that had been emphasized since the early populations in each area.

Although the ability of shovel shaping to determine phylogenies in the human fossil record has been overstated, modern incisor morphology shows clear regional distributions and shoveling appears to have distributed regionally long into the past. There are indications that there is continuity in shovel shapes within regions through time providing evidence that the Multiregional Evolution model of human origins works, but also that shovel-shaped incisors cannot by themselves provide strong evidence for or against either model of modern human origins.

APPENDICES

APPENDIX A

SAMPLE "POPULATIONS," LISTED BY POPULATION NUMBER, WITH GEOGRAPHIC ORIGIN AND SOURCE OF COLLECTION.

Pop.	Country	Population	Age	Source
1	Israel	**Natufian**	**10000 bp**	Sackler School of Medicine, Univ. of Tel Aviv, Tel Aviv
2	Israel	**Bedouin**	**Recent**	Sackler School of Medicine, Univ. of Tel Aviv, Tel Aviv
3	Israel	**Bronze Age**		Sackler School of Medicine, Univ. of Tel Aviv, Tel Aviv
4	Israel	**Roman/Byzantine**		Sackler School of Medicine, Univ. of Tel Aviv, Tel Aviv
5	Australia	**Indigenous**	**Recent**	Universitá della Studi, Rome
6	Papua New Guinea		**Recent**	Universitá della Studi, Rome
7	Tunisia		**Recent**	Universitá della Studi, Rome
8	Ethiopia		**Recent**	Universitá della Studi, Rome
9	Argentina		**Recent**	Universitá della Studi, Rome
10	Indonesia?	**Borneo**	**Recent**	Universitá della Studi, Rome
11	Hong Kong		**Recent**	Universitá della Studi, Rome
12	Indonesia	**Sumatra**	**Recent**	Universitá della Studi, Rome
13	Indonesia	**Celebes**	**Recent**	Universitá della Studi, Rome
14	Switzerland		**Recent**	Universitá della Studi, Rome
15	Germany	**Prussia**	**Recent**	Universitá della Studi, Rome
16	Egypt		**Recent**	Universitá della Studi, Rome
17	Austria		**Recent**	Universitá della Studi, Rome
18	Finland		**Recent**	Universitá della Studi, Rome
19	Sweden		**Recent**	Universitá della Studi, Rome
20	Albania		**Recent**	Universitá della Studi, Rome

Pop.	**Country**	**Population**	**Age**	**Source**
21	Italy	**Sicily**	**Recent**	Universitá della Studi, Rome
22	Italy	**Umbria**	**Recent**	Universitá della Studi, Rome
23	Italy	**Bologna**	**Recent**	Universitá della Studi, Rome
24	Italy	**Sardinia**	**Recent**	Universitá della Studi, Rome
25	Italy	**Lazio**	**Recent**	Universitá della Studi, Rome
26	Italy	**Campania**	**Recent**	Universitá della Studi, Rome
27	Italy	**Piemonte**	**Recent**	Universitá della Studi, Rome
28	Italy	**Puglia**	**Recent**	Universitá della Studi, Rome
29	Italy	**Toscana**	**Recent**	Universitá della Studi, Rome
30	Italy	**Rome**	**Recent**	Universitá della Studi, Rome
31	Argentina	**Tiero del Fuego**	**Recent**	Universitá della Studi, Rome
32	Croatia	**Sandalja**		Institute for Quaternary Geology and Paleontology, Zagreb
33	Croatia	**Vindija**	**40000 bp**	Institute for Quaternary Geology and Paleontology, Zagreb
34	Croatia	**Bezdanjaca**		Institute for Quaternary Geology and Paleontology, Zagreb
35	Croatia	**Veternica**		Institute for Quaternary Geology and Paleontology, Zagreb
36	Croatia	**Vucedol**	**3000 bp**	Institute for Quaternary Geology and Paleontology, Zagreb
37	Croatia	**Bugojno**	**Bronze**	Croatian Natural History Museum, Zagreb
38	Croatia	**Krapina**		
39	Israel	**Qafzeh**		Rockefeller Museum, Jerusalem
40	Czechoslovakia	**Dolni Vestonice**		
41	Sumatra	**Lida-Ajer**	**60-80k**	
42	Hungary	**Hung A**	**0-500 ad**	Hungarian Natural History Museum, Budapest
43	Hungary	**Hung B**	**500-1000 ad**	Hungarian Natural History Museum, Budapest
44	Hungary	**Hung C**	**>1000 ad**	Hungarian Natural History Museum, Budapest
45	Papua New Guinea	**PNG**	**Recent**	Hungarian Natural History Museum, Budapest

Pop.	Country	Population	Age	Source
46	Hungary	**Hung D**	**Neolithic**	Hungarian Natural History Museum, Budapest
47	Hungary	**Hung E**	**Bronze**	Hungarian Natural History Museum, Budapest
48	Hungary	**Hung F**	**500-1000 ad**	Hungarian Natural History Museum, Budapest
49	Hungary	**Hung G**	**>1000 ad**	Hungarian Natural History Museum, Budapest
50	Hungary	**Hung H**	**Iron**	Hungarian Natural History Museum, Budapest
51	Hungary	**Hung I**	**Bronze**	Hungarian Natural History Museum, Budapest
52	Czechoslovakia	**Moravia**	**Recent**	Vienna Natural History Museum, Vienna
53	Czechoslovakia	**Bohemia**	**Recent**	Vienna Natural History Museum, Vienna
54	Germany	**German**	**Recent**	Vienna Natural History Museum, Vienna
55	Austria	**Hainburg**	**Bronze age**	Vienna Natural History Museum, Vienna
56	Serbia		**Recent**	Vienna Natural History Museum, Vienna
57	Slovenia		**Recent**	Vienna Natural History Museum, Vienna
58	Rumania		**Recent**	Vienna Natural History Museum, Vienna
59	Indonesia	**Java**	**Recent**	Vienna Natural History Museum, Vienna
60	China		**Recent**	Vienna Natural History Museum, Vienna
61	Indonesia	**Ambonese**	**Recent**	Vienna Natural History Museum, Vienna
62	Philippines		**Recent**	Vienna Natural History Museum, Vienna
63	Indonesia	**NW Sumatra**	**Recent**	Vienna Natural History Museum, Vienna
64	Bosnia		**Recent**	Vienna Natural History Museum, Vienna
65	Austria	**Austrian**	**Recent**	Vienna Natural History Museum, Vienna
66	Papua New Guinea	**Buginese**	**Recent**	Vienna Natural History Museum, Vienna
67	China	**Hong Kong**	**Recent**	Vienna Natural History Museum, Vienna
68	Greece	**Greek or Byzantine**	**Recent**	Vienna Natural History Museum, Vienna
69	Croatia		**Recent**	Vienna Natural History Museum, Vienna
70	Czechoslovakia	**Czech**	**Recent**	Vienna Natural History Museum, Vienna

Pop.	Country	Population	Age	Source
71	Italy	**Northern Italian**	**Recent**	Vienna Natural History Museum, Vienna
72	Iraq	**Kurd**	**Recent**	Vienna Natural History Museum, Vienna
73	Armenia	**Armenian**	**Recent**	Vienna Natural History Museum, Vienna
74	Turkey	**Turk**	**Recent**	Vienna Natural History Museum, Vienna
75	Tanzania	**Bagamoyo**	**Recent**	Vienna Natural History Museum, Vienna
76	China	**"South China**	**Recent**	Vienna Natural History Museum, Vienna
77	Italy	**Sicilia**	**Neolithic**	Vienna Natural History Museum, Vienna
78	Papua New Guinea	**Bismarck Archipelago**	**Recent**	Vienna Natural History Museum, Vienna
79	Sri Lanka	**Sri Lanka**	**Recent**	Vienna Natural History Museum, Vienna
80	Solomon Islands	**Solomon Islands**		Vienna Natural History Museum, Vienna
81	Dalmatia	**Dalmatian**		Vienna Natural History Museum, Vienna
82	Germany	**Munich**		Vienna Natural History Museum, Vienna
83	Tanzania	**Watusi**		Vienna Natural History Museum, Vienna
84	Georgia	**Tblisi**	**1000 BC**	Vienna Natural History Museum, Vienna
85	Poland	**SW**	**Bronze Age**	Vienna Natural History Museum, Vienna
86	Russia	**Moscow**	**Recent**	Vienna Natural History Museum, Vienna
87	Egypt	**El Kubanieh**	**Recent**	Vienna Natural History Museum, Vienna
88	Argentina		**Recent**	Vienna Natural History Museum, Vienna
89	Indonesia	**Timor**	**Recent**	Vienna Natural History Museum, Vienna
90	Egypt	**Ermenne**	**Ancient**	Vienna Natural History Museum, Vienna
91	Brazil		**Recent**	Vienna Natural History Museum, Vienna
92	Tanzania	**Masai**	**Recent**	Vienna Natural History Museum, Vienna
93	Great Britain	**English**	**Recent**	Vienna Natural History Museum, Vienna
94	Rumania	**Romanian**	**Recent**	Vienna Natural History Museum, Vienna

Pop.	Country	Population	Age	Source
95	Poland	**Pole**	**Recent**	Vienna Natural History Museum, Vienna
96	Hungary	**Magyar**	**Recent**	Vienna Natural History Museum, Vienna
97	Portugal	**Portugese**	**Recent**	Vienna Natural History Museum, Vienna
98	Thailand	**Bangkok**	**Recent**	Vienna Natural History Museum, Vienna
99	Indonesia	**Pulau**	**Recent**	Vienna Natural History Museum, Vienna
100	France	**Toulouse**	**Recent**	Vienna Natural History Museum, Vienna
101	Hungary	**Ullo**	**Recent**	Vienna Natural History Museum, Vienna
102	Turkey	**Ankara**	**Recent**	Vienna Natural History Museum, Vienna
103	Egypt	**Giza**	**Ancient - Pyramids**	Vienna Natural History Museum, Vienna
104	Japan	**Japanese**	**Recent**	Vienna Natural History Museum, Vienna
105	Egypt	**Sayala**	**Recent - Early Christian**	Vienna Natural History Museum, Vienna
106	New Mexico	**Manuelito**	**Recent**	Vienna Natural History Museum, Vienna
107	Bulgaria	**Sofia**	**Modern**	Vienna Natural History Museum, Vienna
108	Italy	**Bologna**	**Recent**	Vienna Natural History Museum, Vienna
109	Lithuania	**Lithuanians**	**Recent**	Vienna Natural History Museum, Vienna
110	France	**French**	**Recent**	Vienna Natural History Museum, Vienna
111	Austria	**Poysdorf**	**Neolithic**	Vienna Natural History Museum, Vienna
112	Morocco	**Mogodor**	**Recent**	Musee de l'Homme, Paris
113	Algeria	**Beni Manassah**	**Recent**	Musee de l'Homme, Paris
114	Tunisia	**Tunisia**	**Recent**	Musee de l'Homme, Paris
115	Canary Islands	**Canary Islands**	**Recent**	Musee de l'Homme, Paris
116	Mauritania	**Maure**		Musee de l'Homme, Paris

Pop.	Country	Population	Age	Source
117	Cape Verde	**Cap Vert**	**Recent**	Musee de l'Homme, Paris
118	Senegal	**Senegal**	**Recent**	Musee de l'Homme, Paris
119	Sudan	**Sudanese**	**Recent**	Musee de l'Homme, Paris
120	Ivory Coast	**Ivory Coast**	**Recent**	Musee de l'Homme, Paris
121	Benin	**Cote d'ór - Dahomey**		Musee de l'Homme, Paris
122	Niger	**Niger**	**Recent**	Musee de l'Homme, Paris
123	China	**Chinese**	**Recent**	Senkenberg Institute, Frankfurt
124	Thailand	**Thai**	**Recent**	Senkenberg Institute, Frankfurt
125	India	**Indian**	**Recent**	Senkenberg Institute, Frankfurt
126	Bangladesh	**Bengal**	**Recent**	Senkenberg Institute, Frankfurt
127	Nepal	**Nepali**	**Recent**	Senkenberg Institute, Frankfurt
128	Indonesia	**Sumatra**	**Recent**	Senkenberg Institute, Frankfurt
129	Malaysia	**Malaysia**	**Recent**	Senkenberg Institute, Frankfurt
130	Indonesia	**Madura Island**	**Recent**	Senkenberg Institute, Frankfurt
131	Russia	**Russia**	**Recent**	Senkenberg Institute, Frankfurt
132	Germany	**Frankfurt**	**Recent**	Senkenberg Institute, Frankfurt
133	Egypt	**Egypt**	**Ancient**	Musee de l'Homme, Paris
134	Egypt	**Thebes**		Musee de l'Homme, Paris
135	Egypt	**Egypt**	**Greek Epoch**	Musee de l'Homme, Paris
136	Ethiopia	**Kibish**	**Recent**	Musee de l'Homme, Paris
137		**Ile d'Élephantine**		Musee de l'Homme, Paris
138	Egypt	**Egypt**	**Recent**	Musee de l'Homme, Paris
139	Sudan	**Sudanese**	**Recent**	Musee de l'Homme, Paris
140	Somalia	**Somali**	**Recent**	Musee de l'Homme, Paris

Pop.	Country	Population	Age	Source
141	Tanzania	Various Tribes	Recent	Musee de l'Homme, Paris
142	Uganda	Uganda	Recent	Musee de l'Homme, Paris
143	Chad	Chad	Recent	Musee de l'Homme, Paris
144	Gabon	Gabon	Recent	Musee de l'Homme, Paris
145	Congo	Congo	Recent	Musee de l'Homme, Paris
146	Central African Republic	CAR	Recent	Musee de l'Homme, Paris
147	South Africa	RSA	Recent	Musee de l'Homme, Paris
148	Japan	Japan	Recent	Musee de l'Homme, Paris
149	Thailand	Thai	Recent	Musee de l'Homme, Paris
150	Armenia	Armenian	Recent	Musee de l'Homme, Paris
151	Iran	Iran	Recent	Musee de l'Homme, Paris
152	Syria	Syria	Recent	Musee de l'Homme, Paris
153	India	India	Recent	Musee de l'Homme, Paris
154	Laos	Laos	Recent	Musee de l'Homme, Paris
155	Vietnam	Vietnam	Recent	Musee de l'Homme, Paris
156	China	China	Recent	Musee de l'Homme, Paris
157	Mongolia	Mongolia	Recent	Musee de l'Homme, Paris
158	Russia	Siberia	Recent	Musee de l'Homme, Paris
159		Semiretchie		Musee de l'Homme, Paris
160	Russia	Russia	Recent	Musee de l'Homme, Paris
161	Russia	Russia	Neolithic	Musee de l'Homme, Paris
162	Sweden	Swede	Recent	Musee de l'Homme, Paris
163	Rumania	Rumania	Recent	Musee de l'Homme, Paris
164	Finland	Finn	Recent	Musee de l'Homme, Paris

Pop.	Country	Population	Age	Source
165	Germany	**German**	**Recent**	Musee de l'Homme, Paris
166	Bulgaria	**Bulgaria**	**Recent**	Musee de l'Homme, Paris
167	Ireland	**Ireland**	**Recent**	Musee de l'Homme, Paris
168	Greece	**Crete**	**Recent**	Musee de l'Homme, Paris
169	Turkey	**Turkey**	**Recent**	Musee de l'Homme, Paris
170	Italy	**Italy**	**Recent**	Musee de l'Homme, Paris
171	Italy	**Etruscan**	**Etruscan**	Musee de l'Homme, Paris
172	Italy	**Sardinia**	**Ancient**	Musee de l'Homme, Paris
173	Italy	**Rome**	**Ancient**	Musee de l'Homme, Paris
174	Portugal	**Portugal**	**Recent**	Musee de l'Homme, Paris
175	France	**France**	**Recent**	Musee de l'Homme, Paris
176	Angola	**Angola**	**Recent**	Musee de l'Homme, Paris
177	Madagascar	**Malagasy**	**Recent**	Musee de l'Homme, Paris
178	Indonesia	**Java**	**Recent**	Musee de l'Homme, Paris
179	Andaman Islands	**Andaman Islands**	**Recent**	Musee de l'Homme, Paris
180	Indonesia	**Celebes**	**Recent**	Musee de l'Homme, Paris
181	Philippines	**Philippines**	**Recent**	Musee de l'Homme, Paris
182	Indonesia	**Timor**	**Recent**	Musee de l'Homme, Paris
183	Australia	**Australia**	**Recent**	Musee de l'Homme, Paris
184	Tahiti	**Tahiti**	**Recent**	Musee de l'Homme, Paris
185	Papua New Guinea	**PNG**	**Recent**	Musee de l'Homme, Paris
186	New Caledonia	**New Caledonia**	**Recent**	Musee de l'Homme, Paris
187	Loyalty Islands -	**Loyalty Islands**	**Recent**	Musee de l'Homme, Paris
188	Micronesia	**Marianes**	**Recent**	Musee de l'Homme, Paris
189	Vanuatu	**New Hebrides**		Musee de l'Homme, Paris

Pop.	Country	Population	Age	Source
190	Solomon Islands	**Solomon Islands**	**Recent**	Musee de l'Homme, Paris
191	Caroline Islands	**Caroline Islands**	**Recent**	Musee de l'Homme, Paris
192	Kiribati	**Gilbert Islands**	**Recent**	Musee de l'Homme, Paris
193	New Zealand	**New Zealand**	**Recent**	Musee de l'Homme, Paris
194	Zimbabwe	**Zimbabwe**	**Recent**	British Museum of Natural History, London
195	South Africa	**RSA**	**Recent**	British Museum of Natural History, London
196	Kenya	**Elmentieta**	**Neolithic**	British Museum of Natural History, London
197	Malawi	**Nyassaland**	**Recent**	British Museum of Natural History, London
198	Tanzania	**Tanzania**	**Recent**	British Museum of Natural History, London
199	Nigeria	**Nigeria**	**Recent**	British Museum of Natural History, London
200	Uganda	**Uganda**	**Recent**	British Museum of Natural History, London
201		**Bantu**	**Recent**	British Museum of Natural History, London
202		**Ashanti**	**Recent**	British Museum of Natural History, London
203	Mozambique	**Mozambique**	**Recent**	British Museum of Natural History, London
204	Gabon	**Gabon**	**Recent**	British Museum of Natural History, London
205	French Congo	**French Congo**		British Museum of Natural History, London
206	Egypt	**Nubian**		British Museum of Natural History, London
207	Egypt	**Ancient Egypt**	**100-200 ad**	British Museum of Natural History, London
208	Egypt	**Egyptian**	**Recent**	British Museum of Natural History, London
209	Polynesia	**Easter Islands**	**Recent**	British Museum of Natural History, London
210	Polynesia	**Hawaii**	**Recent**	British Museum of Natural History, London
211	Polynesia	**Tonga Islands**	**Recent**	British Museum of Natural History, London
212	Polynesia	**Cook Islands**	**Recent**	British Museum of Natural History, London
213	Polynesia	**Marquesas Islands**	**Recent**	British Museum of Natural History, London
214	Micronesia	**Caroline Islands**	**Recent**	British Museum of Natural History, London

Pop.	Country	Population	Age	Source
215	Papua New Guines	**Bismarck Archipelego**	**Recent**	British Museum of Natural History, London
216	Solomon Islands	**Solomon Islands**		British Museum of Natural History, London
217	Vanuatu	**New Hebrides**		British Museum of Natural History, London
218	Loyalty Islands	**Loyalty Islands**	**Recent**	British Museum of Natural History, London
219	Kingsmill Islands	**Kingsmill Islands**	**Recent**	British Museum of Natural History, London
220	New Zealand	**Chatham Islands**	**Recent**	British Museum of Natural History, London
221	New Zealand	**New Zealand**	**Recent**	British Museum of Natural History, London
222	Australia	**Australia**	**Recent**	British Museum of Natural History, London
223	Papua New Guinea	**PNG**	**Recent**	British Museum of Natural History, London
224	China	**Chinese**	**Recent**	British Museum of Natural History, London
225	Andaman Islands	**Andaman Islands**	**Recent**	British Museum of Natural History, London
226	Nicobar Islands	**Nicobar Islands**	**Recent**	British Museum of Natural History, London
227	Malaysia	**Malaya**	**Recent**	British Museum of Natural History, London
228	Indonesia	**Sumatra**	**Recent**	British Museum of Natural History, London
229	Indonesia?	**Borneo**	**Recent**	British Museum of Natural History, London
230	Thailand	**Thai**	**Recent**	British Museum of Natural History, London
231	Phillipines	**Phillipines**	**Recent**	British Museum of Natural History, London
232	Indonesia	**Molucas**	**Recent**	British Museum of Natural History, London
233	Indonesia	**Celebes**	**Recent**	British Museum of Natural History, London
234	Indonesia	**Java**	**Recent**	British Museum of Natural History, London
235	Nepal	**Nepali**	**Recent**	British Museum of Natural History, London
236	Tibet	**Tibet**	**Recent**	British Museum of Natural History, London
237	Burma	**Burma**	**Recent**	British Museum of Natural History, London
238	SrI Lanka	**Sri Lanka**	**Recent**	British Museum of Natural History, London

Pop.	Country	Population	Age	Source
239	India	**Indian**	**Recent**	British Museum of Natural History, London
240	Bangladesh	**Bengal**	**Recent**	British Museum of Natural History, London
241	Afghanistan	**Afghanistan**	**Recent**	British Museum of Natural History, London
242	Iraq	**Mesopotamia**	**Ancient**	British Museum of Natural History, London
243	Iraq	**Mesopotamia**	**Recent**	British Museum of Natural History, London
244	Israel	**Neolithic**	**Neolithic**	British Museum of Natural History, London
245	Israel	**Lachish**	**Bronze**	British Museum of Natural History, London
246	Cyprus	**Cyprus**	**Recent**	British Museum of Natural History, London
247	Turkey	**Turk**	**Recent**	British Museum of Natural History, London
248	Greece	**Crete**	**Recent**	British Museum of Natural History, London
249	Greece	**Greece**	**Recent**	British Museum of Natural History, London
250	Greece	**Greece**	**Ancient**	British Museum of Natural History, London
251	Russia	**Russia**	**Recent**	British Museum of Natural History, London
252	Romania		**Recent**	British Museum of Natural History, London
253	Armenia	**Armenian**	**Recent**	British Museum of Natural History, London
254	Czechoslovakia	**Czech**	**Recent**	British Museum of Natural History, London
255	Poland	**Pole**	**Recent**	British Museum of Natural History, London
256	Latvia	**Latvia**	**Recent**	British Museum of Natural History, London
257	Finland	**Finland**	**Recent**	British Museum of Natural History, London
258	Sweden	**Sweden**	**Recent**	British Museum of Natural History, London
259	Norway	**Norway**	**Recent**	British Museum of Natural History, London
260	Denmark	**Dane**	**Recent**	British Museum of Natural History, London
261	Netherlands	**Holland**	**Recent**	British Museum of Natural History, London
262	Italy	**Italy**	**Recent**	British Museum of Natural History, London
263	Netherlands	**Holland**	**Ancient**	British Museum of Natural History, London

Pop.	Country	Population	Age	Source
264	Germany	**German**	**Recent**	British Museum of Natural History, London
265	Austria	**Austria**	**Recent**	British Museum of Natural History, London
266	Switzerland	**Switzerland**	**Recent**	British Museum of Natural History, London
267	Greece	**Corfu**	**Recent**	British Museum of Natural History, London
268	Malta	**Malta**	**Neolithic**	British Museum of Natural History, London
269	Italy	**Rome**	**Ancient**	British Museum of Natural History, London
270	Spain	**Spain**	**Recent**	British Museum of Natural History, London
271	Portugal	**Portugese**	**Recent**	British Museum of Natural History, London
272	France	**French**	**Recent**	British Museum of Natural History, London
273	Great Britain	**English**	**Early/ Neolithic**	British Museum of Natural History, London
274	Great Britain	**English**	**Bronze**	British Museum of Natural History, London
275	Great Britain	**English**	**Iron**	British Museum of Natural History, London
276	Great Britain	**English**	**Romano-Brit**	British Museum of Natural History, London
277	Great Britain	**English**	**Saxon**	British Museum of Natural History, London
278	Great Britain	**English**	**Medieval**	British Museum of Natural History, London
279	Great Britain	**English**	**Unknown**	British Museum of Natural History, London
280	Japan	**Japanese**	**Recent**	American Museum of Natural History, New York
281	Polynesia	**Marquesas Islands**	**Recent**	American Museum of Natural History, New York
282	Polynesia	**Cook Islands**	**Recent**	American Museum of Natural History, New York
283	New Zealand	**Chatham Islands**	**Recent**	American Museum of Natural History, New York
284	Australia	**Australia**	**Recent**	American Museum of Natural History, New York
285	Caroline Islands	**Caroline Islands**	**Recent**	American Museum of Natural History, New York
286	Micronesia	**Marshall Islands**	**Recent**	American Museum of Natural History, New York

Pop.	Country	Population	Age	Source
287	Vanuatu	**New Hebrides**		American Museum of Natural History, New York
288	Solomon Islands	**Solomon Islands**	**Recent**	American Museum of Natural History, New York
289	Papua New Guines	**Bismarck Archipelego**	**Recent**	American Museum of Natural History, New York
290	Papua New Guines	**New Britain**	**Recent**	American Museum of Natural History, New York
291	Indonesia	**Sumatra**	**Recent**	American Museum of Natural History, New York
292	Malaysia	**Malay Peninsula**	**Recent**	American Museum of Natural History, New York
293	Thailand	**Thai**	**Recent**	American Museum of Natural History, New York
294	Andaman Islands	**Andaman Islands**	**Recent**	American Museum of Natural History, New York
295	China	**Chinese**	**Recent**	American Museum of Natural History, New York
296	Korea	**Korea**	**Recent**	American Museum of Natural History, New York
297	Japan	**Japanese**	**Recent**	American Museum of Natural History, New York
298	Japan	**Ainu**	**Recent**	American Museum of Natural History, New York
299	India	**Indian**	**Recent**	American Museum of Natural History, New York
300	Bangladesh	**Bengal**	**Recent**	American Museum of Natural History, New York
301	Pakistan	**Baluchistan**	**Recent**	American Museum of Natural History, New York
302	Tanzania	**Masai**	**Recent**	American Museum of Natural History, New York
303	Somalia	**Somali**	**Recent**	American Museum of Natural History, New York
304	Kenya	**Kenya**	**Recent**	American Museum of Natural History, New York
305	Malawi	**Malawi**	**Recent**	American Museum of Natural History, New York
306	Rwanda	**Rwanda**	**Recent**	American Museum of Natural History, New York
307	South Africa	**RSA**	**Recent**	American Museum of Natural History, New York
308	Namibia	**Namibia**	**Recent**	American Museum of Natural History, New York
309	Ghana	**Ghana**	**Recent**	American Museum of Natural History, New York
310	Nigeria	**Nigeria**	**Recent**	American Museum of Natural History, New York

Pop.	Country	Population	Age	Source
311	Cameroon	Cameroon	Recent	American Museum of Natural History, New York
312	Togo	Togo	Recent	American Museum of Natural History, New York
313	Tunisia	Tunisia	Recent	American Museum of Natural History, New York
314	Egypt	El Hesa	Recent	American Museum of Natural History, New York
315	Egypt	Thebes		American Museum of Natural History, New York
316	Syria	Syria	Recent	American Museum of Natural History, New York
317	Cyprus	Cyprus	Recent	American Museum of Natural History, New York
318	Lebanon	Lebanon	Recent	American Museum of Natural History, New York
319	Rhodes	Rhodes		American Museum of Natural History, New York
320	Armenia	Armenian	Recent	American Museum of Natural History, New York
321	Dalmatia	Dalmatian	Recent	American Museum of Natural History, New York
322	Montenegro	Montenegro	Recent	American Museum of Natural History, New York
323	Bosnia	Bosnia	Recent	American Museum of Natural History, New York
324	Spain	Spain	Recent	American Museum of Natural History, New York
325	Russia	Russia	Recent	American Museum of Natural History, New York
326	Rumania	Romanian	Recent	American Museum of Natural History, New York
327	Poland	Pole	Recent	American Museum of Natural History, New York
328	Italy	Italy	Recent	American Museum of Natural History, New York
329	Greece	Greece	Recent	American Museum of Natural History, New York
330	Germany	German	Recent	American Museum of Natural History, New York
331	Denmark	Dane	Recent	American Museum of Natural History, New York

APPENDIX B
DATA FOR MODERN HUMAN SAMPLE, SORTED BY REGION.

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT*		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1	201	.	.	2	2	2	2	1	1	0	0	0	1	1	1	2	3	3	3	.	.	.	.	8.2	5.8	9.1	7.0	9.0	7.6	8.3	5.6	2	1	1	2	1	0
2	88	.	999	.	1	.	2	.	0	.	1	.	0	.	0	.	1	.	2	.	.	.	.	.	.	8.4	7.3	.	.	7.1	6.2	1	0	0	2	1	0
3	88	.	999	3	2	.	2	0	0	.	0	1	0	.	1	3	2	.	3	.	.	.	.	7.0	6.8	8.3	7.0	.	.	7.0	6.8	2	0	0	3	0	1
4	91	.	999	2	3	3	2	0	0	0	0	0	0	0	0	2	4	4	2	.	.	.	.	6.2	5.7	8.6	7.6	8.6	7.2	6.3	5.5	3	0	0	2	0	0
5	88	.	999	.	4	.	5	.	0	.	0	.	0	.	0	.	5	.	6	.	.	.	.	.	.	7.7	7.0	.	.	6.4	5.3	4	0	0	5	0	0
6	106	.	999	3	.	.	3	0	.	.	0	1	.	.	0	6	.	.	6	.	.	.	.	7.1	6.8	.	.	.	.	7.5	6.7	.	.	.	3	0	1
7	999	.	999	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.3	5.8	.	.	.	.	.	.	.	.	.	2	0	1
8	999	.	999	1	1	.	.	0	0	.	.	0	0	.	.	1	1	.	.	.	.	.	.	6.6	5.7	7.7	6.2	.	.	.	.	1	0	0	1	0	0
9	999	.	999	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	0
10	999	.	999	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	5.8	6.5	.	.	.	.	5.7	6.2	.	.	.	2	1	0
11	999	.	999	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.6	7.1	.	.	.	.	.	.	.	.	.	0	1	1
12	999	.	999	1	.	1	1	0	.	0	0	1	.	2	2	1	.	1	1	.	.	.	.	6.0	5.6	.	.	8.4	6.0	5.5	5.3	1	0	2	1	0	1
13	70	1	6	1	1	.	0	0	0	.	0	0	1	.	0	1	0	.	0	.	.	.	.	6.6	.	8.8	.	.	.	7.1	.	1	0	1	1	0	0
14	273	1	29	0	0	.	.	0	0	.	.	0	1	.	.	0	0	.	.	.	.	.	.	5.6	5.3	.	6.5	.	.	.	.	0	0	1	0	0	0
15	274	1	29	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	6.0	6.5	.	.	.	.	6.0	7.0	.	.	.	1	1	1
16	274	1	29	1	.	.	1	0	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	6.4	6.2	.	.	.	.	6.6	6.2	.	.	.	1	0	0
17	274	1	29	1	.	0	2	0	.	1	0	0	.	0	0	1	.	0	2	.	.	.	.	6.1	5.6	.	.	8.3	6.8	6.3	5.7	0	1	0	1	0	0
18	274	1	29	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	5.3	6.1	.	.	.	.	6.0	6.1	.	.	.	2	0	0
19	274	1	29	2	.	.	2	0	.	.	0	2	.	.	2	2	.	.	2	.	.	.	.	6.3	6.3	.	.	.	.	6.2	6.2	.	.	.	2	0	2
20	274	1	29	2	0	.	.	0	2	.	.	1	1	.	.	2	0	.	.	.	3	.	.	.	6.5	8.4	7.2	.	.	.	.	0	2	1	2	0	1
21	274	1	29	.	1	1	1	.	0	2	0	.	1	1	1	.	0	1	1	.	.	1	.	.	.	9.5	7.4	9.4	7.5	6.2	6.2	1	0	1	1	0	1
22	274	1	29	1	.	.	1	0	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	4.8	5.6	.	.	.	.	5.2	5.6	.	.	.	1	0	0
23	274	1	29	1	.	.	1	0	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	6.4	6.1	.	.	.	.	6.5	6.0	.	.	.	1	0	0
24	274	1	29	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1	.	.	.	.	6.4	6.6	9.5	7.6	9.3	7.6	7.4	6.7	1	0	1	1	1	0
25	274	1	29	2	0	0	1	0	1	1	0	1	0	0	1	2	0	0	1	.	.	.	.	5.1	5.4	.	6.4	7.4	6.7	.	4.8	0	1	0	2	0	1

*Column names are as follows: No. (case number) Pop. (population number), RG. (Region), and Coun (Country) are labels. Mar.Ridge (Marginal Ridges), Tubercles, Curvature, ASU Shov (Arizona State University system shoveling), ASU Tub (Arizona State University Tubercles) are the morphologies scored, r2 (right I2), r1 (right I1), l1 (left I1), l2 (left I2); measurements are listed as MD (mesial-distal) and BL (buccal-lingual) for the RT (right) I2, RT I1, LT (left) I1, LT I2; then are the considated incisor morphology scores, CENT(ral) and LAT(eral) R(idges), T(ubercles), and C(urvature).

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT I2		RT I1		LT I1		LT I2		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
26	274	1	29	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.8	6.6	7.7	6.3	.	.	0	0	1	.	.	.
27	274	1	29	.	.	0	1	.	.	0	0	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	7.9	6.7	.	5.0	0	0	1	1	0	1
28	274	1	29	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	8.4	6.9	.	.	.	.	1	0	0	.	.	.
29	274	1	29	1	2	2	1	0	0	0	1	1	1	1	0	1	2	2	2	.	.	.	.	.	6.5	8.5	7.2	.	6.8	7.2	6.2	2	0	1	1	0	1
30	274	1	29	1	1	0	1	1	1	3	0	0	1	0	0	1	1	0	1	.	.	.	.	.	7.0	8.1	7.6	8.5	7.6	6.3	6.8	1	1	1	1	1	0
31	274	1	29	1	.	0	.	0	.	0	.	1	.	0	.	1	.	0	.	.	.	.	.	5.8	5.8	.	.	.	6.7	.	.	0	0	0	1	0	1
32	274	1	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	5.7	6.8	6.6	7.0	6.4	5.5	6.1	0	0	0	1	0	0
33	274	1	29	.	0	0	1	.	0	0	0	.	0	0	0	.	0	0	1	.	.	.	.	.	.	7.8	7.3	8.0	7.4	6.0	5.8	0	0	0	1	0	0
34	274	1	29	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	7.9	6.3	.	.	.	.	0	0	2	.	.	.
35	274	1	29	1	1	1	2	0	0	0	0	0	1	1	0	1	1	1	2	.	.	.	.	.	6.4	.	8.1	.	8.0	.	6.6	1	0	1	1	0	0
36	274	1	29	1	0	1	1	0	0	0	0	1	1	1	1	1	0	1	1	.	.	.	.	6.1	6.1	8.1	6.7	.	6.8	.	6.1	0	0	1	1	0	1
37	274	1	29	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	9.1	6.7	.	.	.	.	0	0	0	.	.	.
38	274	1	29	1	.	.	1	0	.	.	0	2	.	.	1	1	.	.	1	.	.	.	.	6.9	6.7	.	.	.	.	7.3	6.3	.	.	.	1	0	2
39	274	1	29	.	.	1	2	.	.	2	1	.	.	1	0	.	.	1	2	.	.	1	.	.	.	.	.	.	.	6.0	6.3	1	2	1	2	1	0
40	274	1	29	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.0	.	.	.	1	0	1
41	274	1	29	.	1	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	8.1	6.1	8.0	6.6	.	.	1	0	1	.	.	.
42	274	1	29	1	1	1	1	0	1	1	0	0	0	0	0	1	2	1	1	.	.	.	.	6.5	6.3	8.1	7.0	8.1	7.1	5.8	5.9	1	1	0	1	0	0
43	274	1	29	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	7.8	7.0	.	.	0	0	1	.	.	.
44	274	1	29	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.4	.	.	.	1	1	1
45	274	1	29	.	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	6.9	.	.	1	2	1	.	.	.
46	274	1	29	0	.	0	1	0	.	0	1	1	.	1	0	0	.	0	0	.	.	.	.	6.3	6.3	.	.	7.7	7.0	6.0	6.8	0	0	1	0	0	1
47	274	1	29	1	.	.	1	0	.	.	0	4	.	.	3	1	.	.	1	.	.	.	.	4.4	6.0	.	.	.	.	3.7	5.4	.	.	.	1	0	4
48	274	1	29	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.4	5.9	.	.	.	.	.	.	.	.	.	2	0	1
49	274	1	29	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.3	.	.	.	2	0	1
50	274	1	29	3	4	3	.	0	2	2	.	0	1	1	.	4	6	5	.	.	3	3	.	7.6	6.7	10.6	7.4	10.1	7.5	.	.	4	2	1	3	0	0
51	274	1	29	1	1	1	.	0	2	2	.	1	1	0	.	1	1	0	.	.	2	1	.	5.1	.	8.9	7.0	8.7	7.3	.	.	1	2	1	1	0	1
52	274	1	29	2	2	.	.	1	2	.	.	1	0	.	.	2	2	.	.	.	2	.	.	6.6	6.7	8.5	8.3	.	.	.	.	2	2	0	2	1	1
53	274	1	29	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	8.0	7.3	.	.	.	3	0	0
54	274	1	29	.	2	1	3	.	0	0	1	.	1	1	1	.	2	1	3	.	.	.	.	.	.	9.3	7.2	9.2	7.2	6.9	6.4	2	0	1	3	1	1
55	274	1	29	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.5	5.9	.	.	.	0	0	2
56	273	1	29	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	5.3	.	.	.	1	0	0
57	273	1	29	.	0	0	1	.	0	0	1	.	1	1	1	.	0	0	1	.	.	.	.	.	.	.	6.7	7.9	6.9	6.7	5.9	0	0	1	1	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
58	276	1	29	2	.	.	1	0	.	.	0	0	.	.	0	2	.	.	1	.	.	.	.	5.7	5.2	.	.	.	.	5.9	5.4	. . .	2 0 0
59	273	1	29	2	1	1	2	0	1	2	0	0	1	0	0	2	1	1	2	.	.	2	.	.	6.1	9.3	7.1	9.2	6.8	6.2	6.0	1 1 1	2 0 0
60	278	1	29	1	1	1	1	0	2	2	1	1	1	1	1	2	1	1	1	.	1	1	.	.	6.1	9.2	6.4	9.1	6.5	7.4	6.3	1 2 1	1 0 1
61	278	1	29	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.4	6.6	.	.	.	.	.	.	. . .	1 0 0
62	278	1	29	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	5.4	6.3	.	.	.	.	5.3	6.2	. . .	2 0 0
63	278	1	29	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.0	5.1	. . .	0 0 1
64	278	1	29	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	5.6	5.1	.	.	.	.	.	.	. . .	2 0 1
65	277	1	29	1	1	.	1	0	2	.	0	0	0	.	0	1	1	.	1	.	1	.	.	.	5.1	7.7	6.1	.	.	5.7	5.0	1 2 0	1 0 0
66	277	1	29	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	.	.	.	.	6.4	6.2	.	6.8	8.1	7.1	6.3	6.0	0 0 0	0 0 1
67	277	1	29	1	0	0	1	0	0	0	1	0	0	0	0	2	0	0	2	.	.	.	.	7.2	5.9	8.8	8.0	8.8	7.4	6.5	6.3	0 0 0	1 0 0
68	277	1	29	1	2	2	1	1	0	2	1	1	0	1	0	1	2	2	1	.	.	1	.	6.5	6.2	8.8	7.3	8.7	7.3	6.8	6.8	2 0 0	1 1 1
69	276	1	29	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.8	6.1	.	.	.	.	.	.	. . .	0 1 0
70	276	1	29	1	1	1	.	0	0	0	.	1	1	1	.	1	1	1	.	.	.	.	.	4.5	5.2	7.0	7.0	6.5	6.4	.	.	1 0 1	1 0 1
71	276	1	29	.	.	2	2	.	.	0	0	.	.	2	2	.	.	2	2	.	.	.	.	.	.	.	.	9.2	7.5	7.7	6.0	2 0 2	2 0 2
72	279	1	29	2	.	.	2	0	.	.	0	2	.	.	2	2	.	.	2	.	.	.	.	.	6.1	.	.	.	.	6.1	6.0	. . .	2 0 2
73	279	1	29	.	0	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	8.6	6.6	.	.	.	.	0 2 0	. . .
74	275	1	29	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	6.0	. . .	1 0 2
75	275	1	29	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	.	5.5	.	.	.	.	6.7	5.6	. . .	2 0 1
76	276	1	29	1	1	.	.	0	0	.	.	0	0	.	.	1	0	.	.	.	.	.	.	6.3	6.1	8.4	6.9	.	.	.	.	1 0 0	1 0 0
77	275	1	29	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.7	5.8	. . .	2 1 0
78	275	1	29	2	0	0	2	0	1	1	0	1	1	1	1	2	0	0	2	.	.	.	.	.	5.2	8.3	7.1	.	7.6	5.7	6.0	0 1 1	2 0 1
79	275	1	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.3	5.9	7.4	7.1	.	6.8	6.1	5.8	0 0 0	1 0 0
80	275	1	29	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	8.4	6.0	.	.	2 0 1	. . .
81	275	1	29	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	0	.	.	.	.	6.1	6.4	.	.	.	.	.	6.4	. . .	1 0 1
82	276	1	29	1	0	.	1	0	0	.	0	0	0	.	0	1	0	.	1	.	.	.	.	6.1	6.0	8.3	6.8	.	.	6.1	5.4	0 0 0	1 0 0
83	278	1	29	0	.	.	0	1	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.3	6.4	.	.	.	.	5.5	5.7	. . .	0 1 1
84	278	1	29	2	.	1	1	1	.	0	0	0	.	0	0	2	.	1	1	.	.	.	.	6.1	5.6	.	.	7.3	6.1	6.3	5.7	1 0 0	2 1 0
85	278	1	29	1	0	0	1	1	1	1	1	0	1	1	0	1	0	0	1	.	.	.	.	5.3	6.5	.	7.2	8.1	7.0	5.6	6.2	0 1 1	1 1 0
86	278	1	29	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	5.6	.	.	.	.	.	.	. . .	1 0 0
87	278	1	29	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	8.7	6.9	6.6	6.8	1 1 1	1 1 1
88	278	1	29	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	.	.	.	.	5.7	6.1	8.0	6.5	.	6.7	5.4	6.3	0 0 0	1 0 0
89	278	1	29	.	0	0	1	.	2	2	0	.	0	0	0	.	0	0	1	.	3	2	.	.	.	.	7.0	7.9	6.7	6.1	5.8	0 2 0	1 0 0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
90	278	1	29	1	1	1	2	0	0	0	0	0	0	0	0	1	1	1	2	.	.	.	.	6.3	6.3	8.3	6.9	.	7.0	6.4	6.3	1	0	0	1	0	0
91	278	1	29	.	.	0	0	.	.	1	0	.	.	1	0	.	.	0	0	.	.	.	.	.	.	.	.	8.1	7.2	6.3	6.5	0	1	1	0	0	0
92	278	1	29	1	1	1	0	0	0	0	1	2	2	2	2	0	0	0	0	.	.	.	.	5.6	5.7	7.8	6.9	.	6.8	.	5.8	1	0	2	1	0	2
93	278	1	29	2	0	0	.	0	0	1	.	0	0	1	.	2	0	0	.	.	.	.	.	6.1	6.1	7.6	6.3	7.6	6.3	.	.	0	0	0	2	0	0
94	278	1	29	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.0	5.0	.	.	.	1	0	1
95	278	1	29	.	0	.	0	.	0	.	1	.	1	.	0	.	0	.	0	.	.	.	.	.	.	8.0	6.1	.	.	5.5	5.5	0	0	1	0	1	0
96	278	1	29	0	.	0	0	0	.	0	0	1	.	1	1	0	.	0	0	.	.	.	.	4.5	5.5	.	.	8.0	6.6	4.8	5.9	0	0	1	0	0	1
97	278	1	29	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	.	.	.	.	5.5	5.5	7.2	6.6	7.4	6.6	5.5	5.2	1	0	1	0	0	1
98	278	1	29	1	1	1	1	1	1	1	0	3	2	2	2	1	1	1	0	.	.	.	.	.	4.8	8.1	7.0	8.0	6.6	5.1	5.9	1	1	2	1	1	3
99	278	1	29	1	0	0	1	1	2	1	1	1	2	2	1	1	0	0	0	.	2	.	.	7.3	6.7	9.4	7.7	9.5	7.6	7.7	6.5	0	2	2	1	1	1
100	278	1	29	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	6.4	.	.	.	0	1	0
101	278	1	29	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.6	5.7	.	.	.	1	0	1
102	278	1	29	1	1	.	.	0	1	.	.	0	0	.	.	1	1	.	.	.	.	.	.	5.5	6.3	7.9	6.6	.	.	.	.	1	1	0	1	0	0
103	278	1	29	1	1	1	1	0	1	1	0	1	2	2	1	1	1	1	1	.	.	.	.	5.4	5.4	8.3	6.4	8.0	6.4	5.5	5.5	1	1	2	1	0	1
104	278	1	29	0	.	0	0	0	.	0	0	0	.	0	0	0	.	0	0	.	.	.	.	6.0	5.8	.	.	7.7	6.1	6.0	6.1	0	0	0	0	0	0
105	278	1	29	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.2	.	.	.	1	0	0
106	278	1	29	1	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	5.4	.	.	.	.	.	.	.	.	.	1	0	1
107	278	1	29	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	5.7	.	.	.	0	0	0
108	278	1	29	1	.	1	1	1	.	2	0	0	.	0	0	2	.	1	1	.	.	2	.	6.2	5.6	.	.	8.3	6.9	.	5.4	1	2	0	1	1	0
109	278	1	29	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	7.8	6.4	7.2	6.5	.	.	1	0	1	.	.	.
110	278	1	29	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.4	.	.	.	2	0	2
111	278	1	29	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.1	5.8	.	.	.	.	.	.	.	.	.	1	0	1
112	278	1	29	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.3	5.9	.	.	.	.	.	.	.	.	.	2	0	1
113	278	1	29	.	.	1	1	.	.	0	1	.	.	1	0	.	.	1	1	.	.	.	.	.	.	.	.	8.1	6.5	6.4	6.1	1	0	1	1	1	0
114	278	1	29	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	7.2	7.2	.	.	.	2	0	0
115	278	1	29	5	0	1	1	0	2	1	0	1	0	1	0	6	0	1	1	.	.	.	.	6.1	6.8	7.7	6.9	7.9	6.9	5.7	5.6	0	2	0	5	0	1
116	278	1	29	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	.	.	.	.	5.8	5.3	7.7	6.6	.	6.6	6.1	5.2	0	0	0	1	0	1
117	278	1	29	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	8.8	6.5	.	.	1	0	1	.	.	.
118	278	1	29	1	1	1	1	1	2	2	1	0	1	0	0	1	1	1	1	.	1	1	.	5.3	5.8	7.2	6.9	7.2	7.0	5.1	6.0	1	2	1	1	1	0
119	278	1	29	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.2	5.4	.	.	.	.	.	.	.	.	.	1	0	1
120	278	1	29	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.2	6.2	.	.	.	0	1	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
121	278	1	29	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	4.7	5.4	. . .	1 0 2
122	278	1	29	2	1	.	.	0	0	.	.	1	1	.	.	2	1	.	.	.	.	.	.	.	5.0	7.0	6.3	.	.	.	.	1 0 1	2 0 1
123	278	1	29	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.6	5.9	. . .	2 0 0
124	278	1	29	.	1	1	1	.	1	0	0	.	0	0	0	.	1	1	1	.	.	.	.	.	.	8.0	6.5	7.5	6.7	5.3	5.7	1 1 0	1 0 0
125	276	1	29	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	5.4	. . .	0 0 2
126	276	1	29	1	1	2	1	0	0	0	0	0	1	1	1	2	1	2	1	.	.	.	.	5.1	5.7	.	6.1	7.6	6.1	.	5.6	1 0 1	1 0 0
127	276	1	29	2	0	0	1	0	2	2	0	0	0	0	0	2	0	0	1	.	1	1	.	6.6	6.2	8.4	7.7	8.3	7.7	6.3	6.4	0 2 0	2 0 0
128	276	1	29	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	.	.	.	.	6.0	5.5	7.4	6.3	7.8	6.1	6.0	5.7	0 0 1	1 0 1
129	276	1	29	1	1	1	1	0	2	0	0	0	1	1	0	1	1	1	1	.	1	.	.	7.2	5.9	.	7.2	8.4	7.1	6.9	6.1	1 2 1	1 0 0
130	276	1	29	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	6.2	6.4	7.7	7.5	.	.	.	.	1 1 1	1 1 1
131	276	1	29	.	2	.	.	.	2	.	.	.	3	.	.	.	2	.	.	.	1	.	.	.	.	8.1	6.8	.	.	.	.	2 2 3	. . .
132	276	1	29	.	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	7.4	6.4	6.2	6.3	1 0 1	1 0 1
133	276	1	29	1	.	1	1	0	.	0	0	1	.	0	1	1	.	1	1	.	.	.	.	7.7	6.1	.	.	8.8	7.2	7.5	6.3	1 0 0	1 0 1
134	276	1	29	1	1	1	.	1	1	0	.	0	0	0	.	1	1	1	.	.	.	.	.	5.4	6.0	7.3	7.1	8.0	7.3	.	.	1 1 0	1 1 0
135	276	1	29	2	1	1	2	0	1	0	0	1	1	0	0	2	1	1	1	.	.	.	.	.	5.8	.	6.5	7.8	6.4	5.7	6.0	1 1 1	2 0 1
136	276	1	29	2	2	.	1	0	0	.	0	1	1	.	1	2	2	.	1	.	.	.	.	.	5.8	7.3	6.4	.	.	6.5	5.7	2 0 1	2 0 1
137	276	1	29	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	2	.	.	.	.	.	5.8	7.3	6.0	.	6.1	6.2	5.4	0 0 0	1 0 0
138	276	1	29	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.5	6.3	. . .	0 0 1
139	276	1	29	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	.	.	.	.	5.2	6.2	.	7.2	7.2	7.4	5.2	6.2	0 0 1	0 0 0
140	276	1	29	1	0	0	1	0	2	2	1	1	2	2	0	1	0	0	1	.	1	2	.	6.4	6.2	8.2	6.3	8.4	6.7	6.3	6.5	0 2 2	1 0 1
141	276	1	29	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0	.	.	.	.	5.2	5.8	7.1	6.2	7.9	6.3	5.7	5.7	0 0 1	0 0 1
142	276	1	29	0	1	.	.	0	0	.	.	0	1	.	.	0	1	.	.	.	.	.	.	6.1	5.7	7.6	6.8	.	.	.	.	1 0 1	0 0 0
143	276	1	29	0	0	.	.	0	0	.	.	2	2	.	.	0	0	.	.	.	.	.	.	5.6	5.8	8.0	6.9	.	.	.	.	0 0 2	0 0 2
144	276	1	29	.	.	0	1	.	.	2	0	.	.	0	1	.	.	0	1	.	.	2	.	.	.	.	.	8.1	7.0	6.6	6.0	0 2 0	1 0 1
145	276	1	29	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	.	.	.	.	5.4	5.8	.	6.4	6.4	6.5	5.2	5.8	0 0 1	1 0 1
146	276	1	29	.	1	1	1	.	0	0	0	.	0	0	0	.	1	1	1	.	.	.	.	.	.	.	7.1	.	6.8	6.4	5.7	1 0 0	1 0 0
147	276	1	29	2	2	2	1	0	0	0	1	1	1	1	1	2	2	2	1	.	.	.	.	6.2	6.1	8.1	7.0	.	6.6	6.6	5.8	2 0 1	2 0 1
148	276	1	29	1	1	1	2	0	0	0	0	1	1	1	1	1	1	1	2	.	.	.	.	7.9	7.0	9.1	7.9	9.0	8.0	7.2	7.5	1 0 1	1 0 1
149	276	1	29	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.6	6.1	. . .	2 0 2
150	276	1	29	0	.	0	.	0	.	0	.	1	.	0	.	0	.	0	.	.	.	.	.	6.3	6.4	.	.	8.1	7.1	.	.	0 0 0	0 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
151	276	1	29	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	.	.	.	.	.	6.0	7.2	7.0	7.6	6.9	6.3	6.1	0 0 0	1 0 0
152	276	1	29	1	1	0	1	0	1	0	0	0	1	1	0	1	1	0	1	.	.	.	.	5.8	5.8	7.5	6.9	8.0	6.6	6.5	5.9	1 1 1	1 0 0
153	276	1	29	2	1	1	2	1	0	1	0	1	2	2	1	2	1	2	2	.	.	.	.	.	5.8	7.6	6.3	8.2	6.6	.	5.6	1 0 2	2 1 1
154	276	1	29	.	.	0	1	.	.	0	0	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	8.1	6.6	4.6	5.1	0 0 1	1 0 1
155	276	1	29	.	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	8.8	7.6	6.6	7.0	1 0 1	1 0 1
156	276	1	29	0	.	0	0	0	.	1	0	3	.	2	2	0	.	0	0	.	.	.	.	5.5	5.5	.	.	7.0	6.3	.	5.2	0 1 2	0 0 3
157	276	1	29	1	1	1	1	0	2	2	0	1	1	1	1	1	1	1	1	.	1	1	.	4.6	5.1	.	6.1	.	6.2	4.6	5.0	1 2 1	1 0 1
158	276	1	29	0	0	0	.	0	0	0	.	1	1	1	.	0	0	0	.	.	.	.	.	5.3	5.9	7.4	6.9	7.8	6.8	.	.	0 0 1	0 0 1
159	276	1	29	.	1	.	0	.	0	.	1	.	1	.	1	.	1	.	0	.	.	.	.	.	.	7.4	6.1	.	.	5.7	5.9	1 0 1	0 1 1
160	276	1	29	0	1	1	0	0	0	2	0	0	0	1	0	0	1	1	0	.	.	1	.	5.5	5.3	7.3	6.6	7.0	6.7	.	5.3	1 0 0	0 0 0
161	276	1	29	0	0	1	.	0	0	0	.	0	1	0	.	0	0	0	.	.	.	.	.	5.1	5.1	7.5	6.4	7.7	6.6	.	.	0 0 1	0 0 0
162	276	1	29	1	.	0	.	0	.	0	.	0	.	0	.	1	.	0	.	.	.	.	.	6.6	5.5	.	.	7.9	6.2	.	.	0 0 0	1 0 0
163	276	1	29	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	6.6	. . .	2 0 1
164	276	1	29	.	.	0	0	.	.	1	0	.	.	1	2	.	.	0	0	.	.	.	.	.	.	.	.	8.0	6.7	.	6.0	0 1 1	0 0 2
165	276	1	29	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.9	6.3	.	.	.	.	.	.	. . .	1 0 0
166	276	1	29	0	.	0	0	3	.	0	3	0	.	0	0	0	.	0	0	.	.	.	.	6.0	6.0	.	.	7.5	7.0	5.8	6.0	0 0 0	0 3 0
167	276	1	29	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	5.3	. . .	1 1 1
168	276	1	29	.	1	0	.	.	0	1	.	.	0	0	.	.	1	0	.	.	.	.	.	.	.	8.8	7.3	8.8	7.0	.	.	1 0 0	. . .
169	276	1	29	1	1	2	2	0	2	2	0	1	0	0	0	1	1	2	2	.	2	2	.	.	6.3	8.5	7.2	8.5	7.4	7.0	5.8	1 2 0	1 0 1
170	276	1	29	.	1	1	0	.	0	0	0	.	1	1	1	.	1	1	0	.	.	.	.	.	.	7.9	5.8	7.3	5.8	5.1	5.0	1 0 1	0 0 1
171	276	1	29	0	0	0	1	0	3	2	0	1	1	1	0	0	0	0	1	.	.	3	.	6.8	5.9	8.4	6.8	8.1	7.4	6.7	5.9	0 3 1	0 0 1
172	276	1	29	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.5	7.1	7.7	7.1	.	.	0 0 1	. . .
173	276	1	29	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	7.4	8.9	7.3	.	.	0 0 1	. . .
174	167	1	29	1	1	1	1	0	2	2	0	1	1	1	1	1	1	1	1	.	1	1	.	6.7	5.4	8.1	6.4	8.2	6.3	6.1	5.6	1 2 1	1 0 1
175	260	1	7	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	5.7	6.2	.	. . .	1 0 0
176	331	1	7	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.4	6.2	.	.	.	.	.	.	. . .	0 0 1
177	18	1	8	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	.	.	.	.	5.8	5.7	6.8	7.1	7.1	6.4	.	5.8	0 0 0	0 1 1
178	164	1	8	2	1	1	.	0	0	0	.	1	1	1	.	2	1	1	.	.	.	.	.	.	5.6	8.3	6.6	8.8	6.6	.	.	1 0 1	2 0 1
179	164	1	8	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.1	. . .	1 1 1
180	257	1	8	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	6.1	. . .	2 1 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
181	259	1	21	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	8.2	7.0	.	.	0 2 1	. . .
182	259	1	21	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.7	. . .	2 0 0
183	19	1	27	1	.	.	0	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
184	162	1	27	.	0	1	.	.	0	0	.	.	0	0	.	.	0	1	.	.	.	.	.	.	.	7.7	7.1	7.4	7.3	.	.	0 0 0	. . .
185	162	1	27	.	.	1	1	.	.	0	0	.	.	2	2	.	.	1	1	.	.	.	.	.	.	.	.	.	6.7	5.3	5.9	1 0 2	1 0 2
186	258	1	27	1	1	1	1	0	0	0	0	2	1	1	2	1	1	1	1	.	.	.	.	5.8	6.1	.	7.1	.	7.0	.	6.1	1 0 1	1 0 2
187	258	1	27	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	7.6	6.4	.	.	.	.	.	.	. . .	1 0 1
188	258	1	27	.	0	.	1	.	0	.	1	.	1	.	1	.	0	.	1	.	.	.	.	.	.	7.5	6.8	.	.	.	6.5	0 0 1	1 1 1
189	109	1	63.4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	5.4	6.2	7.3	7.3	7.0	7.3	5.3	6.2	0 0 0	0 1 0
190	109	1	63.4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	.	.	.	.	6.3	5.8	7.9	6.4	7.8	6.2	6.4	5.8	0 0 0	0 0 0
191	256	1	63.5	1	.	.	1	1	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	5.1	5.3	.	.	.	.	5.3	6.0	. . .	1 1 0
192	15	1	10	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	.	.	.	.	5.4	6.0	7.2	6.5	.	6.4	6.0	6.0	0 0 1	0 1 1
193	54	1	10	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 0 1
194	82	1	10	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.4	5.9	.	.	.	.	.	.	. . .	0 1 0
195	54	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.	.	.	.	6.1	6.3	7.6	7.2	7.3	7.0	5.8	6.4	1 1 1	1 1 1
196	82	1	10	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.2	5.9	.	6.3	.	.	0 0 0	. . .
197	54	1	10	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	5.7	5.8	.	.	.	.	6.0	5.7	. . .	1 0 0
198	54	1	10	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	5.3	6.2	.	.	.	.	.	.	. . .	2 0 2
199	132	1	10	.	2	2	2	.	2	1	1	.	1	1	1	.	2	2	2	.	2	.	.	.	.	7.7	6.6	8.0	6.0	5.5	6.2	2 2 1	2 1 1
200	165	1	10	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.7	6.5	. . .	1 0 1
201	264	1	10	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	4.6	5.6	.	.	.	.	5.3	5.3	. . .	1 0 1
202	264	1	10	0	0	0	.	1	0	0	.	0	0	0	.	0	0	0	.	.	.	.	.	6.0	6.4	.	6.7	7.3	6.3	.	.	0 0 0	0 1 0
203	264	1	10	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	6.2	6.2	.	.	.	.	.	. . .	1 0 0
204	264	1	10	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.1	6.8	7.7	6.9	.	.	0 0 0	. . .
205	264	1	10	.	.	0	2	.	.	1	0	.	.	0	0	.	.	0	2	.	.	.	.	.	.	.	.	.	6.6	.	5.5	0 1 0	2 0 0
206	264	1	10	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.8	6.1	.	.	.	.	.	.	. . .	0 0 0
207	330	1	10	2	0	0	1	0	2	1	0	1	1	1	1	2	0	0	1	.	4	.	.	6.8	6.4	8.4	7.8	8.5	7.9	6.4	6.4	0 2 1	2 0 1
208	330	1	10	1	0	0	1	1	0	0	1	1	1	1	1	1	0	0	1	.	.	.	.	.	5.8	.	7.0	8.1	6.7	6.0	5.8	0 0 1	1 1 1
209	330	1	10	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.5	5.6	.	.	.	.	.	.	. . .	1 0 1
210	330	1	10	0	1	1	1	0	0	0	0	1	0	0	0	0	1	1	0	.	.	.	.	.	5.5	7.1	6.3	7.1	6.2	.	5.8	1 0 0	0 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge r2	r1	l1	l2	Tubercles r2	r1	l1	l2	Curvature r2	r1	l1	l2	ASU Shov r2	r1	l1	l2	ASU Tub r2	r1	l1	l2	RT LAT MD	BL	RT CENT MD	BL	LT CENT MD	BL	LT LAT MD	BL	CENT RTC	LAT RTC
211	330	1	10	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.5	5.2	. . .	0 0 1
212	330	1	10	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.8	5.3	.	.	.	.	.	.	. . .	1 0 0
213	330	1	10	1	1	1	.	0	0	0	.	0	1	1	.	1	0	0	.	.	.	.	.	5.6	5.5	7.5	6.6	7.6	6.4	.	.	1 0 1	1 0 0
214	330	1	10	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	6.6	.	.	.	.	.	.	. . .	1 1 1
215	330	1	10	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	5.5	. . .	0 0 2
216	330	1	10	.	1	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	.	7.3	6.8	.	.	.	.	1 2 2	. . .
217	330	1	10	0	0	.	1	0	0	.	0	1	2	.	1	0	0	.	1	.	.	.	.	.	6.1	.	7.3	.	.	6.7	6.1	0 0 2	0 0 1
218	330	1	10	1	0	.	0	1	0	.	3	1	1	.	1	1	0	.	0	.	.	.	.	5.5	5.3	7.4	6.3	.	.	6.1	5.3	0 0 1	1 1 1
219	330	1	10	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.8	5.8	.	.	.	.	.	.	. . .	0 1 0
220	330	1	10	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	.	.	.	.	5.6	6.4	7.1	7.1	.	6.9	5.9	6.1	0 0 1	0 0 1
221	330	1	10	1	0	0	1	0	0	0	0	1	1	1	0	1	0	0	1	.	.	.	.	5.3	6.1	.	6.7	7.2	6.7	.	5.8	0 0 1	1 0 1
222	330	1	10	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.9	5.8	. . .	2 1 1
223	330	1	10	1	.	0	1	0	.	0	0	0	.	0	0	1	.	0	1	.	.	.	.	5.6	5.3	.	.	7.4	6.1	5.1	5.1	0 0 0	1 0 0
224	330	1	10	1	.	0	1	1	.	2	1	1	.	1	1	1	.	0	1	.	.	1	.	5.5	6.8	.	.	.	7.5	5.7	6.5	0 2 1	1 1 1
225	330	1	10	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	.	.	.	7.9	6.2	.	.	4.9	4.9	0 0 0	0 0 0
226	330	1	10	1	1	.	1	1	2	.	0	0	1	.	1	1	0	.	1	.	3	.	.	4.5	5.8	8.0	6.7	.	.	5.1	5.7	1 2 1	1 1 0
227	330	1	10	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.2	6.6	.	.	.	.	.	.	. . .	0 1 0
228	330	1	10	0	.	0	.	2	.	0	.	2	.	1	.	0	.	0	.	2	.	.	.	5.1	6.8	.	8.7	7.3	.	.	.	0 0 1	0 2 2
229	330	1	10	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.9	5.8	. . .	2 0 1
230	330	1	10	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	8.4	7.6	.	.	.	.	0 2 1	. . .
231	330	1	10	1	.	.	1	0	.	.	0	1	.	.	0	0	.	.	0	.	.	.	.	5.0	5.2	.	.	.	.	4.6	5.4	. . .	1 0 1
232	330	1	10	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	.	.	4.9	6.0	.	.	7.0	6.5	.	.	0 0 0	0 0 0
233	330	1	10	1	.	0	1	0	.	0	0	1	.	0	0	1	.	0	1	.	.	.	.	5.4	6.3	.	.	.	6.3	6.2	6.0	0 0 0	1 0 1
234	330	1	10	0	.	.	0	0	.	.	0	2	.	.	1	0	.	.	0	.	.	.	.	4.7	6.1	.	.	.	.	5.0	5.6	. . .	0 0 2
235	330	1	10	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.1	6.0	.	.	.	.	.	.	. . .	0 1 1
236	330	1	10	.	.	0	0	.	.	0	1	.	.	0	1	.	.	0	0	.	.	.	.	.	.	.	.	8.3	7.7	5.5	6.7	0 0 0	0 1 1
237	330	1	10	1	.	.	0	0	.	.	0	0	.	.	0	1	.	.	0	.	.	.	.	5.7	5.4	.	.	.	.	5.7	5.3	. . .	1 0 0
238	330	1	10	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	7.0	7.8	6.8	.	.	1 0 1	. . .
239	132	1	10	0	1	1	0	2	0	0	2	0	0	0	0	0	1	1	0	1	.	.	1	6.0	6.5	.	6.7	7.6	6.8	6.1	6.2	1 0 0	0 2 0
240	261	1	20	1	.	.	1	0	.	.	0	1	.	.	0	0	.	.	0	.	.	.	.	.	6.2	.	.	.	.	9.2	6.9	. . .	1 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
241	261	1	20	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.1	5.4	.	.	.	.	.	.	.	.	.	0	1	1
242	261	1	20	0	.	1	.	0	.	0	.	1	.	0	.	0	.	0	.	.	.	.	.	6.0	5.2	.	.	8.1	7.0	.	.	1	0	0	0	0	1
243	261	1	20	1	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.7	6.0	.	.	.	.	.	.	.	.	.	1	3	0
244	261	1	20	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.7	6.3	.	.	.	1	0	0
245	261	1	20	0	.	0	0	0	.	0	1	1	.	0	0	0	.	0	0	.	.	.	.	5.5	5.9	.	.	7.5	5.9	5.7	5.6	0	0	0	0	0	1
246	263	1	20	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	.	6.3	.	.	.	.	6.3	6.3	.	.	.	1	0	0
247	95	1	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	4.9	7.7	6.9	7.7	6.8	.	5.3	0	0	0	0	0	0
248	95	1	22	.	2	2	2	.	0	0	4	.	2	2	1	.	2	2	3	.	.	.	.	.	.	8.8	7.8	8.7	7.5	6.2	6.8	2	0	2	2	4	1
249	95	1	22	1	0	0	1	1	0	1	1	0	0	1	0	1	0	0	1	.	.	.	.	6.1	6.4	8.1	6.9	8.0	6.8	5.5	6.1	0	0	0	1	1	0
250	255	1	22	1	.	1	1	1	.	0	1	0	.	0	0	1	.	1	1	.	.	.	.	5.8	6.4	.	.	7.9	7.1	5.8	6.3	1	0	0	1	1	0
251	255	1	22	1	1	1	.	0	0	0	.	0	0	0	.	1	1	1	.	.	.	.	.	.	6.3	.	6.9	7.9	7.2	.	.	1	0	0	1	0	0
252	255	1	22	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	7.5	6.5	.	.	.	.	0	1	0	.	.	.
253	327	1	22	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0
254	97	1	23	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	.	.	.	.	5.5	6.4	7.1	7.4	.	7.9	5.6	6.4	0	0	0	0	0	1
255	97	1	23	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.1	6.4	.	.	.	.	6.3	6.7	.	.	.	0	0	1
256	110	1	9	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.3	.	.	.	2	1	1
257	100	1	9	2	0	0	1	0	0	0	0	1	1	1	1	2	0	0	1	.	.	.	.	5.5	5.4	.	6.8	.	6.9	.	5.3	0	0	1	2	0	1
258	175	1	9	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	6.4	.	.	.	.	2	2	0	.	.	.
259	175	1	9	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.5	5.3	.	.	.	.	6.3	5.8	.	.	.	2	0	0
260	175	1	9	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.0	6.2	.	.	.	.	.	.	.	.	.	2	0	0
261	175	1	9	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.4	6.8	.	.	.	2	0	0
262	175	1	9	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.7	5.0	.	.	.	.	.	.	.	.	.	0	1	1
263	175	1	9	2	.	.	1	0	.	.	0	0	.	.	0	2	.	.	1	.	.	.	.	5.6	5.9	.	.	.	.	6.1	5.7	.	.	.	2	0	0
264	175	1	9	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.2	6.4	.	.	.	1	0	2
265	175	1	9	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.3	5.9	.	.	.	.	.	.	.	.	.	1	0	1
266	175	1	9	1	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.0	6.1	.	.	.	.	.	.	.	.	.	1	0	1
267	175	1	9	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.7	6.1	.	.	.	1	0	0
268	175	1	9	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.1	6.1	.	.	.	.	.	.	.	.	.	0	1	0
269	175	1	9	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	6.6	6.1	.	.	.	.	.	.	.	.	.	0	0	2
270	175	1	9	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.5	6.2	.	.	.	.	7.0	6.4	.	.	.	0	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
271	175	1	9	.	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	8.6	7.2	.	.	1	2	1	.	.	.
272	175	1	9	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	8.0	6.3	.	.	.	.	0	2	1	.	.	.
273	175	1	9	1	2	.	.	0	2	.	.	1	1	.	.	1	2	.	.	.	1	.	.	.	5.7	8.2	6.8	.	.	.	.	2	2	1	1	0	1
274	175	1	9	1	.	2	2	3	.	0	3	0	.	1	1	1	.	2	2	.	.	.	.	6.1	5.7	.	8.4	6.8	6.1	6.2	.	2	0	1	1	3	0
275	175	1	9	2	1	.	.	0	0	.	.	2	1	.	.	2	1	.	.	.	.	.	.	6.4	5.9	8.7	6.8	.	.	.	.	1	0	1	2	0	2
276	175	1	9	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.8	6.2	.	.	.	.	.	.	.	.	.	1	0	1
277	175	1	9	.	.	0	0	.	.	0	0	.	.	0	1	.	.	0	.	.	.	.	.	.	.	.	.	6.8	6.0	5.2	4.9	0	0	0	0	0	1
278	175	1	9	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	8.5	6.6	.	.	.	.	1	2	1	.	.	.
279	272	1	9	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	4.3	.	.	.	.	.	5.8	6.1	.	.	.	1	0	1
280	272	1	9	.	.	1	1	.	.	0	0	.	.	0	0	.	.	1	2	.	.	.	.	.	.	.	.	8.5	7.6	6.7	6.6	1	0	0	1	0	0
281	272	1	9	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	8.7	7.5	.	.	.	.	1	0	1	.	.	.
282	272	1	9	.	0	.	2	.	1	.	1	.	1	.	1	.	0	.	2	.	.	.	.	.	.	9.8	7.4	.	.	6.8	6.5	0	1	1	2	1	1
283	174	1	23	2	.	.	2	0	.	.	1	1	.	.	1	2	.	.	2	.	.	.	.	5.5	5.1	.	.	.	.	5.7	5.9	.	.	.	2	0	1
284	271	1	23	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	4.3	4.6	.	.	.	.	.	.	.	.	.	1	0	2
285	270	1	26	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.8	6.3	.	.	.	.	7.3	6.0	.	.	.	2	0	0
286	270	1	26	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.6	.	.	.	2	0	1
287	324	1	26	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	.	.	.	.	.	5.4	.	6.2	7.0	6.2	4.9	5.7	0	0	0	0	0	1
288	324	1	26	2	0	.	2	0	0	.	0	1	1	.	0	2	0	.	.	.	.	.	.	.	5.3	7.0	6.7	.	.	.	4.8	0	0	1	2	0	1
289	17	2	3	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	5.9	.	.	.	1	1	1
290	17	2	3	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.4	5.8	.	.	.	.	.	.	.	.	.	1	1	1
291	17	2	3	.	1	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	7.0	7.0	7.4	7.1	.	.	1	0	0	.	.	.
292	55	2	3	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	2	.	.	.
293	65	2	3	1	0	.	.	1	2	.	.	1	1	.	.	1	0	.	.	.	2	.	.	.	6.2	7.7	6.6	.	.	.	.	0	2	1	1	1	1
294	65	2	3	.	0	.	0	.	2	.	3	.	1	.	1	.	0	.	0	.	1	.	.	.	.	8.0	6.1	.	.	5.4	5.9	0	2	1	0	3	1
295	65	2	3	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	.	.	.	.	6.1	5.8	.	7.1	8.4	7.0	6.3	5.8	1	0	0	1	0	0
296	65	2	3	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.8	6.3	.	.	.	.	.	.	.	.	.	0	1	1
297	65	2	3	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.1	6.3	.	.	.	.	6.4	6.4	.	.	.	2	0	1
298	65	2	3	0	.	.	.	3	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	6.4	6.3	.	.	.	.	.	.	.	.	.	0	3	2
299	65	2	3	0	0	0	0	1	2	0	0	1	1	1	1	0	0	0	0	.	1	.	.	5.7	5.9	7.4	6.2	7.4	6.4	5.1	5.4	0	2	1	0	1	1
300	65	2	3	1	.	.	1	1	.	.	3	1	.	.	1	1	.	.	1	.	.	.	.	6.4	6.4	.	.	.	.	6.1	7.1	.	.	.	1	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
301	65	2	3	.	1	.	0	.	0	.	0	.	2	.	1	.	1	.	0	.	.	.	.	.	.	8.7	7.2	.	.	7.1	6.7	1 0 2	0 0 1
302	65	2	3	.	.	.	3	.	.	.	1	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6.4	7.0	. . .	3 1 0
303	65	2	3	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	5.6	. . .	1 1 1
304	65	2	3	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.4	6.5	.	.	.	.	.	.	. . .	2 1 1
305	65	2	3	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	6.3	5.8	.	.	.	.	6.1	6.0	. . .	2 1 0
306	65	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.1	5.7	.	6.6	7.8	6.4	.	5.9	0 0 0	0 0 0
307	65	2	3	0	1	1	1	2	2	2	2	0	0	0	0	0	0	1	1	1	2	3	2	6.3	6.9	8.4	7.9	8.4	8.3	6.5	7.0	1 2 0	0 2 0
308	65	2	3	.	1	0	0	.	0	0	0	.	1	1	0	.	1	0	0	.	.	.	.	.	.	7.9	6.9	8.1	6.8	.	6.3	1 0 1	0 0 0
309	55	2	3	1	.	0	.	0	.	0	.	0	.	2	.	1	.	0	.	.	.	.	.	6.6	6.1	.	.	8.8	7.0	.	.	0 0 2	1 0 0
310	65	2	3	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.3	6.5	.	.	.	.	.	.	. . .	1 0 1
311	65	2	3	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	8.8	6.9	.	.	0 0 1	. . .
312	65	2	3	1	1	1	1	0	0	0	0	1	2	1	0	1	1	1	1	.	.	.	.	6.6	5.6	8.5	7.0	8.9	7.0	6.6	5.5	1 0 2	1 0 1
313	65	2	3	1	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.3	5.9	.	.	.	.	.	.	. . .	1 1 0
314	65	2	3	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	7.4	6.8	.	.	.	.	.	.	. . .	1 2 0
315	65	2	3	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	6.6	. . .	0 0 0
316	65	2	3	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.3	6.0	.	.	.	.	.	.	. . .	0 0 0
317	65	2	3	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	6.1	. . .	1 1 0
318	65	2	3	3	.	.	3	1	.	.	0	0	.	.	1	3	.	.	3	.	.	.	.	6.6	6.6	.	.	.	.	6.6	6.5	. . .	3 1 0
319	65	2	3	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.5	6.4	.	.	.	.	.	.	. . .	0 0 1
320	65	2	3	1	1	1	2	0	2	2	0	0	0	0	0	1	1	1	2	.	1	1	.	6.5	6.5	8.7	6.5	8.5	6.3	6.0	5.8	1 2 0	1 0 0
321	65	2	3	3	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	6.3	6.3	.	.	.	.	.	.	. . .	3 1 1
322	65	2	3	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	5.9	. . .	0 0 1
323	56	2	3	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.9	6.5	.	.	.	.	.	.	. . .	2 1 1
324	65	2	3	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.2	6.0	. . .	0 0 0
325	64	2	3	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.3	6.1	.	.	.	.	.	.	. . .	3 0 0
326	65	2	3	2	.	.	2	0	.	.	0	2	.	.	1	2	.	.	2	.	.	.	.	5.8	6.4	.	.	.	.	6.0	6.3	. . .	2 0 2
327	65	2	3	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	6.6	. . .	0 1 1
328	65	2	3	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.4	6.0	. . .	2 1 1
329	65	2	3	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.5	6.4	. . .	1 0 0
330	65	2	3	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.7	5.7	. . .	2 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
331	65	2	3	.	3	2	3	.	2	2	1	.	1	2	1	.	3	2	3	.	3	2	.	.	.	9.0	7.7	9.2	7.8	7.8	7.6	3	2	1	3	1	1
332	65	2	3	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.5	5.4	.	.	.	1	1	0
333	65	2	3	3	3	3	3	1	2	2	1	3	2	2	2	3	3	3	3	.	2	2	.	.	6.8	8.0	7.6	.	6.6	6.6	7.1	3	2	2	3	1	3
334	55	2	3	2	1	1	1	1	0	0	1	1	2	2	2	2	1	1	1	.	.	.	.	5.7	5.6	7.2	6.3	7.0	6.1	4.6	5.5	1	0	2	2	1	1
335	55	2	3	3	.	.	3	1	.	.	0	1	.	.	1	5	.	.	4	.	.	.	.	6.9	7.1	.	.	.	.	6.8	6.3	.	.	.	3	1	1
336	55	2	3	2	.	2	2	1	.	2	1	1	.	2	0	2	.	2	2	.	.	2	.	7.5	6.4	.	.	8.8	7.5	7.0	6.5	2	2	2	2	1	1
337	65	2	3	1	.	0	.	0	.	0	.	0	.	1	.	1	.	0	.	.	.	.	.	6.0	5.8	.	.	8.4	6.8	.	.	0	0	1	1	0	0
338	65	2	3	.	0	0	0	.	0	0	1	.	1	1	1	.	0	0	0	.	.	.	.	.	.	7.6	6.8	7.6	6.7	.	5.6	0	0	1	0	1	1
339	65	2	3	1	1	.	1	0	2	.	1	1	2	.	0	1	1	.	1	.	2	.	.	5.9	6.0	8.1	7.0	.	.	5.8	6.1	1	2	2	1	0	1
340	65	2	3	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	2	.	.	.	.	6.8	6.0	.	.	.	.	6.5	6.2	.	.	.	2	0	0
341	65	2	3	0	1	1	0	1	2	2	0	0	1	0	0	0	1	1	0	.	1	1	.	6.5	6.4	8.9	6.4	8.9	6.5	6.5	6.5	1	2	1	0	1	0
342	65	2	3	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.9	.	8.9	.	.	.	0	0	0	.	.	.
343	65	2	3	1	2	2	1	0	0	0	0	0	0	0	0	1	2	2	1	.	.	.	.	6.8	6.1	8.6	6.7	8.8	6.6	6.9	5.9	2	0	0	1	0	0
344	65	2	3	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	7.2	5.7	.	.	.	.	0	0	0	.	.	.
345	65	2	3	2	3	.	.	0	0	.	.	1	2	.	.	2	3	.	.	.	.	.	.	5.4	6.7	.	7.4	.	.	.	.	3	0	2	2	0	1
346	65	2	3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.3	6.4	.	.	.	1	0	1
347	65	2	3	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	5.8	.	.	.	2	1	0
348	65	2	3	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.3	6.5	8.1	6.6	.	.	0	0	0	.	.	.
349	65	2	3	2	1	1	2	0	0	0	0	0	1	0	0	2	1	1	2	.	.	.	.	8.1	7.4	9.3	7.2	9.1	7.3	7.3	6.1	1	0	1	2	0	0
350	65	2	3	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	7.1	6.6	.	.	.	.	.	.	.	.	.	3	0	1
351	65	2	3	0	.	.	1	1	.	.	1	1	.	.	0	0	.	.	1	.	.	.	.	6.4	5.9	.	.	.	.	5.6	5.5	.	.	.	0	1	1
352	65	2	3	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.2	5.8	.	.	.	.	6.4	6.2	.	.	.	1	0	0
353	65	2	3	3	.	.	3	0	.	.	0	1	.	.	1	5	.	.	5	.	.	.	.	6.5	6.4	.	.	.	.	6.8	6.5	.	.	.	3	0	1
354	65	2	3	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	5.7	5.5	.	.	.	.	.	.	.	.	.	2	1	0
355	65	2	3	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.3	6.4	.	.	.	2	0	1
356	65	2	3	2	2	2	2	0	2	2	1	0	0	0	0	2	2	2	2	.	3	3	.	6.1	5.2	7.7	6.4	7.8	6.8	.	5.9	2	2	0	2	0	0
357	55	2	3	1	0	0	1	1	0	0	1	1	1	1	1	2	0	0	1	.	.	.	.	.	5.9	7.1	6.9	7.4	7.0	5.4	5.7	0	0	1	1	1	1
358	55	2	3	0	0	0	0	1	2	2	1	0	1	2	0	0	0	0	0	.	2	2	.	6.2	6.1	7.2	6.6	7.4	6.8	6.3	6.0	0	2	1	0	1	0
359	55	2	3	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.9	5.7	.	.	.	.	.	.	.	.	.	1	1	0
360	55	2	3	2	2	3	2	1	0	1	0	1	0	0	1	2	2	3	2	.	.	.	.	6.4	6.0	7.4	7.1	7.0	7.2	5.3	5.8	2	0	0	2	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
361	55	2	3	1	.	2	1	0	.	0	1	0	.	0	0	1	.	2	1	.	.	.	.	5.9	5.8	.	.	8.0	6.7	5.5	5.7	2	0	0	1	0	0
362	55	2	3	1	.	1	1	1	.	0	0	1	.	0	1	1	.	1	1	.	.	.	.	6.4	6.5	.	.	8.1	7.2	5.7	6.4	1	0	0	1	1	1
363	55	2	3	2	0	0	2	0	0	0	0	1	2	2	1	2	0	0	2	.	.	.	.	5.8	6.0	.	6.6	.	6.8	5.9	5.9	0	0	2	2	0	1
364	55	2	3	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	.	.	.	.	6.2	6.2	.	7.0	.	7.0	6.1	6.4	0	0	1	0	1	1
365	65	2	3	0	0	.	0	1	0	.	1	1	2	.	0	0	0	.	0	.	.	.	.	6.0	5.5	7.7	6.4	.	.	6.4	5.5	0	0	2	0	1	1
366	55	2	3	2	2	1	3	1	2	2	0	1	2	2	2	3	2	1	4	.	2	3	.	5.6	5.8	8.2	7.3	7.8	7.2	5.0	6.2	2	2	2	2	1	1
367	55	2	3	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	7.4	7.1	7.4	7.1	.	.	0	0	0	.	.	.
368	65	2	3	1	.	.	0	0	.	.	0	0	.	.	1	0	.	.	0	.	.	.	.	5.9	6.1	.	.	.	.	6.3	5.7	.	.	.	1	0	0
369	55	2	3	2	0	0	1	0	0	0	0	1	0	0	0	2	0	0	1	.	.	.	.	5.9	5.5	7.8	6.1	7.9	6.4	6.9	5.6	0	0	0	2	0	1
370	55	2	3	1	.	0	1	1	.	0	1	0	.	0	0	1	.	0	1	.	.	.	.	6.1	5.8	.	.	8.3	6.6	6.1	6.2	0	0	0	1	1	0
371	65	2	3	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.2	5.4	.	.	.	0	0	0
372	65	2	3	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.1	5.8	.	.	.	0	0	2
373	65	2	3	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.4	.	.	.	2	1	1
374	65	2	3	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.0	5.8	.	.	.	1	0	2
375	65	2	3	.	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	8.7	7.1	.	.	1	2	0	.	.	.
376	65	2	3	.	0	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	7.4	7.4	.	.	.	.	0	3	0	.	.	.
377	65	2	3	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.8	.	.	.	1	1	0
378	65	2	3	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	6.5	.	.	.	2	1	1
379	65	2	3	0	0	0	.	0	0	2	.	0	0	0	.	0	0	0	.	.	.	1	.	6.4	6.1	8.6	7.2	8.7	7.4	.	.	0	0	0	0	0	0
380	65	2	3	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	7.5	7.1	.	.	0	0	0	.	.	.
381	55	2	3	0	1	1	1	1	0	0	1	1	2	0	0	0	1	1	1	.	.	.	.	6.3	6.2	9.0	6.8	.	6.9	6.6	6.4	1	0	2	0	1	1
382	55	2	3	1	.	1	1	0	.	0	0	1	.	1	0	2	.	1	2	.	.	.	.	6.1	5.9	.	.	8.6	7.1	5.6	5.9	1	0	1	1	0	1
383	55	2	3	2	.	0	1	1	.	0	1	1	.	1	0	2	.	0	1	.	.	.	.	6.6	7.1	.	.	8.4	7.4	5.8	6.5	0	0	1	2	1	1
384	65	2	3	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.8	6.5	.	.	.	.	.	.	.	.	.	1	1	1
385	65	2	3	1	.	.	1	2	.	.	0	0	.	.	0	1	.	.	1	1	.	.	.	6.8	6.0	.	.	.	.	6.3	6.0	.	.	.	1	2	0
386	65	2	3	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	.	.	.	.	5.8	6.4	8.5	6.7	8.5	6.8	.	6.4	1	0	1	0	0	1
387	111	2	3	2	0	0	2	0	0	0	0	2	2	2	1	2	0	0	2	.	.	.	.	6.0	6.3	.	7.2	8.5	7.5	.	6.6	0	0	2	2	0	2
388	55	2	3	1	.	.	1	1	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.7	5.9	.	.	.	.	6.4	5.8	.	.	.	1	1	0
389	55	2	3	1	1	1	1	0	0	0	0	1	2	2	1	1	1	1	1	.	.	.	.	6.0	6.2	7.7	6.9	.	7.1	6.0	6.6	1	0	2	1	0	1
390	65	2	3	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	5.6	6.9	.	.	.	3	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
391	65	2	3	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	8.5	6.8	.	.	.	.	0	0	2	.	.	.
392	65	2	3	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.9	6.3	.	.	.	.	.	.	.	.	.	1	1	0
393	65	2	3	0	0	.	.	1	2	.	.	0	0	.	.	0	0	.	.	.	1	.	.	5.6	5.8	7.9	6.6	.	.	.	.	0	2	0	0	1	0
394	65	2	3	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.9	5.9	.	.	.	.	.	.	.	.	.	1	0	1
395	65	2	3	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.2	7.4	.	.	.	0	1	1
396	65	2	3	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.1	.	.	.	2	1	1
397	65	2	3	1	.	.	0	0	.	.	0	1	.	.	1	1	.	.	0	.	.	.	.	5.7	6.2	.	.	.	.	5.6	6.1	.	.	.	1	0	1
398	65	2	3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	5.8	.	.	.	1	0	1
399	65	2	3	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.5	5.4	.	.	.	.	5.9	5.2	.	.	.	0	0	0
400	65	2	3	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.1	6.2	.	.	.	.	.	.	.	.	.	1	0	1
401	65	2	3	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.1	5.7	.	.	.	0	0	0
402	65	2	3	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	7.8	7.3	.	.	1	0	0	.	.	.
403	65	2	3	2	1	1	2	0	0	0	0	0	0	0	0	2	1	1	2	.	.	.	.	6.4	6.2	8.4	7.1	.	7.3	6.8	6.5	1	0	0	2	0	0
404	65	2	3	0	1	.	.	1	2	.	.	1	1	.	.	0	1	.	.	.	1	.	.	5.6	6.4	8.5	6.5	.	.	.	.	1	2	1	0	1	1
405	65	2	3	0	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	.	.	.	.	6.1	.	8.4	6.8	.	.	.	.	0	0	0	0	0	1
406	65	2	3	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	7.6	5.9	.	.	.	.	1	0	1	.	.	.
407	65	2	3	2	2	2	2	3	0	0	1	1	2	1	0	2	2	2	2	.	.	.	.	6.8	6.6	7.6	7.0	.	6.9	6.7	6.4	2	0	2	2	3	1
408	65	2	3	.	1	0	0	.	3	2	1	.	0	0	0	.	1	0	0	.	.	2	.	.	.	8.1	7.5	7.8	7.4	.	7.2	1	3	0	0	1	0
409	65	2	3	2	.	0	.	0	.	2	.	0	.	0	.	2	.	0	.	.	.	3	.	5.8	5.8	.	.	7.9	6.7	.	.	0	2	0	2	0	0
410	65	2	3	.	1	1	1	.	2	2	1	.	0	0	0	.	1	1	1	.	1	1	.	.	.	8.2	7.1	8.2	7.2	6.7	6.0	1	2	0	1	1	0
411	65	2	3	0	0	.	.	1	2	.	.	0	0	.	.	0	0	.	.	.	3	.	.	6.7	5.7	8.8	6.8	.	.	.	.	0	2	0	0	1	0
412	65	2	3	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	.	.	.	.	6.6	6.3	7.9	7.3	7.4	7.4	6.6	6.1	0	0	1	0	1	1
413	65	2	3	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	7.9	6.6	.	.	.	.	1	0	0	.	.	.
414	65	2	3	0	.	0	0	3	.	1	3	0	.	0	0	0	.	0	0	.	.	.	.	6.7	6.4	.	.	.	7.3	6.5	6.5	0	1	0	0	3	0
415	65	2	3	2	2	2	2	0	2	2	1	0	0	0	0	2	2	2	2	.	3	3	.	.	6.4	8.4	7.4	9.1	7.3	6.7	6.2	2	2	0	2	0	0
416	65	2	3	1	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	.	.	.	.	5.4	5.7	6.6	6.1	7.1	6.1	.	.	0	0	0	1	0	0
417	65	2	3	2	2	2	2	0	0	0	0	1	1	1	1	2	2	2	2	.	.	.	.	6.6	6.2	8.2	7.0	.	7.0	6.8	6.1	2	0	1	2	0	1
418	65	2	3	2	2	.	.	1	2	.	.	0	1	.	.	2	2	.	.	.	1	.	.	6.0	5.5	7.6	6.3	.	.	.	.	2	2	1	2	1	0
419	65	2	3	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1	.	.	.	.	6.7	6.9	.	8.1	9.4	8.2	.	7.1	0	0	1	1	0	0
420	65	2	3	1	0	0	2	0	0	0	1	0	0	0	0	1	0	0	2	.	.	.	.	5.9	6.3	8.0	7.3	7.9	7.7	6.1	6.6	0	0	0	1	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
421	65	2	3	1	0	.	.	1	2	.	.	0	0	.	.	1	0	.	.	.	1	.	.	5.5	6.3	7.8	7.4	.	.	.	.	0 2 0	1 1 0
422	65	2	3	0	0	1	0	1	2	0	1	1	1	1	0	0	0	1	0	.	1	.	.	5.9	6.5	9.1	7.5	8.9	6.4	5.8	6.3	0 2 1	0 1 1
423	65	2	3	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	5.9	6.5	.	.	.	.	6.1	6.5	. . .	1 0 0
424	65	2	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	.	.	.	.	7.3	6.3	8.7	7.2	8.4	7.1	.	6.3	0 0 1	0 0 0
425	65	2	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	.	.	.	.	5.5	5.3	8.1	6.7	.	7.1	.	5.8	0 0 1	0 0 0
426	65	2	3	0	0	0	0	1	1	0	1	1	1	2	0	0	0	0	0	.	.	.	.	5.9	5.3	7.9	7.4	7.8	7.2	.	5.8	0 1 1	0 1 1
427	65	2	3	2	0	.	.	0	0	.	.	2	2	.	.	2	0	.	.	.	.	.	.	5.5	5.4	8.3	6.4	.	.	.	.	0 0 2	2 0 2
428	65	2	3	2	0	0	3	0	0	0	0	2	2	2	1	2	0	0	3	.	.	.	.	6.7	6.5	8.8	7.6	8.0	7.2	6.2	6.3	0 0 2	2 0 2
429	65	2	3	1	1	1	1	0	0	0	1	1	1	1	0	1	1	0	1	.	.	.	.	6.1	5.6	8.9	6.9	8.8	6.9	5.7	5.7	1 0 1	1 0 1
430	65	2	3	1	0	.	2	0	0	.	0	2	0	.	2	1	0	.	2	.	.	.	.	5.7	6.5	8.8	7.0	.	.	5.9	6.8	0 0 0	1 0 2
431	65	2	3	1	0	0	.	0	0	0	.	1	0	0	.	1	0	0	.	.	.	.	.	5.6	5.7	8.2	6.9	8.1	6.8	.	.	0 0 0	1 0 1
432	65	2	3	2	0	1	1	0	2	2	1	1	1	1	2	2	0	1	1	.	2	2	.	6.6	5.5	8.2	6.3	8.3	6.2	6.6	5.8	0 2 1	2 0 1
433	65	2	3	1	0	.	1	0	0	.	0	1	1	.	1	1	0	.	1	.	.	.	.	5.4	5.8	8.0	6.3	.	.	5.8	5.6	0 0 1	1 0 1
434	65	2	3	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	.	.	.	.	5.9	6.1	8.1	6.9	8.1	6.7	.	.	0 0 0	0 0 0
435	65	2	3	1	1	.	0	1	2	.	0	0	1	.	0	1	1	.	0	.	1	.	.	6.9	6.2	8.6	7.0	.	.	6.8	6.0	1 2 1	1 1 0
436	65	2	3	1	1	1	0	1	0	0	1	0	1	1	0	1	1	1	0	.	.	.	.	5.2	6.1	7.9	6.6	7.9	6.4	5.6	6.4	1 0 1	1 1 0
437	65	2	3	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.7	6.4	. . .	1 0 0
438	65	2	3	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	.	.	.	.	5.1	5.9	7.5	6.5	8.2	6.5	5.0	6.0	0 0 1	0 0 1
439	65	2	3	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	8.2	6.7	8.3	6.9	.	.	1 0 1	. . .
440	65	2	3	.	1	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	9.0	6.3	.	.	.	.	. . .	. 0 2
441	65	2	3	.	1	1	1	.	0	1	0	.	1	1	1	.	1	1	1	.	.	.	.	.	.	8.3	6.8	8.2	6.9	6.3	6.1	1 0 1	1 0 1
442	65	2	3	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	2	.	.	.	.	6.7	6.2	.	.	.	.	6.6	6.0	. . .	1 0 1
443	65	2	3	1	2	2	1	1	2	2	1	0	1	1	0	1	2	2	1	.	2	1	.	7.0	6.3	8.8	7.6	8.8	7.5	6.7	6.8	2 2 1	1 1 0
444	65	2	3	0	0	0	0	1	1	2	1	0	1	1	0	0	0	0	0	.	.	2	.	.	5.1	.	5.9	8.0	6.2	6.5	5.5	0 1 1	0 1 0
445	65	2	3	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.7	7.5	.	.	.	.	1 0 1	. . .
446	65	2	3	.	0	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	.	.	.	.	.	7.8	6.3	8.1	6.1	.	.	0 0 1	. . .
447	65	2	3	2	0	0	.	0	0	0	.	2	2	1	.	2	0	0	.	.	.	.	.	6.8	5.8	8.6	6.8	8.6	6.7	.	.	0 0 2	2 0 2
448	65	2	3	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.6	5.3	.	.	.	.	.	.	. . .	1 0 0
449	65	2	3	2	.	.	2	1	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	5.5	6.3	.	.	.	.	6.0	6.1	. . .	2 1 0
450	65	2	3	.	.	1	1	.	.	0	1	.	.	2	1	.	.	1	1	.	.	.	.	.	.	.	.	7.7	6.5	6.1	5.9	1 0 2	1 1 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
451	65	2	3	0	.	0	0	1	.	0	1	0	.	0	0	0	.	0	0	.	.	.	.	5.5	6.2	.	.	7.6	6.8	5.9	6.2	0	0	0	0	1	0
452	65	2	3	.	1	1	1	.	2	2	2	.	0	0	0	.	1	1	1	.	2	1	1	.	.	9.0	7.9	9.0	7.7	6.6	6.5	1	2	0	1	2	0
453	65	2	3	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	2	.	.	.	.	7.1	6.3	8.5	7.1	9.0	7.1	7.7	6.7	0	0	0	1	0	0
454	65	2	3	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	.	.	.	.	5.7	5.1	7.4	6.6	.	6.4	5.4	5.4	0	0	1	0	0	1
455	65	2	3	1	0	.	1	0	0	.	0	0	1	.	1	1	0	.	1	.	.	.	.	5.8	5.8	7.6	6.6	.	.	6.3	5.4	0	0	1	1	0	0
456	65	2	3	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	.	.	.	.	6.1	6.0	8.9	6.7	9.0	6.6	6.4	5.8	0	0	1	1	0	1
457	65	2	3	2	2	2	2	2	2	2	1	1	0	1	1	3	3	3	3	3	3	3	.	7.7	6.0	9.6	7.2	10.0	7.4	7.0	6.4	2	2	0	2	2	1
458	65	2	3	.	2	2	.	.	2	2	.	.	0	0	.	.	2	2	.	.	2	2	.	.	.	8.2	7.3	8.6	6.8	.	.	2	2	0	.	.	.
459	65	2	3	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	7.2	6.7	.	.	2	0	0	.	.	.
460	65	2	3	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	6	6	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	0
461	65	2	3	.	.	1	1	.	.	0	1	.	.	0	1	.	.	0	1	.	.	.	.	.	.	.	.	7.6	7.0	6.0	6.1	1	0	0	1	1	1
462	65	2	3	2	1	1	.	1	2	0	.	0	1	0	.	2	1	1	.	.	1	.	.	7.2	6.3	10.1	6.8	9.8	6.7	.	.	1	2	1	2	1	0
463	65	2	3	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	.	.	.	.	6.3	5.8	8.7	7.4	8.9	7.6	6.0	6.4	1	0	0	1	0	0
464	65	2	3	.	.	0	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	8.0	6.7	.	.	0	2	0	.	.	.
465	65	2	3	.	0	1	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	8.0	6.8	7.5	6.7	.	.	0	0	1	.	.	.
466	65	2	3	2	1	2	1	0	1	1	0	2	1	1	1	2	1	2	1	.	.	.	.	5.3	5.5	.	6.6	7.6	6.7	6.0	5.7	1	1	1	2	0	2
467	65	2	3	.	0	0	0	.	0	0	1	.	0	0	0	.	0	0	0	.	.	.	.	.	.	8.7	7.2	8.7	7.1	6.2	6.0	0	0	0	0	1	0
468	65	2	3	2	0	0	2	0	0	1	0	1	1	1	0	3	0	0	3	.	.	.	.	6.9	6.5	9.1	7.1	9.0	7.4	7.5	6.4	0	0	1	2	0	1
469	65	2	3	2	2	2	2	0	2	2	1	0	2	2	0	2	2	2	2	.	4	4	.	7.0	5.9	9.0	6.9	9.0	6.7	7.0	6.2	2	2	2	2	0	0
470	65	2	3	2	.	2	.	0	.	0	.	0	.	0	.	2	.	2	.	.	.	.	.	6.4	5.9	.	.	8.5	7.2	.	.	2	0	0	2	0	0
471	65	2	3	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.9	6.0	.	.	.	.	6.0	6.1	.	.	.	0	0	0
472	65	2	3	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	7.8	6.5	7.7	6.4	.	.	0	0	0	.	.	.
473	65	2	3	1	.	0	1	4	0	0	4	0	0	0	0	1	0	0	1	.	.	.	.	6.0	6.1	7.8	6.4	7.7	6.7	6.1	6.3	0	0	0	1	4	0
474	65	2	3	1	.	.	1	1	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	7.0	5.0	.	.	.	.	7.0	5.2	.	.	.	1	1	0
475	65	2	3	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	8.2	6.5	.	.	.	.	1	0	0	.	.	.
476	65	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	5.1	5.5	7.5	6.6	7.6	6.6	.	5.6	0	0	0	1	0	0
477	65	2	3	2	2	2	2	0	2	2	1	1	2	2	1	3	2	2	3	.	3	3	1	6.6	6.5	8.6	7.1	8.9	7.3	6.4	7.0	2	2	2	2	0	1
478	65	2	3	2	0	1	2	1	0	2	0	0	0	0	0	2	0	1	2	.	.	1	.	6.6	6.3	8.5	6.4	8.4	6.6	7.1	6.1	0	0	0	2	1	0
479	65	2	3	0	1	.	.	0	0	.	.	0	1	.	.	0	1	.	.	.	.	.	.	.	5.9	7.9	7.3	.	.	.	.	1	0	1	0	0	0
480	65	2	3	1	1	1	1	0	0	0	0	1	1	1	0	1	1	1	1	.	1	.	.	6.4	5.5	9.8	6.9	.	7.1	.	5.8	1	0	1	1	0	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
481	65	2	3	1	1	1	1	0	2	0	1	0	0	0	0	1	1	1	1	.	.	.	.	6.6	6.1	8.1	6.8	8.3	7.1	6.7	5.9	1	2	0	1	0	0
482	65	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.0	5.7	8.5	6.8	8.6	6.8	6.0	5.8	0	0	0	0	0	0
483	65	2	3	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0	.	.	.	.	5.7	5.1	7.9	6.8	.	6.8	6.0	5.4	0	1	1	0	0	1
484	65	2	3	2	2	2	2	0	0	0	0	1	0	0	0	2	2	2	2	.	.	.	.	.	.	7.5	.	7.5	.	5.7	.	2	0	0	2	0	1
485	65	2	3	2	1	.	.	0	0	.	.	0	0	.	.	2	1	.	.	.	.	.	.	.	6.4	8.1	6.8	.	.	.	.	1	0	0	2	0	0
486	65	2	3	.	.	1	2	.	.	0	1	.	.	2	0	.	.	1	2	.	.	.	.	.	.	.	.	8.6	7.0	6.1	5.7	1	0	2	2	1	0
487	55	2	3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	5.8	.	.	.	1	0	1
488	65	2	3	2	1	1	2	0	0	0	0	1	0	0	0	2	1	1	2	.	.	.	.	.	5.5	7.0	5.8	7.2	6.1	6.0	5.6	1	0	0	2	0	1
489	65	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.0	6.0	8.0	6.6	7.9	6.3	6.1	5.5	0	0	0	0	0	0
490	55	2	3	1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1	.	.	.	.	6.1	5.6	7.9	7.1	7.9	6.8	6.3	6.0	0	0	0	1	1	0
491	55	2	3	.	.	0	0	.	.	2	1	.	.	1	0	.	.	0	0	.	.	2	.	.	.	.	.	8.0	7.1	5.7	5.8	0	2	1	0	1	0
492	55	2	3	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	8.1	7.1	.	.	.	.	0	0	0	.	.	.
493	55	2	3	2	.	0	2	0	.	0	0	1	.	1	0	3	.	0	3	.	.	.	.	6.0	6.5	.	.	7.7	7.5	6.1	6.8	0	0	1	2	0	1
494	55	2	3	.	0	0	.	.	2	2	.	.	1	0	.	.	0	0	.	.	3	3	.	.	.	8.4	7.4	8.0	7.1	.	.	0	2	1	.	.	.
495	55	2	3	2	1	2	2	0	1	2	0	1	1	1	1	2	1	2	2	.	.	2	.	5.2	6.2	8.0	6.5	7.6	6.9	5.6	6.3	1	1	1	2	0	1
496	55	2	3	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	.	.	.	.	5.6	6.0	8.5	7.1	8.7	7.4	5.3	6.0	0	0	1	0	0	1
497	55	2	3	2	3	3	2	0	2	2	0	1	2	1	0	2	3	3	2	.	3	4	.	6.6	7.3	9.5	8.9	9.9	8.8	6.2	7.7	3	2	2	2	0	1
498	55	2	3	2	1	1	2	0	0	0	0	1	1	1	1	2	1	1	2	.	.	.	.	4.8	.	7.8	6.7	8.0	6.9	4.5	5.3	1	0	1	2	0	1
499	55	2	3	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	.	.	.	.	6.1	5.9	8.5	6.7	8.3	7.0	5.7	6.1	0	0	1	1	0	0
500	55	2	3	2	2	3	3	0	2	2	2	1	0	1	0	3	3	3	3	.	1	3	3	7.4	6.2	9.3	8.0	9.2	7.4	8.5	.	2	2	0	2	0	1
501	55	2	3	1	0	.	.	0	0	.	.	1	0	.	.	1	0	.	.	.	.	.	.	5.7	5.7	7.6	6.4	.	.	.	.	0	0	0	1	0	1
502	55	2	3	2	0	.	.	0	0	.	.	0	0	.	.	2	0	.	.	.	.	.	.	7.6	5.9	9.0	7.3	.	.	.	.	0	0	0	2	0	0
503	55	2	3	.	0	0	0	.	0	0	0	.	0	0	1	.	0	0	0	.	.	.	.	.	.	7.9	6.1	8.2	6.1	5.0	5.0	0	0	0	0	0	1
504	55	2	3	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.1	5.5	.	.	.	.	.	.	.	.	.	1	0	0
505	55	2	3	.	.	0	0	.	.	1	1	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.0	6.7	5.4	6.0	0	1	1	0	1	1
506	55	2	3	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	5.5	5.8	.	.	.	.	5.3	5.8	.	.	.	2	0	1
507	55	2	3	1	0	1	0	0	0	0	0	1	1	1	1	1	0	0	0	.	.	.	.	5.4	5.5	7.9	6.5	8.1	6.4	5.6	5.8	0	0	1	1	0	1
508	55	2	3	.	0	0	1	.	0	0	0	.	0	0	0	.	0	0	1	.	.	.	.	.	.	7.8	7.2	7.7	7.1	5.5	6.2	0	0	0	1	0	0
509	55	2	3	1	0	0	.	0	0	0	.	0	1	1	.	0	0	0	.	.	.	.	.	5.7	6.0	8.2	7.1	8.1	7.3	.	.	0	0	1	1	0	0
510	55	2	3	1	0	1	1	1	1	3	2	1	1	1	1	0	1	1	.	.	.	.	.	4.6	6.1	7.6	6.9	7.4	6.8	5.0	6.3	0	1	1	1	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
511	55	2	3	0	0	0	0	1	0	0	0	1	2	1	1	0	0	0	0	.	.	.	.	5.0	5.1	7.3	6.1	7.4	6.0	.	5.6	0 0 2	0 1 1
512	65	2	3	1	.	1	.	0	.	0	.	0	.	0	.	1	.	1	.	.	.	.	.	5.9	6.4	.	.	8.4	6.5	.	.	1 0 0	1 0 0
513	65	2	3	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	8.7	6.9	.	.	0 2 1	. . .
514	65	2	3	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.9	5.7	. . .	1 1 0
515	65	2	3	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.3	5.2	.	.	.	.	.	.	. . .	1 0 0
516	65	2	3	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	.	.	.	.	5.5	5.9	8.4	7.2	7.6	7.1	6.2	6.4	1 0 0	1 0 0
517	65	2	3	1	1	0	.	0	2	2	.	2	1	1	.	1	1	0	.	.	3	3	.	.	5.8	7.1	7.4	7.2	7.7	.	.	1 2 1	1 0 2
518	265	2	3	1	0	0	2	0	2	0	0	1	0	0	1	1	0	0	2	.	2	.	.	6.7	6.2	9.2	6.9	8.6	6.9	.	6.1	0 2 0	1 0 1
519	107	2	5	1	1	1	1	0	0	0	0	0	1	1	0	1	1	1	1	.	.	.	.	6.6	.	6.3	.	8.1	.	6.5	.	1 0 1	1 0 0
520	107	2	5	2	.	2	2	0	.	1	1	1	.	1	0	2	.	2	2	.	.	.	.	6.0	6.5	.	.	8.5	7.4	5.6	6.1	2 1 1	2 0 1
521	107	2	5	.	0	0	2	.	2	2	0	.	2	2	1	.	0	0	2	.	3	3	.	.	.	8.4	7.1	8.1	7.3	4.7	5.7	0 2 2	2 0 1
522	21	2	15	0	0	0	0	1	2	2	1	1	2	2	1	0	0	0	0	.	1	1	.	6.3	7.2	7.2	6.7	.	6.8	6.9	5.9	0 2 2	0 1 1
523	21	2	15	.	.	0	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	9.1	7.9	.	.	0 2 0	. . .
524	22	2	15	1	1	1	1	0	2	2	0	0	0	0	0	1	1	1	1	.	2	2	.	5.8	6.5	8.2	6.8	8.1	6.8	6.0	6.3	1 2 0	1 0 0
525	23	2	15	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.7	6.3	.	.	.	.	.	.	. . .	2 0 0
526	23	2	15	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.8	6.3	.	.	.	.	.	.	. . .	2 1 0
527	23	2	15	.	1	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	.	9.0	7.1	.	.	.	.	1 2 2	. . .
528	23	2	15	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.3	6.0	.	.	.	.	.	.	. . .	1 1 1
529	23	2	15	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	6.5	. . .	0 0 2
530	25	2	15	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	.	.	.	8.0	6.5	.	.	7.0	5.5	0 0 0	0 0 0
531	25	2	15	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.2	. . .	2 1 1
532	25	2	15	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.5	6.3	. . .	1 1 2
533	25	2	15	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.9	6.9	.	.	.	.	.	.	. . .	2 0 1
534	25	2	15	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.7	5.7	. . .	1 0 1
535	26	2	15	1	.	.	1	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	5.4	6.2	.	.	.	.	5.3	6.0	. . .	1 1 1
536	27	2	15	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.2	. . .	2 0 1
537	28	2	15	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.7	5.5	.	.	.	.	.	.	. . .	0 0 0
538	28	2	15	0	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	.	.	.	.	5.7	6.0	7.3	6.7	.	.	.	.	0 0 0	0 0 1
539	28	2	15	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.1	6.6	. . .	2 0 2
540	29	2	15	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.1	. . .	2 0 2

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
541	29	2	15	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.1	.	.	.	.	.	.	.	. . .	2 0 0
542	30	2	15	1	.	0	1	1	.	0	1	0	.	0	0	1	.	0	1	.	.	.	.	7.0	6.1	.	.	8.2	7.4	7.1	.	0 0 0	1 1 0
543	30	2	15	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.3	6.1	.	.	.	.	.	.	. . .	1 0 1
544	30	2	15	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	5.2	5.5	.	.	.	.	5.5	5.5	. . .	0 0 1
545	30	2	15	1	1	1	.	1	2	1	.	0	0	0	.	1	1	1	.	.	1	.	.	6.5	7.1	7.0	7.1	7.6	7.2	.	.	1 2 0	1 1 0
546	30	2	15	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	7.0	. . .	2 0 0
547	30	2	15	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	8.6	7.1	.	.	.	.	0 0 0	. . .
548	30	2	15	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.0	. . .	1 0 1
549	30	2	15	.	3	3	.	.	0	0	.	.	2	1	.	.	3	3	.	.	.	.	.	.	.	8.3	7.4	7.6	7.7	.	.	3 0 2	. . .
550	30	2	15	2	.	.	2	0	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	7.0	6.6	.	.	.	.	6.3	6.7	. . .	2 0 0
551	30	2	15	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.3	6.5	. . .	2 0 1
552	30	2	15	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.2	5.2	. . .	0 1 1
553	30	2	15	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.0	7.3	. . .	0 1 2
554	30	2	15	2	.	0	.	0	.	2	.	1	.	0	.	3	.	0	.	.	.	1	.	6.3	6.8	.	.	8.9	7.4	.	.	0 2 0	2 0 1
555	30	2	15	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	6.1	.	.	.	.	.	.	. . .	1 1 1
556	30	2	15	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.6	6.2	.	.	.	.	.	.	. . .	1 0 1
557	30	2	15	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.3	5.5	.	.	.	.	.	.	. . .	1 0 2
558	30	2	15	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.0	7.0	.	.	.	.	.	.	. . .	1 1 0
559	30	2	15	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	5.2	5.6	.	.	.	.	.	.	. . .	1 0 2
560	30	2	15	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	6.1	. . .	1 0 0
561	30	2	15	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.3	5.9	.	.	.	.	.	.	. . .	2 0 1
562	30	2	15	1	2	2	1	0	2	2	1	1	1	1	1	1	2	2	1	.	1	1	.	6.0	6.1	7.7	7.5	.	7.1	6.5	6.0	2 2 1	1 0 1
563	30	2	15	1	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	6.0	5.2	.	.	.	.	5.7	5.9	. . .	1 0 0
564	30	2	15	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	5.6	. . .	1 0 1
565	30	2	15	1	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.7	5.4	.	.	.	.	.	.	. . .	1 1 0
566	30	2	15	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	5.7	. . .	2 0 1
567	30	2	15	1	.	.	1	0	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	6.6	6.2	.	.	.	.	6.3	6.1	. . .	1 0 0
568	30	2	15	.	.	.	3	.	.	.	0	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	.	.	.	7.5	6.6	. . .	3 0 2
569	30	2	15	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.2	6.8	.	.	.	.	.	.	. . .	1 0 1
570	30	2	15	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.4	6.7	. . .	2 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
571	30	2	15	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.4	6.4	.	.	.	.	.	.	. . .	1 1 1
572	30	2	15	1	1	1	1	0	0	0	1	2	2	2	1	0	1	1	0	.	.	.	.	6.1	6.0	.	.	7.7	6.7	7.5	6.0	1 0 2	1 0 2
573	30	2	15	.	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	8.5	7.1	.	.	1 2 1	. . .
574	30	2	15	.	.	2	2	.	.	1	0	.	.	3	1	.	.	2	2	.	.	.	.	.	.	.	.	7.1	7.0	5.3	6.1	2 1 3	2 0 1
575	30	2	15	1	.	2	.	1	.	2	.	0	.	1	.	1	.	2	.	.	.	1	.	6.3	6.0	.	.	8.1	6.9	.	.	2 2 1	1 1 0
576	30	2	15	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	5.9	7.0	.	.	.	.	.	.	. . .	1 0 2
577	71	2	15	1	2	2	.	0	0	0	.	2	2	2	.	1	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 2	1 0 2
578	71	2	15	2	.	1	2	0	.	0	1	1	.	1	1	2	.	1	2	.	.	.	.	6.2	6.0	.	.	8.3	7.1	.	6.0	1 0 1	2 0 1
579	71	2	15	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	6.2	6.4	.	.	.	.	6.4	6.4	. . .	2 1 0
580	71	2	15	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.2	6.8	.	.	.	.	.	.	. . .	2 1 0
581	77	2	15	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	5.9	. . .	0 0 1
582	71	2	15	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6.5	6.8	. . .	3 0 0
583	71	2	15	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.2	5.9	.	.	.	.	.	.	. . .	1 0 0
584	71	2	15	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.0	6.9	.	.	.	.	5.6	7.1	. . .	2 0 1
585	71	2	15	1	.	.	.	3	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.9	6.9	.	.	.	.	.	.	. . .	1 3 1
586	71	2	15	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.3	6.0	. . .	1 0 0
587	71	2	15	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.7	5.6	.	.	.	.	.	.	. . .	1 0 1
588	71	2	15	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	5.9	5.5	.	.	.	.	.	.	. . .	0 0 2
589	71	2	15	.	2	.	3	.	2	.	0	.	2	.	1	.	2	.	3	.	3	.	.	.	.	9.4	7.4	.	.	7.3	5.7	2 2 2	3 0 1
590	71	2	15	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.3	5.6	.	.	.	.	.	.	. . .	1 1 0
591	71	2	15	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.5	5.9	. . .	0 1 0
592	71	2	15	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.9	7.0	. . .	1 1 0
593	71	2	15	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.0	6.1	.	.	.	.	6.1	6.0	. . .	2 0 0
594	71	2	15	0	.	.	0	1	.	.	1	1	.	.	0	0	.	.	0	.	.	.	.	6.0	6.3	.	.	.	.	6.6	6.2	. . .	0 1 1
595	71	2	15	2	.	0	2	0	.	2	1	1	.	2	1	2	.	0	2	.	.	1	.	6.3	6.8	.	.	8.1	7.0	5.6	6.6	0 2 2	2 0 1
596	71	2	15	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.0	7.1	.	.	.	.	6.4	6.8	. . .	1 0 0
597	71	2	15	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.8	5.7	.	.	.	.	.	.	. . .	1 0 0
598	71	2	15	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	7.3	6.7	.	.	.	.	.	.	. . .	2 0 1
599	71	2	15	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.0	6.6	.	.	.	.	5.9	6.4	. . .	0 0 1
600	71	2	15	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.6	6.1	.	.	.	.	.	.	. . .	0 0 0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
601	71	2	15	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	7.1	.	.	.	2	0	1
602	71	2	15	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.8	6.8	.	.	.	.	.	.	.	.	.	0	1	1
603	71	2	15	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.0	7.1	.	.	.	.	.	.	.	.	.	1	0	0
604	71	2	15	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.3	5.7	.	.	.	2	0	2
605	71	2	15	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	6.5	.	.	.	.	.	.	.	.	.	2	0	1
606	71	2	15	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	6.4	.	.	.	.	.	.	.	.	.	2	0	1
607	108	2	15	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.6	6.3	.	.	.	.	.	.	.	.	.	1	0	1
608	108	2	15	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.2	5.4	.	.	.	.	.	.	.	.	.	0	1	1
609	170	2	15	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1	.	.	.	.	.	5.8	7.6	6.7	7.7	6.7	6.0	6.0	0	0	0	1	1	0
610	170	2	15	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	5.6	.	.	.	1	0	1
611	170	2	15	2	.	.	3	0	.	.	4	0	.	.	0	2	.	.	3	.	.	.	.	6.6	6.3	.	.	.	.	6.8	6.8	.	.	.	2	0	0
612	171	2	15	1	.	.	1	1	.	.	1	1	.	.	0	1	.	.	1	.	.	.	.	6.9	6.6	.	.	.	.	6.3	6.5	.	.	.	1	1	1
613	171	2	15	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.3	.	.	.	1	0	1
614	171	2	15	.	1	1	1	.	0	2	0	.	1	1	1	.	1	2	1	.	.	2	.	.	.	8.8	7.2	8.6	7.3	6.5	6.2	1	0	1	1	0	1
615	172	2	15	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.1	.	.	.	2	1	0
616	173	2	15	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.1	6.8	.	.	.	1	0	2
617	170	2	15	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.2	5.8	.	.	.	.	.	.	.	.	.	0	1	0
618	262	2	15	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.6	5.8	.	.	.	0	0	1
619	262	2	15	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	6.0	.	.	.	0	0	1
620	262	2	15	.	.	0	0	.	.	0	0	.	.	0	1	.	.	0	0	.	.	.	.	.	.	.	.	7.6	7.2	5.7	5.3	0	0	0	0	0	1
621	262	2	15	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.1	.	.	.	0	0	1
622	262	2	15	1	.	.	1	1	.	.	0	0	.	.	1	1	.	.	1	.	.	.	.	5.7	6.1	.	.	.	.	5.4	5.7	.	.	.	1	1	0
623	262	2	15	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	8.2	6.8	.	.	1	0	1	.	.	.
624	262	2	15	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.5	6.1	.	.	.	.	5.9	6.1	.	.	.	2	0	1
625	262	2	15	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.6	5.8	.	.	.	0	0	1
626	262	2	15	1	.	1	.	0	.	0	.	0	.	1	.	1	.	1	.	.	.	.	.	5.3	5.1	.	.	8.4	6.9	.	.	1	0	1	1	0	0
627	262	2	15	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.6	6.5	.	.	.	.	.	.	.	.	.	0	1	1
628	262	2	15	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	6.7	6.8	.	.	.	.	.	.	.	.	.	2	0	1
629	262	2	15	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.9	5.3	.	.	.	0	0	0
630	262	2	15	.	.	0	1	.	.	0	0	.	.	2	1	.	.	0	0	.	.	.	.	.	.	.	.	8.0	7.1	6.5	6.1	0	0	2	1	0	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
631	262	2	15	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	5.1	5.3	.	.	.	.	.	.	.	.	.	0	0	2
632	262	2	15	0	.	.	1	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	6.5	7.0	.	.	.	.	5.6	6.5	.	.	.	0	1	1
633	269	2	15	1	.	1	0	0	.	0	0	1	.	0	1	1	.	1	0	.	.	.	.	5.3	5.8	.	.	7.3	6.1	5.8	6.1	1	0	0	1	0	1
634	269	2	15	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	2	.	.	.	.	5.2	5.7	.	.	.	.	4.6	5.3	.	.	.	1	0	0
635	269	2	15	1	1	1	2	0	2	2	0	1	1	1	1	2	1	1	2	.	2	2	.	5.8	6.4	7.9	7.2	8.0	7.0	5.7	6.5	1	2	1	1	0	1
636	269	2	15	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.0	6.1	.	.	.	.	.	.	.	.	.	1	0	0
637	269	2	15	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	8.3	6.4	.	.	.	.	0	0	2	.	.	.
638	328	2	15	0	.	0	0	0	.	0	0	1	.	2	1	0	.	0	0	.	.	.	.	5.0	4.9	.	.	7.2	6.1	5.1	5.1	0	0	2	0	0	1
639	14	2	28	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.5	6.1	.	.	.	1	1	1
640	14	2	28	1	2	.	.	0	0	.	.	0	0	.	.	1	2	.	.	.	.	.	.	6.0	5.7	7.9	6.6	.	.	.	.	2	0	0	1	0	0
641	266	2	28	.	0	1	.	.	0	0	.	.	1	2	.	.	0	0	.	.	.	.	.	.	.	7.7	6.5	7.4	7.2	.	.	0	0	1	.	.	.
642	266	2	28	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	.	.	.	.	5.5	6.0	.	7.5	.	7.5	5.7	6.3	1	1	1	1	1	0
643	93	2	29	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	5.7	.	.	.	0	1	1
644	52	2	6	0	1	1	0	0	0	0	0	1	2	2	1	0	1	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	0	2	0	0	1
645	53	2	6	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1
646	53	2	6	2	1	1	1	0	0	0	0	1	2	2	1	2	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	0	2	2	0	1
647	53	2	6	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
648	53	2	6	.	1	0	.	.	2	0	.	.	1	2	.	.	1	0	.	.	1	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.
649	53	2	6	.	.	.	0	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	3	0
650	53	2	6	.	1	.	2	.	2	.	0	.	3	.	1	.	1	.	2	.	3	.	.	.	.	.	.	.	.	.	.	1	2	3	2	0	1
651	53	2	6	1	.	.	0	0	.	.	0	2	.	.	2	1	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	2
652	52	2	6	.	2	.	1	.	2	.	1	.	2	.	1	.	2	.	1	.	3	.	.	.	.	8.4	6.5	.	.	6.4	6.5	2	2	2	1	1	1
653	53	2	6	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.0	6.0	.	.	.	.	.	.	.	.	.	2	0	0
654	53	2	6	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	.	.	.	.	5.7	6.3	8.0	7.3	8.1	7.0	5.8	6.3	0	0	1	1	0	1
655	52	2	6	0	0	0	0	0	2	2	0	0	1	1	0	0	0	0	0	.	1	1	.	.	6.4	.	7.7	8.8	7.0	6.6	6.6	0	2	1	0	0	0
656	52	2	6	1	1	.	.	0	2	.	.	1	3	.	.	1	1	.	.	.	1	.	.	5.7	6.3	8.6	6.6	.	.	.	.	1	2	3	1	0	1
657	52	2	6	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.1	.	.	.	2	1	0
658	52	2	6	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.5	6.4	.	.	.	1	1	0
659	52	2	6	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	8.0	6.6	.	.	0	0	2	.	.	.
660	70	2	6	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.4	6.4	.	.	.	2	1	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
661	70	2	6	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.4	.	.	.	.	.	.	.	. . .	1 0 1
662	52	2	6	1	.	0	1	0	.	2	0	0	.	1	0	1	.	0	1	.	.	1	.	5.8	5.9	.	.	8.5	6.8	5.8	5.2	0 2 1	1 0 0
663	52	2	6	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	.	.	.	.	.	5.3	9.3	7.3	9.1	6.9	6.4	6.3	0 0 0	1 0 0
664	52	2	6	0	.	0	0	1	.	1	1	0	.	1	0	0	.	0	0	.	.	.	.	6.7	6.1	.	.	7.5	6.4	6.6	6.3	0 1 1	0 1 0
665	52	2	6	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6.9	6.1	. . .	3 0 0
666	52	2	6	1	1	1	.	0	0	0	.	1	1	1	.	1	1	1	.	.	.	.	.	6.0	5.6	.	7.1	7.3	7.1	.	.	1 0 1	1 0 1
667	53	2	6	3	3	.	3	0	3	.	0	0	0	.	0	3	3	.	3	.	.	.	.	7.3	6.4	9.2	7.6	.	.	8.1	6.4	3 3 0	3 0 0
668	70	2	6	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.5	5.8	. . .	1 0 1
669	70	2	6	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.1	6.2	.	.	.	.	.	.	. . .	1 0 2
670	70	2	6	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.2	6.1	. . .	0 0 0
671	70	2	6	2	.	.	1	1	.	.	3	1	.	.	0	2	.	.	1	.	.	.	.	7.4	7.4	.	.	.	.	7.9	7.0	. . .	2 1 1
672	70	2	6	2	.	.	1	0	.	.	0	1	.	.	1	2	.	.	1	.	.	.	.	6.3	6.2	.	.	.	.	6.3	6.1	. . .	2 0 1
673	70	2	6	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.3	6.0	. . .	2 1 0
674	70	2	6	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.7	7.2	7.8	6.6	.	.	0 0 1	. . .
675	70	2	6	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.2	6.0	.	.	.	.	.	.	. . .	0 0 0
676	70	2	6	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.8	6.1	.	.	.	.	.	.	. . .	1 0 1
677	70	2	6	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	6.3	. . .	0 1 1
678	52	2	6	.	.	.	2	.	.	.	3	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.0	7.0	. . .	2 3 0
679	52	2	6	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.7	6.6	. . .	1 1 0
680	70	2	6	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.3	7.1	.	.	.	.	1 0 1	. . .
681	70	2	6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	.	.	.	.	5.3	5.7	8.3	7.3	8.3	7.5	5.9	5.8	0 0 0	0 0 0
682	70	2	6	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	8.0	6.8	.	.	0 0 0	. . .
683	70	2	6	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.6	6.7	.	.	.	.	1 0 1	. . .
684	254	2	6	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	5.7	. . .	2 0 1
685	254	2	6	1	1	1	.	0	0	0	.	0	1	1	.	1	1	1	.	.	.	.	.	5.8	5.4	8.2	6.2	8.1	6.2	.	.	1 0 1	1 0 0
686	254	2	6	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	8.4	7.0	.	.	0 0 0	. . .
687	42	2	12	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
688	42	2	12	1	2	2	.	1	2	2	.	1	1	1	.	1	2	2	.	.	1	1	.	.	.	.	.	.	.	.	.	2 2 1	1 1 1
689	42	2	12	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0	.	1	1	.	.	.	.	.	.	.	.	.	1 2 0	1 1 0
690	42	2	12	2	.	0	2	3	.	2	2	1	.	1	1	3	.	0	2	.	.	3	3	.	.	.	.	.	.	.	.	0 2 1	2 3 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
691	42	2	12	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	.	.	.	.	5.6	5.5	7.8	6.4	7.4	6.2	5.5	5.6	0	0	1	1	0	1
692	42	2	12	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.6	6.2	7.5	6.3	.	.	0	0	1	.	.	.
693	42	2	12	2	2	2	2	0	2	0	0	1	0	1	0	2	2	2	2	.	3	.	.	.	6.8	7.4	7.4	7.5	6.9	5.7	6.6	2	2	0	2	0	1
694	42	2	12	1	1	1	1	1	2	2	2	0	0	0	0	1	1	1	1	.	2	2	3	6.2	6.5	8.2	7.7	8.6	7.7	6.6	6.1	1	2	0	1	1	0
695	42	2	12	2	1	1	1	0	2	2	0	1	1	1	1	2	1	1	1	.	1	1	.	6.2	5.5	7.7	6.9	7.6	7.0	6.6	5.4	1	2	1	2	0	1
696	42	2	12	1	1	1	1	0	2	2	0	1	1	1	1	1	1	1	1	.	2	2	.	6.8	6.1	9.4	7.6	9.4	7.6	6.4	6.1	1	2	1	1	0	1
697	42	2	12	.	3	3	2	.	2	2	1	.	1	2	1	.	3	3	2	.	3	3	.	.	.	8.9	7.4	8.9	7.4	6.9	6.3	3	2	1	2	1	1
698	42	2	12	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	3	.	.	.	.	.	8.8	6.9	.	.	2	2	1	.	.	.
699	42	2	12	1	1	1	1	1	2	2	3	1	2	2	1	1	1	1	1	.	2	3	.	7.5	6.3	9.5	7.4	9.5	7.3	7.8	6.3	1	2	2	1	1	1
700	42	2	12	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	.	.	.	.	7.7	5.8	8.5	6.8	8.8	6.8	7.1	6.0	1	0	0	1	1	0
701	42	2	12	1	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0	.	.	.	.	5.9	6.8	8.4	7.2	8.5	7.3	5.8	6.5	1	0	1	1	0	0
702	42	2	12	.	2	2	.	.	2	2	.	.	0	0	.	.	2	2	.	.	2	2	.	.	.	8.3	6.4	8.3	6.6	.	.	2	2	0	.	.	.
703	42	2	12	.	.	1	1	.	.	2	0	.	.	1	0	.	.	1	1	.	.	1	.	.	.	.	.	8.1	6.4	6.0	5.5	1	2	1	1	0	0
704	42	2	12	1	.	1	0	0	.	2	0	0	.	1	0	0	.	1	0	.	.	1	.	6.5	5.5	.	.	8.2	6.5	6.5	5.9	1	2	1	1	0	0
705	42	2	12	1	0	.	.	0	2	.	.	1	1	.	.	1	0	.	.	.	1	.	.	6.3	5.9	.	6.7	.	.	.	.	0	2	1	1	0	1
706	43	2	12	.	.	3	1	.	.	0	0	.	.	1	1	.	.	4	2	.	.	.	.	.	.	.	.	8.1	6.4	6.8	5.8	3	0	1	1	0	1
707	43	2	12	2	2	2	.	0	0	0	.	0	1	1	.	2	2	3	.	.	.	.	.	5.5	5.8	7.2	6.4	7.5	6.5	.	.	2	0	1	2	0	0
708	43	2	12	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.0	5.8	.	.	.	1	1	0
709	43	2	12	2	.	0	2	0	.	0	0	1	.	0	1	2	.	0	2	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	2	0	1
710	43	2	12	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	0
711	43	2	12	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0
712	43	2	12	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	0
713	43	2	12	2	.	.	1	0	.	.	0	0	.	.	0	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	0
714	43	2	12	1	0	.	.	0	0	.	.	2	2	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	2	1	0	2
715	43	2	12	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
716	43	2	12	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
717	43	2	12	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
718	43	2	12	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
719	43	2	12	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
720	43	2	12	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
721	43	2	12	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	1
722	43	2	12	1	.	0	0	0	.	0	0	1	.	1	1	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	0	1
723	43	2	12	1	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0	.	1	1	.	.	.	.	.	.	.	.	.	0	2	0	1	0	0
724	43	2	12	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
725	43	2	12	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	8.3	7.3	.	.	.	.	1	2	0	.	.	.
726	43	2	12	3	3	3	3	1	2	2	0	1	1	1	0	3	3	3	3	.	2	1	.	7.4	6.0	8.8	6.6	.	6.6	7.2	6.1	3	2	1	3	1	1
727	43	2	12	.	1	1	1	.	2	2	0	.	0	0	0	.	1	1	1	.	1	1	.	.	.	7.7	6.9	7.9	6.8	5.8	6.0	1	2	0	1	0	0
728	43	2	12	3	2	2	3	0	1	1	0	0	0	0	0	3	2	2	3	.	.	.	.	7.4	6.1	8.1	6.4	7.7	6.2	7.2	6.1	2	1	0	3	0	0
729	43	2	12	.	1	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.0	6.7	7.9	6.7	.	.	1	0	0	.	.	.
730	43	2	12	2	2	2	2	1	2	2	0	1	1	1	1	2	2	2	2	.	1	1	.	7.7	6.9	.	7.3	8.5	7.2	7.5	6.6	2	2	1	2	1	1
731	43	2	12	2	1	1	1	1	2	2	0	0	1	0	0	2	1	1	2	.	3	2	.	6.7	5.8	7.8	7.1	7.6	6.9	6.1	5.5	1	2	1	2	1	0
732	43	2	12	.	2	2	3	.	2	2	1	.	3	3	2	.	2	2	3	.	3	3	.	.	.	9.4	7.7	9.0	7.4	.	6.3	2	2	3	3	1	2
733	43	2	12	2	1	.	1	0	2	.	0	0	1	.	1	2	1	.	1	.	2	.	.	7.6	5.7	8.4	6.6	.	.	6.7	5.6	1	2	1	2	0	0
734	43	2	12	.	2	1	.	.	2	2	.	.	1	0	.	.	2	1	.	.	1	1	.	.	.	8.6	7.1	8.5	7.2	.	.	2	2	1	.	.	.
735	43	2	12	.	.	0	1	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.6	7.1	6.7	6.2	0	0	1	1	0	1
736	43	2	12	1	2	2	1	0	0	0	0	1	1	1	1	1	2	2	1	.	.	.	.	6.6	6.3	9.0	6.9	9.0	7.4	6.4	6.1	2	0	1	1	0	1
737	43	2	12	.	1	1	1	.	0	0	0	.	2	2	1	.	1	1	1	.	.	.	.	.	.	9.0	7.2	9.1	6.6	6.5	5.8	1	0	2	1	0	1
738	43	2	12	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	8.2	6.2	.	.	.	.	0	0	0	.	.	.
739	43	2	12	.	.	1	0	.	.	2	0	.	.	2	1	.	.	1	0	.	.	3	.	.	.	.	.	8.8	7.1	5.2	5.9	1	2	2	0	0	1
740	43	2	12	0	0	.	1	0	0	.	0	1	1	.	1	0	0	.	1	.	.	.	.	5.4	6.1	7.0	6.4	.	.	6.0	6.3	0	0	1	0	0	1
741	43	2	12	2	.	2	2	0	.	0	1	1	.	2	1	2	.	2	2	.	.	.	.	7.2	6.0	.	.	8.6	6.6	7.2	5.6	2	0	2	2	0	1
742	43	2	12	1	0	0	.	0	2	2	.	1	2	1	.	0	0	0	.	.	1	1	.	6.2	5.9	8.1	7.6	8.2	7.3	.	.	0	2	2	1	0	1
743	43	2	12	.	0	.	0	.	0	.	0	.	1	.	1	.	0	.	0	.	.	.	.	.	.	8.0	6.5	.	.	6.3	5.5	0	0	1	0	0	1
744	43	2	12	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	0	.	.	.	.	5.9	6.1	.	7.1	.	7.1	6.1	6.0	0	0	1	0	0	1
745	43	2	12	1	.	.	1	0	.	.	0	0	.	.	1	1	.	.	0	.	.	.	.	5.8	6.3	.	.	.	.	6.1	6.1	.	.	.	1	0	0
746	43	2	12	0	0	0	0	1	2	2	2	1	1	1	1	0	0	0	0	.	1	1	1	6.0	5.4	8.0	6.4	7.8	6.6	6.2	5.4	0	2	1	0	1	1
747	43	2	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.3	6.1	8.7	6.6	8.5	6.9	6.3	6.0	0	0	0	0	0	0
748	43	2	12	.	1	1	1	.	0	0	1	.	1	1	1	.	1	1	1	.	.	.	.	.	.	8.2	5.6	8.2	5.7	6.3	5.7	1	0	1	1	1	1
749	43	2	12	.	1	0	.	.	2	2	.	.	1	0	.	.	0	0	.	.	1	1	.	.	.	8.4	6.9	8.2	6.9	.	.	1	2	1	.	.	.
750	43	2	12	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	6.3	.	.	.	2	0	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
751	43	2	12	.	1	1	1	.	2	2	1	.	1	2	1	.	1	1	1	.	3	3	.	.	.	9.1	6.6	8.5	6.9	6.1	5.4	1	2	1	1	1	1
752	43	2	12	1	1	1	1	1	3	2	1	0	1	1	1	1	1	2	2	.	.	3	.	6.3	6.4	8.2	7.2	.	7.0	6.3	6.2	1	3	1	1	1	0
753	43	2	12	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	9.2	7.1	.	.	.	.	0	0	1	.	.	.
754	43	2	12	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.1	6.0	.	.	.	0	0	1
755	43	2	12	0	.	2	0	1	.	2	0	1	.	1	1	0	.	2	0	.	.	2	.	6.0	6.0	.	.	8.8	6.5	6.1	5.8	2	2	1	0	1	1
756	43	2	12	.	.	1	1	.	.	2	1	.	.	0	0	.	.	1	1	.	.	1	.	.	.	.	.	8.2	7.0	4.3	6.2	1	2	0	1	1	0
757	43	2	12	.	0	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.4	6.6	8.0	6.4	.	.	0	0	0	.	.	.
758	43	2	12	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	7.6	6.4	.	.	0	0	0	.	.	.
759	43	2	12	.	0	0	0	.	2	0	1	.	2	2	1	.	0	0	0	.	1	.	.	.	.	9.1	7.5	9.3	8.0	6.1	6.1	0	2	2	0	1	1
760	43	2	12	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.4	6.1	.	.	.	1	0	0
761	43	2	12	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	8.3	6.9	.	.	.	.	1	0	1	.	.	.
762	43	2	12	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	.	.	.	.	6.0	5.7	8.1	7.4	.	7.4	5.8	6.1	0	0	1	0	0	1
763	43	2	12	0	0	.	0	0	0	.	0	1	1	.	1	0	0	.	0	.	.	.	.	6.2	5.8	7.0	6.0	.	.	6.6	5.9	0	0	1	0	0	1
764	43	2	12	1	.	.	1	0	.	.	1	0	.	.	1	1	.	.	1	.	.	.	.	6.1	6.4	.	.	.	.	6.4	6.4	.	.	.	1	0	0
765	43	2	12	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	6.0	6.1	8.6	7.0	.	.	.	.	0	0	1	0	0	1
766	43	2	12	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.1	6.0	.	.	.	.	.	.	.	.	.	0	0	1
767	43	2	12	2	.	.	0	0	.	.	1	1	.	.	0	2	.	.	0	.	.	.	.	7.0	6.4	.	.	.	.	7.2	6.6	.	.	.	2	0	1
768	43	2	12	2	1	.	.	0	0	.	.	1	0	.	.	2	1	.	.	.	.	.	.	5.9	6.4	8.5	7.0	.	.	.	.	1	0	0	2	0	1
769	43	2	12	0	.	.	0	1	.	.	3	0	.	.	0	0	.	.	0	.	.	.	.	6.5	6.8	.	.	.	.	6.6	6.8	.	.	.	0	1	0
770	43	2	12	.	1	.	2	.	0	.	0	.	1	.	1	.	1	.	2	.	.	.	.	.	.	7.7	6.3	.	.	6.1	5.7	1	0	1	2	0	1
771	43	2	12	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.7	6.8	.	.	.	.	.	.	.	.	.	0	0	1
772	43	2	12	.	0	0	0	.	0	0	1	.	1	1	1	.	0	0	0	.	.	.	.	.	.	8.2	7.4	.	7.2	.	6.9	0	0	1	0	1	1
773	43	2	12	1	0	0	2	0	0	0	0	1	0	0	0	1	0	0	2	.	.	.	.	7.0	6.8	8.3	7.6	8.3	7.7	7.2	6.8	0	0	0	1	0	1
774	43	2	12	1	0	0	1	1	2	0	0	1	2	2	1	1	0	0	1	.	1	.	.	.	6.4	.	7.4	.	7.2	.	5.9	0	2	2	1	1	1
775	43	2	12	0	.	.	0	1	.	.	3	0	.	.	1	0	.	.	0	.	.	.	.	5.9	6.8	.	.	.	.	5.9	6.8	.	.	.	0	1	0
776	43	2	12	.	0	.	1	.	0	.	0	.	2	.	1	.	0	.	1	.	.	.	.	.	.	8.5	6.8	.	.	6.4	5.9	0	0	2	1	0	1
777	43	2	12	1	1	1	.	1	2	2	.	1	0	1	.	1	0	0	.	.	1	1	.	6.1	5.9	8.5	6.5	8.4	6.8	.	.	1	2	0	1	1	1
778	43	2	12	1	0	.	0	0	0	.	0	1	1	.	1	1	0	.	0	.	.	.	.	6.5	6.6	8.5	7.2	.	.	6.5	6.4	0	0	1	1	0	1
779	43	2	12	.	.	1	2	.	.	2	0	.	.	2	2	.	.	1	2	.	.	2	.	.	.	.	.	8.5	7.4	5.5	6.3	1	2	2	2	0	2
780	43	2	12	0	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	.	.	.	.	5.9	6.3	.	7.6	8.7	7.4	.	5.9	0	0	0	0	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
781	43	2	12	.	0	0	.	.	2	2	.	.	1	1	.	.	0	0	.	.	1	1	.	.	.	7.6	6.9	7.8	6.6	.	.	0 2 1	. . .
782	43	2	12	1	.	1	1	1	.	2	1	1	.	1	1	1	.	1	1	.	.	1	.	6.2	6.0	.	.	8.0	6.6	6.2	6.1	1 2 1	1 1 1
783	43	2	12	0	0	0	0	1	0	0	1	1	2	2	1	0	0	0	0	.	.	.	.	6.5	6.4	7.1	6.9	7.6	6.9	6.6	6.4	0 0 2	0 1 1
784	43	2	12	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.6	6.0	.	.	.	.	.	.	. . .	2 1 1
785	43	2	12	.	1	1	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.3	6.1	7.5	6.1	.	.	1 0 1	. . .
786	43	2	12	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	5.9	5.8	.	.	.	.	.	.	. . .	2 0 0
787	43	2	12	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	.	.	.	.	.	5.8	8.5	7.3	.	7.3	6.5	6.3	0 0 1	0 0 1
788	43	2	12	2	.	.	2	0	.	.	1	1	.	.	1	2	.	.	2	.	.	.	.	6.1	6.3	.	.	.	.	6.6	6.2	. . .	2 0 1
789	43	2	12	1	1	1	0	1	2	2	1	1	1	1	1	1	1	1	0	.	1	2	.	6.0	6.2	8.7	6.8	.	6.8	6.0	6.2	1 2 1	1 1 1
790	43	2	12	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	5.1	. . .	1 1 1
791	43	2	12	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.4	6.2	.	.	.	.	.	.	. . .	1 0 1
792	43	2	12	0	0	.	0	0	0	.	1	1	1	.	1	0	0	.	0	.	.	.	.	6.1	4.6	7.7	5.7	.	.	6.1	5.5	0 0 1	0 0 1
793	44	2	12	1	.	.	2	2	.	.	2	1	.	.	1	1	.	.	2	1	.	.	1	6.7	6.2	.	.	.	.	7.1	6.3	. . .	1 2 1
794	44	2	12	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	5.9	.	.	.	.	.	.	. . .	0 0 1
795	44	2	12	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
796	44	2	12	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 0 2
797	44	2	12	1	2	2	.	0	2	2	.	1	1	1	.	1	2	2	.	.	1	1	.	.	.	.	.	.	.	.	.	2 2 1	1 0 1
798	44	2	12	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.5	6.7	. . .	1 1 1
799	44	2	12	1	1	.	1	1	0	.	0	1	1	.	1	1	1	.	1	.	.	.	.	5.7	6.1	7.6	6.4	.	.	6.1	6.0	1 0 1	1 1 1
800	44	2	12	.	0	.	1	.	0	.	1	.	0	.	1	.	0	.	2	.	.	.	.	.	.	8.0	7.2	.	.	6.2	6.7	0 0 0	1 1 1
801	44	2	12	1	2	2	1	1	3	2	1	1	2	1	1	2	2	2	2	.	.	3	.	7.4	6.7	9.8	7.7	9.8	7.8	.	6.8	2 3 2	1 1 1
802	44	2	12	0	0	0	1	3	0	0	1	1	1	1	0	0	0	0	1	.	.	.	.	6.0	6.6	7.7	6.7	7.9	6.5	6.0	6.5	0 0 1	0 3 1
803	44	2	12	0	0	0	1	1	2	2	0	1	1	1	1	0	0	0	1	.	1	1	.	6.5	6.6	.	7.0	7.9	7.6	6.3	6.3	0 2 1	0 1 1
804	44	2	12	0	1	.	.	0	2	.	.	1	2	.	.	0	1	.	.	.	1	.	.	5.4	6.1	9.5	7.6	.	.	.	.	1 2 2	0 0 1
805	44	2	12	.	.	1	1	.	.	0	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	.	.	7.8	6.7	6.5	6.1	1 0 1	1 0 1
806	44	2	12	0	.	1	.	0	.	2	.	1	.	0	.	0	.	1	.	.	.	1	.	.	6.1	.	.	8.7	7.7	.	.	1 2 0	0 0 1
807	44	2	12	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.0	6.1	.	.	.	.	.	.	. . .	2 0 2
808	44	2	12	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.6	6.1	.	.	.	.	.	.	. . .	2 0 1
809	44	2	12	3	2	2	2	0	3	3	1	1	1	1	1	3	2	2	2	.	.	.	.	6.7	6.6	8.8	7.2	9.0	7.2	6.4	6.3	2 3 1	3 0 1
810	44	2	12	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	8.2	7.8	.	.	0 2 1	. . .

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
811	44	2	12	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	7.9	6.5	.	.	2 2 1	. . .
812	44	2	12	.	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	8.1	6.9	6.5	6.5	1 0 1	1 0 1
813	44	2	12	0	0	.	1	0	0	.	0	1	1	.	1	0	0	.	1	.	.	.	.	5.2	5.5	7.0	6.8	.	.	5.4	4.7	0 0 1	0 0 1
814	44	2	12	0	2	2	0	0	3	2	1	0	1	1	1	0	2	2	0	.	.	3	.	.	6.0	8.0	7.1	7.7	7.0	.	5.9	2 3 1	0 0 0
815	44	2	12	.	0	0	0	.	0	0	0	.	1	1	1	.	0	0	0	.	.	.	.	.	.	7.7	6.7	7.8	6.8	6.3	6.0	0 0 1	0 0 1
816	44	2	12	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	6.4	.	.	.	.	.	.	. . .	0 0 1
817	44	2	12	1	.	1	1	0	.	2	1	1	.	1	1	1	.	1	1	.	.	1	.	6.0	5.9	.	.	7.6	6.9	5.6	6.1	1 2 1	1 0 1
818	44	2	12	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	9.0	6.9	.	.	2 0 1	. . .
819	44	2	12	.	.	0	0	.	.	2	0	.	.	2	1	.	.	0	0	.	.	1	.	.	.	.	.	7.7	6.3	5.4	5.3	0 2 2	0 0 1
820	44	2	12	2	1	0	.	0	2	0	.	1	1	1	.	2	1	0	.	.	1	.	.	6.1	5.1	8.1	6.1	8.5	6.5	.	.	1 2 1	2 0 1
821	44	2	12	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	8.3	7.3	.	.	0 2 1	. . .
822	44	2	12	.	.	0	1	.	.	0	1	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	7.7	6.5	6.3	6.7	0 0 1	1 1 1
823	44	2	12	1	1	.	.	2	2	.	.	1	2	.	.	1	1	.	.	1	1	.	.	5.4	5.4	8.3	6.0	.	.	.	.	1 2 2	1 2 1
824	44	2	12	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.3	5.8	. . .	2 0 0
825	44	2	12	1	1	1	0	0	0	2	1	1	1	0	1	1	1	1	0	.	.	1	.	5.9	5.8	8.1	7.0	7.7	6.9	5.6	5.8	1 0 1	1 0 1
826	44	2	12	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	.	.	.	.	5.1	6.1	7.6	6.8	7.9	6.8	5.8	6.4	0 0 0	0 0 1
827	44	2	12	1	0	.	.	0	2	.	.	2	2	.	.	1	0	.	.	.	1	.	.	6.0	6.4	8.9	6.9	.	.	.	.	0 2 2	1 0 2
828	44	2	12	.	.	1	1	.	.	2	1	.	.	2	1	.	.	1	1	.	.	1	.	.	.	.	.	9.7	7.3	7.6	7.1	1 2 2	1 1 1
829	44	2	12	0	1	1	1	2	2	2	2	1	1	1	1	0	1	1	1	3	3	3	3	6.4	5.8	8.6	7.3	8.4	7.0	.	5.5	1 2 1	0 2 1
830	44	2	12	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	7.5	6.1	7.5	6.0	.	.	0 0 1	. . .
831	44	2	12	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	5.3	5.4	.	.	.	.	4.2	5.0	. . .	1 0 0
832	44	2	12	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.2	5.8	. . .	1 1 1
833	44	2	12	1	1	0	1	0	0	0	1	1	0	0	0	1	0	0	1	.	.	.	.	6.1	5.2	7.1	7.2	7.0	7.2	5.6	5.7	1 0 0	1 0 1
834	44	2	12	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.4	. . .	2 0 1
835	44	2	12	1	1	.	.	0	0	.	.	1	2	.	.	1	0	.	.	.	.	.	.	5.5	5.0	7.8	6.1	.	.	.	.	1 0 2	1 0 1
836	44	2	12	2	2	.	.	0	2	.	.	1	1	.	.	2	2	.	.	.	2	.	.	5.9	6.2	7.7	6.6	.	.	.	.	2 2 1	2 0 1
837	44	2	12	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	2	.	.	.	.	5.6	6.2	.	.	.	.	5.6	6.3	. . .	1 0 1
838	44	2	12	.	0	.	1	.	2	.	3	.	1	.	1	.	0	.	1	.	1	.	.	.	.	7.5	7.3	.	.	6.1	6.5	0 2 1	1 3 1
839	44	2	12	1	1	.	1	0	2	.	2	1	1	.	1	1	2	.	1	.	1	.	1	6.2	5.9	7.6	6.9	.	.	6.4	6.1	1 2 1	1 0 1
840	44	2	12	1	0	.	.	0	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	.	6.2	8.5	7.5	.	.	.	.	0 0 1	1 0 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
841	44	2	12	0	0	.	.	1	2	.	.	1	1	.	.	0	0	.	.	.	1	.	.	6.1	6.2	9.0	7.5	.	.	.	.	0	2	1	0	1	1
842	44	2	12	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.1	5.5	.	.	.	.	.	.	.	.	.	2	0	1
843	44	2	12	1	.	1	.	0	.	2	.	1	.	1	.	1	.	1	.	.	.	1	.	5.7	6.0	.	.	7.9	7.0	.	.	1	2	1	1	0	1
844	44	2	12	.	.	0	2	.	.	0	0	.	.	0	1	.	.	0	2	.	.	.	.	.	.	.	.	7.9	6.4	6.1	5.7	0	0	0	2	0	1
845	44	2	12	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.5	5.4	.	.	.	1	0	1
846	46	2	12	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
847	46	2	12	.	1	.	1	.	2	.	0	.	1	.	1	.	0	.	1	.	1	.	.	.	.	.	.	.	.	.	.	1	2	1	1	0	1
848	46	2	12	.	0	0	0	.	0	0	0	.	0	0	1	.	0	0	0	.	.	.	.	.	.	7.2	6.3	7.4	6.9	5.2	5.4	0	0	0	0	0	1
849	46	2	12	0	0	.	.	0	2	.	.	1	1	.	.	0	0	.	.	.	1	.	.	5.9	6.1	8.7	7.2	.	.	.	.	0	2	1	0	0	1
850	47	2	12	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	.	2	3	.	.	6.2	.	7.0	.	7.3	.	5.6	1	2	1	1	1	1
851	47	2	12	1	1	1	.	0	2	2	.	1	1	1	.	0	1	1	.	.	1	1	.	6.3	5.5	7.7	6.3	7.8	6.0	.	.	1	2	1	1	0	1
852	47	2	12	0	0	0	0	0	0	0	0	2	2	2	2	0	0	0	0	.	.	.	.	5.4	5.3	7.2	6.5	7.0	6.2	5.7	5.6	0	0	2	0	0	2
853	48	2	12	.	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	.	.	.
854	48	2	12	1	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	1	0	0
855	48	2	12	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
856	48	2	12	2	.	2	.	1	.	2	.	1	.	0	.	2	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	2	2	0	2	1	1
857	48	2	12	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	1
858	48	2	12	.	1	2	.	.	2	2	.	.	2	2	.	.	1	2	.	.	3	3	.	.	.	8.2	7.2	8.0	7.6	.	.	1	2	2	.	.	.
859	48	2	12	.	0	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	8.2	6.8	.	.	.	.	0	2	0	.	.	.
860	48	2	12	2	.	1	2	0	.	0	0	2	.	1	2	2	.	1	2	.	.	.	.	6.8	5.9	.	.	8.6	6.9	6.6	6.1	1	0	1	2	0	2
861	48	2	12	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	.	.	.	.	6.0	6.1	7.8	7.1	.	7.3	.	6.2	1	0	1	1	0	1
862	48	2	12	0	.	0	0	0	.	2	0	0	.	1	0	0	.	0	0	.	.	1	.	6.2	5.8	.	.	8.1	7.1	6.0	6.0	0	2	1	0	0	0
863	48	2	12	.	2	.	2	.	2	.	1	.	1	.	0	.	2	.	2	.	1	.	.	.	.	8.8	7.6	.	.	7.4	6.8	2	2	1	2	1	0
864	48	2	12	.	1	.	2	.	2	.	1	.	0	.	0	.	1	.	2	.	2	.	.	.	.	8.9	7.2	.	.	6.5	6.4	1	2	0	2	1	0
865	48	2	12	.	.	0	2	.	.	2	1	.	.	1	1	.	.	0	2	.	.	1	.	.	.	.	.	7.8	6.4	6.4	5.8	0	2	1	2	1	1
866	48	2	12	2	.	.	1	0	.	.	0	1	.	.	1	2	.	.	1	.	.	.	.	6.7	5.5	.	.	.	.	7.1	5.9	.	.	.	2	0	1
867	48	2	12	1	1	2	1	1	2	2	0	0	1	1	0	1	1	2	0	.	1	2	.	6.3	6.1	7.9	7.0	8.1	7.2	6.5	5.9	1	2	1	1	1	0
868	48	2	12	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	4.3	5.7	.	.	.	.	.	.	.	.	.	1	0	1
869	48	2	12	1	2	2	2	0	1	3	0	1	1	1	1	2	2	2	2	.	.	.	.	.	6.2	7.0	6.7	.	6.9	.	6.2	2	1	1	1	0	1
870	48	2	12	2	1	2	2	0	0	0	0	1	0	0	1	2	1	2	2	.	.	.	.	5.5	6.1	8.2	7.0	8.1	7.1	6.0	6.4	1	0	0	2	0	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
871	48	2	12	0	0	.	0	0	0	.	0	1	1	.	1	0	0	.	0	.	.	.	.	5.7	5.5	7.5	6.8	.	.	6.1	5.8	0 0 1	0 0 1
872	48	2	12	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	3	.	.	.	.	6.7	6.2	.	.	.	.	6.2	6.0	. . .	2 0 0
873	48	2	12	.	.	2	2	.	.	2	1	.	.	1	1	.	.	2	2	.	.	1	.	.	.	.	.	7.8	7.5	5.7	6.8	2 2 1	2 1 1
874	48	2	12	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.8	6.6	.	.	.	.	.	.	. . .	2 0 1
875	48	2	12	.	1	1	.	.	2	2	.	.	1	1	.	.	1	1	.	.	2	2	.	.	.	9.1	7.2	9.1	7.1	.	.	1 2 1	. . .
876	48	2	12	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	5.5	5.8	.	.	.	.	6.1	6.1	. . .	0 0 0
877	48	2	12	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.5	5.5	.	.	.	.	6.7	5.7	. . .	1 0 1
878	48	2	12	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	7.9	7.4	8.0	7.1	.	.	1 0 1	. . .
879	48	2	12	.	2	2	2	.	0	0	0	.	1	1	1	.	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	2 0 1	2 0 1
880	48	2	12	.	.	0	1	.	.	0	1	.	.	0	1	.	.	0	1	.	.	.	.	.	.	.	.	7.6	6.2	5.7	6.0	0 0 0	1 1 1
881	48	2	12	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.2	5.5	.	.	.	.	.	.	. . .	1 0 1
882	49	2	12	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 0 2
883	49	2	12	.	.	1	.	.	.	2	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	.	.	7.8	6.7	.	.	1 2 2	. . .
884	49	2	12	.	1	.	2	.	2	.	0	.	1	.	1	.	1	.	2	.	1	.	.	.	.	8.6	7.0	.	.	6.5	6.2	1 2 1	2 0 1
885	49	2	12	.	0	0	0	.	2	2	0	.	0	0	1	.	0	0	0	.	3	3	.	.	.	8.1	7.4	8.1	7.5	4.5	5.9	0 2 0	0 0 1
886	49	2	12	2	.	2	2	1	.	2	0	1	.	1	0	2	.	2	2	.	1	.	.	6.8	6.4	.	.	8.8	7.8	6.3	5.7	2 2 1	2 1 1
887	49	2	12	2	0	0	2	0	0	0	0	1	1	1	1	2	0	0	2	.	.	.	.	6.2	6.5	8.3	7.2	8.2	7.6	6.0	6.3	0 0 1	2 0 1
888	50	2	12	1	1	1	1	0	2	2	1	0	0	0	0	1	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	1 2 0	1 0 0
889	50	2	12	.	.	2	2	.	.	0	1	.	.	1	2	.	.	2	2	.	.	.	.	.	.	.	.	7.8	6.6	6.0	6.1	2 0 1	2 1 2
890	51	2	12	.	0	1	1	.	0	0	1	.	1	1	1	.	0	1	1	.	.	.	.	.	.	8.6	7.0	8.7	7.4	5.6	6.6	0 0 1	1 1 1
891	51	2	12	1	0	0	1	1	0	0	1	2	0	0	1	1	0	0	1	.	.	.	.	5.5	6.0	7.7	7.0	.	7.1	.	6.1	0 0 0	1 1 2
892	51	2	12	.	0	0	1	.	0	0	0	.	0	1	1	.	0	0	1	.	.	.	.	.	.	8.0	6.7	.	6.5	6.0	5.3	0 0 0	1 0 1
893	51	2	12	1	.	.	1	0	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	6.4	6.4	.	.	.	.	6.6	6.1	. . .	1 0 1
894	96	2	12	0	.	0	0	1	.	0	0	1	.	2	1	0	.	0	0	.	.	.	.	6.5	6.1	.	.	8.0	6.8	6.7	5.9	0 0 2	0 1 1
895	65	2	12	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.4	5.9	.	.	.	.	.	.	. . .	2 1 0
896	65	2	12	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.1	. . .	2 1 0
897	96	2	12	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	6.8	6.2	.	.	.	.	6.6	6.1	. . .	0 0 0
898	96	2	12	.	2	2	1	.	0	0	1	.	2	2	1	.	2	2	1	.	.	.	.	.	.	7.7	6.7	7.7	6.3	6.0	5.9	2 0 2	1 1 1
899	101	2	12	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.5	6.0	.	.	.	.	.	.	. . .	1 1 1
900	101	2	12	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	5.7	. . .	1 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
901	101	2	12	.	.	0	1	.	.	2	0	.	.	2	0	.	.	0	1	.	.	1	.	.	.	.	.	.	7.1	5.6	5.9	0	2	2	1	0	0
902	96	2	12	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.8	6.4	.	.	.	.	.	.	.	.	.	1	0	1
903	85	2	22	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.0	5.9	.	.	.	.	.	.	.	.	.	1	0	0
904	20	2	1	1	0	0	1	0	2	2	1	0	0	0	0	1	0	0	1	.	2	2	.	6.8	6.2	8.8	7.4	.	7.5	6.8	6.6	0	2	0	1	0	0
905	166	2	5	1	.	.	1	1	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	5.3	6.0	.	.	.	.	5.4	6.0	.	.	.	1	1	1
906	166	2	5	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.0	6.8	.	.	.	1	0	1
907	68	2	11	.	0	.	1	.	0	.	0	.	1	.	1	.	0	.	1	.	.	.	.	.	.	7.9	6.6	.	.	4.7	5.2	0	0	1	1	0	1
908	68	2	11	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.8	5.8	.	.	.	.	.	.	.	.	.	0	0	1
909	68	2	11	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.7	7.4	.	.	.	.	.	.	.	.	.	1	1	0
910	68	2	11	1	.	.	1	0	.	.	1	2	.	.	2	1	.	.	1	.	.	.	.	6.3	6.0	.	.	.	.	6.5	6.1	.	.	.	1	0	2
911	68	2	11	0	.	.	0	1	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	6.6	6.7	.	.	.	.	6.4	6.6	.	.	.	0	1	0
912	68	2	11	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.1	5.6	.	.	.	.	.	.	.	.	.	1	1	1
913	68	2	11	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.2	.	.	.	0	0	1
914	68	2	11	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.3	5.6	.	.	.	0	0	0
915	164	2	11	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	5.6	.	.	.	1	0	0
916	248	2	11	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	7.7	6.5	.	.	0	0	1	.	.	.
917	249	2	11	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.3	6.1	.	.	.	.	.	.	.	.	.	2	0	1
918	250	2	11	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.5	5.5	.	.	.	.	.	.	.	.	.	1	0	1
919	250	2	11	1	1	0	0	0	0	0	1	0	0	0	0	1	1	0	0	.	.	.	.	5.9	5.7	7.4	7.1	.	7.0	5.7	6.1	1	0	0	1	0	0
920	250	2	11	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.6	6.3	.	.	.	0	0	1
921	267	2	11	0	0	0	1	3	0	0	0	0	1	2	0	0	0	0	1	.	.	.	.	6.2	6.1	.	6.8	7.2	6.8	6.0	6.2	0	0	1	0	3	0
922	329	2	11	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.9	5.7	.	.	.	0	0	0
923	329	2	11	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.8	6.0	.	.	.	.	6.5	6.3	.	.	.	0	0	1
924	329	2	11	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.2	6.8	.	.	.	.	.	.	.	.	.	2	0	0
925	329	2	11	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.4	5.2	.	.	.	1	0	0
926	329	2	11	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	.	6.1	.	.	.	.	6.8	6.0	.	.	.	1	0	0
927	329	2	11	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.1	5.7	.	.	.	.	.	.	.	.	.	0	0	0
928	329	2	11	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.5	5.3	.	.	.	2	0	0
929	329	2	11	0	.	0	0	0	.	0	0	1	.	0	0	0	.	0	0	.	.	.	.	.	5.4	7.1	6.4	.	.	5.0	5.5	0	0	0	0	0	1
930	65	2	15	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
931	268	2	18	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	8.0	.	.	.	.	.	.	. . .	2 0 1
932	58	2	24	1	.	.	1	1	.	.	1	1	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
933	58	2	24	2	2	2	2	1	1	1	1	1	1	1	1	2	2	2	2	.	.	.	.	5.5	6.1	8.0	7.1	.	7.7	.	6.9	2 1 1	2 1 1
934	94	2	24	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	.	.	.	.	6.0	7.0	8.6	7.4	8.8	7.4	6.0	7.0	0 0 1	0 0 1
935	94	2	24	1	1	1	1	0	0	0	0	0	1	1	0	1	1	1	1	.	.	.	.	5.8	5.8	.	6.9	8.3	6.8	.	5.9	1 0 1	1 0 0
936	58	2	24	.	.	1	2	.	.	1	0	.	.	2	1	.	.	1	2	.	.	.	.	.	.	.	.	8.7	7.5	6.1	7.0	1 1 2	2 0 1
937	163	2	24	1	1	0	0	0	2	2	0	0	1	1	0	1	1	0	0	.	2	2	.	4.7	5.3	8.0	6.9	8.1	6.8	4.8	5.4	1 2 1	1 0 0
938	163	2	24	2	.	.	2	1	.	.	1	2	.	.	1	2	.	.	2	.	.	.	.	6.5	6.9	.	.	.	.	6.5	6.3	. . .	2 1 2
939	163	2	24	.	.	0	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	1	.	.	.	.	.	8.2	7.2	.	6.4	0 2 1	2 1 0
940	163	2	24	.	.	3	.	.	.	2	.	.	.	1	.	.	.	3	.	.	.	3	.	.	.	.	.	10.3	7.7	.	.	3 2 1	. . .
941	163	2	24	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	5.4	6.3	. . .	2 1 1
942	252	2	24	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.1	. . .	2 0 2
943	252	2	24	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.5	5.4	.	.	.	.	.	.	. . .	1 0 0
944	252	2	24	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.1	. . .	1 1 0
945	252	2	24	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.2	6.3	.	.	.	.	6.6	6.6	. . .	1 0 0
946	326	2	24	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	2	.	.	.	.	.	5.6	.	.	.	.	.	5.7	. . .	1 0 1
947	32	2	30	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.3	6.0	.	.	.	.	.	.	. . .	2 0 0
948	34	2	30	.	2	2	4	.	2	0	0	.	0	0	1	.	3	3	4	.	2	.	.	.	.	8.1	7.1	8.1	7.2	6.4	7.3	2 2 0	4 0 1
949	34	2	30	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.2	6.4	.	.	.	.	.	.	. . .	2 0 1
950	35	2	30	1	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.3	6.4	.	.	.	.	.	.	. 1 0	. . .
951	35	2	30	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.8	7.6	. . .	1 1 0
952	36	2	30	1	.	0	1	0	.	0	1	1	.	2	1	1	.	0	0	.	.	.	.	5.9	6.1	.	.	8.6	7.3	6.0	6.3	0 0 2	1 0 1
953	36	2	30	3	1	1	2	0	2	2	1	2	2	2	2	3	1	1	2	.	1	1	.	6.5	6.0	8.0	6.6	8.0	7.0	.	6.4	1 2 2	3 0 2
954	36	2	30	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.6	6.1	.	.	.	.	5.7	6.5	. . .	0 0 0
955	36	2	30	1	1	1	1	0	2	2	0	2	3	3	2	1	1	1	1	.	1	1	.	6.2	6.7	7.8	7.3	7.1	7.1	6.0	6.3	1 2 3	1 0 2
956	37	2	30	.	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	7.7	6.8	5.4	5.6	0 0 1	0 0 1
957	37	2	30	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.5	5.2	. . .	1 0 1
958	37	2	30	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.4	6.9	.	.	.	.	.	.	. . .	1 0 0
959	37	2	30	.	.	0	2	.	.	0	0	.	.	1	1	.	.	0	2	.	.	.	.	.	.	.	.	7.5	6.6	.	6.5	0 0 1	2 0 1
960	37	2	30	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.7	6.2	. . .	0 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
961	37	2	30	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.6	.	.	.	0	1	1
962	37	2	30	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	.	.	.	.	5.9	5.5	8.3	6.4	8.2	6.6	5.8	5.7	0	0	1	0	0	0
963	37	2	30	1	.	0	1	1	.	0	1	1	.	1	1	1	.	0	1	.	.	.	.	5.8	6.0	.	.	7.4	6.6	5.3	5.8	0	0	1	1	1	1
964	37	2	30	2	2	.	2	0	1	.	0	0	1	.	0	2	2	.	2	.	.	.	.	.	6.3	8.4	7.4	.	.	.	.	2	1	1	2	0	0
965	56	2	30	.	.	.	0	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	3	0
966	57	2	30	2	.	.	2	1	.	.	3	1	.	.	1	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
967	57	2	30	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	.	.	.
968	57	2	30	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	.	.	.	.	6.6	6.1	8.3	6.9	8.3	7.1	6.8	6.1	0	0	1	1	0	1
969	57	2	30	0	.	.	0	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	1	1
970	64	2	30	2	1	1	1	1	0	0	1	1	2	2	1	2	2	1	1	.	.	.	.	6.5	6.6	.	6.7	8.3	7.0	6.6	6.2	1	0	2	2	1	1
971	64	2	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	5.8	7.5	6.3	7.2	6.4	.	6.1	0	0	0	0	0	0
972	64	2	30	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	5.7	8.1	6.6	.	.	.	.	0	0	1	0	0	1
973	64	2	30	3	1	1	2	1	2	2	1	1	2	2	0	3	1	1	2	.	1	1	.	7.2	7.1	8.1	7.1	8.5	7.1	6.4	6.5	1	2	2	3	1	1
974	57	2	30	2	1	.	.	0	2	.	.	0	0	.	.	2	1	.	.	.	1	.	.	5.8	5.8	7.9	6.6	.	.	.	.	1	2	0	2	0	0
975	57	2	30	.	1	1	.	.	2	2	.	.	0	1	.	.	1	1	.	.	1	1	.	.	.	7.6	7.0	7.6	7.0	.	.	1	2	0	.	.	.
976	57	2	30	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	8.6	7.0	.	.	.	.	0	0	1	.	.	.
977	69	2	30	.	1	1	.	.	2	2	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	8.6	7.0	8.3	7.1	.	.	1	2	1	.	.	.
978	69	2	30	.	.	1	0	.	.	2	1	.	.	1	0	.	.	1	0	.	.	1	.	.	.	.	.	8.3	6.9	.	6.3	1	2	1	0	1	0
979	69	2	30	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	7.2	7.0	.	.	.	0	2	1
980	81	2	30	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	9.1	6.8	.	.	.	.	0	0	0	.	.	.
981	64	2	30.1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	.	.	.	.	5.9	5.5	7.9	6.8	.	6.9	.	5.4	0	0	0	1	0	0
982	323	2	30.1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.7	6.0	.	.	.	2	0	1
983	81	2	30.3	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1	.	.	.	.	.	5.6	8.3	6.3	8.2	6.2	.	5.6	0	0	0	1	0	1
984	321	2	30.3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.4	5.9	.	.	.	1	0	1
985	321	2	30.3	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.0	6.2	.	.	.	0	0	1
986	321	2	30.3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.0	.	.	.	1	0	1
987	321	2	30.3	.	.	0	1	.	.	0	1	.	.	1	1	.	.	0	2	.	.	.	.	.	.	.	.	8.2	7.0	6.2	6.3	0	0	1	1	1	1
988	57	2	30.5	0	0	0	0	1	2	2	1	0	1	1	0	0	0	0	0	.	3	2	.	7.3	6.4	8.5	7.7	8.8	7.6	6.8	6.3	0	2	1	0	1	0
989	57	2	30.5	2	0	0	2	0	0	0	0	0	0	0	0	2	0	0	2	.	.	.	.	6.0	6.8	7.8	7.2	8.1	7.1	6.2	6.6	0	0	0	2	0	0
990	57	2	30.5	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	8.4	7.4	.	.	.	.	1	2	1	.	.	.

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
991	57	2	30.5	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.9	5.6	.	.	.	.	.	.	.	.	.	0	0	1
992	57	2	30.5	1	0	.	.	1	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	.	6.8	9.2	7.4	.	.	.	.	0	0	1	1	1	1
993	57	2	30.5	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	..	.	.	.	8.2	6.6	.	.	2	0	0	.	.	.
994	57	2	30.5	1	0	0	2	1	2	2	1	0	0	0	0	2	0	0	2	.	1	1	.	7.0	6.2	8.2	7.1	8.1	7.1	.	6.2	0	2	0	1	1	0
995	57	2	30.5	.	2	2	.	.	0	0	.	.	1	0	.	.	2	2	.	.	.	.	.	.	.	8.1	6.1	7.9	6.4	.	.	2	0	1	.	.	.
996	57	2	30.5	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	.	.	.	.	6.5	6.7	8.3	7.4	8.2	7.2	.	6.9	0	0	0	0	1	0
997	57	2	30.5	1	1	0	0	0	0	0	0	1	1	1	0	1	1	0	0	.	.	.	.	5.8	5.3	.	6.8	7.8	7.2	5.9	5.5	1	0	1	1	0	1
998	57	2	30.5	1	.	0	1	0	.	0	1	0	.	0	0	1	.	0	1	.	.	.	.	6.4	5.7	.	.	8.6	6.5	6.0	6.0	0	0	0	1	0	0
999	57	2	30.5	1	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	.	.	.	.	7.1	6.7	8.0	7.1	8.0	7.1	7.0	6.5	0	0	1	1	0	1
1000	57	2	30.5	1	1	.	1	0	0	.	1	0	0	.	0	1	1	.	1	.	.	.	.	6.3	5.7	7.3	5.9	.	.	6.1	5.5	1	0	0	1	0	0
1001	322	2	30.6	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	6.1	.	.	.	.	.	.	.	.	.	0	1	0
1002	59	2	40	.	4	.	.	.	0	.	.	.	0	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	0	0	.	.	.
1003	62	2	58	1	2	1	3	0	2	0	1	1	0	1	1	1	2	1	3	.	1	.	.	6.9	6.4	8.9	7.1	.	7.1	7.5	6.6	2	2	0	1	0	1
1004	86	2	63.3	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	5.5	.	.	.	0	0	0
1005	131	2	63.3	1	.	.	1	1	.	.	0	0	.	.	0	2	.	.	1	.	.	.	.	5.8	5.6	.	.	.	.	6.4	5.9	.	.	.	1	1	0
1006	160	2	63.3	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.3	6.4	.	.	.	2	0	1
1007	160	2	63.3	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.4	5.7	.	.	.	.	.	.	.	.	.	2	0	1
1008	160	2	63.3	2	.	.	2	0	.	.	1	1	.	.	0	2	.	.	2	.	.	.	.	5.7	6.0	.	.	.	.	5.9	6.1	.	.	.	2	0	1
1009	160	2	63.3	2	.	2	.	1	.	0	.	1	.	0	.	2	.	2	.	.	.	.	.	.	6.0	.	.	8.8	6.7	.	.	2	0	0	2	1	1
1010	161	2	63.3	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	5.4	.	.	.	.	.	.	.	.	.	1	0	1
1011	161	2	63.3	0	1	1	0	1	2	2	0	1	1	2	1	0	1	1	0	.	1	1	.	5.3	6.3	.	6.6	.	6.7	.	5.3	1	2	1	0	1	1
1012	161	2	63.3	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.7	5.6	.	.	.	.	.	.	.	.	.	2	0	1
1013	161	2	63.3	.	2	1	2	.	0	2	0	.	3	1	2	.	2	1	2	.	.	1	.	.	.	9.0	7.0	8.7	7.0	.	6.4	2	0	3	2	0	2
1014	161	2	63.3	2	.	.	2	1	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.3	6.4	.	.	.	.	6.7	6.2	.	.	.	2	1	1
1015	251	2	63.3	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0	0	.	.	.	.	.	5.5	.	5.9	.	6.1	.	5.5	1	0	1	1	1	0
1016	251	2	63.3	2	0	1	2	0	0	0	1	1	1	1	0	2	1	0	2	.	.	.	.	.	6.2	7.1	6.2	.	6.2	6.0	.	0	0	1	2	0	1
1017	251	2	63.3	.	1	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	8.2	7.2	9.0	7.1	.	.	1	0	1	.	.	.
1018	251	2	63.3	.	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	8.5	6.6	8.6	6.2	.	.	1	0	1	.	.	.
1019	325	2	63.3	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	.	.	.	.	.	5.8	6.9	6.8	.	6.8	5.0	5.8	0	0	1	0	0	0
1020	325	2	63.3	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	5.1	.	.	.	1	0	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1021	325	2	63.3	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.9	6.4	.	.	.	.	.	.	.	.	.	1	0	1
1022	72	3	42	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6.7	6.0	.	.	.	3	0	1
1023	242	3	42	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.4	6.1	.	.	.	.	.	.	.	.	.	1	0	0
1024	243	3	42	2	0	0	2	0	1	2	0	0	0	0	0	2	0	0	2	.	1	.	.	5.7	5.9	7.6	7.0	7.7	6.7	5.5	6.2	0	1	0	2	0	0
1025	243	3	42	2	1	1	1	0	2	2	0	0	1	1	0	2	1	1	1	.	1	1	.	7.7	6.6	9.1	7.4	9.0	7.6	7.5	7.1	1	2	1	2	0	0
1026	242	3	42	1	1	1	0	1	0	0	0	0	1	1	0	1	1	1	0	.	.	.	.	7.1	6.5	8.5	6.9	8.2	7.1	.	6.3	1	0	1	1	1	0
1027	243	3	42	1	0	1	0	0	0	0	0	1	1	1	0	0	0	0	0	.	.	.	.	6.0	5.5	.	6.6	7.6	6.8	.	5.5	0	0	1	1	0	1
1028	1	3	43	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	.	.	.
1029	1	3	43	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0
1030	1	3	43	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	.	.	.
1031	1	3	43	0	1	1	.	0	2	2	.	1	1	1	.	0	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	1	2	1	0	0	1
1032	1	3	43	.	.	.	2	.	.	.	3	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	2
1033	1	3	43	1	2	.	1	1	2	.	1	1	1	.	1	1	2	.	2	.	2	.	.	.	.	.	.	.	.	.	.	2	2	1	1	1	1
1034	1	3	43	.	2	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2	2	0	.	.	.
1035	1	3	43	.	.	1	1	.	.	0	0	.	.	1	2	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	1	0	2
1036	1	3	43	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.
1037	1	3	43	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
1038	1	3	43	.	1	1	.	.	0	0	.	.	1	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	1	0	1	.	.	.
1039	1	3	43	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	1	0	0	.	.	.
1040	1	3	43	1	2	.	1	1	0	.	4	1	1	.	1	1	2	.	2	.	.	1	.	.	.	.	.	.	.	.	.	2	0	1	1	1	1
1041	1	3	43	1	.	.	0	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
1042	1	3	43	.	2	1	1	.	0	0	0	.	1	1	1	.	2	1	1	.	1	1	.	.	.	.	.	.	.	.	.	2	0	1	1	0	1
1043	1	3	43	2	1	.	.	0	0	.	.	1	1	.	.	.	2	1	.	.	1	1	.	.	.	.	.	.	.	.	.	1	0	1	2	0	1
1044	1	3	43	.	2	.	.	.	2	.	.	.	1	.	.	.	3	.	.	.	3	.	.	.	.	.	.	.	.	.	.	2	2	1	.	.	.
1045	1	3	43	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
1046	1	3	43	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	3	.	.	.	.	.	.	.	.	.	.	2	2	1	.	.	.
1047	1	3	43	2	2	.	.	1	2	.	.	1	0	.	.	2	2	.	.	.	3	.	.	.	.	.	.	.	.	.	.	2	2	0	2	1	1
1048	1	3	43	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.
1049	1	3	43	2	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	2
1050	1	3	43	1	2	2	1	1	2	2	1	1	0	0	0	1	2	2	1	.	1	1	.	.	.	.	.	.	.	.	.	2	2	0	1	1	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1051	1	3	43	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
1052	1	3	43	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.
1053	1	3	43	.	1	1	1	.	2	2	1	.	2	1	1	.	1	1	0	.	1	1	.	.	.	.	.	.	.	.	.	1	2	2	1	1	1
1054	2	3	43	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1
1055	2	3	43	0	1	1	0	0	0	0	0	1	0	1	1	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	0	0	1
1056	2	3	43	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1	.	1	1	.	.	.	.	.	.	.	.	.	1	0	1	1	0	1
1057	2	3	43	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	1	1	1
1058	2	3	43	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0	0	0	1
1059	2	3	43	.	1	1	.	.	2	2	.	.	1	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.
1060	2	3	43	1	.	1	1	0	.	0	0	2	.	1	2	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	1	0	2
1061	2	3	43	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	.	.	.
1062	2	3	43	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1
1063	2	3	43	0	.	0	0	0	.	0	0	1	.	1	0	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0	0	.	0	0	1
1064	2	3	43	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1
1065	2	3	43	1	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	1	0	1
1066	2	3	43	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1
1067	2	3	43	2	3	3	2	1	2	2	1	1	2	2	1	2	3	3	2	.	3	3	.	.	.	.	.	.	.	.	.	3	2	2	2	1	1
1068	2	3	43	.	.	2	1	.	.	2	0	.	.	2	1	.	.	2	1	.	.	1	.	.	.	.	.	.	.	.	.	2	2	2	1	0	1
1069	2	3	43	.	.	0	0	.	.	2	0	.	.	1	0	.	.	0	0	.	.	1	.	.	.	.	.	.	.	.	.	0	2	1	0	0	0
1070	2	3	43	.	.	2	2	.	.	0	0	.	.	2	2	.	.	2	2	.	.	1	.	.	.	.	.	.	.	.	.	2	0	2	2	0	2
1071	2	3	43	.	.	0	1	.	.	0	0	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	.	.	.	.	0	0	1	1	0	1
1072	2	3	43	.	2	2	.	.	2	2	.	.	1	0	.	.	2	2	.	.	2	2	.	.	.	.	.	.	.	.	.	2	2	1	.	.	.
1073	2	3	43	.	1	1	.	.	2	2	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	.	1	2	1	.	.	.
1074	2	3	43	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1
1075	2	3	43	1	1	.	1	1	0	.	1	1	1	.	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	0	1	1	1	1
1076	2	3	43	.	1	.	1	.	2	.	1	.	1	.	1	.	1	.	1	.	1	.	.	.	.	.	.	.	.	.	.	1	2	1	1	1	1
1077	2	3	43	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0
1078	2	3	43	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	2
1079	2	3	43	2	.	.	2	1	.	.	1	1	.	.	1	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
1080	2	3	43	0	.	.	0	0	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1081	2	3	43	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	.	.	.	.	.	.	.	.	.	.	.	.	1 0 1	0 0 1
1082	2	3	43	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 0 0
1083	2	3	43	0	0	0	0	0	2	2	0	1	1	1	1	0	0	0	0	.	1	1	.	.	.	.	.	.	.	.	.	0 2 1	0 0 1
1084	2	3	43	0	.	0	0	0	.	0	0	1	.	1	1	0	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0 0 1	0 0 1
1085	2	3	43	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 0
1086	2	3	43	0	1	1	0	0	0	0	3	1	1	1	1	0	1	1	0	.	.	.	.	.	.	.	.	.	.	.	.	1 0 1	0 0 1
1087	3	3	43	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	0 2 1	. . .
1088	3	3	43	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2 2 1	. . .
1089	3	3	43	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
1090	3	3	43	2	2	2	2	0	0	0	0	2	2	2	2	2	2	2	2	.	.	.	.	.	.	.	.	.	.	.	.	2 0 2	2 0 2
1091	3	3	43	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 1 1
1092	4	3	43	.	1	1	2	.	0	0	0	.	2	2	1	.	1	1	2	.	.	.	.	.	.	.	.	.	.	.	.	1 0 2	2 0 1
1093	4	3	43	.	0	1	0	.	0	0	0	.	0	1	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0 0 0	0 0 0
1094	4	3	43	0	0	0	.	0	0	0	.	0	1	1	.	0	0	0	.	.	1	1	.	.	.	.	.	.	.	.	.	0 0 1	0 0 0
1095	4	3	43	1	2	2	1	0	2	2	0	2	2	2	1	1	1	1	1	.	3	3	.	.	.	.	.	.	.	.	.	2 2 2	1 0 2
1096	4	3	43	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	. . .	0 0 1
1097	4	3	43	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0 0 1	0 0 0
1098	4	3	43	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	. . .
1099	4	3	43	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	0 0 0	. . .
1100	4	3	43	3	.	2	1	3	.	2	3	2	.	1	1	3	.	1	1	.	.	3	.	.	.	.	.	.	.	.	.	2 2 1	3 3 2
1101	244	3	43	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.1	6.4	.	.	.	.	6.3	6.4	. . .	1 0 0
1102	244	3	43	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	8.4	5.9	.	.	.	.	1 0 1	. . .
1103	245	3	43	1	.	.	1	0	.	.	0	1	.	.	2	1	.	.	1	.	.	.	.	.	7.1	.	.	.	.	.	7.1	. . .	1 0 1
1104	245	3	43	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.3	5.7	.	.	.	.	6.4	5.5	. . .	1 0 0
1105	245	3	43	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	.	.	.	.	.	7.0	.	7.7	.	7.5	.	7.0	1 0 1	1 0 1
1106	245	3	43	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	5.8	. . .	1 0 1
1107	245	3	43	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.5	5.7	. . .	0 0 0
1108	245	3	43	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.7	5.0	. . .	1 0 1
1109	245	3	43	2	1	.	.	0	0	.	.	1	1	.	.	2	1	.	.	.	.	.	.	6.0	5.9	8.3	7.0	.	.	.	.	1 0 1	2 0 1
1110	245	3	43	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	.	5.9	.	.	.	.	.	5.9	. . .	1 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1111	245	3	43	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.2	6.4	.	.	.	.	.	.	. . .	2 0 1
1112	245	3	43	0	1	.	0	0	0	.	0	0	0	.	2	0	1	.	0	.	.	.	.	.	5.7	.	6.8	.	.	6.4	6.3	1 0 0	0 0 0
1113	245	3	43	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.6	6.1	.	.	.	.	.	.	. . .	1 0 1
1114	245	3	43	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.0	6.3	. . .	2 0 0
1115	245	3	43	0	0	0	0	1	2	2	1	2	2	2	1	0	0	0	0	.	1	1	.	5.5	5.4	8.0	6.9	7.8	6.9	5.8	5.5	0 2 2	0 1 2
1116	245	3	43	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.8	. . .	1 1 0
1117	245	3	43	2	.	0	1	0	.	1	0	1	.	1	1	2	.	0	1	.	.	.	.	6.5	6.2	.	.	8.1	7.2	6.7	6.5	0 1 1	2 0 1
1118	245	3	43	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.4	5.7	.	.	.	.	.	.	. . .	1 0 0
1119	245	3	43	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.4	. . .	2 1 0
1120	245	3	43	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1	.	.	.	.	6.2	5.9	8.4	7.1	8.6	7.1	6.2	6.0	0 0 1	1 0 0
1121	245	3	43	2	0	0	2	0	0	0	0	0	1	1	0	2	0	0	2	.	.	.	.	6.0	6.1	8.1	7.1	.	6.9	6.1	6.2	0 0 1	2 0 0
1122	245	3	43	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.7	5.7	.	.	.	.	.	.	. . .	0 0 0
1123	245	3	43	1	1	.	.	0	0	.	.	0	1	.	.	1	0	.	.	.	.	.	.	6.0	5.6	7.6	6.5	.	.	.	.	1 0 1	1 0 0
1124	318	3	51	0	.	.	0	1	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	6.6	6.5	.	.	.	.	6.2	6.3	. . .	0 1 0
1125	73	3	63.1	1	0	.	2	1	0	.	3	2	2	.	0	1	0	.	2	.	.	.	.	5.3	6.1	7.5	6.6	.	.	5.2	6.5	0 0 2	1 1 2
1126	73	3	63.1	0	.	.	0	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	5.6	5.6	.	.	.	.	4.9	5.3	. . .	0 1 1
1127	73	3	63.1	0	.	.	0	0	.	.	0	0	.	.	1	0	.	.	0	.	.	.	.	6.4	6.5	.	.	.	.	6.3	6.9	. . .	0 0 0
1128	73	3	63.1	1	1	1	1	1	2	2	1	0	1	1	1	1	1	1	0	.	2	2	.	6.6	6.8	8.8	6.9	9.8	7.2	6.8	6.9	1 2 1	1 1 0
1129	73	3	63.1	0	1	1	.	0	2	2	.	1	1	1	.	0	1	1	.	.	1	1	.	7.1	5.9	8.4	6.9	8.5	6.8	.	.	1 2 1	0 0 1
1130	73	3	63.1	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	6.3	.	.	.	.	.	.	. . .	0 0 1
1131	150	3	63.1	.	0	0	1	.	0	0	0	.	0	0	0	.	0	0	1	.	.	.	.	.	.	7.9	6.9	8.0	6.7	5.6	6.1	0 0 0	1 0 0
1132	150	3	63.1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	.	.	.	.	5.5	5.7	7.6	6.9	8.2	6.7	5.6	5.8	0 0 0	0 0 1
1133	150	3	63.1	1	.	0	.	0	.	0	.	1	.	0	.	1	.	0	.	.	.	.	.	6.2	5.8	.	.	8.1	6.6	.	.	0 0 0	1 0 1
1134	253	3	63.1	2	0	.	1	0	0	.	0	1	1	.	1	2	0	.	1	.	.	.	.	5.6	6.4	7.5	6.9	.	.	5.4	6.4	0 0 1	2 0 1
1135	320	3	63.1	.	.	0	1	.	.	0	0	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	7.3	6.6	.	5.7	0 0 1	1 0 1
1136	84	3	63.2	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	5.6	6.4	.	.	.	.	5.6	6.1	. . .	0 0 1
1137	84	3	63.2	2	.	.	0	0	.	.	1	1	.	.	1	2	.	.	0	.	.	.	.	6.2	6.6	.	.	.	.	6.5	6.7	. . .	2 0 1
1138	152	3	65	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.6	6.8	.	.	.	.	.	.	. . .	1 0 0
1139	152	3	65	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.3	6.4	.	.	.	.	.	.	. . .	2 0 1
1140	152	3	65	3	.	.	.	0	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	6.9	7.4	.	.	.	.	.	.	. . .	3 0 2

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1141	152	3	65	1	0	.	2	0	0	.	0	2	1	.	2	1	0	.	3	.	.	.	.	.	5.9	7.7	6.6	.	.	5.5	6.0	0	0	1	1	0	2
1142	152	3	65	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.3	.	.	.	2	0	0
1143	316	3	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.3	5.9	7.2	7.4	7.7	7.1	5.6	5.8	0	0	0	0	0	0
1144	316	3	65	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.6	6.1	.	.	.	1	0	0
1145	316	3	65	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.5	.	.	.	0	0	0
1146	316	3	65	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	7.0	5.8	.	.	.	.	.	.	.	.	.	1	0	1
1147	316	3	65	1	0	.	.	0	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	6.2	6.1	8.2	6.3	.	.	.	.	0	0	1	1	0	1
1148	316	3	65	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.1	6.1	.	.	.	.	.	.	.	.	.	2	0	0
1149	74	3	68	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.1	.	.	.	1	1	3
1150	74	3	68	0	.	.	0	1	.	.	3	2	.	.	2	0	.	.	0	.	.	.	.	5.7	6.4	.	.	.	.	5.5	6.3	.	.	.	0	1	2
1151	74	3	68	0	0	0	0	3	0	0	3	1	1	0	0	0	0	0	0	.	.	.	.	5.7	6.8	8.5	7.3	8.4	7.0	6.8	7.1	0	0	1	0	3	1
1152	74	3	68	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.6	6.7	.	.	.	.	7.2	6.7	.	.	.	2	0	0
1153	74	3	68	1	.	.	0	1	.	.	0	0	.	.	1	0	.	.	0	.	.	.	.	5.2	5.8	.	.	.	.	4.8	5.8	.	.	.	1	1	0
1154	74	3	68	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.2	5.9	.	.	.	1	1	1
1155	74	3	68	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.0	4.7	.	.	.	0	0	1
1156	74	3	68	.	.	2	.	.	.	2	.	.	.	3	.	.	.	2	.	.	.	1	.	.	.	.	.	8.6	7.0	.	.	2	2	3	.	.	.
1157	74	3	68	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.2	5.7	.	.	.	.	.	.	.	.	.	2	0	1
1158	74	3	68	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.5	5.8	.	.	.	1	0	1
1159	74	3	68	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.6	5.6	.	.	.	0	0	1
1160	74	3	68	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.7	.	.	.	2	0	0
1161	74	3	68	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	.	.	.	.	5.1	5.9	7.7	6.8	.	6.8	.	5.4	1	0	1	0	0	1
1162	74	3	68	2	.	.	2	0	.	.	1	1	.	.	1	2	.	.	2	.	.	.	.	6.1	6.3	.	.	.	.	6.2	6.0	.	.	.	2	0	1
1163	74	3	68	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.2	6.7	.	.	.	.	.	.	:	.	.	1	1	0
1164	74	3	68	0	.	.	0	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	.	6.2	.	.	.	.	6.0	6.4	.	.	.	0	1	1
1165	74	3	68	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.9	5.9	.	.	.	0	0	0
1166	74	3	68	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.9	6.4	.	.	.	0	1	1
1167	102	3	68	2	.	.	2	0	.	.	0	0	.	.	1	2	.	.	2	.	.	.	.	5.8	5.1	.	.	.	.	5.3	5.2	.	.	.	2	0	0
1168	169	3	68	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.9	6.8	.	.	.	1	0	0
1169	247	3	68	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.8	6.0	.	.	.	1	1	0
1170	247	3	68	1	.	0	1	1	.	0	1	0	.	1	0	1	.	0	1	.	.	.	.	6.5	7.0	.	.	8.2	7.9	6.1	7.0	0	0	1	1	1	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1171	247	3	68	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.2	5.3	.	.	.	.	.	.	. . .	0 1 1
1172	247	3	68	1	.	.	1	0	.	.	0	1	.	.	0	1	.	.	1	.	.	.	.	5.0	6.2	.	.	.	.	5.3	.	. . .	1 0 1
1173	246	3	68.1	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.3	6.2	.	.	.	.	.	.	. . .	1 0 2
1174	246	3	68.1	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.3	5.4	.	.	.	.	.	.	. . .	0 0 0
1175	246	3	68.1	1	1	0	1	0	0	0	0	1	1	1	1	1	1	0	1	.	.	.	.	.	5.5	.	6.7	8.0	6.9	.	5.1	1 0 1	1 0 1
1176	246	3	68.1	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	5.9	.	.	.	.	.	.	. . .	1 1 1
1177	246	3	68.1	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	6.9	6.9	.	.	.	.	.	.	. . .	1 2 0
1178	317	3	68.1	1	0	.	.	0	0	.	.	3	1	.	.	1	0	.	.	.	.	.	.	4.5	.	7.3	7.0	.	.	.	.	0 0 1	1 0 3
1179	317	3	68.1	1	0	0	1	0	0	0	0	0	0	0	0	2	0	0	2	.	.	.	.	5.9	5.7	7.9	6.0	7.8	6.0	5.7	5.4	0 0 0	1 0 0
1180	317	3	68.1	.	0	0	1	.	0	0	0	.	1	1	0	.	0	0	1	.	.	.	.	.	.	.	6.7	.	6.5	5.8	6.0	0 0 1	1 0 0
1181	317	3	68.1	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	4.3	5.3	.	.	.	.	4.4	5.0	. . .	2 0 1
1182	319	3	68.2	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	6.9	6.4	.	.	0 0 2	. . .
1183	319	3	68.2	1	.	.	1	1	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.1	6.5	.	.	.	.	6.2	6.4	. . .	1 1 1
1184	319	3	68.2	1	.	0	1	0	.	1	0	1	.	1	0	1	.	0	2	.	.	.	.	5.6	6.1	.	.	7.6	6.9	5.5	6.1	0 1 1	1 0 1
1185	241	3	31	2	.	.	1	0	.	.	0	2	.	.	2	2	.	.	1	.	.	.	.	5.8	6.0	.	.	.	.	5.5	6.5	. . .	2 0 2
1186	241	3	31	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	9.0	7.1	.	.	1 0 2	. . .
1187	151	3	41	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	8.0	6.6	.	.	.	.	1 2 0	. . .
1188	151	3	41	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.2	5.6	.	.	.	.	.	.	. . .	0 0 0
1189	151	3	41	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	5.5	. . .	1 1 1
1190	151	3	41	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	.	.	.	.	.	6.2	.	6.9	8.8	7.4	.	6.1	1 0 0	1 0 0
1191	151	3	41	2	.	.	2	3	.	.	3	2	.	.	2	2	.	.	2	.	.	.	.	6.3	5.9	.	.	.	.	5.9	5.9	. . .	2 3 2
1192	151	3	41	2	.	.	2	0	.	.	3	2	.	.	2	2	.	.	2	.	.	.	.	6.4	6.1	.	.	.	.	5.8	5.9	. . .	2 0 2
1193	126	3	33	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.6	6.2	.	.	.	.	.	.	. . .	2 0 0
1194	240	3	33	0	.	.	2	0	.	.	0	1	.	.	1	0	.	.	2	.	.	.	.	5.7	6.5	.	.	.	.	6.8	6.8	. . .	0 0 1
1195	240	3	33	1	.	.	2	0	.	.	1	0	.	.	0	0	.	.	2	.	.	.	.	6.7	6.4	.	.	.	.	6.0	5.2	. . .	1 0 0
1196	240	3	33	1	.	0	.	1	.	2	.	0	.	0	.	1	.	0	.	.	.	3	.	7.1	6.9	.	.	8.2	7.3	.	.	0 2 0	1 1 0
1197	240	3	33	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	5.7	.	.	.	.	.	.	. . .	1 0 2
1198	240	3	33	1	0	0	.	0	0	0	.	2	1	1	.	1	0	0	.	.	.	.	.	5.4	5.6	7.9	6.7	8.0	6.8	.	.	0 0 1	1 0 2
1199	240	3	33	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.8	5.8	. . .	1 0 1
1200	240	3	33	.	.	.	1	.	.	.	3	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	6.2	6.6	. . .	1 3 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1201	300	3	33	3	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	5.6	.	.	.	.	.	.	.	.	.	3	0	1
1202	300	3	33	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.1	6.5	.	.	.	.	.	.	.	.	.	2	0	2
1203	300	3	33	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.0	6.1	.	.	.	.	.	.	.	.	.	1	0	1
1204	300	3	33	1	.	1	1	0	.	0	0	1	.	2	1	1	.	1	1	.	.	.	.	6.4	6.3	.	.	8.7	6.7	6.5	6.3	1	0	2	1	0	1
1205	300	3	33	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.9	6.4	.	.	.	2	0	1
1206	300	3	33	.	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.7	7.1	5.4	6.8	0	0	1	0	0	1
1207	125	3	39	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	0
1208	153	3	39	0	.	0	.	1	.	0	.	1	.	0	.	0	.	0	.	.	.	.	.	6.2	5.8	.	.	7.6	6.8	.	.	0	0	0	0	1	1
1209	153	3	39	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	6.8	.	.	.	.	.	.	.	.	.	2	1	1
1210	153	3	39	.	1	1	.	.	2	2	.	.	2	2	.	.	1	1	.	.	1	1	.	.	.	8.0	6.6	7.6	6.8	.	.	1	2	2	.	.	.
1211	153	3	39	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	5.6	6.1	.	.	.	.	.	.	.	.	.	2	0	2
1212	153	3	39	.	.	3	1	.	.	2	0	.	.	2	1	.	.	3	1	.	.	2	.	.	.	.	.	8.4	7.1	.	5.8	3	2	2	1	0	1
1213	153	3	39	.	3	3	.	.	2	2	.	.	2	2	.	.	3	3	.	.	3	1	.	.	.	7.9	8.2	8.0	8.0	.	.	3	2	2	.	.	.
1214	239	3	39	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.2	5.6	.	.	.	.	.	.	.	.	.	2	0	1
1215	239	3	39	.	.	2	2	.	.	0	0	.	.	1	1	.	.	2	2	.	.	.	.	.	.	.	.	7.9	7.6	6.3	6.3	2	0	1	2	0	1
1216	239	3	39	.	3	4	.	.	0	0	.	.	1	1	.	.	5	6	.	.	.	.	.	.	9.2	7.2	8.9	7.2	.	.	.	3	0	1	.	.	.
1217	239	3	39	1	0	0	2	0	2	2	0	0	1	1	1	1	0	0	2	.	2	1	.	6.1	6.9	9.1	6.8	9.4	6.7	6.3	6.0	0	2	1	1	0	0
1218	239	3	39	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.4	6.0	.	.	.	.	6.0	5.9	.	.	.	1	0	1
1219	239	3	39	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.0	5.9	.	.	.	.	.	.	.	.	.	1	1	2
1220	239	3	39	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.4	5.4	.	.	.	.	.	.	.	.	.	0	0	0
1221	239	3	39	.	.	2	3	.	.	0	0	.	.	1	1	.	.	2	3	.	.	.	.	.	.	.	.	8.7	7.2	6.6	6.7	2	0	1	3	0	1
1222	239	3	39	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.2	.	.	.	2	0	1
1223	239	3	39	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.1	.	.	.	1	0	0
1224	239	3	39	1	.	.	.	3	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.3	6.6	.	.	.	.	.	.	.	.	.	1	3	2
1225	239	3	39	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.7	5.9	.	.	.	.	.	.	.	.	.	1	0	0
1226	239	3	39	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.7	5.5	.	.	.	.	.	.	.	.	.	0	0	1
1227	239	3	39	1	.	.	.	4	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.4	6.5	.	.	.	.	.	.	.	.	.	1	4	1
1228	239	3	39	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.5	6.2	.	.	.	1	0	0
1229	239	3	39	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	2	.	.	.	.	6.1	6.1	.	.	.	.	7.1	6.4	.	.	.	1	0	1
1230	239	3	39	1	.	.	2	0	.	.	0	0	.	.	0	1	.	.	2	.	.	.	.	6.1	5.7	.	.	.	.	6.1	6.0	.	.	.	1	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1231	239	3	39	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	5.1	5.4	.	.	.	.	.	.	. . .	1 0 2
1232	239	3	39	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	5.5	5.4	.	.	.	.	.	.	. . .	1 0 2
1233	239	3	39	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	5.2	. . .	2 0 1
1234	239	3	39	2	.	.	1	0	.	.	0	1	.	.	0	2	.	.	1	.	.	.	.	5.8	5.8	.	.	.	.	6.2	6.0	. . .	2 0 1
1235	239	3	39	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.8	6.6	.	.	.	.	.	.	. . .	1 1 1
1236	239	3	39	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	5.8	6.2	.	. . .	2 0 2
1237	239	3	39	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	6.4	.	.	.	.	.	.	. . .	1 0 0
1238	239	3	39	.	1	1	2	.	0	0	0	.	2	1	2	.	1	1	2	.	.	.	.	.	.	.	6.5	.	6.4	.	5.8	1 0 2	2 0 2
1239	239	3	39	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.0	5.8	.	.	.	.	.	.	. . .	2 0 0
1240	239	3	39	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	6.9	.	.	.	.	.	.	. . .	1 0 1
1241	239	3	39	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.3	6.2	.	.	.	.	.	.	. . .	0 0 1
1242	239	3	39	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	5.7	. . .	1 0 1
1243	239	3	39	0	.	.	.	3	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	6.8	.	.	.	.	.	.	. . .	0 3 1
1244	239	3	39	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	9.3	6.2	.	.	.	.	1 0 0	. . .
1245	239	3	39	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	7.6	6.3	.	.	2 0 1	. . .
1246	239	3	39	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	7.5	6.0	.	.	.	.	1 0 0	. . .
1247	239	3	39	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.7	6.4	.	.	.	.	1 0 1	. . .
1248	239	3	39	.	.	.	0	.	.	.	3	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.7	6.4	. . .	0 3 2
1249	239	3	39	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.5	5.5	.	.	.	.	.	.	. . .	1 0 0
1250	239	3	39	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.0	6.4	.	.	.	.	.	.	. . .	2 0 1
1251	299	3	39	2	.	2	2	0	.	2	0	0	.	1	0	2	.	2	2	.	.	1	.	6.5	5.3	.	.	9.0	6.5	6.2	5.4	2 2 1	2 0 0
1252	299	3	39	2	.	.	1	0	.	.	1	1	.	.	0	2	.	.	1	.	.	.	.	5.3	6.3	.	.	.	.	5.9	5.7	. . .	2 0 1
1253	299	3	39	1	3	3	2	0	0	0	1	0	0	0	0	1	3	3	2	.	.	.	.	6.3	5.8	8.8	6.3	8.3	6.2	6.2	5.7	3 0 0	1 0 0
1254	299	3	39	1	.	.	1	1	.	.	0	1	.	.	0	1	.	.	1	.	.	.	.	5.7	6.3	.	.	.	.	6.1	.	. . .	1 1 1
1255	299	3	39	2	.	.	2	0	.	.	0	2	.	.	2	3	.	.	3	.	.	.	.	6.0	4.8	.	.	.	.	5.6	4.9	. . .	2 0 2
1256	299	3	39	0	1	0	0	1	2	2	1	2	2	2	1	0	0	0	0	.	2	2	.	5.9	6.1	8.9	7.4	8.3	7.7	.	6.2	1 2 2	0 1 2
1257	299	3	39	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	5.9	. . .	1 0 0
1258	127	3	55	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.5	5.3	.	.	.	.	.	.	. . .	2 0 1
1259	127	3	55	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	6.4	. . .	3 0 1
1260	235	3	55	.	.	2	2	.	.	2	0	.	.	0	1	.	.	2	2	.	.	2	.	.	.	.	.	8.8	6.4	6.5	5.8	2 2 0	2 0 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1261	235	3	55	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	.	5.9	.	.	.	.	6.1	6.3	.	.	.	2	0	0
1262	235	3	55	.	2	2	1	.	0	0	0	.	0	0	0	.	2	2	1	.	.	.	.	.	.	7.8	6.6	8.0	6.9	.	6.1	2	0	0	1	0	0
1263	235	3	55	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.6	6.3	.	.	.	1	1	1
1264	235	3	55	2	2	.	.	0	2	.	.	1	0	.	.	2	2	.	.	.	1	.	.	6.3	6.5	.	7.0	.	.	.	.	2	2	0	2	0	1
1265	235	3	55	.	.	2	1	.	.	1	0	.	.	2	2	.	.	2	1	.	.	.	.	.	.	.	.	8.9	7.6	7.1	.	2	1	2	1	0	2
1266	235	3	55	2	2	2	2	0	2	2	1	1	1	1	1	2	2	2	2	.	1	1	.	5.1	5.1	7.1	6.4	7.0	6.3	5.3	5.3	2	2	1	2	0	1
1267	235	3	55	2	.	3	3	0	.	0	0	1	.	1	2	3	.	4	3	.	.	.	.	6.8	7.4	.	.	9.2	7.8	7.0	7.5	3	0	1	2	0	1
1268	235	3	55	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	.	.	0	0	0	.	.	.
1269	301	3	57	.	2	.	2	.	0	.	0	.	1	.	1	.	2	.	2	.	.	.	.	.	.	7.9	6.7	.	.	6.1	5.7	2	0	1	2	0	1
1270	301	3	57	1	.	2	2	1	.	2	1	0	.	0	0	2	.	2	2	.	.	1	.	7.2	6.7	.	.	.	7.6	7.5	7.0	2	2	0	1	1	0
1271	79	3	64	.	1	1	.	.	2	2	.	.	0	1	.	.	1	1	.	.	2	2	.	.	.	9.7	7.2	8.6	7.4	.	.	1	2	0	.	.	.
1272	238	3	64	2	2	.	2	1	2	.	1	1	1	.	1	2	2	.	2	.	3	.	.	6.4	6.8	8.6	7.2	.	.	6.8	6.5	2	2	1	2	1	1
1273	238	3	64	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.7	6.5	.	.	.	.	6.8	6.5	.	.	.	2	0	0
1274	238	3	64	2	2	1	1	0	1	0	0	0	1	0	0	2	2	1	1	.	.	.	.	.	6.2	7.8	7.1	8.1	7.0	6.4	6.0	2	1	1	2	0	0
1275	238	3	64	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.8	6.2	.	.	.	.	.	.	.	.	.	2	0	0
1276	238	3	64	1	.	1	1	3	.	2	3	1	.	1	1	1	.	1	1	.	.	3	.	7.1	7.1	.	.	8.6	7.4	.	7.1	1	2	1	1	3	1
1277	238	3	64	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.2	5.4	.	.	.	.	.	.	.	.	.	1	0	1
1278	238	3	64	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.4	5.7	.	.	.	.	.	.	.	.	.	2	1	1
1279	238	3	64	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	.	.	.	.	.	6.1	8.1	6.6	.	6.4	.	5.1	1	0	1	1	0	1
1280	238	3	64	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.4	6.2	.	.	.	.	.	.	.	.	.	2	0	1
1281	158	4	63.3	.	2	2	2	.	0	0	0	.	1	2	1	.	2	2	2	.	.	.	.	.	.	8.0	6.7	8.1	6.6	6.0	6.0	2	0	1	2	0	1
1282	158	4	63.3	3	3	3	3	0	0	0	0	1	0	0	0	3	3	3	3	.	.	.	.	.	6.7	.	7.1	.	7.1	6.4	6.5	3	0	0	3	0	1
1283	158	4	63.3	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.8	6.2	.	.	.	2	0	0
1284	158	4	63.3	.	.	.	5	.	.	.	0	.	.	.	1	.	.	.	6	.	.	.	.	.	.	.	.	.	.	6.0	6.1	.	.	.	5	0	1
1285	158	4	63.3	2	1	.	5	0	0	.	0	0	0	.	1	2	1	.	6	.	.	.	.	.	6.2	7.4	6.6	.	.	6.0	5.9	1	0	0	2	0	0
1286	158	4	63.3	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	3	.	.	.	.	6.0	7.2	.	.	.	.	6.8	6.9	.	.	.	2	0	0
1287	158	4	63.3	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	8.3	7.6	.	.	.	.	2	0	0	.	.	.
1288	158	4	63.3	.	.	2	3	.	.	0	0	.	.	0	0	.	.	2	3	.	.	.	.	.	.	.	.	8.5	6.8	6.2	5.8	2	0	0	3	0	0
1289	11	4	37	2	.	2	.	0	.	0	.	1	.	0	.	2	.	2	.	.	.	.	.	7.4	7.2	.	.	9.3	6.9	.	.	2	0	0	2	0	1
1290	67	4	37	.	2	2	.	.	0	0	.	.	0	0	.	.	2	2	.	.	.	.	.	.	.	8.2	7.1	8.3	7.2	.	.	2	0	0	.	.	.

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1291	76	4	37	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	6.0	.	.	.	2	0	0
1292	123	4	37	.	.	2	2	.	.	0	0	.	.	0	1	.	.	3	3	.	.	.	.	.	.	.	.	7.8	6.3	6.1	5.5	2	0	0	2	0	1
1293	123	4	37	3	3	.	.	0	0	.	.	0	0	.	.	5	5	.	.	.	.	.	.	8.0	6.7	9.6	7.6	.	.	.	.	3	0	0	3	0	0
1294	123	4	37	3	.	.	.	1	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	6.9	6.3	.	.	.	.	.	.	.	.	.	3	1	1
1295	156	4	37	2	.	3	2	1	.	2	1	1	.	0	1	2	.	3	2	.	.	2	.	6.9	7.1	.	.	9.2	8.2	6.9	7.4	3	2	0	2	1	1
1296	156	4	37	1	.	1	1	0	.	0	0	1	.	1	1	1	.	1	1	.	.	.	.	5.7	5.8	.	.	8.3	6.0	5.8	6.0	1	0	1	1	0	1
1297	156	4	37	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	8.8	7.3	.	.	.	.	2	0	1	.	.	.
1298	156	4	37	.	4	.	.	.	0	.	.	.	1	.	.	.	6	.	.	.	.	.	.	.	.	8.9	6.6	.	.	.	.	4	0	1	.	.	.
1299	156	4	37	.	3	3	2	.	2	2	0	.	0	0	1	.	3	3	3	.	1	1	.	.	.	8.3	7.2	8.5	7.2	.	6.2	3	2	0	2	0	1
1300	156	4	37	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.1	6.3	.	.	.	.	.	.	.	.	.	2	0	0
1301	224	4	37	2	2	2	2	0	0	0	0	0	0	0	0	2	2	2	2	.	.	.	.	6.2	6.5	8.6	7.3	.	7.1	6.3	6.5	2	0	0	2	0	0
1302	224	4	37	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.0	.	.	.	2	0	1
1303	224	4	37	1	.	1	1	0	.	0	0	0	.	1	0	1	.	1	1	.	.	.	.	5.8	5.3	.	.	7.6	6.3	5.7	5.1	1	0	1	1	0	0
1304	224	4	37	3	3	.	3	0	2	.	0	2	2	.	2	3	3	.	3	.	2	.	.	5.5	6.5	7.6	7.4	.	.	5.7	6.8	3	2	2	3	0	2
1305	224	4	37	.	.	3	2	.	.	0	0	.	.	0	0	.	.	3	3	.	.	.	.	.	.	.	.	8.5	6.5	6.0	6.0	3	0	0	2	0	0
1306	224	4	37	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.7	6.2	.	.	.	.	.	.	.	.	.	2	1	1
1307	224	4	37	2	.	3	2	0	.	1	0	0	.	0	0	2	.	3	2	.	.	.	.	8.1	7.8	.	.	.	8.5	7.9	7.8	3	1	0	2	0	0
1308	224	4	37	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	6.7	.	.	.	2	0	1
1309	295	4	37	.	.	2	2	.	.	0	0	.	.	0	0	.	.	2	2	.	.	.	.	.	.	.	.	8.1	.	6.2	5.8	2	0	0	2	0	0
1310	295	4	37	3	.	.	.	0	.	.	.	0	.	.	.	5	.	.	.	.	.	.	.	7.1	6.6	.	.	.	.	.	.	.	.	.	3	0	0
1311	295	4	37	2	3	3	2	0	0	0	0	0	0	0	0	3	3	3	3	.	.	.	.	6.1	6.4	7.0	7.3	7.2	7.3	.	6.4	3	0	0	2	0	0
1312	295	4	37	1	2	2	.	0	0	0	.	0	0	0	.	2	2	2	.	.	.	.	.	5.6	6.2	7.7	7.3	7.8	7.5	.	.	2	0	0	1	0	0
1313	295	4	37	2	3	.	.	0	1	.	.	0	0	.	.	2	5	.	.	.	.	.	.	6.8	6.9	8.7	7.2	.	.	.	.	3	1	0	2	0	0
1314	236	4	37.1	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	8.1	6.5	.	.	.	.	2	2	0	.	.	.
1315	61	4	40	2	3	3	.	0	2	2	.	1	1	1	.	3	5	5	.	.	2	2	.	.	.	.	.	.	.	.	.	3	2	1	2	0	1
1316	61	4	40	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.2	7.0	.	.	.	.	1	0	1	.	.	.
1317	63	4	40	1	1	2	.	0	2	2	.	0	0	0	.	1	2	2	.	.	1	2	.	7.0	7.2	7.8	7.8	7.7	7.9	.	.	1	2	0	1	0	0
1318	296	4	47	2	2	2	2	0	0	0	0	0	0	0	0	2	3	3	2	.	.	.	.	6.1	6.3	7.2	7.0	7.4	6.7	5.7	6.4	2	0	0	2	0	0
1319	157	4	54	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	8.3	8.0	.	.	.	2	1	0
1320	157	4	54	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	7.4	6.5	.	.	.	.	2	0	0	.	.	.

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1321	157	4	54	.	2	2	.	.	0	0	.	.	0	0	.	.	2	2	.	.	.	.	.	.	.	8.0	7.0	7.9	6.8	.	.	2 0 0	. . .
1322	157	4	54	.	.	.	3	.	.	.	1	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.9	6.4	. . .	3 1 0
1323	157	4	54	2	3	3	2	0	0	0	0	0	0	0	0	3	3	3	3	.	.	.	.	6.6	5.9	8.1	6.3	8.3	6.5	6.5	5.8	3 0 0	2 0 0
1324	157	4	54	2	3	3	2	0	0	0	0	0	0	0	0	3	4	4	3	.	.	.	.	7.2	.	9.1	.	9.0	7.1	7.2	6.9	3 0 0	2 0 0
1325	76	4	37	3	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	5.4	5.5	.	.	.	.	.	.	. . .	3 0 1
1326	76	4	37	1	1	2	2	0	0	0	0	0	0	0	0	1	1	2	2	.	.	.	.	6.5	5.5	8.4	7.5	8.6	7.2	.	6.8	1 0 0	1 0 0
1327	104	4	44	3	3	3	3	1	0	0	0	0	0	0	0	3	3	3	3	.	.	.	.	7.5	6.7	8.5	7.7	8.5	7.4	.	6.8	3 0 0	3 1 0
1328	104	4	44	2	2	.	2	0	0	.	0	0	0	.	0	2	2	.	2	.	.	.	.	6.4	6.0	8.4	6.3	.	6.3	6.6	5.9	2 0 0	2 0 0
1329	148	4	44	.	.	0	1	.	.	0	1	.	.	1	1	.	.	0	1	.	.	.	.	.	.	.	.	8.6	7.2	6.2	6.3	0 0 1	1 1 1
1330	148	4	44	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.3	6.9	.	.	.	.	.	.	. . .	2 0 1
1331	148	4	44	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	6.4	6.2	.	.	.	.	6.9	6.8	. . .	2 1 0
1332	148	4	44	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.4	6.5	. . .	2 0 0
1333	148	4	44	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	5.5	. . .	2 0 1
1334	148	4	44	3	.	.	3	0	.	.	0	2	.	.	0	5	.	.	5	.	.	.	.	7.5	6.8	.	.	.	.	8.0	.	. . .	3 0 2
1335	148	4	44	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	5.8	. . .	2 0 1
1336	148	4	44	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.		.	.	.	.	6.9	6.6	.	.	.	.	.	.	. . .	2 0 1
1337	148	4	44	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.		.	.	.	.	5.7	5.8	.	.	.	.	.	.	. . .	2 0 0
1338	148	4	44	2	.	.	3	0	.	.	0	1	.	.	0	3	.	.	3	.	.	.	.	.	6.3	.	.	.	.	6.1	6.3	. . .	2 0 1
1339	148	4	44	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	4	.	.	.	.	.	.	.	.	.	.	7.0	5.9	. . .	3 0 0
1340	148	4	44	2	.	.	2	1	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	6.5	6.7	.	.	.	.	6.5	6.6	. . .	2 1 0
1341	148	4	44	.	3	.	3	.	1	.	1	.	0	.	0	.	3	.	4	.	.	.	.	.	.	.	8.2	.	.	6.5	6.1	3 1 0	3 1 0
1342	148	4	44	.	2	2	1	.	0	0	0	.	0	0	0	.	2	2	1	.	.	.	.	.	.	8.2	6.7	7.8	6.8	6.1	6.7	2 0 0	1 0 0
1343	148	4	44	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	8.4	6.3	.	.	2 0 0	. . .
1344	148	4	44	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.3	. . .	2 0 1
1345	148	4	44	1	2	.	.	0	0	.	.	0	0	.	.	1	2	.	.	.	.	.	.	5.2	5.7	.	6.4	.	.	.	.	2 0 0	1 0 0
1346	148	4	44	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.7	6.5	.	.	.	.	.	.	. . .	3 0 0
1347	148	4	44	.	2	2	2	.	0	0	0	.	1	1	1	.	3	3	3	.	.	.	.	.	.	8.8	7.2	8.4	7.6	.	5.7	2 0 1	2 0 1
1348	148	4	44	.	.	2	3	.	.	0	0	.	.	0	0	.	.	2	3	.	.	.	.	.	.	.	.	8.3	7.1	6.0	6.2	2 0 0	3 0 0
1349	148	4	44	.	4	4	.	.	2	2	.	.	2	2	.	.	6	6	.	.	2	2	.	.	.	9.7	7.3	.	7.5	.	.	4 2 2	. . .
1350	148	4	44	5	.	.	5	0	.	.	0	1	.	.	1	5	.	.	5	.	.	.	.	6.1	6.5	.	.	.	.	7.3	7.7	. . .	5 0 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1351	148	4	44	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6.7	6.1	.	.	.	3	0	1
1352	148	4	44	3	.	.	3	0	.	.	0	0	.	.	0	3	.	.	3	.	.	.	.	7.9	7.7	.	.	.	.	7.7	7.6	.	.	.	3	0	0
1353	148	4	44	2	2	.	.	2	2	.	.	0	0	.	.	2	3	.	.	2	3	.	.	6.8	7.4	9.2	8.1	.	.	.	.	2	2	0	2	2	0
1354	148	4	44	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.5	5.0	.	.	.	.	.	5.9	.	.	.	2	0	1
1355	148	4	44	.	2	3	2	.	0	0	0	.	0	0	0	.	3	3	3	.	.	.	.	.	.	7.4	7.1	7.6	7.4	6.2	6.8	2	0	0	2	0	0
1356	148	4	44	.	2	.	3	.	0	.	1	.	0	.	0	.	2	.	3	.	.	.	.	.	.	8.4	6.9	.	.	7.8	6.9	2	0	0	3	1	0
1357	148	4	44	2	.	.	2	0	.	.	0	0	.	.	1	2	.	.	2	.	.	.	.	6.9	6.4	.	.	.	.	6.4	6.8	.	.	.	2	0	0
1358	148	4	44	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	6.4	.	.	.	2	0	0
1359	148	4	44	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	9.1	7.4	.	.	1	0	1	.	.	.
1360	148	4	44	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.1	6.9	.	.	.	2	0	2
1361	148	4	44	2	2	2	.	0	0	0	.	2	1	0	.	2	2	2	.	.	.	.	.	6.6	5.7	8.1	6.7	8.6	6.8	.	.	2	0	1	2	0	2
1362	148	4	44	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	6.3	.	.	.	.	.	.	.	.	.	2	0	1
1363	148	4	44	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.6	7.0	.	.	.	.	.	.	.	.	.	2	0	0
1364	148	4	44	1	.	.	5	0	.	.	0	1	.	.	2	1	.	.	5	.	.	.	.	5.5	5.2	.	.	.	.	5.6	6.1	.	.	.	1	0	1
1365	148	4	44	.	2	.	2	.	0	.	0	.	0	.	1	.	3	.	3	.	.	.	.	.	.	8.1	6.7	.	.	6.6	6.1	2	0	0	2	0	1
1366	148	4	44	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.5	6.7	.	.	.	2	0	0
1367	148	4	44	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.5	6.5	.	.	.	.	.	.	.	.	.	2	0	1
1368	148	4	44	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.4	.	.	.	2	0	1
1369	148	4	44	.	.	3	.	.	.	2	.	.	.	0	.	.	.	5	.	.	.	3	.	.	.	.	.	9.8	7.7	.	.	3	2	0	.	.	.
1370	148	4	44	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.0	5.7	.	.	.	.	.	.	.	.	.	2	0	0
1371	148	4	44	2	2	2	2	0	0	0	0	1	1	1	1	2	2	2	2	.	.	.	.	6.2	6.4	7.5	7.2	7.5	7.2	6.6	6.3	2	0	1	2	0	1
1372	148	4	44	.	.	.	3	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.5	6.5	.	.	.	3	1	1
1373	148	4	44	2	.	.	.	4	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.7	6.7	.	.	.	.	.	.	.	.	.	2	4	1
1374	148	4	44	.	.	3	.	.	.	0	.	.	.	1	.	.	.	5	.	.	.	.	.	.	.	.	.	8.2	7.3	.	.	3	0	1	.	.	.
1375	148	4	44	.	3	3	2	.	0	0	0	.	0	0	2	.	3	3	3	.	.	.	.	.	.	7.7	6.8	.	7.1	5.8	5.9	3	0	0	2	0	2
1376	148	4	44	.	.	.	3	.	.	.	0	.	.	.	2	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.4	5.6	.	.	.	3	0	2
1377	148	4	44	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	7.0	.	.	.	2	1	1
1378	280	4	44	2	2	.	.	0	0	.	.	1	0	.	.	3	3	.	.	.	.	.	.	6.5	6.9	8.0	7.9	.	.	.	.	2	0	0	2	0	1
1379	297	4	44	.	.	.	4	.	.	.	0	.	.	.	0	.	.	.	5	.	.	.	.	.	.	.	.	.	.	8.0	6.6	.	.	.	4	0	0
1380	297	4	44	.	4	.	.	.	0	.	.	.	0	.	.	.	6	.	.	.	.	.	.	.	.	7.9	7.1	.	.	.	.	4	0	0	.	.	.

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	RTC	RTC
1381	297	4	44	2	2	.	2	0	0	.	0	0	1	.	0	2	2	.	2	.	.	.	.	5.8	6.2	7.5	5.9	.	.	5.8	6.1	2 0 1	2 0 0
1382	297	4	44	.	.	3	.	.	.	0	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	.	.	8.7	7.0	.	.	3 0 2	. . .
1383	297	4	44	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.4	6.1	.	.	.	.	.	.	. . .	2 0 0
1384	297	4	44	1	2	.	.	0	0	.	.	0	0	.	.	1	2	.	.	.	.	.	.	.	5.9	8.5	7.2	.	.	.	.	2 0 0	1 0 0
1385	297	4	44	1	3	2	2	0	2	0	0	0	1	0	0	1	3	2	2	.	2	.	.	.	6.2	8.2	6.8	7.0	7.0	6.4	6.0	3 2 1	1 0 0
1386	298	4	44	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	6.7	6.3	.	.	.	.	.	.	. . .	3 0 1
1387	237	4	36	2	2	.	2	0	0	.	0	1	0	.	1	2	2	.	2	.	.	.	.	6.2	7.0	8.5	7.7	.	.	6.0	6.6	2 0 0	2 0 1
1388	237	4	36	2	1	.	.	0	0	.	.	2	1	.	.	2	1	.	.	.	.	.	.	.	6.2	7.2	6.3	.	.	.	.	1 0 1	2 0 2
1389	237	4	36	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	8.1	6.1	.	.	.	.	2 0 0	. . .
1390	237	4	36	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	8.4	6.8	.	.	.	.	.	.	. . .	2 1 0
1391	237	4	36	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.0	7.0	.	.	.	.	.	.	. . .	2 0 0
1392	237	4	36	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	3	.	.	.	.	7.5	6.6	.	.	.	.	7.6	6.5	. . .	2 0 0
1393	237	4	36	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.3	6.9	.	.	.	.	.	.	. . .	2 0 1
1394	237	4	36	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	8.8	7.0	.	.	2 0 0	. . .
1395	237	4	36	2	.	2	.	0	.	0	.	2	.	1	.	2	.	2	.	.	.	.	.	.	5.7	.	.	7.8	6.5	.	.	2 0 1	2 0 2
1396	179	4	39.1	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.3	6.3	.	.	.	.	.	.	. . .	1 1 1
1397	225	4	39.1	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	7.3	7.0	.	.	.	.	.	.	. . .	1 1 0
1398	225	4	39.1	2	2	1	.	0	1	2	.	0	0	0	.	2	2	1	.	.	.	2	.	.	6.4	.	7.5	.	7.5	.	.	2 1 0	2 0 0
1399	225	4	39.1	2	1	1	.	0	2	2	.	1	0	0	.	2	1	1	.	.	2	1	.	5.2	6.1	7.3	6.7	7.4	6.7	.	.	1 2 0	2 0 1
1400	226	4	39.1	2	.	2	2	0	.	0	0	0	.	1	0	2	.	2	2	.	.	.	.	7.3	7.0	.	.	8.8	7.9	6.9	7.0	2 0 1	2 0 0
1401	225	4	39.1	1	.	.	1	1	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	.	6.7	.	.	.	.	.	6.7	. . .	1 1 1
1402	294	4	39.1	1	2	2	1	0	0	0	0	0	0	0	0	2	2	2	2	.	.	.	.	6.9	5.8	.	6.8	.	6.9	.	5.8	2 0 0	1 0 0
1403	154	4	50	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	8.1	6.3	. . .	2 1 1
1404	154	4	50	2	2	.	2	0	0	.	1	0	0	.	0	3	2	.	2	.	.	.	.	.	6.3	7.9	7.1	.	.	7.8	6.9	2 0 0	2 0 0
1405	154	4	50	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.7	6.7	.	.	.	.	.	.	. . .	2 0 0
1406	98	4	67	2	3	3	2	1	0	0	1	1	1	1	0	2	4	4	2	.	.	.	.	6.3	7.1	7.3	7.7	7.0	8.1	6.1	6.8	3 0 1	2 1 1
1407	98	4	67	2	2	2	2	0	0	0	0	0	0	0	1	3	3	3	3	.	.	.	.	7.2	6.5	7.8	6.5	8.2	6.7	6.3	6.3	2 0 0	2 0 0
1408	124	4	67	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.6	6.1	.	.	.	.	.	.	. . .	2 0 0
1409	149	4	67	2	3	.	2	0	0	.	1	1	0	.	1	2	3	.	2	.	.	.	.	7.4	6.8	9.7	7.3	.	.	8.2	6.8	3 0 0	2 0 1
1410	230	4	67	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	7.8	6.3	.	.	1 0 2	. . .

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1411	293	4	67	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	8.4	6.8	.	.	.	.	.	.	. . .	1 0 1
1412	293	4	67	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	7.6	7.1	.	.	.	.	2 0 0	. . .
1413	155	4	70	2	2	2	2	0	0	0	0	0	0	0	0	2	2	2	2	.	.	.	.	4.2	4.8	7.7	6.6	7.7	6.5	.	4.7	2 0 0	2 0 0
1414	155	4	70	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	6.3	. . .	2 0 1
1415	322	4	54	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	3 0 1
1416	322	4	54	1	2	2	1	1	0	0	1	1	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 0	1 1 1
1417	322	4	54	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 0 1
1418	322	4	54	.	2	2	.	.	0	0	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 1	. . .
1419	322	4	54	3	3	3	3	1	2	2	1	1	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 2 0	3 1 1
1420	322	4	54	5	2	.	.	0	0	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 1	5 0 2
1421	322	4	54	.	.	.	3	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	3 1 0
1422	322	4	54	.	.	3	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 2 1	. . .
1423	322	4	54	.	.	2	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 1 2	. . .
1424	322	4	54	2	2	.	2	0	0	.	0	1	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 0	2 0 1
1425	322	4	54	.	2	3	.	.	2	2	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 2 1	. . .
1426	322	4	54	.	1	1	1	.	0	0	0	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1 0 0	1 0 1
1427	322	4	54	2	3	3	2	1	2	2	1	0	1	1	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 2 1	2 1 0
1428	322	4	54	1	1	.	.	0	0	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1 0 2	1 0 1
1429	322	4	54	2	.	.	3	1	.	.	1	0	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 1 0
1430	322	4	54	.	4	4	.	.	1	0	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4 1 1	. . .
1431	322	4	54	.	2	2	2	.	0	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 0	2 0 0
1432	323	4	37	.	.	2	1	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 0	1 0 0
1433	323	4	37	.	3	3	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 0 0	. . .
1434	323	4	37	2	3	3	2	0	0	0	0	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 0 1	2 0 1
1435	323	4	37	1	3	2	1	0	0	0	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 0 1	1 0 1
1436	323	4	37	2	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 1 1
1437	323	4	37	.	2	3	2	.	0	0	1	.	0	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 0	2 1 1
1438	323	4	37	1	2	.	1	1	1	.	1	1	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 1 0	1 1 1
1439	323	4	37	2	2	2	3	0	0	0	0	1	1	0	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2 0 1	2 0 1
1440	323	4	37	3	3	3	3	0	2	2	0	1	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3 2 2	3 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1441	323	4	37	.	1	1	2	.	0	0	0	.	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	2	0	0
1442	323	4	37	.	2	3	.	.	0	0	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	2	.	.	.
1443	323	4	37	2	3	.	2	1	0	.	1	1	0	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	0	0	2	1	1
1444	323	4	37	2	3	.	.	1	0	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	0	1	2	1	1
1445	60	5	37	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0	.	.	.
1446	10	5	40	2	3	3	2	0	0	0	0	0	0	0	0	2	3	3	2	.	.	.	.	7.3	.	8.3	.	8.4	7.2	7.1	6.7	3	0	0	2	0	0
1447	10	5	40	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	7.4	7.1	.	.	.	.	.	.	.	.	.	3	0	0
1448	10	5	40	2	3	2	2	0	0	0	0	0	0	0	0	2	3	3	2	.	.	.	.	8.2	7.0	7.8	7.0	7.6	7.2	7.9	6.7	3	0	0	2	0	0
1449	10	5	40	2	3	3	2	0	0	0	0	1	1	1	1	2	3	3	2	.	.	.	.	6.5	6.2	7.8	7.7	7.8	7.6	5.7	6.4	3	0	1	2	0	1
1450	12	5	40	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	7.9	7.0	.	.	2	0	0	.	.	.
1451	13	5	40	2	2	2	2	1	2	2	1	0	0	0	0	2	3	3	2	.	2	1	.	.	.	.	.	8.0	7.2	6.2	6.8	2	2	0	2	1	0
1452	63	5	40	1	3	3	2	0	0	0	0	0	0	0	0	1	3	3	2	.	.	.	.	7.2	6.3	9.2	7.2	.	7.3	7.9	5.8	3	0	0	1	0	0
1453	59	5	40	0	1	1	1	1	0	0	0	0	1	1	0	0	1	1	1	.	.	.	.	.	5.6	8.0	6.6	7.6	6.9	.	5.5	1	0	1	0	1	0
1454	89	5	40	.	.	3	.	.	.	0	.	.	.	0	.	.	.	5	.	.	.	.	.	.	.	.	.	7.3	6.7	.	.	3	0	0	.	.	.
1455	99	5	40	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	5.5	.	.	.	2	0	0
1456	128	5	40	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	5.8	5.9	.	.	.	.	.	.	.	.	.	2	0	0
1457	130	5	40	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	6.8	7.1	.	.	.	2	0	0
1458	130	5	40	2	2	.	.	1	2	.	.	0	0	.	.	2	2	.	.	.	1	.	.	7.0	7.0	8.1	7.0	.	.	.	.	2	2	0	2	1	0
1459	178	5	40	2	2	2	1	0	0	0	0	1	1	1	1	2	2	2	1	.	.	.	.	6.6	6.5	7.8	6.7	7.4	6.6	6.0	6.3	2	0	1	2	0	1
1460	180	5	40	.	.	2	2	.	.	0	0	.	.	1	1	.	.	2	2	.	.	.	.	.	.	.	.	7.7	6.8	6.6	6.8	2	0	1	2	0	1
1461	178	5	40	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	5.7	6.2	.	.	.	.	.	.	.	.	.	3	0	1
1462	178	5	40	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.1	7.9	.	.	.	2	1	0
1463	178	5	40	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	7.0	6.5	.	.	.	.	1	0	0	.	.	.
1464	182	5	40	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	.	.	7.8	.	.	.	.	2	2	2	.	.	.
1465	178	5	40	3	4	4	3	1	0	0	0	0	0	0	1	4	6	6	4	.	.	.	.	.	7.0	7.9	7.8	.	.	7.7	6.9	4	0	0	3	1	0
1466	178	5	40	.	3	2	2	.	0	0	0	.	1	1	1	.	4	2	2	.	.	.	.	.	.	8.8	7.6	.	7.3	6.3	6.1	3	0	1	2	0	1
1467	182	5	40	.	2	1	2	.	0	2	1	.	1	1	1	.	2	1	2	.	.	4	.	.	.	.	6.9	8.3	7.8	6.4	6.3	2	0	1	2	1	1
1468	228	5	40	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.2	6.3	.	.	.	.	.	.	.	.	.	2	0	2
1469	229	5	40	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	7.5	6.8	.	.	.	2	1	1
1470	232	5	40	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	6.2	.	.	.	.	2	1	1	.	.	.

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1471	233	5	40	3	.	.	2	0	.	.	0	0	.	.	1	3	.	.	3	.	.	.	.	.	6.5	.	.	.	.	.	6.3	. . .	3 0 0
1472	234	5	40	2	2	3	2	0	0	0	0	1	1	1	1	2	2	3	3	.	.	.	.	5.5	6.9	.	7.8	8.8	8.1	5.5	6.9	2 0 1	2 0 1
1473	233	5	40	2	.	2	2	1	.	1	1	1	.	1	1	2	.	2	3	.	.	.	.	6.8	6.4	.	.	.	7.1	6.9	6.3	2 1 1	2 1 1
1474	233	5	40	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	7.4	7.1	.	.	.	.	.	.	. . .	3 0 0
1475	233	5	40	3	.	.	3	0	.	.	0	1	.	.	2	5	.	.	5	.	.	.	.	6.7	5.8	.	.	.	.	6.5	6.0	. . .	3 0 1
1476	291	5	40	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.1	. . .	2 0 0
1477	129	5	52	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.5	6.2	.	.	.	.	.	.	. . .	2 1 0
1478	227	5	52	1	2	2	2	1	0	0	0	0	1	1	0	1	3	2	2	.	.	.	.	.	6.5	.	7.5	.	7.6	6.7	6.6	2 0 1	1 1 0
1479	292	5	52	1	.	.	2	0	.	.	3	1	.	.	1	1	.	.	2	.	.	.	.	6.9	6.2	.	.	.	.	6.7	6.3	. . .	1 0 1
1480	292	5	52	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.2	7.2	. . .	1 1 1
1481	292	5	52	3	2	2	.	0	0	1	.	2	2	2	.	3	2	2	.	.	.	.	.	.	6.2	.	7.7	8.9	7.6	.	.	2 0 2	3 0 2
1482	292	5	52	2	2	.	2	0	0	.	0	1	1	.	1	2	2	.	2	.	.	.	.	5.6	5.1	.	6.8	.	.	.	5.6	2 0 1	2 0 1
1483	292	5	52	.	1	.	2	.	0	.	0	.	0	.	0	.	2	.	2	.	.	.	.	.	.	8.7	7.3	.	.	5.9	6.8	1 0 0	2 0 0
1484	62	5	58	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.6	. . .	2 1 0
1485	62	5	58	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.6	4.5	.	.	.	.	.	.	. . .	0 0 1
1486	181	5	58	.	3	.	.	.	1	.	.	.	1	.	.	.	5	.	.	.	.	.	.	.	.	8.7	7.7	.	.	.	.	3 1 1	. . .
1487	181	5	58	.	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	8.2	6.7	.	.	.	.	2 0 1	. . .
1488	181	5	58	2	2	2	.	0	0	2	.	1	0	0	.	3	2	2	.	.	.	1	.	7.2	6.2	8.4	6.7	8.1	6.8	.	.	2 0 0	2 0 1
1489	181	5	58	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.1	6.3	.	.	.	.	.	.	. . .	2 0 0
1490	181	5	58	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.9	6.3	.	.	.	.	.	.	. . .	1 0 0
1491	181	5	58	.	.	1	2	.	.	0	1	.	.	1	0	.	.	1	2	.	.	.	.	.	.	.	.	8.3	7.2	5.8	6.4	1 0 1	2 1 0
1492	181	5	58	2	2	.	2	0	2	.	0	1	0	.	0	2	2	.	2	.	1	.	.	.	5.5	7.2	7.5	.	.	6.0	5.8	2 2 0	2 0 1
1493	181	5	58	2	2	.	.	0	1	.	.	1	1	.	.	2	2	.	.	.	.	.	.	5.7	5.8	7.6	6.8	.	.	.	.	2 1 1	2 0 1
1494	181	5	58	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.3	6.2	.	.	.	.	.	.	. . .	2 1 1
1495	181	5	58	2	3	3	2	0	2	2	0	1	0	0	1	2	3	3	2	.	2	2	.	7.4	7.4	8.4	7.9	.	7.9	6.9	6.8	3 2 0	2 0 1
1496	181	5	58	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.5	6.7	.	.	.	.	.	.	. . .	2 0 0
1497	181	5	58	3	3	.	3	0	0	.	0	0	0	.	0	5	5	.	5	.	.	.	.	7.2	6.4	8.8	6.9	.	.	7.5	6.4	3 0 0	3 0 0
1498	181	5	58	.	.	.	3	.	.	.	0	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	.	.	.	7.6	7.0	. . .	3 0 2
1499	181	5	58	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.5	6.2	.	.	.	.	.	.	. . .	2 0 1
1500	181	5	58	.	.	.	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	5.9	5.8	. . .	3 0 0

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1501	181	5	58	.	3	3	.	.	0	0	.	.	2	2	.	.	4	4	.	.	.	.	.	.	.	8.3	7.4	8.1	7.3	.	.	3	0	2	.	.	.
1502	181	5	58	2	.	2	2	0	.	0	0	0	.	0	0	3	.	3	3	.	.	.	.	6.4	6.0	.	.	8.0	6.8	6.5	6.0	2	0	0	2	0	0
1503	181	5	58	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.0	6.4	.	.	.	.	.	.	.	.	.	2	0	2
1504	181	5	58	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.7	5.2	.	.	.	.	.	.	.	.	.	2	0	1
1505	181	5	58	.	.	2	3	.	.	0	0	.	.	0	1	.	.	2	3	.	.	.	.	.	.	.	.	7.7	7.0	5.8	6.3	2	0	0	3	0	1
1506	231	5	58	2	.	.	2	0	.	.	0	0	.	.	0	3	.	.	2	.	.	.	.	7.1	6.7	.	.	.	.	7.2	6.7	.	.	.	2	0	0
1507	5	5	124	1	.	.	1	0	.	.	0	0	.	.	1	2	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	0
1508	183	5	124	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.6	6.6	.	.	.	.	.	.	.	.	.	2	1	1
1509	183	5	124	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.9	6.0	.	.	.	2	0	0
1510	183	5	124	1	.	.	1	0	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	6.7	5.9	.	.	.	.	6.6	6.6	.	.	.	1	0	0
1511	183	5	124	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	7.0	6.4	.	.	.	.	.	.	.	.	.	1	0	0
1512	222	5	124	3	.	.	.	0	.	.	.	1	.	.	.	5	.	.	.	.	.	.	.	6.1	6.6	.	.	.	.	.	.	.	.	.	3	0	1
1513	222	5	124	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.5	6.4	.	.	.	1	0	2
1514	222	5	124	2	2	.	2	1	2	.	1	1	1	.	0	2	2	.	2	.	1	.	.	.	6.5	9.4	7.7	.	.	7.7	7.1	2	2	1	2	1	1
1515	222	5	124	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.7	6.7	.	.	.	1	0	1
1516	222	5	124	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.6	6.2	.	.	.	.	.	.	.	.	.	0	0	0
1517	222	5	124	1	.	.	1	1	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	7.0	6.7	.	.	.	.	7.3	7.0	.	.	.	1	1	0
1518	222	5	124	0	1	.	1	0	0	.	0	1	2	.	1	0	1	.	1	.	.	.	.	7.3	6.5	9.5	7.6	.	.	7.1	6.5	1	0	2	0	0	1
1519	222	5	124	2	2	2	2	0	3	3	3	0	1	1	1	2	3	3	2	.	.	.	.	7.9	6.6	9.2	7.8	8.8	7.5	7.8	7.4	2	3	1	2	0	0
1520	222	5	124	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.5	6.8	.	.	.	2	1	2
1521	284	5	124	1	.	.	1	0	.	.	0	1	.	.	2	1	.	.	1	.	.	.	.	6.0	5.8	.	.	.	.	5.7	5.9	.	.	.	1	0	1
1522	284	5	124	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0	0	.	.	.	.	7.5	6.7	8.3	7.4	8.4	7.5	.	6.4	0	0	0	0	1	1
1523	284	5	124	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.2	6.4	.	.	.	2	0	0
1524	284	5	124	1	.	.	1	1	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	.	6.2	.	.	.	.	7.0	6.2	.	.	.	1	1	0
1525	284	5	124	2	.	.	.	3	.	.	.	4	.	.	.	2	.	.	.	.	.	.	.	6.1	6.1	.	.	.	.	4.9	5.4	.	.	.	2	3	4
1526	6	5	129	0	0	0	0	0	2	2	0	1	0	0	1	0	0	0	0	.	1	1	.	.	.	.	.	.	.	.	.	0	2	0	0	0	1
1527	6	5	129	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1
1528	6	5	129	1	.	2	1	0	.	0	0	0	.	1	0	1	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	2	0	1	1	0	0
1529	6	5	129	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	0	2
1530	6	5	129	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1531	6	5	129	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 0 0
1532	45	5	129	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	2 0 1
1533	45	5	129	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 0 1
1534	45	5	129	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 0 0
1535	66	5	129	2	1	1	2	0	0	0	0	1	1	1	1	2	1	1	2	.	.	.	.	7.0	6.2	8.1	6.9	8.0	7.0	7.0	6.2	1 0 1	2 0 1
1536	78	5	129	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	6.7	6.4	8.3	6.8	.	.	.	.	0 0 1	0 0 1
1537	78	5	129	.	.	.	3	.	.	.	0	.	.	.	2	.	.	.	4	.	.	.	.	.	.	.	.	.	6.7	6.1	.	. . .	3 0 2
1538	78	5	129	.	1	1	.	.	2	2	.	.	2	1	.	.	1	1	.	.	3	3	.	.	.	10.2	7.4	10.2	7.5	.	.	1 2 2	. . .
1539	78	5	129	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.7	6.8	.	.	.	.	.	.	. . .	0 0 1
1540	78	5	129	0	.	.	0	3	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	7.4	7.7	.	.	.	.	7.8	7.3	. . .	0 3 1
1541	185	5	129	2	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	6.3	6.4	.	.	.	.	.	.	. . .	2 1 1
1542	185	5	129	1	2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	.	.	.	.	7.0	5.8	8.5	7.7	8.3	7.7	.	6.2	2 1 1	1 1 1
1543	185	5	129	1	1	2	2	0	2	2	1	0	0	0	0	1	1	2	2	.	2	3	.	6.8	6.1	8.6	7.3	9.0	7.8	7.2	7.0	1 2 0	1 0 0
1544	215	5	129	.	.	0	0	.	.	2	1	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	.	7.3	6.5	5.6	6.3	0 2 0	0 1 0
1545	215	5	129	.	.	1	1	.	.	0	0	.	.	1	0	.	.	1	0	.	.	.	.	.	.	.	.	.	6.7	6.1	6.1	1 0 1	1 0 0
1546	215	5	129	2	2	2	.	0	1	1	.	1	1	0	.	2	2	2	.	.	.	.	.	7.9	6.5	9.0	7.9	9.2	8.0	.	.	2 1 1	2 0 1
1547	223	5	129	1	.	1	1	1	.	2	1	1	.	0	0	1	.	1	1	.	.	1	.	6.3	6.0	.	.	9.3	6.6	6.3	5.8	1 2 0	1 1 1
1548	223	5	129	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.3	. . .	2 0 0
1549	223	5	129	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.3	5.7	. . .	1 0 0
1550	223	5	129	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	7.4	.	.	.	.	1 0 0	. . .
1551	223	5	129	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.5	6.3	. . .	2 0 0
1552	223	5	129	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.4	7.4	. . .	2 1 0
1553	223	5	129	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.6	6.4	.	.	.	.	.	.	. . .	1 0 1
1554	223	5	129	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	6.2	. . .	1 0 2
1555	223	5	129	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	9.7	7.2	.	.	.	.	2 2 1	. . .
1556	289	5	129	1	.	2	1	0	.	2	1	0	.	0	0	1	.	2	1	.	.	1	.	7.3	6.8	.	.	.	7.5	6.8	6.6	2 2 0	1 0 0
1557	289	5	129	2	1	1	2	0	1	2	0	1	1	1	1	2	1	1	2	.	.	1	.	.	6.2	7.0	7.2	7.2	7.1	6.0	6.7	1 1 1	2 0 1
1558	289	5	129	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	5.6	5.8	7.4	6.2	7.8	6.4	6.0	5.5	0 0 0	0 1 0
1559	289	5	129	0	.	.	0	1	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	7.0	6.3	.	.	.	.	6.9	6.6	. . .	0 1 1
1560	289	5	129	2	.	.	1	0	.	.	3	1	.	.	1	2	.	.	1	.	.	.	.	.	7.1	.	.	.	.	7.0	7.2	. . .	2 0 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1561	290	5	129	2	1	2	2	0	0	1	1	1	0	0	0	2	1	2	2	.	.	.	.	7.4	6.7	7.9	6.8	8.5	7.1	7.1	6.9	1 0 0	2 0 1
1562	290	5	129	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	8.1	7.1	. . .	2 1 1
1563	290	5	129	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	8.5	7.7	.	.	.	.	2 0 1	. . .
1564	290	5	129	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.2	6.2	. . .	0 1 2
1565	290	5	129	2	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	7.0	6.8	.	.	.	.	.	.	. . .	2 0 2
1566	290	5	129	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.2	6.2	. . .	0 1 0
1567	290	5	129	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.8	6.7	.	.	.	.	.	.	. . .	2 0 1
1568	290	5	129	1	.	1	.	1	.	1	.	1	.	1	.	1	.	1	.	.	.	.	.	5.9	6.3	.	.	9.0	7.5	.	.	1 1 1	1 1 1
1569	290	5	129	.	2	2	3	.	2	2	0	.	1	1	1	.	2	2	3	.	2	2	.	.	.	9.2	7.8	9.1	7.9	7.6	7.2	2 2 1	3 0 1
1570	290	5	129	2	2	2	2	0	2	2	0	0	0	0	0	2	2	2	2	.	1	1	.	.	7.3	8.6	7.8	.	7.8	6.8	6.9	2 2 0	2 0 0
1571	290	5	129	1	.	.	1	0	.	.	1	1	.	.	1	1	.	.	1	.	.	.	.	8.0	7.5	.	.	.	.	7.9	7.8	. . .	1 0 1
1572	290	5	129	1	.	1	1	0	.	1	1	1	.	0	1	1	.	1	1	.	.	.	.	6.8	6.3	.	.	8.2	7.2	.	6.4	1 1 0	1 0 1
1573	290	5	129	.	1	1	1	.	1	1	0	.	3	2	2	.	1	1	1	.	.	.	.	.	.	8.6	7.2	8.5	7.1	6.5	6.3	1 1 3	1 0 2
1574	290	5	129	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	7.0	7.0	.	.	.	.	.	.	. . .	1 1 0
1575	290	5	129	1	.	0	0	1	.	1	1	1	.	0	1	0	.	0	0	.	.	.	.	6.8	6.5	.	.	8.3	6.9	.	6.3	0 1 0	1 1 1
1576	290	5	129	1	.	.	0	1	.	.	1	1	.	.	1	1	.	.	0	.	.	.	.	.	6.2	.	.	.	.	.	6.2	. . .	1 1 1
1577	290	5	129	1	.	.	2	0	.	.	0	0	.	.	0	1	.	.	2	.	.	.	.	6.6	6.0	.	.	.	.	.	6.1	. . .	1 0 0
1578	290	5	129	1	.	0	1	1	.	2	0	1	.	2	1	0	.	0	1	.	.	3	.	6.8	6.1	.	.	8.3	6.9	6.3	5.9	0 2 2	1 1 1
1579	290	5	129	.	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	9.0	6.6	.	.	.	.	1 0 2	. . .
1580	290	5	129	0	.	.	0	0	.	.	0	2	.	.	1	0	.	.	0	.	.	.	.	6.3	6.1	.	.	.	.	5.7	5.5	. . .	0 0 2
1581	290	5	129	0	.	.	0	3	.	.	3	1	.	.	0	0	.	.	0	.	.	.	.	7.0	6.5	.	.	.	.	6.7	7.0	. . .	0 3 1
1582	290	5	129	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.1	6.7	. . .	0 1 1
1583	290	5	129	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	9.1	7.1	.	.	.	.	1 2 1	. . .
1584	290	5	129	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.3	. . .	0 1 0
1585	290	5	129	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	3	.	.	.	.	8.6	7.3	.	.	.	.	2 2 1	. . .
1586	290	5	129	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	.	.	9.2	6.9	.	.	2 2 2	. . .
1587	290	5	129	.	1	1	0	.	0	1	1	.	0	0	0	.	1	1	0	.	.	.	.	.	.	6.5	9.2	6.3	.	6.0	.	1 0 0	0 1 0
1588	290	5	129	1	1	.	.	1	1	.	.	1	1	.	.	1	0	.	.	.	.	.	.	7.1	6.1	8.8	8.0	.	.	.	.	1 1 1	1 1 1
1589	290	5	129	.	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	7.9	6.7	.	.	1 2 0	. . .
1590	290	5	129	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	.	.	.	.	.	7.5	8.9	7.8	.	7.9	7.5	7.4	0 1 0	0 1 0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1591	290	5	129	.	.	0	0	.	.	1	1	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.0	7.0	6.6	6.6	0	1	1	0	1	1
1592	290	5	129	0	.	.	0	1	.	.	3	1	.	.	1	0	.	.	0	.	.	.	.	.	6.5	.	.	.	.	6.3	7.1	.	.	.	0	1	1
1593	290	5	129	0	.	0	.	1	.	0	.	1	.	1	.	0	.	0	.	.	.	.	.	7.3	7.0	.	.	8.4	7.2	.	.	0	0	1	0	1	1
1594	290	5	129	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.4	6.5	.	.	.	.	.	.	.	.	.	0	1	0
1595	290	5	129	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.0	5.6	.	.	.	.	.	.	.	.	.	0	0	0
1596	290	5	129	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.3	5.9	.	.	.	1	0	0
1597	289	5	129	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	6.4	.	.	.	1	0	1
1598	80	5	130	3	.	.	.	1	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	7.4	6.8	.	.	.	.	.	.	.	.	.	3	1	0
1599	80	5	130	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.2	7.5	.	.	.	2	1	0
1600	190	5	130	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	.	.	7.1	7.0	.	.	.	2	0	0
1601	190	5	130	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.5	6.7	.	.	.	.	.	.	.	.	.	2	1	0
1602	216	5	130	.	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	8.5	7.1	.	.	2	2	0	.	.	.
1603	288	5	130	1	1	2	1	0	1	0	0	0	0	0	0	1	2	2	1	.	.	.	.	6.3	6.4	8.1	6.6	.	6.6	6.5	6.3	1	1	0	1	0	0
1604	288	5	130	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.5	6.2	.	.	.	1	1	2
1605	288	5	130	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.7	6.6	.	.	.	.	.	.	.	.	.	2	1	1
1606	186	5	133	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	6.6	.	.	.	2	0	1
1607	186	5	133	2	.	.	1	0	.	.	0	0	.	.	0	2	.	.	1	.	.	.	.	.	6.7	.	.	.	.	7.0	6.7	.	.	.	2	0	0
1608	186	5	133	1	1	1	1	1	2	2	0	1	1	1	1	1	1	1	1	.	1	1	.	6.8	6.7	8.7	8.0	.	7.8	.	6.7	1	2	1	1	1	1
1609	186	5	133	2	2	1	2	1	1	2	1	1	0	0	1	2	2	1	2	.	.	1	.	6.8	6.5	8.2	6.5	8.0	6.5	7.1	6.4	2	1	0	2	1	1
1610	186	5	133	1	.	.	1	0	.	.	0	1	.	.	0	1	.	.	1	.	.	.	.	6.8	7.1	.	.	.	.	7.1	7.2	.	.	.	1	0	1
1611	186	5	133	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.6	.	.	.	1	0	0
1612	186	5	133	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.1	6.4	.	.	.	2	0	1
1613	186	5	133	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.0	6.8	.	.	.	.	.	.	.	.	.	2	1	0
1614	186	5	133	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	7.3	.	.	.	.	.	.	.	.	.	2	1	1
1615	186	5	133	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	9.2	7.2	.	.	.	.	2	1	0	.	.	.
1616	187	5	133	1	2	2	.	1	1	1	.	0	0	0	.	1	2	2	.	.	.	.	.	6.5	7.1	8.7	7.8	.	7.7	.	.	2	1	0	1	1	0
1617	187	5	133	3	.	.	.	0	.	.	.	1	.	.	.	5	.	.	.	.	.	.	.	6.9	6.7	.	.	.	.	.	.	.	.	.	3	0	1
1618	187	5	133	.	1	2	.	.	2	2	.	.	1	1	.	.	1	2	.	.	2	3	.	.	.	7.7	7.5	8.1	7.4	.	.	1	2	1	.	.	.
1619	187	5	133	.	3	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	.	8.0	7.2	.	.	.	.	3	0	0	.	.	.
1620	187	5	133	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	.	6.2	.	.	.	.	.	5.9	.	.	.	1	0	0

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1621	187	5	133	2	2	2	2	0	2	2	0	1	0	0	0	2	2	2	2	.	2	2	.	7.3	6.4	8.0	7.1	7.7	7.2	6.8	6.4	2 2 0	2 0 1
1622	187	5	133	2	2	2	1	1	2	2	1	1	1	1	1	2	2	2	1	.	3	3	.	6.5	6.5	8.7	7.3	.	7.3	6.3	6.3	2 2 1	2 1 1
1623	187	5	133	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.4	6.3	. . .	2 0 1
1624	187	5	133	2	1	.	.	1	1	.	.	0	1	.	.	2	1	.	.	.	.	.	.	6.8	6.3	.	7.2	.	.	.	.	1 1 1	2 1 0
1625	217	5	133	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.5	7.0	.	.	.	.	.	.	. . .	2 0 0
1626	218	5	133	1	.	.	.	5	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.7	5.8	.	.	.	.	.	.	. . .	1 5 0
1627	217	5	133	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.3	6.4	. . .	2 1 1
1628	287	5	133	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	5.7	.	.	.	.	.	.	. . .	2 0 1
1629	287	5	133	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	7.7	6.6	.	.	.	.	1 0 1	. . .
1630	189	5	133	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.1	6.5	.	.	.	.	.	.	. . .	2 0 0
1631	189	5	133	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	6.0	. . .	1 0 1
1632	189	5	133	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	6.6	.	.	.	.	.	.	. . .	1 0 1
1633	189	5	133	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	6.8	6.2	.	. . .	2 1 1
1634	189	5	133	0	0	1	.	1	2	2	.	1	1	1	.	0	0	1	.	.	1	2	.	6.1	6.4	7.6	7.1	7.8	7.0	.	.	0 2 1	0 1 1
1635	189	5	133	1	.	.	2	0	.	.	0	2	.	.	1	2	.	.	2	.	.	.	.	4.6	4.4	.	.	.	.	5.9	5.6	. . .	1 0 2
1636	189	5	133	2	2	2	1	0	0	0	0	2	1	1	2	2	2	2	1	.	.	.	.	6.2	6.2	.	7.0	8.1	7.0	6.0	6.1	2 0 1	2 0 2
1637	192	5	126	.	3	3	2	.	0	0	1	.	0	0	0	.	3	3	2	.	.	.	.	.	.	8.6	7.0	.	6.9	7.3	6.6	3 0 0	2 1 0
1638	188	5	136	1	2	.	.	0	0	.	.	2	0	.	.	1	2	.	.	.	.	.	.	5.6	5.5	6.1	6.7	.	.	.	.	2 0 0	1 0 2
1639	188	5	136	2	3	.	2	0	1	.	0	0	0	.	0	2	5	.	2	.	.	.	.	6.2	6.6	7.9	7.1	.	.	6.8	6.5	3 1 0	2 0 0
1640	191	5	136	2	2	2	2	0	0	0	0	0	1	0	0	2	2	2	2	.	.	.	.	.	6.5	7.6	7.2	.	7.6	7.1	.	2 0 1	2 0 0
1641	188	5	136	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.5	6.9	.	.	.	.	.	.	. . .	1 0 1
1642	188	5	136	.	2	.	2	.	1	.	1	.	0	.	0	.	2	.	2	.	.	.	.	.	.	7.5	7.4	.	.	6.6	6.8	2 1 0	2 1 0
1643	214	5	136	2	1	1	2	0	2	2	0	0	0	0	0	2	0	1	2	.	2	2	.	.	6.5	.	7.0	.	7.0	.	6.6	1 2 0	2 0 0
1644	214	5	136	1	.	.	0	0	.	.	0	0	.	.	0	1	.	.	0	.	.	.	.	7.1	7.2	.	.	.	.	6.9	7.0	. . .	1 0 0
1645	285	5	136	2	.	.	1	0	.	.	1	1	.	.	1	2	.	.	1	.	.	.	.	6.0	6.5	.	.	.	.	6.4	6.3	. . .	2 0 1
1646	285	5	136	2	1	1	2	0	1	0	0	1	1	1	1	2	1	1	2	.	.	.	.	5.5	6.5	7.4	7.0	7.5	7.9	5.9	6.4	1 1 1	2 0 1
1647	286	5	136	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.7	7.2	. . .	1 1 1
1648	184	5	135	.	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	9.0	7.0	.	.	1 2 1	. . .
1649	209	5	135	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	5.8	6.1	.	.	.	.	.	.	. . .	2 0 1
1650	210	5	135	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	6.5	.	.	.	.	.	.	. . .	1 1 2

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub					RT LAT		RT CENT		LT CENT		LT LAT	CENT	L.
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1651	210	5	135	.	2	2	2	.	2	2	0	.	0	0	0	.	2	2	2	.	1	2	.	.	.	8.8	7.9	8.6	7.9	6.6	5.6	2 2 0	2 0 0
1652	210	5	135	2	1	2	2	0	0	0	0	1	0	0	1	2	1	2	2	.	.	.	.	5.3	5.8	7.7	6.8	7.3	6.8	5.5	5.9	1 0 0	2 0 1
1653	210	5	135	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.8	6.7	. . .	1 1 1
1654	210	5	135	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	6.1	. . .	1 0 2
1655	210	5	135	1	2	.	.	0	0	.	.	2	2	.	.	1	2	.	.	.	.	.	.	.	5.2	.	7.1	.	.	.	.	2 0 2	1 0 2
1656	211	5	135	2	3	3	.	0	1	1	.	1	1	1	.	2	3	3	.	.	.	.	.	7.1	6.4	9.0	7.2	9.3	7.0	.	.	3 1 1	2 0 1
1657	212	5	135	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	5.8	. . .	2 0 2
1658	213	5	135	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	7.3	6.5	.	.	.	.	.	.	. . .	2 0 2
1659	210	5	135	.	2	2	2	.	2	2	0	.	1	1	0	.	2	2	2	.	2	2	.	.	.	7.5	7.7	7.8	7.5	6.0	6.5	2 2 1	2 0 0
1660	212	5	135	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	8.6	7.5	.	.	.	.	2 1 1	. . .
1661	212	5	135	2	.	.	.	0	.	.	.	2	.	.	.	3	.	.	.	.	.	.	.	6.4	6.0	.	.	.	.	.	.	. . .	2 0 2
1662	212	5	135	1	1	.	.	1	1	.	.	1	1	.	.	1	0	.	.	.	.	.	.	5.6	6.1	7.3	6.9	.	.	.	.	1 1 1	1 1 1
1663	213	5	135	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	5.7	. . .	2 0 0
1664	209	5	135	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	8.6	6.1	.	.	.	.	1 0 1	. . .
1665	210	5	135	.	2	2	.	.	1	0	.	.	0	0	.	.	2	2	.	.	.	.	.	.	.	8.2	7.5	8.1	7.6	.	.	2 1 0	. . .
1666	210	5	135	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	5.0	5.0	.	.	.	.	5.5	5.4	. . .	1 0 0
1667	210	5	135	1	2	.	2	0	1	.	0	0	1	.	0	1	2	.	2	.	.	.	.	6.6	6.7	8.5	7.1	.	.	6.9	6.5	2 1 1	1 0 0
1668	210	5	135	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.2	5.7	.	.	.	.	.	.	. . .	2 0 0
1669	210	5	135	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	.	.	.	.	5.3	5.9	6.4	6.6	6.8	6.8	.	5.8	0 0 0	1 0 0
1670	210	5	135	.	1	1	1	.	0	0	0	.	1	0	1	.	1	1	1	.	.	.	.	.	.	7.0	6.0	7.1	7.1	5.7	5.2	1 0 1	1 0 1
1671	210	5	135	1	.	.	1	1	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.3	6.1	.	.	.	.	5.1	6.0	. . .	1 1 1
1672	210	5	135	3	3	.	3	0	0	.	0	0	0	.	0	4	5	.	4	.	.	.	.	7.0	6.7	9.0	7.1	.	.	7.5	6.7	3 0 0	3 0 0
1673	210	5	135	2	2	2	2	0	0	0	0	0	0	0	0	2	2	2	2	.	.	.	.	6.3	7.0	7.9	7.0	.	7.0	6.3	6.5	2 0 0	2 0 0
1674	210	5	135	2	1	1	2	0	0	0	0	1	0	0	1	2	1	1	2	.	.	.	.	6.0	6.6	7.6	7.1	8.0	7.1	.	6.2	1 0 0	2 0 1
1675	210	5	135	0	1	1	0	0	1	0	0	1	1	2	0	0	1	1	0	.	.	.	.	.	5.9	7.4	7.3	.	7.4	5.6	6.1	1 1 1	0 0 1
1676	210	5	135	2	2	2	2	0	1	0	0	1	1	2	1	2	2	2	2	.	.	.	.	6.6	6.1	7.8	6.6	7.5	6.6	6.2	6.4	2 1 1	2 0 1
1677	210	5	135	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.1	5.7	. . .	2 0 0
1678	210	5	135	3	.	.	3	0	.	.	0	1	.	.	1	4	.	.	4	.	.	.	.	7.0	7.0	.	.	.	.	7.0	7.0	. . .	3 0 1
1679	210	5	135	0	1	.	1	0	0	.	0	0	0	.	0	0	1	.	1	.	.	.	.	6.4	6.0	7.4	6.8	.	.	6.1	6.1	1 0 0	0 0 0
1680	281	5	135	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	7.1	6.7	8.7	7.1	.	.	.	.	1 0 1	1 0 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1681	281	5	135	1	.	.	2	3	.	.	0	0	.	.	0	1	.	.	2	.	.	.	.	7.4	6.9	.	.	.	.	7.5	7.0	.	.	.	1	3	0
1682	281	5	135	2	1	2	2	1	2	2	1	1	1	1	0	2	2	2	2	.	1	1	.	.	.	7.5	7.3	7.5	7.3	5.7	6.7	1	2	1	2	1	1
1683	281	5	135	3	2	2	3	0	2	2	0	0	0	0	0	3	3	3	3	.	1	1	.	6.7	6.7	8.6	7.1	8.3	7.0	7.0	6.8	2	2	0	3	0	0
1684	281	5	135	.	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	8.4	7.1	.	.	1	2	0	.	.	.
1685	281	5	135	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.1	6.0	.	.	.	.	.	.	.	.	.	2	0	1
1686	281	5	135	.	.	.	0	.	.	.	5	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.1	6.6	.	.	.	0	5	2
1687	281	5	135	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.8	.	.	.	0	0	0
1688	281	5	135	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	7.5	7.0	.	.	1	0	0	.	.	.
1689	281	5	135	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.8	5.6	.	.	.	.	.	.	.	.	.	0	1	0
1690	281	5	135	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	2	2	2	.	.	.
1691	281	5	135	1	2	1	2	0	2	2	1	0	0	0	1	1	2	1	2	.	2	2	.	6.4	6.6	8.4	7.6	7.9	7.4	6.5	6.4	2	2	0	1	0	0
1692	281	5	135	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	6.8	5.6	.	.	.	.	5.6	5.5	.	.	.	0	0	0
1693	281	5	135	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.8	6.3	.	.	.	0	1	0
1694	281	5	135	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.1	6.5	.	.	.	.	.	.	.	.	.	1	0	1
1695	281	5	135	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.8	6.0	.	.	.	1	1	0
1696	281	5	135	1	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	7.9	5.9	.	.	.	.	.	.	.	.	.	1	3	0
1697	281	5	135	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.9	6.6	.	.	.	2	0	1
1698	281	5	135	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	9.0	7.9	.	.	.	.	2	1	1	.	.	.
1699	281	5	135	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.1	6.4	.	.	.	0	1	1
1700	282	5	135	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.2	.	.	.	1	1	0
1701	193	5	128	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.3	6.4	.	.	.	.	.	.	.	.	.	0	0	0
1702	220	5	128	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.4	6.5	.	.	.	.	.	.	.	.	.	1	0	1
1703	220	5	128	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	6.2	.	.	.	.	.	.	.	.	.	2	0	1
1704	221	5	128	1	1	.	2	5	0	.	0	0	.	1	1	1	.	1	2	.	.	.	.	7.9	6.8	8.4	7.7	.	.	7.1	6.8	1	0	1	1	5	0
1705	220	5	128	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.4	6.1	.	.	.	2	0	1
1706	221	5	128	1	2	2	2	0	0	0	0	0	0	0	0	1	2	2	2	.	.	.	.	.	5.7	8.0	6.7	7.8	6.7	5.9	5.9	2	0	0	1	0	0
1707	221	5	128	2	.	.	.	0	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.9	6.6	.	.	.	.	.	.	.	.	.	2	0	0
1708	283	5	128	1	1	1	1	1	2	2	1	0	0	0	1	1	1	1	1	.	1	1	.	6.3	6.4	8.5	7.0	8.2	7.1	6.2	6.2	1	2	0	1	1	0
1709	113	6	72	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.0	6.1	.	.	.	2	0	1
1710	113	6	72	1	.	.	0	0	.	.	0	1	.	.	1	1	.	.	0	.	.	.	.	5.3	5.7	.	.	.	.	5.5	5.9	.	.	.	1	0	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1711	113	6	72	0	.	.	1	1	.	.	1	1	.	.	1	0	.	.	1	.	.	.	.	5.6	6.8	.	.	.	.	.	6.6	. . .	0 1 1
1712	113	6	72	.	1	.	0	.	2	.	1	.	2	.	1	.	1	.	0	.	2	.	.	.	.	8.3	7.1	.	.	6.2	5.7	1 2 2	0 1 1
1713	113	6	72	0	.	1	0	0	.	1	1	1	.	2	1	0	.	1	0	.	.	.	.	5.6	5.5	.	.	.	.	5.5	5.7	1 1 2	0 0 1
1714	113	6	72	1	2	2	2	0	0	0	0	1	1	1	1	1	2	2	2	.	.	.	.	5.6	5.8	8.2	6.2	8.1	6.9	5.6	5.7	2 0 1	1 0 1
1715	113	6	72	1	1	1	.	2	2	2	.	1	0	0	.	1	1	1	.	3	3	3	.	7.6	7.0	9.6	7.8	9.9	7.9	.	.	1 2 0	1 2 1
1716	113	6	72	.	.	2	1	.	.	0	1	.	.	2	1	.	.	2	1	.	.	.	.	.	.	.	.	8.0	6.9	6.1	5.7	2 0 2	1 1 1
1717	113	6	72	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	7.2	6.7	.	.	.	.	7.5	7.0	. . .	0 0 1
1718	113	6	72	0	2	.	.	1	2	.	.	1	1	.	.	0	2	.	.	.	3	.	.	5.4	5.0	8.2	7.3	.	.	.	.	2 2 1	0 1 1
1719	113	6	72	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.4	6.3	. . .	1 1 2
1720	113	6	72	0	1	1	.	0	0	0	.	1	0	1	.	0	1	1	.	.	.	.	.	5.5	6.8	8.3	7.2	8.0	7.2	.	.	1 0 0	0 0 1
1721	113	6	72	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.8	5.3	.	.	.	.	.	.	. . .	0 0 0
1722	113	6	72	2	2	1	1	1	2	2	1	0	0	0	0	2	2	1	1	.	1	1	.	6.3	6.4	8.0	7.0	7.7	6.8	6.0	6.4	2 2 0	2 1 0
1723	113	6	72	2	0	0	.	1	2	2	.	2	2	3	.	2	0	0	.	.	3	3	.	.	6.2	8.0	7.0	8.0	7.0	.	.	0 2 2	2 1 2
1724	113	6	72	.	.	1	0	.	.	0	0	.	.	1	1	.	.	1	0	.	.	.	.	.	.	.	.	7.8	6.6	5.1	5.5	1 0 1	0 0 1
1725	113	6	72	1	.	.	0	1	.	.	1	0	.	.	0	1	.	.	0	.	.	.	.	6.5	6.1	.	.	.	.	6.7	6.1	. . .	1 1 0
1726	113	6	72	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.1	7.1	.	.	.	.	.	.	. . .	2 0 2
1727	113	6	72	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.0	6.1	. . .	1 1 1
1728	113	6	72	2	2	.	.	1	2	.	.	1	1	.	.	2	2	.	.	.	2	.	.	.	6.3	8.3	.	.	.	.	.	2 2 1	2 1 1
1729	113	6	72	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	6.1	.	.	.	.	.	.	. . .	1 0 1
1730	113	6	72	2	2	.	2	0	0	.	1	1	1	.	1	2	2	.	2	.	.	.	.	6.7	6.5	8.7	7.8	.	.	6.7	6.8	2 0 1	2 0 1
1731	113	6	72	1	2	2	2	1	0	2	3	0	0	0	0	1	2	2	2	.	.	1	.	6.4	6.5	8.2	6.9	8.3	7.0	6.4	6.6	2 0 0	1 1 0
1732	113	6	72	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0	.	.	.	.	5.3	5.4	7.0	6.2	7.0	6.2	5.1	5.4	1 0 1	0 0 1
1733	113	6	72	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	3	.	.	.	.	.	.	9.9	7.7	.	.	0 2 1	. . .
1734	113	6	72	0	0	0	0	1	0	0	0	2	2	2	1	0	0	0	0	.	.	.	.	6.3	5.8	8.6	6.4	8.4	6.4	6.0	5.5	0 0 2	0 1 2
1735	113	6	72	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.0	. . .	0 0 1
1736	116	6	101	2	.	2	1	1	.	2	1	2	.	2	2	2	.	2	1	.	.	3	.	6.4	6.4	.	.	9.0	6.8	.	5.8	2 2 2	2 1 2
1737	116	6	101	.	.	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	5.8	5.7	. . .	1 2 0
1738	112	6	103	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.3	. . .	1 0 0
1739	112	6	103	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	.	. . .	2 0 0
1740	112	6	103	1	.	0	0	3	.	2	0	1	.	0	0	1	.	0	0	.	.	1	.	6.9	6.5	.	.	8.7	7.0	6.4	6.5	0 2 0	1 3 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1741	112	6	103	.	.	0	0	.	.	0	0	.	.	2	0	.	.	0	0	.	.	.	.	.	.	.	.	8.1	7.1	.	7.1	0 0 2	0 0 0
1742	112	6	103	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.4	6.5	. . .	0 1 0
1743	112	6	103	1	.	.	1	1	.	.	1	0	.	.	0	1	.	.	0	.	.	.	.	5.7	5.9	.	.	.	.	5.5	6.0	. . .	1 1 0
1744	112	6	103	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	5.7	.	.	.	.	.	.	. . .	1 0 0
1745	112	6	103	1	1	1	0	1	2	2	1	0	1	1	1	1	1	1	0	.	1	1	.	6.7	6.6	8.4	6.9	8.4	7.0	6.4	6.6	1 2 1	1 1 0
1746	112	6	103	.	0	0	1	.	0	0	0	.	1	1	0	.	0	0	1	.	.	.	.	.	.	8.0	7.0	7.9	7.0	5.7	6.3	0 0 1	1 0 0
1747	112	6	103	.	2	.	2	.	1	.	0	.	2	.	0	.	2	.	2	.	.	.	.	.	.	8.2	7.3	.	.	5.5	6.4	2 1 2	2 0 0
1748	112	6	103	1	2	2	1	0	0	1	0	1	2	2	1	1	2	2	1	.	.	.	.	6.1	6.3	7.5	7.0	7.7	7.0	6.4	6.2	2 0 2	1 0 1
1749	112	6	103	1	2	2	1	1	2	2	1	0	0	0	0	1	2	2	1	.	1	1	.	6.2	5.9	7.2	6.6	7.0	6.3	5.5	5.8	2 2 0	1 1 0
1750	115	6	326	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	5.4	5.7	.	.	.	.	5.5	6.1	. . .	2 0 1
1751	115	6	326	1	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	6.1	5.4	7.5	7.4	.	.	.	.	1 0 1	1 0 1
1752	115	6	326	.	.	0	1	.	.	0	0	.	.	0	0	.	.	0	1	.	.	.	.	.	.	.	.	8.2	6.6	5.6	5.8	0 0 0	1 0 0
1753	115	6	326	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.2	5.4	. . .	0 1 1
1754	115	6	326	.	1	1	0	.	2	1	1	.	1	1	0	.	1	1	0	.	1	.	.	.	.	7.5	6.9	6.9	6.9	5.9	6.2	1 2 1	0 1 0
1755	115	6	326	2	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	5.8	6.0	.	.	.	.	6.0	6.3	. . .	2 0 0
1756	115	6	326	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	8.3	6.9	.	.	0 0 0	. . .
1757	115	6	326	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	7.7	6.0	.	.	0 0 2	. . .
1758	115	6	326	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.5	5.5	.	.	.	.	.	.	. . .	2 0 1
1759	122	6	106	0	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.8	5.6	.	.	.	.	.	6.0	. . .	0 0 1
1760	122	6	106	1	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.0	6.5	.	.	.	.	6.3	6.5	. . .	1 0 1
1761	122	6	106	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.4	6.4	. . .	1 0 0
1762	7	6	119	2	0	0	2	0	0	0	0	1	0	0	1	2	0	0	2	.	.	.	.	.	.	.	.	.	.	.	.	0 0 0	2 0 1
1763	7	6	119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	0 0 0	0 0 0
1764	114	6	119	1	0	0	1	1	0	0	1	2	2	1	2	1	0	0	1	.	.	.	.	5.6	6.6	7.2	7.2	7.4	7.2	5.6	6.5	0 0 2	1 1 2
1765	114	6	119	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	2	.	.	.	.	5.9	5.3	7.1	6.0	6.9	6.3	.	5.3	1 0 1	1 1 1
1766	114	6	119	2	.	0	1	1	.	0	0	0	.	2	1	2	.	0	1	.	.	.	.	6.0	6.2	.	.	8.4	7.0	6.0	5.8	0 0 2	2 1 0
1767	114	6	119	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	8.1	7.4	7.7	7.5	.	.	0 0 1	. . .
1768	114	6	119	2	.	.	.	3	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.0	5.5	.	.	.	.	.	.	. . .	2 3 1
1769	114	6	119	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.4	6.2	.	.	.	.	.	.	. . .	1 0 1
1770	114	6	119	1	.	1	1	1	.	2	0	1	.	0	0	1	.	1	1	.	.	1	.	4.7	5.7	.	.	8.4	6.9	5.3	5.9	1 2 0	1 1 1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1771	114	6	119	0	1	.	0	1	0	.	1	0	0	.	0	0	1	.	0	.	.	.	.	5.0	5.2	8.3	6.1	.	.	5.4	5.2	1 0 0	0 1 0
1772	114	6	119	1	0	0	.	1	0	1	.	1	2	2	.	1	0	0	.	.	.	.	.	6.3	6.1	7.9	7.1	8.0	7.5	.	.	0 0 2	1 1 1
1773	114	6	119	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.7	6.6	.	.	.	.	.	.	. . .	2 0 1
1774	114	6	119	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.6	6.1	.	.	.	.	.	.	. . .	1 0 1
1775	313	6	119	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.8	6.6	.	.	.	.	6.0	7.0	. . .	0 0 0
1776	143	6	81	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2	1	2	2	1	6.8	6.2	8.3	6.5	8.5	6.5	7.3	6.1	2 2 1	2 2 1
1777	143	6	81	.	1	0	1	.	1	0	0	.	0	0	0	.	1	0	0	.	.	.	.	.	.	7.4	6.2	7.3	6.1	6.2	5.7	1 1 0	1 0 0
1778	16	6	85	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.4	6.2	.	.	.	.	6.6	6.4	. . .	1 0 0
1779	87	6	85	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.0	. . .	0 0 1
1780	90	6	85	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.6	6.3	. . .	0 0 0
1781	90	6	85	.	0	.	0	.	0	.	0	.	2	.	1	.	0	.	0	.	.	.	.	.	.	7.7	6.2	.	.	5.6	5.4	0 0 2	0 0 1
1782	90	6	85	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	8.4	7.0	.	.	.	.	2 0 0	. . .
1783	90	6	85	1	2	1	.	0	2	2	.	1	1	1	.	0	2	2	.	.	1	1	.	6.3	6.0	8.5	7.1	8.6	6.9	.	.	2 2 1	1 0 1
1784	90	6	85	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.7	7.3	. . .	1 1 0
1785	90	6	85	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.4	6.6	. . .	1 1 1
1786	90	6	85	.	1	1	0	.	2	0	1	.	1	0	1	.	1	1	0	.	1	.	.	.	.	9.1	7.4	9.3	7.2	6.6	6.4	1 2 1	0 1 1
1787	90	6	85	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	8.4	7.3	.	.	.	.	1 2 0	. . .
1788	90	6	85	0	0	.	0	0	1	.	0	1	2	.	1	0	0	.	0	.	.	.	.	6.3	5.7	7.8	7.0	.	.	6.5	6.0	0 1 2	0 0 1
1789	90	6	85	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	5.8	. . .	0 0 1
1790	103	6	85	.	.	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.3	6.3	5.7	5.9	0 0 1	0 0 1
1791	103	6	85	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	9.7	7.6	.	.	.	.	0 0 1	. . .
1792	105	6	85	.	.	0	0	.	.	0	0	.	.	2	1	.	.	0	0	.	.	.	.	.	.	.	.	8.0	6.3	6.6	5.8	0 0 2	0 0 1
1793	105	6	85	1	2	.	1	0	2	.	1	0	1	.	0	1	2	.	1	.	1	.	.	6.3	6.6	7.5	7.3	.	.	6.6	6.6	2 2 1	1 0 0
1794	105	6	85	1	1	1	1	0	1	1	0	1	1	1	0	1	1	1	1	.	.	.	.	7.1	6.0	8.1	7.2	8.0	7.2	7.2	6.0	1 1 1	1 0 1
1795	105	6	85	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.0	6.0	. . .	0 1 1
1796	105	6	85	0	1	2	0	1	0	1	1	1	1	1	2	0	1	2	0	.	.	.	.	.	5.8	8.8	.	.	6.6	7.0	5.7	1 0 1	0 1 1
1797	105	6	85	0	0	0	.	0	0	0	.	2	1	2	.	0	0	0	.	.	.	.	.	6.7	6.7	9.0	7.1	9.2	7.2	.	.	0 0 1	0 0 2
1798	105	6	85	.	2	2	1	.	1	0	0	.	2	2	1	.	2	2	1	.	.	.	.	.	.	8.5	6.2	8.6	6.6	.	5.3	2 1 2	1 0 1
1799	105	6	85	1	0	.	.	1	0	.	.	0	0	.	.	1	0	.	.	.	.	.	.	6.4	6.4	7.7	7.0	.	.	.	.	0 0 0	1 1 0
1800	105	6	85	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.7	5.8	. . .	2 0 2

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1801	105	6	85	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	6.6	6.1	.	.	.	.	.	.	.	.	.	1	2	0
1802	105	6	85	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.3	5.9	.	.	.	.	.	.	.	.	.	0	1	1
1803	105	6	85	1	.	2	.	1	.	2	.	0	.	0	.	1	.	2	.	.	.	1	.	7.6	6.4	.	9.9	7.9	.	.	.	2	2	0	1	1	0
1804	105	6	85	1	0	.	0	3	0	.	1	2	2	.	2	1	0	.	0	.	.	.	.	6.5	6.5	9.0	8.2	.	.	6.9	6.8	0	0	2	1	3	2
1805	105	6	85	1	1	1	1	0	0	0	1	1	2	1	1	1	1	1	1	.	.	.	.	6.3	6.5	9.3	7.1	.	7.4	6.4	6.8	1	0	2	1	0	1
1806	105	6	85	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.5	.	.	.	1	1	0
1807	105	6	85	3	.	.	.	0	.	.	.	1	.	.	.	4	.	.	.	.	.	.	.	6.5	6.7	.	.	.	.	.	.	.	.	.	3	0	1
1808	105	6	85	.	2	.	2	.	1	.	0	.	2	.	1	.	2	.	2	.	.	.	.	.	.	.	6.8	.	.	6.0	5.3	2	1	2	2	0	1
1809	105	6	85	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.5	6.0	.	.	.	1	0	0
1810	105	6	85	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.1	6.0	.	.	.	1	1	1
1811	105	6	85	2	1	0	.	1	2	2	.	1	1	1	.	2	1	0	.	.	3	3	.	6.3	6.3	9.3	.	8.9	.	.	.	1	2	1	2	1	1
1812	105	6	85	.	.	0	0	.	.	2	1	.	.	1	0	.	.	0	0	.	.	2	.	.	.	.	.	9.9	8.0	.	6.3	0	2	1	0	1	0
1813	105	6	85	1	.	.	0	0	.	.	1	1	.	.	1	1	.	.	0	.	.	.	.	5.8	4.8	.	.	.	.	5.1	5.3	.	.	.	1	0	1
1814	105	6	85	2	.	1	.	0	.	2	.	0	.	1	.	2	.	1	.	.	.	2	.	6.1	.	.	.	8.8	6.4	.	.	1	2	1	2	0	0
1815	105	6	85	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.3	6.3	.	.	.	.	.	.	.	.	.	0	0	1
1816	105	6	85	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.9	6.9	.	.	.	2	0	0
1817	105	6	85	1	3	3	0	0	1	1	0	0	1	1	0	1	3	3	0	.	.	.	.	5.8	5.5	8.0	6.5	.	6.6	5.9	5.4	3	1	1	1	0	0
1818	105	6	85	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	5.9	.	.	.	1	0	1
1819	105	6	85	.	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	8.6	7.2	.	.	.	.	0	1	1	.	.	.
1820	105	6	85	.	.	2	2	.	.	1	0	.	.	2	2	.	.	2	2	.	.	.	.	.	.	.	.	8.1	7.4	.	7.3	2	1	2	2	0	2
1821	105	6	85	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.3	5.6	.	.	.	1	1	0
1822	105	6	85	.	2	2	2	.	2	2	2	.	0	0	0	.	2	2	2	.	1	1	1	.	.	8.8	6.7	9.0	6.6	6.4	5.9	2	2	0	2	2	0
1823	105	6	85	1	.	0	.	0	.	0	.	0	.	0	.	0	.	0	.	.	.	.	.	6.6	5.9	.	.	9.3	6.6	.	.	0	0	0	1	0	0
1824	105	6	85	1	1	.	.	1	0	.	.	1	2	.	.	1	1	.	.	.	.	.	.	7.5	6.3	9.7	7.7	.	.	.	.	1	0	2	1	1	1
1825	105	6	85	.	.	1	1	.	.	1	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	8.8	7.7	7.2	7.5	1	1	1	1	1	1
1826	105	6	85	1	.	.	1	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	7.1	6.4	.	.	.	.	7.0	6.2	.	.	.	1	0	0
1827	105	6	85	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	7.5	6.7	.	.	.	.	.	.	.	.	.	1	0	2
1828	105	6	85	0	1	.	0	1	2	.	2	0	1	.	1	0	1	.	0	.	2	.	1	6.9	6.4	9.1	7.4	.	.	6.5	6.3	1	2	1	0	1	0
1829	105	6	85	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.1	6.2	.	.	.	1	1	0
1830	105	6	85	2	1	.	.	0	2	.	.	2	1	.	.	2	1	.	.	.	1	.	.	5.3	6.2	.	7.4	.	.	.	.	1	2	1	2	0	2

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1831	105	6	85	3	.	.	.	1	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	7.3	7.2	.	.	.	.	.	.	. . .	3 1 1
1832	105	6	85	.	0	0	0	.	0	1	1	.	0	0	1	.	0	0	0	.	.	.	.	.	.	8.0	6.9	7.7	6.8	6.1	6.5	0 0 0	0 1 1
1833	105	6	85	1	1	.	.	0	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	6.6	6.7	8.7	7.7	.	.	.	.	1 0 0	1 0 0
1834	105	6	85	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	.	.	.	.	7.2	6.5	8.3	7.2	7.6	7.1	6.6	6.3	0 0 1	0 1 1
1835	105	6	85	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	7.0	6.8	.	.	.	.	.	.	. . .	2 0 2
1836	133	6	85	3	.	3	.	0	.	2	.	0	.	1	.	3	.	3	.	.	.	3	.	5.3	5.5	.	.	7.8	6.6	.	.	3 2 1	3 0 0
1837	134	6	85	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	9.4	7.0	.	.	.	.	1 2 1	. . .
1838	135	6	85	2	2	2	1	2	2	2	2	1	2	2	1	2	2	2	1	2	3	3	3	.	6.7	9.3	7.2	9.6	7.3	6.7	6.4	2 2 2	2 2 1
1839	133	6	85	1	1	2	2	0	0	2	0	0	1	1	0	1	1	2	2	.	.	1	.	5.7	6.3	7.7	7.2	.	7.2	5.8	6.4	1 0 1	1 0 0
1840	133	6	85	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.1	5.9	.	.	.	.	.	.	. . .	1 1 1
1841	133	6	85	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	7.8	7.1	.	.	1 1 0	. . .
1842	133	6	85	.	.	1	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	.	.	.	7.7	.	.	1 2 2	. . .
1843	133	6	85	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.1	6.1	.	.	.	.	.	.	. . .	1 1 0
1844	133	6	85	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	5.0	6.0	. . .	2 0 1
1845	133	6	85	1	.	.	.	3	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.8	6.2	.	.	.	.	.	.	. . .	1 3 1
1846	133	6	85	3	1	.	.	0	2	.	.	1	1	.	.	3	1	.	.	.	1	.	.	5.8	6.3	8.1	6.9	.	.	.	.	1 2 1	3 0 1
1847	133	6	85	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.3	7.1	.	.	.	.	.	.	. . .	2 0 2
1848	133	6	85	2	.	.	2	4	.	.	4	1	.	.	1	2	.	.	2	.	.	.	.	6.9	6.5	.	.	.	.	6.3	6.0	. . .	2 4 1
1849	133	6	85	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	8.2	6.9	.	.	.	.	0 0 2	. . .
1850	133	6	85	0	.	.	0	0	.	.	1	1	.	.	1	0	.	.	0	.	.	.	.	5.3	5.6	.	.	.	.	5.4	5.9	. . .	0 0 1
1851	133	6	85	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.6	5.8	.	.	.	.	.	.	. . .	2 1 1
1852	133	6	85	1	.	.	2	0	.	.	0	2	.	.	1	1	.	.	2	.	.	.	.	5.5	6.2	.	.	.	.	5.7	6.4	. . .	1 0 2
1853	135	6	85	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	6.0	. . .	1 0 1
1854	135	6	85	1	0	.	.	0	2	.	.	2	2	.	.	1	0	.	.	.	1	.	.	.	6.2	8.3	7.3	.	.	.	.	0 2 2	1 0 2
1855	135	6	85	1	.	.	1	4	.	.	4	0	.	.	0	1	.	.	1	.	.	.	.	5.8	6.4	.	.	.	.	5.4	6.5	. . .	1 4 0
1856	135	6	85	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	6.4	. . .	1 0 1
1857	135	6	85	2	1	1	1	0	2	2	1	2	2	2	1	2	1	1	1	.	2	1	.	6.0	6.1	8.3	7.1	8.5	.	6.5	6.4	1 2 2	2 0 2
1858	135	6	85	1	1	1	1	0	0	0	0	1	1	1	0	1	1	1	1	.	.	.	.	.	6.0	7.7	6.5	.	6.2	6.0	5.5	1 0 1	1 0 1
1859	135	6	85	2	.	1	.	0	.	2	.	2	.	1	.	2	.	1	.	.	.	1	.	5.5	6.9	.	.	7.6	7.1	.	.	1 2 1	2 0 2
1860	135	6	85	0	0	0	0	0	0	0	0	2	2	2	2	0	0	0	0	.	.	.	.	.	6.4	7.8	6.9	.	6.6	.	6.0	0 0 2	0 0 2

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1861	135	6	85	.	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	7.8	6.7	.	.	.	.	1 2 1	. . .
1862	135	6	85	0	.	.	.	3	.	.	.	4	.	.	.	0	.	.	.	.	.	.	.	6.0	6.4	.	.	.	.	.	.	. . .	0 3 4
1863	135	6	85	2	1	2	.	0	2	2	.	3	3	3	.	2	1	2	.	.	2	3	.	6.0	5.7	7.6	6.4	7.7	6.6	.	.	1 2 3	2 0 3
1864	135	6	85	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.6	6.5	. . .	0 1 3
1865	135	6	85	3	.	.	.	0	.	.	.	2	.	.	.	3	.	.	.	.	.	.	.	6.6	7.2	.	.	.	.	.	.	. . .	3 0 2
1866	138	6	85	0	.	2	.	0	.	0	.	0	.	0	.	0	.	2	.	.	.	.	.	5.7	6.8	.	.	7.8	7.0	.	.	2 0 0	0 0 0
1867	138	6	85	2	2	2	2	3	1	1	3	1	2	2	1	2	2	2	2	.	.	.	.	7.3	7.3	8.2	7.8	8.1	7.7	6.8	7.3	2 1 2	2 3 1
1868	207	6	85	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.2	6.6	.	.	.	.	.	.	. . .	2 0 1
1869	207	6	85	.	.	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	6.3	6.3	. . .	2 2 0
1870	207	6	85	1	0	0	1	0	2	2	1	0	1	1	0	1	0	0	1	.	2	2	.	6.1	4.8	.	5.5	8.2	7.2	.	6.3	0 2 1	1 0 0
1871	208	6	85	2	.	1	.	0	.	1	.	2	.	2	.	3	.	1	.	.	.	.	.	6.8	6.2	.	8.2	6.2	.	.	.	1 1 2	2 0 2
1872	207	6	85	1	.	2	.	0	.	2	.	0	.	0	.	1	.	2	.	.	.	1	.	7.4	6.3	.	8.7	.	.	.	.	2 2 0	1 0 0
1873	207	6	85	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	6.1	. . .	1 1 1
1874	207	6	85	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	5.5	5.9	.	.	.	.	.	.	. . .	2 0 1
1875	207	6	85	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	7.9	6.8	.	.	0 2 1	. . .
1876	207	6	85	2	1	1	.	1	1	1	.	0	1	1	.	2	1	1	.	.	.	.	.	.	5.4	8.3	6.8	.	6.7	.	.	1 1 1	2 1 0
1877	207	6	85	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	1	.	.	.	.	5.5	6.2	.	.	.	.	.	6.2	. . .	0 0 0
1878	207	6	85	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.9	6.2	. . .	1 0 1
1879	207	6	85	2	.	.	2	0	.	.	0	1	.	.	0	2	.	.	2	.	.	.	.	6.9	6.2	.	.	.	.	6.7	6.0	. . .	2 0 1
1880	207	6	85	.	1	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	8.2	7.0	.	.	.	.	1 2 0	. . .
1881	207	6	85	1	2	.	.	0	0	.	.	0	1	.	.	1	2	.	.	.	.	.	.	5.7	5.8	8.2	6.8	.	.	.	.	2 0 1	1 0 0
1882	207	6	85	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.9	6.1	.	.	.	.	.	.	. . .	1 1 0
1883	207	6	85	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.4	6.4	.	.	.	.	.	.	. . .	2 0 0
1884	208	6	85	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	5.8	. . .	2 0 1
1885	208	6	85	2	.	.	1	0	.	.	0	2	.	.	2	2	.	.	1	.	.	.	.	5.6	5.9	.	.	.	.	5.6	5.7	. . .	2 0 2
1886	208	6	85	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	5.5	6.4	. . .	2 0 1
1887	207	6	85	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.8	5.7	.	.	.	.	.	.	. . .	1 0 0
1888	314	6	85	.	.	1	1	.	.	0	0	.	.	2	2	.	.	1	1	.	.	.	.	.	.	.	.	7.8	6.4	.	6.2	1 0 2	1 0 2
1889	314	6	85	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	8.8	7.1	.	.	.	.	0 0 2	. . .
1890	314	6	85	0	0	.	.	0	0	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	5.7	7.6	6.4	.	.	.	.	0 0 1	0 0 1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1891	314	6	85	1	0	1	1	3	2	0	1	0	2	1	0	1	0	1	1	.	1	.	.	6.2	6.3	8.3	6.7	.	6.9	6.6	6.5	0 2 2	1 3 0
1892	314	6	85	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.7	5.8	. . .	1 0 0
1893	314	6	85	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	.	.	.	.	5.3	5.3	6.4	6.5	6.8	6.3	4.9	5.7	0 0 0	1 0 0
1894	314	6	85	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	1	.	.	.	.	5.5	5.3	8.3	5.8	8.0	6.0	6.1	5.6	0 0 1	1 0 0
1895	314	6	85	1	0	1	1	1	2	2	1	1	1	1	1	1	0	1	1	.	2	1	.	6.5	7.1	8.7	7.4	8.7	7.1	6.3	6.8	0 2 1	1 1 1
1896	314	6	85	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.6	5.4	. . .	1 1 1
1897	314	6	85	0	0	0	0	1	1	2	1	1	1	1	0	0	0	0	0	.	.	1	.	6.2	5.7	7.9	6.9	7.4	6.5	.	6.1	0 1 1	0 1 1
1898	314	6	85	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.5	6.2	.	.	.	.	.	.	. . .	1 0 1
1899	314	6	85	2	1	1	.	1	3	1	.	0	0	0	.	2	1	1	.	.	.	.	.	.	5.8	.	7.0	.	6.9	.	5.8	1 3 0	2 1 0
1900	315	6	85	.	.	0	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	7.6	6.1	.	.	0 2 1	. . .
1901	315	6	85	0	0	0	0	1	3	1	1	0	1	1	0	0	0	0	0	.	.	.	.	6.1	6.4	7.1	7.0	7.9	6.8	5.9	.	0 3 1	0 1 0
1902	119	6	115	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.2	6.4	. . .	1 1 2
1903	119	6	115	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.4	6.2	.	.	.	.	.	.	. . .	1 0 1
1904	119	6	115	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	5.5	6.0	.	.	.	.	6.0	5.8	. . .	1 0 0
1905	119	6	115	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	9.0	7.1	.	.	.	.	0 0 2	. . .
1906	119	6	115	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	7.7	6.1	.	.	.	.	.	.	. . .	1 0 0
1907	119	6	115	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.8	6.2	. . .	1 1 1
1908	139	6	115	.	0	0	0	.	0	0	0	.	0	0	0	.	0	0	0	.	.	.	.	.	.	6.9	6.1	.	6.1	5.5	5.7	0 0 0	0 0 0
1909	139	6	115	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	9.0	6.5	.	.	2 0 2	. . .
1910	139	6	115	1	2	1	1	1	0	0	0	2	1	1	2	2	2	1	1	.	.	.	.	6.7	6.0	8.8	6.5	8.7	6.6	7.1	5.9	2 0 1	1 1 2
1911	139	6	115	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.9	. . .	1 0 1
1912	139	6	115	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	6.3	. . .	1 1 1
1913	139	6	115	.	2	2	.	.	2	2	.	.	0	0	.	.	3	3	.	.	3	3	.	.	.	9.2	7.7	8.9	7.6	.	.	2 2 0	. . .
1914	139	6	115	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1	.	.	.	.	5.9	7.0	8.0	7.2	7.8	7.4	.	7.0	0 0 1	1 0 1
1915	139	6	115	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	5.3	.	.	.	.	.	.	. . .	0 1 1
1916	139	6	115	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	5.5	6.8	. . .	3 0 1
1917	139	6	115	0	0	0	0	1	0	0	1	1	0	0	1	0	0	0	0	.	.	.	.	7.0	6.7	9.0	7.6	9.4	7.4	.	6.7	0 0 0	0 1 1
1918	119	6	115	0	0	0	0	3	2	2	3	1	2	2	1	0	0	0	0	.	2	2	.	.	6.6	.	7.8	8.2	7.6	6.0	6.9	0 2 2	0 3 1
1919	119	6	115	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.2	5.9	.	.	.	.	.	.	. . .	1 0 1
1920	206	6	.	.	.	.	1	.	.	.	0	.	.	.	4	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.6	. . .	1 0 4

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1921	219	6	.	3	.	.	2	0	.	.	0	1	.	.	1	3	.	.	3	.	.	.	.	6.4	5.9	.	.	.	.	6.6	5.7	.	.	.	3	0	1
1922	219	6	.	2	2	2	2	0	1	1	0	1	0	0	1	2	2	2	2	.	.	.	.	5.6	6.2	7.8	7.5	.	7.4	.	6.1	2	1	0	2	0	1
1923	121	6	74	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.7	5.9	.	.	.	.	.	.	.	.	.	1	1	1
1924	121	6	74	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	9.0	6.7	.	.	1	0	1	.	.	.
1925	121	6	74	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	7.3	6.0	.	.	.	.	.	.	.	.	.	2	1	1
1926	121	6	74	2	.	.	2	2	.	.	2	1	.	.	1	2	.	.	2	2	.	.	3	6.4	6.5	.	.	.	.	6.7	6.5	.	.	.	2	2	1
1927	121	6	74	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.9	6.1	.	.	.	2	0	1
1928	121	6	74	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.4	6.1	.	.	.	.	6.2	6.3	.	.	.	2	0	1
1929	121	6	74	1	2	.	1	1	0	.	1	1	2	.	1	1	2	.	1	.	.	.	.	7.2	6.9	9.6	7.7	.	.	7.5	7.0	2	0	2	1	1	1
1930	.	6	74	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.2	6.6	.	.	.	.	.	.	.	.	.	1	0	1
1931	.	6	74	0	.	.	0	3	.	.	3	1	.	.	1	0	.	.	0	.	.	.	.	6.4	6.1	.	.	.	.	6.0	6.1	.	.	.	0	3	1
1932	.	6	74	2	2	.	2	2	2	.	2	1	1	.	1	2	2	.	2	2	3	.	2	7.5	6.2	8.1	7.1	.	.	7.3	6.3	2	2	1	2	2	1
1933	.	6	74	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	6.0	.	.	.	1	0	1
1934	.	6	74	2	.	.	2	0	.	.	0	1	.	.	1	2	.	.	2	.	.	.	.	6.2	6.3	.	.	.	.	5.8	6.5	.	.	.	2	0	1
1935	.	6	74	.	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	9.6	8.0	.	.	2	2	0	.	.	.
1936	117	6	79	0	1	0	1	1	0	0	2	1	1	0	0	0	1	0	1	.	.	.	1	5.8	6.6	8.0	7.5	7.6	7.1	6.3	6.6	1	0	1	0	1	1
1937	309	6	90	2	.	.	2	0	.	.	0	2	.	.	1	2	.	.	2	.	.	.	.	6.0	6.3	.	.	.	.	.	5.8	.	.	.	2	0	2
1938	309	6	90	.	.	2	1	.	.	0	1	.	.	3	0	.	.	2	1	.	.	.	.	.	.	.	.	8.7	7.2	7.7	6.1	2	0	3	1	1	0
1939	309	6	90	1	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	6.2	6.0	.	.	.	.	.	.	.	.	.	1	0	2
1940	309	6	90	1	1	1	0	0	2	0	0	1	1	1	1	1	1	1	0	.	1	.	.	6.0	5.8	7.2	6.5	.	6.4	.	6.0	1	2	1	1	0	1
1941	309	6	90	1	1	.	.	1	0	.	.	1	1	.	.	1	1	.	.	.	.	.	.	6.4	6.7	7.5	7.0	.	.	.	.	1	0	1	1	1	1
1942	309	6	90	.	.	.	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	5.6	.	.	.	2	1	0
1943	309	6	90	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.1	5.7	.	.	.	.	.	.	.	.	.	1	0	0
1944	309	6	90	1	2	2	2	0	0	0	0	0	0	0	0	1	2	2	2	.	.	.	.	.	5.8	7.7	6.8	8.0	7.2	5.6	5.8	2	0	0	1	0	0
1945	120	6	93	.	.	2	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	8.0	6.4	.	.	2	2	0	.	.	.
1946	120	6	93	.	0	.	.	.	0	.	.	.	3	.	.	.	0	.	.	.	.	.	.	.	.	8.2	7.1	.	.	.	.	0	0	3	.	.	.
1947	120	6	93	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	5.6	5.7	.	.	.	.	.	.	.	.	.	1	1	0
1948	120	6	93	0	0	.	0	2	2	.	2	0	0	.	0	0	0	.	0	2	3	.	2	8.5	7.3	.	7.9	.	.	7.8	7.4	0	2	0	0	2	0
1949	199	6	107	0	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.1	6.3	.	.	.	.	.	.	.	.	.	0	1	1
1950	199	6	107	.	.	.	2	.	.	.	3	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.8	7.0	.	.	.	2	3	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
1951	199	6	107	.	.	.	1	.	.	.	3	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.4	6.9	.	.	.	1	3	0
1952	199	6	107	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.5	6.8	.	.	.	.	.	.	.	.	.	1	1	1
1953	199	6	107	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.7	6.1	.	.	.	.	6.4	6.4	.	.	.	1	0	0
1954	199	6	107	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.6	6.4	.	.	.	2	0	0
1955	199	6	107	0	.	.	0	1	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	.	7.1	.	.	.	.	6.7	7.1	.	.	.	0	1	0
1956	199	6	107	2	2	2	1	1	2	2	0	0	1	1	2	3	3	3	2	.	2	3	.	6.2	6.2	.	7.3	.	7.4	4.9	5.4	2	2	1	2	1	0
1957	199	6	107	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.0	6.3	.	.	.	.	.	.	.	.	.	0	0	1
1958	310	6	107	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.9	6.1	.	.	.	1	0	0
1959	310	6	107	2	.	.	.	0	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	5.1	5.0	.	.	.	.	.	.	.	.	.	2	0	1
1960	310	6	107	0	.	.	0	1	.	.	1	0	.	.	0	0	.	.	0	.	.	.	.	.	6.0	.	.	.	.	6.0	6.0	.	.	.	0	1	0
1961	310	6	107	2	1	1	.	0	0	0	.	1	0	0	.	2	1	1	.	.	.	.	.	8.1	6.4	.	6.9	8.8	6.8	.	.	1	0	0	2	0	1
1962	310	6	107	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.1	5.7	.	.	.	1	1	0
1963	118	6	110	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	7.9	6.9	.	.	.	0	0	2
1964	118	6	110	2	2	2	.	1	0	0	.	1	1	1	.	2	2	2	.	.	.	.	.	7.2	7.1	7.8	7.5	8.2	7.5	.	.	2	0	1	2	1	1
1965	118	6	110	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.5	6.7	.	.	.	2	1	1
1966	118	6	110	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.0	6.0	.	.	.	.	.	.	.	.	.	2	1	1
1967	118	6	110	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.1	6.1	.	.	.	.	6.0	6.1	.	.	.	1	0	1
1968	118	6	110	.	2	2	.	.	0	0	.	.	1	1	.	.	3	3	.	.	.	.	.	.	.	8.1	6.9	8.5	6.9	.	.	2	0	1	.	.	.
1969	118	6	110	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	8.5	6.4	.	.	1	0	2	.	.	.
1970	118	6	110	.	1	2	2	.	0	2	1	.	1	1	1	.	0	2	2	.	.	1	.	.	.	8.3	6.8	.	6.9	6.5	6.1	1	0	1	2	1	1
1971	118	6	110	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	5.9	.	.	.	1	1	2
1972	118	6	110	.	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	8.0	6.2	.	.	1	0	2	.	.	.
1973	118	6	110	2	2	2	2	1	0	1	1	1	1	0	0	2	2	2	2	.	.	.	.	6.9	6.4	7.9	7.3	8.1	7.5	7.2	6.6	2	0	1	2	1	1
1974	118	6	110	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	5.2	4.5	.	.	.	.	5.2	4.6	.	.	.	1	0	1
1975	118	6	110	1	.	1	.	1	.	0	.	1	.	1	.	1	.	1	.	.	.	.	.	7.3	6.6	.	.	9.7	7.6	.	.	1	0	1	1	1	1
1976	118	6	110	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	5.2	6.5	.	.	.	.	.	.	.	.	.	1	0	1
1977	118	6	110	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	.	8.3	7.5	.	.	.	.	2	2	2	.	.	.
1978	118	6	110	.	0	0	.	.	1	0	.	.	0	0	.	.	0	0	.	.	.	.	.	.	.	8.2	7.0	7.8	7.1	.	.	0	1	0	.	.	.
1979	118	6	110	1	.	.	1	1	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	6.0	6.4	.	.	.	.	6.2	6.8	.	.	.	1	1	0
1980	312	6	118	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	7.0	6.2	.	.	.	.	.	.	.	.	.	1	0	1

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1981	312	6	118	1	.	.	0	0	.	.	0	1	.	.	1	0	.	.	0	.	.	.	.	6.1	5.9	.	.	.	.	6.3	5.7	. . .	1 0 1
1982	202	6	.	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	5.8	. . .	0 0 1
1983	.	6	.	2	1	2	2	0	0	1	0	1	1	1	1	2	2	2	2	.	.	.	.	7.4	5.5	9.1	6.2	.	6.1	7.0	5.4	1 0 1	2 0 1
1984	176	6	73	1	.	.	1	0	.	.	0	0	.	.	0	1	.	.	1	.	.	.	.	6.0	6.2	.	.	.	.	6.0	6.3	. . .	1 0 0
1985	311	6	78	1	1	1	2	0	0	0	0	1	0	0	1	2	1	1	2	.	.	.	.	.	5.8	8.4	7.1	8.5	7.0	7.0	6.1	1 0 0	1 0 1
1986	311	6	78	3	.	.	2	0	.	.	0	2	.	.	1	3	.	.	2	.	.	.	.	.	5.3	.	.	.	.	7.4	5.4	. . .	3 0 2
1987	311	6	78	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	5.9	5.4	. . .	0 1 0
1988	311	6	78	1	.	2	1	1	.	1	0	1	.	1	1	1	.	2	1	.	.	.	.	6.8	6.0	.	.	.	6.6	6.4	6.1	2 1 1	1 1 1
1989	146	6	80	1	.	1	2	0	.	2	1	2	.	1	1	1	.	2	2	.	.	2	.	6.8	6.2	.	.	.	6.9	6.2	6.0	1 2 1	1 0 2
1990	146	6	80	1	2	2	2	1	0	0	1	2	1	1	2	1	2	2	2	.	.	.	.	6.1	6.8	7.9	7.4	.	7.4	.	6.6	2 0 1	1 1 2
1991	145	6	83	0	1	.	1	0	2	.	0	1	1	.	1	0	1	.	1	.	1	.	.	6.0	5.4	8.1	6.2	.	.	6.0	5.6	1 2 1	0 0 1
1992	145	6	83	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	8.3	7.0	. . .	2 0 1
1993	145	6	83	1	2	2	1	0	0	0	0	3	1	1	2	1	2	2	1	.	.	.	.	6.0	6.0	9.0	6.8	8.5	6.9	6.3	6.2	2 0 1	1 0 3
1994	145	6	83	1	2	1	1	2	2	2	2	2	1	1	1	1	2	1	1	1	2	3	1	7.0	6.7	8.5	7.6	8.3	7.7	6.6	6.8	2 2 1	1 2 2
1995	145	6	83	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.0	6.2	.	.	.	.	.	.	. . .	2 0 0
1996	145	6	83	1	2	2	1	1	2	2	1	2	2	2	2	1	2	2	1	.	2	3	.	7.2	7.2	8.8	7.4	9.2	7.4	7.1	7.1	2 2 2	1 1 2
1997	144	6	88	.	.	0	.	.	.	2	.	.	.	2	.	.	.	0	.	.	.	1	.	.	.	.	.	8.8	7.6	.	.	0 2 2	. . .
1998	144	6	88	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	6.9	6.4	.	.	.	.	.	.	. . .	2 0 0
1999	144	6	88	1	.	.	0	2	.	.	2	1	.	.	1	1	.	.	0	2	.	.	1	7.3	6.9	.	.	.	.	7.2	6.9	. . .	1 2 1
2000	144	6	88	1	.	1	1	0	.	0	0	2	.	2	2	1	.	1	1	.	.	.	.	7.1	6.8	.	.	9.0	7.4	6.6	6.9	1 0 2	1 0 2
2001	144	6	88	1	1	1	1	1	2	2	0	1	1	1	1	1	1	1	1	.	1	1	.	5.7	6.0	7.9	6.7	7.6	6.9	6.1	6.0	1 2 1	1 1 1
2002	144	6	88	1	1	2	2	1	2	2	2	1	1	1	1	1	1	2	2	.	4	4	3	7.1	7.6	9.2	8.2	.	8.0	7.0	7.5	1 2 1	1 1 1
2003	144	6	88	1	.	.	0	1	.	.	0	1	.	.	1	1	.	.	0	.	.	.	.	6.6	6.1	.	.	.	.	6.9	6.1	. . .	1 1 1
2004	204	6	88	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.5	6.8	.	.	.	.	.	.	. . .	2 1 0
2005	204	6	88	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.4	5.7	. . .	1 1 0
2006	204	6	88	2	.	.	1	2	.	.	1	0	.	.	1	2	.	.	1	2	.	.	.	7.0	5.8	.	.	.	.	6.9	6.1	. . .	2 2 0
2007	204	6	88	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	6.5	. . .	2 1 2
2008	205	6	.	1	.	.	2	0	.	.	0	0	.	.	0	2	.	.	2	.	.	.	.	.	6.2	.	.	.	.	7.5	6.3	. . .	1 0 0
2009	8	7	87	1	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	. . .	1 0 0
2010	8	7	87	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	.	.	.	.	.	.	.	.	1 0 0	0 0 0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
2011	8	7	87	0	.	.	0	0	.	.	0	0	.	.	0	0	.	.	0	.	.	.	.	5.7	6.0	.	.	.	.	5.0	6.2	.	.	.	0	0	0
2012	8	7	87	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	1	.	.	.
2013	136	7	87	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.8	6.3	.	.	.	0	0	0
2014	136	7	87	2	1	1	1	0	2	2	1	1	2	3	1	2	1	1	2	.	2	2	.	4.6	5.9	8.6	6.8	8.7	6.9	5.2	6.4	1	2	2	2	0	1
2015	136	7	87	1	.	1	2	0	.	2	2	1	.	1	0	1	.	1	2	.	.	2	3	7.3	6.8	.	.	8.5	6.8	6.8	6.5	1	2	1	1	0	1
2016	136	7	87	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	8.8	7.3	.	.	2	2	1	.	.	.
2017	196	7	94	.	.	0	0	.	.	0	1	.	.	1	1	.	.	0	0	.	.	.	.	.	.	.	.	8.2	7.4	.	6.4	0	0	1	0	1	1
2018	196	7	94	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	5.8	7.2	.	.	.	.	.	.	.	.	.	1	1	1
2019	196	7	94	.	.	.	2	.	.	.	4	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.7	7.2	.	.	.	2	4	1
2020	196	7	94	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.5	.	.	.	0	0	2
2021	304	7	94	2	2	2	2	1	2	2	3	1	1	1	1	2	2	2	2	.	3	3	.	6.5	7.0	.	.	9.0	7.3	6.8	6.9	2	2	1	2	1	1
2022	304	7	94	0	.	.	.	1	.	.	.	2	.	.	.	0	.	.	.	.	.	.	.	6.5	6.3	.	.	.	.	.	.	.	.	.	0	1	2
2023	306	7	108	1	0	.	1	0	0	.	0	.	0	.	0	1	0	.	1	.	.	.	.	.	6.3	8.4	6.7	.	.	5.8	6.6	0	0	0	1	0	0
2024	140	7	113	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.8	.	.	.	1	1	1
2025	140	7	113	.	1	.	2	.	2	.	0	.	1	.	1	.	1	.	2	.	1	.	.	.	.	7.7	6.9	.	.	6.4	5.7	1	2	1	2	0	1
2026	140	7	113	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	7.2	6.8	.	.	.	.	.	.	.	.	.	0	0	1
2027	140	7	113	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.6	5.5	.	.	.	1	0	1
2028	140	7	113	.	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	.	8.0	6.2	.	.	.	.	0	0	0	.	.	.
2029	303	7	113	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.4	7.5	.	.	.	1	0	1
2030	75	7	117	3	3	3	3	1	2	2	1	0	1	1	0	3	4	4	3	.	2	2	.	7.0	6.8	8.3	7.5	8.7	7.4	7.1	7.1	3	2	1	3	1	0
2031	75	7	117	0	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	6.2	5.7	.	.	.	.	.	.	.	.	.	0	0	1
2032	83	7	117	1	0	0	2	0	2	2	0	1	1	1	1	1	0	0	2	.	1	1	.	6.7	6.5	9.1	7.6	.	7.6	7.0	6.8	0	2	1	1	0	1
2033	83	7	117	2	.	.	2	1	.	.	1	0	.	.	0	2	.	.	2	.	.	.	.	7.0	6.5	.	.	.	.	6.6	6.1	.	.	.	2	1	0
2034	92	7	117	0	.	.	0	1	.	.	3	1	.	.	0	0	.	.	0	.	.	.	.	7.1	6.7	.	.	.	.	6.9	7.1	.	.	.	0	1	1
2035	141	7	117	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.5	6.3	.	.	.	1	0	0
2036	141	7	117	0	.	1	2	0	.	0	0	1	.	0	0	0	.	1	2	.	.	.	.	6.7	6.0	.	.	8.2	7.5	6.7	6.5	1	0	0	0	0	1
2037	141	7	117	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	5.3	5.6	.	.	.	.	.	.	.	.	.	2	1	0
2038	141	7	117	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	6.4	5.8	.	.	.	.	.	.	.	.	.	1	0	0
2039	141	7	117	.	1	.	2	.	0	.	0	.	1	.	0	.	1	.	2	.	.	.	.	.	.	.	7.9	.	.	7.3	7.4	1	0	1	2	0	0
2040	141	7	117	1	0	.	1	0	0	.	0	1	1	.	1	1	0	.	1	.	.	.	.	5.2	5.5	8.1	6.4	.	.	5.6	5.6	0	0	1	1	0	1

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
2041	141	7	117	1	0	0	0	0	0	0	0	2	0	1	2	1	0	0	0	.	.	.	.	5.7	6.2	8.2	6.7	8.0	6.7	6.0	6.0	0	0	0	1	0	2
2042	141	7	117	2	.	.	.	1	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	7.2	6.5	.	.	.	.	.	.	.	.	.	2	1	0
2043	141	7	117	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	7.0	6.2	.	.	.	2	0	0
2044	141	7	117	1	1	1	0	0	2	2	1	1	0	0	0	1	1	1	0	.	2	3	.	6.7	6.2	.	6.8	.	6.8	6.5	6.3	1	2	0	1	0	1
2045	141	7	117	2	1	.	2	0	2	.	0	1	1	.	1	2	1	.	2	.	1	.	.	5.5	6.0	8.2	7.2	.	.	5.7	6.0	1	2	1	2	0	1
2046	141	7	117	.	2	2	2	.	2	2	2	.	2	2	1	.	2	2	2	.	3	3	1	.	.	9.1	7.4	9.5	7.7	7.1	6.1	2	2	2	2	2	1
2047	198	7	117	.	0	.	1	.	0	.	0	.	1	.	0	.	0	.	1	.	.	.	.	.	.	8.5	6.3	.	.	6.3	5.7	0	0	1	1	0	0
2048	198	7	117	.	.	0	0	.	.	0	0	.	.	0	1	.	.	0	0	.	.	.	.	.	.	.	.	7.4	5.9	5.5	5.0	0	0	0	0	0	1
2049	302	7	117	1	.	2	2	0	.	0	0	1	.	1	1	2	.	3	3	.	.	.	.	6.8	6.9	.	.	9.7	7.4	8.4	6.0	2	0	1	1	0	1
2050	302	7	117	2	2	2	2	1	0	2	2	0	0	0	0	2	2	2	2	.	.	1	2	6.0	7.0	7.9	7.4	7.7	7.2	6.7	7.2	2	0	0	2	1	0
2051	302	7	117	2	2	.	.	2	2	.	.	1	1	.	.	2	2	.	.	2	1	.	.	6.4	6.7	9.0	7.0	.	.	.	.	2	2	1	2	2	1
2052	302	7	117	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.4	6.1	.	.	.	1	1	1
2053	302	7	117	3	.	.	3	0	.	.	0	4	.	.	3	3	.	.	3	.	.	.	.	6.8	7.3	.	.	.	.	6.9	7.3	.	.	.	3	0	4
2054	302	7	117	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	5.8	5.7	.	.	.	1	1	1
2055	302	7	117	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	7.1	6.8	.	.	.	1	0	0
2056	302	7	117	1	1	1	1	1	0	0	1	1	0	0	0	1	1	1	1	.	.	.	.	6.4	6.5	8.1	6.6	8.0	6.8	7.0	6.3	1	0	0	1	1	1
2057	302	7	117	0	0	1	1	1	0	1	1	0	0	1	0	0	0	1	1	.	.	.	.	5.5	6.2	7.4	6.9	7.3	7.0	5.4	6.3	0	0	0	0	1	0
2058	302	7	117	1	1	1	1	3	0	0	0	1	1	0	1	1	1	1	1	.	.	.	.	7.3	7.3	9.6	7.5	9.3	7.3	.	6.4	1	0	1	1	3	1
2059	302	7	117	1	2	2	2	0	1	0	0	1	1	0	0	1	2	2	2	.	.	.	.	.	6.4	.	7.3	9.0	7.7	.	6.3	2	1	1	1	0	1
2060	302	7	117	1	.	.	2	0	.	.	1	0	.	.	0	1	.	.	2	.	.	.	.	6.2	5.9	.	.	.	.	6.0	6.1	.	.	.	1	0	0
2061	142	7	120	1	.	.	1	0	.	.	1	0	.	.	0	1	.	.	1	.	.	.	.	6.9	7.0	.	.	.	.	7.0	6.8	.	.	.	1	0	0
2062	142	7	120	0	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	6.6	6.7	.	.	.	.	.	.	.	.	.	0	1	0
2063	200	7	120	2	2	2	2	0	1	0	0	1	1	1	1	2	2	2	2	.	.	.	.	.	7.4	7.9	7.9	8.4	7.7	.	6.6	2	1	1	2	0	1
2064	201	7	.	1	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	7.0	6.9	.	.	.	.	.	.	.	.	.	1	1	1
2065	.	7	.	.	.	1	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	.	.	7.9	7.6	.	.	1	2	2	.	.	.
2066	.	7	.	1	.	.	2	0	.	.	0	1	.	.	1	1	.	.	2	.	.	.	.	7.4	6.4	.	.	.	.	7.7	6.4	.	.	.	1	0	1
2067	.	7	.	2	1	1	2	1	2	2	1	1	0	0	0	2	1	1	2	.	2	2	.	7.1	6.5	8.8	6.7	.	6.5	.	6.4	1	2	0	2	1	1
2068	.	7	.	.	.	.	1	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.0	6.3	.	.	.	1	1	1
2069	.	7	.	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.0	.	.	.	1	0	1
2070	197	7	99	0	.	.	.	0	.	.	.	0	.	.	.	0	.	.	.	.	.	.	.	5.8	6.1	.	.	.	.	.	.	.	.	.	0	0	0

No.	Pop.	RG.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
2071	305	7	99	2	.	2	2	0	.	0	1	1	.	1	1	2	.	2	2	.	.	.	.	7.2	6.6	.	.	.	7.0	6.4	6.6	2	0	1	2	0	1
2072	203	7	104	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.8	7.0	.	.	.	1	1	0
2073	308	7	105	1	1	1	2	3	2	2	3	1	1	1	1	1	1	1	2	.	1	1	.	.	7.4	.	7.2	.	7.3	7.8	7.0	1	2	1	1	3	1
2074	147	7	114	.	.	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	6.0	.	.	.	2	0	2
2075	147	7	114	0	.	0	0	1	.	0	1	1	.	1	1	0	.	0	0	.	.	.	.	6.6	6.6	.	.	8.4	7.4	6.3	6.3	0	0	1	0	1	1
2076	147	7	114	2	2	1	2	1	2	0	0	0	0	0	0	2	2	1	2	.	1	.	.	6.3	6.6	7.4	7.0	8.5	7.2	6.4	6.6	2	2	0	2	1	0
2077	147	7	114	1	.	.	2	3	.	.	3	1	.	.	1	1	.	.	2	.	.	.	.	7.6	8.2	.	.	.	.	7.6	8.2	.	.	.	1	3	1
2078	147	7	114	.	.	.	1	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	6.1	.	.	.	1	1	0
2079	147	7	114	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	6.0	6.2	.	.	.	.	.	.	.	.	.	2	1	1
2080	147	7	114	1	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	6.7	5.8	.	.	.	.	.	.	.	.	.	1	1	2
2081	147	7	114	1	0	.	.	2	2	.	.	1	0	.	.	1	0	.	.	3	1	.	.	.	7.0	7.9	7.1	.	.	.	.	0	2	0	1	2	1
2082	195	7	114	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	6.8	6.2	.	.	.	.	.	.	.	.	.	1	0	1
2083	195	7	114	0	0	.	.	3	2	.	.	1	1	.	.	0	0	.	.	.	3	.	.	6.0	6.3	8.3	7.2	.	.	.	.	0	2	1	0	3	1
2084	195	7	114	.	1	.	.	.	0	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	7.1	6.7	.	.	.	.	1	0	2	.	.	.
2085	195	7	114	1	.	.	1	1	.	.	0	2	.	.	3	1	.	.	1	.	.	.	.	7.0	6.9	.	.	.	.	6.8	7.0	.	.	.	1	1	2
2086	195	7	114	.	.	2	1	.	.	2	0	.	.	2	1	.	.	2	1	.	.	2	.	.	.	.	.	9.2	7.1	5.3	5.5	2	2	2	1	0	1
2087	195	7	114	2	.	.	2	0	.	.	0	2	.	.	2	2	.	.	2	.	.	.	.	.	7.0	.	.	.	.	.	6.8	.	.	.	2	0	2
2088	195	7	114	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	6.0	5.9	.	.	.	.	.	.	.	.	.	2	0	2
2089	195	7	114	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	5.9	6.7	.	.	.	.	.	.	.	.	.	2	0	1
2090	307	7	114	1	.	.	1	0	.	.	0	1	.	.	1	1	.	.	1	.	.	.	.	6.6	6.2	.	.	.	.	6.7	6.2	.	.	.	1	0	1
2091	307	7	114	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	0	.	.	.	.	.	.	.	.	.	.	6.4	6.1	.	.	.	1	0	1
2092	307	7	114	0	.	.	1	0	.	.	0	1	.	.	1	0	.	.	1	.	.	.	.	6.9	6.7	.	.	.	.	6.7	6.7	.	.	.	0	0	1
2093	307	7	114	1	1	.	.	1	1	.	.	1	0	.	.	1	0	.	.	.	.	.	.	6.4	6.7	7.9	6.9	.	.	.	.	1	1	0	1	1	1
2094	307	7	114	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.2	5.4	.	.	.	2	0	0
2095	307	7	114	0	.	.	1	1	.	.	1	0	.	.	0	0	.	.	1	.	.	.	.	.	6.0	.	.	.	.	.	6.0	.	.	.	0	1	0
2096	307	7	114	.	.	1	1	.	.	0	1	.	.	1	1	.	.	1	1	.	.	.	.	.	.	.	.	7.7	6.7	5.5	6.4	1	0	1	1	1	1
2097	307	7	114	1	.	.	.	2	.	.	.	1	.	.	.	1	.	.	.	2	.	.	.	7.7	7.8	.	.	.	.	.	.	.	.	.	1	2	1
2098	307	7	114	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	.	.	.	.	6.8	6.6	8.4	7.1	8.3	7.0	7.5	6.8	1	0	0	1	1	0
2099	194	7	123	.	.	.	2	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	7.4	.	.	.	2	2	1
2100	201	7	.	1	0	.	.	0	0	.	.	0	0	.	.	1	0	.	.	.	.	.	.	.	.	.	6.3	7.1	7.4	.	.	0	0	0	1	0	0

No.	Pop.	RG.Coun.		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2101	.	7	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	2	.	.	.	3	.	.	.	.	.	8.5	6.5	.	.	2 2 2	. . .
2102	.	7	.	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.2	6.4	. . .	1 0 1
2103	177	8	98	0	.	3	2	0	.	2	2	1	.	2	0	0	.	5	2	.	.	3	1	6.8	7.1	.	.	9.5	7.5	6.6	7.1	3 2 2	0 0 1
2104	177	8	98	2	2	2	1	0	2	2	0	1	0	0	1	2	2	2	1	.	1	1	.	6.9	5.6	.	6.3	9.2	6.4	6.5	5.6	2 2 0	2 0 1
2105	177	8	98	.	2	.	.	.	0	.	.	.	2	.	.	.	2	.	.	.	.	.	.	.	.	8.5	6.4	.	.	.	.	2 0 2	. . .
2106	177	8	98	.	.	.	1	.	.	.	0	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.8	6.3	. . .	1 0 1
2107	177	8	98	.	.	.	1	.	.	.	0	.	.	.	0	.	.	.	1	.	.	.	.	.	.	.	.	.	.	6.0	5.8	. . .	1 0 0
2108	177	8	98	2	.	.	2	0	.	.	0	2	.	.	2	2	.	.	2	.	.	.	.	6.4	6.9	.	.	.	.	6.6	7.1	. . .	2 0 2
2109	177	8	98	3	.	.	.	1	.	.	.	0	.	.	.	3	.	.	.	.	.	.	.	6.7	6.2	.	.	.	.	.	.	. . .	3 1 0
2110	177	8	98	1	1	0	1	0	0	0	0	1	1	1	1	1	1	0	1	.	.	.	.	5.7	5.9	8.2	7.1	8.0	6.8	5.6	5.7	1 0 1	1 0 1
2111	177	8	98	3	3	2	.	0	0	0	.	1	1	1	.	3	3	2	.	.	.	.	.	7.2	6.4	9.7	7.2	9.7	7.4	.	.	3 0 1	3 0 1
2112	177	8	98	1	2	.	.	0	0	.	.	1	1	.	.	1	2	.	.	.	.	.	.	.	7.0	9.1	7.7	.	.	.	.	2 0 1	1 0 1
2113	177	8	98	.	3	3	3	.	0	0	0	.	0	0	0	.	3	3	3	.	.	.	.	.	.	9.6	7.0	9.4	7.2	8.0	6.8	3 0 0	3 0 0
2114	177	8	98	1	2	2	2	0	0	0	0	1	1	1	1	2	2	2	2	.	.	.	.	6.2	6.4	.	6.4	7.7	6.4	6.2	6.4	2 0 1	1 0 1
2115	177	8	98	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	.	.	.	.	.	6.5	6.3	. . .	2 0 0
2116	177	8	98	2	2	2	.	2	2	2	.	0	0	0	.	2	2	2	.	1	2	1	.	7.1	6.9	9.2	7.5	9.0	7.3	.	.	2 2 0	2 2 0
2117	177	8	98	.	2	2	.	.	2	2	.	.	1	1	.	.	2	2	.	.	1	1	.	.	.	8.2	6.7	8.3	6.9	.	.	2 2 1	. . .
2118	177	8	98	.	1	.	.	.	3	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	7.7	7.3	.	.	.	.	1 3 2	. . .
2119	177	8	98	2	2	2	2	0	1	1	0	0	0	0	1	2	2	2	2	.	.	.	.	6.1	5.7	8.7	6.5	8.2	6.7	6.4	5.7	2 1 0	2 0 0
2120	177	8	98	.	2	.	.	.	0	.	.	.	1	.	.	.	2	.	.	.	.	.	.	.	.	8.5	7.0	.	.	.	.	2 0 1	. . .
2121	177	8	98	.	.	0	.	.	.	2	.	.	.	0	.	.	.	0	.	.	.	2	.	.	.	.	.	7.7	6.8	.	.	0 2 0	. . .
2122	177	8	98	.	2	2	2	.	2	2	0	.	0	0	0	.	2	2	2	.	2	2	.	.	.	.	6.9	8.1	7.0	5.4	5.8	2 2 0	2 0 0
2123	201	8	.	1	2	1	1	0	0	0	1	1	1	1	1	1	2	2	1	.	.	.	.	.	6.1	8.6	6.5	.	6.9	.	6.2	2 0 1	1 0 1

APPENDIX C
DATA FOR SHORT TERM TEMPORAL SAMPLE, SORTED BY TIME AND REGION.

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	RTC
1	neo	273	29	0	0			0	0			0	1			0	0							5.6	5.3		6.5					0 0 1	0 0 0
1	neo	273	29				1				0				0				1											5.8	5.3		1 0 0
1	neo	273	29		0	0	1		0	0	1		1	1	1		0	0	1								6.7	7.9	6.9	6.7	5.9	0 0 1	1 1 1
1	neo	273	29	2	1	1	2	0	1	2	0	0	1	0	0	2	1	1	2			2			6.1	9.3	7.1	9.2	6.8	6.2	6	1 1 1	2 0 0
2	neo	111	3	2	0	0	2	0	0	0	0	2	2	2	1	2	0	0	2					6	6.3		7.2	8.5	7.5		6.6	0 0 2	2 0 2
2	neo	46	12	1				0				1				0																	1 0 1
2	neo	46	12		1		1		2		0		1		1		0		1		1											1 2 1	1 0 1
2	neo	46	12		0	0	0		0	0	0		0	0	1		0	0	0							7.2	6.3	7.4	6.9	5.2	5.4	0 0 0	0 0 1
2	neo	46	12	0	0			0	2			1	1			0	0				1			5.9	6.1	8.7	7.2					0 2 1	0 0 1
2	neo	30	15	1		0	1	1		0	1	0		0	0	1		0	1					7	6.1			8.2	7.4	7.1		0 0 0	1 1 0
2	neo	77	15				0				0				1				0											6	5.9		0 0 1
2	neo	268	18	2				0				1				2								6.5	8								2 0 1
2	neo	35	30	1				1				0				0								6.3	6.4							1 0	
2	neo	35	30				1				1				0				0											7.8	7.6		1 1 0
2	neo	161	63.3	1				0				1				1									5.4								1 0 1
2	neo	161	63.3	0	1	1	0	1	2	2	0	1	1	2	1	0	1	1	0		1	1		5.3	6.3		6.6		6.7		5.3	1 2 1	0 1 1
2	neo	161	63.3	2				0				1				2								5.7	5.6								2 0 1
2	neo	161	63.3		2	1	2		0	2	0		3	1	2		2	1	2			1				9	7	8.7	7		6.4	2 0 3	2 0 2
2	neo	161	63.3	2			2	1			0	1			1	2			2					6.3	6.4					6.7	6.2		2 1 1
3	neo	1	43		1				0				1				1															1 0 1	
3	neo	1	43	1				0				0				1																	1 0 0
3	neo	1	43			0				0				1				0														0 0 1	
3	neo	1	43	0	1	1		0	2	2		1	1	1		0	1	1			1	1										1 2 1	0 0 1
3	neo	1	43				2				3				2				2														3 2

*Column names are as follows: RGN (Region), Time [neo(lithic), bro(nze), iro(n), rec(ent)], Pop. (Population number), and Coun. (Country) are labels. Mar. Ridge (Marginal Ridges), Tubercles, Curvature, ASU Shov (Arizona State University system shoveling), ASU Tub (Arizona State University Tubercles) are the morphologies scored, r2 (right I2), r1 (right I1), l1 (left I1), l2 (left I2); measurements are listed as MD (mesial-distal) and BL (buccal-lingual) for the RT (right) I2, RT I1, LT (left) I1, LT I2; then are the considated incisor morphology scores, CENT(ral) and LAT(eral) R(idges), T(ubercles), and C(urvature).

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
3	neo	1	43	1	2		1	1	2		1	1	1		1	1	2		2		2											2 2 1	1 1 1
3	neo	1	43		2				2				0				1				2											2 2 0	
3	neo	1	43			1	1			0	0			1	2			1	1													1 0 1	1 0 2
3	neo	1	43			2				2				2				2				2										2 2 2	
3	neo	1	43	1			1	1			1	1			1	1			1														1 1 1
3	neo	1	43		1	1			0	0			1	0			1	1			1	1										1 0 1	
3	neo	1	43			1				0				0				1				1										1 0 0	
3	neo	1	43	1	2		1	1	0		4	1	1		1	1	2		2			1										2 0 1	1 1 1
3	neo	1	43	1			0				1				1				1														1 1 1
3	neo	1	43		2	1	1		0	0	0		1	1	1		2	1	1		1	1										2 0 1	1 0 1
3	neo	1	43	2	1			0	0			1	1				2	1			1	1										1 0 1	2 0 1
3	neo	1	43		2				2				1				3				3											2 2 1	
3	neo	1	43				1				0				1				1														1 0 1
3	neo	1	43		2				2				1				2				3											2 2 1	
3	neo	1	43	2	2			1	2			1	0			2	2				3											2 2 0	2 1 1
3	neo	1	43		1				2				1				1				1											1 2 1	
3	neo	1	43	2				1				2				2																	2 1 2
3	neo	1	43	1	2	2	1	1	2	2	1	1	0	0	0	1	2	2	1		1	1										2 2 0	1 1 1
3	neo	1	43	1				0				1				0																	1 0 1
3	neo	1	43			2				2				2				2				2										2 2 2	
3	neo	1	43		1	1	1		2	2	1		2	1	1		1	1	0		1	1										1 2 2	1 1 1
3	neo	244	43	1			1	0			0	0			0	1			1					6.1	6.4					6.3	6.4		1 0 0
3	neo	244	43			1				0				1				1								8.4	5.9					1 0 1	
7	neo	196	94			0	0			0	1			1	1			0	0									8.2	7.4		6.4	0 0 1	0 1 1
7	neo	196	94	1				1				1				1								5.8	7.2								1 1 1
7	neo	196	94				2				4				1				2											7.7	7.2		2 4 1
7	neo	196	94				0				0				2				0											6.4	6.5		0 0 2
1	bro	274	29	1			1	1			1	1			1	1			1					6	6.5					6	7		1 1 1
1	bro	274	29	1			1	0			0	0			0	0			1					6.4	6.2					6.6	6.2		1 0 0
1	bro	274	29	1		0	2	0		1	0	0		0	0	1		0	2					6.1	5.6			8.3	6.8	6.3	5.7	0 1 0	1 0 0
1	bro	274	29	2			2	0			0	0			0	2			2					5.3	6.1					6	6.1		2 0 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1	bro	274	29	2			2	0			0	2			2	2			2					6.3	6.3					6.2	6.2		2 0 2
1	bro	274	29	2	0			0	2			1	1			2	0				3				6.5	8.4	7.2					0 2 1	2 0 1
1	bro	274	29		1	1	1		0	2	0		1	1	1		0	1	1			1				9.5	7.4	9.4	7.5	6.2	6.2	1 0 1	1 0 1
1	bro	274	29	1			1	0			0	0			0	0			1					4.8	5.6					5.2	5.6		1 0 0
1	bro	274	29	1			1	0			0	0			0	0			1					6.4	6.1					6.5	6		1 0 0
1	bro	274	29	1	1	1	1	1	0	1	1	0	1	1	0	1	1	1	1					6.4	6.6	9.5	7.6	9.3	7.6	7.4	6.7	1 0 1	1 1 0
1	bro	274	29	2	0	0	1	0	1	1	0	1	0	0	1	2	0	0	1					5.1	5.4		6.4	7.4	6.7		4.8	0 1 0	2 0 1
1	bro	274	29		0	0			0	0			1	1			0	0								7.8	6.6	7.7	6.3			0 0 1	
1	bro	274	29			0	1			0	0			1	1			0	1									7.9	6.7		5	0 0 1	1 0 1
1	bro	274	29		1				0				0				1									8.4	6.9					1 0 0	
1	bro	274	29	1	2	2	1	0	0	0	1	1	1	1	0	1	2	2	2						6.5	8.5	7.2		6.8	7.2	6.2	2 0 1	1 0 1
1	bro	274	29	1	1	0	1	1	1	3	0	0	1	0	0	1	1	0	1						7	8.1	7.6	8.5	7.6	6.3	6.8	1 1 1	1 1 0
1	bro	274	29	1		0		0		0		1		0		1		0						5.8	5.8				6.7			0 0 0	1 0 1
1	bro	274	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						5.7	6.8	6.6	7	6.4	5.5	6.1	0 0 0	1 0 0
1	bro	274	29		0	0	1		0	0	0		0	0	0		0	0	1							7.8	7.3	8	7.4	6	5.8	0 0 0	1 0 0
1	bro	274	29		0				0				2				0									7.9	6.3					0 0 2	
1	bro	274	29	1	1	1	2	0	0	0	0	0	1	1	0	1	1	1	2						6.4		8.1		8		6.6	1 0 1	1 0 0
1	bro	274	29	1	0	1	1	0	0	0	0	1	1	1	1	1	0	1	1					6.1	6.1	8.1	6.7		6.8		6.1	0 0 1	1 0 1
1	bro	274	29		0				0				0				0									9.1	6.7					0 0 0	
1	bro	274	29	1			1	0			0	2			1	1			1					6.9	6.7					7.3	6.3		1 0 2
1	bro	274	29			1	2			2	1			1	0			1	2			1								6	6.3	1 2 1	2 1 0
1	bro	274	29				1				0				1				1											6.1	6		1 0 1
1	bro	274	29		1	0			0	0			1	1			0	0								8.1	6.1	8	6.6			1 0 1	
1	bro	274	29	1	1	1	1	0	1	1	0	0	0	0	0	1	2	1	1					6.5	6.3	8.1	7	8.1	7.1	5.8	5.9	1 1 0	1 0 0
1	bro	274	29			0				0				1				0										7.8	7			0 0 1	
1	bro	274	29				1				1				1				1											6.6	6.4		1 1 1
1	bro	274	29			1				2				1				1				1							6.9			1 2 1	
1	bro	274	29	0		0	1	0		0	1	1		1	0	0		0	0					6.3	6.3			7.7	7	6	6.8	0 0 1	0 0 1
1	bro	274	29	1			1	0			0	4			3	1			1					4.4	6					3.7	5.4		1 0 4
1	bro	274	29	2				0				1				2								6.4	5.9								2 0 1
1	bro	274	29				2				0				1				2											6.1	6.3		2 0 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1	bro	274	29	3	4	3		0	2	2		0	1	1		4	6	5			3	3		7.6	6.7	10.6	7.4	10.1	7.5			4 2 1	3 0 0
1	bro	274	29	1	1	1		0	2	2		1	1	0		1	1	0			2	1		5.1		8.9	7	8.7	7.3			1 2 1	1 0 1
1	bro	274	29	2	2			1	2			1	0			2	2				2			6.6	6.7	8.5	8.3					2 2 0	2 1 1
1	bro	274	29				3				0				0				4											8	7.3		3 0 0
1	bro	274	29		2	1	3		0	0	1		1	1	1		2	1	3							9.3	7.2	9.2	7.2	6.9	6.4	2 0 1	3 1 1
1	bro	274	29				0				0				2				0											5.5	5.9		0 0 2
2	bro	55	3		0				0				2				0															0 0 2	
2	bro	55	3	1		0		0		0		0		2		1		0						6.6	6.1			8.8	7			0 0 2	1 0 0
2	bro	55	3	2	1	1	1	1	0	0	1	1	2	2	2	2	1	1	1					5.7	5.6	7.2	6.3	7	6.1	4.6	5.5	1 0 2	2 1 1
2	bro	55	3	3			3	1			0	1			1	5			4					6.9	7.1					6.8	6.3		3 1 1
2	bro	55	3	2		2	2	1		2	1	1		2	0	2		2	2			2		7.5	6.4			8.8	7.5	7	6.5	2 2 2	2 1 1
2	bro	55	3	1	0	0	1	1	0	0	1	1	1	1	1	2	0	0	1						5.9	7.1	6.9	7.4	7	5.4	5.7	0 0 1	1 1 1
2	bro	55	3	0	0	0	0	1	2	2	1	0	1	2	0	0	0	0	0		2	2		6.2	6.1	7.2	6.6	7.4	6.8	6.3	6	0 2 1	0 1 0
2	bro	55	3	1				1				0				1								6.9	5.7								1 1 0
2	bro	55	3	2	2	3	2	1	0	1	0	1	0	0	1	2	2	3	2					6.4	6	7.4	7.1	7	7.2	5.3	5.8	2 0 0	2 1 1
2	bro	55	3	1		2	1	0		0	1	0		0	0	1		2	1					5.9	5.8			8	6.7	5.5	5.7	2 0 0	1 0 0
2	bro	55	3	1		1	1	1		0	0	1		0	1	1		1	1					6.4	6.5			8.1	7.2	5.7	6.4	1 0 0	1 1 1
2	bro	55	3	2	0	0	2	0	0	0	0	1	2	2	1	2	0	0	2					5.8	6		6.6		6.8	5.9	5.9	0 0 2	2 0 1
2	bro	55	3	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0					6.2	6.2		7		7	6.1	6.4	0 0 1	0 1 1
2	bro	55	3	2	2	1	3	1	2	2	0	1	2	2	2	3	2	1	4		2	3		5.6	5.8	8.2	7.3	7.8	7.2	5	6.2	2 2 2	2 1 1
2	bro	55	3		0	0			0	0			0	0			0	0								7.4	7.1	7.4	7.1			0 0 0	
2	bro	55	3	2	0	0	1	0	0	0	0	1	0	0	0	2	0	0	1					5.9	5.5	7.8	6.1	7.9	6.4	6.9	5.6	0 0 0	2 0 1
2	bro	55	3	1		0	1	1		0	1	0		0	0	1		0	1					6.1	5.8			8.3	6.6	6.1	6.2	0 0 0	1 1 0
2	bro	55	3	0	1	1	1	1	0	0	1	1	2	0	0	0	1	1	1					6.3	6.2	9	6.8		6.9	6.6	6.4	1 0 2	0 1 1
2	bro	55	3	1		1	1	0		0	0	1		1	0	2		1	2					6.1	5.9			8.6	7.1	5.6	5.9	1 0 1	1 0 1
2	bro	55	3	2		0	1	1		0	1	1		1	0	2		0	1					6.6	7.1			8.4	7.4	5.8	6.5	0 0 1	2 1 1
2	bro	55	3	1			1	1			0	0			0	1			1					6.7	5.9					6.4	5.8		1 1 0
2	bro	55	3	1	1	1	1	0	0	0	0	1	2	2	1	1	1	1	1					6	6.2	7.7	6.9		7.1	6	6.6	1 0 2	1 0 1
2	bro	55	3				1				0				1				1											6.1	5.8		1 0 1
2	bro	55	3	1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1					6.1	5.6	7.9	7.1	7.9	6.8	6.3	6	0 0 0	1 1 0
2	bro	55	3			0	0			2	1			1	0			0	0			2						8	7.1	5.7	5.8	0 2 1	0 1 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	bro	55	3		0				0				0				0									8.1	7.1					0 0 0	
2	bro	55	3	2		0	2	0		0	0	1		1	0	3		0	3					6	6.5			7.7	7.5	6.1	6.8	0 0 1	2 0 1
2	bro	55	3		0	0			2	2			1	0			0	0			3	3				8.4	7.4	8	7.1			0 2 1	
2	bro	55	3	2	1	2	2	0	1	2	0	1	1	1	1	2	1	2	2			2		5.2	6.2	8	6.5	7.6	6.9	5.6	6.3	1 1 1	2 0 1
2	bro	55	3	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0					5.6	6	8.5	7.1	8.7	7.4	5.3	6	0 0 1	0 0 1
2	bro	55	3	2	3	3	2	0	2	2	0	1	2	1	0	2	3	3	2		3	4		6.6	7.3	9.5	8.9	9.9	8.8	6.2	7.7	3 2 2	2 0 1
2	bro	55	3	2	1	1	2	0	0	0	0	1	1	1	1	2	1	1	2					4.8		7.8	6.7	8	6.9	4.5	5.3	1 0 1	2 0 1
2	bro	55	3	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0					6.1	5.9	8.5	6.7	8.3	7	5.7	6.1	0 0 1	1 0 0
2	bro	55	3	2	2	3	3	0	2	2	2	1	0	1	0	3	3	3	3		1	3	3	7.4	6.2	9.3	8	9.2	7.4	8.5		2 2 0	2 0 1
2	bro	55	3	1	0			0	0			1	0			1	0							5.7	5.7	7.6	6.4					0 0 0	1 0 1
2	bro	55	3	2	0			0	0			0	0			2	0							7.6	5.9	9	7.3					0 0 0	2 0 0
2	bro	55	3		0	0	0		0	0	0		0	0	1		0	0	0							7.9	6.1	8.2	6.1	5	5	0 0 0	0 0 1
2	bro	55	3	1				0				0				1								5.1	5.5								1 0 0
2	bro	55	3			0	0			1	1			1	1			0	0									8	6.7	5.4	6	0 1 1	0 1 1
2	bro	55	3	2			2	0			0	1			1	2			2					5.5	5.8					5.3	5.8		2 0 1
2	bro	55	3	1	0	1	0	0	0	0	0	1	1	1	1	1	0	0	0					5.4	5.5	7.9	6.5	8.1	6.4	5.6	5.8	0 0 1	1 0 1
2	bro	55	3		0	0	1		0	0	0		0	0	0		0	0	1							7.8	7.2	7.7	7.1	5.5	6.2	0 0 0	1 0 0
2	bro	55	3	1	0	0		0	0	0		0	1	1		0	0	0						5.7	6	8.2	7.1	8.1	7.3			0 0 1	1 0 0
2	bro	55	3	1	0	1	1	1	1	3	2	1	1	1	1	0	1	1						4.6	6.1	7.6	6.9	7.4	6.8	5	6.3	0 1 1	1 1 1
2	bro	55	3	0	0	0	0	1	0	0	0	1	2	1	1	0	0	0	0					5	5.1	7.3	6.1	7.4	6		5.6	0 0 2	0 1 1
2	bro	47	12	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1		2	3			6.2		7		7.3		5.6	1 2 1	1 1 1
2	bro	47	12	1	1	1		0	2	2		1	1	1		0	1	1			1	1		6.3	5.5	7.7	6.3	7.8	6			1 2 1	1 0 1
2	bro	47	12	0	0	0	0	0	0	0	0	2	2	2	2	0	0	0	0					5.4	5.3	7.2	6.5	7	6.2	5.7	5.6	0 0 2	0 0 2
2	bro	51	12		0	1	1		0	0	1		1	1	1		0	1	1							8.6	7	8.7	7.4	5.6	6.6	0 0 1	1 1 1
2	bro	51	12	1	0	0	1	1	0	0	1	2	0	0	1	1	0	0	1					5.5	6	7.7	7		7.1		6.1	0 0 0	1 1 2
2	bro	51	12		0	0	1		0	0	0		0	1	1		0	0	1							8	6.7		6.5	6	5.3	0 0 0	1 0 1
2	bro	51	12	1			1	0			1	1			1	1			1					6.4	6.4					6.6	6.1		1 0 1
2	bro	36	30	1		0	1	0		0	1	1		2	1	1		0	0					5.9	6.1			8.6	7.3	6	6.3	0 0 2	1 0 1
2	bro	36	30	3	1	1	2	0	2	2	1	2	2	2	2	3	1	1	2		1	1		6.5	6	8	6.6	8	7		6.4	1 2 2	3 0 2
2	bro	36	30	0			0	0			0	0			0	0			0					5.6	6.1					5.7	6.5		0 0 0
2	bro	36	30	1	1	1	1	0	2	2	0	2	3	3	2	1	1	1	1		1	1		6.2	6.7	7.8	7.3	7.1	7.1	6	6.3	1 2 3	1 0 2

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	bro	37	30			0	0			0	0			1	1			0	0									7.7	6.8	5.4	5.6	0 0 1	0 0 1
2	bro	37	30				1				0				1				0											6.5	5.2		1 0 1
2	bro	37	30	1				0				0				0								6.4	6.9								1 0 0
2	bro	37	30			0	2			0	0			1	1			0	2									7.5	6.6		6.5	0 0 1	2 0 1
2	bro	37	30				0				0				1				0											6.7	6.2		0 0 1
2	bro	37	30				0				1				1				0											6	6.6		0 1 1
2	bro	37	30	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0					5.9	5.5	8.3	6.4	8.2	6.6	5.8	5.7	0 0 1	0 0 0
2	bro	37	30	1		0	1	1		0	1	1		1	1	1		0	1					5.8	6			7.4	6.6	5.3	5.8	0 0 1	1 1 1
2	bro	37	30	2	2		2	0	1		0	0	1		0	2	2		2						6.3	8.4	7.4					2 1 1	2 0 0
3	bro	3	43			0				2				1				0			1											0 2 1	
3	bro	3	43		2				2				1				2			2												2 2 1	
3	bro	3	43	1				1				1				1																	1 1 1
3	bro	3	43	2	2	2	2	0	0	0	0	2	2	2	2	2	2	2	2													2 0 2	2 0 2
3	bro	3	43				1				1				1				1														1 1 1
3	bro	245	43	1			1	0			0	1			2	1			1						7.1						7.1		1 0 1
3	bro	245	43	1			1	0			0	0			0	1			1					6.3	5.7					6.4	5.5		1 0 0
3	bro	245	43	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1						7		7.7		7.5		7	1 0 1	1 0 1
3	bro	245	43				1				0				1				0											5.7	5.8		1 0 1
3	bro	245	43				0				0				0				0											5.5	5.7		0 0 0
3	bro	245	43				1				0				1				1											5.7	5		1 0 1
3	bro	245	43	2	1			0	0			1	1			2	1							6	5.9	8.3	7					1 0 1	2 0 1
3	bro	245	43	1			2	0			0	1			1	1			1						5.9						5.9		1 0 1
3	bro	245	43	2				0				1				2								7.2	6.4								2 0 1
3	bro	245	43	0	1		0	0	0		0	0	0		2	0	1		0						5.7		6.8			6.4	6.3	1 0 0	0 0 0
3	bro	245	43	1				0				1				1								5.6	6.1								1 0 1
3	bro	245	43				2				0				0				2											6	6.3		2 0 0
3	bro	245	43	0	0	0	0	1	2	2	1	2	2	2	1	0	0	0	0	1	1			5.5	5.4	8	6.9	7.8	6.9	5.8	5.5	0 2 2	0 1 2
3	bro	245	43				1				1				0				1											6	5.8		1 1 0
3	bro	245	43	2		0	1	0		1	0	1		1	1	2		0	1					6.5	6.2			8.1	7.2	6.7	6.5	0 1 1	2 0 1
3	bro	245	43	1				0				0				1								6.4	5.7								1 0 0
3	bro	245	43				2				1				0				2											6.6	6.4		2 1 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
3	bro	245	43	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1					6.2	5.9	8.4	7.1	8.6	7.1	6.2	6	0 0 1	1 0 0
3	bro	245	43	2	0	0	2	0	0	0	0	0	1	1	0	2	0	0	2					6	6.1	8.1	7.1		6.9	6.1	6.2	0 0 1	2 0 0
3	bro	245	43	0				0				0				0								6.7	5.7								0 0 0
3	bro	245	43	1	1			0	0			0	1			1	0							6	5.6	7.6	6.5					1 0 1	1 0 0
1	iro	275	29				1				0				2				1											5.8	6		1 0 2
1	iro	275	29	2			2	0			0	1			1	2			2						5.5					6.7	5.6		2 0 1
1	iro	275	29				2				1				0				2											5.7	5.8		2 1 0
1	iro	275	29	2	0	0	2	0	1	1	0	1	1	1	1	2	0	0	2						5.2	8.3	7.1		7.6	5.7	6	0 1 1	2 0 1
1	iro	275	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					6.3	5.9	7.4	7.1		6.8	6.1	5.8	0 0 0	1 0 0
1	iro	275	29			2				0				1				2										8.4	6			2 0 1	
1	iro	275	29	1			0	0			1	1			1	1			0					6.1	6.4						6.4		1 0 1
2	iro	50	12	1	1	1	1	0	2	2	1	0	0	0	0	1	1	1	1		1	1										1 2 0	1 0 0
2	iro	50	12			2	2			0	1			1	2			2	2									7.8	6.6	6	6.1	2 0 1	2 1 2
2	iro	171	15	1			1	1			1	1			0	1			1					6.9	6.6					6.3	6.5		1 1 1
2	iro	171	15				1				0				1				1											6.1	6.3		1 0 1
2	iro	171	15		1	1	1		0	2	0		1	1	1		1	2	1			2				8.8	7.2	8.6	7.3	6.5	6.2	1 0 1	1 0 1
2	iro	172	15				2				1				0				2											6.2	6.1		2 1 0
2	iro	173	15				1				0				2				1											7.1	6.8		1 0 2
2	iro	269	15	1		1	0	0		0	0	1		0	1	1		1	0					5.3	5.8			7.3	6.1	5.8	6.1	1 0 0	1 0 1
2	iro	269	15	1			1	0			0	0			0	1			2					5.2	5.7					4.6	5.3		1 0 0
2	iro	269	15	1	1	1	2	0	2	2	0	1	1	1	1	2	1	1	2		2	2		5.8	6.4	7.9	7.2	8	7	5.7	6.5	1 2 1	1 0 1
2	iro	269	15	1				0				0				1								5	6.1								1 0 0
2	iro	269	15		0				0				2				0									8.3	6.4					0 0 2	
2	iro	32	30	2				0				0				2								6.3	6								2 0 0
3	iro	4	43		1	1	2		0	0	0		2	2	1		1	1	2													1 0 2	2 0 1
3	iro	4	43		0	1	0		0	0	0		0	1	0		0	0	0													0 0 0	0 0 0
3	iro	4	43	0	0	0		0	0	0		0	1	1		0	0	0			1	1										0 0 1	0 0 0
3	iro	4	43	1	2	2	1	0	2	2	0	2	2	2	1	1	1	1	1		3	3										2 2 2	1 0 2
3	iro	4	43	0			0	0			0	1			1	0			0														0 0 1
3	iro	4	43	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0													0 0 1	0 0 0
3	iro	4	43																														

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
3	iro	4	43			0				0				0				0														0 0 0	
3	iro	4	43	3		2	1	3		2	3	2		1	1	3		1	1			3										2 2 1	3 3 2
1	rec	276	29	2			1	0			0	0			0	2			1					5.7	5.2					5.9	5.4		2 0 0
1	rec	278	29	1	1	1	1	0	2	2	1	1	1	1	1	2	1	1	1		1	1			6.1	9.2	6.4	9.1	6.5	7.4	6.3	1 2 1	1 0 1
1	rec	278	29	1				0				0				1								6.4	6.6								1 0 0
1	rec	278	29	2			2	0			0	0			0	2			2					5.4	6.3					5.3	6.2		2 0 0
1	rec	278	29				0				0				1				0											5	5.1		0 0 1
1	rec	278	29	2				0				1				3								5.6	5.1								2 0 1
1	rec	277	29	1	1		1	0	2		0	0	0		0	1	1		1		1				5.1	7.7	6.1			5.7	5	1 2 0	1 0 0
1	rec	277	29	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0					6.4	6.2		6.8	8.1	7.1	6.3	6	0 0 0	0 0 1
1	rec	277	29	1	0	0	1	0	0	0	1	0	0	0	0	2	0	0	2					7.2	5.9	8.8	8	8.8	7.4	6.5	6.3	0 0 0	1 0 0
1	rec	277	29	1	2	2	1	1	0	2	1	1	0	1	0	1	2	2	1			1		6.5	6.2	8.8	7.3	8.7	7.3	6.8	6.8	2 0 0	1 1 1
1	rec	276	29	0				1				0				0								5.8	6.1								0 1 0
1	rec	276	29	1	1	1		0	0	0		1	1	1		1	1	1						4.5	5.2	7	7	6.5	6.4			1 0 1	1 0 1
1	rec	276	29			2	2			0	0			2	2			2	2									9.2	7.5	7.7	6	2 0 2	2 0 2
1	rec	279	29	2			2	0			0	2			2	2			2						6.1					6.1	6		2 0 2
1	rec	279	29		0				2				0				0				1					8.6	6.6					0 2 0	
1	rec	276	29	1	1			0	0			0	0			1	0							6.3	6.1	8.4	6.9					1 0 0	1 0 0
1	rec	276	29	1	0		1	0	0		0	0	0		0	1	0		1					6.1	6	8.3	6.8			6.1	5.4	0 0 0	1 0 0
1	rec	278	29	0			0	1			0	1			1	0			0					6.3	6.4					5.5	5.7		0 1 1
1	rec	278	29	2		1	1	1		0	0	0		0	0	2		1	1					6.1	5.6			7.3	6.1	6.3	5.7	1 0 0	2 1 0
1	rec	278	29				0				1				0				0											6.3	6.4		0 1 0
1	rec	278	29				1				0				1				1											5.6	5.7		1 0 1
1	rec	278	29	1	1			0	1			0	0			1	1							5.5	6.3	7.9	6.6					1 1 0	1 0 0
1	rec	278	29	1	1	1	1	0	1	1	0	1	2	2	1	1	1	1	1					5.4	5.4	8.3	6.4	8	6.4	5.5	5.5	1 1 2	1 0 1
1	rec	278	29	0		0	0	0		0	0	0		0	0	0		0	0					6	5.8			7.7	6.1	6	6.1	0 0 0	0 0 0
1	rec	278	29				1				0				0				2											6.1	6.2		1 0 0
1	rec	278	29	1				0				1				2									5.4								1 0 1
1	rec	278	29				0				0				0				0											6.3	5.7		0 0 0
1	rec	278	29	1		1	1	1		2	0	0		0	0	2		1	1			2		6.2	5.6			8.3	6.9		5.4	1 2 0	1 1 0
1	rec	278	29		1	1			0	0			1	1			1	1								7.8	6.4	7.2	6.5			1 0 1	

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1	rec	278	29				2				0				2				2											6.2	6.4		2 0 2
1	rec	278	29	1				0				1				1								6.1	5.8								1 0 1
1	rec	278	29	2				0				1				2								6.3	5.9								2 0 1
1	rec	278	29			1	1			0	1			1	0			1	1									8.1	6.5	6.4	6.1	1 0 1	1 1 0
1	rec	278	29				2				0				0				3											7.2	7.2		2 0 0
1	rec	278	29	5	0	1	1	0	2	1	0	1	0	1	0	6	0	1	1					6.1	6.8	7.7	6.9	7.9	6.9	5.7	5.6	0 2 0	5 0 1
1	rec	278	29	1	0	0	1	0	0	0	0	1	0	0	1	1	0	0	1					5.8	5.3	7.7	6.6		6.6	6.1	5.2	0 0 0	1 0 1
1	rec	278	29	1	0	0	1	1	1	1	1	0	1	1	0	1	0	0	1					5.3	6.5		7.2	8.1	7	5.6	6.2	0 1 1	1 1 0
1	rec	278	29	1				0				0				1									5.6								1 0 0
1	rec	278	29			1	1			1	1			1	1			1	1									8.7	6.9	6.6	6.8	1 1 1	1 1 1
1	rec	278	29	1	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1					5.7	6.1	8	6.5		6.7	5.4	6.3	0 0 0	1 0 0
1	rec	278	29		0	0	1		2	2	0		0	0	0		0	0	1	3	2						7	7.9	6.7	6.1	5.8	0 2 0	1 0 0
1	rec	278	29	1	1	1	2	0	0	0	0	0	0	0	0	1	1	1	2					6.3	6.3	8.3	6.9		7	6.4	6.3	1 0 0	1 0 0
1	rec	278	29			0	0			1	0			1	0			0	0									8.1	7.2	6.3	6.5	0 1 1	0 0 0
1	rec	278	29	1	1	1	0	0	0	0	1	2	2	2	2	0	0	0	0					5.6	5.7	7.8	6.9		6.8		5.8	1 0 2	1 0 2
1	rec	278	29	2	0	0		0	0	1		0	0	1		2	0	0						6.1	6.1	7.6	6.3	7.6	6.3			0 0 0	2 0 0
1	rec	278	29				1				0				1				1											5	5		1 0 1
1	rec	278	29		0		0		0		1		1		0		0		0							8	6.1			5.5	5.5	0 0 1	0 1 0
1	rec	278	29	0		0	0	0		0	0	1		1	1	0		0	0					4.5	5.5			8	6.6	4.8	5.9	0 0 1	0 0 1
1	rec	278	29	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0					5.5	5.5	7.2	6.6	7.4	6.6	5.5	5.2	1 0 1	0 0 1
1	rec	278	29	1	1	1	1	1	1	1	0	3	2	2	2	1	1	1	0						4.8	8.1	7	8	6.6	5.1	5.9	1 1 2	1 1 3
1	rec	278	29	1	0	0	1	1	2	1	1	1	2	2	1	1	0	0	0	2				7.3	6.7	9.4	7.7	9.5	7.6	7.7	6.5	0 2 2	1 1 1
1	rec	278	29			1				0				1				1										8.8	6.5			1 0 1	
1	rec	278	29	1	1	1	1	1	2	2	1	0	1	0	0	1	1	1	1	1	1			5.3	5.8	7.2	6.9	7.2	7	5.1	6	1 2 1	1 1 0
1	rec	278	29	1				0				1				1								5.2	5.4								1 0 1
1	rec	278	29				0				1				0				0											5.2	6.2		0 1 0
1	rec	278	29				1				0				2				0											4.7	5.4		1 0 2
1	rec	278	29	2	1			0	0			1	1			2	1								5	7	6.3					1 0 1	2 0 1
1	rec	278	29				2				0				0				2											5.6	5.9		2 0 0
1	rec	278	29		1	1	1		1	0	0		0	0	0		1	1	1							8	6.5	7.5	6.7	5.3	5.7	1 1 0	1 0 0
1	rec	276	29				0				0				2				0											5.7	5.4		0 0 2

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1	rec	276	29	1	1	2	1	0	0	0	0	0	1	1	1	2	1	2	1					5.1	5.7		6.1	7.6	6.1		5.6	1 0 1	1 0 0
1	rec	276	29	2	0	0	1	0	2	2	0	0	0	0	0	2	0	0	1		1	1		6.6	6.2	8.4	7.7	8.3	7.7	6.3	6.4	0 2 0	2 0 0
1	rec	276	29	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1					6	5.5	7.4	6.3	7.8	6.1	6	5.7	0 0 1	1 0 1
1	rec	276	29	1	1	1	1	0	2	0	0	0	1	1	0	1	1	1	1		1			7.2	5.9		7.2	8.4	7.1	6.9	6.1	1 2 1	1 0 0
1	rec	276	29	1	1			1	1			1	1			1	1							6.2	6.4	7.7	7.5					1 1 1	1 1 1
1	rec	276	29		2				2				3				2				1					8.1	6.8					2 2 3	
1	rec	276	29			1	1			0	0			1	1			1	1									7.4	6.4	6.2	6.3	1 0 1	1 0 1
1	rec	276	29	1		1	1	0		0	0	1		0	1	1		1	1					7.7	6.1			8.8	7.2	7.5	6.3	1 0 0	1 0 1
1	rec	276	29	1	1	1		1	1	0		0	0	0		1	1	1						5.4	6	7.3	7.1	8	7.3			1 1 0	1 1 0
1	rec	276	29	2	1	1	2	0	1	0	0	1	1	0	0	2	1	1	1						5.8		6.5	7.8	6.4	5.7	6	1 1 1	2 0 1
1	rec	276	29	2	2		1	0	0		0	1	1		1	2	2		1						5.8	7.3	6.4			6.5	5.7	2 0 1	2 0 1
1	rec	276	29	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	2						5.8	7.3	6		6.1	6.2	5.4	0 0 0	1 0 0
1	rec	276	29				0				0				1				0											6.5	6.3		0 0 1
1	rec	276	29	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0					5.2	6.2		7.2	7.2	7.4	5.2	6.2	0 0 1	0 0 0
1	rec	276	29	1	0	0	1	0	2	2	1	1	2	2	0	1	0	0	1		1	2		6.4	6.2	8.2	6.3	8.4	6.7	6.3	6.5	0 2 2	1 0 1
1	rec	276	29	0	0	0	0	0	0	0	0	1	1	2	1	0	0	0	0					5.2	5.8	7.1	6.2	7.9	6.3	5.7	5.7	0 0 1	0 0 1
1	rec	276	29	0	1			0	0			0	1			0	1							6.1	5.7	7.6	6.8					1 0 1	0 0 0
1	rec	276	29	0	0			0	0			2	2			0	0							5.6	5.8	8	6.9					0 0 2	0 0 2
1	rec	276	29			0	1			2	0			0	1			0	1			2						8.1	7	6.6	6	0 2 0	1 0 1
1	rec	276	29	1	0	0	1	0	0	0	0	1	1	1	1	1	0	0	1					5.4	5.8		6.4	6.4	6.5	5.2	5.8	0 0 1	1 0 1
1	rec	276	29		1	1	1		0	0	0		0	0	0		1	1	1								7.1		6.8	6.4	5.7	1 0 0	1 0 0
1	rec	276	29	2	2	2	1	0	0	0	1	1	1	1	1	2	2	2	1					6.2	6.1	8.1	7		6.6	6.6	5.8	2 0 1	2 0 1
1	rec	276	29	1	1	1	2	0	0	0	0	1	1	1	1	1	1	1	2					7.9	7	9.1	7.9	9	8	7.2	7.5	1 0 1	1 0 1
1	rec	276	29				2				0				2				2											5.6	6.1		2 0 2
1	rec	276	29	0		0		0		0		1		0		0		0						6.3	6.4			8.1	7.1			0 0 0	0 0 1
1	rec	276	29	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1						6	7.2	7	7.6	6.9	6.3	6.1	0 0 0	1 0 0
1	rec	276	29	1	1	0	1	0	1	0	0	0	1	1	0	1	1	0	1					5.8	5.8	7.5	6.9	8	6.6	6.5	5.9	1 1 1	1 0 0
1	rec	276	29	2	1	1	2	1	0	1	0	1	2	2	1	2	1	2	2						5.8	7.6	6.3	8.2	6.6		5.6	1 0 2	2 1 1
1	rec	276	29			0	1			0	0			1	1			0	1									8.1	6.6	4.6	5.1	0 0 1	1 0 1
1	rec	276	29			1	1			0	0			1	1			1	1									8.8	7.6	6.6	7	1 0 1	1 0 1
1	rec	276	29	0		0	0	0		1	0	3		2	2	0		0	0					5.5	5.5			7	6.3		5.2	0 1 2	0 0 3

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
1	rec	276	29	1	1	1	1	0	2	2	0	1	1	1	1	1	1	1	1	1	1			4.6	5.1		6.1		6.2	4.6	5	1 2 1	1 0 1
1	rec	276	29	0	0	0		0	0	0		1	1	1		0	0	0						5.3	5.9	7.4	6.9	7.8	6.8			0 0 1	0 0 1
1	rec	276	29		1		0		0		1		1		1		1		0							7.4	6.1			5.7	5.9	1 0 1	0 1 1
1	rec	276	29	0	1	1	0	0	0	2	0	0	0	1	0	0	1	1	0		1			5.5	5.3	7.3	6.6	7	6.7		5.3	1 0 0	0 0 0
1	rec	276	29	0	0	1		0	0	0		0	1	0		0	0	0						5.1	5.1	7.5	6.4	7.7	6.6			0 0 1	0 0 0
1	rec	276	29	1		0		0		0		0		0		1		0						6.6	5.5			7.9	6.2			0 0 0	1 0 0
1	rec	276	29				2				0				1				2											6.7	6.6		2 0 1
1	rec	276	29			0	0			1	0			1	2			0	0									8	6.7		6	0 1 1	0 0 2
1	rec	276	29	1				0				0				1								5.9	6.3								1 0 0
1	rec	276	29	0		0	0	3		0	3	0		0	0	0		0	0					6	6			7.5	7	5.8	6	0 0 0	0 3 0
1	rec	276	29				1				1				1				0											6	5.3		1 1 1
1	rec	276	29		1	0			0	1			0	0			1	0								8.8	7.3	8.8	7			1 0 0	
1	rec	276	29	1	1	2	2	0	2	2	0	1	0	0	0	1	1	2	2	2	2				6.3	8.5	7.2	8.5	7.4	7	5.8	1 2 0	1 0 1
1	rec	276	29		1	1	0		0	0	0		1	1	1		1	1	0							7.9	5.8	7.3	5.8	5.1	5	1 0 1	0 0 1
1	rec	276	29	0	0	0	1	0	3	2	0	1	1	1	0	0	0	0	1		3			6.8	5.9	8.4	6.8	8.1	7.4	6.7	5.9	0 3 1	0 0 1
1	rec	276	29		0	0			0	0			1	1			0	0								7.5	7.1	7.7	7.1			0 0 1	
1	rec	276	29		0	0			0	0			1	1			0	0									7.4	8.9	7.3			0 0 1	
2	rec	17	3				1				1				1				0											6.3	5.9		1 1 1
2	rec	17	3	1				1				1				0								6.4	5.8								1 1 1
2	rec	17	3		1	1			0	0			0	0			0	0								7	7	7.4	7.1			1 0 0	
2	rec	65	3	1	0			1	2			1	1			1	0			2					6.2	7.7	6.6					0 2 1	1 1 1
2	rec	65	3		0		0		2		3		1		1		0		0	1						8	6.1			5.4	5.9	0 2 1	0 3 1
2	rec	65	3	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1					6.1	5.8		7.1	8.4	7	6.3	5.8	1 0 0	1 0 0
2	rec	65	3	0				1				1				0								5.8	6.3								0 1 1
2	rec	65	3	2			2	0			0	1			1	2			2					6.1	6.3					6.4	6.4		2 0 1
2	rec	65	3	0				3				2				0								6.4	6.3								0 3 2
2	rec	65	3	0	0	0	0	1	2	0	0	1	1	1	1	0	0	0	0	1				5.7	5.9	7.4	6.2	7.4	6.4	5.1	5.4	0 2 1	0 1 1
2	rec	65	3	1			1	1			3	1			1	1			1					6.4	6.4					6.1	7.1		1 1 1
2	rec	65	3		1		0		0		0		2		1		1		0							8.7	7.2			7.1	6.7	1 0 2	0 0 1
2	rec	65	3				3				1				0				4											6.4	7		3 1 0
2	rec	65	3				1				1				1				1											5.8	5.6		1 1 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	65	3	2				1				1				2								7.4	6.5								2 1 1
2	rec	65	3	2			2	1			1	0			0	2			2					6.3	5.8					6.1	6		2 1 0
2	rec	65	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					6.1	5.7		6.6	7.8	6.4		5.9	0 0 0	0 0 0
2	rec	65	3	0	1	1	1	2	2	2	2	0	0	0	0	0	0	1	1	1	2	3	2	6.3	6.9	8.4	7.9	8.4	8.3	6.5	7	1 2 0	0 2 0
2	rec	65	3		1	0	0		0	0	0		1	1	0		1	0	0							7.9	6.9	8.1	6.8		6.3	1 0 1	0 0 0
2	rec	65	3	1				0				1				1								5.3	6.5								1 0 1
2	rec	65	3			0				0				1				0										8.8	6.9			0 0 1	
2	rec	65	3	1	1	1	1	0	0	0	0	1	2	1	0	1	1	1	1					6.6	5.6	8.5	7	8.9	7	6.6	5.5	1 0 2	1 0 1
2	rec	65	3	1				1				0				0								6.3	5.9								1 1 0
2	rec	65	3	1				2				0				1				1				7.4	6.8								1 2 0
2	rec	65	3				0				0				0				0											6.3	6.6		0 0 0
2	rec	65	3	0				0				0				0								6.3	6								0 0 0
2	rec	65	3				1				1				0				1											5.8	6.1		1 1 0
2	rec	65	3	3			3	1			0	0			1	3			3					6.6	6.6					6.6	6.5		3 1 0
2	rec	65	3	0				0				1				0								6.5	6.4								0 0 1
2	rec	65	3	1	1	1	2	0	2	2	0	0	0	0	0	1	1	1	2		1	1		6.5	6.5	8.7	6.5	8.5	6.3	6	5.8	1 2 0	1 0 0
2	rec	65	3	3				1				1				3								6.3	6.3								3 1 1
2	rec	65	3				0				0				1				0											5.7	5.9		0 0 1
2	rec	65	3	2				1				1				2								6.9	6.5								2 1 1
2	rec	65	3				0				0				0				0											5.2	6		0 0 0
2	rec	65	3	3				0				0				3								6.3	6.1								3 0 0
2	rec	65	3	2			2	0			0	2			1	2			2					5.8	6.4					6	6.3		2 0 2
2	rec	65	3				0				1				1				0												6.6		0 1 1
2	rec	65	3				2				1				1				2											7.4	6		2 1 1
2	rec	65	3				1				0				0				1											5.5	6.4		1 0 0
2	rec	65	3				2				0				1				2											5.7	5.7		2 0 1
2	rec	65	3		3	2	3		2	2	1		1	2	1		3	2	3		3	2				9	7.7	9.2	7.8	7.8	7.6	3 2 1	3 1 1
2	rec	65	3				1				1				0				1											6.5	5.4		1 1 0
2	rec	65	3	3	3	3	3	1	2	2	1	3	2	2	2	3	3	3	3		2	2			6.8	8	7.6		6.6	6.6	7.1	3 2 2	3 1 3
2	rec	65	3	1		0		0		0		0		1		1		0						6	5.8			8.4	6.8			0 0 1	1 0 0
2	rec	65	3		0	0	0		0	0	1		1	1	1		0	0	0							7.6	6.8	7.6	6.7		5.6	0 0 1	0 1 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	65	3	1	1		1	0	2		1	1	2		0	1	1		1		2			5.9	6	8.1	7			5.8	6.1	1 2 2	1 0 1
2	rec	65	3	2			2	0			0	0			0	3			2					6.8	6					6.5	6.2		2 0 0
2	rec	65	3	0	1	1	0	1	2	2	0	0	1	0	0	0	1	1	0		1	1		6.5	6.4	8.9	6.4	8.9	6.5	6.5	6.5	1 2 1	0 1 0
2	rec	65	3		0	0			0	0			0	0			0	0								8.9		8.9				0 0 0	
2	rec	65	3	1	2	2	1	0	0	0	0	0	0	0	0	1	2	2	1					6.8	6.1	8.6	6.7	8.8	6.6	6.9	5.9	2 0 0	1 0 0
2	rec	65	3		0				0				0				0									7.2	5.7					0 0 0	
2	rec	65	3	2	3			0	0			1	2			2	3							5.4	6.7		7.4					3 0 2	2 0 1
2	rec	65	3				1				0				1				1											6.3	6.4		1 0 1
2	rec	65	3				2				1				0				2											6.6	5.8		2 1 0
2	rec	65	3		0	0			0	0			0	0			0	0								8.3	6.5	8.1	6.6			0 0 0	
2	rec	65	3	2	1	1	2	0	0	0	0	0	1	0	0	2	1	1	2					8.1	7.4	9.3	7.2	9.1	7.3	7.3	6.1	1 0 1	2 0 0
2	rec	65	3	3				0				1				4								7.1	6.6								3 0 1
2	rec	65	3	0			1	1			1	1			0	0			1					6.4	5.9					5.6	5.5		0 1 1
2	rec	65	3	1			1	0			0	0			0	1			1					6.2	5.8					6.4	6.2		1 0 0
2	rec	65	3	3			3	0			0	1			1	5			5					6.5	6.4					6.8	6.5		3 0 1
2	rec	65	3	2				1				0				2								5.7	5.5								2 1 0
2	rec	65	3				2				0				1				2											6.3	6.4		2 0 1
2	rec	65	3	2	2	2	2	0	2	2	1	0	0	0	0	2	2	2	2		3	3		6.1	5.2	7.7	6.4	7.8	6.8		5.9	2 2 0	2 0 0
2	rec	65	3	0	0		0	1	0		1	1	2		0	0	0		0					6	5.5	7.7	6.4			6.4	5.5	0 0 2	0 1 1
2	rec	65	3	1			0	0			0	0			1	0			0					5.9	6.1					6.3	5.7		1 0 0
2	rec	65	3				0				0				0				0											5.2	5.4		0 0 0
2	rec	65	3				0				0				2				0											5.1	5.8		0 0 2
2	rec	65	3				2				1				1				2											6.1	6.4		2 1 1
2	rec	65	3				1				0				2				1											7	5.8		1 0 2
2	rec	65	3			1				2				0				1				1						8.7	7.1			1 2 0	
2	rec	65	3		0				3				0				0									7.4	7.4					0 3 0	
2	rec	65	3				1				1				0				1											6.6	6.8		1 1 0
2	rec	65	3				2				1				1				2											7	6.5		2 1 1
2	rec	65	3	0	0	0		0	0	2		0	0	0		0	0	0				1		6.4	6.1	8.6	7.2	8.7	7.4			0 0 0	0 0 0
2	rec	65	3			0				0				0				0										7.5	7.1			0 0 0	
2	rec	65	3	1				1				1				1								5.8	6.5								1 1 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	65	3	1			1	2			0	0			0	1			1	1				6.8	6					6.3	6		1 2 0
2	rec	65	3	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0					5.8	6.4	8.5	6.7	8.5	6.8		6.4	1 0 1	0 0 1
2	rec	65	3				3				0				0				4											5.6	6.9		3 0 0
2	rec	65	3		0				0				2				0									8.5	6.8					0 0 2	
2	rec	65	3	1				1				0				1								5.9	6.3								1 1 0
2	rec	65	3	0	0			1	2			0	0			0	0				1			5.6	5.8	7.9	6.6					0 2 0	0 1 0
2	rec	65	3	1				0				1				1								5.9	5.9								1 0 1
2	rec	65	3				0				1				1				0											7.2	7.4		0 1 1
2	rec	65	3				2				1				1				2											6.8	6.1		2 1 1
2	rec	65	3	1			0	0			0	1			1	1			0					5.7	6.2					5.6	6.1		1 0 1
2	rec	65	3				1				0				1				1											6.1	5.8		1 0 1
2	rec	65	3	0			0	0			0	0			0	0			0					5.5	5.4					5.9	5.2		0 0 0
2	rec	65	3	1				0				1				1								5.1	6.2								1 0 1
2	rec	65	3				0				0				0				0											6.1	5.7		0 0 0
2	rec	65	3			1				0				0				1										7.8	7.3			1 0 0	
2	rec	65	3	2	1	1	2	0	0	0	0	0	0	0	0	2	1	1	2					6.4	6.2	8.4	7.1		7.3	6.8	6.5	1 0 0	2 0 0
2	rec	65	3	0	1			1	2			1	1			0	1				1			5.6	6.4	8.5	6.5					1 2 1	0 1 1
2	rec	65	3	0	0			0	0			1	0			0	0							6.1		8.4	6.8					0 0 0	0 0 1
2	rec	65	3		1				0				1				1									7.6	5.9					1 0 1	
2	rec	65	3	2	2	2	2	3	0	0	1	1	2	1	0	2	2	2	2					6.8	6.6	7.6	7		6.9	6.7	6.4	2 0 2	2 3 1
2	rec	65	3		1	0	0		3	2	1		0	0	0		1	0	0			2				8.1	7.5	7.8	7.4		7.2	1 3 0	0 1 0
2	rec	65	3	2		0		0		2		0		0		2		0				3		5.8	5.8			7.9	6.7			0 2 0	2 0 0
2	rec	65	3		1	1	1		2	2	1		0	0	0		1	1	1		1	1				8.2	7.1	8.2	7.2	6.7	6	1 2 0	1 1 0
2	rec	65	3	0	0			1	2			0	0			0	0				3			6.7	5.7	8.8	6.8					0 2 0	0 1 0
2	rec	65	3	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0					6.6	6.3	7.9	7.3	7.4	7.4	6.6	6.1	0 0 1	0 1 1
2	rec	65	3		1				0				0				1									7.9	6.6					1 0 0	
2	rec	65	3	0		0	0	3		1	3	0		0	0	0		0	0					6.7	6.4				7.3	6.5	6.5	0 1 0	0 3 0
2	rec	65	3	2	2	2	2	0	2	2	1	0	0	0	0	2	2	2	2		3	3			6.4	8.4	7.4	9.1	7.3	6.7	6.2	2 2 0	2 0 0
2	rec	65	3	1	0	0		0	0	0		0	0	0		0	0	0						5.4	5.7	6.6	6.1	7.1	6.1			0 0 0	1 0 0
2	rec	65	3	2	2	2	2	0	0	0	0	1	1	1	1	2	2	2	2					6.6	6.2	8.2	7		7	6.8	6.1	2 0 1	2 0 1
2	rec	65	3	2	2			1	2			0	1			2	2				1			6	5.5	7.6	6.3					2 2 1	2 1 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
2	rec	65	3	1	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1					6.7	6.9		8.1	9.4	8.2		7.1	0	0	1	1	0	0
2	rec	65	3	1	0	0	2	0	0	0	1	0	0	0	0	1	0	0	2					5.9	6.3	8	7.3	7.9	7.7	6.1	6.6	0	0	0	1	0	0
2	rec	65	3	1	0			1	2			0	0			1	0				1			5.5	6.3	7.8	7.4					0	2	0	1	1	0
2	rec	65	3	0	0	1	0	1	2	0	1	1	1	1	0	0	0	1	0		1			5.9	6.5	9.1	7.5	8.9	6.4	5.8	6.3	0	2	1	0	1	1
2	rec	65	3	1			1	0			0	0			0	1			1					5.9	6.5					6.1	6.5				1	0	0
2	rec	65	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0					7.3	6.3	8.7	7.2	8.4	7.1		6.3	0	0	1	0	0	0
2	rec	65	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0					5.5	5.3	8.1	6.7		7.1		5.8	0	0	1	0	0	0
2	rec	65	3	0	0	0	0	1	1	0	1	1	1	2	0	0	0	0	0					5.9	5.3	7.9	7.4	7.8	7.2		5.8	0	1	1	0	1	1
2	rec	65	3	2	0			0	0			2	2			2	0							5.5	5.4	8.3	6.4					0	0	2	2	0	2
2	rec	65	3	2	0	0	3	0	0	0	0	2	2	2	1	2	0	0	3					6.7	6.5	8.8	7.6	8	7.2	6.2	6.3	0	0	2	2	0	2
2	rec	65	3	1	1	1	1	0	0	0	1	1	1	1	0	1	1	0	1					6.1	5.6	8.9	6.9	8.8	6.9	5.7	5.7	1	0	1	1	0	1
2	rec	65	3	1	0		2	0	0		0	2	0		2	1	0		2					5.7	6.5	8.8	7			5.9	6.8	0	0	0	1	0	2
2	rec	65	3	1	0	0		0	0	0		1	0	0		1	0	0						5.6	5.7	8.2	6.9	8.1	6.8			0	0	0	1	0	1
2	rec	65	3	2	0	1	1	0	2	2	1	1	1	1	2	2	0	1	1		2	2		6.6	5.5	8.2	6.3	8.3	6.2	6.6	5.8	0	2	1	2	0	1
2	rec	65	3	1	0		1	0	0		0	1	1		1	1	0		1					5.4	5.8	8	6.3			5.8	5.6	0	0	1	1	0	1
2	rec	65	3	0	0	0		0	0	0		0	0	0		0	0	0						5.9	6.1	8.1	6.9	8.1	6.7			0	0	0	0	0	0
2	rec	65	3	1	1		0	1	2		0	0	1		0	1	1		0		1			6.9	6.2	8.6	7			6.8	6	1	2	1	1	1	0
2	rec	65	3	1	1	1	0	1	0	0	1	0	1	1	0	1	1	1	0					5.2	6.1	7.9	6.6	7.9	6.4	5.6	6.4	1	0	1	1	1	0
2	rec	65	3				1				0				0				1											6.7	6.4				1	0	0
2	rec	65	3	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0					5.1	5.9	7.5	6.5	8.2	6.5	5	6	0	0	1	0	0	1
2	rec	65	3		1	1			0	0			1	1			1	1								8.2	6.7	8.3	6.9			1	0	1			
2	rec	65	3		1			0				2				0										9	6.3									0	2
2	rec	65	3		1	1	1		0	1	0		1	1	1		1	1	1							8.3	6.8	8.2	6.9	6.3	6.1	1	0	1	1	0	1
2	rec	65	3	1			2	0			0	1			1	1			2					6.7	6.2					6.6	6				1	0	1
2	rec	65	3	1	2	2	1	1	2	2	1	0	1	1	0	1	2	2	1		2	1		7	6.3	8.8	7.6	8.8	7.5	6.7	6.8	2	2	1	1	1	0
2	rec	65	3	0	0	0	0	1	1	2	1	0	1	1	0	0	0	0	0			2			5.1		5.9	8	6.2	6.5	5.5	0	1	1	0	1	0
2	rec	65	3		1				0				1				1									8.7	7.5					1	0	1			
2	rec	65	3		0	0			0	0			1	0			0	0								7.8	6.3	8.1	6.1			0	0	1			
2	rec	65	3	2	0	0		0	0	0		2	2	1		2	0	0						6.8	5.8	8.6	6.8	8.6	6.7			0	0	2	2	0	2
2	rec	65	3	1				0				0				0								6.6	5.3										1	0	0
2	rec	65	3	2			2	1			0	0			0	2			2					5.5	6.3					6	6.1				2	1	0
2	rec	65	3			1	1			0	1			2	1			1	1									7.7	6.5	6.1	5.9	1	0	2	1	1	1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	65	3	0		0	0	1		0	1	0		0	0	0		0	0					5.5	6.2			7.6	6.8	5.9	6.2	0 0 0	0 1 0
2	rec	65	3		1	1	1		2	2	2		0	0	0		1	1	1		2	1	1			9	7.9	9	7.7	6.6	6.5	1 2 0	1 2 0
2	rec	65	3	1	0	0	2	0	0	0	0	0	0	0	0	1	0	0	2					7.1	6.3	8.5	7.1	9	7.1	7.7	6.7	0 0 0	1 0 0
2	rec	65	3	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0					5.7	5.1	7.4	6.6		6.4	5.4	5.4	0 0 1	0 0 1
2	rec	65	3	1	0		1	0	0		0	0	1		1	1	0		1					5.8	5.8	7.6	6.6			6.3	5.4	0 0 1	1 0 0
2	rec	65	3	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1					6.1	6	8.9	6.7	9	6.6	6.4	5.8	0 0 1	1 0 1
2	rec	65	3	2	2	2	2	2	2	2	1	1	0	1	1	3	3	3	3	3	3	3		7.7	6	9.6	7.2	10	7.4	7	6.4	2 2 0	2 2 1
2	rec	65	3		2	2			2	2			0	0			2	2			2	2				8.2	7.3	8.6	6.8			2 2 0	
2	rec	65	3			2				0				0				2										7.2	6.7			2 0 0	
2	rec	65	3	1				1				0				1				6	6												1 1 0
2	rec	65	3			1	1			0	1			0	1			0	1									7.6	7	6	6.1	1 0 0	1 1 1
2	rec	65	3	2	1	1		1	2	0		0	1	0		2	1	1			1			7.2	6.3	10.1	6.8	9.8	6.7			1 2 1	2 1 0
2	rec	65	3	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1					6.3	5.8	8.7	7.4	8.9	7.6	6	6.4	1 0 0	1 0 0
2	rec	65	3			0				2				0				0				1						8	6.7			0 2 0	
2	rec	65	3		0	1			0	0			1	1			0	0								8	6.8	7.5	6.7			0 0 1	
2	rec	65	3	2	1	2	1	0	1	1	0	2	1	1	1	2	1	2	1					5.3	5.5		6.6	7.6	6.7	6	5.7	1 1 1	2 0 2
2	rec	65	3		0	0	0		0	0	1		0	0	0		0	0	0							8.7	7.2	8.7	7.1	6.2	6	0 0 0	0 1 0
2	rec	65	3	2	0	0	2	0	0	1	0	1	1	1	0	3	0	0	3					6.9	6.5	9.1	7.1	9	7.4	7.5	6.4	0 0 1	2 0 1
2	rec	65	3	2	2	2	2	0	2	2	1	0	2	2	0	2	2	2	2		4	4		7	5.9	9	6.9	9	6.7	7	6.2	2 2 2	2 0 0
2	rec	65	3	2		2		0		0		0		0		2		2						6.4	5.9			8.5	7.2			2 0 0	2 0 0
2	rec	65	3	0			0	0			0	0			0	0			0					5.9	6					6	6.1		0 0 0
2	rec	65	3		0	0			0	0			0	0			0	0								7.8	6.5	7.7	6.4			0 0 0	
2	rec	65	3	1		0	1	4	0	0	4	0	0	0	0	1	0	0	1					6	6.1	7.8	6.4	7.7	6.7	6.1	6.3	0 0 0	1 4 0
2	rec	65	3	1			1	1			1	0			0	1			1					7	5					7	5.2		1 1 0
2	rec	65	3		1				0				0				1									8.2	6.5					1 0 0	
2	rec	65	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					5.1	5.5	7.5	6.6	7.6	6.6		5.6	0 0 0	1 0 0
2	rec	65	3	2	2	2	2	0	2	2	1	1	2	2	1	3	2	2	3		3	3	1	6.6	6.5	8.6	7.1	8.9	7.3	6.4	7	2 2 2	2 0 1
2	rec	65	3	2	0	1	2	1	0	2	0	0	0	0	0	2	0	1	2			1		6.6	6.3	8.5	6.4	8.4	6.6	7.1	6.1	0 0 0	2 1 0
2	rec	65	3	0	1			0	0			0	1			0	1								5.9	7.9	7.3					1 0 1	0 0 0
2	rec	65	3	1	1	1	1	0	0	0	0	1	1	1	0	1	1	1	1		1			6.4	5.5	9.8	6.9		7.1		5.8	1 0 1	1 0 1
2	rec	65	3	1	1	1	1	0	2	0	1	0	0	0	0	1	1	1	1					6.6	6.1	8.1	6.8	8.3	7.1	6.7	5.9	1 2 0	1 0 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	65	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					6	5.7	8.5	6.8	8.6	6.8	6	5.8	0 0 0	0 0 0
2	rec	65	3	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0					5.7	5.1	7.9	6.8		6.8	6	5.4	0 1 1	0 0 1
2	rec	65	3	2	2	2	2	0	0	0	0	1	0	0	0	2	2	2	2							7.5		7.5		5.7		2 0 0	2 0 1
2	rec	65	3	2	1			0	0			0	0			2	1								6.4	8.1	6.8					1 0 0	2 0 0
2	rec	65	3			1	2			0	1			2	0			1	2									8.6	7	6.1	5.7	1 0 2	2 1 0
2	rec	65	3	2	1	1	2	0	0	0	0	1	0	0	0	2	1	1	2						5.5	7	5.8	7.2	6.1	6	5.6	1 0 0	2 0 1
2	rec	65	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					6	6	8	6.6	7.9	6.3	6.1	5.5	0 0 0	0 0 0
2	rec	65	3	1		1		0		0		0		0		1		1						5.9	6.4			8.4	6.5			1 0 0	1 0 0
2	rec	65	3			0				2				1				0				1						8.7	6.9			0 2 1	
2	rec	65	3				1				1				0				1											5.9	5.7		1 1 0
2	rec	65	3	1				0				0				1								5.3	5.2								1 0 0
2	rec	65	3	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1					5.5	5.9	8.4	7.2	7.6	7.1	6.2	6.4	1 0 0	1 0 0
2	rec	65	3	1	1	0		0	2	2		2	1	1		1	1	0			3	3			5.8	7.1	7.4	7.2	7.7			1 2 1	1 0 2
2	rec	265	3	1	0	0	2	0	2	0	0	1	0	0	1	1	0	0	2		2			6.7	6.2	9.2	6.9	8.6	6.9		6.1	0 2 0	1 0 1
2	rec	42	12	1			1	1			1	1			1	1			1														1 1 1
2	rec	42	12	1	2	2		1	2	2		1	1	1		1	2	2			1	1										2 2 1	1 1 1
2	rec	42	12	1	1	1	1	1	2	2	1	0	0	0	0	0	0	0	0		1	1										1 2 0	1 1 0
2	rec	42	12	2		0	2	3		2	2	1		1	1	3		0	2			3	3									0 2 1	2 3 1
2	rec	42	12	1	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0					5.6	5.5	7.8	6.4	7.4	6.2	5.5	5.6	0 0 1	1 0 1
2	rec	42	12		0	0			0	0			1	1			0	0								7.6	6.2	7.5	6.3			0 0 1	
2	rec	42	12	2	2	2	2	0	2	0	0	1	0	1	0	2	2	2	2		3				6.8	7.4	7.4	7.5	6.9	5.7	6.6	2 2 0	2 0 1
2	rec	42	12	1	1	1	1	1	2	2	2	0	0	0	0	1	1	1	1		2	2	3	6.2	6.5	8.2	7.7	8.6	7.7	6.6	6.1	1 2 0	1 1 0
2	rec	42	12	2	1	1	1	0	2	2	0	1	1	1	1	2	1	1	1		1	1		6.2	5.5	7.7	6.9	7.6	7	6.6	5.4	1 2 1	2 0 1
2	rec	42	12	1	1	1	1	0	2	2	0	1	1	1	1	1	1	1	1		2	2		6.8	6.1	9.4	7.6	9.4	7.6	6.4	6.1	1 2 1	1 0 1
2	rec	42	12		3	3	2		2	2	1		1	2	1		3	3	2		3	3				8.9	7.4	8.9	7.4	6.9	6.3	3 2 1	2 1 1
2	rec	42	12			2				2				1				2				3						8.8	6.9			2 2 1	
2	rec	42	12	1	1	1	1	1	2	2	3	1	2	2	1	1	1	1	1		2	3		7.5	6.3	9.5	7.4	9.5	7.3	7.8	6.3	1 2 2	1 1 1
2	rec	42	12	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1					7.7	5.8	8.5	6.8	8.8	6.8	7.1	6	1 0 0	1 1 0
2	rec	42	12	1	1	1	0	0	0	0	0	0	1	0	1	0	0	0	0					5.9	6.8	8.4	7.2	8.5	7.3	5.8	6.5	1 0 1	1 0 0
2	rec	42	12		2	2			2	2			0	0			2	2			2	2				8.3	6.4	8.3	6.6			2 2 0	
2	rec	42	12			1	1			2	0			1	0			1	1			1						8.1	6.4	6	5.5	1 2 1	1 0 0

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	42	12	1		1	0	0		2	0	0		1	0	0		1	0			1		6.5	5.5			8.2	6.5	6.5	5.9	1 2 1	1 0 0
2	rec	42	12	1	0			0	2			1	1			1	0				1			6.3	5.9		6.7					0 2 1	1 0 1
2	rec	43	12			3	1			0	0			1	1			4	2									8.1	6.4	6.8	5.8	3 0 1	1 0 1
2	rec	43	12	2	2	2		0	0	0		0	1	1		2	2	3						5.5	5.8	7.2	6.4	7.5	6.5			2 0 1	2 0 0
2	rec	43	12				1				1				0				1											7	5.8		1 1 0
2	rec	43	12	2		0	2	0		0	0	1		0	1	2		0	2													0 0 0	2 0 1
2	rec	43	12				2				0				0				2														2 0 0
2	rec	43	12				1				0				0				1														1 0 0
2	rec	43	12	2			2	0			0	0			0	3			3														2 0 0
2	rec	43	12	2			1	0			0	0			0	2			1														2 0 0
2	rec	43	12	1	0			0	0			2	2			0	0															0 0 2	1 0 2
2	rec	43	12				2				1				1				2														2 1 1
2	rec	43	12	1				1				1				0																	1 1 1
2	rec	43	12				1				1				1				1														1 1 1
2	rec	43	12	1				0				1				1																	1 0 1
2	rec	43	12	1				0				1				0																	1 0 1
2	rec	43	12	1				1				1				0																	1 1 1
2	rec	43	12	2				0				1				2																	2 0 1
2	rec	43	12	1		0	0	0		0	0	1		1	1	0		0	0													0 0 1	1 0 1
2	rec	43	12	1	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0		1	1										0 2 0	1 0 0
2	rec	43	12	1			1	1			1	1			1	1			1														1 1 1
2	rec	43	12		1				2				0				1				1					8.3	7.3					1 2 0	
2	rec	43	12	3	3	3	3	1	2	2	0	1	1	1	0	3	3	3	3		2	1		7.4	6	8.8	6.6		6.6	7.2	6.1	3 2 1	3 1 1
2	rec	43	12		1	1	1		2	2	0		0	0	0		1	1	1		1	1				7.7	6.9	7.9	6.8	5.8	6	1 2 0	1 0 0
2	rec	43	12	3	2	2	3	0	1	1	0	0	0	0	0	3	2	2	3					7.4	6.1	8.1	6.4	7.7	6.2	7.2	6.1	2 1 0	3 0 0
2	rec	43	12		1	1			0	0			0	0			0	0								8	6.7	7.9	6.7			1 0 0	
2	rec	43	12	2	2	2	2	1	2	2	0	1	1	1	1	2	2	2	2		1	1		7.7	6.9		7.3	8.5	7.2	7.5	6.6	2 2 1	2 1 1
2	rec	43	12	2	1	1	1	1	2	2	0	0	1	0	0	2	1	1	2		3	2		6.7	5.8	7.8	7.1	7.6	6.9	6.1	5.5	1 2 1	2 1 0
2	rec	43	12		2	2	3		2	2	1		3	3	2		2	2	3		3	3				9.4	7.7	9	7.4		6.3	2 2 3	3 1 2
2	rec	43	12	2	1		1	0	2		0	0	1		1	2	1		1		2			7.6	5.7	8.4	6.6			6.7	5.6	1 2 1	2 0 0
2	rec	43	12		2	1			2	2			1	0			2	1			1	1				8.6	7.1	8.5	7.2			2 2 1	

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	43	12			0	1			0	0			1	1			0	0									8.6	7.1	6.7	6.2	0 0 1	1 0 1
2	rec	43	12	1	2	2	1	0	0	0	0	1	1	1	1	1	2	2	1					6.6	6.3	9	6.9	9	7.4	6.4	6.1	2 0 1	1 0 1
2	rec	43	12		1	1	1		0	0	0		2	2	1		1	1	1							9	7.2	9.1	6.6	6.5	5.8	1 0 2	1 0 1
2	rec	43	12		0				0				0				0									8.2	6.2					0 0 0	
2	rec	43	12			1	0			2	0			2	1			1	0			3						8.8	7.1	5.2	5.9	1 2 2	0 0 1
2	rec	43	12	0	0		1	0	0		0	1	1		1	0	0		1					5.4	6.1	7	6.4			6	6.3	0 0 1	0 0 1
2	rec	43	12	2		2	2	0		0	1	1		2	1	2		2	2					7.2	6			8.6	6.6	7.2	5.6	2 0 2	2 0 1
2	rec	43	12	1	0	0		0	2	2		1	2	1		0	0	0			1	1		6.2	5.9	8.1	7.6	8.2	7.3			0 2 2	1 0 1
2	rec	43	12		0		0		0		0		1		1		0		0							8	6.5			6.3	5.5	0 0 1	0 0 1
2	rec	43	12	0	0	1	1	0	0	0	0	1	1	1	1	0	0	0	0					5.9	6.1		7.1		7.1	6.1	6	0 0 1	0 0 1
2	rec	43	12	1			1	0			0	0			1	1			0					5.8	6.3					6.1	6.1		1 0 0
2	rec	43	12	0	0	0	0	1	2	2	2	1	1	1	1	0	0	0	0		1	1	1	6	5.4	8	6.4	7.8	6.6	6.2	5.4	0 2 1	0 1 1
2	rec	43	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					6.3	6.1	8.7	6.6	8.5	6.9	6.3	6	0 0 0	0 0 0
2	rec	43	12		1	1	1		0	0	1		1	1	1		1	1	1							8.2	5.6	8.2	5.7	6.3	5.7	1 0 1	1 1 1
2	rec	43	12		1	0			2	2			1	0			0	0			1	1				8.4	6.9	8.2	6.9			1 2 1	
2	rec	43	12	2			2	0			0	1			1	2			2												6.3		2 0 1
2	rec	43	12		1	1	1		2	2	1		1	2	1		1	1	1		3	3				9.1	6.6	8.5	6.9	6.1	5.4	1 2 1	1 1 1
2	rec	43	12	1	1	1	1	1	3	2	1	0	1	1	1	1	1	2	2			3		6.3	6.4	8.2	7.2		7	6.3	6.2	1 3 1	1 1 0
2	rec	43	12		0				0				1				0									9.2	7.1					0 0 1	
2	rec	43	12				0				0				1				0											5.1	6		0 0 1
2	rec	43	12	0		2	0	1		2	0	1		1	1	0		2	0			2		6	6			8.8	6.5	6.1	5.8	2 2 1	0 1 1
2	rec	43	12			1	1			2	1			0	0			1	1			1						8.2	7	4.3	6.2	1 2 0	1 1 0
2	rec	43	12		0	0			0	0			0	0			0	0								8.4	6.6	8	6.4			0 0 0	
2	rec	43	12			0				0				0				0										7.6	6.4			0 0 0	
2	rec	43	12		0	0	0		2	0	1		2	2	1		0	0	0		1					9.1	7.5	9.3	8	6.1	6.1	0 2 2	0 1 1
2	rec	43	12				1				0				0				1											6.4	6.1		1 0 0
2	rec	43	12		1				0				1				0									8.3	6.9					1 0 1	
2	rec	43	12	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0					6	5.7	8.1	7.4		7.4	5.8	6.1	0 0 1	0 0 1
2	rec	43	12	0	0		0	0	0		0	1	1		1	0	0		0					6.2	5.8	7	6			6.6	5.9	0 0 1	0 0 1
2	rec	43	12	1			1	0			1	0			1	1			1					6.1	6.4					6.4	6.4		1 0 0
2	rec	43	12	0	0			0	0			1	1			0	0							6	6.1	8.6	7					0 0 1	0 0 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	43	12	0				0				1				0								6.1	6								0 0 1
2	rec	43	12	2			0	0			1	1			0	2			0					7	6.4					7.2	6.6		2 0 1
2	rec	43	12	2	1			0	0			1	0			2	1							5.9	6.4	8.5	7					1 0 0	2 0 1
2	rec	43	12	0			0	1			3	0			0	0			0					6.5	6.8					6.6	6.8		0 1 0
2	rec	43	12		1		2		0		0		1		1		1		2							7.7	6.3			6.1	5.7	1 0 1	2 0 1
2	rec	43	12	0				0				1				0								6.7	6.8								0 0 1
2	rec	43	12		0	0	0		0	0	1		1	1	1		0	0	0							8.2	7.4		7.2		6.9	0 0 1	0 1 1
2	rec	43	12	1	0	0	2	0	0	0	0	1	0	0	0	1	0	0	2					7	6.8	8.3	7.6	8.3	7.7	7.2	6.8	0 0 0	1 0 1
2	rec	43	12	1	0	0	1	1	2	0	0	1	2	2	1	1	0	0	1		1				6.4		7.4		7.2		5.9	0 2 2	1 1 1
2	rec	43	12	0			0	1			3	0			1	0			0					5.9	6.8					5.9	6.8		0 1 0
2	rec	43	12		0		1		0		0		2		1		0		1							8.5	6.8			6.4	5.9	0 0 2	1 0 1
2	rec	43	12	1	1	1		1	2	2		1	0	1		1	0	0			1	1		6.1	5.9	8.5	6.5	8.4	6.8			1 2 0	1 1 1
2	rec	43	12	1	0		0	0	0		0	1	1		1	1	0		0					6.5	6.6	8.5	7.2			6.5	6.4	0 0 1	1 0 1
2	rec	43	12			1	2			2	0			2	2			1	2			2						8.5	7.4	5.5	6.3	1 2 2	2 0 2
2	rec	43	12	0	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0					5.9	6.3		7.6	8.7	7.4		5.9	0 0 0	0 1 1
2	rec	43	12		0	0			2	2			1	1			0	0			1	1				7.6	6.9	7.8	6.6			0 2 1	
2	rec	43	12	1		1	1	1		2	1	1		1	1	1		1	1			1		6.2	6			8	6.6	6.2	6.1	1 2 1	1 1 1
2	rec	43	12	0	0	0	0	1	0	0	1	1	2	2	1	0	0	0	0					6.5	6.4	7.1	6.9	7.6	6.9	6.6	6.4	0 0 2	0 1 1
2	rec	43	12	2				1				1				2								5.6	6								2 1 1
2	rec	43	12		1	1			0	0			1	1			0	0								7.3	6.1	7.5	6.1			1 0 1	
2	rec	43	12	2				0				0				2								5.9	5.8								2 0 0
2	rec	43	12	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0						5.8	8.5	7.3		7.3	6.5	6.3	0 0 1	0 0 1
2	rec	43	12	2			2	0			1	1			1	2			2					6.1	6.3					6.6	6.2		2 0 1
2	rec	43	12	1	1	1	0	1	2	2	1	1	1	1	1	1	1	1	0		1	2		6	6.2	8.7	6.8		6.8	6	6.2	1 2 1	1 1 1
2	rec	43	12				1				1				1				1											6.2	5.1		1 1 1
2	rec	43	12	1				0				1				1								6.4	6.2								1 0 1
2	rec	43	12	0	0		0	0	0		1	1	1		1	0	0		0					6.1	4.6	7.7	5.7			6.1	5.5	0 0 1	0 0 1
2	rec	44	12	1			2	2			2	1			1	1			2	1			1	6.7	6.2					7.1	6.3		1 2 1
2	rec	44	12	0				0				1				0								6	5.9								0 0 1
2	rec	44	12				1				1				1				1														1 1 1
2	rec	44	12	1				0				2				0																	1 0 2

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	44	12	1	2	2		0	2	2		1	1	1		1	2	2			1	1										2 2 1	1 0 1
2	rec	44	12				1				1				1				0											5.5	6.7		1 1 1
2	rec	44	12	1	1		1	1	0		0	1	1		1	1	1		1					5.7	6.1	7.6	6.4			6.1	6	1 0 1	1 1 1
2	rec	44	12		0		1		0		1		0		1		0		2							8	7.2			6.2	6.7	0 0 0	1 1 1
2	rec	44	12	1	2	2	1	1	3	2	1	1	2	1	1	2	2	2	2			3		7.4	6.7	9.8	7.7	9.8	7.8		6.8	2 3 2	1 1 1
2	rec	44	12	0	0	0	1	3	0	0	1	1	1	1	0	0	0	0	1					6	6.6	7.7	6.7	7.9	6.5	6	6.5	0 0 1	0 3 1
2	rec	44	12	0	0	0	1	1	2	2	0	1	1	1	1	0	0	0	1		1	1		6.5	6.6		7	7.9	7.6	6.3	6.3	0 2 1	0 1 1
2	rec	44	12	0	1			0	2			1	2			0	1				1			5.4	6.1	9.5	7.6					1 2 2	0 0 1
2	rec	44	12			1	1			0	0			1	1			1	0									7.8	6.7	6.5	6.1	1 0 1	1 0 1
2	rec	44	12	0		1		0		2		1		0		0		1				1			6.1			8.7	7.7			1 2 0	0 0 1
2	rec	44	12	2				0				2				2								6	6.1								2 0 2
2	rec	44	12	2				0				1				2								6.6	6.1								2 0 1
2	rec	44	12	3	2	2	2	0	3	3	1	1	1	1	1	3	2	2	2					6.7	6.6	8.8	7.2	9	7.2	6.4	6.3	2 3 1	3 0 1
2	rec	44	12			0				2				1				0				1						8.2	7.8			0 2 1	
2	rec	44	12			2				2				1				2				1						7.9	6.5			2 2 1	
2	rec	44	12			1	1			0	0			1	1			1	1									8.1	6.9	6.5	6.5	1 0 1	1 0 1
2	rec	44	12	0	0		1	0	0		0	1	1		1	0	0		1					5.2	5.5	7	6.8			5.4	4.7	0 0 1	0 0 1
2	rec	44	12	0	2	2	0	0	3	2	1	0	1	1	1	0	2	2	0			3			6	8	7.1	7.7	7		5.9	2 3 1	0 0 0
2	rec	44	12		0	0	0		0	0	0		1	1	1		0	0	0							7.7	6.7	7.8	6.8	6.3	6	0 0 1	0 0 1
2	rec	44	12	0				0				1				0								6	6.4								0 0 1
2	rec	44	12	1		1	1	0		2	1	1		1	1	1		1	1			1		6	5.9			7.6	6.9	5.6	6.1	1 2 1	1 0 1
2	rec	44	12			2				0				1				2										9	6.9			2 0 1	
2	rec	44	12			0	0			2	0			2	1			0	0			1						7.7	6.3	5.4	5.3	0 2 2	0 0 1
2	rec	44	12	2	1	0		0	2	0		1	1	1		2	1	0			1			6.1	5.1	8.1	6.1	8.5	6.5			1 2 1	2 0 1
2	rec	44	12			0				2				1				0				2						8.3	7.3			0 2 1	
2	rec	44	12			0	1			0	1			1	1			0	1									7.7	6.5	6.3	6.7	0 0 1	1 1 1
2	rec	44	12	1	1			2	2			1	2			1	1			1	1			5.4	5.4	8.3	6					1 2 2	1 2 1
2	rec	44	12				2				0				0				2											6.3	5.8		2 0 0
2	rec	44	12	1	1	1	0	0	0	2	1	1	1	0	1	1	1	1	0			1		5.9	5.8	8.1	7	7.7	6.9	5.6	5.8	1 0 1	1 0 1
2	rec	44	12	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0					5.1	6.1	7.6	6.8	7.9	6.8	5.8	6.4	0 0 0	0 0 1
2	rec	44	12	1	0			0	2			2	2			1	0				1			6	6.4	8.9	6.9					0 2 2	1 0 2

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	44	12			1	1			2	1			2	1			1	1			1						9.7	7.3	7.6	7.1	1 2 2	1 1 1
2	rec	44	12	0	1	1	1	2	2	2	2	1	1	1	1	0	1	1	1	3	3	3	3	6.4	5.8	8.6	7.3	8.4	7		5.5	1 2 1	0 2 1
2	rec	44	12		0	0			0	0			1	1			0	0								7.5	6.1	7.5	6			0 0 1	
2	rec	44	12	1			1	0			0	0			0	1			1					5.3	5.4					4.2	5		1 0 0
2	rec	44	12				1				1				1				1											5.2	5.8		1 1 1
2	rec	44	12	1	1	0	1	0	0	0	1	1	0	0	0	1	0	0	1					6.1	5.2	7.1	7.2	7	7.2	5.6	5.7	1 0 0	1 0 1
2	rec	44	12				2				0				1				2											6.2	6.4		2 0 1
2	rec	44	12	1	1			0	0			1	2			1	0							5.5	5	7.8	6.1					1 0 2	1 0 1
2	rec	44	12	2	2			0	2			1	1			2	2				2			5.9	6.2	7.7	6.6					2 2 1	2 0 1
2	rec	44	12	1			2	0			0	1			1	1			2					5.6	6.2					5.6	6.3		1 0 1
2	rec	44	12		0		1		2		3		1		1		0		1		1					7.5	7.3			6.1	6.5	0 2 1	1 3 1
2	rec	44	12	1	1		1	0	2		2	1	1		1	1	2		1		1		1	6.2	5.9	7.6	6.9			6.4	6.1	1 2 1	1 0 1
2	rec	44	12	1	0			0	0			1	1			1	0								6.2	8.5	7.5					0 0 1	1 0 1
2	rec	44	12	0	0			1	2			1	1			0	0				1			6.1	6.2	9	7.5					0 2 1	0 1 1
2	rec	44	12	2				0				1				2								6.1	5.5								2 0 1
2	rec	44	12	1		1		0		2		1		1		1		1				1		5.7	6			7.9	7			1 2 1	1 0 1
2	rec	44	12			0	2			0	0			0	1			0	2									7.9	6.4	6.1	5.7	0 0 0	2 0 1
2	rec	44	12				1				0				1				1											5.5	5.4		1 0 1
2	rec	48	12		1				0				0				0															1 0 0	
2	rec	48	12	1	1			0	0			0	0			0	0															1 0 0	1 0 0
2	rec	48	12	1				1				1				0																	1 1 1
2	rec	48	12	2		2		1		2		1		0		2		2				2										2 2 0	2 1 1
2	rec	48	12				2				0				1				2														2 0 1
2	rec	48	12		1	2			2	2			2	2			1	2			3	3				8.2	7.2	8	7.6			1 2 2	
2	rec	48	12		0				2				0				0				1					8.2	6.8					0 2 0	
2	rec	48	12	2		1	2	0		0	0	2		1	2	2		1	2					6.8	5.9			8.6	6.9	6.6	6.1	1 0 1	2 0 2
2	rec	48	12	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1					6	6.1	7.8	7.1		7.3		6.2	1 0 1	1 0 1
2	rec	48	12	0		0	0	0		2	0	0		1	0	0		0	0			1		6.2	5.8			8.1	7.1	6	6	0 2 1	0 0 0
2	rec	48	12		2		2		2		1		1		0		2		2		1					8.8	7.6			7.4	6.8	2 2 1	2 1 0
2	rec	48	12		1		2		2		1		0		0		1		2		2					8.9	7.2			6.5	6.4	1 2 0	2 1 0
2	rec	48	12			0	2			2	1			1	1			0	2			1						7.8	6.4	6.4	5.8	0 2 1	2 1 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	48	12	2			1	0			0	1			1	2			1					6.7	5.5					7.1	5.9		2 0 1
2	rec	48	12	1	1	2	1	1	2	2	0	0	1	1	0	1	1	2	0		1	2		6.3	6.1	7.9	7	8.1	7.2	6.5	5.9	1 2 1	1 1 0
2	rec	48	12	1				0				1				1								4.3	5.7								1 0 1
2	rec	48	12	1	2	2	2	0	1	3	0	1	1	1	1	2	2	2	2						6.2	7	6.7		6.9		6.2	2 1 1	1 0 1
2	rec	48	12	2	1	2	2	0	0	0	0	1	0	0	1	2	1	2	2					5.5	6.1	8.2	7	8.1	7.1	6	6.4	1 0 0	2 0 1
2	rec	48	12	0	0		0	0	0		0	1	1		1	0	0		0					5.7	5.5	7.5	6.8			6.1	5.8	0 0 1	0 0 1
2	rec	48	12	2			2	0			0	0			0	3			3					6.7	6.2					6.2	6		2 0 0
2	rec	48	12			2	2			2	1			1	1			2	2			1						7.8	7.5	5.7	6.8	2 2 1	2 1 1
2	rec	48	12	2				0				1				2								6.8	6.6								2 0 1
2	rec	48	12		1	1			2	2			1	1			1	1			2	2				9.1	7.2	9.1	7.1			1 2 1	
2	rec	48	12	0			0	0			1	0			0	0			0					5.5	5.8					6.1	6.1		0 0 0
2	rec	48	12	1			1	0			0	1			1	1			1					6.5	5.5					6.7	5.7		1 0 1
2	rec	48	12		1	1			0	0			1	1			1	1								7.9	7.4	8	7.1			1 0 1	
2	rec	48	12		2	2	2		0	0	0		1	1	1		2	2	2													2 0 1	2 0 1
2	rec	48	12			0	1			0	1			0	1			0	1									7.6	6.2	5.7	6	0 0 0	1 1 1
2	rec	48	12	1				0				1				1								6.2	5.5								1 0 1
2	rec	49	12				2				0				2				2														2 0 2
2	rec	49	12			1				2				2				0				1						7.8	6.7			1 2 2	
2	rec	49	12		1		2		2		0		1		1		1		2		1					8.6	7			6.5	6.2	1 2 1	2 0 1
2	rec	49	12		0	0	0		2	2	0		0	0	1		0	0	0		3	3				8.1	7.4	8.1	7.5	4.5	5.9	0 2 0	0 0 1
2	rec	49	12	2		2	2	1		2	0	1		1	0	2		2	2		1			6.8	6.4			8.8	7.8	6.3	5.7	2 2 1	2 1 1
2	rec	49	12	2	0	0	2	0	0	0	0	1	1	1	1	2	0	0	2					6.2	6.5	8.3	7.2	8.2	7.6	6	6.3	0 0 1	2 0 1
2	rec	96	12	0		0	0	1		0	0	1		2	1	0		0	0					6.5	6.1			8	6.8	6.7	5.9	0 0 2	0 1 1
2	rec	96	12	2				1				0				2								6.4	5.9								2 1 0
2	rec	96	12				2				1				0				2											6.2	6.1		2 1 0
2	rec	96	12	0			0	0			0	0			0	0			0					6.8	6.2					6.6	6.1		0 0 0
2	rec	96	12		2	2	1		0	0	1		2	2	1		2	2	1							7.7	6.7	7.7	6.3	6	5.9	2 0 2	1 1 1
2	rec	101	12	1				1				1				1								5.5	6								1 1 1
2	rec	101	12				1				0				1				1											6.1	5.7		1 0 1
2	rec	101	12			0	1			2	0			2	0			0	1			1							7.1	5.6	5.9	0 2 2	1 0 0
2	rec	96	12	1				0				1				1								5.8	6.4								1 0 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	21	15	0	0	0	0	1	2	2	1	1	2	2	1	0	0	0	0		1	1		6.3	7.2	7.2	6.7		6.8	6.9	5.9	0 2 2	0 1 1
2	rec	21	15			0				2				0				0				1						9.1	7.9			0 2 0	
2	rec	22	15	1	1	1	1	0	2	2	0	0	0	0	0	1	1	1	1		2	2		5.8	6.5	8.2	6.8	8.1	6.8	6	6.3	1 2 0	1 0 0
2	rec	23	15	2				0				0				3								6.7	6.3								2 0 0
2	rec	23	15	2				1				0				2								6.8	6.3								2 1 0
2	rec	23	15		1				2				2				1				1					9	7.1					1 2 2	
2	rec	23	15	1				1				1				1								5.3	6								1 1 1
2	rec	23	15				0				0				2				0											5.7	6.5		0 0 2
2	rec	25	15		0		0		0		0		0		0		0		0							8	6.5			7	5.5	0 0 0	0 0 0
2	rec	25	15				2				1				1				2											6.8	6.2		2 1 1
2	rec	25	15				1				1				2				1											6.5	6.3		1 1 2
2	rec	25	15	2				0				1				2								5.9	6.9								2 0 1
2	rec	25	15				1				0				1				0											6.7	5.7		1 0 1
2	rec	26	15	1			1	1			1	1			1	0			0					5.4	6.2					5.3	6		1 1 1
2	rec	27	15				2				0				1				2											6.1	6.2		2 0 1
2	rec	28	15	0				0				0				0								5.7	5.5								0 0 0
2	rec	28	15	0	0			0	0			1	0			0	0							5.7	6	7.3	6.7					0 0 0	0 0 1
2	rec	28	15				2				0				2				2											7.1	6.6		2 0 2
2	rec	29	15				2				0				2				2											6.2	6.1		2 0 2
2	rec	29	15	2				0				0				2								6.1									2 0 0
2	rec	30	15	1				0				1				1								6.3	6.1								1 0 1
2	rec	30	15	0			0	0			0	1			1	0			0					5.2	5.5					5.5	5.5		0 0 1
2	rec	30	15	1	1	1		1	2	1		0	0	0		1	1	1			1			6.5	7.1	7	7.1	7.6	7.2			1 2 0	1 1 0
2	rec	30	15				2				0				0				2											6.7	7		2 0 0
2	rec	30	15		0				0				0				0									8.6	7.1					0 0 0	
2	rec	30	15				1				0				1				0											6	6		1 0 1
2	rec	30	15		3	3			0	0			2	1			3	3								8.3	7.4	7.6	7.7			3 0 2	
2	rec	30	15	2			2	0			1	0			0	2			2					7	6.6					6.3	6.7		2 0 0
2	rec	30	15				2				0				1				2											6.3	6.5		2 0 1
2	rec	30	15				0				1				1				0											5.2	5.2		0 1 1
2	rec	30	15				0				1				2				0											7	7.3		0 1 2

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	30	15	2		0		0		2		1		0		3		0				1		6.3	6.8			8.9	7.4			0 2 0	2 0 1
2	rec	30	15	1				1				1				0									6.1								1 1 1
2	rec	30	15	1				0				1				1								5.6	6.2								1 0 1
2	rec	30	15	1				0				2				1								6.3	5.5								1 0 2
2	rec	30	15	1				1				0				1								6	7								1 1 0
2	rec	30	15	1				0				2				1								5.2	5.6								1 0 2
2	rec	30	15				1				0				0				1											5.8	6.1		1 0 0
2	rec	30	15	2				0				1				2								5.3	5.9								2 0 1
2	rec	30	15	1	2	2	1	0	2	2	1	1	1	1	1	1	2	2	1		1	1		6	6.1	7.7	7.5		7.1	6.5	6	2 2 1	1 0 1
2	rec	30	15	1			1	0			0	0			0	0			0					6	5.2					5.7	5.9		1 0 0
2	rec	30	15				1				0				1				1											6.2	5.6		1 0 1
2	rec	30	15	1				1				0				0								5.7	5.4								1 1 0
2	rec	30	15				2				0				1				2											7	5.7		2 0 1
2	rec	30	15	1			1	0			1	0			0	1			1					6.6	6.2					6.3	6.1		1 0 0
2	rec	30	15				3				0				2				4											7.5	6.6		3 0 2
2	rec	30	15	1				0				1				0								6.2	6.8								1 0 1
2	rec	30	15				2				0				1				2											6.4	6.7		2 0 1
2	rec	30	15	1				1				1				0								6.4	6.4								1 1 1
2	rec	30	15	1	1	1	1	0	0	0	1	2	2	2	1	0	1	1	0					6.1	6			7.7	6.7	7.5	6	1 0 2	1 0 2
2	rec	30	15			1				2				1				1				1						8.5	7.1			1 2 1	
2	rec	30	15			2	2			1	0			3	1			2	2									7.1	7	5.3	6.1	2 1 3	2 0 1
2	rec	30	15	1		2		1		2		0		1		1		2				1		6.3	6			8.1	6.9			2 2 1	1 1 0
2	rec	30	15	1				0				2				1								5.9	7								1 0 2
2	rec	71	15	1	2	2		0	0	0		2	2	2		1	2	2														2 0 2	1 0 2
2	rec	71	15	2		1	2	0		0	1	1		1	1	2		1	2					6.2	6			8.3	7.1		6	1 0 1	2 0 1
2	rec	71	15	2			2	1			1	0			0	2			2					6.2	6.4					6.4	6.4		2 1 0
2	rec	71	15	2				1				0				2								6.2	6.8								2 1 0
2	rec	71	15				3				0				0				4											6.5	6.8		3 0 0
2	rec	71	15	1				0				0				1								6.2	5.9								1 0 0
2	rec	71	15	2			2	0			0	1			1	2			2					6	6.9					5.6	7.1		2 0 1
2	rec	71	15	1				3				1				1								6.9	6.9								1 3 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	71	15				1				0				0				1											6.3	6		1 0 0
2	rec	71	15	1				0				1				1								5.7	5.6								1 0 1
2	rec	71	15	0				0				2				0								5.9	5.5								0 0 2
2	rec	71	15		2		3		2		0		2		1		2		3		3					9.4	7.4			7.3	5.7	2 2 2	3 0 1
2	rec	71	15	1				1				0				1								5.3	5.6								1 1 0
2	rec	71	15				0				1				0				0											6.5	5.9		0 1 0
2	rec	71	15				1				1				0				1											6.9	7		1 1 0
2	rec	71	15	2			2	0			0	0			0	2			2					6	6.1					6.1	6		2 0 0
2	rec	71	15	0			0	1			1	1			0	0			0					6	6.3					6.6	6.2		0 1 1
2	rec	71	15	2		0	2	0		2	1	1		2	1	2		0	2			1		6.3	6.8			8.1	7	5.6	6.6	0 2 2	2 0 1
2	rec	71	15	1			1	0			0	0			0	1			1					6	7.1					6.4	6.8		1 0 0
2	rec	71	15	1				0				0				1								5.8	5.7								1 0 0
2	rec	71	15	2				0				1				3								7.3	6.7								2 0 1
2	rec	71	15	0			0	0			0	1			1	0			0					6	6.6					5.9	6.4		0 0 1
2	rec	71	15	0				0				0				0								5.6	6.1								0 0 0
2	rec	71	15				2				0				1				2											6.2	7.1		2 0 1
2	rec	71	15	0				1				1				0								6.8	6.8								0 1 1
2	rec	71	15	1				0				0				1								6	7.1								1 0 0
2	rec	71	15				2				0				2				2											5.3	5.7		2 0 2
2	rec	71	15	2				0				1				2								6.5	6.5								2 0 1
2	rec	71	15	2				0				1				2								6.5	6.4								2 0 1
2	rec	108	15	1				0				1				1								6.6	6.3								1 0 1
2	rec	108	15	0				1				1				0								5.2	5.4								0 1 1
2	rec	170	15	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	1						5.8	7.6	6.7	7.7	6.7	6	6	0 0 0	1 1 0
2	rec	170	15				1				0				1				0											6.3	5.6		1 0 1
2	rec	170	15	2			3	0			4	0			0	2			3					6.6	6.3					6.8	6.8		2 0 0
2	rec	170	15	0				1				0				0								6.2	5.8								0 1 0
2	rec	262	15				0				0				1				0											5.6	5.8		0 0 1
2	rec	262	15				0				0				1				2												6		0 0 1
2	rec	262	15			0	0			0	0			0	1			0	0									7.6	7.2	5.7	5.3	0 0 0	0 0 1
2	rec	262	15				0				0				1				0											6	6.1		0 0 1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
2	rec	262	15	1			1	1			0	0			1	1			1					5.7	6.1					5.4	5.7		1 1 0
2	rec	262	15			1				0				1				1										8.2	6.8			1 0 1	
2	rec	262	15	2			2	0			0	1			1	2			2					6.5	6.1					5.9	6.1		2 0 1
2	rec	262	15				0				0				1				0											6.6	5.8		0 0 1
2	rec	262	15	1		1		0		0		0		1		1		1						5.3	5.1			8.4	6.9			1 0 1	1 0 0
2	rec	262	15	0				1				1				0								5.6	6.5								0 1 1
2	rec	262	15	2				0				1				3								6.7	6.8								2 0 1
2	rec	262	15				0				0				0				0											5.9	5.3		0 0 0
2	rec	262	15			0	1			0	0			2	1			0	0									8	7.1	6.5	6.1	0 0 2	1 0 1
2	rec	262	15	0				0				2				0								5.1	5.3								0 0 2
2	rec	262	15	0			1	1			1	1			1	0			0					6.5	7					5.6	6.5		0 1 1
2	rec	328	15	0		0	0	0		0	0	1		2	1	0		0	0					5	4.9			7.2	6.1	5.1	5.1	0 0 2	0 0 1
2	rec	93	29				0				1				1				0											5.7	5.7		0 1 1
2	rec	34	30		2	2	4		2	0	0		0	0	1		3	3	4		2					8.1	7.1	8.1	7.2	6.4	7.3	2 2 0	4 0 1
2	rec	34	30	2				0				1				2								7.2	6.4								2 0 1
2	rec	56	30				0				3				0				0														0 3 0
2	rec	57	30	2			2	1			3	1			1	2			2														2 1 1
2	rec	57	30			1				0				0				1														1 0 0	
2	rec	57	30	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0					6.6	6.1	8.3	6.9	8.3	7.1	6.8	6.1	0 0 1	1 0 1
2	rec	57	30	0			0	1			1	1			1	0			0														0 1 1
2	rec	64	30	2	1	1	1	1	0	0	1	1	2	2	1	2	2	1	1					6.5	6.6		6.7	8.3	7	6.6	6.2	1 0 2	2 1 1
2	rec	64	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						5.8	7.5	6.3	7.2	6.4		6.1	0 0 0	0 0 0
2	rec	64	30	0	0			0	0			1	1			0	0								5.7	8.1	6.6					0 0 1	0 0 1
2	rec	64	30	3	1	1	2	1	2	2	1	1	2	2	0	3	1	1	2		1	1		7.2	7.1	8.1	7.1	8.5	7.1	6.4	6.5	1 2 2	3 1 1
2	rec	57	30	2	1			0	2			0	0			2	1				1			5.8	5.8	7.9	6.6					1 2 0	2 0 0
2	rec	57	30		1	1			2	2			0	1			1	1			1	1				7.6	7	7.6	7			1 2 0	
2	rec	57	30		0				0				1				0									8.6	7					0 0 1	
2	rec	69	30		1	1			2	2			1	1			1	1			1	1				8.6	7	8.3	7.1			1 2 1	
2	rec	69	30			1	0			2	1			1	0			1	0			1						8.3	6.9		6.3	1 2 1	0 1 0
2	rec	69	30				0				2				1				0				2							7.2	7		0 2 1
2	rec	81	30		0				0				0				0								9.1	6.8					0 0 0	

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT			LAT		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
2	rec	86	63.3				0				0				0				0											6.4	5.5				0	0	0
2	rec	131	63.3	1			1	1			0	0			0	2			1					5.8	5.6					6.4	5.9				1	1	0
2	rec	160	63.3				2				0				1				2											7.3	6.4				2	0	1
2	rec	160	63.3	2				0				1				2								6.4	5.7										2	0	1
2	rec	160	63.3	2			2	0			1	1			0	2			2					5.7	6					5.9	6.1				2	0	1
2	rec	160	63.3	2		2		1		0		1		0		2		2							6			8.8	6.7			2	0	0	2	1	1
2	rec	251	63.3	1	1	1	1	1	0	0	0	0	1	0	0	1	1	0	0						5.5		5.9		6.1		5.5	1	0	1	1	1	0
2	rec	251	63.3	2	0	1	2	0	0	0	1	1	1	1	0	2	1	0	2						6.2	7.1	6.2		6.2	6		0	0	1	2	0	1
2	rec	251	63.3		1	0			0	0			1	1			0	0								8.2	7.2	9	7.1			1	0	1			
2	rec	251	63.3		1	1			0	0			1	1			1	1								8.5	6.6	8.6	6.2			1	0	1			
2	rec	325	63.3	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0						5.8	6.9	6.8		6.8	5	5.8	0	0	1	0	0	0
2	rec	325	63.3				1				0				1				1											6.1	5.1				1	0	1
2	rec	325	63.3	1				0				1				1								5.9	6.4										1	0	1
3	rec	2	43				0				0				1				0																0	0	1
3	rec	2	43	0	1	1	0	0	0	0	0	1	0	1	1	0	0	0	0													1	0	0	0	0	1
3	rec	2	43	1	1	1	1	0	0	0	1	1	1	1	0	1	1	1	1		1	1										1	0	1	1	0	1
3	rec	2	43	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1													1	0	1	1	1	1
3	rec	2	43	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0													0	0	0	0	0	1
3	rec	2	43		1	1			2	2			1	0			1	1			1	1										1	2	1			
3	rec	2	43	1		1	1	0		0	0	2		1	2	1		1	1													1	0	1	1	0	2
3	rec	2	43			0				0				1				0														0	0	1			
3	rec	2	43	0			0	0			0	1			1	0			0																0	0	1
3	rec	2	43	0		0	0	0		0	0	1		1	0	0		0	0													0	0		0	0	1
3	rec	2	43	1			1	1			1	1			1	1			1																1	1	1
3	rec	2	43	1	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0													1	0	0	1	0	1
3	rec	2	43	0			0	0			0	1			1	0			0																0	0	1
3	rec	2	43	2	3	3	2	1	2	2	1	1	2	2	1	2	3	3	2		3	3										3	2	2	2	1	1
3	rec	2	43			2	1			2	0			2	1			2	1			1										2	2	2	1	0	1
3	rec	2	43			0	0			2	0			1	0			0	0			1										0	2	1	0	0	0
3	rec	2	43			2	2			0	0			2	2			2	2			1										2	0	2	2	0	2
3	rec	2	43			0	1			0	0			1	1			0	1													0	0	1	1	0	1

RGN	Time	Pop.	Coun.	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				RT LAT		RT CENT		LT CENT		LT LAT		CENT	LAT
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
3	rec	2	43		2	2			2	2			1	0			2	2			2	2										2 2 1	
3	rec	2	43		1	1			2	2			1	1			1	1			1	1										1 2 1	
3	rec	2	43	1			1	0			0	1			1	1			1														1 0 1
3	rec	2	43	1	1		1	1	0		1	1	1		1						1											1 0 1	1 1 1
3	rec	2	43		1		1		2		1		1		1		1		1		1											1 2 1	1 1 1
3	rec	2	43	0			0	0			0	0			0	0			0														0 0 0
3	rec	2	43	0				0				2				0																	0 0 2
3	rec	2	43	2			2	1			1	1			1	2			2														2 1 1
3	rec	2	43	0			0	0			1	0			0	0			0														0 0 0
3	rec	2	43	0	1	1	0	0	0	0	0	1	1	1	1	0	1	1	0													1 0 1	0 0 1
3	rec	2	43	1				0				0				1																	1 0 0
3	rec	2	43	0	0	0	0	0	2	2	0	1	1	1	1	0	0	0	0		1	1										0 2 1	0 0 1
3	rec	2	43	0		0	0	0		0	0	1		1	1	0		0	0													0 0 1	0 0 1
3	rec	2	43				1				1				0				1														1 1 0
3	rec	2	43	0	1	1	0	0	0	0	3	1	1	1	1	0	1	1	0													1 0 1	0 0 1
7	rec	304	94	2	2	2	2	1	2	2	3	1	1	1	1	2	2	2	2		3	3		6.5	7			9	7.3	6.8	6.9	2 2 1	2 1 1
7	rec	304	94	0				1				2				0								6.5	6.3								0 1 2

APPENDIX D
DATA FOR FOSSIL INCISOR SAMPLE, SORTED BY SITE.

ID	Region	Mar ridge				Tubercles				Curvature				ASU shov				ASU tub				R LAT		R CEN		L CEN		L LAT		Right					
		r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R	T	C	R	T	C
Atapuerca At27	Europe			1				2				4																					1	2	4
Atapuerca 560, 53	Europe			2	1			2	3			4	3																	1	3	3	2	2	4
Atapuerca at 198	Europe			2				2				4																					2	2	4
Atapuerca AT 197	Europe		2				2				4																						2	2	4
Atapuerca at 29	Europe	2				3				4																				2	3	4			
Atapuerca at 283	Europe	2				2				4																				2	2	4			
Biache *	Europe																																		
Combe Grenal 5	Europe			3	5			0	3			3	4																	3	0	3	5	3	4
Combe Grenal E2	Europe			2	4			1	2			4	4																	2	1	4	4	2	4
Dolni Vestonici 13	Europe			1				3																		9.3	8.2						1	1	3
Dolni Vestonici 14	Europe	0	0	0	0	1	1	1	1	2	2	1	1									7.7	7.4	9.8	8	9.3	8.1	7.4	7.1	0	1	2	0	1	2
Krapina - D132	Europe		3				2				3				4				4					9.7	8.8								3	2	3
Krapina - KDP 17	Europe	3	4	4	3	4	2	2	4	4	4	3	4	5	6	5	4		4	4		8.2	8.6	10	9	10.9	9.2	8.6	9.3	3	4	4	4	2	4
Krapina - KDP 18	Europe	4				3				4				5								8.5	8.9							4	3	4			
Krapina - KDP 2	Europe	3	3	4		5	2	2		3	4	4		3	5	5			4	4		7.6	8.8	9.5	9.1	9	9.2			3	5	3	3	2	4
Krapina - KDP 21	Europe		2	3			2	2			4	4			3	5			2	3				10	9	10.2	8.6						2	2	4
Krapina - KDP 22	Europe		3				3				4				4									9.2	8								3	3	4
Krapina - KDP 22	Europe		3				3				4				3				4					9.5	7.9								3	3	4
Krapina - KDP 29	Europe			3	1			2	3			4	3			3	1			3						10.2	9.4	7.9	9.2	1	3	3	3	2	4
Krapina - KDP 3	Europe	1				5				3				1								7.7	9.4							1	5	3			
Krapina - KDP 30	Europe	2	3			4	2			4	4			2	3					3		8.6	8.9	10.3	9.1					2	4	4	3	2	4
Krapina - KDP 35	Europe	1	3			3	2			4	4			1	3				4			7.3	7.7	9	8					1	3	4	3	2	4
Krapina - KDP 5	Europe	3	3	3	3	3	2	2	3	3	4	4	3	3	3	3	3		3	3		8.3	8.1		8.1		8		8.3	3	3	3	3	2	4
Krapina - KDP 6	Europe				3				4				4				4											8.9	9.4	3	4	4			
Krapina -KDP 4	Europe	3	3	3	3	3	2	2	3	4	4	4	4	3	4	4	5		4	4		8.1	8.3	10.2	8.7	9.8	8.6	8.2	8.6	3	3	4	3	2	4
Lida-Ajer Cave	Sumatra		2				0				0																						2	0	0
Marillac *																																			
Nariokotome	Africa	2	2	2	2	1	2	2	1	1	2	2	1									8.4	8.5	11.5	9.4	12	9.3	8.6	8.4	2	1	1	2	2	2

ID	Region	Mar ridge				Tubercles				Curvature				ASU shov				ASU tub				R LAT		R CEN		L CEN		L LAT		Right	
		r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	MD	BL	MD	BL	MD	BL	MD	BL	R T C	R T C
Qafzeh 10 *																															
Qafzeh 11	Levant	1	1	1	1	1	2	2	1	2	1	1	1	1	0	0	1		1	1		7.2	6.9	9.3	6.9	8.7		7.4	6.9	1 1 2	1 2 1
Qafzeh 4	Levant			2				0				2				2				1						9.8	[illegible]				2 0 2
Qafzeh 9	Levant	2		1	2	1		2	1	2	1	1	1	2		1	2	4		2	4	8.2	8	9.2		10.3	8.1	8.3	8	2 1 2	1 2 1
Rabat	Africa				3				3				4																		3 3 4
Sangiran s7-1	Asia		2				2				1				3				1					10.3	8						2 2 1
Sangiran S7-2	Asia				2				1				4				2											6.9	7.1	2 1 4	
Sangiran s7-56	Asia				2				2				4				2											7.6	7.6	2 2 4	
St. Cesaire *																															
Subalyuk	Europe	4	2				2			4	3			6	2				1			7.4		9	6.4						2 2 3
Vindija 290	Europe	4				1				4												7.8	8.4							4 1 4	
Vindija 289	Europe		3				2				3				4				3					9.9	8.3						3 2 3
Yuanmou 1	Asia		2	3			2	2			1	1																			2 2 1
Zhoukoudian 2	Asia		3				2				3													9.8	7.9						3 2 3
Zhoukoudian 4	Asia		3				2				2															10.7	8.1				3 2 2
Zhoukoudian 6	Asia	3				2				1												8.3	8.2							3 2 1	

* Scores are not provided as these specimens have not yet been formally described.

APPENDIX E
ERROR ANALYSIS SAMPLE: ORIGINAL SCORES, RETEST SCORES, AND DIFFERENCES BETWEEN SCORING EVENTS

Original Scores

Pop.	ID	RG	Coun	Mar ridge				Tubercles				Curvature				ASU shov				ASU tub							Right		
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
64	1027	7	30	3	1	1	2	1	2	2	1	1	2	2	0	3	1	1	2		1	1		1	2	2	3	1	1
30	1641	5	15	1				0				1				1											1	0	1
74	2097	9	68	2			2	0			0	0			0	2			2								2	0	0
74	2151	9	68	2			2	0			1	1			1	2			2								2	0	1
999	2247	999	9999	2				0				1				2											2	0	1
999	2274	999	9999	2			2	1			1	0			0	2			2								2	1	0
75	2325	27	117	3	3	3	3	1	2	2	1	0	1	1	0	3	4	4	3		2	2		3	2	1	3	1	0
65	2703	5	3	2				1				1				2											2	1	1
65	2900	5	3	0	1	1	1	2	2	2	2	0	0	0	0	0	0	1	1	1	2	3	2	1	2	0	0	2	0
81	3385	7	30		0				0				0				0							0	0	0			
65	3405	5	3	1				0				1				1											1	0	1
71	3911	5	15	1				3				1				1											1	3	1
65	4156	5	3	0				0				0				0											0	0	0
71	4247	5	15	1				1				0				1											1	1	0
71	4399	5	15				1				1				0				1								1	1	0
71	4400	5	15	2			2	0			0	0			0	2			2								2	0	0
71	4456	5	15	1				0				0				1											1	0	0
65	4500	5	3	3			3	1			0	0			1	3			3								3	1	0
65	4654	5	3				2				1				1				2								2	1	1
57	5898	7	30.5			2				0				0				2						2	0	0			
57	5900	7	30.5	1	0	0	2	1	2	2	1	0	0	0	0	2	0	0	2		1	1		0	2	0	1	1	0
90	5958	24	85		2				0				0				2							2	0	0			

*Column names are as follows: Pop. (Pop.ulation number), ID (Museum Catalog #), RG (Region), and Coun. (Country) are labels. Mar.Ridge (Marginal Ridges), Tubercles, Curvature, ASU Shov (Arizona State University system shoveling), ASU Tub (Arizona State University Tubercles) are the morphologies scored, r2 (right I2), r1 (right I1), l1 (left I1), l2 (left I2); then are the considated incisor morphology scores, CENT(ral) and LAT(eral) R(idges), T(ubercles), and C(urvature).

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right						
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC	
65	6057	5	3		0	0	0		0	0	1		1	1	1		0	0	0					0	0	1	0	1	1	
65	6066	5	3	0	1	1	0	1	2	2	0	0	1	0	0	0	1	1	0		1	1		1	2	1	0	1	0	
65	7692	5	3	2	1	1	2	0	0	0	0	0	1	0	0	2	1	1	2					1	0	1	2	0	0	
65	11644	5	3			1				2				0				1				1		1	2	0				
65	11726	5	3				1				1				0				1								1	1	0	
65	12097	5	3	0	0	0		0	0	2		0	0	0		0	0	0				1		0	0	0	0	0	0	
65	22823	5	3	0	0	0		0	0	0		0	0	0		0	0	0						0	0	0	0	0	0	
65	22516	5	3		1	1	1		2	2	2		0	0	0		1	1	1		2	1	1	1	2	0	1	2	0	
65	22480	5	3			1	1			0	1			0	1			0	1					1	0	0	1	1	1	
55	21080	5	3		0	0			2	2			1	0			0	0			3	3		0	2	1				
65	22440	5	3	2	0	0	2	0	0	1	0	1	1	1	0	3	0	0	3					0	0	1	2	0	1	
65	22196	5	3		1				0				0				1							1	0	0				
65	22177	5	3	2	0	1	2	1	0	2	0	0	0	0	0	2	0	1	2			1		0	0	0	2	1	0	
65	21196	5	3		1				0				0				1							1	0	0				
65	14106	5	3			0				2				1				0				1		0	2	1				
203	84.9.5.2	28	104				1				1				0				1								1	1	0	
207	1888.8.1.76	24	85	2			2	0			0	1			0	2			2								2	0	1	
207	1888.8.1.11	24	85	1	2			0	0			0	1			1	2							2	0	1	1	0	0	
210	pol 130 793	21	135		2	2	2		2	2	0		1	1	0		2	2	2		2	2		2	2	1	2	0	0	
210	9.70 1096	21	135	3	3		3	0	0		0	0	0		0	4	5		4					3	0	0	3	0	0	
221	1968.8.8.93	22	128	1	2	2	2	0	0	0	0	0	0	0	0	1	2	2	2					2	0	0	1	0	0	
222	AUS 80 5	18	124	2	2	2	2	0	3	3	3	0	1	1	1	2	3	3	2					2	3	1	2	0	0	
235	58.6.24.232	12	55	2	2	2	2	0	2	2	1	1	1	1	1	2	2	2	2		1	1		2	2	1	2	0	1	
224	7.6932	14	37	2		3	2	0		1	0	0		0	0	2		3	2					3	1	0	2	0	0	
236	7.5302	14	37.1		2				2				0				2				1			2	2	0				
238	1949.12.7.30		12	64	2	2		2	1	2		1	1	1		1	2	2		2		3			2	2	1	2	1	1
239	85.2.16.4	12	39		3	4			0	0			1	1			5	6						3	0	1				
240	as 49 685	12	33	1	0	0		0	0	0		2	1	1		1	0	0						0	0	1	1	0	2	
243	as 13-29 2	9	42	2	0	0	2	0	1	2	0	0	0	0	0	2	0	0	2		1			0	1	0	2	0	0	
244	1961.17.2.1	9	43			1				0				1				1						1	0	1				
269	5.2204	5	15	1	1	1	2	0	2	2	0	1	1	1	1	2	1	1	2		2	2		1	2	1	1	0	1	
274	e113 282	1	29	1		0	2	0		1	0	0		0	0	1		0	2					0	1	0	1	0	0	

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	CR	CT	CC	LR	LT	LC
274	e113 254	1	29		1	1	1		0	2	0		1	1	1		0	1	1			1		1	0	1	1	0	1
274	e113 216	1	29		0	0			0	0			1	1			0	0						0	0	1			
274	e113 180	1	29	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	1	0	0
274	4.0352	1	29	3	4	3		0	2	2		0	1	1		4	6	5			3	3		4	2	1	3	0	0
274	4.0349	1	29	1	1	1		0	2	2		1	1	0		1	1	0			2	1		1	2	1	1	0	1
274	4.0348a	1	29		2	1	3		0	0	1		1	1	1		2	1	3					2	0	1	3	1	1

Retest scores

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	r2	rl	ll	l2	CR	CT	CC	LR	LT	LC
64	1027	7	30	2	1	1	2	1	2	2	0	0	1	1	0	2	1	1	2		1	1		1	2	1	2	1	0
30	1641	5	15	1				1				0				1											1	1	0
74	2097	9	68	2			2	0			0	0			0	2			2								2	0	0
74	2151	9	68	1			2	0			1	1			0	1			2								1	0	1
9999	2247	999	9999	2				0				1				2											2	0	1
999	2274	999	9999	2			2	1			1	1			1	2			2								2	1	1
75	2325	27	117	3	3	3	3	1	2	2	1	1	1	1	1						2	2		3	2	1	3	1	1
65	2703	5	3	2				1				0				2											2	1	0
65	2900	5	3	0	1	1	1	2	2	2	2	0	0	0	0	0	1	1	1	1	3	3	1	1	2	0	0	2	0
81	3385	7	30		1				0				0				0							1	0	0			
65	3405	5	3	2				1				1				2											2	1	1
71	3911	5	15	1				3				1				1											1	3	1
65	4156	5	3	0				0				0				0											0	0	0
71	4247	5	15	2				0				1				2											2	0	1
71	4399	5	15				1				1				1				1								1	1	1
71	4400	5	15	1			1	0			1	0			0	1			1								1	0	0
71	4456	5	15	2				0				1				2											2	0	1
65	4500	5	3	3			3	1			0	0			1	3			3								3	1	0

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
65	4654	5	3				2				1				1				2								2	1	1
57	5898	7	30.5			1				0				0				1						1	0	0			
57	5900	7	30.5	1	0	0	1	1	0	2	1	0	0	0	0	1	0	0	1			1		0	0	0	1	1	0
90	5958	24	85		2				0				0				2							2	0	0			
65	6057	5	3		0	0	0		0	0	1		1	1	1		0	0	0					0	0	1	0	1	1
65	6066	5	3	0	1	1	0	1	2	2	0	0	1	0	0	0	1	1	0		1	1		1	2	1	0	1	0
65	7692	5	3	2	1	1	1	0	2	0	0	1	1	1	0	2	1	1	1		1			1	2	1	2	0	1
65	11644	5	3			1				1				0				0						1	1	0			
65	11726	5	3				1				1				1				1								1	1	1
65	12097	5	3	0	0			0	0			0	1			0	0							0	0	1	0	0	0
65	22823	5	3		0	0	0		0	0	0		1	0	1		0	0	0					0	0	1	0	0	1
65	22516	5	3	1	1	1		1	2	2		0	1	1		1	1	1			1	1		1	2	1	1	1	0
65	22480	5	3			1	0			0	1			1	1			0	0					1	0	1	0	1	1
55	21080	5	3		1	1			2	2			1	1			1	1			2	2		1	2	1			
65	22440	5	3	2	0	0	2	0	0	1	0	1	2	2	0	2	0	0	2					0	0	2	2	0	1
65	22196	5	3	0	1			0	0			0	0			0	1							1	0	0	0	0	0
65	22177	5	3	1	0	1	1	1	0	2	1	0	0	0	1	1	0	1	1			1		0	0	0	1	1	0
65	21196	5	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0					1	0	0	0	0	0
65	14106	5	3			0				2				1				0				1		0	2	1			
203	84.9.5.2	28	104				1			1			0			1								0	1	0	1		
207	1888.8.1.76	24	85	2			2	0			0	1			1	2			2								2	0	1
207	1888.8.1.11	24	85	1	1			0	0			0	1			1	1							1	0	1	1	0	0
210	pol 130 793	21	135		2	2	2		2	2	0		1	1	0		2	2	2		2	2		2	2	1	2	0	0
210	9.70 1096	21	135	3	3		3	0	0		0	0	0		0	5	5		4					3	0	0	3	0	0
221	1968.8.8.93	22	128	1	2	2	2	0	0	0	0	0	0	0	0	1	2	2	2					2	0	0	1	0	0
222	AUS 80 5	18	124	2	3	2	2	0	3	3	3	0	2	1	0	2	3	3	2					3	3	2	2	0	0
235	58.6.24.232	12	55	2	2	3	2	0	2	2	1	0	0	1	0	2	2	3	2		2	1		2	2	0	2	0	0
224	7.6932	14	37	2	2	2	2	0	0	1	0	1	0	0	1	2	2	3	2					2	0	0	2	0	1
236	7.5302	14	37.1		2				2				0				2				1			2	2	0			
238	1949.12.7.30	12	64	2	2		1	1	2		1	0	1		0	2	2		2		3			2	2	1	2	1	0
239	85.2.16.4	12	39		3	4			0	0			1	1			5	6						3	0	1			
240	as 49 685	12	33	1	0	0		0	0	0		1	1	1		1	0	0						0	0	1	1	0	1

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
243	as 13-29 2	9	42	1		0	2	0		1	0	0		0	0	2		0	2					0	1	0	1	0	0
244	1961.17.2.1	9	43			1				0				1				1						1	0	1			
269	5.2204	5	15	1	1	1	1	0	2	2	0	1	2	2	1	1	1	2	2		2	2		1	2	2	1	0	1
274	e113 282	1	29	1		0	2	0		1	0	0		1	0	2		0	2					0	1	1	1	0	0
274	e113 254	1	29		1	1			0	2			1	1			0	1				1		1	0	1			
274	e113 216	1	29		0	0			0	0			1	1			0	0						0	0	1			
274	e113 180	1	29	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					0	0	0	1	1	0
274	4.0352	1	29	2	4	3		0	2	2		1	1	1		2	6	5			3	2		4	2	1	2	0	1
274	4.0349	1	29	1	1	1		0	2	0		1	1	0		1	1	0			1			1	2	1	1	0	1
274	4.0348a	1	29		1	1	2		0	0	0		2	2	2		1	1	2					1	0	2	2	0	2

Differences between original and retest scores

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
64	1027	7	30	1	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0		0	0		0	0	1	1	0	1
30	1641	5	15	0				1				1				0								#	#	#	0	-1	1
74	2097	9	68	0			0	0			0	0			0	0			0					#	#	#	0	0	0
74	2151	9	68	1			0	0			0	0			1	1			0					#	#	#	1	0	0
9999	2247	999	9999	0				0				0				0								#	#	#	0	0	0
999	2274	999	9999	0			0	0			0	1			1	0			0					#	#	#	0	0	-1
75	2325	27	117	0	0	0	0	0	0	0	0	1	0	0	1						0	0		0	0	0	0	0	-1
65	2703	5	3	0				0				1				0								#	#	#	0	0	1
65	2900	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0
81	3385	7	30		1				0				0				0							-1	0	0	#	#	#
65	3405	5	3	1				1				0				1								#	#	#	-1	-1	0
71	3911	5	15	0				0				0				0								#	#	#	0	0	0
65	4156	5	3	0				0				0				0								#	#	#	0	0	0
71	4247	5	15	1				1				1				1								#	#	#	-1	1	-1

Pop.	ID	RG Coun		Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
71	4399	5	15				0				0				1				0					#	#	#	0	0	-1
71	4400	5	15	1			1	0			1	0			0	1			1					#	#	#	1	0	0
71	4456	5	15	1				0				1				1								#	#	#	-1	0	-1
65	4500	5	3	0			0	0			0	0			0	0			0					#	#	#	0	0	0
65	4654	5	3				0				0				0				0					#	#	#	0	0	0
57	5898	7	30.5			1				0				0				1						1	0	0	#	#	#
57	5900	7	30.5	0	0	0	1	0	2	0	0	0	0	0	0	1	0	0	1		1	0		0	2	0	0	0	0
90	5958	24	85		0				0				0				0							0	0	0	#	#	#
65	6057	5	3		0	0	0		0	0	0		0	0	0		0	0	0					0	0	0	0	0	0
65	6066	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0		0	0	0	0	0	0
65	7692	5	3	0	0	0	1	0	2	0	0	1	0	1	0	0	0	0	1					0	-2	0	0	0	-1
65	11644	5	3			0				1				0				1				1		0	1	0	#	#	#
65	11726	5	3				0				0				1				0					#	#	#	0	0	-1
65	12097	5	3	0	0	0		0	0	2		0	1	0		0	0	0				1		0	0	-1	0	0	0
65	22823	5	3	0	0	0		0	0	0		0	1	0		0	0	0						0	0	-1	0	0	-1
65	22516	5	3		0	0	1		0	0	2		1	1	0		0	0	1		1	0	1	0	0	-1	0	1	0
65	22480	5	3			0	1			0	0			1	0			0	1					0	0	-1	1	0	0
55	21080	5	3		1	1			0	0			0	1			1	1			1	1		-1	0	0	#	#	#
65	22440	5	3	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1					0	0	-1	0	0	0
65	22196	5	3		0				0				0				0							0	0	0	#	#	#
65	22177	5	3	1	0	0	1	0	0	0	1	0	0	0	1	1	0	0	1			0		0	0	0	1	0	0
65	21196	5	3		0				0				0				1							0	0	0	#	#	#
65	14106	5	3			0				0				0				0				0		0	0	0	#	#	#
203	84.9.5.2	28	104				0				1				0				1					#	#	#	0	#	#
207	1888.8.1.76	24	85	0			0	0			0	0			1	0			0					#	#	#	0	0	0
207	1888.8.1.11	24	85	0	1			0	0			0	0			0	1							1	0	0	0	0	0
210	pol 130 793	21	135		0	0	0		0	0	0		0	0	0		0	0	0		0	0		0	0	0	0	0	0
210	9.70 1096	21	135	0	0		0	0	0		0	0	0		0	1	0		0					0	0	0	0	0	0
221	1968.8.8.93	22	128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	0	0
222	AUS 80 5	18	124	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0					-1	0	-1	0	0	0
235	58.6.24.232	12	55	0	0	1	0	0	0	0	0	1	1	0	1	0	0	1	0		1	0		0	0	1	0	0	1
224	7.6932	14	37	0		1	0	0		0	0	1		0	1	0		0	0					1	1	0	0	0	-1

Pop.	ID	RG	Coun	Mar. Ridge				Tubercles				Curvature				ASU Shov				ASU Tub				Right					
				r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	r2	r1	l1	l2	CR	CT	CC	LR	LT	LC
236	7.5302	14	37.1		0				0				0				0				0			0	0	0	#	#	#
238	1949.12.7.30	12	64	0	0		1	0	0		0	1	0		1	0	0		0		0			0	0	0	0	0	1
239	85.2.16.4	12	39		0	0			0	0			0	0			0	0						0	0	0	#	#	#
240	as 49 685	12	33	0	0	0		0	0	0		1	0	0		0	0	0						0	0	0	0	0	1
243	as 13-29 2	9	42	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0		1			0	0	0	1	0	0
244	1961.17.2.1	9	43			0				0				0				0						0	0	0	#	#	#
269	5.2204	5	15	0	0	0	1	0	0	0	0	0	1	1	0	1	0	1	0		0	0		0	0	-1	0	0	0
274	e113 282	1	29	0		0	0	0		0	0	0		1	0	1		0	0					0	0	-1	0	0	0
274	e113 254	1	29		0	0	1		0	0	0		0	0	1		0	0	1			0		0	0	0	#	#	#
274	e113 216	1	29		0	0			0	0			0	0			0	0						0	0	0	#	#	#
274	e113 180	1	29	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0					0	0	0	0	-1	0
274	4.0352	1	29	1	0	0		0	0	0		1	0	0		2	0	0			0	1		0	0	0	1	0	-1
274	4.0349	1	29	0	0	0		0	0	2		0	0	0		0	0	0			1	1		0	0	0	0	0	0
274	4.0348a	1	29		1	0	1		0	0	1		1	1	1		1	0	1					1	0	-1	1	1	-1

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