



DNA Tribes® Digest June 27, 2009
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Table of Contents:

Introduction: Lands of the Maize.....	1
Genetic Relationships in Mesoamerica.....	2
Seeds of Mesoamerican Civilization: the Mayan Region.....	2
Empire of the Aztecs: the Mexican Region	5
Bridge to the South: the Central American Region	7
Conclusion	9
Getting the Most from Your Testing	10

Introduction: Lands of the Maize

Hello, and welcome to the June 2009 issue of DNA Tribes® Digest. In this issue, we continue our exploration of genetic relationships among American Indians, this time focusing on a central group of regions that connects North America to South America: the Mexican, Mayan, and Central American genetic regions. These regions encompass the lands where maize was first cultivated, allowing the development of distinctively Mesoamerican cultural traditions that seeded the civilizations of the Mayas, Mexica, and possibly the Mississippian Mound Builders of the present day United States. Two previous DNA Tribes® Digest issues that also examine American Indian genetic relationships are:

<http://www.dnatribes.com/dnatribes-digest-2009-05-30.pdf> (focusing on South American Indians: the Patagonian, Amazonian, and Andean regions); and

<http://www.dnatribes.com/dnatribes-digest-2008-10-25.pdf> (focusing on the genetic link between the Americas and far eastern Siberia as well as links between North American Indians and their relatives to the south).

Happy Fourth of July and I hope to speak with you soon,

Lucas Martin
DNA Tribes

Genetic Relationships in Mesoamerica

In this article, we explore genetic relationships in Mesoamerican Indian genetic regions, including the Mayan, Mexican, and Central American regions.

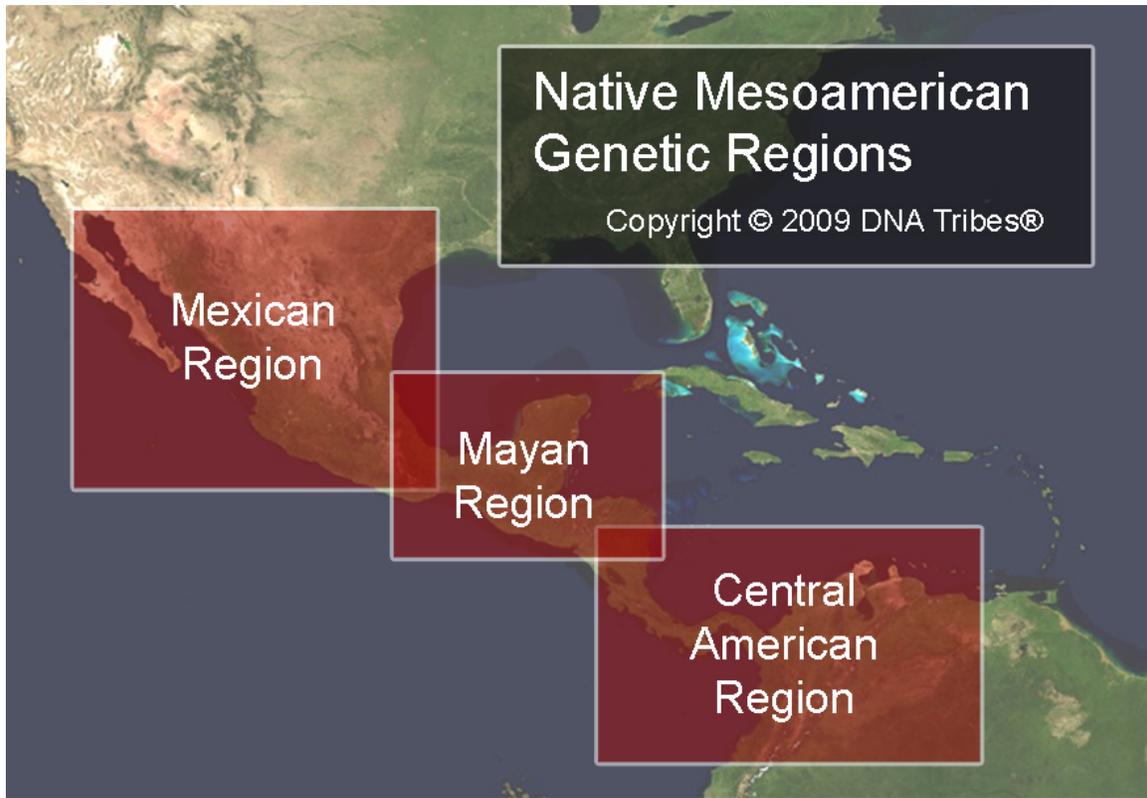


Figure 1: Native Mesoamerican regions surveyed in this article.

Seeds of Mesoamerican Civilization: the Mayan Region

Background: The Mayan genetic region characterizes native populations of an area that extends from southeastern Mexico through the Yucatan Peninsula and east to parts of present day Honduras and El Salvador. It is here that the Mayan family of related languages is spoken, and it was here and nearby in the narrow but ecologically diverse “waist” of southern Mexico that the seeds of Mesoamerican civilization first were germinated.

According to the creation story recorded in the Kiche Mayan text *Popul Vuh* (meaning “Council Book,” and traditionally known as “The Light That Came from Across the Sea¹,”

¹ The Kiche Maya accounts describe origins from the east. One possibility is that these eastern territories were in the Caribbean Sea. The Caribbean Islands as possible stepping stones for north-south contacts

among other names), the first humans were fashioned from corn. There is a germ of truth in this mythical account, because all indigenous Mesoamerican civilizations were nourished by a remarkable plant, maize. Although maize today is a staple crop around the world, it was first cultivated by American Indians, perhaps in present day Oaxaca along the Gulf Coast of southeastern Mexico². Maya communities have traditionally grown maize as part of a distinctive form of agriculture developed here known as the *milpa*. In this system, multiple crops are grown together as polycultures, where several species complement and enhance the growth of the others, increase crop yields, protect from harmful insects, and reduce soil depletion³.

The first Mesoamerican civilization was that of the Olmecs, who emerged approximately 1400 BC and built cities along the Gulf Coast in present day southeastern Mexico, where they cultivated a sophisticated urban culture that built aqueducts and pyramids. The Olmecs are sometimes known as the “Mother Culture” of Mesoamerica, because (as with the Romans in Europe) their culture established many institutions that were continued by subsequent Mesoamerican civilizations.

To the east of these Olmec cities, Maya cultures began to emerge, developing Olmec institutions in a new direction, including a glyphic written language, mathematical system, and a multilayered calendar system. To facilitate commerce, maritime trade routes were established based on dugout canoes. The Classic Mayas built their own large urban and ceremonial centers concentrated in the southern lowlands, but later abandoned these sites for unknown reasons. After this collapse, new Postclassic Mayan cultures emerged at the periphery of the Classic Mayan zone: in the Yucatan Peninsula to the north (which had been invaded by Toltecs) and to the south in the highlands of present day Guatemala (where metallurgy was developed, likely based on imported Andean technologies).

After the European discovery of a sea route to the Americas, Mayan communities remained relatively insulated from Spanish conquest by their hard to reach jungle locations. The Mayan literary tradition continued, adopting the European (Latin) alphabet in texts such as the Kiche *Popul Vuh* and Yucatec *Chilam Balam* books. Today, approximately six million

between North and South America have been discussed in the May 2009 issue of DNA Tribes® Digest at: <http://www.dnatribes.com/dnatribes-digest-2009-05-30.pdf>. Similar accounts of origins in an eastern sea can also be found in some North American Indian traditions.

² Thought to be the product of centuries of careful human cultivation and improvement of a plant related to the wild teosinte grasses, maize today is a human dependant plant that cannot live in the wild due to its husk, which must be manually removed for reproduction to take place. Unlike most food crops, maize is more diverse than its wild relatives: more than fifty varieties of maize are found in Mexico (thirty of these in Oaxaca alone). In recent years, maize has also been adapted as a source of biofuel, including the gas substitute ethanol as well as other developing energy technologies.

However, diets based on maize can cause the vitamin deficiency pellagra if the maize is not prepared properly. American Indians traditionally nixtamalize maize before consumption by soaking in an alkaline solution (usually lime) before hulling. The adoption of maize initially led to outbreaks of pellagra in Europe and America before the necessity of proper preparation using lime was recognized.

³ This synergistic *milpa* agriculture has spread throughout the Americas to as far as Chile and New England. Among North American Indians, maize, beans, and squash are grown together as the “Three Sisters” companion plants: the corn providing a stalk for the bean to climb, and the bean fixing nitrogen for the growing corn. These three plants also complement each other nutritionally when eaten by humans, each making up for nutrients that the other lacks.

indigenous Mayan speakers live throughout this zone speaking 29 recognized Mayan languages⁴, interspersed among communities where Mayan and Spanish cultures have blended to form new Mestizo cultures incorporating elements of indigenous and European traditions.

Genetic analysis: Genetic contributions to the Mayan region from the 35 other world regions⁵ presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 2** and summarized in **Table 1** below.

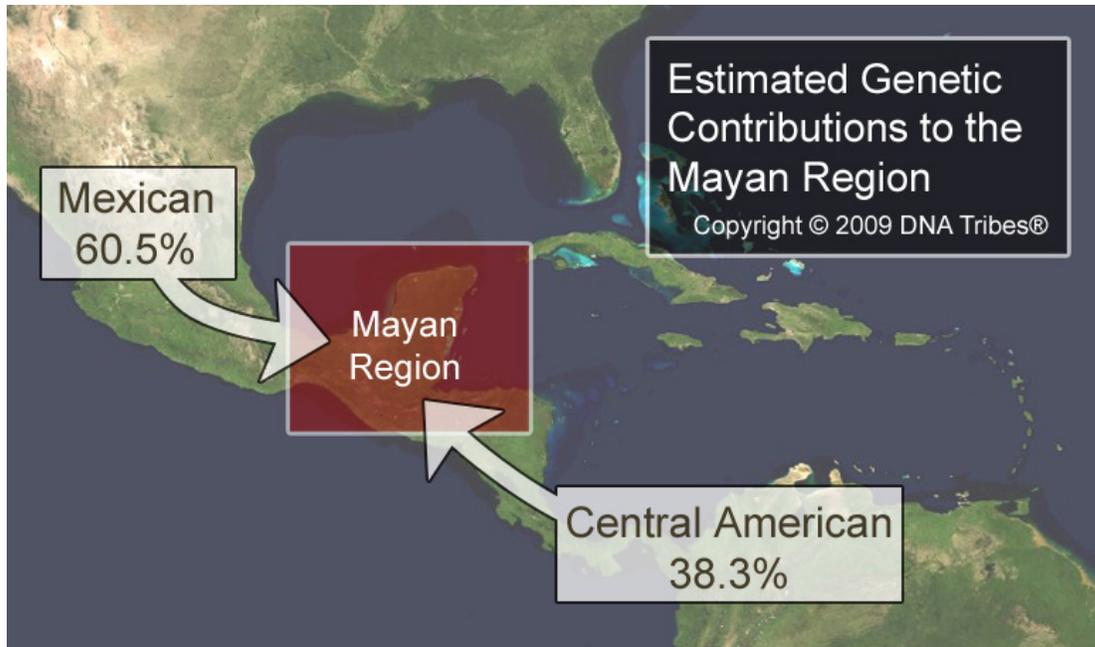


Figure 2: Estimated genetic contributions to the Mayan region.

Genetic Region	Estimated Contribution
Mexican	60.5%
Central American	38.3%
Other	1.2%

Table 1: Estimated genetic contributions to the Mayan region.

Discussion: Results in **Table 1** indicate contributions from the Mexican (60.5%) and Central American (38.3%) regions. The Mexican contribution might date to early interactions with neighboring peoples of southern Mexico such as the Olmecs, as well as ongoing contacts with

⁴ Mayan words that have entered English include cigar (from the American Indian religious custom of smoking tobacco, a practice known as *zicar* in Mayan) and hurricane (from *Huracan*, a Mayan god of storms).

⁵ A map illustrating the genetic world regions presently identified by DNA Tribes® analysis can be viewed at: <http://dnatribes.com/populations.html>.

western urban centers that continue to this day. The Central American contribution might reflect contacts with more easterly populations, including maritime contacts mentioned in Maya origin accounts.

Empire of the Aztecs: the Mexican Region

Background: Sometime near the twelfth century AD, Nahuatl-speaking nomads appeared on the outskirts of the urban centers of the Valley of Mexico. These nomads were known to the city dwellers as Chichimecs or Dog People, strangers wandering amid the pyramided capitals of the south, sometimes serving as mercenaries in the armies of the warring city-states. One group of Chichimec nomads was known as the Mexica (pronounced meh-SHEEH-kah, now often described as Aztecs⁶). After several generations of wandering, the Mexica settled in 1325 AD on an island in Lake Texcoco⁷ and began to build the city they named Tenochtitlán. This island settlement was farmed using a local system of agriculture in which artificial floating gardens or *chinampas* were marked off and maintained in the shallow lake waters.

Over time, Tenochtitlán grew in influence and established itself among the city-states of the Valley of Mexico, forming a powerful Triple Alliance with the neighboring cities Texcoco and Tlacopan and receiving tribute from surrounding peoples. In the process, this small settlement founded by wandering nomads absorbed the traditions of Mesoamerican civilization and developed them according to a distinctive Nahuatl-speaking Mexican culture. When the Spanish conquistador Hernán Cortés arrived in 1519, his men were awed by a sprawling metropolis of aqueducts and botanical gardens. However, it was not long before Tenochtitlán was weakened by the spread of smallpox and finally conquered by an alliance of the Spanish conquistadors and the neighboring Tlaxcalans, indigenous enemies of the Tenochans. The ruins of Tenochtitlán were then rebuilt under Spanish rule to become Mexico City.

The Mexican genetic region characterizes indigenous populations throughout Mexico, including the historically Nahuatl-speaking⁸ peoples as well as many other ethnic groups such as Otomi, who were known as mercenaries in the armies of the Tenochans. This region constitutes

⁶ The name “Aztec” has come into use through modern historians based on the Aubin codex, a Nahuatl text that describes the Mexica as fleeing servitude in a place called Aztlán. These refugees were instructed by the god Huitzilopochtli never again to call themselves Aztecs, but instead to be known as Mexica. Nevertheless, the indigenous Mexicans are now commonly described as “Aztecs,” while the actual indigenous name Mexica has remained more obscure.

The location of Aztlán is unknown, although various sites have been proposed. According to Nahuatl texts, the ancestors for the Mexica first originated in a place called Chicomoztoc (meaning “Place of the Seven Caves,” reminiscent of cave origins described in several other North American Indian traditions), later migrated to Aztlán, and then fled Aztlán to finally reach the Valley of Mexico. The Nahuatl language of the Mexica is classified by linguists as part of the Uto-Aztecan family that is spoken in Mexico as well as by American Indians of the western United States such as the Comanche, Hopi, and Ute peoples.

⁷ According to legend, this settlement was inspired by a vision of an eagle perched on a cactus plant, an image recorded on Nahuatl codices and today incorporated in the national flag of Mexico.

⁸ Nahuatl customs that have been adopted in English speaking cultures include chewing gum (*chicle* or *tziktli*) and chocolate (*xocolātl*, meaning “bitter water” in reference to the traditional Mexican preparation of chocolate as a drink). Among modern dog breeds, the Chihuahua is thought to be descended in part from the indigenous Mexican *Techichi* bred by the Toltecs and later by the Mexica.

the northern extension of indigenous Mesoamerican civilizations, which culminated in the empire of the Aztecs only after development by many earlier peoples such as legendary Toltecs as well as humbler, anonymous farmers who first cultivated the maize that would feed so many great cities. Although the empire of the Aztecs is sometimes regarded as a vanished civilization, it has in fact developed into a new Mestizo culture blending indigenous and Spanish traditions in the country that still bears the indigenous name of its founding tribe: Mexico.

Genetic analysis: Genetic contributions to the Mexican region from the 35 other world regions presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 3** and summarized in **Table 2** below.



Figure 3: Estimated genetic contributions to the Mexican genetic region.

Genetic Region	Estimated Contribution
Mayan	55.6%
Andean	21.6%
Athabaskan	13.4%
Salishan	4.9%
Arctic	3.8%
Other	0.8%

Table 2: Estimated genetic contributions to the Mexican genetic region.

Discussion: Results in **Table 2** indicate the largest contribution from the Mayan region (55.6%). This might reflect contacts among early maize-growing agriculturalists in southern Mexico whose traditions expanded east to the Mayans and west to the Valley of Mexico⁹. Substantial contributions are also identified from the Andean region that characterizes indigenous populations along the western coast of South America¹⁰.

Also identified are contributions from other westerly regions of North America, including Athabaskan (13.4%), Salishan (4.9%), and Arctic (3.8%). These contributions might reflect gene flow mediated by nomadic Uto-Aztecan speaking nomadic peoples, who intermittently entered the more densely settled urban centers of central Mexico from the north. More generally, these contributions reflect the parallel patterns of north-south continuity that are observed along the western (Pacific Ocean) and eastern (Atlantic Ocean) coasts of the Americas.

Bridge to the South: the Central American Region

Background: The Central American genetic region characterizes indigenous populations of the Central American isthmus as well as northern parts of South America. Compared to other parts of the Americas, little is known about this Isthmo-Colombian zone, which is sometimes described as the “Intermediate Area” by archaeologists because it lies between the better understood civilization centers of Mesoamerica and the Andes. Nevertheless, several significant archaeological sites have been discovered here, including *Ciudad Perdida* in Colombia, which is thought to predate Machu Picchu. Also discovered in this area were the enigmatic stone spheres of Costa Rica, a series of variously sized balls cut from rock discovered in this part of Central America.

⁹ Another possible offshoot of this Mesoamerican cultural kernel was the mound building Mississippian civilization that spread along the Mississippi River Valley of North America. The artistic traditions of the Mississippians included the use of a flying serpent motif, reminiscent of the Quetzalcoatl imagery that was ubiquitous among Mesoamerican Indians. These Mound builders are considered the ancestors of modern tribal nations of the Southeastern United States, including Cherokee, Chickasaw, Choctaw, Creek, Seminole, and Shawnee peoples. These links between indigenous civilizations of Mesoamerica and lands of the United States are discussed at: <http://www.dnatribes.com/dnatribes-digest-2008-10-25.pdf>.

¹⁰ Genetic relationships among South American Indians are discussed at: <http://www.dnatribes.com/dnatribes-digest-2009-05-30.pdf>.

This region is home to a variety of indigenous cultures, some of which maintain minimal contacts with urban centers and instead have established more locally oriented patterns of life. Languages spoken here include the Chibchan family of languages as well as other languages whose classification is uncertain.

Genetic analysis: Genetic contributions to the Central American region from the 35 other world regions presently identified by DNA Tribes® analysis were estimated. Results are illustrated in **Figure 4** and summarized in **Table 3** below.

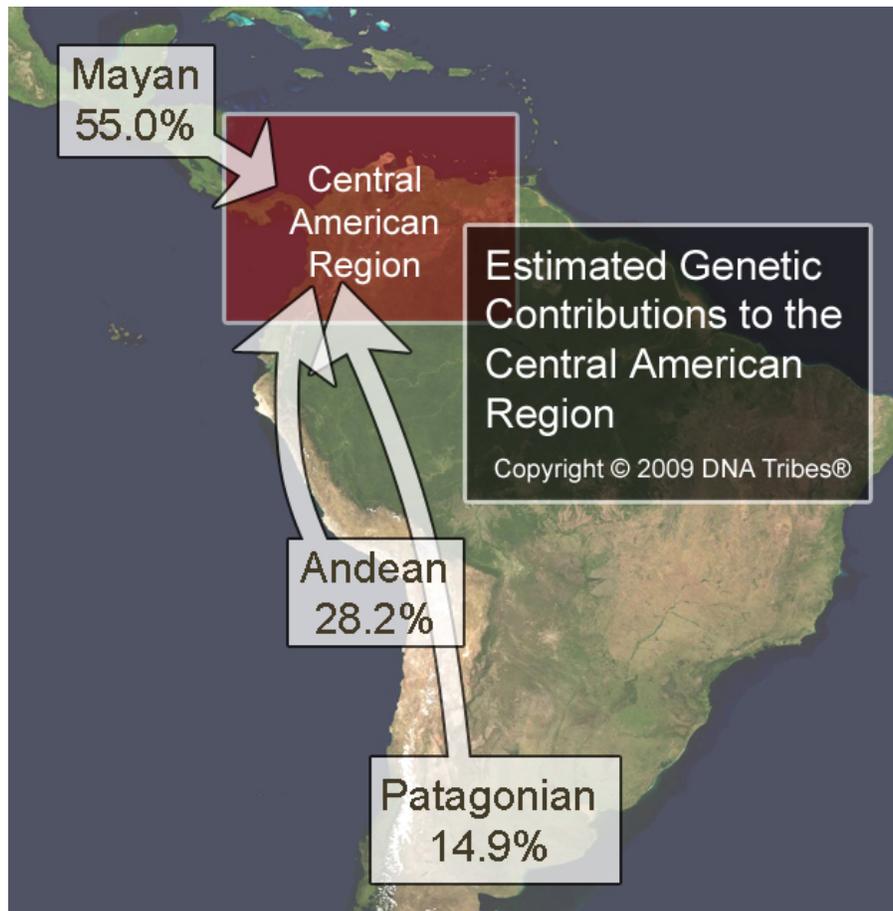


Figure 4: Estimated genetic contributions to the Central American region.

Genetic Region Estimated Contribution	
Mayan	55.0%
Andean	28.2%
Patagonian	14.9%
Other	1.9%

Table 3: Estimated genetic contributions to the Central American region.



Discussion: Results in **Table 3** indicate substantial contributions from both the northerly Mayan (55.0%) and southerly Andean (28.2%) and Patagonian (14.9%) genetic regions, consistent with contacts with populations of both Mesoamerica and South America in this geographically intermediate zone.

Conclusion

In all Mesoamerican Indian populations, substantial continuity with neighboring regions was observed. In addition, additional evidence of general north-south continuity along American Indians of the Pacific Coast was identified. This Pacific coast north-south continuity was most pronounced in the Mexican and Central American regions and contrasted substantially with the separate but parallel Atlantic coast north-south continuity observed for the Amazonian genetic region¹¹.

¹¹ For more information, see: <http://www.dnatribes.com/dnatribes-digest-2009-05-30.pdf>.



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More detailed background information about genetic relationships among world regions and populations is available in issues of DNA Tribes® Digest, which can be found at:

<http://dnatribes.com/news/news.html>