ANOMALOUS MITOCHONDRIAL DNA LINEAGES IN THE CHEROKEE

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Abstract. A sample of 52 individuals who purchased mitochondrial DNA testing to determine their female lineage was assembled after the fact from the customer files of DNA Consultants. All claim matrilineal descent from a Native American woman, usually named as Cherokee. The main criterion for inclusion in the study is that test subjects must have obtained results *not* placing them in the standard Native American haplogroups A, B, C or D, hence the use of the word "anomalous." Most subjects reveal haplotypes that were unmatched anywhere else except among other participants. There proves to be a high degree of interrelatedness and common ancestral lines. Haplogroup T emerges as the largest lineage, followed by U, X, J and H. Similar proportions of these haplogroups are noted in the populations of Egypt, Israel and other parts of the East Mediterranean.

THE CHEROKEE

The Cherokee Indians are a Southeast U.S. indigenous people traced by anthropological science to at least the sixteenth century, when Spanish conquistador Hernando de Soto invaded the region. Archeological excavations have established continuity between today's Eastern Band of Cherokee Indians in North Carolina and the Qualla Phase of occupation of the Appalachian Mountains from 1450 C.E. "or earlier," i.e., the Pisgah Phase (Fogelson 2003:338). According to Cherokee elders and keepers of their traditions, notably Keetoowah priests, their age is much more ancient, and their origins and migrations before settling in the Great Smoky Mountains quite complex. Their pre-contact population may have been as high as 30,000 (Thornton 1992:17), and although their numbers dwindled in the aftermath of European contact, typhoid, smallpox and warfare, they were the most numerous of the so-called Five Civilized Tribes of Indians displaced across the Mississippi in the years before 1838. After removal, about 1,500 remained to be registered on Indian census rolls in the East (Fogelson 2003:341), while many more doubtless were in hiding or were sufficiently assimilated to go unnoticed. According to a 2007 report from the U.S. Census Bureau, the Cherokee are the largest tribal group today, with a population of 331,000 or 15% of all American Indians. This figure seems to reflect mostly or exclusively those enrolled in the three federally recognized tribes of the Cherokee Nation of Oklahoma, United Keetoowah Band in Arkansas and Oklahoma and Eastern Band of Cherokee Indians in North Carolina, not Cherokees or their descendants who have never been placed on a U.S. government roll. No Cherokees live on reservations. The most numerous community, in fact, resides in the Greater Los Angeles area.

Despite their numbers, the Cherokee have had few DNA studies conducted on them. As shown in **Fig. 1**, there are only three known reports on Cherokee mitochondrial DNA. A total of 60 subjects are involved, all from Oklahoma. Possibly the reason the Cherokee are not recruited for more studies stems from their being perceived as admixed in comparison with other Indians. Accordingly, they are deemed less worthy of study. Yet only 9.5 percent of Native American samples are

judged "unmixed" in the first place. One study that maintains the "Atlantic seaboard and several regions of the Southeastern US have the highest admixture rates, which approximate 50%," also admits that firmly established genealogies for the Navajo, believed to be one of the most unmixed tribes, show that even they have "not inconsequential numbers of genes of European origin" (Crawford 1998:134-35). No matter how you look at it admixture is a problem in the study of American Indians. When geneticists use the word it designates lineages that do not belong to one of the five generally accepted American Indian mitochondrial DNA haplogroups A, B, C, D and X. This is true of the two examples of H and one of J reported in Cherokee descendants by Schurr (2000:253). Schurr takes these exceptions to prove the rule and regards them as instances of European admixture. The governing logic seems to go as follows:

Lineage A, B, C, D and X are American Indian.
Therefore, all American Indians are lineage A, B, C, D and X.

If any haplogroups are discovered that are *not* A, B, C, D or X, they are rejected from the study sample (as evidently in Bolnick and Smith 2003). The reasoning of many anthropologists and geneticists can be summarized as: "All men are two-legged creatures; therefore since the skeleton we dug up has two legs, it is human." It might be a kangaroo.

Fig. 1. DNA Studies that Include Data from Southeastern Indians.

mtDNA Haplogroup	n=	A	B	C	D	X	Other (Schurr)
Cherokee							
Oklahoma Stillwell (Malhi 2001)	37	10.8	45.9	43.3	0.0	0.0	
Oklahoma Red Cross (Mahli 2001)	19	21.1	21.1	52.5	5.3	0.0	
Smith et al. 1999 (and Schurr 2000)	4	0.0	0.0	25.0	0.0	0.0	H=2 J=1
Total	60	13.3	35.0	45.0	1.7	0.0	
Choctaw							
Weis 2001 (and Bolnick & Smith 2003)	27	74.1	18.5	3.7	0.0	0.0	
Chickasaw							
Bolnick & Smith	8	12.5	75.0	12.5	0.0	0.0	
Creek							
Weis; Lorenz & Smith; Bolnick & Smith	39	35.9	15.4	20.5	28.2	0.0	
Merriwether & Ferrell; Bolnick & Smith	71	36.6	15.5	9.9	38.0	0.0	
Total	110	36.4	15.5	13.6	34.5	0.0	
Seminole							
Huoponen (1997), incl. Bolnick & Smith	40	62.5	25.0	7.5	5.0	0.0	
Total	**245**						

DESCRIPTION OF THE STUDY

The present study concentrates on the "kangaroos"—the documented or self-identifying Cherokee descendants whose haplotypes do not fit the current orthodoxy in American Indian population genetics. Cases come from the customer files of DNA Consultants, a testing service founded in 2003. The method used is the standard one adopted for differentiating mitochondrial DNA lineages by characteristic mutations on a control sequence known as the D loop, which contains two segments called Hypervariable Region (or Section) I and Hypervariable Region (or Section) II (Richards and Macaulay 2000). Included are 52 individuals who ordered a Native American mitochondrial DNA test, and whose matrilineal ancestry, as it was determined in testing, happens to fall outside the haplogroups A, B, C and D. (Additionally, seven instances are adduced of X , which can be Native American or Eurasian.) Comparisons were made to the databases known as Richards, Cambridge Concordance and Mitosearch. Raw data appears in **Appendix A**. All test subjects have given permission for their names and results to be published in this article. All have submitted detailed genealogies naming, insofar as was known to them, a Cherokee female ancestor. A list of haplotypes and earliest known female ancestors appears in **Fig. 2**.

Fig. 2. List of Participants by Ancestry.

	Hg	Genealogy
1	H	New England Indian, Norse?
2	X2	Annie L. Garrett, b. 1846, Miss.
3	J*	Native American
4	H	Native American
5	X2	Native American
6	H	Cherokee
7	X2	Agnes Weldy b. ~1707
8	H	Canadian?
9	J*	Cherokee, Emily Glover 1837-1903, Tenn.
10	X2	Seyinus from Qualla Boundary, N.C., b. 1862
11	U2e*	Cherokee paramour of Lithuanian-Scottish trader Enoch Jordan, b. ~1790 NW Ga.
12	U2e*	Susanna Owens, Cherokee, b. 1760, Granville Co., N.C.
13	U2e*	Rosannah Alexander, b. ~ 1749, Mecklenburg Co., N.C., Cherokee (?)
14	U2e*	Susannah Wallen or Waldon
15	U5b*	Eliza Ann Ellis, wife of George Culver, b. ~ 1775, d. ~ 1830, Hancock Co., Ga.
16	U2e*	Cherokee, N.C.
17	U5a1a	Ann Dreaweah, Cherokee
18	U5*	Adopted, Okla.
19	U5a1a*	Jane Rose of the Eastern Band of Cherokee Indians
20	U5a1a*	Clarissa Green, wife of John Hodge, b. 1846, Cherokee Wolf Clan, Okla.

21	U4*	Lillie C. Wilson-Field, 1857-1937, b. Catawba, N.C.
22	U5b2	Wilma Nell Atchison, wife of Gilbert, Blackfoot (?), b. Kansas
23	K2	Sarah Ann Rose, b. Rock Creek, N.C.
24	T1*	Ann Houston, b. Va., mother of Susannah Walker; Melungeon
25	T1*	Native American (surrogate mother?)
26	T1*	Melungeon and Cherokee
27	X2	Mother of Ollie McCorkle, b. Ohio, Native American, descendant b. 1906, I.T.
28	T*	Melungeon
29	T2*	Native American
30	K	Mother of Linna Mitchell, born 1779, Choctaw Nation
31	T2*	Cherokee
32	T*	Sully Firebush, daughter of a Cherokee chief
33	Unknown	Unknown Bermuda
34	T5	Choctaw-Cherokee
35	T*	Zella Hand Rogers, adopted 1901 by Hand family, S.D.; Red Lake Band of Chippewa
36	Unknown	
37	Unknown	Hurley Choctaw or Pitchlynn on Armstrong Rolls (?)
38	L1b1	
39	T4	Choctaw-Cherokee
40	Unknown	
41	T*	Cherokee
42	L1c2	Subject identifies as Native American
43	L3	Juanita Pratts, b. Mexico 1885; Comanche or Mexican
44	J*	Betsy Walker, Cherokee, adopted by Sen. Felix Walker
45	J*	Myra Jarvis, Melungeon, b. 1815, Ga.
46	J*	Betsy Walker, Cherokee, adopted by Sen. Felix Walker
47	X2	Polly, Cherokee mother of Angelina Demarius Thomas by Col. Will Thomas
48	X2	Cherokee woman married to Longhunter Wallen (Walden)
49	U2e*	Jane Campbell, b. 1828, Choctaw Co., Miss.
50	T*	Native American
51	T*	Cherokee Gentry sisters
52	T*	Cherokee Gentry sisters

HAPLOGROUP H

Let us examine these anomalous haplotypes starting with haplogroup H, the most characteristically European. H is termed Helena in the scheme of Seven Daughters of Eve (Sykes 2001). Its highest frequency occurs in Spain and France, where Europeans wintered the last Ice Age (Achilli et al. 2004; Loogväli et al. 2004; Pereira et al. 2005). It was probably the predominant maternal lineage that gave

rise to the hunter-gatherer Magdalenian culture of cave art made famous by the paintings at Lascaux and elsewhere in southern France and northern Spain and Portugal. When agriculture spread to Europe from the Middle East some 7,000 to 9,000 years ago, H was either among the recipients or bearers. It is the most common female lineage throughout Europe, accounting for approximately half the population. It is the haplogroup, in fact, of the British man whose DNA was selected as the Cambridge Reference Sequence, the norm against which mutations and other haplogroups are measured (Anderson 1981; Andrews 1999). The exact same sequence makes an early European appearance in a skeleton excavated from the Paglicci Cave in Apulia in the heel of the Italian Peninsula, dated to 28,000 years ago (Caramelli et al. 2008). Historically, H is the maternal line of French queens and kings. Marie Antoinette, whose mitochondrial DNA has been reconstructed in two modern-day forensic cases (Jehaes 2001), descends from Frederuna of France, consort of Charles the Simple, a descendant of the emperor Charlemagne. H is also the haplogroup of Queen Victoria, Prince Philip and Russian Czarina Alexandra (Gill et al. 1994).

Although this quintessentially European haplogroup would seem to be the most likely suspect if admixture were responsible for anomalous haplogroups, it plays only a minor role in our study. There are but four cases of H. **Case 1** is a Rhode Island woman who claims descent from New England Indians. Her profile matches no other in the Cambridge Concordance, FBI database (Monson 2002) or Mitosearch, although there is a one-step mutation to an individual classified as Amerind in the Cambridge Concordance. **Case 4** is unusual for a mutation at nucleotide site 16362C. This woman lives in Georgia and claims descent from a Cherokee woman. Her mutations are matched by descendants of women born in the 1860s in Wisconsin and Arkansas but by no others. There are also close but not exact matches with Korea, Japan and Mongolia. The mutation 16362C occurs in four out of five of the classic Native American haplogroups. Because Case 4's mutations are only reported in people born in North America, it seems appropriate, particularly in conjunction with a suitable oral tradition, to regard her lineage as indigenous to North America, not as admixture arriving recently from Europe. **Case 6** is marked by a mutation at 93G not instanced anywhere else. According to the subject's daughter, Joy Shorkey, the line can be traced to Sarah Smith, born 16 August 1806 in Georgia, suspected to be Cherokee. **Case 8** falls in the same category.

HAPLOGROUP X

Haplogroup X is a latecomer to the received set of Native American haplogroups. Sykes names it Xenia ("foreign woman"), which is a good choice given its mysterious origins and world travels. Its relative absence in Mongolia and Siberia and a recently proven center of diffusion in Lebanon and Israel (Brown et al. 1998, Malhi and Smith 2002; Smith et al. 1999; Reidla 2003; Shlush et al. 2009) pose problems for the standard account of the peopling of the Americas. Today, haplogroup X accounts for about 2% of the population of Europe, the Middle East (Near East in British usage) and North Africa. It is more characteristic of the East Mediterranean and Caucasus than other parts of Europe. Particular concentrations appear in Georgia (8%), Orkney Islands (7%) and Israeli Druze (28%, Shlush et al.

2009). Among Native American groups, it has been reported in high frequencies among the Ojibwe and other northern tribes, where it comprises up to 25% of mtDNA lineages. Among the Micmac of the northeastern U.S. and adjacent Canadian provinces, its frequency attains 50%. It is also present in lesser percentages in the West among the Sioux (15%), the Nuu-Chah-Nulth (11%–13%), the Navajo (7%) and the Yakima (5%). Two clades have been proposed. Rare X1 is predominately North African, associated with Afro-Asiatic language speakers. X2, conventionally divided into a Native American branch (X2a) and all others (X2b-f), is much more common (van Oven and Kayser 2008).

We have seven instances of haplogroup X. They all belong to X2, but it is not possible to assign them all to subclade X2a.[1] No two haplotypes are exactly alike, although the shared motifs 153G, 195C and 225A in HVS2 are recurrent. All genealogies reported lead to a Cherokee woman. **Case 2** derives from Annie L. Garrett, born 1846 in Mississippi; there is an oral tradition in the family of her being Cherokee. **Case 7** is the mitochondrial DNA of Michelle Baugh of Hazel Green, Alabama, traced to Agnes Weldy, born about 1707. Descendants include enrolled members of the Eastern Band of Cherokee Indians. **Case 10** goes back to Seyinus, a Cherokee woman born on or near the Qualla Boundary in North Carolina in 1862. **Case 27** is the son of Gladys Lulu Sutton, born in Indian Territory in 1906; her birth certificate specifically states that she was a Cherokee Indian. Her mother was Olivia McCorkle Walker Ginn, born in West Virginia in 1865. This line matches that of Penelope Greene Fraser, born 1779, in Walton County, Georgia (Mitosearch ID 3M6H6). **Case 47,** James Stiles Riddle, has a genealogy descending directly from the Cherokee woman called Polly, who had a daughter out of wedlock, Angelina Demarius (born 1827, married Sherrill), with Col. Will Thomas, the founder of the Eastern Band of Cherokee Indians in North Carolina. Polly was the namesake for the Qualla reservation (the sound *p* lacking in the Cherokee language and being rendered with *qu*). **Cases 44** and **46** below also have a connection to Col. Thomas through another paramour of his who was evidently of haplogroup J. Finally, **Case 48** reflects descent from a Cherokee woman who married a Walden/Wallen of the same surname as Longhunter Elisha Wallen, one of the first white explorers of Tennessee, and a member of the Melungeons, a mixed ethnic group of East Tennessee. **Case 5** has unknown antecedents, believed, however, to have been Native American.

HAPLOGROUP J

The most common forms of J, termed Jasmine in the scheme of Oxford Ancestors, seem to have originated in present-day Lebanon approximately 10,000 years before present and to have moved north and west into Europe. Views about J are still evolving. Previously restricted to theories based on HVS1 sequences, its

[1] If we compare our own and other known X2a haplotypes with the X2's reported in Shlush et al.'s study of the Israeli and Lebanese Druze, the same common mutations are observed. It would appear that the demarcation between Native American and Old World forms of X2 is an artificial one. Significantly, both "branches" have the same estimated time to coalescence, 20,000 to 30,000 years before present. But usually, if an X2 is found in the New World it is automatically assigned to X2a.

phylogeny continues to be articulated with the benefit of full genome sequencing (Logan 2008). All four of our J's are to be classified as J* (all J not otherwise characterized and subdivided). The overall haplogroup is found throughout Europe with particularly high concentrations around the eastern Baltic Sea, Russia and among the Bedouins and Yemeni, where it reaches frequencies of 25% or higher. It is a major Jewish female lineage (Thomas 2002), and it is a strong contributor to Arab, Greek and Italian populations as well. It is also relatively common in India. Along with male haplogroup J, it is believed to have been instrumental in spreading agriculture from the Middle East about 7,000 years ago. Haplogroup J has been linked to longevity and a certain form of hereditary blindness.

Case 9 has a J haplotype distinguished by the unusual mutation 16162C. The subject's mutations are also associated with Native American lineages A and D (Comas 1996). Like the others in this study the specific haplotype is matched or nearly matched only with rare mitochondrial lineages reported in people born in the Americas. And like all the others, too, it goes back to a Cherokee source. Case 9 is Jerry W. Moore, the father of Michael Wayne Moore, who has traced the line to Emily Glover, born in Tennessee in 1837, reportedly a Cherokee. Both **Case 44** and **Case 46** trace their line back to Betsy Walker, a Cherokee woman born about 1720 in Soco (One-Town). Betsy was given as a child to Sen. Felix Walker to raise. While he was an apprentice for the Walkers, young Will Thomas (later chief of the Eastern Cherokees) fell in love with Catherine Hyde, her descendant. Catherine Hyde is the 6th-great-grandmother of test subject Kimberly McFadden Hill. Her sister Annie Hyde married Holloman Battle and produced the other instance of Betsy Walker's mitochondrial haplotype in modern-day descendant Sharon Crisp Bedzyk. The fourth example of J*, Judith Alef (**Case 45)**, is a descendant of presumed Cherokee Myra Jarvis, a Melungeon woman born in 1815 in Georgia.

HAPLOGROUP U

Haplogroup U is a complex mega-lineage with an estimated age of more than 50,000 years. It is the oldest European haplogroup that is Homo sapiens rather than Homo erectus or Neanderthal, representing the first colonization of Europe by its present inhabitants. Human societies with haplogroup U4, U5 and U5a may have come into contact with Neanderthals living in Europe at the time. U shows up in the archeological record in Delphi and Spain around 50,000 years ago. Today U5, the most common clade, accounts for about 10% of matrilineal types in Europeans. Other clades of U are responsible for about five and a half percent, making U the second largest haplogroup after H. It has been found in high frequencies in the Indian subcontinent and at a low frequency in the Japanese, the North African Berber population, Ethiopians and Senegalese (Torroni et al. 1996, Passarino et al. 1998, Macaulay et al. 1999). In Finland, a population with a relatively small number of founder types, it has been associated with several rare medical conditions (Finnilä et al. 2000). One important divide in subcluster U2 goes back to the earliest millennia of the migrations of humans out of Africa, with U2e splitting off and expanding north into Europe, probably traveling along the Zagros Mountains, and U2i settling in India, where it reaches frequencies of around 25% today. With the exception of a single instance of U6 in a study of Mexican Indians, where it is attributed to European admixture (Green et al. 2000), haplogroup U has never been

reported in American Indians to my knowledge. In our sample it covers 13 cases or 25% of the total, second in frequency only to haplogroup T.

Let us first describe the U5's. **Case 20** is Mary M. Garrabrant-Brower. She belongs to U5a1a* but has no close matches anywhere, unless a one-step mutation on HVS2 with an Asian and two Chinese samples are to be taken into account. Her great-grandmother was Clarissa Green of the Cherokee Wolf Clan, born 1846. Clarissa Green's grandfather was remembered as a Cherokee chief. Mary's mother Mary M. Lounsbury maintained the Cherokee language and rituals. **Case 19**, Bruce Dean, another U5a1a*, matches only one other person on both sectors, Marie Eastman, born 1901 in Indian Territory (Mitosearch EDCCB). Because of the precision of the match, he and the descendant of Marie Eastman who was tested and made the entry in Mitosearch are almost certainly cousins in a genealogical, as well as genetic sense. His descent is from Jane Rose, a member of the Eastern Cherokee Band whose family is listed on the Baker Rolls, the final arbiter of enrollment established by the U.S. government. **Case 22** is Michael Gilbert, who was given little information about his mother, Wilma Nell Atchison, beyond the fact that she was Blackfoot – probably the Virginia/North Carolina tribe by this name, also called Saponi, Sissipah and Haliwah. His haplotype is U5b2. Although there are four exact matches on both sectors, two of these are in the Old World (Ireland and Denmark), one is of unknown origin but American, and one leads to Arpahia Finley, born about 1827 in Albemarle County, Va. The latter location is the traditional homeland of the Blackfoot Indians. Because of the division of the matches, one could speculate that in this instance we may be dealing with a lineage that came over from northwestern Europe and *became* American Indian, only in all likelihood long before Columbus. **Case 15** is that of my wife, Teresa Panther-Yates, whose mtDNA can be designated as U5b*. It has no matches remotely close to it in either the Concordance or Mitosearch. Teresa has traced her maternal line back to Isabel Culver, who married Levin Ellis in Hancock County, Georgia, and died about 1838. There is a tradition in her family that this line was Cherokee. **Case 17**, an example of U5a1a, does have two matches – South Carolina and Norway – but the subject claims that the line goes back to Ann Dreaweah, a Cherokee woman married to a half blood Cherokee man. It may be another bifurcated lineage with representatives on both sides of the Atlantic. **Case 18** has no close matches at all and may be placed in the category of U5*. The subject was adopted in Oklahoma and knows nothing of his mother's ancestry. **Case 21** is Gerald Potterf, a U4* who traces his mother's line to Lillie C. Wilson-Field, born in 1857, Catawba County, North Carolina. She was probably Cherokee, although her ancestors may have been Catawba, a Siouan tribe from the Carolinas who joined the Cherokee in great numbers during the eighteenth century. U4 is associated with North Africa and the Middle East.

Our survey of U's leaves the five haplotypes classified U2e*. **Case 11** is my own, for which there are no close matches. This line evidently arose from a Jewish Indian trader and a Cherokee woman. My fifth-great-grandmother was born about 1790 on the northern Georgia and southwestern North Carolina frontier and had a relationship with a trader named Enoch Jordan. The trader's male line descendants from his white family in North Carolina possess Y chromosomal J, a common Jewish type. Some Jordans, in fact, bear the Cohen Modal Haplotype that has been

suggested to be the genetic signature of Old Testament priests (Thomas et al. 1998). Enoch Jordan was born about 1768 in Scotland of forbears from Russia or the Ukraine. My mother, Bessie Cooper, was a double descendant of Cherokee chief Black Fox and was born on Sand Mountain in northeastern Alabama near Black Fox's former seat at Creek Path (and who was Paint Clan). The Cooper line goes back to William Cooper, a scout and road builder for Daniel Boone, who married Malea Labon (Hebrew first and last name), the daughter of a Choctaw woman and a French trader. The Cooper surname often appears in lists of common Melungeon names. I said there were no close matches for my mtDNA, but **Case 12**, Phyllis LaForce Starnes of Harriman, Tennessee, turned out to match perfectly with mine on HVS2. She traces her maternal line to Susanna Owens, born about 1760, probably in Granville County, North Carolina. The family is Melungeon like the Coopers, and Starnes suffers from a disease common among Melungeons and Sephardic Jews. Both Starnes' and my haplotypes share several motifs with three other cases of U2e*. **Case 13** is a near match with **Case 16**. The former's maternal line reportedly goes back to Rosannah Alexander, born about 1749 in Mecklenburg County, North Carolina, believed to be Cherokee. **Case 14** is a descendant of Mahalia Waldon (her surname coming from a famous Longhunter and Melungeon family). Mahalia was born in 1834 in Hancock County, Tennessee, in the Melungeon population center. All U2e* cases appear to have Melungeon, Cherokee and Jewish connections. The most frequent Cherokee clan mentioned in their genealogies is Paint Clan.

HAPLOGROUP T

Maternal lineage T ("Tara") is believed to have originated in Mesopotamia approximately 10,000 to 12,000 years ago and to have moved northwards through the Caucasus and westwards from Anatolia into Europe. It shares a common source with haplogroup J in parent haplogroup JT (Finnilä et al. 2001). Ancient people with haplogroup T were likely some of the first agriculturalists and probably comprised the group which first brought agriculture to Europe with the Neolithic Revolution. T is the same haplogroup as Sykes's, who named it Tara after the ancient center and capital of Ireland. The matches with the Russian Tsar Nicholas in a famous case (Gill 1994) prove that T was the matrilineal line of much aristocracy (along with H, above). Maurice, prince of Nassau, England's Charles I and King George I of Great Britain were all apparently T. The haplogroup includes slightly fewer than 10% of modern Europeans. The closer one goes to its origin in the Fertile Crescent the more likely T is to be found in higher frequencies.

All our T's are unmatched except in some cases with each other. **Case 35**, Jonlyn L. Roberts, has a puzzling, but typical genealogy that led her to embark on a lifelong quest for answers. Her mother, Zella, was adopted by the George and Mary Hand family of Hand County, South Dakota in 1901. Little information was passed down, but piecing together clues from her childhood, Roberts believes that her mother's original family might have come from the Red Lake Ojibwe Indian Reservation or one of the North or South Dakota reservations. At any rate, her mtDNA haplotype is a unique form of T*, one similar to others in this study. **Case 32**, another T*, leads to an unknown ancestor in Oklahoma. **Case 28**, also T*, is an individual reporting Melungeon ancestry. His mtDNA matched four people on both

sectors in Mitosearch. All these were born in the United States; one traces back to Birdie Burns, born 1889 in Arkansas, the daughter of Alice Cook, a Cherokee (ID AB3YK). **Case 41**, Gail Lynn Dean**,** is the wife of Case 19; both claim Cherokee (among other) ancestries. No near match has her mutation 236C. **Case 32,** Linda Burckhalter, is the great-great-granddaughter of Sully Firebush, the daughter of a Cherokee chief who married Solomon Sutton, the stowaway son of a London merchant, in what would seem to be another variation of the "Jewish trader marries chief's daughter" pattern. Rounding out our T* are the two matching **Cases 51 and 52**, both descended in different lines from the historically documented Gentry sisters.

Cases 24, 25 and **26** are perfectly matching T1* individuals completely unknown to one another before testing. Two of them claim Melungeon ancestry; the other's is unknown. Case 26 is a distant cousin of mine with the same surname whom I did not know before he became a customer. Case 24 is the aunt of Case 12. **Cases 29** and **31** are examples of unique T2*'s. Both were ignorant of the origins of their maternal line, suspecting only that they were Native American. **Case 29**, which is T4, is from an extended family that claims Choctaw-Cherokee ancestry (like my own). The sole instance of T5, **Case 34**, took not only the mitochondrial test but also our CODIS-marker-based population matching ancestry test, DNA Fingerprint, to validate "Cherokee or Jewish ancestry" from her mother. She has scattered matches but none on both sectors. The results of her DNA Fingerprint Test show Ashkenazi Jewish in the No. 1 position, as well as American Indian admixture.

DISCUSSION AND CONCLUSION

As tabulated in Fig. 3 and the Appendix, our small *ex post facto* survey shows a great deal of diversity both of haplogroups and haplotypes. It contains several examples of people who discovered through testing they are related and share the same Cherokee ancestry and even the identical matrilineal clan. It cannot be emphasized enough that our sample was assembled after the fact from individuals who did not know each other, and who came from all over the country. Unlike the U.S. majority population, the sample exhibits a mix of haplogroups that turns the usual pattern on its head. Haplogroup H, instead of an expected 50% dominant position, is one of the smallest, with only 7.7%. Haplogroup U, an older lineage representing the first wave of colonization of Europe before the ascendency of H, is numerous and highly diversified at 25% of the total number of participants. Haplogroup X, marked by an exiguous presence in the Old as well as New World (where it is found in large numbers only in select groups), attains a frequency more than tenfold that of Eurasia or Native America (13.5%). But the most startling statistic is the frequency of occurrence of T haplotypes. At 26.9 %, they figure as the leading haplogroup, with 14 individuals. Several of these evidently come from the same Cherokee family or clan, although they have been separated and scattered from their original home by circumstances and the events of history. The many interrelationships noted above reinforce the conclusion that this is a faithful cross-section of a population. No such mix could have resulted from post-1492 European gene flow into the Cherokee Nation. That would have required a large influx of non-European women marrying Cherokee men. The anomalous types of mitochondrial

DNA (added to already documented examples of A, B, C and D haplotypes that are not part of this article) must reflect a pre-Columbian population structure.

If not from sources in Siberia, Mongolia and Asia, where do our non-European, non-Indian-appearing elements come from? The level of haplogroup T in the Cherokee (26.9%) approximates the percentage for Egypt (25%), one of the only lands where T attains a major position among the various mitochondrial lineages. In Egypt, T is three times what it is in Europe. Haplogroup U in our sample is about the same as the Middle East in general. Its frequency is similar to that of Turkey and Greece. J has a frequency not unlike Europe (a little less than 10%). Our five instances of J sometimes have matches or near matches with European Jews.

But the most telling evidence in my opinion concerns haplogroup X. This, as we have seen, ranks as the third largest haplogroup. The only other place on earth where it is found at an elevated level apart from other American Indian groups like the Ojibwe is among the Druze, an endogamous population living for thousands of years with little genetic influx in the Hills of Galilee in northern Israel and Lebanon. The work of Shlush et al. (2009) demonstrates that the homeland of the Druze, because of the diversity of X haplotypes in it as well as their high frequency, is the center of a worldwide diffusion for X. It is the hallmark of a population of which the Druze are the lasting surviving heirs. The region acted as a refugium for humans during the last Ice Age much as the Iberian Peninsula did for other lineages (chiefly H). Haplogroup X (and to a lesser extent, K) is one of the distinctive signatures of the first out-of-Africa settlers in the land of Canaan (present-day Israel and Lebanon). In other words, the peculiar Druze sect preserves the genetics of the bedrock population.

In the case of this genetic refugium, however, I propose that since there is no starlike population expansion driving haplogroup X outward into Europe and to other parts of the Middle East, the lineage can only have spread in discontinuous fashion to the Americas and to other places where it has been noted such as North Africa, England, South America and Papua New Guinea. It must have arrived by sea. There are no genetic footsteps of haplogroup X leading to the New World across Europe, nor in Siberia or along a circumpolar route, as has been variously argued. From a genetic perspective, X survives at elevated frequencies in two separate places, Canaan or Palestine and Native North America. Its presence is particularly noteworthy in the tribes situated around the Great Lakes and Saint Lawrence Seaway like the Ojibwe and Micmac—and in the Cherokee, as shown in this article.

On the Y chromosome side of Shlush et al.'s study, male haplogroup K was found to have a relatively high frequency of 11% in the Galilee region (2008:2). K (renamed T in the revised YCC nomenclature) has long been suspected to be the genetic signature of the Phoenicians (*Who Were the Phoenicians?*). This early seafaring people originated in the interior of Lebanon after 1200 B.C.E. (Aubet 2001:13-16) and spread later to Asia Minor, North Africa, Sicily and Spain, creating a mining and mercantile empire. Notably, they served as mariners for the Egyptians. Herodotus, moreover, has the following account of their trade activities with "a race of men who live . . . beyond the Pillars of Hercules":

> On reaching this country, they unload their goods, arrange them tidily along the beach, and then, returning to their boats, raise a smoke. Seeing the

> smoke, the natives come down to the beach, place on the ground a certain quantity of gold in exchange for the goods, and go off again to a distance. The Carthaginians then come ashore and take a look at the gold; and if they think it represents a fair price for their wares, they collect it and go away; if, on the other hand, it seems too little, they go back aboard and wait, and the natives come and add to the gold until they are satisfied. Their is perfect honesty on both sides; the Carthaginians never touch the gold until it equals in value what they have offered for sale, and the natives never touch the goods until the gold has been taken away (IV.196:279).

Some readers will immediately recognize in Herodotus' account a description of the Sacred Trade Circle of American Indians. No word was ever exchanged. The principal was "what you see is what you get." Barter alone was used. The exchange could be evened out to make it acceptable to one or another of the two parties if they were hesitant to accept it, as the Phoenicians were in the passage given above. All "sales" were final, since in the nature of things they were mutually satisfactory or else the deal would not have been consummated.[2] Without a doubt it was the Phoenicians, whose name among themselves was *Cana'ni* or KHNAI 'Canaanites', not *Phoenikoi* 'red paint people' (Aubet 2001:9-12; cf. *Oxford Classical Dictionary* s.v. "Phoenicians"), who are referenced by James Adair when he observes that "several old American towns are called Kanāai," and suggests that the Conoy Indians of Pennsylvania and Maryland were Canaanites and their tribal name a corruption of the word Canaan. The Conoy Indians are the same Indians William Penn around 1700 described as resembling Italians, Jews and Greeks. By about 1735 they had dwindled to a "remnant of a nation, or subdivided tribe, of Indians," according to Adair (1930:56, 67, 68). One of the oldest Cherokee clans is called Red Paint Clan (*Ani-wodi*).

It is hoped that a second article will analyze Cherokee traditions about Egypt, Greece, Cyrene, Israel and Phoenicia and present links and alignments involving language, epigraphy, culture and historical accounts in addition to the genetics reported here.

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[2] The most complete written description of the custom of the trade circle I can think of appears in a book that I wrote some years ago, as follows:

> To my knowledge, no one has ever successfully explained the origin of the term Indian giver. Was it the Indians who took back or the white man? The question is important if we are to know what to do with the Indian gift today. Seer tradition unravels the mystery as follows.
>
> When the white man first appeared in his sailing ships he left strange gifts on the shore. These were treated as goods placed on a trade blanket. It was normal for no verbal communication to take place in the sacred trade circle, though it was unusual for the two parties not to be present at the same time. Our people understood the gesture and honored it with equal return gifts. Perhaps the pile they left on the shore exceeded the value of the white man's gifts. Maybe it was too little. It was hard to tell, nor did it matter. They were accepted. All gifting is final. *The Eighth Arrow: Right, Wrong and Confused Paths According to Tihanama Elder Wisdom* (e-book). Marion: Standing Bear Press, 2007:169.

Fig. 3. Haplogroup Distribution of Anomalous Types versus Europe and Other Populations.

Hg	N=	%	Europe	Middle East	Egypt	Druze	Eastern Mediter-ranean
H	4	7.7	53.5	36.8			
J	5	9.6	9.5	11.4	6.3	7.0	12.7
X	7	13.5	1.5	3.5	1.6	27.9	4.8
U	13	25	22.2	26.3	7.8	11.6	16.4
K	2	3.8	5.8	6.2	3	16.3	3.6
T	14	26.9	8.4	11.9	25	4.7	6.0
L	3	5.8					
Unk.	4	7.7					
X? H?	1						
J?	1						
H?	1						
A?	1						
Total	50	100	n=1021	n=2736	n=64	n=43	n=165

Source: Suppl. data from Richards et al. (2000); this study.

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Appendix A. Test Subjects by HVS1 and HVS2 Mutations.

	Hg	HVS1	HVS2
1	H	16239A 16519C	263G 315.1C
2	X2	16182C 16183C 16189C 16223T 16248T 16278T 16519C	73G 153G 195C 225A 263G 309.1C 309.2C 315.1C
3	J*	16069T 16126C 16311C 16519C	73G 185A 188G 228A 263G 295T 309.1C 315.1C
4	H	16183C 16189C 16193.1C 16362C 16519C	257G 263G 309.1C 309.2C 315.1C
5	X2	16183C 16189C 16193.1C 16223T 16255A 16278T 16519C	73G 153G 195C 225A 227G 263G 315.1C
6	H	16189C 16193.1C 16193.2C 16356C 16362C 16519C	93G 263G 315.1C
7	X2	16129A 16183C 16189C 16193.1C 16223T 16255A 16278T 16519C	73G 153G 195C 225A 226C 263G 309.1C 315.1C
8	H	16519C	185A 263G 315.1C
9	J*	16069T 16126C 16162G	73G 228A 263G 295T 309.1C 315.1C
10	X2	16189C 16193.1C 16223T 16278T 16519C	73G 153G 195C 225A 226C 227G 263G 309.1C 315.1C
11	U2e*	16051G 16129C 16145A 16182C 16183C 16189C 16362C 16519C	73G 152C 217C 263G
12	U2e*	16051G 16075C 16092C 16129C 16183C 16189C 16362C 16519C	73G 152C 217C 263G
13	U2e*	16051G 16092C 16129C 16183C 16189C 16362C 16519C 16525G	73G 152C 217C 263G 315.1C
14	U2e*	16051G 16129C 16183C 16189C 16362C 16519C 16525G	73G 152C 217C 263G 315.1C
15	U5b*	16189C 16193.1C 16193.2G 16270C 16519C	73G 150T 185A 163G 309.1C 315.1C
16	U2e*	16051G 16092C 16129C 16182C 16183C 16189C 16362C 16519C	73G 150T 185A 163G 309.1C 315.1C

17	U5a1a	16231C 16256T 16270T 16399G	73G 152C 263G 315.1C
18	U5*	16193T 16270T 16296T 16391A	73G 150T 263G 315.1C
19	U5a1a*	16114A 16192T 16256T 16270T 16294T 16526A	73G 263G 315.1C
20	U5a1a*	16192T 16249C 16256T 16270T 16399G	73G 199C 263G 315.1C
21	U4*	16342C 16343G 16356C 16390A 16519C	73G 150T 263G 309.1C 315.1C
22	U5b2	16114T 16224C 16270T	73G 150T 263G 279C 315.1C
23	K2	16093C 16192T 16224C 16311C 16519C	73G 194C 263G
24	T1*	16126C 16163G 16185.1T 16189D 16294T 16519C	73G 152C 195C 263G 309.1C 315.1C
25	T1*	16126C 16163G 16185.1T 16189D 16294T 16519C	73G 152C 195C 263G 309.1C 315.1C
26	T1*	16126C 16163G 16185.1T 16189D 16294T 16519C	73G 152C 195C 263G 309.1C 315.1C
27	X2	16189C16223T 16271C 16278T 51619C	73G (or 73.1G) 153G 195C 225A 226C 227G 263G 309.1C 315.1C
28	T*	16126C 16189C 16193.1C 16278T 16294T 16296T 16519C	73G 263G 309.1C 315.1C
29	T2*	16126C 16266T 16294T 16304C 16519C	73G 263G 309.1C 315.1C 385G
30	K	16093C 16224C 16245T 16311C 16519C	73G 263G 309.1C 309.2C 315.1C
31	T2*	16126C 16187T 16294T 16296T 16304C 16519C	73G 151D 152.1C 263G 309.1C 315.1C
32	T*	16126C 16163G 16185.1T 16189D 16257T 16294T 16519C	73G 152C 183G 195C 263G 309.1C 315.1C
33	Unknown	16183C 16189C 16193.1C 16276A 16325C	73G 149.1T 152D 263G 315.1C
34	T5	16126C 16153A 16294T 16296T 16519C	73G 150T 263G 309.1C 315.1C
35	T*	16126C 16172C 16185.1T 16189D 16294T16298C 16399G 16519C	73G 146C 263G 309.1C 315.1C
36	Unknown	16069T 16164G 16234T 16519C	73G 185A 188G 228A 263G 295T 309.1C 315.1C

37	Unknown	16183C 16189C 16193.1C 16261T 16519C	263G 309.1C 309.2C 315.1C
38	L1b1	(16234T)	(357G)
39	T4	16126C 16256T 16294T 16296T 16519C	73G 263G 309.1C 315.1C
40	Unknown	16039A 16188D 16193.1C 16223T 16290T 16319C 16362C 16519C	73G 152C 235G 263G 309.1C 315.1C
41	T*	16126C 16189C 16193.1C 16193.2C 16294T 16296T 16519C	73G 151D 152.1C 236C 263G 315.1C
42	L1c2	(African sequences)	
43	L3	16223T 16258T 16320T 16519C	73G 150T 189G 195C 263G 309.1C 315.1C
44	J*	16069T 16126C 16172C	
45	J*	16069T 16126C 16311C 16366T 16368C 16519C	93G 185A 188G 228A 263G 295T 309.1C 315.1C
46	J*	16069T 16126C 16172C	73G 228A 263G 295T 315.1C
47	X2	16189C 16192T 16223T 16278T 16519C 16528T	
48	X2	16189C 16223T 16278T 16519C	
49	U2e*	16051G 16075C 16092C 160129C 160183C 160189C 160362C 160519C	73G 152C 217C 263G
50	T*	16126C 16163G 16185.1T 16189D 16294T 16324C 16519C	73G 152C 183G 195C 263G 309.1C 315.1C
51	T*	16126C 16182C 16183C 16189C 16294T 16296T 16298C 16519C	73G 195C 263G 315.1C
52	T*	16126C 16182C 16183C 16189C 16294T 16296T 16298C 16519C	73G 195C 263G 315.1C

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