



DNA Tribes® Digest February 1, 2012
Copyright © 2012 DNA Tribes®. All rights reserved.

To request an email subscription to DNA Tribes® Digest, email digest@dnatribes.com with the subject heading “Subscribe.” To unsubscribe from DNA Tribes® Digest, email digest@dnatribes.com with the subject heading “Unsubscribe.” Previous issues of DNA Tribes® Digest are available online at <http://dnatribes.com/library.html>.

Table of Contents:

Introduction.....	1
The North African Region	2
Historical Background	2
Genetic Analysis of the North African Region (STR).....	4
Genetic Analysis of North African Populations (SNP)	5
Conclusion	6
Getting the Most from Your STR Testing	7

Introduction

Hello, and welcome to the February 2012 issue of DNA Tribes® Digest. This month’s feature article explores genetic relationships of North African populations. This includes two separate analyses (autosomal STR and autosomal SNP), each providing an independent source of information about genetic links in this part of the world.

Best regards,
Lucas Martin
DNA Tribes

The North African Region

Historical Background

The North African genetic region includes populations of northwestern Africa, including both Berber and Arabic speaking populations of present day Morocco, Algeria, Tunisia, (to some degree) Libya, and the Siwa Oasis of Egypt (see **Figure 1**). This genetic region has been identified based on both autosomal STR and autosomal SNP markers used in DNA Tribes® analysis.¹

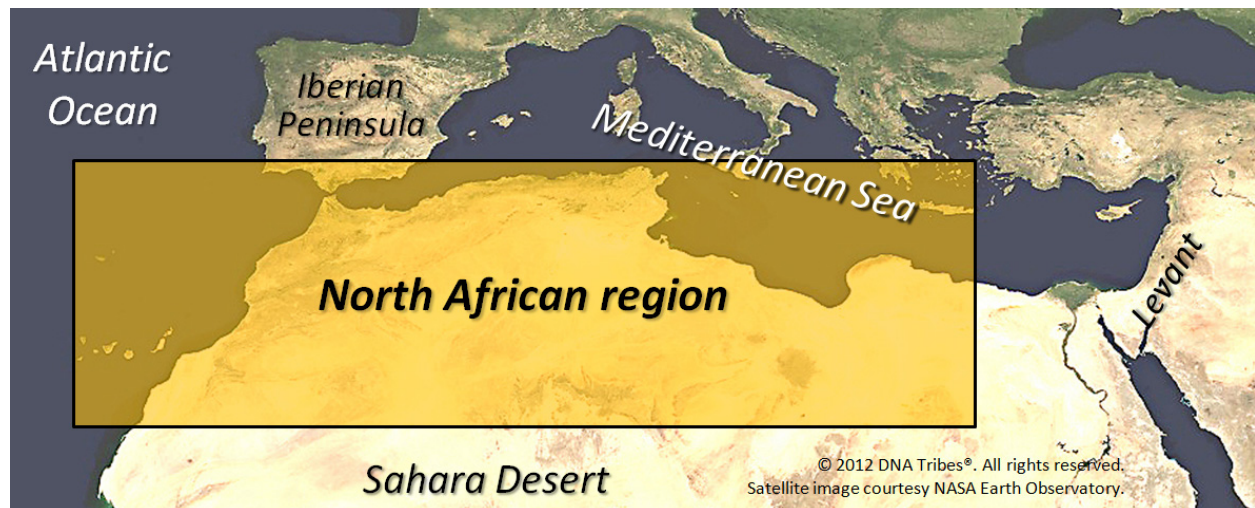


Figure 1: The North African world region identified based on STR and SNP data. For more about the world regions in DNA Tribes® STR based 15, 21 and 27 Marker Kit tests, see <http://dnatribes.com/populations.html>. For more information about DNA Tribes® SNP analysis, see <http://www.dnatribes.com/snp.html>.

North Africa is traditionally known as the Maghreb, referring to the West or “Place of Sunset.” This area is bordered by the Mediterranean Sea and Sahara Desert (see **Figure 1**), which have both isolated North Africa and also connected it to neighboring lands of Africa, Europe, and the Near East.

During the Last Glacial Maximum (when much of Europe, Asia, and North America was covered by ice), North Africa was home to Iberomaurusian cultures linked to the Iberian Peninsula (Spain and Portugal) between 20,000 and 10,000 BCE.

Although is relatively arid today, North Africa’s climate has been wetter and greener in the past. During the Mesolithic period between 10,000 and 6,000 BCE, hunting-gathering Capsian cultures flourished on the grassy North African savannas. Saharan rock art portrays the lost landscapes of the “Green Sahara,” including elephants, antelopes, giraffes, buffalo, and other animals now absent from North Africa.

Also dating to this “Green Sahara” period are early megalithic sites such as Nabta Playa, predating Stonehenge by 1,000 years. Like the earlier Iberomaurusian cultures, Capsian hunting peoples

¹More information about DNA Tribes® STR based 15, 21 and 27 Marker Kit tests is available at the link <http://dnatribes.com/populations.html>. For DNA Tribes® SNP analysis, see <http://www.dnatribes.com/snp.html>.

continued to interact with the West Mediterranean (the Iberian Peninsula and Sicily). Capsian cultures were also probably in contact with the Eburran culture of East Africa (including Kenya).

After the “5.9 kiloyear event” of approximately 3,900 BCE, the ancient “Green Sahara” became drier and increasingly like the arid desert of today. However, ancient sources described some of the large North African lakes that remained into classical antiquity: for instance, Lake Tritonis was said to be a large freshwater lake (possibly in present day Tunisia).

Although difficult to verify due to a loss of records, the Roman historian Sallust recorded a local North African (Punic) tradition remembered in his time (the 1st century BCE). According to this Punic account, the first inhabitants of North Africa were the Gaetulians and Libyans, both nomadic hunting-gathering cultures. These indigenous cultures later mixed with a wave of sea migrants (apparently from the Levant) that included Medes and Armenians. The new mixed cultures then began trade contacts with the Iberian Peninsula and became ancestors of the historical Mauri (Moors) and Numidians.²

Mediterranean contacts intensified during the Iron Age, when seafaring Phoenicians from the Levant established several trading colonies in North Africa (c. 800-700 BCE). These Phoenician (Punic) cities eventually emerged as local Carthaginian cultures that continued contacts with neighboring Africans as well as the Iberian Peninsula.

Mediterranean contacts during the Classical period also included Greek colonies in the “Pentapolis” (five cities) of Cyrenaica.³ More recently, waves of Arabic speaking migrants entered North Africa during the medieval period; like the Phoenicians before them, they merged with North African cultures to create new societies in contact with other Mediterranean and Near Eastern societies.

Despite many waves of migration from the Mediterranean and Near East, North Africa is also home to longstanding indigenous societies that have mixed and interacted with migrants since ancient times. For instance, early Egyptian sources describe several western peoples, such as the Meshwesh, Tehenu, and Libu. These cultures are thought to be ancestral to the Berber (Amazigh) cultures that live throughout North Africa to the present day.

Many Berber communities still speak one of the Berber languages, which are part of the larger Afroasiatic language family that also includes ancient Egyptian, Phoenician, and Hebrew, as well as the Cushitic, Chadic, and Omotic languages of Africa.

² See <http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.02.0126%3Achapter%3D18> (*The Jugurthine War* ch. 18). Sallust dates this migration before the arrival of Phoenicians (c. 800-700 BCE). Pre-Phoenician cultures of the Bronze Age Levant included Mitannians and nomadic Habiru (*Sa.kas*). These early Hurro-Urartian societies were possibly linked to ancestral Armenian cultures of the Transcaucasus. By the Iron Age, these migratory cultures had been integrated in local societies speaking Canaanite languages (such as Phoenician, Hebrew, etc.).

Sallust further associated these pre-Phoenician sea migrations with the figure of “Hercules” (Melqart), who was also associated with several cities of the Iberian Peninsula, including: Gadeira (Cadiz), Qart Hadasht (Cartagena), and the Balearic city of Ibossim (Ibiza).

³ The ancient Greek-Sicilian historian Diodorus Siculus mentions an ancient bronze tripod given to a king of Libya (Triton, cf. Lake Tritonis) by the Argonauts and Heracles, who had sailed in the southern Black Sea (Pontus) and Don River (Tanais) before traveling west to Cadiz (Gadeira). This was either via a northern river-ocean route (possibly a Varangian-like route involving the Volga and Atlantic); or else via the Danube (Ister) and Adriatic. See http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Diodorus_Siculus/4C*.html (sec. 56; also sec. 17-18).

Genetic Analysis of the North African Region (STR)

Genetic contributions to the North African region (excluding self-reference to North Africans) were identified based on autosomal STR data. Results are summarized in **Table 1** and illustrated in **Figure 2**.

World Region or Europa-Sub-Region	Estimated Contribution
Levantine	57.3%
Portuguese	23.6%
Sahelian	9.2%
African Great Lakes	5.9%
Other	4.0%

Table 1: Genetic contributions to the North African region (STR).

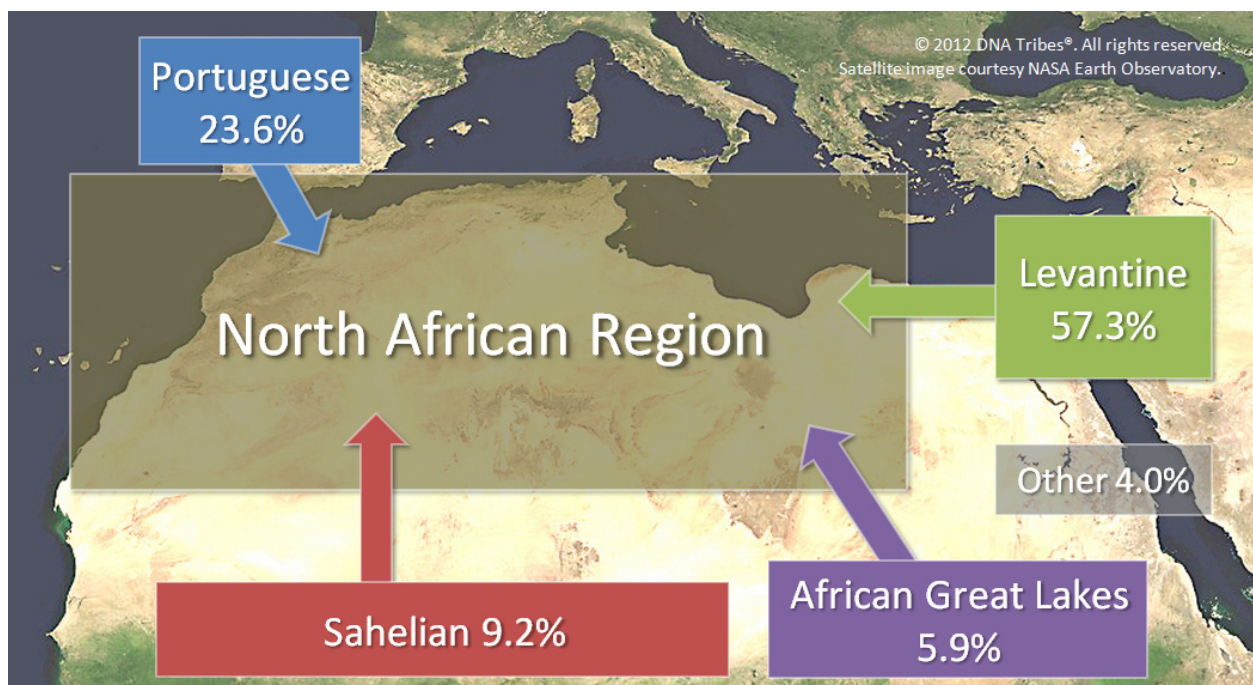


Figure 2: Genetic contributions to the North African region based on autosomal STR data. For more about the world regions in DNA Tribes® STR based 15, 21 and 27 Marker Kit tests, see <http://dnatribes.com/populations.html>.

Discussion: Results in **Table 1** indicate genetic links between North Africa and several neighboring regions. The largest contribution was from the Levantine region (57.3%); this might express genetic links with the East Mediterranean dating to the Arab expansions of the medieval period, as well as earlier North African links with Egypt and the seagoing Phoenician cultures of ancient Canaan.

Results also indicated Portuguese links (23.6%), suggesting contacts between North Africa and the parts of the Iberian Peninsula facing the Atlantic Ocean (present day Portugal and Galicia). This

might express historical links dating to the Phoenician (Punic) cultures, as well as older Iberomaurusian and Capsian contacts with the West Mediterranean attested in the archaeological record.

Finally, results indicated genetic links between North Africa and two regions of Sub-Saharan Africa: Sahelian (9.2%) and African Great Lakes (5.9%). The Sahelian links might express contacts dating to the medieval Moorish (Berber) expansions, as well as older links via Trans-Saharan cultures such as the Tuareg and perhaps the more ancient Garamantes and Gaetulians. Similarly, genetic links with the African Great Lakes might express contacts via nomadic cultures of the Sahara Desert, as well as older “Green Sahara” contacts linking ancient Capsians with Eburran cultures of East Africa.

Genetic Analysis of North African Populations (SNP)

Regional admixture components in several North African populations (excluding North African admixture) were quantified using autosomal SNP data. Results are summarized in **Table 2** and illustrated in **Figure 3**.

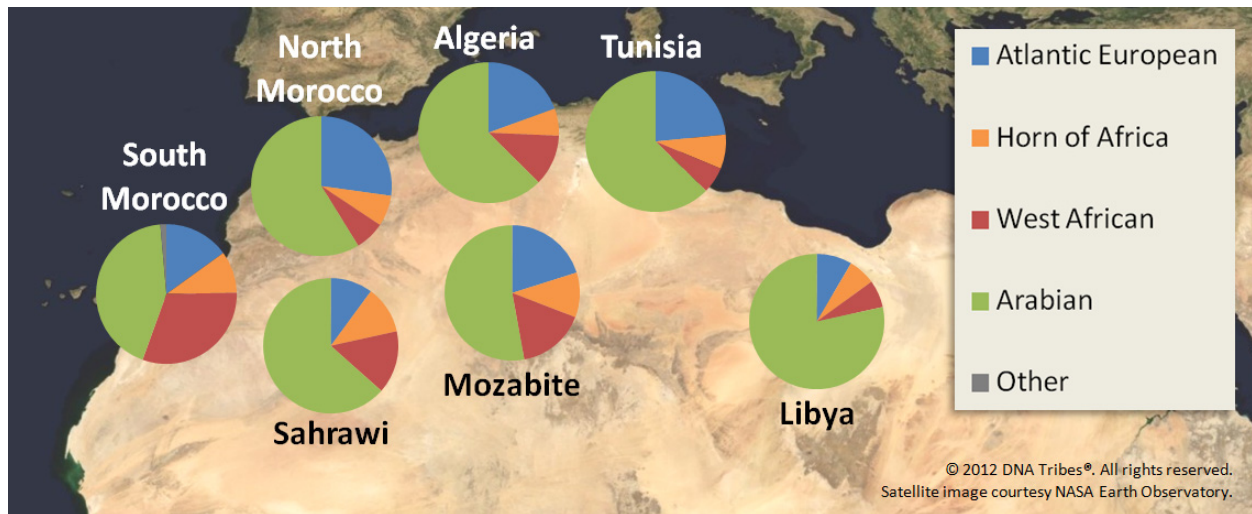


Figure 3: Regional admixture in North African populations based on autosomal SNP data (excluding admixture from the North African region that includes these populations). For more information about the regions included in DNA Tribes® SNP admixture analysis, see <http://www.dnatribes.com/snp.html>.

Discussion: Results in **Table 2** indicate that excluding North African admixture, the largest admixture component for sampled North African populations was from the Arabian region (average 60.3%). This region includes populations of the Arabian Peninsula, Egypt, and the Levant. The pattern of Arabian admixture is consistent with periodic North African links with the Near East via the Southern Mediterranean coast (such as Phoenician migrations) and via the Sahara Desert (such as Arab migrations).

Results also indicated an Atlantic European component for all studied populations. This was largest in North Morocco (27.2%) and Tunisia (23.4%). Although based on separate SNP analysis, this Atlantic European component is similar to the more specific Portuguese genetic link identified based on STR data (see previous section). This Atlantic European admixture might express ancient contacts between North Africa and the West Mediterranean dating to the prehistoric Iberomaurusian and Capsian cultures, as well as Phoenician and Moorish links with Southwest Europe in later periods.

In addition, results identified Horn of Africa (average 8.5%) and West African (average 13.3%) components. These were most pronounced for the South Moroccan population, but were found for all studied North African populations. This suggests consistent patterns of contact between North Africa and Sub-Saharan regions, possibly dating to early periods such as the Capsian culture that was in contact with East Africa during the “Green Sahara” period.

Population	Arabian	Atlantic European	West African	Horn of Africa	Other
Algeria	62.6%	19.4%	11.7%	6.2%	0.0%
Libya	78.5%	8.5%	6.6%	6.5%	0.0%
Mozabite	52.8%	20.1%	16.3%	10.7%	0.0%
North Morocco	58.8%	27.2%	6.9%	7.1%	0.0%
Sahrawi	63.4%	10.1%	15.0%	11.4%	0.0%
South Morocco	43.0%	15.0%	30.8%	9.7%	1.4%
Tunisia	62.7%	23.4%	6.0%	7.9%	0.0%
Average	60.3%	17.7%	13.3%	8.5%	0.2%

Table 2: Regional admixture in North African populations based on autosomal SNP data.

Conclusion

Results for both autosomal SNP and autosomal STR markers indicated North African genetic links with populations of the Middle East, Europe, and Sub-Saharan Africa (summarized in **Table 3**).

Differences between results (SNP and STR) express the separate reference datasets available for each type of marker. At present, STR data incorporate a larger global database of populations, which allows for a more detailed analysis of regional admixture components. However, results for both types of marker identified similar geographical links between North Africa and neighboring world regions.

In both cases, results identified a primary Middle Eastern component and a secondary European and Sub-Saharan African components. These genetic links might express North Africa’s periodic links with Arab and Phoenician cultures attested in historical sources, as well as more ancient contacts attested in the archaeological record.

Genetic Components Identified	STR Analysis	SNP Analysis (Average)
Middle Eastern component	Levantine (57.3%)	Arabian (60.3%)
European component	Portuguese (23.6%)	Atlantic European (17.7%)
Sub-Saharan African components	Sahelian (9.2%); African Great Lakes (5.9%)	West African (13.3%); Horn of Africa (8.5%)

Table 3: Comparison of autosomal STR and autosomal SNP analysis for North African populations.



Getting the Most from Your STR Testing

Once your 15, 21 or 27 Marker Kit STR testing is complete, we offer several options to keep your report current and customize your genetic analysis for the information you want. (*Prices are listed as of February 1, 2012 and are subject to change.*)

Updating Your Analysis:

DNA Tribes® analysis is updated on a periodic basis to include new reference data as well as refinements to our match algorithms and world regions analysis. (A map illustrating current populations and genetic regions is available at <http://dnatribes.com/populations.html>.)

After your testing is complete, your analysis can be updated at any times of your choice for \$24.99 through our secure online checkout at http://dnatribes.com/order_addons.html.

Customizing Your Analysis with Add-On Reports:

DNA Tribes® offers several \$24.99 Add-On reports to customize your analysis:

African Panel: A listing of your DNA match scores for all individual Sub-Saharan African populations in our database.

Central Asian Panel: A listing of your DNA match scores for individual native Central Asian and Siberian populations in our database, also including Roma (European Gypsy) match scores.

East Asian Panel: A listing of your DNA match scores for East Asian populations in our database, including all individual Chinese, Japanese, Korean, and Southeast Asian populations.

Middle Eastern Panel: A listing of your DNA match scores for Middle Eastern populations in our database, including all individual Arab, Berber, Caucasus, Jewish, Persian, and Turkish populations.

Native American Panel: A listing of your DNA match scores for all individual Native American populations in our database.

South Asian Panel: A listing of your DNA match scores for South Asian populations in our database, including all individual populations of Bangladesh, India, Nepal, Pakistan, and Sri Lanka.

Extended Match Results: A comprehensive listing of your DNA match scores for all individual populations in our database.

Once lab testing is complete, Add-On reports can be performed at any time (without the need to submit new DNA samples) by ordering through our secure online checkout at http://dnatribes.com/order_addons.html.



DNA Tribes® Europa: A Detailed Comparison to European Sub-Regions:

DNA Tribes® Europa provides the most detailed and complete analysis of European autosomal genetic structure available. DNA Tribes® Europa provides your DNA match scores for 17 genetic sub-regions of Europe, which is substantially more robust than the individual population matches in Parts B – C of reports and more detailed than the European world regions referenced in Part D of core results.

More information about *DNA Tribes® Europa* is available for \$49.99 at:
<http://dnatribes.com/dnatribes-europa.html>

Confirm or Clarify Your Results with Lab Upgrade:

For customers who have completed testing with DNA Tribes®, we offer 15-to-21, 15-to-27 and 21-to-27 Marker Upgrade tests. Upgrades include lab testing of additional STR marker systems, allowing a closer comparison of your own DNA to world populations for enhanced match precision and power of exclusion. The incorporation of additional marker systems can confirm or clarify your existing results, and all upgrades includes an update to all Add-On reports previously ordered for your kit.

Upgrades are available through our secure online checkout system at:
http://dnatribes.com/order_upgrades.html.

Researching Your Results:

Each person's DNA Tribes® results are one of a kind and express their own unique collection of genetic material inherited from both paternal and maternal ancestors. Your personal DNA matches can express recent family genealogy and more ancient genetic relationships among world populations.

A library of articles based on DNA Tribes® original ongoing research and analysis of world genetic structure is available free at <http://dnatribes.com/library.html>.