



DNA Tribes® Digest February 1, 2013
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Introduction

Hello, and welcome to the February 2013 issue of DNA Tribes® Digest. This month’s article features a geographical analysis of autosomal DNA from two ancient individuals: the pharaoh Ramesses III and another individual (possibly his son), who lived more than 3,000 years ago during the 20th Dynasty of Egypt (during the Bronze-Iron Age transition).

A previous issue of DNA Tribes® Digest identified African related ancestry for King Tut and other royal mummies from the Amarna Period.¹ In this issue, results indicate that the later pharaoh Ramesses III also inherited alleles that are most frequent in present day populations of Sub-Saharan Africa. This provides additional, independent evidence of Sub-Saharan African ancestry (possibly among several ancestral components) for pharaonic families of ancient Egypt.

Best regards,
Lucas Martin
DNA Tribes

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¹ For analysis of King Tut and other Amarna mummies, see <http://dnatribes.com/dnatribes-digest-2012-01-01.pdf>.

Ramesses III and African Ancestry in the 20th Dynasty of New Kingdom Egypt

Background

In recent years, genetic data have become available not only for present day populations around the world, but also for ancient individuals. When ancient individuals are tested, results can illuminate the geographical links between populations during early periods and provide clues about the relationships between ancient and modern populations. In some cases, DNA results can reflect population expansions and migrations that have taken place after the period when the ancient individuals lived.

The January 2012 issue of DNA Tribes® Digest included autosomal STR analysis for King Tutankhamun and several other 18th Dynasty (Amarna Period) mummies. DNA results identified alleles that today are most frequent in Sub-Saharan Africa and found in Middle Eastern populations at lower frequencies.² This suggests a Sub-Saharan African genetic component for the Amarna Period royal family, but does not exclude the possibility of additional ancestral components for those ancient individuals (such as West Asian or Mediterranean components that are found in Egypt today).³

To expand on those results, this month's article includes geographical analysis of autosomal STR profiles from a later pharaonic family of the 20th Dynasty of ancient Egypt: Ramesses III and another man (possibly his son Pentawer).⁴ Ramesses III reigned between 1186 – 1155 BCE, during the transition from the Late Bronze Age to the Early Iron Age.

During this period, the influence of New Kingdom Egypt was declining, and new independent cultures were emerging around Egypt's imperial frontiers. These changes involved several population movements during and after the time of Ramesses III (see **Figure 1**). Those migrations included: Nubian and Nilotic expansions from the Upper Nile; Bantu expansions from West Africa into Eastern and Southern Africa; Semitic expansions near Canaan and the Red Sea; and Sea Peoples migrations in the Mediterranean.

To the south of Egypt (near present day Sudan and South Sudan), **Nubians cultures** (formerly Egyptian colonies) established the newly independent Kingdom of Kush.⁵ Also near the Upper Nile, neighboring **Nilotic speaking cultures** (including relatives of present day Maasai, Alur, and Luo) later embarked on a series of long term migrations towards the African Great Lakes, eventually reaching parts of present day Kenya, Uganda, and Tanzania by the 18th century CE.

To the east of Egypt, **Semitic speaking cultures** were developing around the East Mediterranean and Red Sea trade routes. Egyptians associated the East Mediterranean territories of Canaan with the former Hyksos pharaohs and the eclectic Amarna Period culture of the Bronze Age.⁶ During the Iron Age,

² For more information, see <http://dnatribes.com/dnatribes-digest-2012-01-01.pdf>. Specifically, the Amarna family's alleles that today are most frequent in Sub-Saharan Africa included D18S51=19 and D21S11=34.

³ For more information, see <http://dnatribes.com/dnatribes-digest-2012-09-01.pdf>.

⁴ For the original data used in this geographical analysis, see <http://bmj.com/content/345/bmj.e8268>.

⁵ These Nubian cultures might have been influenced by Bronze Age maritime links with the Indus Valley (Harappan) Civilization. See <http://www.scirp.org/journal/PaperInformation.aspx?paperID=24584>. The name "Meluhha" was associated with both Western South Asia and Africa. It is also thought that South Asian Zebu cattle (depicted on Indus seals) were introduced to East Africa during the Harappan period (possibly around 1600 BCE) to become ancestors of modern Sanga cattle.

⁶ For more information, see <http://dnatribes.com/dnatribes-digest-2012-09-01.pdf>.

Canaan was home to emerging Israelite and Phoenician cultures that traded with early kingdoms in the Horn of Africa.

For instance, early Hebrew and Ethiopic texts describe a legendary encounter between King Solomon and the Queen of Sheba. However, the extent of these ancient north-south contacts via the Red Sea is somewhat unknown, in part due to the archaeological *terra incognita* of the Arabian Peninsula. Nevertheless, these contacts might have involved gene flow between East African and Near Eastern populations near the Red Sea and Horn of Africa.⁷

To the north of Egypt, **Sea Peoples** were involved in a series of migrations in the Mediterranean. These maritime cultures probably included early Indo-Europeans from the Aegean and West Asia. The Sea Peoples' invasion of Egypt during the reign of Ramesses III was repelled. However, Sea Peoples raided and settled in territories of the former Hittite, Mycenaean, and Mitannian empires during the Bronze Age Collapse and were probably related to not only Sicilian (Siculi) and Sardinian (Nuragic) peoples, but also possibly to pre-Phoenician cultures of North Africa.⁸

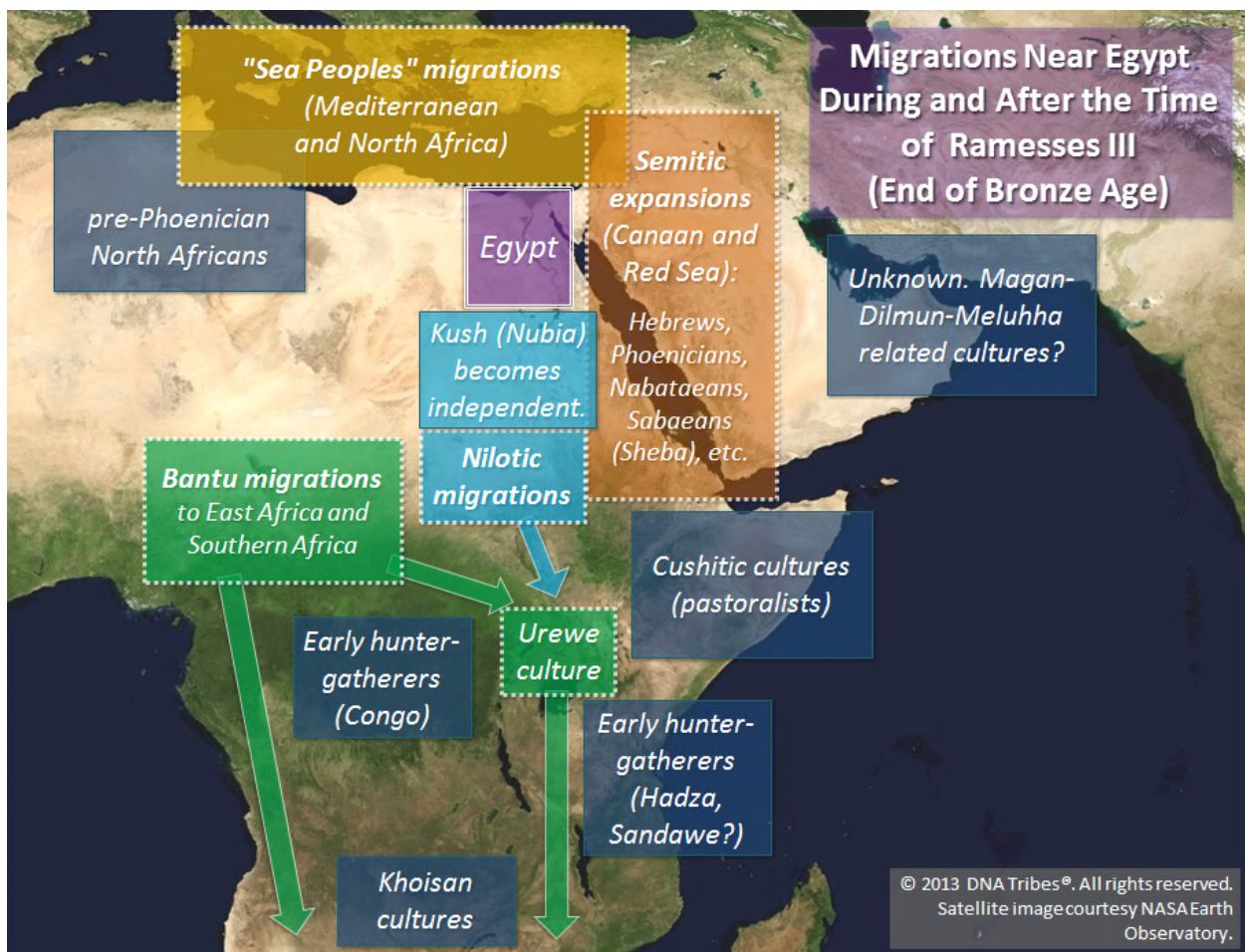


Figure 1: Map of migrations near Egypt during and after the time of Ramesses III (1186-1155 BCE).

⁷ For more information, see <http://dnatribes.com/dnatribes-digest-2012-03-01.pdf>.

⁸ For more detailed discussion, see <http://dnatribes.com/dnatribes-digest-2012-02-01.pdf>.

In the interior of Africa, another major expansion was beginning around the time of Ramesses III: the **Bantu migrations** that spread from West Africa (possibly originating near present day Cameroon and Nigeria) and eventually reached the African Great Lakes and Southern Africa over the course of three millennia.

The Bantu migration was one of the most important events in prehistory (comparable to the Indo-European language expansions in Eurasia) and reshaped the cultural landscape of Africa. Today, Bantu languages include Swahili (spoken near the Indian Ocean) and Zulu and Xhosa (spoken in present day South Africa). These diverse Bantu speaking cultures are thought to be descended from a mixture of early West African migrants and indigenous populations of East Africa and Southern Africa.

The present day genetic structure of Egypt might also have been influenced by **later expansions** in the Mediterranean and Near East. These included the large empires of the ancient world that integrated multiple cultures (primarily of West Asia), such as the Achaemenid and Macedonian empires (both known for religious tolerance). Similarly, the Arab migrations of the medieval period began in the Hejaz (the Arabian Peninsula adjacent to the Red Sea), and might have increased Egyptian contacts with neighboring populations of North Africa and the Near East.

All of these migrations (see **Figure 1**) might have influenced the present day genetic structure of Africa and Eurasia (including Egypt). For this reason, present day DNA matches in the following geographical analysis might to some degree reflect these population movements that took place after the time in Ramesses III.

Genetic Analysis

Geographical analysis of Ramesses III and Unknown Man E (possibly Ramesses' son Pentawer) was performed using their autosomal STR profiles based on eight tested loci.^{9,10} Results are summarized in **Table 1** and illustrated in **Figure 2-3**.

Discussion: Results in **Table 1** indicate that the autosomal STR profiles for both Ramesses and Unknown Man E are most frequent in present day regions of Sub-Saharan Africa and also found in Near Eastern regions at lower frequencies.

Among present day world populations, Ramesses III's autosomal STR profile is most frequent in the African Great Lakes region, where it is approximately 335.1 times as frequent as in the world as a whole (see **Table 1** and **Figure 2**). Unknown Man E's autosomal STR profile is most frequent in the Southern Africa region, where it is approximately 134.6 times as frequent as in the world as whole (see **Table 1** and **Figure 3**). Both autosomal STR profiles are also found in the Levantine region that includes populations of present day Egypt, but are substantially more frequent in regions of Sub-Saharan Africa (see **Table 1**).

Specifically, both of these ancient individuals inherited the alleles D21S11=35 and CSFIPO=7, which are found throughout Sub-Saharan Africa but are comparatively rare or absent in other regions of the world. These African related alleles are different from the African related alleles identified for the previously studied Amarna period mummies (D18S51=19 and D21S11=34).¹¹ This provides independent evidence for African autosomal ancestry in two different pharaonic families of New Kingdom Egypt.

⁹ For publication of the original data used in this geographical analysis, see <http://bmj.com/content/345/bmj.e8268>.

¹⁰ For more information about the regions used in DNA Tribes® analysis, see <http://dnatribes.com/populations.html>.

¹¹ See <http://dnatribes.com/dnatribes-digest-2012-01-01.pdf>.



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World Region	Ramesses III	Unknown Man E (possible Pentawer)
African Great Lakes	335.1	104.0
Southern African	266.0	134.6
Tropical West African	241.7	42.8
Horn of Africa	114.0	48.2
Sahelian	57.0	11.3
North African	23.9	13.5
Levantine	14.3	4.9
Arabian	5.1	1.4
South India	4.4	1.5
Aegean	3.3	0.9
Mesopotamian	2.4	0.9
North India	2.3	0.7
Mestizo	2.1	10.1
Northwest European	1.4	0.5
Mediterranean	1.1	0.5
Salishan	1.0	12.9
Eastern India	0.6	0.3
Finnic	0.3	0.3
Eastern European	0.2	0.1
Chinese	0.1	0.2
Southeast Asian	0.1	0.1
Altaiian	0.1	0.2
Gran Chaco	0.1	7.7
Tibetan	0.1	0.1
Japanese	0.1	0.2
Manchurian	0.1	0.1
Central American	0.0	2.7
Australian	0.0	0.0
Andean	0.0	2.5
Malay Archipelago	0.0	0.0
Athabaskan	0.0	1.3
Ojibwa	0.0	1.1
Polynesian	0.0	0.0
Mexican	0.0	0.5
Mayan	0.0	0.5
North Amerindian	0.0	0.4
Arctic	0.0	0.0
Amazonian	0.0	0.0
Patagonian	0.0	0.0

Table 1: Top MLI (Match Likelihood Index) scores for the autosomal STR profiles of Ramesses III and Unknown Man E (possibly Pentawer) based on the world regions identified by DNA Tribes® STR analysis. Each MLI score identifies the likelihood of occurrence of an STR profile in that region versus the likelihood of occurrence in the world as a whole. For more about the world regions identified by DNA Tribes® STR analysis, see <http://dnatribes.com/populations.html>.



These results indicate that both Ramesses III and Unknown Man E (possibly his son Pentawer) shared an ancestral component with present day populations of Sub-Saharan Africa. This preliminary analysis based on eight STR markers does not identify the percentages of Sub-Saharan African ancestry for these ancient individuals. This preliminary analysis also does not exclude additional ancestral components (such as Near Eastern or Mediterranean related components) for these ancient pharaonic Egyptians.

In addition, these DNA match results in present day world regions might in part express population changes in Africa after the time of Ramesses III. In particular, DNA matches in present day populations of Southern Africa and the African Great Lakes might to some degree reflect genetic links with ancient populations (formerly living closer to New Kingdom Egypt) that have expanded southwards in the Nilotic and Bantu migrations of the past 3,000 years (see **Figure 1**).

Possibilities for Future Research: These results are based on the eight STR markers for which these pharaonic mummies have been tested, which allow a preliminary geographical analysis for these ancient individuals who lived in Egypt during the 12th century BCE.

Future research that could confirm and expand on these findings could include SNP microarray based testing of Amarna and Ramesside mummies, which could potentially identify the percentages of Sub-Saharan African and other ancestral components for these ancient individuals. SNP based testing of other ancient individuals from the Bronze and Iron Age Mediterranean, Near East, and Africa could provide further insight about early population relationships and migrations since this period.

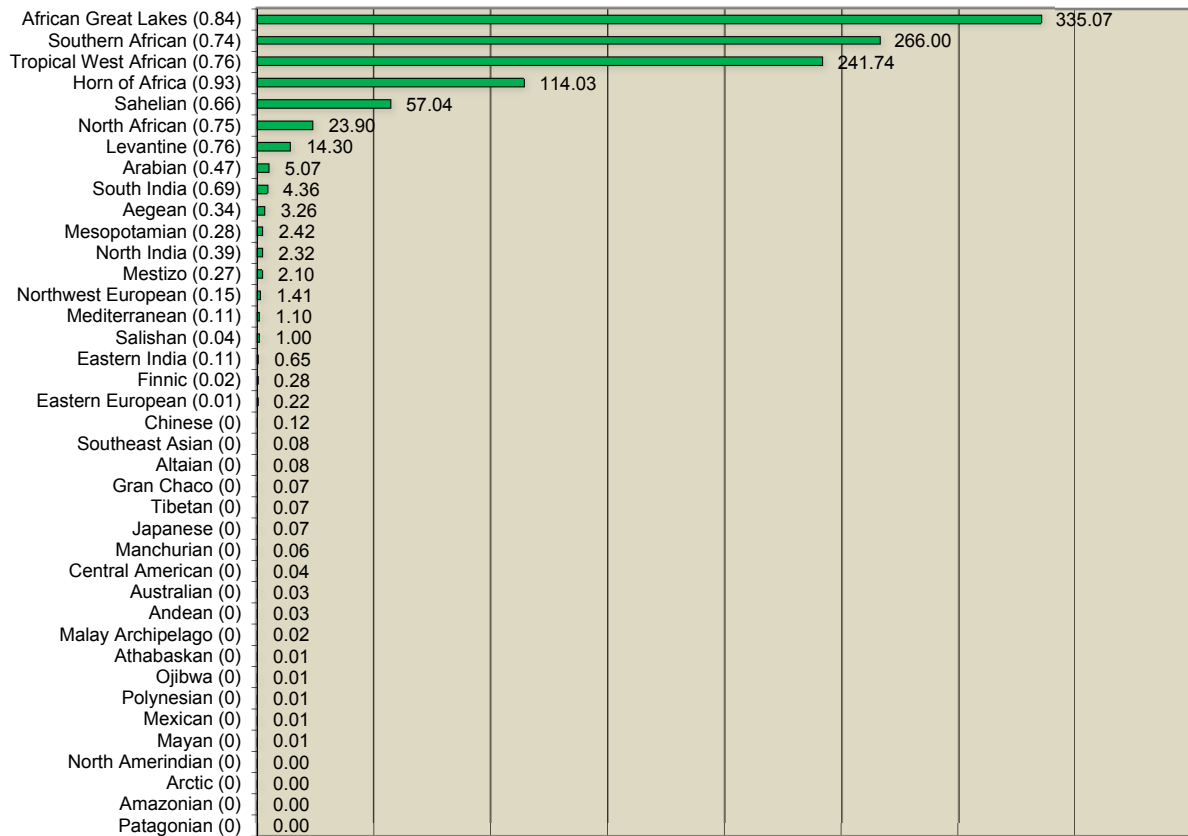
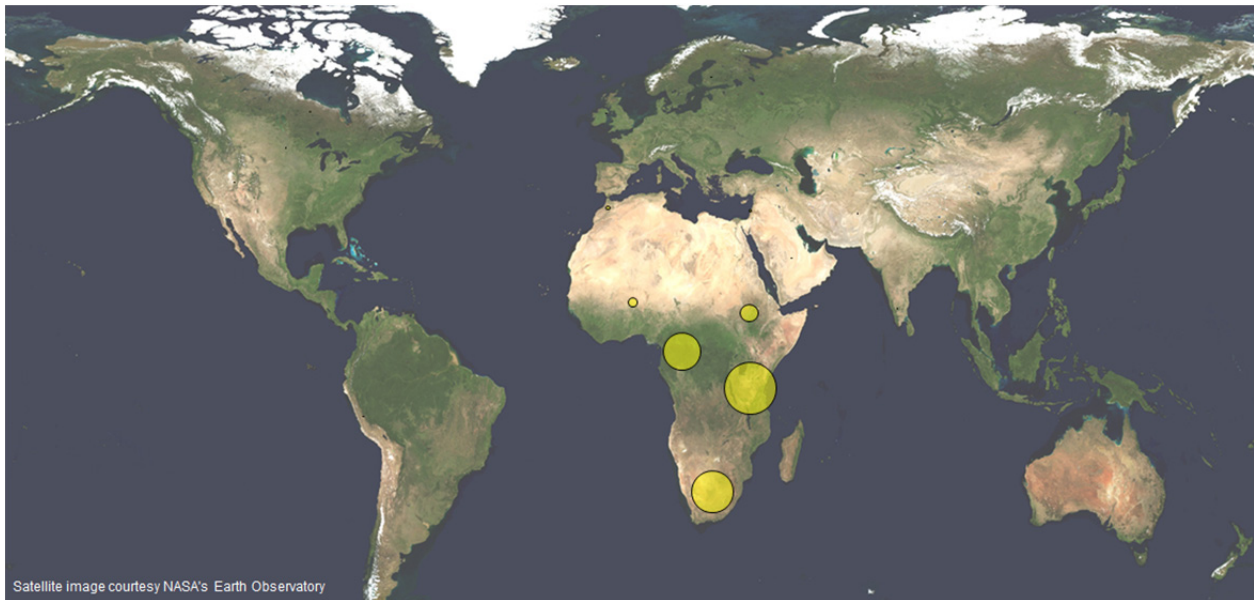


Figure 2: DNA Tribes® geographical analysis of Ramesses III's autosomal STR profile.

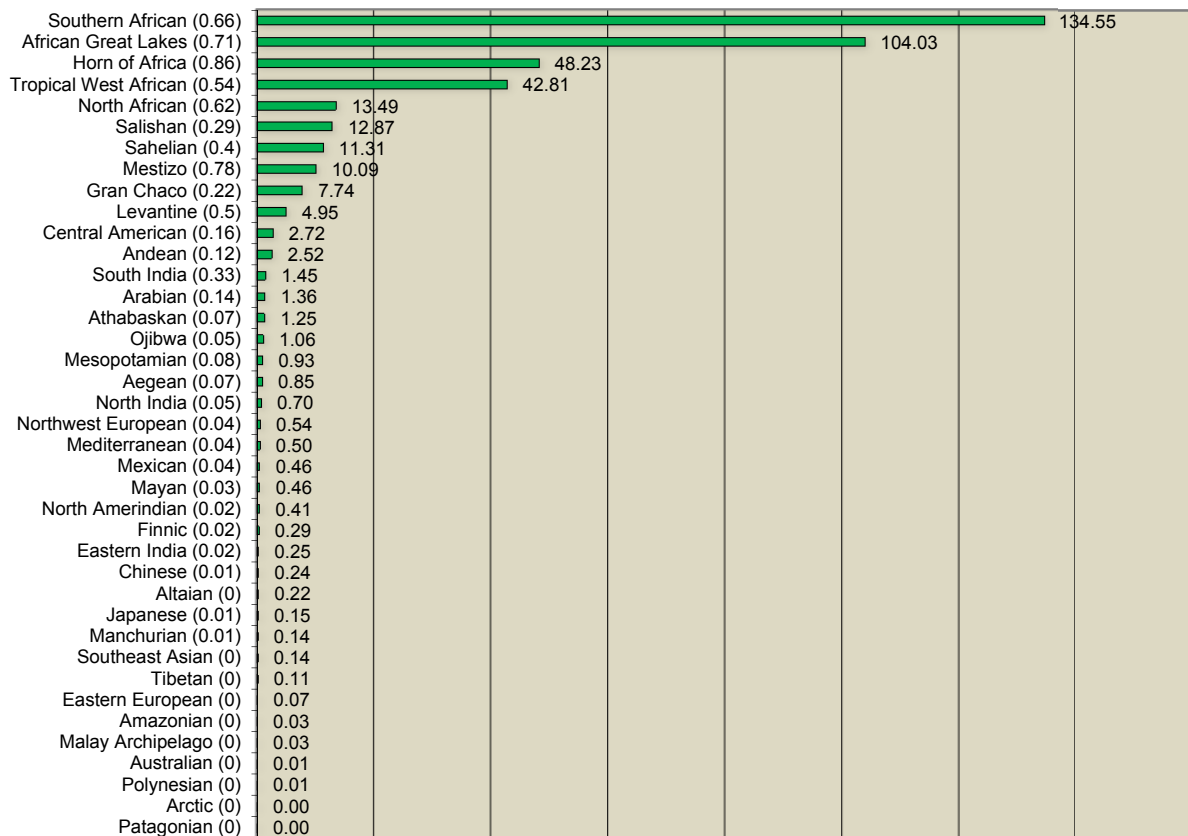
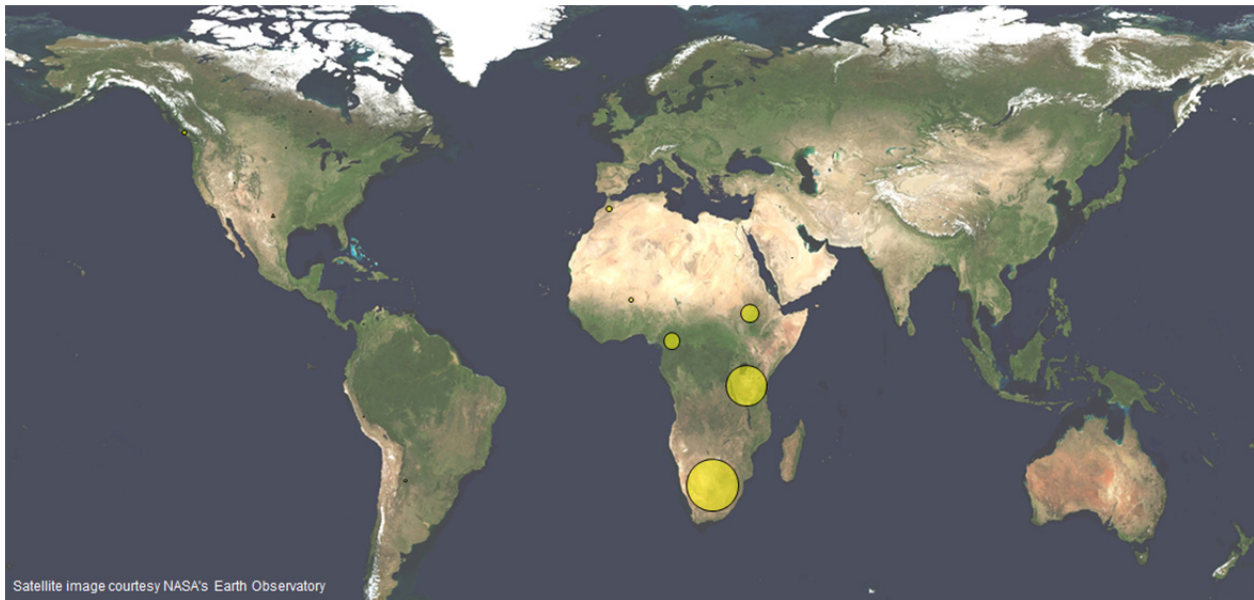


Figure 3: DNA Tribes® geographical analysis of autosomal STR profile for Unknown Man E (possibly Pentawer).



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