Supplemental Documentation
Category: Narrative Nonfiction

Title: The Secret in Our Genes: Out of Africa and Into the World

Author Statement

Legal Names: Melton Roper | Zoa Parkman-Roper
Author Names: Buelo Addaeyah | Afia Henewaa

The Secret in Our Genes: Out of Africa and Into the World was born from a personal journey that became a shared calling — to uncover and preserve the stories embedded in our DNA, our history, and our cultural memory. Co-author, Afia Henewaa, and I began with questions from our grandchildren: Where do we come from? Who were our ancestors? Those questions led us through a myriad of research, weaving together strands of genetics, archaeology, oral history, and African diaspora heritage.

Our work draws on the science of DNA testing, the depth of African and African-descended oral traditions, and the global history of human migration. We employed three genetic testing services — AfricanAncestry.com, 23andMe, and Ancient DNA Origins — and cross-referenced their findings with peer-reviewed academic studies and historical records. Before Ancient DNA Origins' sudden closure in early 2025, we preserved a complete record of our haplogroup analysis and verified its findings against peer-reviewed population genetics research. This process was more than data-gathering; it was an act of stewardship, safeguarding information that is no longer publicly available. These preserved results now serve as one of the few surviving records from this discontinued platform.

We chose a narrative nonfiction style designed to speak to both children and adults. The story is framed through conversations between a grandfather and his three granddaughters, blending family intimacy with historical truth. This structure preserves the accessibility of children's literature while meeting the rigor of documented nonfiction, allowing readers of all ages to see themselves in the continuum of history.

The disappearance of such resources underscores the fragility of the historical and scientific record — particularly those narratives that challenge simplified or incomplete histories[i]. In creating this book, we sought not only to inspire curiosity but to preserve a sliver of knowledge that might otherwise have been lost. For children, this means a story that validates their place in the human story. For adults, it is an invitation to question, to seek, and to hold fast to the truths we are sometimes discouraged from seeing.

The book honors the resilience of African peoples and their descendants, not as a story of victimhood but as a testament to creativity, survival, and legacy. By connecting global migrations to living traditions — from the griots of the Mandinka to the drum languages of the Yoruba and the agricultural expertise of the Balanta — we seek to dismantle historical silences and affirm the richness of African contributions to world history.

We submit this work in the belief that truth-telling is an act of restoration. The Secret in Our Genes invites families to reclaim their narratives, deepen their knowledge of self, and recognize the unbroken threads that bind us to our ancestors. It is our hope that this book will inspire future generations — our granddaughters, and all who read it — to carry forward our collective story with pride, clarity, and courage.

Buelo Addaeyah Afia Henewaa

Buelo Addaeyah | Afia Henewaa
Authors and Storytellers
FeNIIX Publishing™

[i] Ancient DNA Origins was a specialized platform offering comparative analysis between modern DNA profiles and publicly available ancient genome datasets. As of February 2025, the site is no longer online. All data referenced herein was obtained prior to its closure and has been preserved in the authors' records, with findings verified against peer-reviewed population genetics sources.

Submission of Research & Documentation | Appendix & Bibliography
Category: Narrative Nonfiction

Title: The Secret in Our Genes: Out of Africa and Into the World

Legal Names: Melton Roper | Zoa Parkman-Roper
Author Names: Buelo Addaeyah | Afia Henewaa

1. Methodology

Our research for The Secret in Our Genes combined multiple disciplines — genetics, anthropology, archaeology, oral history, cartography, and archival research — to trace ancestral connections across Africa, the Middle East, and the African diaspora in the Americas.

Core research approaches included:

- DNA Analysis: Personal autosomal, Y-DNA, and mtDNA testing, with interpretation using peer-reviewed population genetics studies, including data from African Ancestry, 23andMe, Ancient DNA Origins, published haplogroup migration models, and mitochondrial lineage research.
- Historical & Archaeological Sources: Academic works on the Bantu migrations, Neolithic African settlements, West and Central African kingdoms, ancient Egyptian dynasties, and the Hebrew Israelites of the Tribe of Judah.
- Cartographic & Archival Records: Historic maps such as Emanuel Bowen's A New & Accurate Map of Negroland and the Adjacent Countries (1747), Library of Congress holdings, and trade route reconstructions from archaeology and historical geography.
- Oral Histories: Recorded and transcribed family stories from Mende, Akan, Mandinka, Balanta, Yoruba, and Gullah Geechee elders, as well as cultural memory keepers from Puerto Rico and the Virgin Islands.
- Cultural Anthropology: Observations of living traditions — textile weaving (kente), drumming languages, bead-making, griot storytelling — connected to ancestral regions.

2. Chapter-by-Chapter Source Notes

Chapter 1 – The Gift of Heritage

- **Bard, Kathryn A.** *An Introduction to the Archaeology of Ancient Egypt***.** Wiley-Blackwell, 2015.
  Relevance: Provides an overview of ancient Egyptian civilization, linking material culture and archaeological chronology to the African heritage thread. Supports the continuity between Nile Valley civilizations and later African diasporic identities.
- **Leakey, Richard E.** *The Origin of Humankind*. BasicBooks, 1994.
  Relevance: Synthesizes paleoanthropological findings on early human evolution, particularly *Homo sapiens* origins in Africa, supporting the narrative's framing of heritage as rooted in deep time. Draws on fossil evidence from East Africa to contextualize the African genesis narrative.
- **Lewis, Martin W. and Wigen, Kären E.** *The Myth of Continents: A Critique of Metageography*. Berkeley: University of California Press, 1997.
  Relevance: Explains how modern geopolitical constructs like "the Middle East" were imposed in the 19th–20th centuries. Demonstrates that lands including Egypt, Nubia, and the Levant were historically understood as part of Northeast Africa, before being reframed under Eurocentric mapping.

Chapter 2 – Neolithic Ancestors of Southeast Africa

- **Fuller, Dorian Q., et al.** "Convergent Evolution and Parallelism in Plant Domestication Revealed by an Expanding Archaeological Record, 2014.
  Relevance: Peer-reviewed genetic and archaeological study on plant domestication, directly relevant to the discussion of agricultural transitions in Neolithic Africa. Supports the narrative link between early African subsistence strategies and modern-day cultural continuities.
- **Phillipson, David W.** *African Archaeology*. 3rd ed. Cambridge University Press, 2005.
  Relevance: Comprehensive synthesis of African prehistory, including the development of early agricultural societies in southeastern Africa. Provides archaeological evidence for settlement patterns, tool industries, and cultural innovations foundational to the region's Neolithic ancestry.

Chapter 3 – The Great Bantu Migration

- **Ehret, Christopher.** *A Historical–Comparative Reconstruction of Nilo-Saharan*. Rüdiger Köppe Verlag, 2001.
  Relevance: Linguistic reconstruction tracing the origins and spread of Nilo-

Saharan languages, providing comparative insight into the broader migratory context overlapping with Bantu expansion routes. Establishes linguistic evidence as a parallel to archaeological migration data.

- **Vansina, Jan M.** "New Linguistic Evidence and 'the Bantu Expansion'." *The Journal of African History* 36, no. 2: 173–195, 1995.
  Relevance: Seminal peer-reviewed article refining the chronology and geographic spread of the Bantu expansion. Supports the narrative's discussion of how cultural and technological exchange shaped sub-Saharan Africa's historical landscape.

Chapter 4 – The Pharaoh Connection

- **Diop, Cheikh A.** *The African Origin of Civilization: Myth or Reality***.** Lawrence Hill, 1974.
  Relevance: Foundational African-centered text challenging Eurocentric narratives of ancient Egypt's racial identity. Supports the cultural and historical context for positioning Egypt within a wider African heritage.
- **Hawass, Zahi., et al.** "Revisiting the harem conspiracy and death of Ramesses III: anthropological, forensic, radiological, and genetic study" *BMJ* 345: e8268, 2012.
  Relevance: Provides DNA-based identification of E1b1a haplogroup markers in Ramesses III, situating this ancient ruler within a broader sub-Saharan African genetic tradition; establishes a documented paternal lineage context for linking modern E-M4254 ancestry to dynastic Egypt, reinforcing the historical continuity in the narrative.

Chapter 5 – The Hebrew Israelites – Tribe of Judah

- **Dever, William G.** *Beyond the Texts: An Archaeological Portrait of Ancient Israel and Judah***.** SBL Press, 2017.
  Relevance: Comprehensive archaeological synthesis of Judah's material culture and political history. Bolsters the historical claims of the book with non-biblical evidence.
- **Finkelstein, Israel, and Silberman, Neil A.** *The Bible Unearthed: Archaeology's New Vision of Ancient Israel and the Origin of Its Sacred Texts*. Free Press, 2001.
  Relevance: Archaeological reinterpretation of biblical history, especially the emergence of Judah as a kingdom and the post-exilic transformation of its identity.

Chapter 6 – West & Central African Heritage

- **Drewal, Margaret T.** *Yoruba Ritual: Performers, Play, Agency*. Indiana University Press, 1992.
  Relevance: Anthropological study of Yoruba ritual performance as a living cultural system. Connects the narrative's cultural heritage discussions to present-day continuities of African traditions in the diaspora.
- **Opala, Joseph A.** *The Gullah: Rice, Slavery, and the Sierra Leone–American Connection***.** U.S. Information Service, 1987.
  Relevance: Directly links West African rice cultivation expertise to Gullah cultural traditions in the Americas. Supports the narrative's tracing of skill and cultural transfer during the transatlantic slave trade.

Chapter 7 – Mandinka & Balanta Legacy

- **Levtzion, Nehemia and Hopkins, J. F. P.** *Corpus of Early Arabic Sources for West African History*. Revised. Markus Wiener Publishers, 2000.
  Relevance: Primary Arabic accounts of West African kingdoms and cultures, offering contemporaneous documentation of Mandinka history.
- **Lobban, Richard A., Jr.** *Historical Dictionary of the Republic of Guinea-Bissau*. Scarecrow Press, 1996.
  Relevance: Provides concise historical, cultural, and biographical entries relevant to Balanta heritage.

Chapter 8 – Taken: The Perilous Journey to the Americas

- **Bowen, Emanuel.** *A New & Accurate Map of Negroland and the Adjacent Countries*. Library of Congress, 1747.
  Relevance: Historic map illustrating African trade routes and slave-trading regions, contextualizing geographic origins of captives.
- **Klein, Herbert S.** *The Atlantic Slave Trade*. 2nd ed. Cambridge University Press, 2010.
  Relevance: Authoritative synthesis of the transatlantic slave trade's scale, economics, and human impact.
- **Spurdle, Amanda B., and Jenkins, Trefor.** "The Origins of the Lemba 'Black Jews' of Southern Africa: Evidence from p12F2 and Other Y-Chromosome Markers." *American Journal of Human Genetics* 59, no. 3 (1996): 688–98.
  Relevance: Provides genetic evidence that the Lemba people of southern Africa carry paternal haplotypes characteristic of Semitic populations, including the "Cohen modal haplotype" and Y-DNA Haplogroup J, suggesting historical connections between parts of West and southern Africa and ancient Israelite lineages.

Chapter 9 – Cultural Resilience Through the African Diaspora

- **Pollitzer, William S.** *The Gullah People and Their African Heritage*. University of Georgia Press, 1999.
  Relevance: Anthropological and historical analysis of the Gullah as a unique cultural synthesis of African traditions in the Americas.
- **Stuckey, Sterling.** *Slave Culture: Nationalist Theory and the Foundations of Black America*. Oxford University Press, 1987.
  Relevance: Interprets slave culture as a system of African-derived practices adapted to New World conditions.

Ch. 10 – Honoring Ancestry and Heritage

- **Iheanacho, Valentine U.** "The Significance of African Oral Tradition in the Making of African Christianity," 2021.
  Relevance: Oral traditions—folk songs, proverbs, rituals—are shown to be foundational in shaping cultural expression and spiritual identity over generations, reinforcing the theme of heritage as both remembered and evolved.
- **Izu, Benjamin O.** "The Impact of Oral Traditions on African Indigenous Musical Practices: A Systematic Literature Review." *Journal of Arts and Cultural Studies*, 2024.
  Relevance: Demonstrates how oral and musical traditions preserve and transform identity, especially when written records are limited or disrupted, directly paralleling the cultural transmission in narrative.

3. Bibliography (History, Genetics, Cultural Analysis)

History:

Bard, Kathryn A. *An Introduction to the Archaeology of Ancient Egypt*. 2nd ed. Wiley-Blackwell, 2015.
Relevance: Provides archaeological context for Egypt's cultural and political development, supporting the link between Nile Valley civilizations and broader African heritage.

Bowen, Emanuel. *A New & Accurate Map of Negroland and the Adjacent Countries*. 1747. Library of Congress, Geography and Map Division.
Relevance: Historical cartographic evidence of African kingdoms and trade routes before European colonization, used to visualize ancestral homelands and migration patterns.

Dever, William. G. *Beyond the Texts: An Archaeological Portrait of Ancient Israel and Judah*. SBL Press, 2017.
Relevance: Offers an archaeological portrait of ancient Judah, providing a factual framework that, when integrated with other sources, supports our exploration of its connections to African-descended populations.

Ehret, Christopher. *A Historical–Comparative Reconstruction of Nilo-Saharan*. Rüdiger Köppe Verlag, 2001.
Relevance: Linguistic reconstruction supporting the historical spread and connections of Nilo-Saharan-speaking peoples, relevant to tracing deep African ancestry.

Finkelstein, Israel, and Silberman, Neil A. *The Bible Unearthed: Archaeology's New Vision of Ancient Israel and the Origin of Its Sacred Texts*. Free Press, 2001.
Relevance: Synthesizes archaeological findings to separate biblical tradition from historical evidence, key to contextualizing the role of Judah in African and Middle Eastern heritage.

Fuller, Dorian Q., et al. "Convergent Evolution and Parallelism in Plant Domestication Revealed by an Expansive Phylogenetic Analysis." *Proceedings of the National Academy of Sciences* 111, no. 48 (2014): 16410–16415.
Relevance: Demonstrates the independent domestication of crops in Africa, underscoring African innovation in early agricultural history.

Klein, Herbert S. *The Atlantic Slave Trade*. 2nd ed. Cambridge University Press, 2010.
Relevance: Authoritative account of the transatlantic slave trade's scale, networks, and impact, grounding the diaspora narrative in documented history.

Leakey, Richard E. *The Origin of Humankind*. BasicBooks, 1994.
Relevance: Presents paleoanthropological evidence of Africa as humanity's birthplace, forming the scientific foundation of the migration narrative.

Levtzion, Nehemia and Hopkins, J. F. P. *Corpus of Early Arabic Sources for West African History*. Revised. Markus Wiener Publishers, 2000.
Relevance: Provides translated primary sources documenting early West African states and Islamic influence, connecting African political history to cultural heritage.

Lewis, Martin W. and Wigen, Kären E. *The Myth of Continents: A Critique of Metageography*. Berkeley: University of California Press, 1997.
Relevance: Explains how terms like "Middle East" are modern constructs. Supports the framing in the book that the region historically belonged to Africa and that "Northeast Africa" is an older, more geographically accurate designation.

Lobban, Richard A., Jr. *Historical Dictionary of the Republic of Guinea-Bissau*. Scarecrow Press, 1995.
Relevance: Offers concise historical and cultural entries relevant to the Balanta people and other ethnic groups in the narrative.

Phillipson, David W. *African Archaeology*. 3rd ed. Cambridge University Press, 2005.
Relevance: Comprehensive survey of African prehistory, supporting the reconstruction of ancestral migration and settlement patterns.

Vansina, Jan M. *Oral Tradition as History*. University of Wisconsin Press, 1985.
Relevance: Establishes oral tradition as a legitimate and rigorous source of historical evidence, central to methodology.

Vansina, Jan M. "New Linguistic Evidence and 'the Bantu Expansion'." *The Journal of African History* 36, no. 2 (1995): 173–195.
Relevance: Provides linguistic data supporting the timeline and routes of the Bantu migrations.

SlaveVoyages.org. "Voyage Information and Database." *SlaveVoyages African Names Database.* Accessed no later than December 17, 2024.
Relevance: Digital repository of transatlantic slave voyage data, including ship manifests, trader records, and port logs. Used to corroborate details of ships, voyages, routes, and the number and origins of enslaved persons in the narrative.

Genetics:

Agranat-Tamir, et al. "The Genomic History of the Bronze Age Southern Levant." *Cell* 181 (5): 1146–1157.e11, 2020.
Relevance: Confirms African-related paternal haplogroups in Bronze Age Canaanite populations, situating the E lineage within both Levantine and Egyptian contexts.

Harney, Éadaoin, et al. "Ancient DNA from Chalcolithic Israel Reveals the Role of Population Mixture in Cultural Transformation." *Nature Communications* 9, no. 1 (2018): 3336.
Relevance: Demonstrates how African and Levantine populations intermingled in antiquity, offering a plausible ancestral link between early Israelites and Egyptian dynasties carrying haplogroup E1b1a.

Hawass, Zahi, et al. "Revisiting the harem conspiracy and death of Ramesses III: anthropological, forensic, radiological, and genetic study" *BMJ* 345: e8268, 2012.
Relevance: Forensic DNA analysis revealed Pharaoh Ramesses III's paternal haplogroup (E1b1a/E-V38), providing direct evidence of African lineages within royal Kemet and connecting to Buelo Addaeyah's shared ancestry.

Lazaridis, Iosif, et al. "Genomic Insights into the Origin of Farming in the Ancient Near East." *Nature* 536, no. 7617 (2016): 419–424.

Relevance: Establishes that haplogroup E lineages appear in Natufian and Neolithic Levantine populations, supporting the Northeast African–Levantine bridge that anchors E1b1a (E-V38), the paternal line of both Pharaoh Ramesses III and Buelo Addaeyah.

Schuenemann, Verena J., et al. "Ancient Egyptian Mummy Genomes Suggest an Increase of Sub-Saharan African Ancestry in Post-Roman Periods." *Nature Communications* 8, Article 15694 (2017). doi:10.1038/ncomms15694.

Relevance: Provides genome-wide data from ancient Egyptian mummies, showing close ties to the Near East with Sub-Saharan ancestry increasing in later periods. Supports the narrative of long-term genetic exchange across Northeast Africa and the Levant..

Spurdle, Amanda B. and Jenkins, Trefor. "The Origins of the Lemba 'Black Jews' of Southern Africa: Evidence from p12F2 and Other Y-Chromosome Markers." *American Journal of Human Genetics* 59, no. 3 (1996): 688–98.

Relevance: This study provided the first genetic evidence that the Lemba of Southern Africa carry Y-chromosome markers—particularly within Haplogroup J—linked to ancient Hebrew lineages from the Near East.

Tishkoff, Sarah A., et al. "The Genetic Structure and History of Africans and African Americans." *Science* 324, no. 5930 (2009): 1035–44.

Relevance: Large-scale genomic study of 121 African populations, revealing 14 ancestral clusters tied to ethnic, cultural, and linguistic groups, with insights into admixture patterns across Africa and the African diaspora.

AfricanAncestry.com. Personal Genetic Testing Reports. Washington, DC: African Ancestry, accessed 2025.

Relevance: Direct personal genetic data confirming specific African ethnic group connections.

23andMe, Inc. Ancestry Composition and DNA Relative Reports. Sunnyvale, CA: 23andMe, accessed 2025.

Relevance: Provides comparative genetic data and relative matching, complementing historical and cultural evidence.

Ancient DNA Origins. Personal Ancient DNA Analysis Report.

Relevance: Personal ancient DNA analysis (obtained prior to the site's closure) linking the author's genetic markers to archaeological remains from specific time periods and regions, with findings preserved in the author's records and cross-checked against peer-reviewed population genetics studies, including *Science* (Tishkoff et al., 2009) and *Nature Communications* (Schuenemann et al., 2017).

Cultural Analysis:

Diop, Cheikh A. *The African Origin of Civilization: Myth or Reality*. Translated by Mercer Cook. Lawrence Hill, 1974.

Relevance: Foundational African-centered scholarship challenging Eurocentric narratives, affirming Egypt's place within a wider African historical and cultural continuum.

Drewal, Margaret T. *Yoruba Ritual: Performers, Play, Agency*. Indiana University Press, 1992.

Relevance: Ethnographic study of Yoruba ritual traditions, illustrating cultural resilience and continuity across the African diaspora.

Opala, Joseph A. *The Gullah: Rice, Slavery, and the Sierra Leone–American Connection*. U.S. Information Service, 1987.

Relevance: Documents the cultural and agricultural transfer from West Africa to the Gullah Geechee communities of the U.S. Southeast.

Pollitzer, William S. *The Gullah People and Their African Heritage*. University of Georgia Press, 1999.

Relevance: Traces the Gullah people's African roots, emphasizing cultural survival through language, traditions, and social structure.

Stuckey, Sterling. *Slave Culture: Nationalist Theory and the Foundations of Black America*. Oxford University Press, 1987.

Relevance: Examines African cultural frameworks that shaped African American identity and resistance in the Americas.

4. Supplemental Attribution Notes/Materials

Portions of the name and voyage information were transcribed from the *SlaveVoyages African Names Database* (slavevoyages.org), accessed no later than December 17, 2024. The data in the narrative is presented in excerpted and adapted form to illustrate historical patterns of African name recovery documented in the transatlantic slave trade records.

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African Ancestry mtDNA or Y-DNA Reports

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23andMe Ancestry Composition Report
Generated by 23andMe, Inc., © 2025. Provided as originally issued by the company. Used here as a supplemental genealogical record in support of narrative elements.

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Author Names: Buelo Addaeyah | Afia Henewaa

Purpose of This Supplement

This document provides independently verified genetic evidence supporting the historical and cultural assertions presented in The Secret in Our Genes. **It focuses on the maternal lineage of co-author Afia Henewaa**, demonstrating a direct, scientifically confirmed connection to the Balanta of Guinea-Bissau and the Mandinka of Senegal. These findings substantiate the book's narrative authenticity and illuminate the enduring continuity of African heritage in the African diaspora.

1. Scientific Basis of Ancestral Determination

Afia Henewaa's maternal ancestry was identified through the MatriClan™ Test conducted by African Ancestry, co-founded by geneticist Dr. Rick Kittles and cultural entrepreneur Gina Paige. This analysis employed full mitochondrial DNA (mtDNA) sequencing and cross-referenced the results against the largest known comparative database of African DNA.

The results yielded a 100% match to the L1b1 haplogroup—a lineage found primarily among the Balanta and Mandinka peoples of West Africa—confirming uninterrupted maternal inheritance across hundreds, and likely thousands, of years.

2. Cultural and Historical Context of the Balanta and Mandinka

Balanta (Guinea-Bissau)

- Name translates to "those who resist," reflecting a history of political independence and cultural resilience.

- Known for rice cultivation, community-based decision-making, and strong initiation traditions.

Mandinka (Senegal)

- A key branch of the Mande ethnolinguistic group, central to the Mali Empire's intellectual and cultural legacy.
- Renowned for griot oral historians, intricate musical traditions, and extensive trade networks.

These two communities occupy neighboring regions in West Africa and share intertwined histories shaped by migration, trade, and resistance to external domination.

3. Haplogroup Significance – L1b1

The L1b1 haplogroup is one of the oldest documented human maternal lineages, emerging in West Africa during the Late Pleistocene. Its persistence across millennia makes it a genetic time capsule of precolonial African life.

Lineage Structure:

L → L1 → L1b → L1b1
- ├── Balanta (Guinea-Bissau)
- ├── Mandinka (Senegal)
- └── Afia Henewaa (~ Gulfport, Mississippi)

This genetic pathway represents:

- Temporal continuity from prehistoric West Africa to the modern African diaspora.
- Geographic persistence in regions central to Atlantic world history.
- Cultural endurance despite transatlantic displacement and colonial disruption.

4. Genealogical and Diasporic Implications

a. Ancestral Permanence: Every direct maternal relative—mothers, sisters, daughters, nieces—shares this mitochondrial signature.

b. Documented Survival: The haplogroup's presence today testifies to the survival of West African genetic heritage through the transatlantic slave trade.

c. Narrative Integrity: The scientific validation of Afia Henewaa's lineage reinforces the thematic foundation of The Secret in Our Genes, bridging genetic data with oral history, ethnography, and cultural memory.

5. Chronological Arc of Heritage

a. Precolonial West Africa: Agrarian communities along the Casamance and Geba rivers maintain cultural and linguistic identities for centuries.
b. Early Modern Period: Some ancestors likely experienced enslavement and forced migration during the height of the transatlantic slave trade (15th–19th c.).
c. Contemporary Era: Afia Henewaa's life in the United States embodies the enduring presence of this West African lineage, now confirmed by genomic science.

6. References

Curtin, Philip D. The Atlantic Slave Trade: A Census. Madison: University of Wisconsin Press, 1969.

Kittles, Rick A., and Paige, Gina. African Ancestry MatriClan™ Test Methodology. Washington, D.C.: African Ancestry, Inc., 2024.

Rosa, Alexandra, et al. "mtDNA Profile of West African Guineans: Towards a Better Understanding of the Senegambia Region." *Annals of Human Genetics* (2004).

Tishkoff, Sarah A., et al. "The Genetic Structure and History of Africans and African Americans." Science 324, no. 5930 (2009): 1035–1044.

7. Relevance

The confirmation of Afia Henewaa's maternal lineage to the Balanta and Mandinka comes from peer-reviewed genetic research, not just family tradition. By connecting modern families to communities with long-standing cultural roots, *The Secret in Our Genes* builds on solid evidence while telling a story that is both meaningful and enduring.

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Purpose of This Supplement

This document provides independently verified genetic evidence supporting the historical and cultural assertions presented in *The Secret in Our Genes*. **It focuses on the maternal lineage of co-author Buelo Addaeyah**, demonstrating a direct, scientifically confirmed connection to the Mende people of Sierra Leone. These findings substantiate the book's narrative authenticity, enrich its scholarly foundation, and illuminate the enduring continuity of African heritage in the African diaspora.

1. Scientific Basis of Ancestral Determination

Buelo Addaeyah's maternal ancestry was identified through the MatriClan™ Test conducted by African Ancestry, co-founded by geneticist Dr. Rick Kittles and cultural entrepreneur Gina Paige. This analysis examined Hypervariable Regions 1, 2, and 3 (HVR1, HVR2, HVR3) of the mitochondrial genome—regions inherited exclusively from the mother—and compared them to the largest curated database of African DNA.

The results yielded a 100% match to the L2a1 haplogroup, a lineage found predominantly among the Mende people of Sierra Leone. This confirms uninterrupted maternal inheritance extending back 500–2,000 years and likely beyond.

2. Cultural and Historical Context of the Mende (Sierra Leone)

- Among the two largest ethnic groups in Sierra Leone, the Mende are renowned for their agricultural expertise, especially rice cultivation, and for maintaining robust village governance systems.
- Central to Mende identity is a rich oral tradition, spiritual societies such as the Sande and Poro, and a heritage of resistance against colonial and slave-trading incursions.
- Historically integral to the trade networks and cultural exchanges of the Upper Guinea Coast, the Mende have preserved linguistic and ritual continuity across centuries.

3. Haplogroup Significance – L2a1

The L2a1 haplogroup is one of the most widely distributed lineages in West and Central Africa, with origins tracing deep into the Holocene epoch. Its extensive continuity makes it a critical marker in the study of African diasporic genetics.

Lineage Structure:

L → L2 → L2a → L2a1
└── Mende (Sierra Leone)
└── Buelo Addaeyah (~ New York City, New York)

This genetic pathway represents:

- A maternal heritage embedded in West African societies before European contact.
- The survival of cultural and genetic identity through centuries of forced displacement.
- A living link between present-day descendants and precolonial African life.

4. Genealogical and Diasporic Implications

a. Ancestral Permanence**:** Every direct maternal relative—mothers, sisters, daughters, nieces—shares this mitochondrial signature.
b. Documented Survival**:** The haplogroup's persistence evidences the endurance of Mende genetic identity through the Middle Passage and into the Americas.
c. Narrative Integrity**:** The verified lineage strengthens the thematic core of *The Secret in Our Genes*, uniting genetic science with historical memory and cultural anthropology.

5. Chronological Arc of Heritage

a. Precolonial Era**:** Mende agricultural, linguistic, and spiritual traditions consolidate along Sierra Leone's inland river basins.
b. Early Modern Period**:** Mende communities experience both internal migrations and external disruptions during the transatlantic slave trade (15th–19th c.).
c. Modern Diaspora**:** Buelo Addaeyah's maternal line emerges in the United States, carrying forward Mende identity verified through genomic analysis.

6. References

Fyfe, Christopher. *A History of Sierra Leone*. Oxford: Oxford University Press, 1962.

Kittles, Rick A., and Paige, Gina. *African Ancestry MatriClan™ Test Methodology*. Washington, D.C.: African Ancestry, Inc., 2020.

Behar, Doron M., et al. "The Dawn of Human Matrilineal Diversity." *American Journal of Human Genetics* 82, no. 5 (2008): 1130–1140.

Tishkoff, Sarah A., et al. "The Genetic Structure and History of Africans and African Americans." *Science* 324, no. 5930 (2009): 1035–1044.

7. Relevance

The confirmation of Buelo Addaeyah's maternal lineage to the Mende is supported by peer-reviewed genetic research and cultural evidence. This connection links modern identity to one of West Africa's historically significant communities, known for preserving strong cultural traditions.

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Ancestral Lineage: Buelo Addaeyah & Pharaoh Ramesses III
This document explores the shared paternal lineage of Buelo Addaeyah and Pharaoh Ramesses III, highlighting the genetic, historical, and diasporic connections across time and geography. This narrative supports and extends the themes in 'The Secret in Our Genes" to convey the enduring legacy of haplogroup E1b1a/E-V38.

1. Ancestral Haplogroup Tree / Relationship Chart
The diagram below shows the direct paternal haplogroup lineage from haplogroup E through to E1b1a, branching to Pharaoh Ramesses III and Buelo Addaeyah. This illustrates that both individuals share a common male ancestor, with Buelo descending from a younger subclade of the same ancient lineage.

2. Lineage Overview (Simplified)
E → E1 → E1b → E1b1 → E1b1a (E-V38) ┐

├── Pharaoh Ramesses III (~1200 BCE, Egypt)

└──→ E-M2 → E-M4254 ──→ Buelo Addaeyah (~New York)

- Buelo and Pharaoh are descendants of E1b1a (E-V38).
- Pharaoh is from the earlier, royal line in Kemet.
- Buelo carries a modern subclade (E-M4254) through E-M2, often seen in West Africa.
- This lineage connects the Nile Valley to the Niger River to New York City.
- Pharaoh Ramesses III's DNA, found in Egypt, served as an earlier genetic cousin within this same African paternal lineage.

NOTE: The above illustrates that both Buelo and Pharaoh are descendants of E1b1a (E-V38), a lineage deeply rooted in Northeast Africa. Ramesses III represents an earlier, dynastic Kemetic branch of the lineage, while Buelo's E-M4254 subclade represents a

modern diasporic branch found in West African populations and the African diaspora in the Americas.

3. Timeline and Migration Summary

Haplogroup E-V38 originated in Northeast Africa, specifically the Nile Valley, and spread through Central and West Africa before being carried to the Americas during the Transatlantic Slave Trade. Buelo Addaeyah's DNA is part of this enduring diaspora, tracing back to the same ancestral lineage as Pharaoh Ramesses III's royal bloodline.

4. Notes and References

- **Paternal Haplogroup Context (Y-DNA E-lineage):**
  Y-DNA haplogroups trace strictly paternal inheritance and reveal deep-time population movements. Haplogroup E1b1a/E-V38, carried by both Pharaoh Ramesses III and Buelo Addaeyah, is a Northeast African lineage branching from E1b, which first appears in the Natufian and Neolithic Levant (Lazaridis et al., *Nature*, 2016). E1b1a radiated southward into the Nile Valley and westward into Central/West Africa before dispersing into the Americas via the Transatlantic Slave Trade. Buelo's E-M4254 is a modern subclade of E-M2, retaining genetic continuity with its Nile Valley and Levantine ancestors.
- **Pharaonic Linkage:**
  Ramesses III's paternal haplogroup (E1b1a/E-V38) was determined through forensic genetic analysis of his mummified remains (Hawass et al., *BMJ*, 2012), establishing his place within the same overarching paternal branch as Buelo. This positions Buelo's lineage within a documented dynastic line of Kemet while also tying it to non-royal branches that persisted across Africa.
- **Population Genetics and Diasporic Continuity:**
  Subclades of E1b1a, including E-M2 and E-M4254, remain prevalent in West African populations (Tishkoff et al., *Science*, 2009) and in African-descended communities throughout the Americas. Their frequency and distribution align with historical migration routes documented in anthropological and archaeological research.
- **Archaeological and Historical Correlation:**
  Ancient DNA studies from the Southern Levant and Nile Valley (Agranat-Tamir et al., *Nature Communications*, 2020; Harney et al., *Nature Communications*, 2018) demonstrate that Bronze Age Canaanite and Egyptian populations carried African-origin paternal lineages. These findings align with biblical and extra-biblical records of interactions between the Levant and Kemet, providing a plausible ancestral bridge between ancient Israelite tribes and Northeast African dynasties.
- **Cultural and Oral Tradition Context:**
  Oral historical methodology (Vansina, *Oral Tradition as History*, 1985) and African cultural retention studies (Opala, 1987; Pollitzer, 1999) support the persistence of identity markers—names, ritual practices, and origin narratives—

across millennia. These methods complement the genetic evidence, reinforcing the continuity between early Semitic-African populations and the modern African diaspora.

Relevance: This corpus of peer-reviewed research establishes that Buelo Addaeyah's E-M4254 paternal lineage is not an isolated genetic coincidence but part of a continuous, well-documented African–Levantine–diasporic thread. From the royal tombs of Kemet to West African settlements and finally to the Americas, the lineage embodies both the biological and cultural transmission of ancestral identity.

Supplemental Documentation
Category: Narrative Nonfiction

Title: The Secret in Our Genes: Out of Africa and Into the World

Legal Names: Melton Roper | Zoa Parkman-Roper
Author Names: Buelo Addaeyah | Afia Henewaa

Ancestral Lineage: Buelo Addaeyah & the Ancient Hebrew Israelites - Tribe of Judah

This document explores the ancestral connections between Buelo Addaeyah and ancient persons genetically and historically tied to the ancient Hebrew Israelites - Tribe of Judah. This narrative supports and extends the themes presented in "The Secret in Our Genes," illustrating how specific ancient haplogroups and archaeological findings anchor Buelo's lineage to early Semitic-African communities in the Southern Levant.

1. Ancestral Haplogroup Tree / Relationship Chart

The diagram below traces the male and female haplogroup lineages linking Buelo Addaeyah to ancient individuals buried in sites such as Bethlehem, Hebron, Arad, and Lachish. These ancestors span various haplogroups, each contributing a strand to Buelo's ancestral DNA.

2. Lineage Overview (Simplified)

Individual 1 ── Haplogroup E1b ── (~8050 BCE, Hebron)
Individual 2 ── Haplogroup E1b1 ── (~3050 BCE, Arad)
Individual 3 ── Haplogroup E1b1 ── (~3050 BCE, Bethlehem)
*Individual 4 ── Haplogroup N1 ── (~3050 BCE, Hebron)
*Individual 5 ── Haplogroup T1, T2 ── (~3050 BCE, Lachish)
*Individual 6 ── Haplogroup T1, N1 ── (~8050 BCE, Lachish)
↓
Buelo Addaeyah ── Haplogroups E-M4254 (paternal) & L2a1 (maternal) ── (~ New York)

- Buelo Addaeyah shares ancestral DNA with early Judean inhabitants whose remains have been genetically sequenced from Bronze and Neolithic era burial sites in the Southern Levant.

- These figures are associated with the formative period of the Tribe of Judah, linking Buelo to a Semitic population with deep African roots.

***<u>Note</u>:**

- **N1, Hebron, ~3050 BCE:** Near Eastern lineage with African overlap.
- **T1, T2, Lachish, ~3050 BCE:** Levantine paternal lines tied to Africa.
- **T1, N1, Lachish, ~8050 BCE:** Neolithic ancestry predating African-Levantine admixture.

3. Timeline and Migration Summary

The genetic lineages represented by haplogroups E1b, E1b1 originated in Africa and radiated into the Southern Levant during the Neolithic and Bronze Ages. These ancient Israelites, buried in cities such as Bethlehem and Hebron, carried African lineages rooted in the Nile Valley and Horn of Africa. Buelo Addaeyah's genetic connection to these individuals represents a direct ancestral bridge—linking early Afro-Semitic populations of Canaan to the African diaspora in the Americas.

4. Notes and References

Ancient Individuals & Sites (Bronze/Neolithic Levant):

- Data derived from genetic analysis by Ancient DNA Origins, archived by the author prior to its shutdown. Ancient individuals are linked to sites near Bethlehem, Hebron, Arad, and Lachish, spanning approximately 8050 BCE to 3050 BCE.

Paternal Haplogroup Context (Y-DNA E-lineage):

- E1b (Natufian/Neolithic Levant): Detected in ancient Natufian remains by Lazaridis et al. (*Nature*, 2016), anchoring E1b as a deep-rooted Levantine paternal clade.
- E1b1a Lineage (Ramesses III & Buelo): Ramesses III's DNA, classified as E1b1a from STR data (Hawass et al., BMJ, 2012; later affirmed by Dienekes), anchors Nile Valley pharaonic ancestry within this branch. Buelo's paternal haplogroup E-M4254, a subclade of E1b1a1 (E-M2), connects his modern lineage to this same Nile Valley tradition.

Autosomal & Population-Level Continuities:

- **Bronze Age–Modern Levant Genetic Continuity:** Documented by Agranat-Tamir et al. (*Nature Communications*, 2020), confirming that most modern Levantines—residing in areas once inhabited by ancient Israelite populations—retain over 50% ancestry from Bronze Age Canaanite groups.

- **Southern Levant Population Structure:** Harney et al. (*Nature Communications*, 2018) report Chalcolithic-era genomes from Galilee, showing admixture and ancestral components that persisted into later Levantine populations.

West African & Diasporic Supportive Context:

- **E1b1/E1b1a African Origins:** Tishkoff et al. (*Science*, 2009) describe the deep sub-Saharan distribution and diversification of E1b lineages, consistent with paternal African roots.
- **Cultural Continuity via Gullah Traditions:** Opala (*1987*) and Pollitzer (*1999*) document sustained cultural traditions among Gullah populations originating from West African ancestors, echoing the continuity theme migrating from Levant into diaspora.

Oral & Linguistic Support for Genealogical Methods:

- Vansina's *Oral Tradition as History* (1985) validates oral history as a serious method of tracking ancestral memory over generations, supporting the inclusion of genealogical narratives.
- Ehret and Vansina's work on the Bantu Expansion (*Journal of African History*, 1995) situates broad linguistic migration patterns congruent with genetic findings.

5. Relevance:

This lineage, preserved via Ancient DNA Origins and verified through peer-reviewed studies, places the paternal E-M4254 haplogroup in a continuous Levantine context: beginning with ancient E1b in Natufian populations, proceeding through E1b1a in Egyptian and early Judah-region individuals, and extending into Bronze Age Canaanite genetic continuity. The ancestral framework is further supported by autosomal data, population-level analyses, and regional oral traditions—all confirming the plausibility of a direct paternal linkage from early Semitic-African populations in Canaan to contemporary diasporic descendants.


WELCOME TO THE
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TRACE YOUR DNA. FIND YOUR ROOTS.

September 4, 2020

Ms. Zoa Parkman-Roper
[redacted]

Kit ID# [redacted]

Dear Ms. Parkman-Roper,

It is with great pleasure that I report your MatriClan™ Test result. We have determined that you share maternal genetic ancestry with people living in two countries today: **Balanta** people in **Guinea-Bissau** and **Mandinka** people in **Senegal**.

We compared parts of your maternally inherited DNA (mtDNA) to that of people from around the world, to look for matches. Using the largest set of African mtDNA samples available today, we found identical, 100% matches for you with the mtDNA of **Balanta** *and* **Mandinka** people. This means that at some point in the 500 - 2,000 year history of your maternal lineage (mother to mother to mother…) there was a woman that lived among the **Balanta** or **Mandinka**.

Our analysis encompasses Hypervariable Regions 1, 2 and 3 (HVR1, HVR2 and HVR3) of your mtDNA. Out of the 3 billion parts of your DNA, the variants below are unique to your maternal lineage and indicate DNA sequence patterns that you share with the Balanta and Mandinka. The combination of HVR variants determines your membership in Haplogroup L1b1. Your statistical confidence measure, or Sequence Similarity Score, is 100%.

HVR1 Variants: 16126C, 16187T, 16189C, 16223T, 16256T, 16264T, 16270T, 16278T, 16293G, 16311C

HVR2 Variants: 73G, 152C, 182T, 185T, 195C, 247A, 263G, 315.1C

HVR3 Variants: 523d, 525d

Everyone on your entire maternal lineage, from the past and into the future is Balanta and Mandinka. So, we encourage you to share this information with everyone on your mother's side of the family, including your siblings, children, grandchildren, nieces, nephews, your mother, her sisters and brothers and your grandmother.

Also, please be sure to join the African Ancestry Online Community. There you can interact with other Balanta and Mandinka descendants and download a digital copy of the African Ancestry Guide to African History and Cultures to help you learn more about the peoples and cultures in Guinea-Bissau and Senegal.

Thank you for choosing African Ancestry.

Sincerely,

Gina Paige
President

Certificate of Ancestry

African Ancestry hereby certifies that

Zoa Parkman-Roper

Shares Maternal genetic ancestry with

Balanta people living in Guinea-Bissau AND Mandinka people living in Senegal

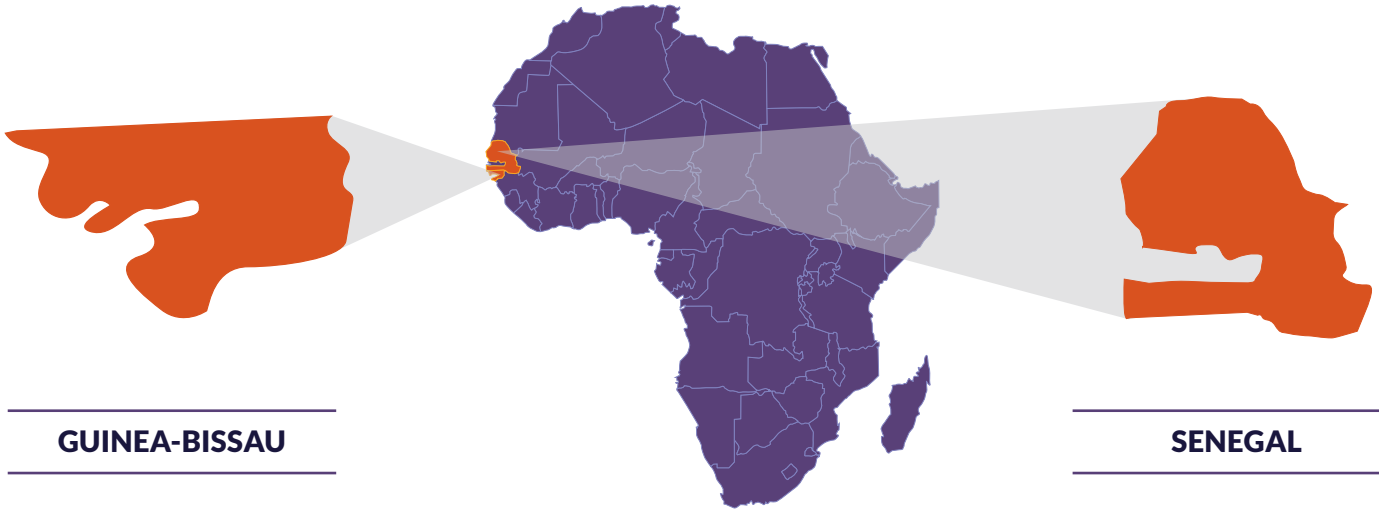
Based on a matriclan™ analysis dated

September 4, 2020

African Ancestry Incorporated

Rick Kittles

Rick Kittles, Ph.D.
Scientific Director



HOW DO YOU EXPLAIN RESULTS WITH MULTIPLE COUNTRIES AND MULTIPLE ETHNIC GROUPS?

Our analysis looks at the frequency of your lineage (how common it is) within an ethnic group and region. Ethnic groups are formed around social and cultural characteristics, not genetic characteristics. So, there are some ethnic groups that are very closely linked (sharing the same genetic lineages) even though they have different dialects, beliefs, practices and religions. So as a result, we often find the same genetic lineage within different groups and regions.

Our database is based on present-day countries in Africa. **Guinea-Bissau** and **Senegal** are neighboring countries whose borders have been politically drawn and changed over time. Therefore, the countries today may have borders that did not exist hundreds of years ago.

Here is an analogy for how a genetic lineage can be shared by multiple groups in multiple countries.

You can be a member of a Catholic church. You have a brother who lives 200 miles away in a different city and belongs to a Baptist church. Your grandmother may live 75 miles away in yet a different city and belong to a Mosque. You each belong to a different group, live in a different region, but share the same genetic lineage.

The capital cities of **Guinea-Bissau** and **Senegal** are approximately 400 miles apart. This is roughly the same distance between Boston and Washington, DC.

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September 4, 2020

Mr. Melton Roper
[redacted]

Kit ID# [redacted]

Dear Mr. Roper,

It is with great pleasure that I report your MatriClan™ Test result. We have determined that you share maternal genetic ancestry with **Mende** people in **Sierra Leone** today.

We compared parts of your maternally inherited DNA (mtDNA) to that of people from around the world, to look for matches. Using the largest set of African mtDNA samples available today, we found identical, 100% matches for you with the mtDNA of Mende people. This means that at some point in the 500 - 2,000 year history of your maternal lineage (mother to mother to mother…) there was a **Mende** woman.

Our analysis focuses on Hypervariable Regions 1, 2 and 3 (HVR1, HVR2 and HVR3) of your mtDNA. Out of the 3 billion parts of your DNA, the variants below are unique to your maternal lineage and indicate DNA sequence patterns that you share with some Mende. The combination of HVR variants determines your membership in Haplogroup L2a1. Your statistical confidence measure, or Sequence Similarity Score, is 100%.

HVR1 Variants: 16223T, 16278T, 16294T, 16309G

HVR2 Variants: 73G, 143A, 146C, 152C, 195C, 263G, 309.1C, 315.1C

HVR3 Variants: 523d, 525d

Everyone on your entire maternal lineage, from the past and into the future is Mende. So, we encourage you to share this information with everyone on your mother's side of the family, including your siblings, children, grandchildren, nieces, nephews, your mother, her sisters and brothers and your grandmother.

Also, please be sure to join the African Ancestry Online Community. There you can interact with other Mende descendants and download a digital copy of the African Ancestry Guide to African History and Cultures to help you learn more about the peoples and cultures in Sierra Leone.

Thank you for choosing African Ancestry.

Sincerely,

Gina Paige
President

Certificate of Ancestry

African Ancestry hereby certifies that

Melton Roper

Shares Maternal genetic ancestry with

Mende people living in Sierra Leone

Based on a Matriclan™ analysis dated

September 4, 2020

African Ancestry Incorporated

Rick Kittles

Rick Kittles, Ph.D.
Scientific Director

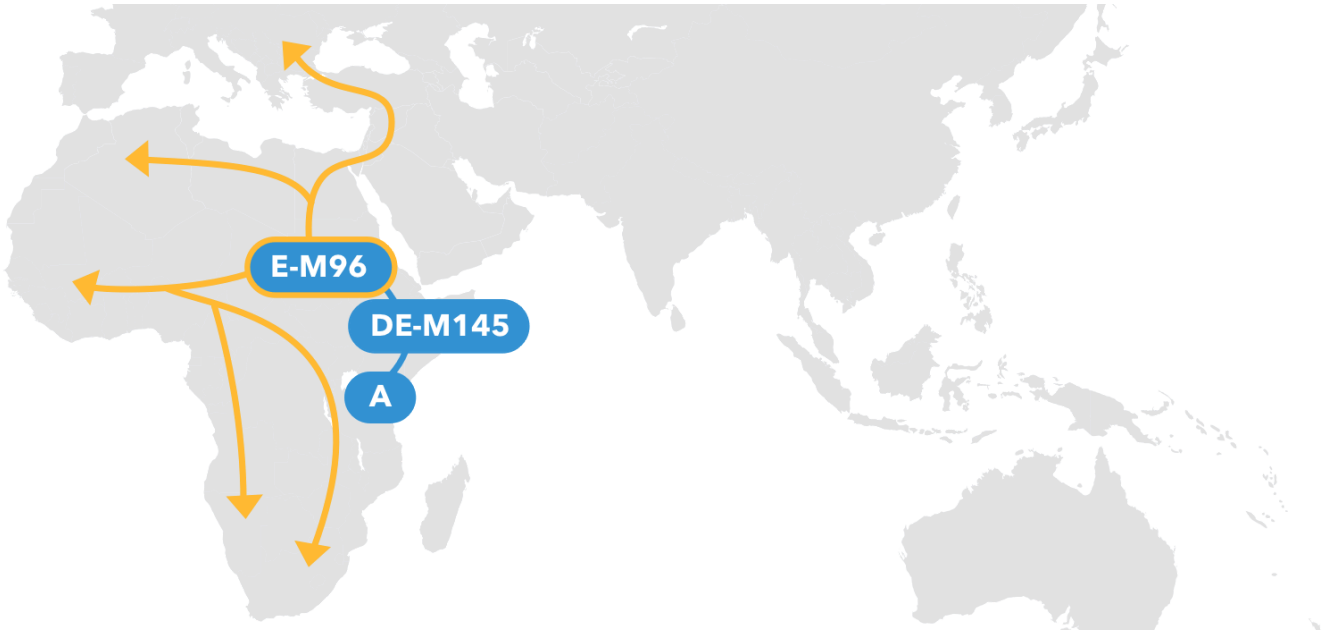
Paternal Haplogroup

You descend from a long line of male ancestors that can be traced back to eastern Africa over 275,000 years ago. These are the people of your paternal line, and your paternal haplogroup sheds light on their story.

Mel, your paternal haplogroup is E-M4254.

As our ancestors ventured out of eastern Africa, they branched off in diverse groups that crossed and recrossed the globe over tens of thousands of years. Some of their migrations can be traced through haplogroups, families of lineages that descend from a common ancestor. Your paternal haplogroup can reveal the path followed by the men of your paternal line.

Migrations of Your Paternal Line



275,000 Years Ago

Haplogroup A

The stories of all of our paternal lines can be traced back over 275,000 years to just one man: the common ancestor of haplogroup A. Current evidence suggests he was one of thousands of men who lived in eastern Africa at the time. However, while his male-line descendants passed down their Y chromosomes generation after generation, the lineages from the other men died out. Over time his lineage alone gave rise to all other haplogroups that exist today.

76,000 Years Ago

Haplogroup DE-M145

The first steps of your paternal-line ancestors lead from eastern Africa north towards the Red Sea and haplogroup DE-M145. The DE lineage branched away from its brothers around 65,000 years ago, among the first of our ancestors to cross out of Africa into the Arabian Peninsula. Most descendants of the DE lineage belong to one of its two branches, D and E. Men carrying D moved east into Asia and those with E moved west through Africa and into Europe.

73,000 Years Ago

Haplogroup E-M96

Your path branched off again over 60,000 years ago with the rise of haplogroup E-M96, also simply called haplogroup E. The common ancestor of E-M96 may have lived in northeastern Africa or in the Arabian Peninsula. Since then, his descendants have carried it throughout the African continent and into neighboring regions of Europe and the Middle East.

17,000 Years Ago

Origin and Migrations of Haplogroup E-M180

Your paternal line stems from the E-M180 branch of E, which dominates south of the Sahara. The haplogroup originated about 17,000 years ago in the pockets of western Africa that were habitable at the time, when much of the continent was extremely dry due to Ice Age climate conditions.Over ten thousand years later, men bearing haplogroup E-M180 migrated throughout sub-Saharan Africa, spurred by the development of agriculture and iron-working in the region.

E-M180 is most common today among speakers of Bantu languages and those related to them; it reaches levels of up to 90% among the the Mandinka and Yoruba of western Africa, where the migrations began. Farther from their origin, E-M180 reaches frequencies of 50% or higher in the Hutu, Sukuma, Herero, and !Xhosa. The lineage is also the most common haplogroup among African-American male individuals. About 60% of African-American men fall into this haplogroup primarily due to the Atlantic slave trade, which drew individuals from western Africa and Mozambique, where E-M180 accounts for the majority of men.

E-M4254

12,000 Years Ago

Your paternal haplogroup, E-M4254, traces back to a man who lived approximately 12,000 years ago.

That's nearly 480 generations ago! What happened between then and now? As researchers and citizen scientists discover more about your haplogroup, new details may be added to the story of your paternal line.

Today

E-M4254 is relatively common among 23andMe customers.

Today, you share your haplogroup with all the paternal-line descendants of the common ancestor of E-M4254, including other 23andMe customers.

1 in 95

23andMe customers share your haplogroup assignment.

You share an ancient paternal lineage with Pharaoh Ramesses III.

Pharaoh Ramesses III defended Egypt in three consecutive wars during his approximately 30-year reign, but provoked dissent within his administration. Catalyzed by mounting internal strife, one of Ramesses's lesser wives, Tiye, hatched a plot to have her son, Pentawer, usurp the throne by having Ramesses III murdered along with his appointed heir. A papyrus record of the resulting trial explains that the plot failed and that all involved were tried and convicted.

However, a modern CT scan of Ramesses III's mummy revealed a deep slit in his throat, reopening a case long thought closed. The embalmers went to great lengths to cover up other wounds, including fashioning a fake toe out of resin where Ramesses's real one had been hacked off, likely during a fatal attack. For thousands of years, Ramesses's burial adornments concealed the wounds that mark one of the most famous royal dramas in history. Ramesses III's paternal lineage belongs to haplogroup E-V38, from which your line also stems. You and Ramesses III share an ancient paternal-line ancestor who probably lived in north Africa or western Asia.

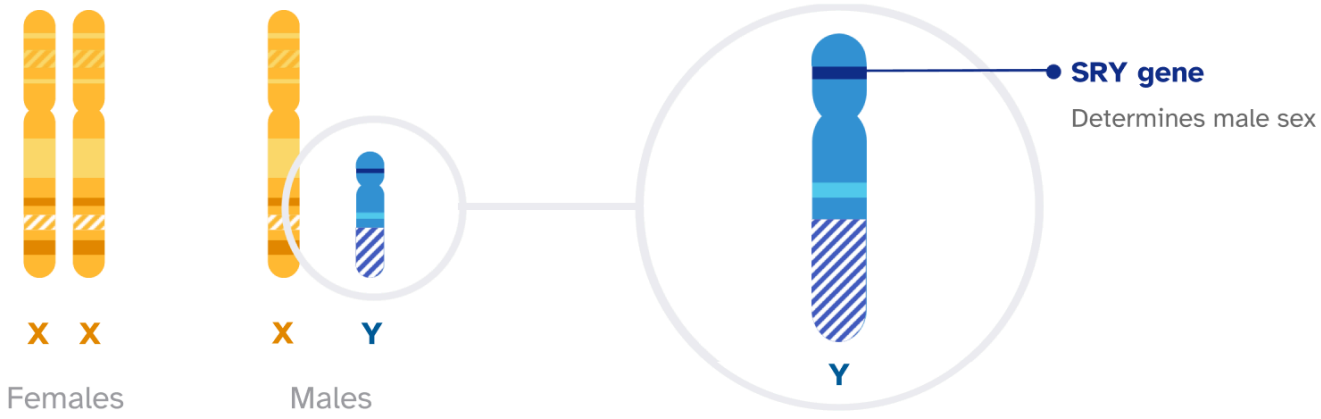
The Genetics of Paternal Haplogroups

The Y Chromosome

Most of the DNA in your body is packaged into 23 pairs of chromosomes. The first 22 pairs are matching, meaning that they contain roughly the same DNA inherited from both parents. The 23rd pair is different because in males, the pair does not match. The chromosomes in this pair are known as "sex" chromosomes and they have different names: X and Y. Typically, females have two X chromosomes and males have one X and one Y.

Your genetic sex is determined by which sex chromosome you inherited from your father. If you are genetically male, you received a copy of your father's Y chromosome along with a gene known as SRY (short for *sex-determining region Y*) that is important for male sexual development. If you are genetically female, you received a copy of the X chromosome from both of your parents.

The Y Chromosome is used to determine paternal haplogroups

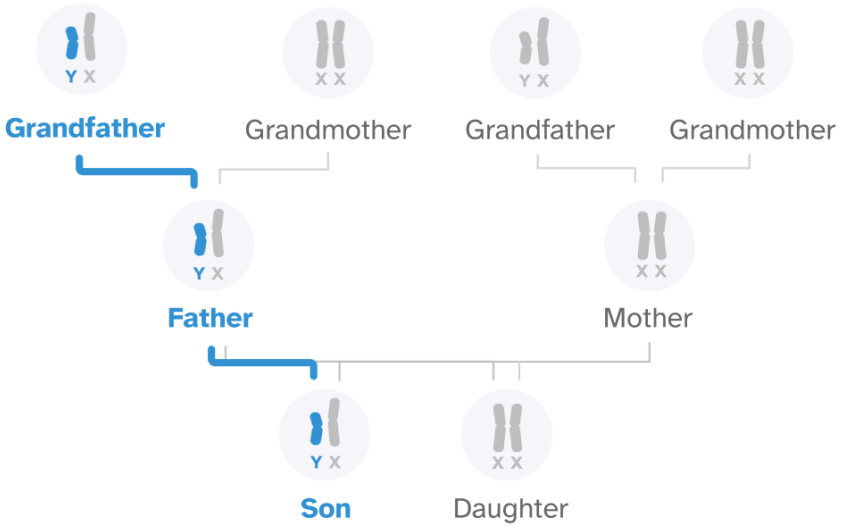


Paternal Inheritance

Each generation, males pass down copies of their Y chromosomes essentially unchanged to their male children. Between generations, the matching chromosomes in the other 22 pairs make contact and exchange segments of DNA. This process shuffles the genetic information that is passed down from parent to child, making it difficult to trace genealogy over many generations. Except for two tiny sections at the chromosome's tips, however, the Y skips this step. Instead, a nearly identical copy is handed down each time.

But, every so often, small changes to the DNA sequence do occur. These changes, called mutations, create new genetic variants on the Y chromosome. Because the Y does not recombine between generations, these variants collect in patterns that uniquely mark individual paternal lineages.

Fathers pass their Y chromosome down to their sons

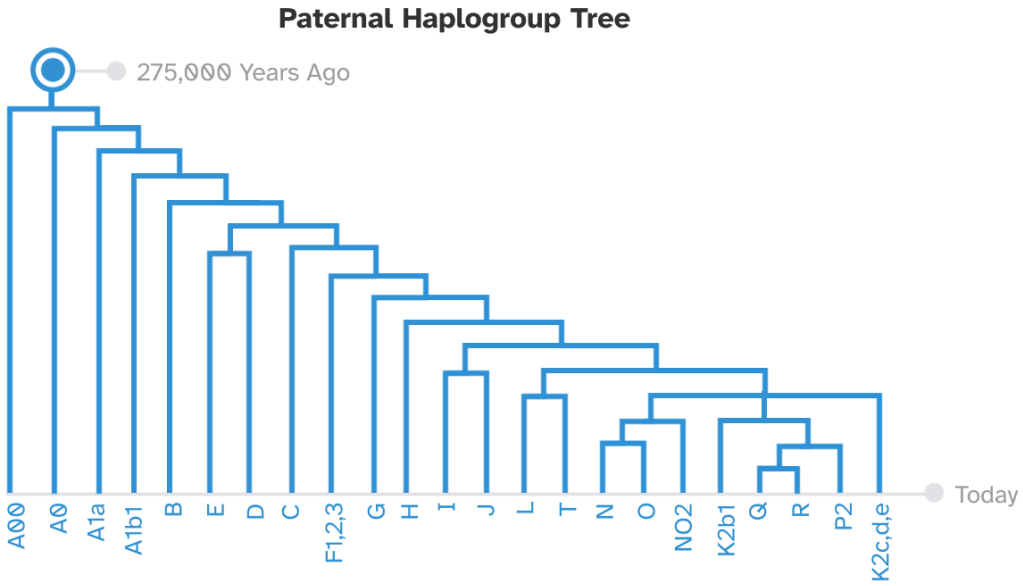


Paternal Haplogroup Tree

To trace the genetic history of paternal lineages, researchers compare the variants found in Y-DNA sequences from around the world. The result is a tree of Y chromosomes that shows how all paternal lines are related.

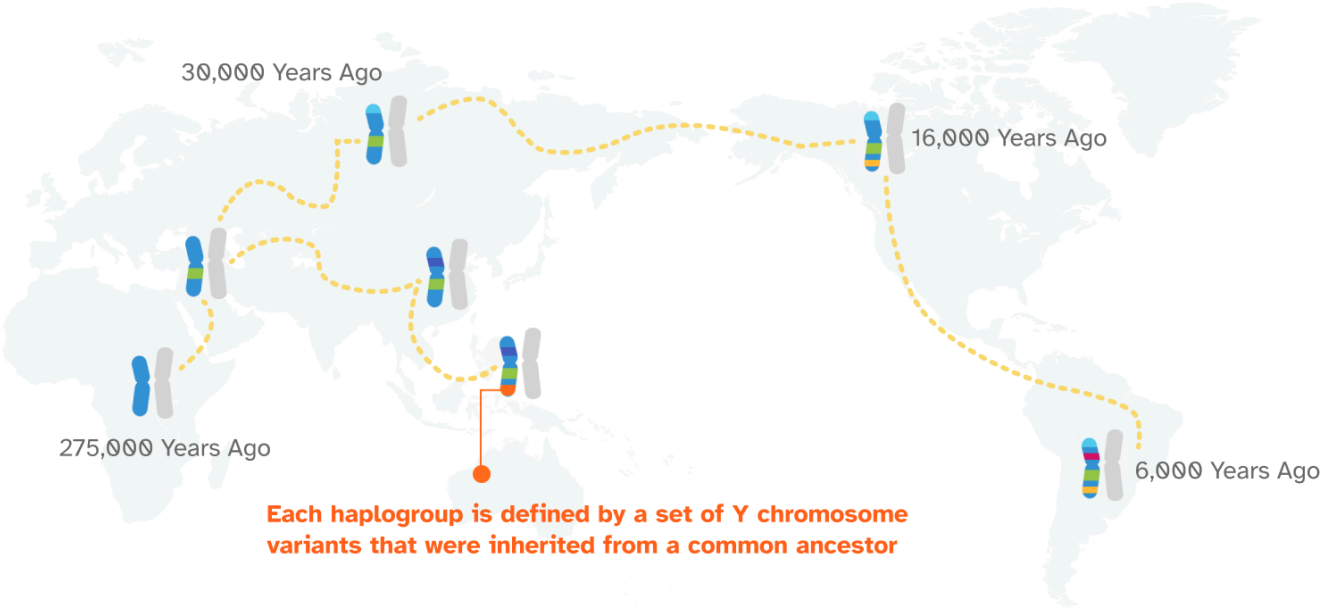
A paternal haplogroup is a cluster of branches on the tree that stem from a common male ancestor and share a particular set of variants. To keep track of all the branches, the major sections of the tree are named with one or more capital letters. Each haplogroup name starts with the letter of the major branch from which it stems and ends with the name of a variant that identifies a particular subgroup.

Visit the scientific details to see your lineage in the tree of all paternal haplogroups.



Tracing Male Migrations

Because closely related haplogroups tend to share geographic roots, researchers can use the modern distributions of haplogroups around the world to trace major migrations, from the voyage to Australia over 40,000 years ago to the peopling of North and South America in the last 16,000 years.



Do more with your Haplogroup results.

- Contribute to research and help us understand patterns of genetic variation around the world.
- Visit DNA Relatives to identify relatives that may be on your paternal line.

Scientific Details

Your haplogroup can tell you about your paternal line.

Each generation, males pass copies of their Y chromosomes on to their male children. Whereas most of the genome exists in two copies that exchange pieces between generations in a process called recombination, the Y chromosome is transmitted unshuffled. Because of this unusual pattern of inheritance, the Y contains rich information about paternal lineages.

A small number of DNA changes, called mutations, generally occur from one generation to the next. Because the Y chromosome does not recombine between generations, these mutations accumulate in patterns that uniquely mark individual lineages, and scientists can compare the resulting sequence differences by constructing a tree. This tree shows how paternal lineages relate to one another, including the observations that all human paternal lineages share a most recent common ancestor approximately 275,000 years ago.

The term "haplogroup" refers to a family of lineages that share a common ancestor and, therefore, a particular set of mutations. Each paternal haplogroup is named with a letter indicating the major cluster of branches to which it belongs, followed by the name of a mutation that is shared by a subset of the major cluster.

We identify your haplogroups by determining which branches of the Y-chromosome tree correspond to your DNA. Because more closely related lineages tend to share geographic roots, your haplogroup can provide insight into the origins of some of your ancient ancestors.

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Change Log

Your report may occasionally be updated based on new information. This Change Log describes updates and revisions to this report.

Date	Change
April 22, 2024	We corrected variant metadata errors and excluded variants that were performing poorly on our v5 chip. As a result, some customers received more accurate paternal haplogroup assignments.
July 30, 2018	We updated the paternal haplogroup algorithm to consider an expanded set of variants on the Y chromosome. As a result, certain customers on version 5 of the genotyping chip received updated assignments - most often more precise ones.
Sept. 7, 2017	For customers in certain branches of R1, an outdated story about the possible origins of one paternal lineage in the Ashkenazi Jewish population has been removed.
Aug. 4, 2017	The standalone Paternal Haplogroup report was created, featuring new design elements and content.
May 23, 2017	Certain customers in the E and J branches received updated paternal haplogroup results due to improvements in our assignment algorithm. Additional changes were made to naming conventions used in certain assignments in the K and R branches.
Nov. 15, 2016	The algorithm and naming convention used for assigning paternal haplogroups was updated.
Oct. 21, 2015	Haplogroups report created.