

From the Bourbon Cadaster to Genomics. Digital platforms and interdisciplinarity: the project “We Are What They Were” of Riposto

«DigItalia» 2-2024
DOI: 10.36181/digitalia-00109

Salvatore Spina

Università degli Studi di Catania. Dipartimento di Scienze Umanistiche

The Mediterranean, conceptualized by Braudel as a “liquid continent”, is shaped by its peoples, cultures, and economies over time. Today, genetic research, through an interdisciplinary approach, redefines this continent by bridging History and Biological Sciences. The We Are What They Were project undertakes the historical reconstruction of the Riposto community during the 17th and 18th centuries by intertwining primary sources and genomic data, culminating in the creation of a web portal. This study emphasizes the strategic use of genealogical approaches and genetic analysis as tools for community description, focusing on the Y chromosome analysis of the “Sorbello” surname from Riposto. This analysis establishes a methodology that interconnects historical data and information, aiming to explain community structures crucial for describing Europe and the Mediterranean in the modern age. This project exemplifies the integration of digital platforms and interdisciplinarity in historical and genetic research, offering new insights into the complex interplay of Genetics, History, and community identity.

1. Interconnection

In 2021, the digital historical and archival research “The Bourbon Cadaster in Sicily (1845). The study of the «Riposto» Section” started as a “Local Time Machine”¹ within the European project Time Machine Europe², an international organization established as a research dimension aimed at integrating humanistic, scientific, and technological approaches in a multidisciplinary vision. This vision aspires, on the one hand, to create an infrastructure capable of accommodating the digital products derived from various research projects across Europe – assisting researchers in the construction and maintenance of servers, databases, and multiple types of information technology – and, on the other hand, to construct the Big Data of European historical and archival culture.

¹ <https://www.timemachine.eu/lrm-projects/il-catasto-borbonico-in-sicilia-1845-studio-della-sezione-riposto/>.

² <https://www.timemachine.eu/time-machine-organisation/>.

Indeed, Time Machine Europe focuses on the creation of a collective system of digital information that can map the economic, cultural, geographical, and historical evolution of Europe, starting from the opportunities and perspectives that emerge for scholars from the digital revolution and the ability to encode cultural heritage in a shareable, processable, accessible, interoperable, interconnected format.

Over recent years, significant digitization projects have created the background for developing the “Digital Ecological Niche” (DEN)³. This dimension has enhanced the interplay system by enriching it with new media, but most importantly, with a new agent: the computer.

Within this new “niche”, the interplay system and the produced data constitute a new archive which aligns with conservation entities, forming their digital stream. While it is true that archives have acquired a status quo leading them towards hybridization systems, striving to implement administrative and political choices that enable them to meet the needs of automation and dematerialization, it is even truer that historical archives have embarked on a digitization journey that only in recent times considers the Web and the Internet as tools for conveying information that can “narrate” the historical-archival heritage.

A closer example is the *thematic portals* of the Italian National Archival System⁴, where users can access thematic archives aimed at creating an archival and historical thread among documents that allow the understanding of specific phenomena, events, or dimensions. “Rete degli archivi per non dimenticare”⁵, for instance, gathers documentation on the terrorist crises that struck Italy, or “Archivi della moda del Novecento”⁶, which seeks to define the styles that characterized this art throughout the 20th century, however, it works more as a search-engine referring to various fashion houses’ websites rather than as a repository intending to establish a semantic, archival, and historical framework of the matter.

In those notes, we propose to consider the following question: Can a historical source be narrated visually? Is it possible to narrate a complete archival heritage or some parts of it? Is it possible to collect different archives and create a unique narration that lets us understand how other sources can deal with the same argument?

2. At the origin of the project

Nowadays, the digital turn – the digital revolution – has become key not only for protecting and preserving but mostly for describing the entire society and culture of the postmodern world.

Because of that technological condition, if we want to consider the questions referred to above correctly, we must start our reasoning from a concept that became an axiom of Archival Science: the invented archive.

Thanks to the advent of the Internet infrastructure and the Web, most historians have started to create a digital documentary complex that aims to gather all sources, information, and data dealing with the same matter. We can consider, as explanatory examples, the “Picturing United

³ Salvatore Spina, *Homo-Loggatus. The anthropological condition of historians in the digital world*, «Journal of Mathematical Techniques and Computational Mathematics», 2 (2023), n. 10, p. 431-437; Salvatore Spina, *Digitality as a “longue durée” historical phenomenon*, «Umanistica Digitale», (2024), n. 18, p. 1-25.

⁴ The Italian “Sistema Archivistico Nazionale” (SAN) represents a gateway that has facilitated the unification of digitized archival resources from national institutions. The SAN can be found at the link: <<https://san.beniculturali.it/web/san/archivi-tematici>>.

⁵ <https://www.memoria.san.beniculturali.it/>.

⁶ https://www.moda.san.beniculturali.it/wordpress/?page_id=251.

States History”⁷, the “Charles Booth’s London, Poverty maps and police notebooks”⁸, and the “Brexit Collection”⁹ websites. On the other hand, a different website’s category, such as the “Black Cultural Archives”¹⁰, aims to let communities document their heritage and their pasts, as the principle that underlies the Public History approach. Indeed, as Jeannette Allis Bastian maintained, documentary heritage plays a crucial role in community memory and constructs of identity «to construct and maintain reliable memory. However, communities above all require access to their written documents, ownership of the primary sources of their history»¹¹. The ability to create collective memory and collective identity is directly linked to confronting and interpreting a community’s past. Collective memory can include written records, oral traditions, public commemorations, and artefacts.

Going beyond what has been said, whatever the reason they are created, archives are meant to preserve our identity and prove our existence. The goal of that kind of digital (invented) archive is to link different sources to each other in order to create a heritage that could let everyone know who was behind an event, let everyone understand what the Past is, and how History can allow everyone to understand and how to participate in solving the social and political crisis in present time. The digital world lets us deal with the “participative historical approach”.

However, some considerations are in order. Establishing community archives, invented archives, or participatory archives has affected Archival Science, especially regarding the paradigm of the “archive’s creator.” The latter is key for guaranteeing the identity of the documents’ sedimentation, reliability, and fruition of the entire archive.

When we browse a digital archive, we probably face the creator’s authoritativeness issue, leading us to deeply analyze every document before considering it as an official source.

Although, in any case, an archival source – digital or digitized – takes on meaning only in the scholar’s mind. Even the most authoritative source loses its historical prominence in an illogical context.

In 2020, the concept of a multidisciplinary research project to retrace the history of a community based in eastern Sicily began to take shape. Riposto is a town situated between Catania and Messina. Until the Nineteenth century, it constituted the coastal borough of Mascali County.

Riposto is a natural harbour and one of the most crucial trading squares on the Mascaliese coast. From Riposto, a myriad of agricultural products embarks, while the square welcomes various goods originating from the Mediterranean. Given its location and the presence of a rich and productive territory, over the centuries, the village of Riposto has been the destination of a significant immigration phenomenon. Between the seventeenth and eighteenth centuries, many people from Catania, Messina, Acireale, the centre of the County, and other Sicilian cities settled in this hamlet to exploit the hinterland’s natural harbour and highly fertile lands.

Thanks to this geographical and productive condition, a little melting pot arose, and the diverse community, once permanently established, initiated the process of constructing the Ripostese identity.

The extensive historiography¹² has attempted to describe the social and commercial dynamics

⁷ <https://picturinghistory.gc.cuny.edu>.

⁸ <https://booth.lse.ac.uk/map/14/-0.1174/51.5064/100/0>.

⁹ <https://lse-atom.arkivum.net/uklse-dl1er01>.

¹⁰ <https://blackculturalarchives.org>.

¹¹ Jeannette A. Bastian, *Owning Memory: How a Caribbean Community Lost Its Archives and Found Its History*, Westport, (Conn): Libraries Unlimited, 2003.

¹² Sebastiano Fresta, *Una comunità agricola nelle terre della Contea di Mascali (1681-1823)*, Catania: Arti Grafiche, 1969; Enrico Iachello, *Il vino e il mare: “Trafficcanti” siciliani tra ‘700 et ‘800 nella Contea di Mascali*, Catania: Maimone, 1997; Enrico Iachello — Alfio Signorelli, *Trafficcanti e produttori in un’area*

of the Ripostese community, yet it has never answered the question: who are the Ripostese? What paths did these people traverse before settling on the Mascalese shores? What were the social dynamics? How did the initial nucleus of the hamlet develop? Which were the most influential families that determined the economic and social balances of the community? What were the marital relations like? How did the community develop over the subsequent centuries, and which nuclei firmly took root? What relationship do we continue to have with this community?

The project aims to answer the historical problem posed by the historian Giuseppe Giarrizzo: What was Riposto before “Riposto”? In a series of seminars delivered by Giarrizzo to doctoral students at the Faculty of Humanities of the University of Catania, the necessity for a historical account of Riposto was identified – this was not due to Giarrizzo’s connection to the city but instead to the distinctive characteristics exhibited by the geographical structure of Riposto. The territory of this town encompasses a diverse range of topographical features, extending from the coastal region to the elevated terrain of Mount Etna. This orographic diversity has facilitated the cultivation of grapes and the production of wines of exceptional quality, ranking among the finest in Sicily. Conversely, Riposto was home to a natural port that could accommodate the influx of agricultural products from the surrounding countryside, establishing itself as the sole maritime gateway to the region, in contrast to the ports of Catania and Messina. The history of Riposto thus offers a valuable opportunity for historians to reconstruct eastern Sicily’s economic and political events. Indeed, Giuseppe Giarrizzo’s invitation was to examine Riposto not through the lens of the “*Historia minima*” – an approach he would later employ in his study of *Biancavilla*¹³ – but through an analytical methodology that could potentially extend the historical assessment to multiple levels, thereby elucidating the “whole” through models representing supra-local and national complexity.

3. The Online Portal

The project’s initial concept underwent modifications during its implementation, particularly concerning the potential for a graphical representation of the outcomes and the possibility of engaging the community in constructing its historical identity.

In this case, the project could have followed two paths, one of which would have flattened and standardized it, namely the creation of an invented and participatory archive, which would have allowed for the collection provided by citizens in addition to archival documentation. The other path, on the other hand, looked towards a new and multidisciplinary approach, aiming to scientifically connect the community of the present with that of the Past, in an attempt to underpin the answer to Giarrizzo’s question: “We are what they were!” (Fig. 1).

vinicola: La Contea di Mascali tra '700 e '800, in: *Il Mezzogiorno preunitario. Economia, società e istituzioni*, a cura di A. Massafra, Bari: Dedalo 1988; Salvatore Spina, *Riposto vecchio e Riposto nuovo negli atti notarili di Giovanni Cali e Geronimo Pasini: studi per la storia di Riposto*, Acireale-Roma: Bonanno Editore, 2011; Salvatore Spina, *Riposto: territorio, infrastrutture, identità urbana, 1841-1920*, Algra, Viagrande 2015; Salvatore Spina, *Il porto di Riposto. Profili economici e politici di un progetto difficile*, «Nuova economia e Storia», 24 (2018), n. 3-4, p. 45-82; Salvatore Spina, *Porti di frontiera: il caso di Riposto*, in: *Fra le mura della modernità: le rappresentazioni del limite dal Cinquecento ad oggi*, a cura di L. Scalisi, C. H. Sanchez, Roma: Viella, 2019.

¹³ Giuseppe Giarrizzo, *Un comune rurale della Sicilia etnea (Biancavilla 1810-1860)*, Catania: Società di Storia Patria per la Sicilia orientale, 1963.



Figura 1.

It was thus imperative to commence not with the notion of establishing an “invented archive” but instead with the concept of the “source” that aspires to narrate itself through its affiliation with the individuals it represents as one of numerous “proofs of existence.” It was essential to start from the fundamental concept that people have genuinely lived in those spaces, and the source makes a cartographic representation of this.

Places, indeed, exist after humans name them, and only when a place is “indicated” does it enter History through those documents that serve, primarily, to identify the acting persons – the only ones capable of signifying spaces – to give them coordinates within that place which only they can understand.

From this perspective, it is not the cadastral documentation that opens up to history, but rather the people who, in reconstructing their life paths, return to history through the spatial coordinates of which the Cadaster has been an official tool.

Cadastral surveys, therefore, manage to synthesize human flows, and even though they are compiled, developed, and adopted as acts that served – and still serve – administrations (central or peripheral), they cannot exist without those “listed and enumerated people”.

Thanks to the Cadaster, we can pinpoint persons in a specific spot and elucidate their spaces and estate properties, which are the result of economic activities, necessitating recording in specific documents – such as notarial deeds –, yet this is insufficient for reconstructing their most significant relationships and genealogy. To reach this goal, historians must invariably engage with “Civil Registration” records, parish documentation (the Registers of Cura d’Animae), and the Riveli¹⁴ – in the case of Sicily, during the Modern age.

¹⁴ In the Kingdom of Sicily, between 1570 and 1748, general censuses were conducted for fiscal purposes, giving rise to the comprehensive documentary corpus of the «Riveli dei beni e delle anime». These censuses also served to determine the number of men fit for military service, aged between eighteen and sixty,

These different heritages are linked to each other's. Suppose it is true that cadasters were used from the eighteenth century. In that case, it is more accurate that thanks to these administrative documents, we can create a network among data extracted from the Civil Registration. All this information can let historians answer the question about the origin of a community and where every citizen lived.

Assuming this perspective, Riposto's Local Time Machine project aims to create a digital platform – a historiography instrument – which can link people to their families, pinpoint them in the cadastral map, and locate the origin of family trees.

In an increasingly interconnected world, where research is profoundly interdisciplinary, cadasters and civil registration records are now complemented by "atoms and genes"¹⁵. Although this insight had its initial theorization in the works of Cavalli-Sforza¹⁶ and Sorre¹⁷, it is with advances in genetic and genomic¹⁸ research that evidence from the Natural Sciences has been able to redefine Historiography and methodologies. Thus, the Braudelian "liquid continent"¹⁹ takes on additional meanings, not considering that concept only from a geographical and commercial point of view but as a dimension that interacts with humans and their biological structures and identity.

The Mediterranean predates humanity but becomes a "historical matter" when humans name it, imposing meaning upon it. History has meant places that provided the first utility to humans and received that deficit that necessarily modifies it from them. And every exchange between humans and the environment, between humans and the Mediterranean, has translated into a heritage which has testified to the History of Europe. Nevertheless, if archives and writings rep-

ready to serve the monarch militarily. Periodically, without any fixed schedule, when it became necessary to update the previous allocation of fiscal and military burden, a new decree was issued, ordering the Universitas and their inhabitants to make a sworn declaration on the number of souls and the extent of their possessions. However, this type of census, being carried out for fiscal reasons, focused more on the variation of the owned real estate by the inhabitants, than on demographic trends. Cfr. Francesco Ercole, *I riveli di beni e di anime del Regno di Sicilia*, Roma: Istituto Poligrafico dello Stato, 1931; Domenico Ligresti, *Dinamiche demografiche nella Sicilia moderna: 1505-1806*, Milano: FrancoAngeli, 2002.

¹⁵ Jonathan Shaw, *Who killed the men of England? The written record of history meets genomics, evolution, demography, and molecular archaeology*, «Harvard Magazine», (2009), p. 30-35/75.

¹⁶ Luigi Luca Cavalli-Sforza, *Population structure and human evolution*, «Proceedings of the Royal Society of London. Series B, Containing papers of a Biological character», 22 (1966), p. 362-379; Luigi Luca Cavalli-Sforza et al., *DNA Markers and Genetic Variation in the Human Species*, «Cold Spring Harbor Symposia on Quantitative Biology», 51 (1986), n. 0, p. 411-417; Luigi Luca Cavalli-Sforza, *Genes, peoples, and languages*, «Proceedings of the National Academy of Sciences of the United States of America», 94 (1997), n. 15, p. 7719-7724.

¹⁷ Maximilien J. Sorre, *Les fondements biologiques de la géographie humaine*, Paris: Colin, 1943.

¹⁸ Paolo Francalacci et al., *Estrazione e analisi del DNA da reperti museali: Atti dei seminari ANMS di Pavia*, Pavia, 2008, p. 24-30; Yuet Wai Kan – Andrée M. Dozy, *Polymorphism of DNA sequence adjacent to human beta-globin structural gene: relationship to sickle mutation*. «Proceedings of the National Academy of Sciences of the United States of America», 11 (1978), n. 75, p. 5631-5635; Christine Kenneally, *Storia invisibile della razza umana: come il DNA e la storia danno forma alla nostra identità e al nostro futuro*, Milano: Mondadori, 2016; M. Krings et al., *Neandertal DNA sequences and the Origin of Modern Humans*, «Celi», (1997), p. 19-30; Iñigo Olalde et al., *The Beaker Phenomenon and The Genomic Transformation Of Northwest Europe*, «Nature», (2018), n. 555, p. 160-196; Stefania Vai et al., *How a Paleogenomic Approach Can Provide Details on Bioarchaeological Reconstruction: A Case Study from the Globular Amphorae Culture*, «Genes», 6 (2021), n. 12, p. 910; James S. Wainscoat et al., *Evolutionary relationships of human populations from an analysis of nuclear DNA polymorphisms*, «Nature», 6053 (1986), n. 319, p. 6-12.

¹⁹ Fernand Braudel, *Il Mediterraneo, lo spazio, la storia, gli uomini, le tradizioni*, Milano: Bompiani, 1992; Fernand Braudel, *Scritti sulla storia*, Milano: Bompiani, 2003; Fernand Braudel, *Storia, misura del mondo*, Bologna: Il Mulino 2015.

resent the Past, the Future lies in the most extensive database that History has ever created: the genetic heritage.

It encompasses all the data and information capable of explaining human history. From this perspective, archives represent the culmination of human action, while genetic heritage is the paradigm that drives action, which exists as *a priori*. Thus, the possibility of creating a direct link between the two dimensions – the *a priori* archive (genomic heritage²⁰) and the *a posteriori* one (historical archives) – could provide the answers to stories and History, both locally and globally. Therefore, if over the centuries, we have never reconsidered the notion that written documentation is the sole proof of human action, nowadays, these “Big Data of History”²¹ need to connect also with genomic banks to describe aspects of Mediterranean communities, which have allowed that “continent” to assume the “mobility” that makes it a unique and identity-defining space.

During the research workflow, the question that was the leitmotiv which underlies the project was turned into the concept/answer “We are what They were”, which became the key to describing the structure of Riposto’s community in the 18th century through a methodology that seeks to engage primary sources (cadaster, civil registration, notarial, and administrative information) with those derived from genomic databases. We cannot disregard the genes that characterize our lives.

In examining a community within a clearly defined spatial framework, the methodological approach does not seek to align with the conventional tenets of micro-history research, particularly if the distinction between macro and micro-historical perspectives remains a prominent feature of contemporary historical inquiry. To date, Riposto represents the optimal setting for developing a project that has yet to be undertaken, namely, establishing a link between subjects from the past and those who are currently living. What we want to explain and analyze, thanks to the WAWTW project, is how Mediterranean communities were born, evolved, distributed in the territories throughout history, and eventually disappeared.

We have to point out that a biochemistry element links everyone to someone who, in the Past, moved from someplace in the world and decided to live in a different place. In the new location, their genome changed the community’s biological balance, and the latter’s genomic heritage, for its part, reconfigured one of the newcomers. To test the veracity of this assumption, it is essential to situate the research within a well-established community comprising a few individuals, thereby providing a context for the investigation.

The emergence of biological sciences and genomic banks has allowed historians to analyze specific historical events and phenomena with enhanced precision and detail. For instance, migration can now be approached from a fresh scientific angle. Investigating small populations – such as that of the city of Riposto – facilitates the exploration of migratory patterns, as it mitigates the challenges associated with genetic overexposure. Territories exist independently of human influence; instead, the human endeavour to forge connections leaves a genetic imprint, imparting unique characteristics to specific locations. Essentially, genomic research involves an

²⁰ The most important genomic banks are LocusLink, RefSeq, COGs, GeneCards, UniGene, EuGENES, Ensembl. These banks collect and annotate genomic data, accessible to researchers, with the aim of addressing the issues posed by different research fields. Among the most significant in Europe is the company DeCODE in Iceland, which has succeeded in sequencing the genome of all Icelanders.

²¹ Joris van Eijnatten — Toine Pieters — Jaap Verheul, *Big Data for Global History: The Transformative Promise of Digital Humanities*, «BMGN - Low Countries Historical Review», 128 (2013), n. 4, p. 55-77; Shawn Graham — Ian Milligan — Scott Weingart, *Exploring Big Historical Data. The Historian’s Macroscope*, London: Imperial College Press 2015; Frederic Kaplan — Isabella di Lenardo, *Big Data of the Past*, «Frontiers in Digital Humanities», 4 (2017), 12.

analysis of the landscape and its influence on the community. In the case of Riposto, demographic data indicates that the population had already been defined and well-established in the area by the Nineteenth century.

Once a relationship between people and the environment is established, it can also give rise to health crises, which in turn prompt political and administrative actions. To combat the spread of a pandemic, it is necessary to take a multifaceted approach that encompasses medical intervention and legislative measures designed to mitigate the underlying health issues. The combination of Genetics and Biology allows health historians and paleopathologists to describe the origin of a disease, its microbiological characteristics, and how its effect changed families' stories and the history of an entire community. To illustrate, we may consider the genetic illness of Queen Victoria of England, namely haemophilia.

On the other hand, thanks to DNA – and aDNA (Ancient DNA)²² – we can push the limit imposed by the typographic age back in time, aiming to describe the path of populations. We can link all of us to our ancestors in an even broader perspective.

In 2021, the feasibility of that interdisciplinary approach was demonstrated, thanks to the DNA test on a Riposto citizen. The test has permitted the scholars to go beyond the meanness of the archival sources²³ in order to describe the origin of the surname “Sorbello” and from which part of Europe this family left to arrive in the 15th century in Sicily.

4. Section and browsing: the visual experience

In January 2023, after some years of research – and still in continuous updating – the database started to take shape on the web. The website²⁴ was designed to allow users to map the cadastre and identify the real estate of the citizens of Riposto. Web users can browse the entire database of the cadastre section or the “Le strade e i luoghi” section, where all the real estate is organized by “roads”.

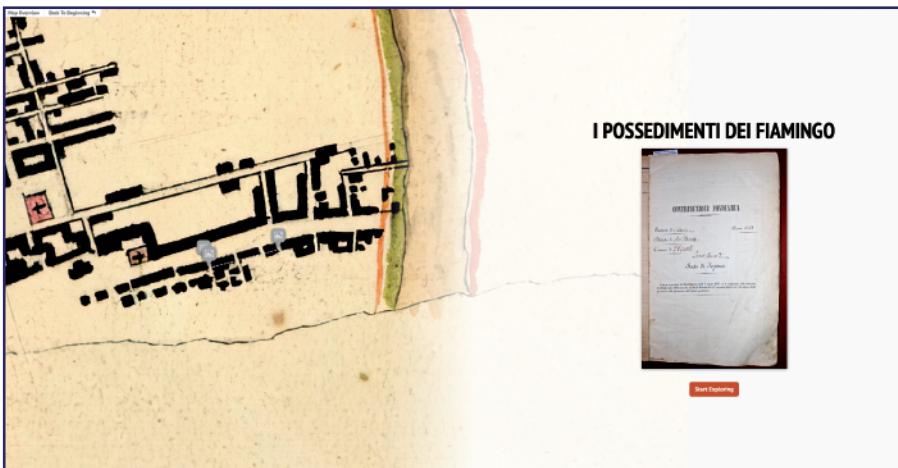


Figure 2.

²² David Caramelli — Martina Lari, *Il DNA antico: metodi di analisi e applicazioni*, Firenze: A. Pontecorboli, 2004; Russell Higuchi et al., *DNA sequences from the quagga, an extinct member of the horse family*, «Nature», 312 (1984), n. 5991, p. 15-21.

²³ Salvatore Spina — Giuseppe Sorbello, *Dagli archivi storici alle mappe genomiche. Il caso di Riposto*, «Aidainformazioni», (2021), n. 1-2, p. 173-194.

²⁴ <https://wawtwproject.altervista.org>.

The “I proprietari” section, instead, is organized by the “owner” (Fig. 2) to gather all information about the real estate belonging to the same person. Web users can browse the family tree (Fig. 3) and the genomic profile within the section.



Figure 3.

The structure of the entire website is based on the idea that by logging the internet, historians can visually describe an event, trying to overpass the typographic method. In our case, the website becomes a historiographic instrument that lets the cadastral map of Riposto “tell” us where Ripostesi comes from, how and when they started a family, and where they have moved over the years.

The website links ripostesi’s family trees and their genomic sample to the map. These links allows scholars to analyze data from various perspectives through a concrete multidisciplinary approach. To date, it is possible to browse the Cali, Fiamingo, and Sorbello family trees. Regarding the latter, it is possible to browse the genomic profile stored in the YFull Genomic repository²⁵. To guarantee web users browse an always up-to-date Chromosome-Y tree, it was decided to maintain the YTree within a website iFrame webpage. The reason that underlies the chosen solution is that by adding more samples in the YFull database, the terminal subclade location may change, determining a new position in the Chromosome-Y tree of the individual sample. The modifications to the genomic database tab, made possible by the iFrame, will be reflected on our project website immediately.

The genetic research conducted by scholars modifies the results of databases. With each insertion of the results of a genetic analysis by a scientist, the position structure of subclades is modified. The structure of the genomic database ensures the constant updating of data, guaranteeing that researchers who access it can read the results. This precludes external sites from accessing the database and locally reproducing the structure of subclade changes. Conversely, by situating the page within an iFrame, it is possible to ensure that visitors to our site are always presented with the most up-to-date information regarding the subclades.

²⁵ <https://www.yfull.com>.

The genomic section aims to transcend the limitations inherent to archival research. Integrating biological investigations enables a connection between official documents and genetic individuality, thus bridging the gap between “remains” and notarial evidence.

To illustrate: an archive document may provide insight into the specifics of a marriage, including data regarding the subjects involved and the dowries they brought into the relationship. However, biological evidence allows us to gain insight into how such a marriage union affected the genetic structure of the community and the genetic “errors” it entailed. This condition is particularly relevant in a historical period when incest was not prohibited, yet entailed genetic complications that had ramifications for the community and the collective health of all citizens. Indeed, genetic incompatibilities were a primary cause of familial and community-wide health issues, often precipitating the onset of diseases that posed a significant risk to the entire population.

The union of two consanguineous individuals – who share part of the genetic heritage – increases the risk of generating offspring affected by diseases of which the parents are carriers. The presence of a high number of sick individuals subsequently changes the health structure of a given geographical area, which becomes emblematic of specific diseases, such as, for example, Mediterranean anaemia (a disease typical of Western Europe)²⁶, which, although developed as a response to African malaria, marks the genome of European populations. Or in the case of India and the high rate of malformed subjects, which are born within closed communities (castes), where consanguinity is a characteristic element²⁷.

This principle, now paradigmatic in anthropological and archaeological research, has led to the exploration of integrating the visual narratives of community families with information derived from genetic investigations on living individuals, embracing the concept of viewing the community of the living as the genetic result of previous centuries – “We Are What They Were”!

Thus, the collective system of digital information on the portal anticipated creating a specific form to gather data from the DNA analysis of living subjects. Currently, the only case included in the portal concerns the genomics related to the surname “Sorbello” (Fig. 4), which, on the one hand, has allowed for “mapping” the subject’s haplogroup (and those of his ancestors) within a Euro-Mediterranean context, and on the other hand, has opened the project to the perspective of involving the entire community, aiming to intercept various biological data to define the dynamics of migration that led to the formation of the Riposto community.

Within the “Genomics” form, it is possible to view the subject’s position within a phylogenetic tree, identify his Y haplogroup and subclades – more recent subdivisions of a haplogroup based on more detailed and distinctive genetic markers –, find other individuals with similar Y sequences, and estimate the age of the haplogroup under investigation.

The webpage of the subclade, for example, R-Y133731 (of the surname “Sorbello”), describes the sequence of haplogroups and mutations that led to the formation of the subclade²⁸ in ques-

²⁶ In 1944, a correlation was identified between sickle cell anemia, also known as Mediterranean anemia, and protection from malaria infection. Subsequently, Michael Lanzer employed electron microscopy techniques in 1993 to compare healthy, normal red blood cells with normal red blood cells infected with *P. falciparum*, with the objective of identifying a red blood cell whose characteristic crescent shape gives rise to sickle cell anemia. This characteristic developed as a physiological defense mechanism of the human body to prevent infection by malaria, which is unable to attack sickle-shaped red blood cells. See: Michael Lanzer et al., *Transcriptional differences in polymorphic and conserved domains of a complete cloned P. falciparum chromosome*. «Nature», 6413 (1993), n. 361, p. 654-657.

²⁷ Siddhartha Mukherjee, *Il gene: il viaggio dell'uomo al centro della vita*, Milano: Mondadori, 2016.

²⁸ Each subclade is characterized by brief information accompanying it: the age of subclade formation and the age of the most recent common ancestor (TMRCA).

Dall'archivio al Web

Il Mappale dell'Archivio Mortillaro

Visualizza elementi

Nome, status e/o famiglia



Sorbello Giuseppe
[Albero genealogico](#) | [Possedimenti](#) | [Genomica](#) | [Aplogruppo](#)

Vista da 1 a 1 di 1 elementi (filtrati da 684 elementi totali)

Figure 4.

tion. Moreover, it is possible to obtain a more detailed class of information by clicking on the “info” link of the common ancestor²⁹ (MRCA). Within this section, one can find: 1) the name of the haplogroup and more details on its estimated age (top right); 2) the formula used to calculate the estimated age of the haplogroup, which consists of a rounded arithmetic mean of the age of each branch. In the case of the subclade R-Y133731, characterized by two branches referring to the analysis of the Y chromosome of two subjects (YF011861 and YF123889) whose results were uploaded on the YFull platform, the first subject’s branch has an estimated age of 501 years, while the second subject’s branch has an estimated age of 206 years. The arithmetic mean $(501+206)/2$ equals 353 years; 3) the TMRCA form allows consulting the list of branches³⁰ belonging to the haplogroup or subclade. SNP Form: includes all SNPs characterizing the subclade in question and the quality with which these were read during the analysis; 4) the SAMPLE form, which contains details related to the sequenced DNA³¹ samples; 5) the MAP

²⁹ In Genetic Genealogy, the TMRCA (Time to Most Recent Common Ancestor) serves as an approximate indication of the time at which the last ancestor, from whom all members of a given group descend, lived, and is measured in years before the present (ybp).

³⁰ BRANCH ID: This is the identifier for the DNA samples analyzed and uploaded onto the platform. NUMBERS OF SNPs: These are the total known and new Single Nucleotide Polymorphisms (SNPs) located between the subclade and the present. COVERAGE (BP): Indicates the depth at which the DNA subject to analysis is sequenced. FORMULA TO CORRECT SNPs NUMBER: This is the formula by which the number of SNPs is corrected, and whose data will then be used to estimate the age of the branch. FORMULA TO ESTIMATE AGE: This formula is used to estimate the age of the branch. The arithmetic mean of the ages of the branches, as mentioned, is indicative of the age of the haplogroup or subclade.

³¹ SAMPLE ID: This is the identifier for the DNA samples analyzed and uploaded to the platform. COUNTRY / LANGUAGE: Identifies the origin of the user who has undergone analysis of their Y chromosome. INFO: Generic information. REF: Indicates the version of the DNA assembly analyzed. For example, Hg19, an abbreviation for Human Genome 19, is a specific version of the assembly published in 2009. FILE: Specifies the format of the media file containing the genetic data. TESTING COMPANY: Indicates the company that processed the analysis. STATISTICS: Includes information on the analysis, such as the median depth of reading of individual SNPs (53X – 53 reads), the length of the DNA segment analyzed (19.5 Mbp - 19.5 million base pairs analyzed), and the depth at which the SNP is sequenced (151 BP). STATUS: Indicates whether the data analysis for upload to the YFull platform was successful.

form, where the geographical location of the samples is graphically highlighted. Scrolling down the form, it is possible to view the migration of the line from “Out of Africa” to the present by clicking on the link “Theoretical Computed Paths” (Fig. 5-6).

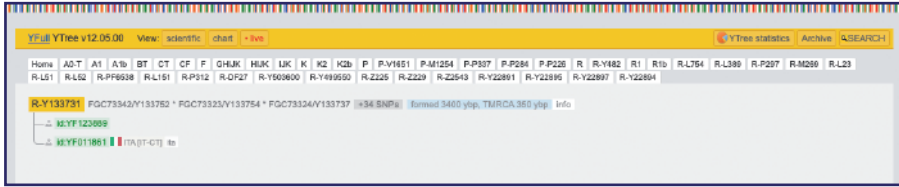


Figure 5.

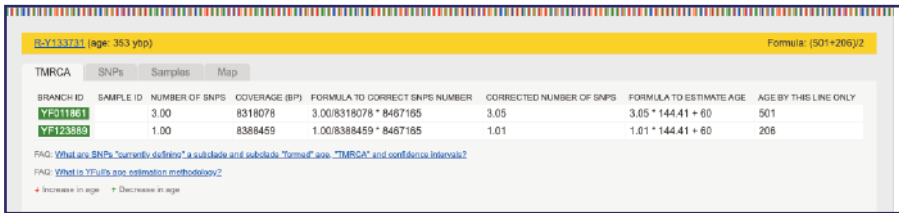


Figure 6.



Figure 7.

An examination of this information through a historical lens reveals the composition of a community, elucidating critical turning points and uncovering the underlying factors linked to significant historical occurrences.

Purely scientific data cannot fool an existing historiographical tool. While maintaining the specificity of the various research fields – the historian is not called to become a biologist – the portal wants to become the first example of a visual “narrative” that can cross different disciplinary areas.

In our case, to elucidate, the “Sorbello” subclade suggests that this genome-surname originated in the Middle East, crossed Europe, took root in the Iberian peninsula and from here moved to Sicily during the Spanish domain in the 16th century (Fig. 7).

Solely empirical data cannot sway a current historiographical instrument. While maintaining the distinctiveness of various academic domains – historians are not required to adopt the role of biologists – the platform aspires to serve as a pioneering instance of a visual narrative that bridges multiple disciplines.

To complete the entire “Ripostesi Chromosome-Y story”, it is necessary to place their genomic sample in the YTree. Consequently, getting a DNA sample from Riposto’s citizens who at least have the same surname as that recorded in the cadastre³² is indispensable. The project aims to link the living persons to the cadastre and the family trees built starting from the surname cited in the cadastral section of Riposto. Then, it is possible to link living persons to the genomic tree, tracing the migration phenomenon³³ that underlies the building of Riposto’s community.

In this instance, the archive is not participatory, except involving individuals who consent to undergo genetic analysis to connect them to their ancestors.

Moreover, in our case, the concept of “democratizing history” should not be interpreted according to the logic of enabling everyone to write and narrate the past but rather as a process aimed at bringing into the historical narrative those persons who have never been included in historiographical thought, as individuals who have not had the opportunity to leave a trace in “official acts”, except those that depict them as “records” for the management of political, administrative, and fiscal affairs.

Indeed, the digitization and online publication of documentation do not liberate them from the status of “registered person”. However, thanks to the interconnections among various documents and linking these data to genomic banks, they are reattributed a connection with the time in which they lived and with the territories that welcomed them, making them active agents of a network that necessarily must encompass them to sustain itself.

Thanks to the “StoryMapJS”³⁴ tool – an instrument developed by the Knight Lab (Northwestern University)³⁵, which lets users pinpoint information, images and different information on a digitalized map – it was possible to write a “visual” story of our cadastre map³⁶ (Fig. 8).

³² Viola Grugni et al., *Y-chromosome and Surname Analyses for Reconstructing Past Population Structures: The Sardinian Population as a Test Case*, «International Journal of Molecular Sciences», 20 (2019), n. 22, p. 5763.

³³ Joscha Gretzinger et al., *The Anglo-Saxon migration and the formation of the early English gene pool*, «Nature», 610 (2022), n. 7930, p. 112-119; Iosif Lazaridis et al., *A genetic probe into the ancient and medieval history of Southern Europe and West Asia*, «Science (New York, N.Y.)», 377 (2022), n. 6609, p. 940-951; I. Olalde et al., *The Beaker Phenomenon And The Genomic Transformation Of Northwest Europe*, cit.; Laurie J. Reitsema et al., *The diverse genetic origins of a Classical period Greek army*, «Proceedings of the National Academy of Sciences», 119 (2022), n. 41, p. e2205272119.

³⁴ <https://storymap.knightlab.com>.

³⁵ Miranda Mulligan, *What is Knight Lab? Technology, editorial content and events*, *Northwestern University Knight Lab*, April 2013, <<https://knightlab.northwestern.edu/2013/04/24/what-is-knightlab-technology-editorial-content-and-events/>>.

³⁶ Daniela Bleichmar — Vanessa Schwartz, *Visual History. The Past in Pictures*, «Representations», 145 (2019), n. 1, p. 1-31; Adam J. Bradley et al., *Visualization and the Digital Humanities*, «IEEE Computer Graphics and Applications», 38 (2018), n. 6, p. 26-38; John Theibault, *Visualizations and Historical Arguments*, in: *Writing History in the Digital Age*, ed. by J. Dougherty, K. Nawrotzki, Ann Arbor: Michigan university press, 2013, p. 173-185, <<https://doi.org/10.2307/j.ctv65sx57.19>>; Tobias Ebbrecht-Hartmann et al., *Digital visual history: historiographic curation using digital technologies*, «Rethinking History», 27 (2023), n. 2, p. 159-186.

In our case, we use the digital image of the cadastral map preserved at the “Centro regionale per l’inventario, la catalogazione e la documentazione grafica, fotografica, aerofotogrammetrica, audiovisiva”³⁷.

Riposto’s cadastral map is part of the Vincenzo Mortillaro Archive, which collects all the graphical projects drawn by Mortillaro from 1850 when he was entrusted with the task of rectifying the cadastre and completing the work of describing the urban layout of Sicilian cities. Moreover, he has received the assignment to complete the description with adequate cartographic support. Ten years later, after the unification of Italy, the process of studying and compiling this essential administrative tool ceased.

Nowadays, these maps represent the most essential historical cartographic source to describe Sicily’s cities, villages, and boroughs before the Risorgimento.



Figure 8.



Figure 9.

³⁷ Centro regionale per l’inventario, la catalogazione e la documentazione grafica, fotografica, aerofotogrammetrica, audiovisiva, *Catasto Borbonico Archivio Mortillaro di Villarena (1837-1853)*, Catania, *Mappa del territorio di Giarre e Riposto (/Milo/Sant’Alfio/Santa Venerina/Zafferana Etnea)*, 121, <<https://www.cricd.it/pages.php?idpagina=303>>.

Specific sections of the map were linked to other cartographic sources to enrich the information about those places. For instance, thanks to some cartographic map preserved at the State Archive of Catania, it was possible to visually describe the area surrounding the Church of the Sacra Lettera (Fig. 9), to name every road (Fig. 10), and locate the zone of the various “scari” (landing points) of the natural harbour (Fig. 11).



Figure 10.

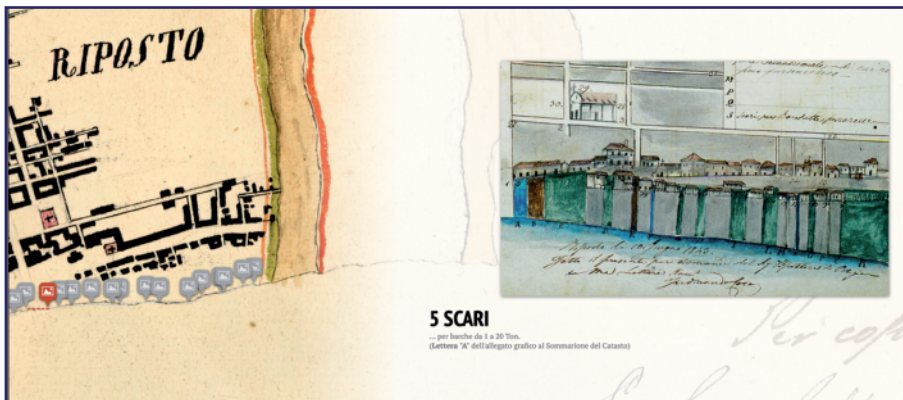


Figure 11.

5. Looking beyond the perspectives...

The project has focused on integrating genealogies into the digitized cadastral map, beginning with reconstructing the genealogical story of the most significant families on a patrilineal (or surname-based) basis. This methodological choice has enabled, on the one hand, the precise correlation between archival source data and individuals and, on the other hand, the preservation of person and family identity within the context of a complex community, such as those that have shaped the social and anthropological characteristics of Europe.

Surname-based genealogical lines emerge as an effective mode of representation and preservation of individual identity over time, in contrast to the fan-shaped depiction of the traditional genealogical tree, which does not ensure clarity of personal identity, primarily as one traces further back in time. Furthermore, this approach proves particularly useful in small-sized villages like Riposto, where the “founder effect” can outline the genetic makeup of an entire community.

The assertion that a few families are at the origin of a vast number of descendants – shaping the village’s current population – opens up an exciting and complex historical scenario. The challenge highlighted is to trace the timeline of a group of families with a common ancestry while maintaining the integrity of each identity. Critical reflection on delineating this intricate genealogical network leads to the notion that organization by surnames is the most suitable approach for preserving and navigating the shared history of these families. Thus, the surname approach has become essential for tracing family connections over the centuries.

Research on archival documents (e.g., parish registers, civil status registers), although capable of providing a detailed historical framework dating back to the 14th century, inevitably encounters limitations due to the absence of even earlier documents. This gap, as suggested by Cavalli-Sforza³⁸ and Sorre³⁹ – as well as a scientific community that has demonstrated the possibilities of genetic analysis⁴⁰ – can be effectively bridged by genetic analysis, which serves as an indispensable complementary tool capable of extending the temporal history of surname lines. This methodology surpasses the barriers of documentary gaps, opening new perspectives on forming and evolving identities, with Riposto serving as a case study.

Studying an individual’s Y chromosome is a powerful key to unveiling the history of patrilineal ancestry. The Y chromosome, inherited from father to son, constitutes a genetic path following the male line of descent. This aspect is closely related to the inheritance of surnames, which, typically, are passed down along the same patrilineal line. Therefore, Y chromosome analysis offers a direct means to investigate and understand the history of familial lines sharing a common surname.

By decoding SNPs (Single Nucleotide Polymorphisms)⁴¹ via Y chromosome analysis, tracing a genetic narrative that extends well beyond the temporal scope of historical documents is possible. Functional genetic markers (SNPs) allow for reconstructing migrations and ancestral connections in ways that traditional documentation might not make accessible. The biological history, thus revealed by integrating with the documentary history, completes and enriches the overall picture of each patrilineal line.

Further progression in a subsequent phase of the project will involve the analysis of DNA from bone remains in the crypt of the Church of Madonna della Sacra Lettera (Fig. 12), which will allow – in a highly experimental framework – to connect living subjects to the deceased ancestor whose remains have rested, since the 18th century – the time when the church was founded and built⁴² – in the church’s crypt.

³⁸ Luigi Luca Cavalli-Sforza, *Genes, peoples, and languages*, cit.

³⁹ Maximilien-Joseph Sorre, *Les fondements biologiques de la géographie humaine*, cit.

⁴⁰ Anne M. Bowcock et al., *Study of 47 DNA markers in five populations from four continents*, «Gene Geography : A Computerized Bulletin on Human Gene Frequencies», 1 (1987), n. 1, p. 47-64; Christine Kenneally, *Storia invisibile della razza umana: come il DNA e la storia danno forma alla nostra identità e al nostro futuro*. cit.; M. Krings et al., *Neandertal DNA sequences and the Origin of Modern Humans*. cit.; James S. Wainscoat et al., *Evolutionary relationships of human populations from an analysis of nuclear DNA polymorphisms*. cit.

⁴¹ David Botstein et al., *Construction of a genetic linkage map in man using restriction fragment length polymorphisms*, «American Journal of Human Genetics», 32 (1980), n. 3, p. 314-331; Y. W. Kan, A. M. Dozy, *Polymorphism of DNA sequence adjacent to human beta-globin structural gene: relationship to sickle mutation*, cit.; J. S. Wainscoat et al., *Evolutionary relationships of human populations from an analysis of nuclear DNA polymorphisms*, cit.

⁴² Salvatore Spina, *Riposto vecchio e Riposto nuovo negli atti notarili di Giovanni Calì e Geronimo Pasini: studi per la Storia di Riposto*, cit.



Figure 12.

In 1712, Giovanni Calì, a native of Acireale, founded the Church of the Madonna della Sacra Lettera. The construction was completed in 1761, and from that moment on, this sacred site became the final resting place for the “settlers” who had passed away. Although the village fell under the administration of Mascali, the maritime community was already present and established in those spaces, indicating that commercial activities were shifting from the centre of the County towards the “periphery” represented by the natural harbour.

After certain political events that dissolved the County the following century, Riposto gained autonomy. This factor was decisive for the fate of the burial site, which had to be closed in compliance with the sanitary regulations of funeral policing. These regulations, at that time, defined a new political, cultural, and legal approach to death and burials.

With the construction of a new cemetery, the municipal administration was indeed forced to seal the crypt, which became inaccessible. Over the last fifty years, this site has attracted the attention of several renowned national and international scholars who felt the need to document the history of the City of Riposto, a territory of significant political and commercial importance for the entire hinterland. Each written analysis leads back to the little church, the oldest place of worship in the maritime village.

Thus, archaeologists, such as Giuseppe Tropea, initiated several reconnaissance actions, as did the historian and academician of the Lincei, Giuseppe Giarrizzo. From a historical-cultural perspective, there is also a purely urban one: the church has significant structural issues that require maintenance work. Hence, in the 1970s, efforts were made to address the problem of water infiltration due to the proximity of the sea. In 1979, during the interventions, suspicions arose that beneath the church floor might lie traces significant for studying its structure and origins.

A portion of the concrete pavement was removed, revealing a layer of marine gravel mixed with sand, approximately 50 cm high, likely formed due to a sudden and violent storm surge. Further excavation uncovered a paved floor with square terracotta tiles. Beyond this, a significant quantity of human bones was discovered – a logical pendant to the existence of the crypt, whose chronology was yet to be determined.

The intervention of the Superintendency ensured that the bones were enclosed, all together, in spaces protected by glass, allowing access for potential visitors and scholars.

Nowadays, the project *We Are What They Were* looks at the possibility of conducting a genetic study on multiple levels to restore historical, cultural, and methodological value to a site with unique characteristics to meet the constant demand for the creation of digital products that can integrate the “analogue” historical heritage into the internet.

The analysis of DNA from over 400 skulls would indeed allow a scientific definition of the Riposto’s community structure, dietary lifestyle, health, and epidemiological framework, with the perspective of creating a complex of interconnected data (Big Data) that could explain the methodology capable of elucidating the essence of humans in their unique and unrepeatable nature.

Thanks to the application of specific computer tools, algorithms, and Artificial Intelligence, we can “understand life” and give a face to our ancestors. Human “remains” are all that time preserves of individuals, populations, or species of the Past. Nowadays, these “identities” have become central concepts of scientific research in every field, representing a “question” that is difficult to address, not only due to interpretive problems but even more so to the ethical dimension that emerges predominately here. Hence, human remains from paleontological or archaeological excavations and those in museum collections have a peculiar status. They represent a unique singularity, more than rare: they are – together – the “subject” that was alive, but also the “object,” as the material remains, of study by Anthropology. They thus find themselves in a dramatic intermediate condition between what remains of existence (with all the implications of this status) and, at the same time, what represents an irreplaceable scientific interest, a proper biological and cultural archive of humans from the past, which can (and must) be recorded, known, and interpreted. They are unique sources of information about human evolution, phylogeny, and population ecology and allow for the description of migratory dynamics. Therefore, human remains are essential for reconstructing – for example – lifestyle and quality of life⁴³ in

⁴³ The genetic analysis of skulls may offer an intriguing perspective on the population history of Riposto, enabling the reconstruction of past familial connections and the identification of paternal haplogroups – that is, genetic markers transmitted from father to son, which allow for the tracing of individuals’ ancestral origins over time – present in the samples. The genetic data obtained can be compared with existing reference databases to determine the specific paternal haplogroup of each sample. Once the paternal haplogroups are identified, it will be possible to trace familial connections within the samples themselves. Through comparative analysis of genetic results, it is indeed feasible to identify kinship ties among the different individuals buried in the Church of the Letter. For instance, two samples sharing the same paternal haplogroup may suggest a direct patrilineal connection between them. This type of information can assist in reconstructing genealogical trees and in gaining a deeper understanding of the genetic heritage of the Riposto population over the centuries. Furthermore, the genetic results of the samples could be compared with those of the living population of Riposto. This comparison might reveal possible connections between current families and ancient samples. For example, if a living individual has a paternal haplogroup matching that of a skull buried in the Church of the Letter, it could suggest a direct familial connection between the individual and the one buried within the church. This kind of genetic comparison can provide a tangible link between the past and present, allowing the inhabitants of Riposto to discover their ancestral roots and to better understand the migratory history of their community. Through the DNA

the past (e.g., dietary behaviours⁴⁴, funeral practices, medical and therapeutic practices⁴⁵, activities performed in life) as well as paleoepidemiological aspects in the study of diseases, becoming all the more relevant as other types of documentation become scarcer.

Therefore, it is crucial for humans who want to understand themselves to recover these remains with care. But beyond the limits of consciousness, the research frontier has not yet reached maturity, and the objectives to meet the need to search for these signs of past life have been acquired relatively recently. Despite skeletal remains being frequently on the horizon of archaeological excavation (rarer in paleontological ones), the understanding of the need for accurate recovery and study is still not fully assimilated – this means that the risk of losing information of significant relevance for the definition of a historical-anthropological testimony is still relatively high. Ancient human remains have long been overlooked in specific scientific environments, as they were not deemed worthy of the same attention as pottery or industrial finds. Still, they were also considered a problem and, as such, eliminated, hidden, or reburied. In this last case, a sense of pietas and/or almost guilt prevailed for the act performed, among the complex and opposing feelings that manifest conspicuously in the act of violating sanctity when searching for testimonies to study it. Due to this dualism of subject/object, symbol, and materiality, skeletal remains face additional challenges in museum display or academic teaching.

It is clear, therefore, that a profound reflection is necessary. Still, above all, the frontier of research must be opened towards the interdisciplinarity and multidisciplinary capability of enriching the knowledge of Man and the World – including the digital one. For this reason, a scientific awareness that focuses scholars' attention on one of the most substantial osuaries in Sicily, the crypt of the Church of the Madonna della Sacra Lettera in Riposto, is necessary.

analysis of the samples, another interesting perspective might emerge: the identification of specific genetic mutations that have manifested within the Riposto population over the centuries. These mutations could be of clinical nature, referring to specific medical conditions or genetic predispositions that have been passed down through generations. Identifying such mutations could offer a better understanding of hereditary diseases that may still be present in the current population. For instance, the presence of a genetic mutation associated with a certain hereditary disease could be discovered.

⁴⁴ To reconstruct the dietary regime of the community, it is possible to proceed with radiocarbon dating and analysis of the stable isotope contents of carbon and nitrogen using the AMS system of CEDAD, based on a 3 MV (million volts) particle accelerator, taking care of sample treatment to remove any possible contamination, extraction of bone collagen, and determination of the radiocarbon age with the accelerator. The measurement of ¹³C and ¹⁵N values will allow for insights into ancient dietary regimes by identifying, for example, the plant, animal, and marine components in the diet.

⁴⁵ Skeletal remains are the primary source of data on the complex interaction between pathogens and humans. Mature research has already highlighted how genetic analysis can reveal the presence of diseases affecting bones, and the recently developed diagnostic procedures and methods for extracting these data provide new options for answering the most significant questions about the disease panorama and the role diseases have played in the evolutionary journey that led to current human societies. The analysis of the skeletal remains from Riposto will, therefore, allow us to understand the health status of the community and which microbes and/or pandemic and epidemic event have altered the social structure as well as that of individual families. These aspects, subsequently, will enable us to build a database that can serve as a reference point for the comprehensive study of the relationship between humans, bacteria, and viruses, facilitating the identification of health policies capable of preventing and overcoming other epidemic dangers in the future, and specifically, of targeted treatments for health protection.

Il Mediterraneo è una dimensione-concetto – definito da Braudel “continente liquido” –, che origina e si definisce nel ruolo delle genti, delle culture e delle economie che si sono susseguite nei suoi tempi. Oggi, attraverso un approccio interdisciplinare, anche la ricerca genetica riesce a ridefinire questo “continente”, grazie al venire in essere di quel ponte dialettico tra la Storia e le Scienze biologiche. Su questo assunto, trova ragione il progetto We Are What They Were, che guarda alla ricostruzione storica della comunità ripostese, tra Settecento e Ottocento, attraverso un lavoro di interconnessione tra fonti primarie e dati genomici, i cui risultati confluiscono nella progettazione di un portale web, visto come strumento storiografico. In questo studio, l’approccio genealogico e l’analisi genetica emergono quali strumenti strategici per la descrizione della comunità, consentendo un workflow storico-metodologico focalizzato sull’analisi del cromosoma Y di un vivente, che, completando la storia dell’ascendenza patrilineare del cognome “Sorbello”, partendo dal borgo ripostese, ha consentito di gettare le basi per una metodologia in grado di interconnettere dati e informazioni storiche, allo scopo di spiegare gli assetti delle comunità, la cui esatta configurazione è determinante per la descrizione dell’Europa e del Mediterraneo in età moderna.

REFERENCES

- Jeannette A. Bastian. *Owning Memory: How a Caribbean Community Lost Its Archives and Found Its History*. Westport, (Conn): Libraries Unlimited, 2003.
- Daniela Bleichmar — Vanessa Schwartz. *Visual History. The Past in Pictures*. «Representations», 145 (2019), n. 1, p. 1-31.
- David Botstein et al. *Construction of a genetic linkage map in man using restriction fragment length polymorphisms*. «American Journal of Human Genetics», 32 (1980), n. 3, p. 314-331.
- Anne M. Bowcock et al. *Study of 47 DNA markers in five populations from four continents*. «Gene Geography: A Computerized Bulletin on Human Gene Frequencies», 1, (1987), n. 1, p. 47-64.
- Adam J. Bradley et al. *Visualization and the Digital Humanities*. «IEEE Computer Graphics and Applications», 38 (2018), n. 6, p. 26-38.
- Fernand Braudel. *Il Mediterraneo, lo spazio, la storia, gli uomini, le tradizioni*. Milano: Bompiani, 2017.
- Fernand Braudel. *Scritti sulla storia*. Milano: Bompiani, 2003.
- Fernand Braudel. *Storia, misura del mondo*. Bologna: Il Mulino 2015.
- David Caramelli — Martina Lari. *Il DNA antico: metodi di analisi e applicazioni*. Firenze: A. Pontecorvoli, 2004.
- Luigi Luca Cavalli-Sforza et al. *DNA Markers and Genetic Variation in the Human Species*. «Cold Spring Harbor Symposia on Quantitative Biology», 51 (1986), n. 0, p. 411-417.
- Luigi Luca Cavalli-Sforza. *Genes, peoples, and languages*. «Proceedings of the National Academy of Sciences of the United States of America», 94 (1997), n. 15, p. 7719-7724.
- Luigi Luca Cavalli-Sforza. *Population structure and human evolution*. «Proceedings of the Royal Society of London. Series B, Containing papers of a Biological character», 22 (1966), p. 362-379.
- Tobias Ebbrecht-Hartmann et al. *Digital visual history: historiographic curation using digital technologies*, «Rethinking History», 27 (2023), n. 2, p. 159-186.
- Joris van Eijnatten — Toine Pieters — Jaap Verheul. *Big Data for Global History: The Transformative Promise of Digital Humanities*. «BMGN - Low Countries Historical Review», 128 (2013), n. 4, p. 55-77.

- Francesco Ercole. *I riveli di beni e di anime del Regno di Sicilia*. Roma: Istituto Poligrafico dello Stato, 1931.
- Paolo Francalacci — Giovanna Melas — Domenica A. Obinu. *Estrazione e analisi del DNA da reperti museali*. «Museologia scientifica memorie» (2008), n. 3, p. 24-30.
- Sebastiano Fresta. *Una comunità agricola nelle terre della Contea di Mascali (1681-1823)*. Catania: Arti Grafiche, 1969.
- Giuseppe Giarrizzo. *Un comune rurale della Sicilia etnea (Biancavilla 1810-1860)*. Catania: Società di Storia Patria per la Sicilia orientale, 1963.
- Shawn Graham — Ian Milligan — Scott Weingart. *Exploring Big Historical Data. The Historian's Macroscope*. London: Imperial College Press 2015.
- Joscha Gretzinger et al. *The Anglo-Saxon migration and the formation of the early English gene pool*. «Nature», 610 (2022), n. 7930, p. 112-119.
- Viola Grugni et al. *Y-chromosome and Surname Analyses for Reconstructing Past Population Structures: The Sardinian Population as a Test Case*. «International Journal of Molecular Sciences», 20 (2019), n. 22, p. 5763.
- Russell Higuchi et al. *DNA sequences from the quagga, an extinct member of the horse family*. «Nature», 312 (1984), n. 5991, p. 15-21.
- Enrico Iachello. *Il vino e il mare: "Trafficcanti" siciliani tra '700 et '800 nella Contea di Mascali*. Catania: Maimone, 1997.
- Enrico Iachello — Alfio Signorelli. *Trafficcanti e produttori in un'area vinicola: la Contea di Mascali tra '700 e '800*. In: *Il Mezzogiorno preunitario. Economia, società e istituzioni*, a cura di A. Massafra. Bari: Dedalo 1988.
- Yuet Wai Kan — Andrée M. Dozy. *Polymorphism of DNA sequence adjacent to human beta-globin structural gene: relationship to sickle mutation*. «Proceedings of the National Academy of Sciences of the United States of America», 75 (1998), n. 11, p. 5631-5635.
- Frederic Kaplan — Isabella di Lenardo. *Big Data of the Past*. «Frontiers in Digital Humanities», 4 (2017), 12.
- Christine Kenneally. *Storia invisibile della razza umana: come il DNA e la storia danno forma alla nostra identità e al nostro futuro*. Milano: Mondadori, 2016.

- Matthias Krings et al. *Neandertal DNA sequences and the Origin of Modern Humans*. «Cell», 90 (1997), n. 11, p. 19-30.
- Iosif Lazaridis et al. *A genetic probe into the ancient and medieval history of Southern Europe and West Asia*. «Science (New York, N.Y.)», 377 (2022), n. 6609, p. 940-951.
- Michael Lanzer — Derik de Bruin — Jeffrey V. Ravetch. *Transcriptional differences in polymorphic and conserved domains of a complete cloned P. falciparum chromosome*. «Nature», 6413 (1993), n. 361, p. 654-657.
- Domenico Ligresti. *Dinamiche demografiche nella Sicilia moderna: 1505-1806*. Milano: FrancoAngeli, 2002.
- Siddhartha Mukherjee. *Il gene: il viaggio dell'uomo al centro della vita*. Milano: Mondadori, 2016
- Miranda Mulligan. *What is Knight Lab? Technology, editorial content and events, Northwestern University Knight Lab*. April 2013.
<<https://knightlab.northwestern.edu/2013/04/24/what-is-knight-lab-technology-editorial-content-and-events/>>.
- Iñigo Olalde et al. *The Beaker Phenomenon And The Genomic Transformation Of Northwest Europe*. «Nature», 555 (2018), p. 543.
- Laurie J. Reitsema et al. *The diverse genetic origins of a Classical period Greek army*. «Proceedings of the National Academy of Sciences», 119 (2022), n. 41, p. e2205272119.
- Jonathan Shaw. *Who killed the men of England? The written record of history meets genomics, evolution, demography, and molecular archaeology*. «Harvard Magazine», (2009), p. 30-35/75.
- Maximilien J. Sorre. *Les fondements biologiques de la géographie humaine*. Paris: Colin 1943.
- Salvatore Spina. *Digitality as a «longue durée» historical phenomenon*. «Umanistica Digitale», (2024), n. 18, p. 1-25. <<https://doi.org/10.6092/issn.2532-8816/19420>>.
- Salvatore Spina. *Homo-Loggatus. The anthropological condition of historians in the digital world*. «Journal of Mathematical Techniques and Computational Mathematics», 2 (2023), n. 10, p. 431-437.
- Salvatore Spina. *Porti di frontiera: il caso di Riposto*. In: *Fra le mura della modernità: le rappresentazioni del limite dal Cinquecento ad oggi*, a cura di L. Scalisi, C. H. Sanchez. Roma: Viella, 2019.

- Salvatore Spina. *Il porto di Riposto. Profili economici e politici di un progetto difficile*. «Nuova economia e Storia», 24 (2018), n. 3-4, p. 45-82.
- Salvatore Spina. *Riposto: territorio, infrastrutture, identità urbana, 1841-1920*. Algra, Viagrande 2015.
- Salvatore Spina. *Riposto vecchio e Riposto nuovo negli atti notarili di Giovanni Calì e Geronimo Pasini: studi per la storia di Riposto*. Acireale-Roma: Bonanno Editore, 2011.
- Salvatore Spina — Giuseppe Sorbello. *Dagli archivi storici alle mappe genomiche: il caso di Riposto*. «Aidainformazioni», (2021), n. 1-2, p. 173-194.
- John Theibault. *Visualizations and Historical Arguments*. In: *Writing History in the Digital Age*, ed. by J. Dougherty, K. Nawrotzki. Ann Arbor: Michigan university press, 2013, p. 173-185, <<https://doi.org/10.2307/j.ctv65sx57.19>>.
- Stefania Vai et al. *How a Paleogenomic Approach Can Provide Details on Bioarchaeological Reconstruction: A Case Study from the Globular Amphorae Culture*. «Genes», 12 (2021), n. 6, p. 910.
- James S. Wainscoat et al. *Evolutionary relationships of human populations from an analysis of nuclear DNA polymorphisms*. «Nature», 319 (1986), n. 6053, p. 6-12.