

Primary Sources:

"1990: Launch of the Human Genome Project." Genome.gov. Accessed 30 Aug. 2019.

This source talks about why the Human Genome Project was started. It begins in 1990 officially and was funded and gained the attention of organizations looking to help mutations caused by radiation and for the sake of advancing medicine. The source gives many names of organizations involved with the start of the project like the National Institutes of Health and U.S. Department of Energy. The source is helpful because it gives a breakdown of what happened on specific years leading to the making of the finalized invention. The information we can use off of this source is the organizations involved because the reason behind the organizations wanting to support this experiment can give insight on how the project broke barriers. Also, the source explains what the project is supposed to be like in five years from its start. That can be talked about to see if it actually lived up to expectations.

"Breaking the Code." 1990-1999, edited by Cynthia Rose, Detroit, Gale, 2004, pp. 477-81. Gale In Context: U.S. History. Accessed 30 Aug. 2019.

This source is about breaking down what the Human Genome Project is and what it was used for. First, it talks about what makes up a human being (their DNA). Next, the text introduces the interest of the Department of Energy and how genes may have mutated from the bombs that were dropped in Hiroshima and Nagasaki, Japan. After revealing the interest, the article talks about the significance of understanding the human DNA. It can be used to find cures or understand the patterns of some diseases. Because of this, the article then addresses the concern of the people about ethical and legal issues, such as "selecting" the DNA without diseases or disorders for a child. This resource is a radio broadcast that has been turned into an article. It has been labeled as a primary source due to the excerpt from "Breaking the Code" in the article and because it was written by the National Human Genome Research Institute. This resource is credible because it was written/spoken by the National Human Genome Research Institute themselves. It was written in 1999, when the project was going on. This resource will provide background information for the Human Genome Project and information about how it may help the development of science and medicine. This source will not help or hurt our viewpoint because it primarily serves as background information. It will be useful in the final project because it provides an overview of what the topic of the project is about.

"Francis Collins." Scientists: Their Lives and Works, Detroit, UXL, 2006. Gale In Context: Science. Accessed 16 Sept. 2019.

This source is about Francis Collins and his contributions to the human genome project as the leader. It begins by describing how he felt about science. Then, the article explains how Collins got into the science field and his interests. After this, the article lists some of his successes and then goes on to talk about his involvement in the HGP. This resource is from a

book and is a primary source. It was published in 2006 and was published by Gale, so it is credible. This resource will provide us with some insight into the people who were working on the human genome project. Not only that, but it also helps our viewpoint by listing some of the things that the Human Genome Project has helped, such as other medical developments. Because of this, this resource will be useful in our final project and what we plan on achieving.

“Human Genome Project Produces Many Benefits.” *Genome.gov*, 11 Nov. 2011, Accessed 27 Oct. 2019.

This source is a primary source as it is from a national database that archives information about the Human Genome Project. In this article, the benefits of the Human Genome Project are discussed. It gives an overview of what is expected to change in medical knowledge and how much is expected to be spent on these new practices. The source is useful because it provides information on some areas that the project has helped grow or expected to help grow. It also provides information on a case that exemplifies how the HGP has already been helpful and led to the discovery of rare genetic mutations. It represents how the project was a breakthrough because it describes how it has been able to be used to detect a rare mutation and how it is expanding different medical fields.

Venter, John Craig. "The Sequence of the Human Genome." *Medicine, Health, and Bioethics: Essential Primary Sources*, edited by K. Lee Lerner and Brenda Wilmoth Lerner, Detroit, Gale, 2006, pp. 61-65. *Gale In Context: U.S. History*. Accessed 30 Aug. 2019.

The source introduces author John Craig Venter as an individual that contributed to the Human Genome Project. He was a researcher at the National Institutes of Health and also co-founded The Institute for Genomic Research also known as TIGR. He and his group of scientists had actually sequenced the first bacterial genome and used something called the shotgun method, a method that he would continue to use in his future discoveries about genomes. The actual primary source from Venter is about when the HGP started and challenges that scientists faced while working on the project. This source is a primary source and serves to show that scientists and researchers definitely broke barriers in how the world of science viewed the human genome. It's also an informational text because it does provide information of a person, who is considered a primary source while providing the primary sources itself. This would help explain how individuals like Venter went through hardships during the project and how they were able to overcome those hardships to explain how the human genome is today.

Volkow, Nora D. "Map of Human Genome Opens New Opportunities for Drug Abuse Research." *National Institute on Drug Abuse Pamphlets*, vol. 20, National Institute on Drug Abuse, 2006, p. 3. 4 vols. *Gale In Context: High School*. Accessed 30 Aug. 2019.

The resource is about how the complete discovery of the human genome has contributed to modern-day medical research. The information about the genome has cracked questions about

how to deal with drug abuse. The National Institute on Drug Abuse (NIDA) is constantly looking for ways to treat drug addiction through exploring the field of genomics, where the information about the human genome would come into play. NIDA has already conducted research and has made some discoveries as to what they'll be doing in hopes of treating addictions such as nicotine addiction. NIDA is also making use of modern technology and advanced technology as innovations continue to evolve. This source is a primary source from the National Institute on Drug Abuse Pamphlets by Nora D. Volkow. It is a credible source because it talks about how the Human Genome Project has opened doors for other medical interventions and innovations. This goes to show that not only was the Human Genome Project a breakthrough within the field of science, it was also the starting point for future medical advances.

Primary Image Sources:

Valentine, Rebecca. "Genome Scientists (left to Right) Eric Lander, Robert Waterston, James Watson, and Francis Collins..." 2000-2009, edited by Lawrence W. Baker, Detroit, Gale, 2013. Gale In Context: High School. Accessed 5 Sept. 2019.

This source is a primary source because it is a photograph of the genome scientist who started the human genome project. It shows the scientists celebrating the announcement of the sequencing of the human genome.

Secondary Sources:

"About the Human Genome Project." Human Genome Project Information Archive. Accessed 30 Aug. 2019

The source is about the purpose, goals, and the steps taken to complete the Human Genome Project. It was created and started in 1990 and was completely finished by 2003. The Human Genome Project was only expected to last 15 years, but the time period was reduced due to the advancements in technology, being completed after 13 years. The total number of genes has changed over time as newer discoveries were made, but it's stayed at about 20,500 genes since 2003. The source includes an outline of how the number has changed throughout the years as well as the reasoning behind it. It outlines the things that were focused on as the years went by throughout the entire duration of the project and provides financial data that was involved and includes organizations and individuals that took part in the project.

The resource is a secondary source and is an informational archive about the Human Genome Project from the Human Genome Project Information Archive and includes archives about the works from the project. It is a credible source because its information was derived from institutions such as the U.S. Department of Energy Office of Science and the Office of Biological and Environmental Research. In addition, the information is up to date as up-to-date as it can be since it was last modified by the creator on March 26th of 2019. This resource will help us in providing plentiful background information about the topic because we have to be able to be knowledgeable about the topic before discussing anything else.

Cobb, Bryan. "Human Genome Project." The Gale Encyclopedia of Science, edited by K. Lee Lerner and Brenda Wilmoth Lerner, 5th ed., Farmington Hills, Gale, 2014. Gale In Context: Science. Accessed 30 Aug. 2019.

This resource talks about the goals of the Human Genome Project as well as what it actually is. Not only that, but this resource includes a timeline of what was happening and what was being discovered throughout the entire project. The timeline starts in the first decade (beginning in 1983) and ends in 2003 when the project was completed. Following the timeline can give insight into what was being discovered and what that actually means for the future of medicine and science. This is how this article shows that the Human Genome Project was breaking barriers, since the information it revealed led to the development of other medical innovations. The most valuable part of this resource would be the timeline since other sources we have can fulfill the job of the background information. This resource is considered a "topic overview," but it comes from a book and is a secondary source. This article was written by Bryan Cobbs and was edited by K. Lee Lerner and Brenda Wilmoth Lerner. The article is considered newer since it was published in late August of 2017. This can make the source more credible since there has been a time to reflect on what the project has done and how it has succeeded. This resource will provide us with a timeline of the Human Genome Project. The article can support our viewpoint because it proves that the HGP was a breakthrough for science.

"Human Genome Project." Genetics, edited by Richard Robinson, New York, Macmillan Reference USA, 2008. Gale In Context: Biography. Accessed 17 Sept. 2019.

This source is an overall explanation of the Human Genome Project. It starts by talking about the origins of the project and how it started then it talked about the competition between sectors and their opposing views about how this new development should be publicized. It then went on to talk about the effects of the project along with how the genome project would be conducted. The source is from a website and is a secondary source. It would be helpful by providing the information on what genome was used for the project and why it was chosen. It can also provide more information behind the biology of the project. The source can also provide information on how the issue with the Human Genome Project is controversial and many see it as unethical.

"Human Genome Project." The Gale Encyclopedia of Science, edited by K. Lee Lerner and Brenda Wilmoth Lerner, 5th ed., Farmington Hills, Gale, 2014. Gale In Context: Science. Accessed 30 Aug. 2019.

The source talks about what complications there were and what complications had to be addressed before starting the Human Genome Project. It also goes on about the goals and the plan to find the DNA sequence through the HGP. The entire passage includes a brief but detailed timeline about each decade of how the Human Genome Project came to be completed and how it's affected the public now. The passage also addresses misconceptions and any other doubts that

may exist within the general public. An example would be people thinking that the published human genome sequence means that every human has the same arrangement of DNA sequences, but that is not true. The resource is a secondary source and is by author Bryan Cobb and is edited by K. Lee Lerner and Brenda Wilmoth Lerner. It is a credible source and would be useful in this research project because it gives us an insight of what happened while the project was in motion and gives insight as to how the general public reacted to the results as well. This kind of information would help in explaining how the Human Genome Project broke barriers as well as provide even further information about the project itself.

"Human Genome Project." World of Genetics, Detroit, Gale, 2009. Gale In Context: Science. Accessed 30 Aug. 2019.

The article begins by providing a brief explanation of what the HGP is and jumps straight into where the sequencing work was done. Afterward, the article dove into the different stages of the HGP. From this, we are able to see how the research and the actual project works. The purpose of this article was to describe the process of HGP. It also goes into detail about the study of genomes and genome parts. This resource is an article and it is a secondary source. The article was published in 2009 by the database system Gale, so it can be considered reliable. This article will help us describe the entire process and how having it be done is an actual breakthrough for science and medicine. This article talks about how the Human Genome Project has helped developments in medicine since we are now able to understand human coding. Because of this, it will help our viewpoint. This source will be helpful in our final paper because it supports our viewpoint.

Hollox, Edward J., PhD, and Edward R. Rosick, DO. "Human Genome Project." The Gale Encyclopedia of Genetic Disorders, edited by Tracie Moy and Laura Avery, 4th ed., vol. 2, Farmington Hills, Gale, 2016, pp. 941-43. Gale Health and Wellness. Accessed 30 Aug. 2019.

This source is an in-depth description of how exactly the Human Genome Project was orchestrated. It lists out the stages of the project and the inventions that made the stages easier to be completed. It also talks about how the project is useful for human geneticists and medical researchers and all of its abilities to identify genes, map and find genes and much more. The source would be helpful towards the building of a website about the impact of the Human Genome Project because it talks about how it made processes much easier for medical professionals. This fact can be used to explain the barriers broken because it talks about the inventions that were put together to help push the project to do the things it can now do.

"James D. Watson." World of Chemistry, Detroit, Gale, 2006. Gale In Context: Science. Accessed 4 Sept. 2019.

This source is a biography of James D. Watson, an American molecular biologist, who won the 1962 Nobel Prize in physiology or medicine for discovering the structure of DNA where

he was appointed the director of the Human Genome Project of the National Institute of Health in 1989. Watson and his partner Francis Crick theorized about DNA and worked on their model of the DNA model where they discovered the double-helix structure of DNA. This source contributes to the theme of breaking barriers because it explains the life of the founder of The Human Genome Project and how he became the first director.

Sparrow, Robert, and Glenn Cohen. "Genetically Engineering Humans: A Step Too Far?" *The Pharmaceutical Journal*, 24 Sept. 2015, Accessed 28 Oct. 2019.

The source is a secondary source that provides opposing opinions about how the Human Genome Project has led to further topics on how to address medical issues such as genetic engineering. It discusses the pros and cons of genetic engineering and addresses ethical concerns about it. The source goes to show that genetic engineering wouldn't have been possible without the background knowledge obtained from the Human Genome Project. The images on the site also provide visuals about the topic and include the opinions of the professionals who share their thoughts about genetic engineering. It contributes to the theme of breaking barriers because it sets an example of how far the Human Genome Project has impacted how the world uses technology for medical purposes.

"The Beerys: Meet A Family Changed By Sequencing Technology." *Genome: Unlocking Lifes Code*, 26 Sept. 2014, Accessed 28 Oct. 2019.

This source is a secondary source and is a website article. The source talks about the medical condition and background of two twins, the Beery twins, and how they were able to be helped with genome sequencing. The twins were suffering from a medical condition that worsened as time and treatment went on. When the mother decided enough was enough, she decided to get their genomes sequenced as was able to better help her children. This information is helpful for the topic as it provides an example of a family that was helped because of the Human Genome Project. It shows how the project broke barriers as it enabled there to be a better understanding of human genomes which in turn opened the door for diagnosis such as the Beery twins to happen.

"Understanding gene interactions holds key to personalized medicine, scientists say." *NewsRx Health*, 14 Apr. 2019, p. 85. *Gale In Context: High School*. Accessed 6 Sept. 2019.

This source is a secondary source because it is an article from a newsletter by NewsRx Health about how The Human Genome Project opened new doors to personalized medicine and medical treatment which contributes to the theme of breaking barriers.

van Ommen, G J B. "The Human Genome Project and the Future of Diagnostics, Treatment and Prevention." *Journal of Inherited Metabolic Disease*, U.S. National Library of Medicine, May 2002, Accessed 27 Oct. 2019.

This source is a secondary source that provides information on the future of the human genome project in terms of biology and medicine. The article references how the project opens up the medical field's pharmacogenomics and allows there to be some benefits like a decrease in healthcare costs. This source helps support the topic because it provides information on how the project is shedding light on different medicine areas, in this case, pharmacogenomics. It shows how the Human Genome Project broke barriers because now scientists understand the human genomes better that they are able to design lower toxicity drugs through a bit of modification.

Secondary Image Sources:

"About the Human Genome Project." *Human Genome Project Information Archive*. Accessed 10, Dec. 2019.

This is the official logo of the Human Genome Project which shows breaking barrier because it symbolizes the Human Genome Project that sequenced approximately 20,000-25,000 genes in human DNA.

Admin. "During Pregnancy, If The Mother Suffers Organ Damage, The Baby in The Womb Sends Stem Cells to Repair the Damaged Organ." *Mind-Blowing Facts*, 15 May 2017. Accessed 10, Dec. 2019.

This image of a fetus in a womb shows a breaking barrier because, after the completion of sequencing the human genome, doctors are now able to detect various diseases such as cystic fibrosis, muscular dystrophy, Tay-Sachs disease, and sickle cell disease while a fetus is in the womb.

"Biographical Sketch of Francis S. Collins, M.D., Ph.D." National Institutes of Health, U.S. Department of Health and Human Services, 27 June 2017, Accessed 27 Oct. 2019

This source describes who Francis Collins is and his role in science. It also talks about how he was involved in the Human Genome Project. This source is beneficial because it provides an image of who Francis Collins is and it gives more information regarding his significance with the discovery and development of the Human Genome Project. This information helps understand what barriers were broken as his research has information that explains what exactly is being transformed.

"DNA sequence from human genome." *Biotechnology: In Context*, edited by Brenda Wilmoth Lerner and K. Lee Lerner, Gale, 2012. In Context Series. Gale In Context: Science, Accessed 28 Oct. 2019.

This image shows a DNA sequence from a human genome. It is beneficial because it provides an example of how human genomes look and how scientists are exposed to them. It contributes to the theme breaking barriers as it corresponds with the topic of the Human Genome Project by representing just exactly what the project was revolving around. The “highlighted” letters in the picture are the bases that the project alters which leads to having freedom with different features of human characteristics.

“Eggs Choose Sperm, Fertilization Is Not Random!” *Deccan Chronicle*, 18 Nov. 2017. Accessed 10, Dec. 2019.

This image of an egg and sperms shows a breaking barrier because after completing the sequence of the human genome, doctors are able to choose which egg gets fertilized to avoid having babies with birth defects or lower chances of survival.

Elfarash, Ameer Effat M. "How to Sequence a whole gene." Ameer Effat M. Elfarash, Accessed 29 Oct. 2019.

This resource is a secondary source and it is an image. It provides us insight into what was going on in the media during the time of the Human Genome Project. This helps us prove our point of the Human Genome Project breaking barriers because it shows how important the project was and how it significantly impacted society, considering they had limited knowledge of what composed human genetics. This resource also serves as a visual for one of our pages on the website.

“Get a Leg up on Summer with Relief for Varicose Veins.” *Get a Leg up on Varicose Veins - Mayo Clinic Health System*. Accessed 10, Dec. 2019.

This image of a varicose vein shows a breaking barrier because in the case of the Kentucky family case they suffered from a rare mutation that caused there to be a narrowing of the leg arteries. The genomic analysis helped physicians figure out the mutation involved in the gene NT5E.

“Giants in Genomics: John Sulston.” *Stories*, The Public Engagement Team at the Wellcome Genome Campus, 3 Apr. 2018, Accessed 28 Oct. 2019

This source describes another scientist who is involved in the making of the Human Genome Project. John Sulston was a major scientist in the development of the Human Genome Project as his work leads to many discoveries and breakthroughs within the project. He worked alongside many other scientists, two of who are mentioned previously, who were important in the making of the project. This source is beneficial to the topic because it provides an image of who John Sulston is and how he helped with the discovery and application of the Human Genome Project.

“Girl With Third Degree Burns At Hiroshima Red Cross Hospital.” *Girl With Third Degree Burns At Hiroshima Red Cross Hospital* | *The World War II Multimedia Database*, 10 Aug. 1945. Accessed 10, Dec. 2019.

This image of a WWII atomic bombing victim shows a breaking barrier because the scientists studied human genes and were interested in determining if there was a link between an increase of genetic mutations and the survivors of the bombings.

Lauren. “Happy Healthy Babies X: A How to Guide.” *Gemmotherapy with Lauren Hubele*, 6 May 2019. Accessed 10, Dec. 2019.

This image of happy babies shows a breaking barrier because it shows how in the future scientists and doctors can bring out advances in diagnosis and treatments of various diseases and also discovering rare mutations and treatment for a healthier generation in the future.

“National Institutes of Health.” *National Institutes of Health*, U.S. Department of Health and Human Services. Accessed 10, Dec. 2019.

This is the official logo of the National Institutes of Health (NIH) which shows breaking barrier because it was one of the collaborators, along with the U.S. Department of Energy (DOE), of the Human Genome Project to sequence the entire human genome and identify all the genes in the human DNA. We are using the logo to represent the significance of the NIH in collaborating with the success of the Human Genome Project.

“Scientist Adding Liquid To Flask From Dropper.” *Picfair.com*. Accessed 10, Dec. 2019.

This image of a scientist squeezing the liquid out of a medicine dropper shows a breaking barrier because it shows the type of work they do in the process of the project.

TachibanaOct, Chris, et al. “[Science: AAAS.” *Science*. Accessed 10, Dec. 2019.

This image of a scientist looking through a telescope shows a breaking barrier because scientists play a major role in the process of DNA sequence.

“The Human Genome Project.” *Genome.gov*. Accessed 10, Dec. 2019.

This image of genetic markers shows a breaking barrier because it is an equipment used for sequencing DNA in the Human Genome Project. We are using this image to show an example of the process of sequencing genome.

“U.S. Department of Energy.” *Energy.gov*. Accessed 10, Dec. 2019.

This is the official logo of The U.S. Department of Energy (DOE) which shows breaking barrier because it was one of the collaborators, along with The National Institutes of Health (NIH), of the Human Genome Project to sequence the entire human genome and identify all the

genes in the human DNA. We are using the logo to represent the significance of the DOE in collaborating with the success of the Human Genome Project.

Wallace, Tim. "Lab Mice Make Poor Models for Real-World Immune Systems." *Cosmos*, 4 May 2017. Accessed 10, Dec. 2019.

This image of laboratory mice shows a breaking barrier because researchers studied the genetic makeup of nonhuman organisms, such as laboratory mice to know more of complete gene sequences and possibly apply it to the genes of different organisms, humans included. We are using this image to show what type of experiments and studies scientists do in the project.

WHAT IS LIFE - DNA and Dublin Schrodinger James Watson, Francis Crick, Maurice Wilkinson, Rosalind Franklin, Charles Jencks. Accessed 10, Dec. 2019.

This is a photo of James Watson and Francis Crick shows breaking barrier because they were the scientists along with the Rosalind Franklin who won the noble prize for discovering the structure of DNA. This is a photo of James Watson and Francis Crick standing next to the model they made of DNA in 1953. We will use this picture to represent the important figures that have a large influence on the Human Genome Project.

Welsh, Jonathan. "October Is National Breast Cancer Awareness Month." *Care Resource Community Health Centers, Inc.*, 14 May 2019. Accessed 10, Dec. 2019.

This image of a pink ribbon symbolizes breast cancer which shows breaking barriers because breast cancer is a disease that results from a genetic mutation of the BRCA1 and BRCA2 gene. The Human Genome Project helps scientists to understand the complex genetic makeup of humans helps doctors with diagnosing diseases like breast cancer and provide early detection of the disease.

Secondary Video Sources:

"Medical Mystery." *Genome: Unlocking Life's Code*, Accessed 28. Oct. 2019.

This source is a short documentary of the Beery twins and how their lives transversed over the years in relation to their medical condition, its progress, and their involvement with human genomes. This video is helpful because it provides a firsthand experience of what was going through the minds of the parents and how they felt during the twins' lives, which in the end led to them going through with genome sequencing. It shows how the project broke barriers as it was used to identify what exactly was happening to the twins by analyzing their genomes.