

Rita Levi Montalcini:
Breaking Barriers to Discover the Nerve Growth Factor

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Individual Performance
Process Paper: 500

Process Paper

I chose my topic, Rita Levi-Montalcini, from a book titled *Women in Science: 50 Fearless Pioneers Who Changed The World* by Rachel Ignotofsky. I brainstormed ideas by writing down the names of women who stood out to me as difference-makers and wrote down their allies and supporters. Montalcini's story interested me because her barriers were very prominent. Growing up during World War II, she faced gender barriers, religious barriers, and scientific barriers. I was also very interested in finding a female role model who was not well known but made a significant impact on history. In the end, it was clear to me that she was a perfect fit for this year's theme, as she faced many barriers in her life.

I first began my research process by locating any books that she had written or written about her. I was fortunate enough to find her autobiography entitled *In Praise of Imperfection: My Life and Work*, which was my main primary source. I began checking websites to see if they had the same information as the book did. That way, I knew what was reliable and not false information on websites. I also found documents she had written herself, such as *A Nerve Growth-Stimulating Factor Isolated From Snake Venom*, to specifically search for images, obtain quotes, and learn who her colleagues were. I corresponded with Marguerite Hollaway, an author who wrote an article and interviewed Rita Levi-Montalcini for *Scientific American*. Ms. Hollaway recommended to me other books and people I could reach out to expand my research. I also participated in an e-review of my project hosted by the National Museum of African American History and Culture.

I decided to do an individual performance because I have always felt comfortable on stage and enjoy scriptwriting. I love putting myself in the shoes of historical figures and telling their story. My biggest challenge was to rely on other sources than Montalcini's autobiography. I wanted to make sure I still had a balance of different sources besides her book. Another challenge was trying to keep my script within the time limit. Montalcini faced many barriers, and I wanted to incorporate as many as I could. I worked on my performance for approximately 60 hours, both during school and outside of school.

Rita Levi Montalcini broke many barriers. She succeeded in discovering the Nerve Growth Factor despite facing gender, religious, and scientific barriers. During World War II in Turin, Italy, a series of discriminatory laws called the Manifesto of Racial Scientists placed barriers on all Jews pursuing scientific studies. Being forced as a young scientist, Montalcini stopped her research and went into hiding. With a growing passion for her work, she decided to take dangerous risks and continue her research. In the end, her risks were successful when she discovered the Nerve Growth Factor, earning her the Nobel Prize of Physiology and Medicine, which would become a break-through discovery for the scientific community. Her bravery and determination helped to advance science.

Annotated Bibliography

Primary Sources

Books

Levi-Montalcini, Rita. *In Praise of Imperfection ; My Life and Work*. New York, Basic, 1988.

This primary source book is about Rita's life. It was used throughout the entire performance and set the base of my script. I also used this book to discover her gender, racial, and scientific barriers. This source gave me a deeper understanding of her outlooks of being persecuted and discriminated against for who she was. It also allowed me to bring the human side of her to the script.

Levi-Montalcini, Rita. *The Saga Of The Nerve Growth Factor : Preliminary Studies, Discovery, Further Development*. Singapore ; River Edge, N.J., World Scientific, 1997.

This primary source book is about Rita's process and discovery of the Nerve Growth factor. This book was used throughout the middle and ending of my performance. I used it to explain the scientific terms and work she did during her time while she was hiding, when she returned to work at Turin University, and also when she worked with Viktor Hamburger. This source gave me a better understanding of how and what she used to work with the chick embryos.

Images

Levi-Montalcini, Rita. "Nerve Fibre OutGrowth," *Scientific American*, 1979, www.nobelprize.org/prizes/medicine/1986/press-release/. Accessed 11 Feb. 2020.

This primary source image was used to understand the effects of the items used to create a large growth of fibers. This image is used as a prop in my performance to show the before and after of her work

Weitman, Herb. "Viktor Hamburger at Home in St. Louis," *Washington University Department of Public Affairs*, 1986, www.researchgate.net/figure/Viktor-Hamburger-at-home-in-St-Louis-1986-Photo-by-Herb-Weitman-Washington-University_fig6_8046223. Accessed 6 Feb. 2020.

This image of Viktor Hamburger was used in the middle of my script and as a prop. I used this image to emphasize Rita's quote describing her first encounter with Viktor. He impacted Rita's discoveries greatly and I wanted to show Rita's remembrance of him.

Letters

Sperry, Roger 1913-1994. "Roger Sperry to Rita Levi-Montalcini, January 16, 1992." *Handle.Net*, 16 Jan. 1992, hdl.handle.net/1912/20419, <http://hdl.handle.net/10776/10773>. Accessed 14 Dec. 2019.

This letter was used to research Rita's supporters. This letter is a prop located in Rita's work area to show how she always looked to her supporters side she needed help. This letter gave me a better understanding of how her allies impacted her work.

Newspapers/Journals

Cohen, S., et al. "A NERVE GROWTH-STIMULATING FACTOR ISOLATED FROM SARCOM AS 37 AND 180." *Proceedings of the National Academy of Sciences*, vol. 40, no. 10, 1 Oct. 1954, pp. 1014–1018, www.pnas.org/content/40/10/1014, 10.1073/pnas.40.10.1014. Accessed 11 Feb. 2020.

This primary source was used as a prop and understanding of how snake venom and chick embryos were used to create the Nerve Growth Factor. This journal was used to create a better understanding of Rita's work as she documented it.

Cohen, S., and R. Levi-Montalcini. "A NERVE GROWTH-STIMULATING FACTOR ISOLATED FROM SNAKE VENOM." *Proceedings of the National Academy of Sciences*, vol. 42, no. 9, 1 Sept. 1956, pp. 571–574, www.pnas.org/content/42/9/571?ijkey=bc0a4768660ad21130d5a72f90c08ed83b7fffb4&keytype=tf_ipsecsha, 10.1073/pnas.42.9.571. Accessed 11 Feb. 2020.

This primary source journal was used to access images and photos. It was used as a prop and towards the end of my performance. It gave me a better understanding of how Stanley Cohen's mention of snake venom provided them the shortcut they were looking for.

Levi-Montalcini, Rita 1909-2012. "CV and List of Scientific Contributions of Rita Levi-Montalcini, around 1965." *Handle.Net*, 2012, hdl.handle.net/1912/20139, <http://hdl.handle.net/10776/10649>. Accessed 14 Dec. 2019.

This primary source journal was used to find all of Rita's life work and achievements. This journal is used as a prop to towards the end of the performance. It gave me a deeper understanding of Rita's drive to work over the 82 years of her life.

Levi-Montalcini, Rita, and Pietro Calissano. "The Nerve-Growth Factor: A New Tool For Manipulating Neurons." *Scientific American*, June 1979.

This primary source newspaper was used to have a better understanding of the impact of Rita's discovery. This newspaper is used towards the ending of my performance in Rita's achievements and impacts.

Suro, Roberto. "WOMAN IN THE NEWS; UNRAVELER OF MYSTERIES: RITA LEVI-MONTALCINI." *The New York Times*, 14 Oct. 1986, www.nytimes.com/1986/10/14/science/woman-in-the-news-unraveler-of-mysterie-s-rita-levi-montalcini.html?searchResultPosition=1. Accessed 23 Jan. 2020.

This newspaper was used to access quotes and further descriptions of Rita and images of her life. This primary source is used throughout the performance with quotes. It gave me a stronger outlook of Rita's personality so I could bring her to life in my script.

Press Release

The Nobel Prize. "The Nobel Prize in Physiology or Medicine 1986." *NobelPrize.Org*, 2019, www.nobelprize.org/prizes/medicine/1986/press-release/. Accessed 14 Dec. 2019.

This primary website was used to understand Rita's scientific barrier that opened up a new stage of discovery in the neurobiology field. This source is used throughout the script to highlight her struggles and works in the scientific field. It was also used in my script when she had received a call saying she had won the Nobel Prize for Physiology or Medicine for her discovery of the Nerve Growth Factor.

Videos

Chao, Moses. "A Conversation with Rita Levi-Montalcini." *YouTube*, 13 May 2011, www.youtube.com/watch?v=HkXGTjBS4N8. Accessed 14 Dec. 2019.

The information from this video was used throughout the script. This primary source was also used for quotes and Rita's point of view of her experience in hiding and research. It gave me a deeper understanding of her mannerisms and her personality to add to the performance.

Nobel Prize. "Interview Rita Levi-Montalcini, Nobel Prize in Medicine 1986." *YouTube*, 29 May 2009, www.youtube.com/watch?v=3dMQv0xcxQc. Accessed 14 Dec. 2019.

This primary video was used to understand what the Nobel Prize of Physiology or Medicine was. And how Rita received it for her work with the Nerve Growth Factor and when she received it in 1986. It was also used in the ending of the script to highlight her greatest achievement among scientists in the world.

Society Of Neuroscience. "History of Neuroscience: Rita Levi-Montalcini." *YouTube*, 5 July 2012, www.youtube.com/watch?v=WgkAR-vrJpM&list=PLzJuq7nUV24R_2hY4STYGLG8uEWO5S8V1-. Accessed 14 Dec. 2019.

This primary source was used to understand Rita's history and background. It is used in the middle of my script to explain Rita's scientific barriers and work.

Websites

WHOAS: Woods Hole Access Server. "WHOAS Home." *Mblwhoilibrary.Org*, 2019, darchive.mblwhoilibrary.org/. Accessed 14 Dec. 2019.

This primary source was my main source for letters and journals that she received from her supporters such as Renato Dulbecco and Viktor Hamburger. They would offer her tips and encouragement and she continued her work. This source is used throughout my entire script and used to gain a stronger understanding of her supporters, research, and work.

Secondary Sources

Book

Ignotofsky, Rachel. *Women in Science : 50 Fearless Pioneers Who Changed the World*. New York, Ten Speed Press, 2018.

This book was used to find my topic for this year's theme as I knew that I wanted to do a woman in science. It gave me a summary of Rita's accomplishments and I could definitely tell right away that she had broken gender, race, and religious barriers.

Video

Euronews. "Oldest Nobel Winner Rita Levi-Montalcini Dies at 103." *YouTube*, 30 Dec. 2012, www.youtube.com/watch?v=SXjt5GI5qEQ. Accessed 14 Dec. 2019.

This source was used towards the end of the script. It gave me a better understanding of Rita's impact, how many people looked up to her, and her influence among the scientific community.

Websites

Brainy Quote. "BrainyQuote." *BrainyQuote*, BrainyQuote, 2013, www.brainyquote.com/authors/rita-levi-montalcini-quotes. Accessed 14 Dec. 2019.

This website was used throughout my script. This source gave me quotes to understand Rita's outlook of being an independent woman. It also helped me understand her outlook of being discriminated against.

European Brain Research Institute. "Rita Levi Montalcini NGF Premio Nobel." *Ebri.It*, 2017, www.ebri.it/en/pagine/1_nerve_growth_factor_ngf_2_nerve_growth_factor_ngf_62. Accessed 14 Dec. 2019.

This source was used to discover Rita's achievements and impacts. It was used towards the end of my script. It gave me a better understanding of her 82 years of research.

Holloway, Marguerite. "Finding the Good in the Bad: A Profile of Rita Levi-Montalcini." *Scientific American*, Scientific American, 30 Dec. 2012, www.scientificamerican.com/article/finding-the-good-rita-levi-montalcini/. Accessed 14 Dec. 2019.

This secondary source was used to access quotes and Rita's own opinions of her work. This website is used throughout the end of the script.