**Bloom, K., & Arbuthnot, P. (2014). Antiviral restriction factors and immune evasion strategies of hepatitis B virus. *World Journal of Gastroenterology*, *20*(29), 9760–9782.**

**Cech, T. R. (1986). RNA as an Enzyme. *Scientific American*, *255*(5), 64–75. http://www.jstor.org/stable/24976086**

This article written by Cech himself, speaks on the impact that the discovery of ribozymes had, challenging the traditional view of nucleic acids and enzymes. It further goes on about the implications of his research within the context of evolution, and its potential applications as well. We used this article to understand the context in which the research was conducted, under the idea that cellular reactions are catalyzed by a protein enzyme. Furthermore, this article was used to compile information on the impact Cech’s work on the theory of the origin of early life.

**Cech, T. R. (1989, December 8). *Self-splicing and enzymatic activity of an intervening sequence RNA from Tetrahymena* [Nobel Lecture]. Howard Hughes Medical Institute, Department of Chemistry and Biochemistry, University of Colorado.** [**https://www.nobelprize.org/uploads/2018/06/cech-lecture.pdf**](https://www.nobelprize.org/uploads/2018/06/cech-lecture.pdf)

This article was written by Cech when he had won the Nobel Prize. In his perspective, he specifies the order of his experiment, findings and purpose. It presents several different diagrams from his results. This article was used in the project to explain the process of his experiment. Additionally, Cech’s diagrams are included to add visual aid in interpretation and understanding.

**Cech, T. R. (1990). Self-splicing and enzymatic activity of an intervening sequence RNA from Tetrahymena. *Angewandte Chemie International Edition in English*, *29*(7), 759–768.**

In this Nobel lecture, Cech speaks upon the doubt around the idea of RNA possessing catalytic abilities, due to its history as a genetic information carrier. He further explains the methodology for his experiments that led to the discovery of a self-splicing intron in the ribosomal RNA precursor of Tetrahymena. This lecture was used within the methodology and results portion of our project to explain Cech’s research and discoveries.

**Cornu, T. I., Mussolino, C., & Cathomen, T. (2014). Editing the genome of human cytomegalovirus (HCMV) by using zinc finger nucleases and transcription activator-like effector nucleases. In S. Reddehase & J. Podlech (Eds.), *Cytomegaloviruses: From Molecular Pathogenesis to Human Disease* (pp. 119–130). Caister Academic Press.**

**Dropulic, B., & Jeang, K. T. (1994). Gene therapy for human immunodeficiency virus type 1 infection: Ribozyme-mediated inhibition of viral expression. *The Journal of the American Medical Association*, *271*(6), 457–460.**

**Guerrier-Takada, C., Gardiner, K., Marsh, T., Pace, N., & Altman, S. (1992). The RNA moiety of ribonuclease P is the catalytic subunit of the enzyme. *Cell*, *35*(3 Pt 2), 849–857.**

**Hampel, A., & Tritz, R. (2001). The hairpin ribozyme: Discovery, two-dimensional model, and development for gene therapy. *Molecular Biotechnology*, *12*(1), 117–130.**

**Janzen, E., & Chen, I. A. (2020). Promiscuous ribozymes and their proposed role in prebiotic evolution. Chemical Reviews, 120(1), 509–541.** [**https://doi.org/10.1021/acs.chemrev.9b00620**](https://doi.org/10.1021/acs.chemrev.9b00620)

In this article, the concept of ribozyme’s ability to catalyze reactions with a plethora of unique substrates. It then uses this concept to pitch the idea of ribozymes playing a key factor in the early part of life’s evolution. In the context of our research, the article was used to explore the impact of Cech’s research within the study of evolution, and the possibility of it being responsible for starting life.

**Knoepfel, S. A., & Gatignol, A. (2013). Gene therapy strategies to block HIV-1 replication by RNA interference. In A. Lever & M. DiGiandomenico (Eds.), *RNA Interference and Viruses: Current and Future Perspectives* (pp. 87–100). Caister Academic Press.**

**Masquida, Benoît., & Leclerc, F. (2024). *Looking at ribozymes: Biology of catalytic RNA*. John Wiley & Sons, Incorporated.**

This textbook provided various concepts about ribozymes. From chemical composition, history, experiment, outcomes, and purpose. Though the terminology differed, the basic principles were similar to those in Cech's article. It also featured diagrams with both two- and three-dimensional figures. Overall, its content supported our knowledge of ribozymes.

**Mlýnský́, V., Bussi, G., Šponer, J., & Banáš, P. (2010). Extensive molecular dynamics simulations showing that canonical G8 and protonated A38H+ forms are both possible active forms of the hairpin ribozyme. *Journal of Chemical Theory and Computation*, *6*(9), 2649–2663.**

**Puerta-Fernández, E., Romero-López, C., Barroso-Mantecón, J. A., & Berzal-Herranz, A. (2003). Ribozymes: Recent advances in the development of RNA tools. *FEMS Microbiology Reviews*, *27*(1), 75–97.**

This review article emphasizes the application of ribozymes within the fields of therapeutic and biotechnological tools. It highlights the different types of naturally occurring ribozymes, describing their differences in function as a result of their structures. This article was used primarily within the impact section of the research, explaining the possibilities of therapeutic ribozymes; however, it was also used to understand certain aspects of Thomas Cech’s research results.

**Scarborough, R. J., & Gatignol, A. (2015). The hairpin ribozyme. In B. Berkhout, H. C. J. Ertl, & M. S. Weinberg (Eds.), Gene Therapy for HIV and Chronic Infections (Vol. 848, pp. 117–135). Springer.** [**https://doi.org/10.1007/978-1-4939-2432-5\\_6**](https://doi.org/10.1007/978-1-4939-2432-5/_6)

The article speaks upon the different classes of ribozymes, later focusing on the hairpin ribozyme, discussing its unique structure and characteristics. Additionally, this source describes the attempts and research that has been conducted to enhance the catalytic performance of the ribozyme through altering its sequence and structure in turn. The information from this article was used for the impact portion of the project, highlighting the possibility of inhibiting viral diseases and genes from being expressed, and using ribozymes as a form of biotechnology.

**Schnepp, B. C., & Johnson, P. R. (2014). Recent advances in adenovirus-vectored HIV-1 vaccines. In P. Ten Haaft & D. E. Griffin (Eds.), *Adenoviral Vectors for Gene Therapy: Second Edition* (pp. 153–176). Elsevier Science.**

**Takahashi, M., Burnett, J. C., & Rossi, J. J. (2015). Aptamer–siRNA chimeras for HIV. In D. von Laer & C. Baum (Eds.), *Gene Therapy for Hepatitis C Virus: From Basics to Clinical Application* (pp. 211–233). Springer.**

**von Laer, D., & Baum, C. (Eds.). (2015). *Gene Therapy for Hepatitis C Virus: From Basics to Clinical Application*. Springer.**

**Walter, N. G., & Engelke, D. R. (2002a, October). *Ribozymes: Catalytic RNAS that cut things, make things, and do odd and useful jobs*. Biologist (London, England).** [**https://pmc.ncbi.nlm.nih.gov/articles/PMC3770912/**](https://pmc.ncbi.nlm.nih.gov/articles/PMC3770912/)

This review provides a summary of Cech’s findings and experiment focusing on its impact and refining the central dogma. It explains how its enzymatic and self-splicing ability offers a solution to the ‘chicken-and-egg’ problem. We used this in our project to explain Cech’s impact from his findings as it supports the idea that proteins might have developed later if a single macromolecule could have served as both the genetic carrier and the catalyst.

**Weerasinghe, D., Liem, S. E., & Asad, S. (1991). Development of ribozymes for gene therapy. *The FASEB Journal*, *5*(12), 2693–2703.**

This text outlines the possibility for the application of synthesized ribozymes in gene therapy. It provides a possible procedure for the process, noting the criteria and factors that would increase the therapeutic response and outcomes. We used this paper within the impact section of our project, emphasizing the relevancy of ribozymes outside the origin of life.

**Wu, Q., & Guo, P. (2009). The structure and function of catalytic RNAs. Science in China Series C: Life Sciences, 52(3), 232-244.**

This article firstly emphasizes the initial beliefs of RNA’s function as a catalyst, basing it on their ability to form high ordered secondary structures like proteins. Furthermore, the article speaks on the different classes of ribozymes and how they are differentiated based on size, and the reactions they catalyze. We used this article while compiling information of the context of Cech’s research to highlight the initial beliefs that surrounded the concept of catalytic RNA. Additionally, we used this article within the impact section, providing context for some of the articles related to gene therapy applications of ribozymes.