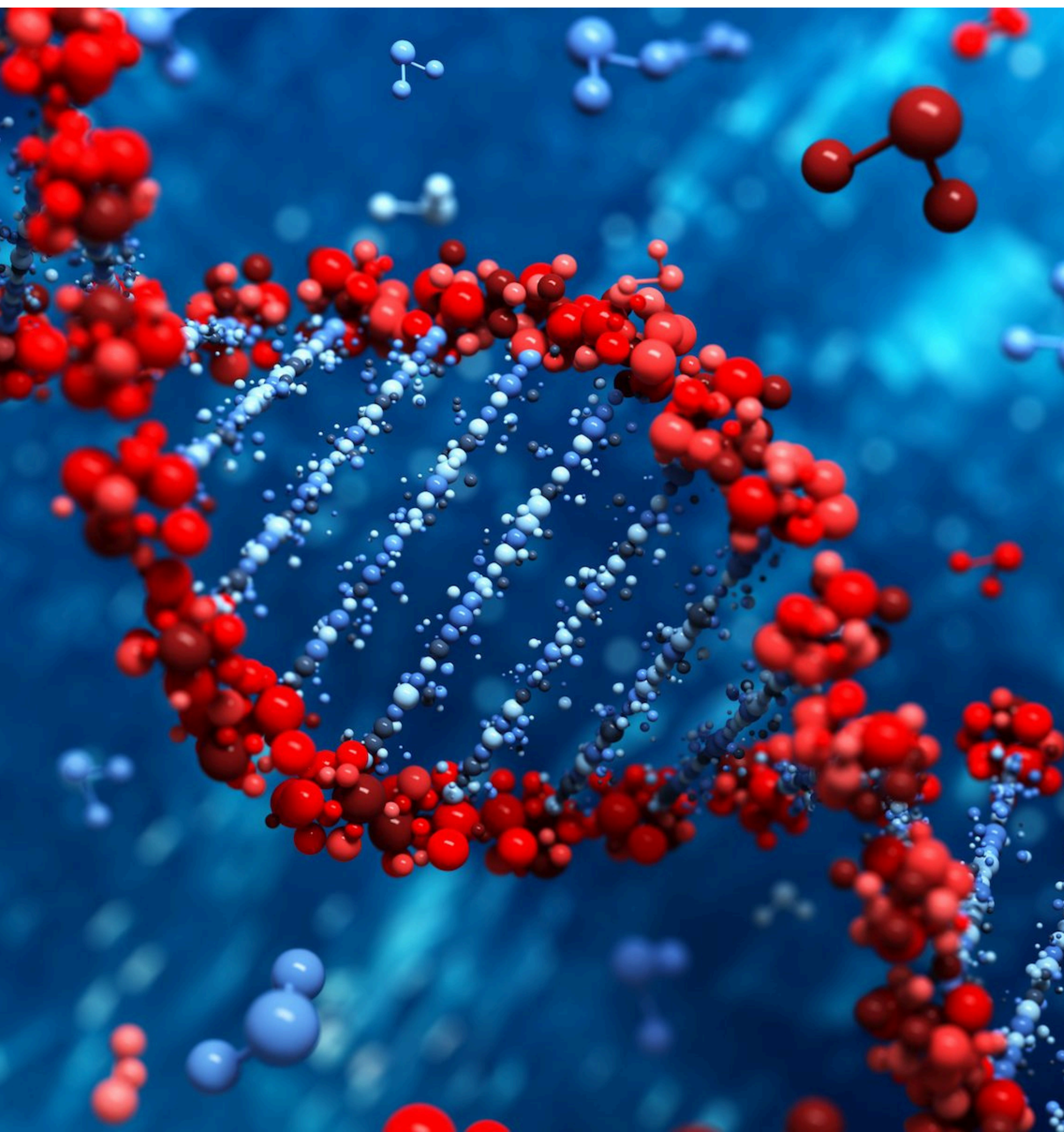


# A Living Glossary: Rhetoric in Biology

Brendan Reynolds



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# *Introduction*

## SECTION 1.1 INTRODUCTION TO GLOSSARY

Scientific studies predominantly center around the field of biology, with most required undergraduate coursework focused on environmental factors, living organisms, disease, chemical formulas, and physiological systems. There is little, if any, focus on the field of rhetoric—an immense area of argumentative writing that scientists lack familiarity with and consequently this lack of comprehension can weaken their writing. Educated scientists are equipped with an analytical mind trained by scientific formulas and are immediately overwhelmed by a discipline that at first seems too vague and formless to comprehend.

Throughout the study of science, students are not taught to express themselves or construct arguments; instead, they are encouraged to present concrete data derived from experiments. This is evident in any research paper, which is typically structured by an abstract, introduction, methods, and results. In undergraduate classes, students' papers must remain impersonal, which instills ambiguity in future researchers and encourages them to reduce themselves to factual information rather than opinionated pieces. Unfortunately, breaking this mold would mean completely destroying one's chances of publication.

The scope of rhetoric is large and thus formidable to scientists who want to become educated in the field. The immensity of rhetoric is due to the fact that it can exist in any form of media that aims to persuade or send a message—it is not limited by type, form, or even words. It exists within infrastructure, advertisements, papers, training guides, and anywhere else subject to human influence. However, once familiar with these patterns, one can begin to see the similarities between the field of rhetoric and science—both rely on audience, observation, culture, and structure. This glossary aims to explore these parallels more deliberately. It encapsulates several entries combining the methods of both rhetoric and science.

In attempts to synthesize the rhetorical world with the scientific one, while still remaining accessible, the format of each entry stays consistent for clarity. Each glossary begins with a scientific definition and then expands on the term's importance to biologists. Next, entries will delve into rhetorical support and theory for context and relation to the term, which is followed by a redefinition of the term as it acts rhetorically while resonating with its scientific roots. Finally, the term will be tied to an example of renowned scientific discoveries or notable people that engage in rhetorical practices to better emphasize the importance of rhetoric in scientific communication. Additionally, the glossary itself is formatted after an organic chemistry textbook to further lend itself accessible to scientists who are familiar with this modality of learning. Through this process, I can translate jargon scientists are already familiar with into rhetorical terms and tactics. In addition to these anecdotes, theoretical support is mostly derived from *Ancient Rhetorics for Contemporary Students* by Debra Hawhee and Sharon Crowley to provide a fundamental understanding in a way that is accessible and easy to comprehend for those new to rhetoric—while also serving as a bridge between the two studies. Ultimately, this glossary functions as an intermediary between two worlds and a document on the importance of rhetorical awareness within scientific discourse.

# *Analysis of Environmental Allocation*

*Formal Definition: Strategically distributing natural resources (like water, land, minerals) to meet societal needs while ensuring long-term environmental integrity and sustainability.*

## SECTION 2.1 INTRODUCTION & BIOLOGICAL RELEVANCE

The idea of **environmental allocation** is one we are all familiar with, the act of distributing resources across a community. For instance, the construction of state parks, hunting-ban legislation, and wildlife corridors all ensure habitat support for non-human species. These practices of distribution determine the sustainability of an environment and ultimately determine whether a species prospers or fails. **This allocation is never neutral**—it is shaped by logic, social values, biases, funding, and of course the resources available.

## SECTION 2.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

When familiar with **environmental allocation**, we can then parallel it to the formation of our arguments. Just as biologists must decide which resources to prioritize for an endangered species, **rhetoers must decide which appeals to emphasize**. Instead of asking which habitat to conserve, rhetors ask which audience to address. Instead of allocating resources, rhetors allocate argumentative emphasis.

Crowley and Hawhee's in *Ancient Rhetorics for Contemporary Students* explains the potential resources rhetoricians allocate, noting that "three kinds of arguments or proofs are convincing in rhetoric: arguments formed in the issue itself, arguments based on the rhetor's character and reputation, and arguments that appeal to the emotions" (118). Conservation biologists focus on the amount of land necessary, the quality of habitat, and the resources required to sustain a species. Similarly, rhetoricians focus on the **logic (logos), credibility (ethos), or emotion (pathos)** that an argument calls for based on the audience they're trying to persuade.

## SECTION 2.3 REDEFINITION

**ENVIRONMENTAL ALLOCATION RHETORICALLY: THE ACT OF PROPERLY ASSESSING A COMMUNITY'S IDEALS, SHAPED BY THEIR ENVIRONMENT, TO DECIDE WHICH APPEALS WILL BEST ENSURE THE DURABILITY, RELATABILITY, AND SURVIVABILITY OF OUR ARGUMENTS.**

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## SECTION 2.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

In conservation biology, we notice the impact of environmental allocation the most when it fails. For example, the **Aral Sea disaster**– once one of the largest lakes in the world– occurred when the Soviet Union diverted its rivers for irrigation, causing the lake to shrink and now lie barren. Species that depended on the lake’s ecosystem disappeared, and communities that relied on its resources suffered devastating losses. Rhetors can think of this ‘sea’ as an audience: **when an ineffective argument is made, the audience dissipates and thus the rhetorical resource is wasted**. This framework of environmental allocation raises the stakes of argumentative works and places emphasis on choosing appeals that will best resonate with an audience and reflect their cultural context.

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## SECTION 2.5 TERM IN RELATION

This framework of allocating argumentative resources efficiently coincides with **adaptation**, and the idea that our cases should reflect and be built upon culture. Like the unique needs of a community, **every argument requires** choices about **allocation** and an emphasis on the importance of the **cultural dialogue** of the present.

# Analysis of Niche

*Formal Definition: An organism's specific role or function within its ecosystem, encompassing everything from its habitat and what it eats to how it interacts with other species and its environment.*

## SECTION 3.1 INTRODUCTION & BIOLOGICAL RELEVANCE

In biology, every species, organism, and even individual cells, **occupies an environment that best suits its unique adaptations**. Through the process of evolution, environmental pressures shape traits that ensure survival within that habitat. Deserts and tundras, for instance, can be observed to reveal the way organisms fit their **niches** to endure harsh conditions. For example, cacti have evolved to live long periods of time without water, fulfilling a vital **niche** as one of the few forms of greenery in the desert. The **niches** individual organisms fill within their environments are **crucial for the stability of their community, whether visible or not**.

## SECTION 3.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

The concept of **niches** can be applied to the field of rhetoric, and even the identities of individual rhetors. A rhetor's success depends on their ability to thrive within certain environments **given their identity**.

The idea of identity and its importance in rhetoric is best illuminated by *Rhodes & Alexanders, Queer Rhetoric and the Pleasures of the Archive*, which frames a **rhetor's identity as a catalyst** to effective writing. Marginalized writers, in particular, are positioned to leverage their unique perspectives, as queer rhetoric “works to unseat the rhetorical and material tyranny of the normal itself.” Rhodes & Alexander emphasize moments when rhetors **use their own identities to destabilize and upset systems of oppression** that have been normalized.

## SECTION 3.3 REDEFINITION

**NICHE RHETORICALLY: THE ACT OF A RHETOR SELF-ACTUALIZING THEIR IDENTITY IN RELATION TO THE CULTURAL AND NORMALIZED STRUCTURES OF THEIR SOCIETY IN ORDER TO MORE EFFECTIVELY SHAPE THEIR ARGUMENTS TO THE ENVIRONMENTAL PRESSURES THEY ENCOUNTER.**

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### SECTION 3.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

In the field of biology, ethics is a common topic of concern. Arguments over ethical practices exploded with the discovery of HeLa cells– the first immortal human cell line which originates from Henrietta Lack’s, a Black patient, who never gave consent, or even knowledge, of these cells' existence. Global debates over this sparked when Rebecca Skloot published a book, *The Immortal Life of Henrietta Lacks*, which highlighted more than just the medical malpractice, but the racial injustice involved. It **leveraged Lack’s Niche** as a Black woman in a predominantly white society to **reframe the argument beyond individual ethics**, exposing it as a systematic issue. The work directly challenged the dominant cultural assumption that Black bodies were available for scientific experimentation, calling attention to the deep racial inequities underlying research and society as a whole. Skloot was able to achieve this through realizing the **importance of Lack’s identity**, and therefore **her niche**, and using it to critique and call for the stabilization of an oppressive environment.

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### SECTION 3.5 TERM IN RELATION

The act of placing one’s identity at the forefront of their rhetoric coincides with the act of **Environmental Allocation**. In which a rhetor must effectively use their own identity and the arguments available to them to best ensure the effectiveness of the argument.

# Analysis of Predator Rhetoric

*Predator’s Formal Definition: An animal that naturally preys on others.*

## SECTION 4.1 INTRODUCTION & BIOLOGICAL RELEVANCE

In biological terms, a **predator maintains a crucial role in fostering balance** within an ecosystem. Positioned at the top of the food-chain, its job is to prey on smaller organisms in its environment. Through the idea of ecology and our education, we have become familiar with the concept of an apex predator—something that reigns triumphant within its **habitat, embodying power, adaptability, and survival**. These predators are known for the ferocity they wield to secure stability within their environment. If a predator is too few in number or inefficient in its role, prey populations can grow unchecked, placing the ecosystem at risk of collapse.

## SECTION 4.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

In the same way predators keep their habitats in check, **effective writing can act as a predator**—through targeting oppressive systems and undermining stagnant ideas. In Hsu’s article, “*Dispatches from a body on fire: slow death at the intersections of race, gender, and disability*,” where Hsu frames biologic disease and its inflammation as the embodied consequence of systematic oppression, particularly, white supremacy, showing how harm perpetuates as systems go unchecked. This framwork allows us to draw parallels between predators and rhetoric. It is within these oppressive ideologies that my framework of **Predator Rhetoric** becomes relevant, **targeting harmful systems and ideas**.

## SECTION 4.3 REDEFINITION

**NICHE RHETORICALLY: THE ACT OF A RHETOR SELF-ACTUALIZING THEIR IDENTITY IN RELATION TO THE CULTURAL AND NORMALIZED STRUCTURES OF THEIR SOCIETY IN ORDER TO MORE EFFECTIVELY SHAPE THEIR ARGUMENTS TO THE ENVIRONMENTAL PRESSURES THEY ENCOUNTER.**

## SECTION 4.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

Hsu’s article itself argues that our identities enable us “to claim space in ways that others might not (461).” We can see Hsu doing this within the paper, using their own **transgender, Asian identity to strategically challenge the normalcy and dominance of white supremacist ideals**—preying upon the system's fallacies just as a predator would within its ecosystem. In using their **identity**, Hsu enacts **Predator Rhetoric**, positioning their own ideas as a predator, strategically targeting dominant or stagnant systems of thought. In doing so, they actively aim to dismantle a structure on the brink of collapse and while restoring balance to the system. Paralleling this to science, there is Rosalind Franklin, who **challenged the dominant narrative of the scientific world**. Through her discoveries, she used empirical evidence to precisely strike where Watson & Crick failed. Franklin, entrenched in a field who disrespected women, used academic rigor to independently analyze DNA’s structure, tracking the weaknesses in prevailing models that others missed (Cobb). In doing so, she simultaneously made one of the greatest scientific discoveries while challenging the male-dominated structure of her field. **Franklin embodied Predator Rhetoric**, using precision, accuracy, and cultural context to dismantle both intellectual and systematic barriers.

## SECTION 4.5 TERM IN RELATION

This action of infusing our papers with the ferociousness of a predator coincides with the importance of our writing being **Iron-Latticed**. Along with being disruptive to stagnating systems, our works should be clear, concise, and effective in their composition. Thus, allowing them to maximize their impact on the ideas they engage in.



# Analysis of Mutation

*Formal Definition: The changing of the structure of a gene, which may result in a variant form able to be transmitted to subsequent generations, caused by the alteration of single base units in DNA, or the deletion, insertion, or rearrangement of larger sections of genes or chromosomes.*

## SECTION 5.1 INTRODUCTION & BIOLOGICAL RELEVANCE

The idea of **mutation** is one of the first concepts biologists become acquainted with. Mutation, as it is situated in the sciences, is simply the irreversible change to a DNA sequence that may potentially affect the organism's appearance, traits, or even internal mechanisms. **Mutations are the source of all genetic diversity** and the **backbone of evolution** from simple single-celled prokaryotes to the larger more complex creatures we know today. Historically, these mutations have been known to be completely random but in fact can be induced by an organism's environmental factors. Interestingly, **mutations can be both beneficial and deleterious**, simultaneously the reason a bird has wings and why people develop life-threatening cancer.

## SECTION 5.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

The discussion and research of **mutations** within the biological community is prevalent and foundational to the entire field and can be translated to the practice of rhetoric. Crowley and Hawhee's *Ancient Rhetorics for Contemporary Student* explains that in the field of rhetoric that "older Sophists believe that the world is always changing and that knowledge itself is full of contraries; that is, knowledge is never certain" (pg. 40). Akin to mutation, and much like the foundational understanding of kairos, **rhetoric is always evolving and metamorphosing into something new** and beyond understanding. Although it is up to rhetors to induce the change they want to see, much like biologist culture mutations in micro-organisms, rhetors must analyze their position and **mutate long-standing structural arguments in their favor**.

## SECTION 5.3 REDEFINITION

**MUTATION RHETORICALLY: THE IRREVERSIBLE INTRODUCTION OF A NOVEL CHANGE TO A DISCOURSE IN ATTEMPTS TO ACHIEVE A CALCULATED SHIFT THAT CHALLENGES ESTABLISHED STRUCTURES TO INDUCE A NEW TRAJECTORY FOR DEBATE.**

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## SECTION 5.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

Although mutations, like arguments, are spun usually out of random, it is up to **rhetoricians to incite the changes in dialogue** that further prompt generative discussion to prevent stagnation and circular conversations. Like mutations, not all rhetorical tactics are beneficial, ethical or even based in fact, for example: The introduction of misleading statistics or false claims which can prompt confusion and outrage instead of productive debate. Examples of harmful mutation of thought have unfortunately been common within the field of science. Andrew Wakefield, an expelled surgeon, who worked on the infamous *Lancet case series* which demonized vaccines and falsified data that supposedly found that vaccines linked to increases in autism (Rao). This study immediately sparked conversation and controversy, and rates of MMR vaccines dropped drastically in response. The Wakefield example serves as an instance of **rhetorical mutation**, rooted in manipulated data rather than evidence, and was **responsible for the rapid shift in public opinion** which continues to pervade today’s discourse.

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## SECTION 5.5 TERM IN RELATION

The power rhetors hold to irreversibly mutate public perception through the introduction of inventive ideas goes hand in hand with the foundation of **predator rhetoric** which both aim to upset and challenge long-standing systems.

# *Analysis of Partition*

*Formal Definition: The action or state of dividing or being divided into parts.*

## SECTION 6.1 INTRODUCTION & BIOLOGICAL RELEVANCE

The process of **partitioning**, in reference to science, is the **separation of two immiscible layers**, typically organic and aqueous, in order to purify a substance based on its solubility. Essentially, the **act of isolating a goal product based on its intrinsic properties**.

This purification is essential in laboratories and requires a researcher to know the **particular character of their goal** molecule in order for a successful reaction. If a researcher were to misunderstand how the compound behaves, it will be lost in the ‘waste layer.’ A simpler example of this process is the mixture of oil and water, which naturally separate into two distinct layers: aqueous (water) and organic (oil). If a researcher assumes their compound of interest will remain with the oil, they will discard the aqueous layer in the waste bin, the result could be disastrous if that assumption were wrong.

## SECTION 6.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

When familiar with the act of scientific partitioning, scientists can further understand its importance to the formation of rhetorical arguments. In Crowley and Hawhee’s *Ancient Rhetorics for Contemporary Student*, the term **partition** is defined as the “division of the issue into its constituent parts” (224). Rhetoricians use **partition to break down ideas into components** of an overall argument, serving as a roadmap of which points to argue. Scientists use partitions to isolate purified compounds, serving as reagents to further experimentation, the roadmap to discovery itself. **Both fields rely on understanding the distinct layers** and how their goal product interacts within them.

## SECTION 6.3 REDEFINITION

**PARTITION RHETORICALLY: THE ACT OF NAVIGATING COMPETING LAYERS—SCIENTIFIC, SOCIAL, AND IDEOLOGICAL—TO FIND THE MOST TRUE, PURE, AND CLEAR PRODUCT POSSIBLE.**

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## SECTION 6.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

The rhetorical idea of **partitioning** is integral to the field of scientific discovery, especially as it pertains to the sharing and promotion of these revelations. Charles Darwin provides us with a clear example of the power of partitioning, in his discovery of evolution through the observation of finches of the Galápagos island. While his findings were revolutionary they could not immediately be accepted due to the prevailing religious and social beliefs of the time. In reference to partitioning, Darwin had **to navigate the layers his idea would have to survive, the social and religious context. In order to garner acceptance of his idea**, he carefully introduced it to his social circles and trusted colleagues which gradually expanded its reach—a strategy which would be ineffective had he introduced it directly to the Church. This illuminates how in both science and rhetoric that the practice of partitioning ensures that **ideas survive, travel through the right layers, and emerge in their clearest form**, ready to be understood, accepted, and built upon.

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## SECTION 6.5 TERM IN RELATION

The foundation of partitioning is supported by the term **niche** in which ideas and the rhetor have to be understood in the context of their environment to be effective. These ideas go hand-in-hand to the formulation of arguments that will survive the layers of the systems they exist within.

# *Analysis of Taxonomic Analysis*

*Formal Definition: The branch of science concerned with classification, especially of organisms; systematics.*

## SECTION 7.1 INTRODUCTION & BIOLOGICAL RELEVANCE

**Taxonomy**, in plain English, is the study of how species arose, evolved, and are related to each other. This is especially important when mapping out the genetic history of specific species, linking them back to the Last Universal Common Ancestor, LUCA, in which all species derive. Biologists especially concern themselves with the latest relatives of *Homo sapiens*, such as *Homo bodoensis* and the Neanderthals, to **better understand the evolutionary context of humankind today**. These separate, but common, species give scientists a glimpse in further understanding the genetic complexity and migration patterns of modern humans.

## SECTION 7.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

Biologists split up species based on phenotypes, cellular make-up, and behavioral traits to hypothesize family lineages and potential environmental factors which caused these divisions. When paralleling this practice to rhetoric, we can see that **rhetoers are responsible for researching the earlier forms of arguments**, moments that catalyzed their development, and the ways counter-arguments evolved alongside them. For instance, to understand the scope of contentious issues, such as abortion, a rhetor must trace the argument back through its earlier branches—from religious conceptions, physician resistance to mid-wives, to the recent overturning of *Roe v Wade*—**all perspectives must be tracked to best formulate an argument**. Mirroring how biologists use taxon trees to chart the branches of speciation, effective rhetors must use taxonomic analysis to map the development of arguments over time.

Diane’s, *Autozoography: Notes Toward a Rhetoricity of the Living*, draws upon a quote that justifies the argument for taxonomic analysis in which Deridda states “Everything begins in the folds of citation” (533). This metaphor explains that every argument emerges within a web of prior discourses. The citations, predecessors, and the controversies that shaped it, explaining that all arguments exist inside the context in which they are situated.

## SECTION 7.3 REDEFINITION

**TAXONOMIC ANALYSIS RHETORICALLY: THE PURPOSEFUL TRACING OF ARGUMENTS OVER TIME USING RESEARCH, CULTURAL CONTEXT, AND PRECEDENT TO MAP HOW IDEAS DEVELOP AND BRANCH TO ADD MEANINGFUL DISCUSSION TO HISTORICAL DEBATES.**

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## SECTION 7.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

The practice of building upon theories with research is common in the scientific fields, and can be used to formulate arguments about the properties of our world. For example, Galileo Galilei, a renowned scientist known for challenging the geocentric model. This model hypothesized that the center of the universe was Earth and was strongly supported by the church. Galileo **built upon the heliocentric theory proposed by Copernicus**, using his own astronomical observations to formulate arguments (Starchild). By **situating his work with the context of prior theories**, precedent, and the cultural influence of religious resistance, he **effectively traced and further expanded the branches of the debate**, practicing the idea of taxonomic analysis to redefine the world as we know it.

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## SECTION 7.5 TERM IN RELATION

The practice of taxonomic analysis adds to the concept of **environmental allocation**, in which a rhetorician must know the history of an argument as well as the audience they intend to present to. Both of these terms can **transform an argument into something culturally relevant and effective**.

# Analysis of Iron-Latticed

*Formal Definition: A regular geometrical arrangement of points or objects over an area or in space specifically : the arrangement of atoms in a crystal*

## SECTION 8.1 INTRODUCTION & BIOLOGICAL RELEVANCE

**Iron**, a strong, essential biological metal, binds together through its atomic bonds. The arrangement of molecular compounds is of much interest in the scientific field and is often an introductory topic to incoming experts. The importance of these arrangements is due to the fact that the **molecular bonds of a compound are what determine its structure, intrinsic properties, and behavior**. Interestingly, these bonds are malleable and can be shaped by their environments, such as the structure of bound iron molecules. Typically, **iron forms lattices**, an ordered, repeating structure that **gives it a sturdy configuration that can withstand external pressure**. However, when heated or cooled, the metal expands and contracts, and the structure of the iron-lattice is **reorganized to adopt a different structural form**.

## SECTION 8.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

Like the elemental structure of iron, **powerful rhetoric must be forged in the fiery strength of timing, location, and context**, while still maintaining a sense of structural stability. In Crowley and Hawhee’s *Ancient Rhetorics for Contemporary Students*, they argue that “each rhetorical situation is unique, each occurs in a time and place that can't be wholly anticipated or replicated” (37). This mirrors the behavior of the iron lattice—stable enough to hold its shape, but **flexible enough to reorganize under pressures**. Like iron, which forms in the cores of stars through high pressure nuclear fusion, disputes and controversies are products of contention and societal tension. Mimicking the nature of iron’s behavior, **modern discourse requires both durability and responsiveness** to the conditions that surround it.

## SECTION 8.3 REDEFINITION

**IRON-LATTICED RHETORICALLY: THE CAREFUL ANALYSIS OF CURRENT DEBATES TO FORMULATE AND STRUCTURE A RESPONSE WHICH IS BUILT UPON FIRM LOGIC WHILE REMAINING FLEXIBLE ENOUGH TO BEND TO THE HEAT OF DEBATE, CONFLICT, AND PUBLIC TENSION.**

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## SECTION 8.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

In the sciences, this approach is integral to the formation of research papers. Nearly all published research papers follow the same format, containing an abstract, introduction, methods, results, and conclusion. While this layout can feel like a constraint in the scientific world, it **works effectively as a lattice that other researchers are familiar with** and can add onto with their own research. The familiar pattern enables scientists to use the findings to extend and reorganize the lattice structure even further, evolving understanding. A revolutionary example of this was Jinek’s paper on the Crispr/Cas9 system, which was a comprehensive guide on the steps of gene editing. This was met with immediate attention, and researchers rushed to replicate their findings delineated in their format. This research, which was published in 2012, was the reason Chinese researcher He Jiankui made headlines for editing his twins' genomes, Lulu & Nana, to be HIV resistant in 2018 (Raposo). This demonstrates the **power of the iron-latticed structure**—information circulated efficiently, building upon foundational understanding which can be reorganized and further adapted by others.

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## SECTION 8.5 TERM IN RELATION

This works alongside **adaptation**, which takes advantage of events, and together molds timely opinions into something carefully forged. Both encourage that papers and opinions **should be structured similar to metallic atoms, clear, concise, and effective in their composition and context**—situated within the argument, and adding necessary thoughts to the current dialogue while simultaneously being flexible enough to be built upon.

# Analysis of Frequency

*Formal Definition: The number of repetitions of a periodic process in a unit of time*

## SECTION 9.1 INTRODUCTION & BIOLOGICAL RELEVANCE

The idea of **frequency** in science is often associated with the study of physics, most commonly related to light, sound, or electromagnetic waves. The **frequency determines the character of these waves**—the color of light, the pitch of sound, and the strength of electromagnetic force. Biological systems also rely on frequencies, seen in the repetition of heartbeats, breaths, and oscillations of circadian rhythms. **Frequency is a necessary unit to survival** and the maintenance of life while subtly influencing aspects of our environment.

## SECTION 9.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

The importance of frequency can be paralleled to the field of rhetoric. Tina Campt, in *Black Visual Frequency*, engages this term more critically in its relation to cultural and human interpretation. She analyzes frequency not simply as repetition. **She illuminates how frequency of song creates its own argument**, and is a reflection of culture. She does so by citing a specific example of enslaved Black laborers resisting through sound—their song serving as “a metronome that makes their work not only seen, but heard.” Through scientific understanding, we have become intimately familiar with the necessity of our own frequencies, but tend to forget their power. These seemingly mundane biological frequencies maintain life; **however, interruptions in these patterns through rhetoric can create powerful arguments** about vulnerability, change, or the conditions required for survival.

## SECTION 9.3 REDEFINITION

**FREQUENCY RHETORICALLY: THE DELIBERATE REPETITION OF DISRUPTIVE IDEAS THROUGH DIFFERENT MEDIA TO PROMOTE AN ARGUMENT THAT DEMANDS ATTENTION.**

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## SECTION 9.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

The practice of frequency is common in the scientific community, used to advocate for research that is initially met with backlash. A prominent modern example of this is the skepticism over climate change data. **Climate change is a contentious debate**, stemming from suspicion of the validity of researchers' statements, often fueled by parties which benefit economically and have motives to question findings that would harm them financially. While the evidence of climate change has been tracked for decades through the analysis of atmosphere contents compared to fluctuations in global temperature, **the simple publication of these statistics is insufficient to sway public opinion**. This is where advocacy groups come in, such as the *Just Stop Oil* campaign, which go to radical extremes to convey a message that depends on frequency and public outrage. **This group enacts multiple forms of media which aim to raise awareness** of climate change. Their motif has been the covering of iconic figures in a bright orange color, and were responsible for the spray painting of Taylor Swift's jets, painting Stonehenge, and throwing cans of tomato soup on Vincent Van Gogh's 'Sunflowers.' These movements have demonstrated frequency in action. **The repeated, multimodal, and dramatic demonstrations have made the argument for climate change impossible to ignore** and exemplify the power of frequency.

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## SECTION 9.5 TERM IN RELATION

The act of **frequency** works in tandem with the idea of **mutation**. They are both responsible for the development of discourse. **Mutation provides the framework** of conversation while **frequency serves to bring attention** to the points made and sway public opinion. Both are instrumental to the field of rhetoric and the expansion of the way the audience views ideas.

# *Analysis of Adaptation*

*Formal Definition: A change or the process of change by which an organism or species becomes better suited to its environment.*

## SECTION 10.1 INTRODUCTION & BIOLOGICAL RELEVANCE

In the scientific field, **adaptation** is understood as the process of change by which an organism becomes better suited to its environment. Adaptation gives rise to a multitude of traits such as the structure of a bird's wings, a chameleon's camouflage, or even the way our fingers prune in water. These features are **not neutral** but instead persist because **they offer an advantage**. Consider Darwin's finches, birds that under selective pressure developed beaks of varying lengths to access different food sources. These adaptations, derived from years of natural selection, **enabled multiple finch species to flourish** in the same ecosystem.

## SECTION 10.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

When understanding **adaptation**, we see the critical role that an organism's environment plays in shaping their features. Using this framework of adaptation and paralleling it to rhetoric, we come **to understand how our arguments should reflect and be built upon the culture** and current dialogue of the present. In Crowley and Hawhee's *Ancient Rhetorics for Contemporary Students*, they explore the topic of commonplaces, in which we come to understand that rhetors "responses are determined by the ideologies to which they subscribe," highlighting how our perspectives and opinions are shaped by the communities in which we are raised. Just as our thumbs evolved to grasp objects, enabling us to make stone tools, commonplaces instilled by our environment allow us to craft and shape arguments.

## SECTION 10.3 REDEFINITION

**ADAPTATION RHETORICALLY: THE PRACTICE OF CONTINUOUSLY ASSESSING OUR ENVIRONMENT, IDEALS, AND CIRCUMSTANCES TO FURTHER PROBE AND REINVIGORATE OUR ARGUMENTS.**

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## SECTION 10.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

It is in the failure to understand our audiences and the importance of communal symbols, that our arguments fall flat. Our arguments must adapt to the cultural, social, and ideological landscapes for our audiences in order to persuade. For instance, the argument for the existence of adaptation relied on these same principles. Charles Darwin emulated the importance of understanding his circumstances in his discovery of evolution through the observation of finches of the Galápagos island. Being at the forefront of this major discovery, he knew he would face backlash, especially from authoritarian religious powers. This environmental context led him to strategically delay presenting his findings, and instead focused on gathering evidence. During his five-week visit to the Galápagos Islands, he carefully charted and documented a multitude of animal and plant species in order to support his hypothesis (Klientours). This constant assessment of his environment and the context in which he would present his ideas allowed him to invigorate his arguments with statistics and proof that could not be refused. Darwin adapted his argument to have traits that would strengthen his argument for a hostile environment.

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## SECTION 10.5 TERM IN RELATION

The practice of **adaptation** goes hand-in-hand with **frequency**, which functions well within certain environments—like whale calls in water—and poorly in others—such as a fork scraping a plate. It’s all **a matter of time, place, and intent**, all which can come together to make or break an argument.

# Analysis of Stagnation

*Formal Definition: The state of not flowing or moving.*

## SECTION 11.1 INTRODUCTION & BIOLOGICAL RELEVANCE

**Stagnation**, scientifically, refers to a system that has slowed or stopped. While this term often invokes a negative connotation, scientifically, it is often necessary for growth. Nature itself observes this stillness, in which the environment **stagnates to create conditions for life**—still water allows for the bloom of bacteria, dormant seedlings lie in wait beneath the soil until spring, even our own cells enter quiescence to repair genetic material and survive stress. Although scientists often focus on progress and constant movement in nature, **periods of stagnation are crucial for restoration and growth.**

## SECTION 11.2 EXPANSION INTO RHETORIC & THEORETICAL SUPPORT

The idea of stagnation in science can be paralleled to the field of rhetoric. Stagnation has a similar equivalent in the field of rhetoric, stasis. Stasis, as discussed by Crowley and Hawhee's *Ancient Rhetorics for Contemporary Students*, is the **pausing of arguments to probe questions deeply**—to halt, analyze, confront points of contention and uncover paths forward. Like scientific stagnation, **rhetorical stasis emphasizes reflection before action.** We are often quick to assume positions, polarizing and pitting us against each other. Instead, Crowley & Hawhee expand upon this and discuss that if two rhetors disagree, the stasis marks the place where they come to rest, where they can agree that they disagree (56). **Here, “rest” can be understood as deliberate stillness—a human form of stagnation**

## SECTION 11.3 REDEFINITION

**STAGNATION RHETORICALLY: THE PRACTICE OF SLOWING DOWN OUR OWN CONSCIOUS DELIBERATIONS TO UNDERSTAND OUR STANCE BEFORE ENTERING DEBATE.**

## SECTION 11.4 BIOLOGICAL CASE STUDY & RHETORICAL IMPORTANCE

Paralleling this further to the scientific field, is the father of genetics, Gregor Mendel. The key to his **discoveries was patience and conscious effort.** First, Mendel noticed the way the pea plants in his garden produced variations in their appearances. Rather than rushing to conclusions, he instead raised and recorded generations of pea plants—**meticulously observing how traits such as seed shape and color were inherited** (Mikos). This deliberate reflection allowed for Mendel to uncover the fundamental principles of inheritance, laying the groundwork for genetics—even without knowledge of DNA.

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## SECTION 11.5 TERM IN RELATION

Through this practice of stagnation, our arguments grow into something **Iron-Latticed**, clear and firm in conviction, yet still human and malleable under the right conditions. We must understand our own rhetorical perspective to adequately handle others' pressure—or even adjust our stances when so persuaded.



SEE ALSO: [IRON-LATTICED](#) (17)

# *Message to Reader*

## SECTION 12.1 MESSAGE

To discuss rhetorical choices within this glossary, I wanted to first explore the format. The textbook style allows for the intended audience, scientific peers, to easily digest the information without getting lost in unfamiliar conventions. While I'm aware this does eliminate general audiences who detest textbook presentation, the choice is intentional. This glossary's goal is not for universal appreciation, but to cater to STEM students who want an accessible rhetorical bridge without forcing them to adapt to a different modality. This familiarity of the format builds ethos and invites reluctant readers into a discipline they'd otherwise avoid. Continuing with this emphasis in familiarity, I chose to display my text in Times New Roman, a standard font in scientific textbooks, to further reinforce credibility, accessibility, and provide a sense of academic integrity.

In addition to these choices, I chose to omit diagrams and pictures in my presentation. While classic textbooks are filled with diagrams and charts, I wanted to purposefully provide a piece of writing that lacked these scaffoldings. While this initially sounds counter-intuitive, the intent is to slow readers down and encourage them to deliberately engage and connect with each term in the glossary rather than relying on a quick breakdown provided by a graphic. Without visual shortcuts, readers must grapple with the terms on their own, reinforcing the glossary's goal of fostering rhetorical awareness rather than passive study.

Ultimately, my glossary rhetorical choices work together to create a learning experience that is accessible while simultaneously rigorous. It functions to ease scientific readers into the field of rhetoric through structures they are already familiar with.

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