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Mixing Medievalism and Molecular Biology in the Age of COVID-19

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Mixing Medievalism and Molecular Biology in the Age of COVID-19

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Abstract

"From Beast Books to Resurrecting Dinosaurs" is a general education honors course focusing on the description, understanding, and classification of animals over time. It was first co-taught with a chronological structure that began with classical texts and ended with synthetic biology, until COVID-19 prompted a reconsideration of that structure. This reconsideration, in turn, brought the literature closer to the biology, essentially integrating the approaches of both disciplines—without detriment to either, to the wonder of the molecular biologist and the medievalist.

Frontispiece for the course "From Beast Books to Resurrecting Dinosaurs," 2021[1]

Sandy: Two years before the pandemic arrived, we developed "From Beast Books to Resurrecting Dinosaurs," an integrative biology and comparative literature honors course.

Bryan: Through the course, we sought to explore methods and approaches used throughout the history of Western civilization to describe, explain, classify, and expand biodiversity: the variety of living organisms in the natural world.

Sandy: The course was approved, and we taught it a year later. But that would be the last time we would teach the course as described in our course proposal, with Aristotle and Pliny leading us to medieval texts, including bestiaries, Albertus Magnus, and Chaucer, followed by Cavendish and Bacon…

Bryan: …and Linnaeus and Darwin providing an entry into the world of science: models (molecular and otherwise) of genes and DNA, and methods of engineering genomes, genetic codes, and life itself.

[1] Central Image: "Witches" by squarefrog. Insets (clockwise from bottom left): "Microscope Image" by Gordon Johnson; "Animal Kingdom" by Carl Linnaeus; "Chimera Image" by Lady of Hats; "Adam Names the Animals" from *The Aberdeen Bestiary*; "DNA Image" by PublicDomainPictures; "Sketch from Notebook B" by Charles Darwin; "Geospiza" by Charles Darwin.

Sandy: COVID-19 would jumble those established plans and this comfortable chronology.

Bryan: The first switch to remote learning, in spring 2020, came just after we had made the transition to Linnaean and Darwinian systematics.

Sandy: Zoom seemed simply another means to reinforce the present paradigm: science and technology to the rescue. And Bryan would answer the call, seeing 'my' world—also once his world, as an undergraduate English minor—ordered by a different set of 'rules' and hierarchies, an alien way to make sense of the universe, our universe.

Bryan: Although previously I had found the swirl of ideas in the first half of the course disorienting, even chaotic, the COVID shift brought a different kind of turmoil. It meant frantically rethinking what we would do with the class, restructuring the content around the pandemic; adapting class activities, lab and field work, and assignments for the online modality; rebuilding our community.

Sandy: Nevertheless, we managed to escape disastrous consequences; indeed, the students expressed disconcerting enthusiasm (including a suggestion to do exactly the same thing the next year).

Bryan: We were relieved simply to have gotten through it and were prepared for—anticipating—a return to 'normal' teaching the following spring, 2021.

Both: We were not prepared for the message, received in December after finals, requiring us to teach the first part of the course online. The structure and focus of the class would again be challenged, but not as it had been the previous spring—after we had already taught the classical, medieval, and early modern sections, after we had reached an age in which contemporary communication technologies seemed wholly appropriate, as did digital renderings of virus particles and mathematical models of infectious disease.

Sandy: Where would the Middle Ages and Chaucer's 'New Science' fit now that the coronavirus—unseen until the twentieth century—dominated everything? Even as an English instructor bearing the humanities' flickering torch, I couldn't in good conscience pretend the coronavirus didn't exist by proceeding as originally planned, that is, chronologically, which would have avoided DNA for the first half of the course even while we held class remotely to avoid contagion.

Bryan: We would have to integrate the newest science on the virus—the mutant strains, zoonotic transmission, RNA vaccines—into "Beasts" from the beginning of the term. We would have to remix the science and literature entirely.

Sandy: Now Isidore of Seville, bestiaries, and Chaucer would face off against experiments, hypotheses, and molecular biology. I feared for them. They'd had a hard enough time when they had their own space on the syllabus. I have become perhaps too aware of how challenging students find poetry, never mind classical, medieval, and early modern poetry.

Bryan: I worried about teaching genetic replication before defining genes, or inheritance, or generations.

Sandy: I decided to start with etymologies, a comfortable refuge for me, then move on to metaphors. *Auctorite*. Relevant real and fantastic animals, too: lions, eagles, flies, and dragons, monoceros, phoenixes. We would examine the virus etymologically and metaphorically, and interrogate Theodore Brown's contention that 'making truth' in science is through metaphor. We would consider *trouthe* in the Middle Ages. We would contrast classical and biblical *auctorite* with scientific authority through what constitutes both.

Bryan: We would attack the not-quite-living virus directly, dissecting it through electron micrographs while reading Robert Hooke's and Margaret Cavendish's seventeenth-century perspectives on microscopy. When we talked about origins, we put primitive metabolisms and the RNA world of self-replicating molecules beside a bestiary page depicting The Creation. We discussed poisons—those conjured by the Weird Sisters or carried by contagions—and possible antidotes. We thought about the problems Nature herself poses—the vastness of biodiversity and how we've shrunk it, or at least come to apprehend it, through study. And how, unfortunately, we've quite literally shrunk it through the way we live.

Both: We reworked the mixture, awakened our students' interest not only in the ingredients—literature, science, even fantasy—but how to blend them: dark magic to those who are unable to believe that could be done even in the best of times.

Sandy: It's not that some of the active learning exercises weren't transferable. It was, of course, possible to read stanzas of *The Parliament of Fowls* aloud and have students do some of what had been planned for in-person classes over Zoom, in groups or alone, such as:

1. Create a bird checklist using the keywords that each of you compiled in the homework. Fill in the checklist. Add sketches or illustrations where appropriate.
2. Write a short scholarly summary of the poem, using all the keywords of the group.
3. Write a short instructional manual or survivor's guide on how to understand the poem. All the keywords of the group should be used. Use figures where helpful.
4. Create a guide for a test (*recitatio*) on Chaucer to be administered to medieval students who have no access to paper or pens. All the keywords of the group should be used.
5. Create dictionary entries for the keywords listed by each member of the group. Be sure to include examples from either of the two readings assigned for today.

Bryan: But these activities evolved, their elements altered and recombined. We asked the students to go outside on a cold weekend in mid-February and watch birds, observe them the way a naturalist would, and then create something that represented their experience—all while reading Chaucer's poetry.

Sandy: *The Parliament of Fowls* celebrated our return to teaching in person, and it seemed to resonate with students more than in previous iterations of the course. Chaucer's courtly and rather unnatural eagles embodying profitless speech, however conventional and evocative, were appreciated in a new way. Waiting a year to see and win their beloved, reasonable for literary romance, untenable for the continuation of life, seemed to parallel lived experiences left unspoken. The students returned to eagles: Chaucer's, Pliny's, and Isidore's. They fixated on kind, diversity, and the integration of the science.

Bryan: Our reformulated course left more room for us to discuss hybrids and chimeras—both mythic monsters and those born of synthetic biology.

Sandy: How strange it was to watch students not just re-engage with the bestiary we introduced earlier, but trace its influence on fantasy hybrids in games and television shows or create their own hybrids that bore a far greater resemblance to the literary tradition than the molecular one.

Bryan: We studied creatures that humanity has erased from existence, and we talked not only about the technological advances that make de-extinction conceivable and even feasible, but also about restoring ecologies and reestablishing connections between organisms, species, fields.

Sandy: Curiously, it was the students who made the connections as they created new worlds to keep mythical, literary, and real creatures safe from human neglect, exploitation, and indifference.

Both: Three times we have been pushed to see new relationships, new ways to read, and new ways to teach. Three times the experience has charmed us into trying again.

Works Cited: Printed

Brown, Theodore. 2003. *Making Truth: Metaphor in Science*. Urbana and Chicago: University of Illinois Press.

Linnaeus, Carolus. 1735. "Animal Kingdom." *Systema Naturae*, 1st ed. Leiden: T. Haak.

The Aberdeen Bestiary. 1996. *The Aberdeen Bestiary Project*. Aberdeen University. University of Aberdeen Library Special Collections.

Works Cited: Online

Darwin, Charles. 1837. "Sketch from p. 36 of Notebook B." Uploaded August 18, 2011. Accessed August 6, 2021. https://commons.wikimedia.org/wiki/File:Darwin_tree.png.

———. 1845. "Geospiza." *Journal of Researches into the Natural History and Geology of the Countries Visited during the Voyage of the H.M.S. Beagle Round the World, under the Command of Capt. Fitz Roy, R.N.* 2nd ed. London: J. Murray. Accessed August 6, 2021. https://www.biodiversitylibrary.org/page/2010582#page/393/mode/1up.

Johnson, Gordon. n.d. "Microscope Image." Accessed August 6, 2021. https://pixabay.com/vectors/microscope-magnify-line-art-science-5138742/.

Lady of Hats. 2016. "Chimera Image." Last modified November 1, 2016. Accessed August 6, 2021. https://commons.wikimedia.org/wiki/File:DnD_Chimera.png.

PublicDomainPictures. n.d. "DNA Image." Accessed August 6, 2021. https://www.publicdomainpictures.net/en/view-image.php?image=42609&picture=dna.

Squarefrog. n.d. "Witches." Accessed August 6, 2021. https://pixabay.com/vectors/cauldron-witches-potion-witchcraft-5524900/.

FROM BEAST BOOKS TO RESURRECTING DINOSAURS (SPRING 2019)

READINGS, TOPICS, AND SELECTED ASSIGNMENTS

Weeks 1–5: Classical *Animalia* and Medieval Beasts

Tues 1/8 **Introductory**

Method: integration & collaboration

Names, language, definition.

Scientia, *questia*, science, questions

Thurs 1/10 **Origins: Writing and Teaching the Natural World**

Have read, Aristotle, *History of Animals*, I.i. and "Introduction"

Tues 1/15 **Author, Authority, Sources**

Roman Natural History: Pliny the Elder, *The Natural History*, vol. III. Bk VIII, chapters XVII-XXII, LXXXI-LXXXIII, The Nature of the Terrestrial: lion, hare, mouse, shrew

Journal Identify two authorities identified by Pliny to support what he says about lions. How do the authorities provide support for Pliny's claims? Be specific. Find one contemporary authority—scientific source—to counter one of those claims.

Thurs 1/17 **Classical Appropriations**

Aesop, "The Lion & the Mouse," "The Kingdom of the Lion"

Ovid, *Metamorphoses* ("The Primal Chaos-Separation of the Elements," I.1-31; "Other Species Are Generated," I.416-437; "Phoebus Kills Python and Sees Daphne," I.438-472)

Tues 1/22 **Medieval *Auctorite*: Etymology (!?), Metaphor, and Allegory**

Physiologus, Introduction & Lion [¶1]; Books of Beasts in British Library

Isidore of Seville, *Etymologiae,* XII.ii.-iii.4 on pp. 251-255 (Beasts through Shrews)

Aberdeen Bestiary, "Creation," including "Creation of the Animals," f1r-2v

Journal Create an etymology of your own name and draw conclusions about your lineage, behaviors, and appearance. Compare to others of your kind in word and image.

Thurs 1/24 **Utilities**

Aberdeen Bestiary: "Adam Naming the Animals," 5r and 5v, and Lion, Bear, Elephant,Eagle, Turtledove, Goose

Hildegard de Bingen, *Physica*, intro & some birds

Tues 1/29 **Method, Order, Tone**

Albertus Magnus, *On Animals*, Bk I, chapters 1 & 2, "A Digression Declaring the Manner," "On the Types of Parts," and chapter 3, first 10¶s; Bk VII, chapter v, "A Digression Setting forth the Reasons for Good Health or Defect"; Bk VIII, Tract v, chapter 1, first 7¶s (Lions); Bk XXIII (Eagle, Goose, Turtledove); Resnick & Kitchell, "Albert's Importance for Medieval Science," "A Digression Declaring the Manner and the Order of Instruction"

Thurs 1/31 **Representing Medieval Taxonomies**

Crane, "A Taxonomy of Creatures in the Second-Family Bestiary," *New Medieval Literatures*, 10 (2008): 1-15

Chaucer, *Parliament of Fowls*

Tues 2/5 **Catching up, Zoo View, & Review**

Journal Identify 8 key words. Then quote one passage from the readings that seems to exemplify the word. Define that word. Then discuss specific details of the passage (of which you have already quoted its entirety) in relation to the word. Do not generalize. Then choose a second key word and do the same thing above with a second passage.

Zoo View Assemble images of creatures that reflect ideas of classical natural history, the bestiaries, and more recent scientific discoveries and ways of thinking. Then curate those representations by naming and organizing them according to different schemes used throughout history.

Thurs 2/7 **Unit Test**

<u>Weeks 6–10: Developing a/the Scientific Method</u>

Tues 2/12 **Idols of/and the Past**

Bacon, *Novum Organum*, "Preface," Aphorisms I, VIII, XI-XIV, XVIII-XIX, XXXI, XLIV, XLIX, XC, and *The New Atlantis* (excerpt)

Thurs 2/14 Cavendish, *Observations upon Experimental Philosophy*, "Of Micrography, and of Magnifying and Multiplying Glasses," 3. "Of the Eyes of Flies," 9. "Of a Butter-flie," 10. & *The Description of a New World, Called The Blazing-World* (excerpt)

Merian, *Metamorphosis Insectorum Surinamensium* (*Transformations of the Insects of Suriname*), and "New Butterfly Species…"

Journal	Compare one of Bacon's claims to one of Cavendish's claims. Consider how each makes his/her argument: tone, form, voice, when they wrote, potential connections between the works. Compare apples to apples, focusing on either the "scientific" texts or the "Utopian" worlds they created.
Tues 2/19	Linnaeus, *Systema Naturae*, chapter 5, "Observations on the Animal Kingdom"
	Skim a few pages of Linnaeus, *Systema Naturae*, Insects, Lepidoptera
	Video: Carl Linnaeus by Natural History Museum
	Paterlini, "There Shall Be Order," *EMBO Reports*
Thurs 2/21	**Transition**
	Zimmer, "Darwin, Linnaeus, and One Sleepy Guy," *Discover Magazine*
Tues 2/26	**Evolution: Evidence and Mechanism**
	HHMI BioInteractive, *The Origin of Species: The Making of a Theory* (video)
	Excerpt from Darwin & Wallace, "On the Tendency of Species to Form Varieties…," comm. to Linnean Society of London
E-Journal	How does Darwin explain the tendency of species to form varieties? Quote some key lines/passages. What empirical (based on observation) evidence does Darwin cite in this manuscript to buttress his argument?
Thurs 2/28	**Darwin in Experiment and Poem**
	Nicholls, "The Seeds That Sowed a Revolution," *Nautilus*
	Darwin, "Does Sea-water Kill Seeds?," *Gardeners' Chronicle and Agricultural Gazette*
	Padel, "Salting the Seeds," *Darwin: A Life in Poems*
	McGrath, "Darwin's Descendant, On Origin of Poetry," *The New York Times*
E-Journal	What was Darwin's purpose in doing the experiment with seeds in salt water? What did he learn and what was the process that led him to make certain inferences or tentative conclusions? Discuss something shared between Darwin's article "Does Sea-water Kill Seeds?" and Padel's poem "Salting the Seeds." Then discuss what you perceive as important differences.
Tues 3/12	**Trees**
	Excerpt from Wallace, "The Origin of Species and Genera," *Nineteenth Century*
	"Patterns," *Evolution 101*, evolution.berkeley.edu (interactive website)
	Darwin, "Classification," *On the Origin of Species*, 1st edition, chapter XIII

Notebook Create and/or find three stories about the origin of an animal's behavior and/or form. Represent classical, medieval, and scientific styles in your stories. The scientific tale should represent Darwinian thinking, explaining the origin mechanistically and providing evidence for the mechanism. Cite any sources you use. End with a short analysis comparing and contrasting the three stories.

Thurs 3/14 **More Trees**

Quammen, *The Tangled Tree*, chapters 1-8

E-Journal Reflect on how your understanding of Darwin's ideas changed (if it did) after having read the excerpt from Quammen's book.

Tues 3/19 **Inheritance and Counting**

SciShow, "Gregor Mendel: Great Minds" (video)

Mendel, "Experiments in Plant Hybridization," comm. to Brünn Natural History Society

Lobo, "Genetics and Statistical Analysis," *Nature Education*

Thurs 3/21 **Zoo View + Review**

Week 11–15: A New Biology

Tues 3/26 **Mutants**

Blake, "The Fly," *Songs of Experience*

Brookes, *Fly: An Experimental Life*, chapter 1

Notebook Darwin wrote, "The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth." Use words and picture(s) to illustrate, interpret, and comment on this passage.

Thurs 3/28 **Unit Test**

Tues 4/2 **Research Papers**

Proposal Pick a single word you think is key to or compelling in both the pre-Darwinian and post-Darwinian reading we have done. You will be addressing how its meaning and usage have changed over time. To this purpose, you will need to introduce the earliest known relevant (to the course) definition and usage and account for the changes over time. You will likely need to address the following questions: How does intended audience and/or who uses the word contribute to what the word means or is assumed to mean? How has time and history impacted the understanding of the word's meaning, utility, and/or importance? Can you discern any pattern or process in the way change has occurred, been welcomed or rejected, and can you account for it in some substantive way?

Thurs 4/4	**Building Models: The Double Helix**
	HHMI BioInteractive, *The Double Helix* (video)
	Watson & Crick, "A Structure for Deoxyribose Nucleic Acid," *Nature*
	Doyle, "The Red-Headed League," *The Adventures of Sherlock Holmes*
Tues 4/9	**DNA and Metaphor**
	Swenson, "The DNA Molecule," *Poetry*
	Duchamp, *Nude Descending a Staircase, No. 2* (painting)
	Taylor & Dewsbury, "On the Problem and Promise of Metaphor Use in Science and Science Communication," *J. Microbiol. Biol. Educ*
E-Journal	Respond to each of the individual works. Then describe one or more of the connections that emerged as you considered the works together.
Thurs 4/11	**Expression: The Central Dogma**
	Stated Clearly, "What is DNA?" and "What is a Gene?" (videos)
	"The Information in DNA Is Decoded by Transcription" and "The Information in DNA Determines Cellular Function via Transmission," *Nature Education*
Notebook	Construct and submit a model (physical, mathematical, or conceptual) that represents a significant idea, object, or process (scientific or otherwise) from the course. Include a description of the model, what it represents and/or explains, the evidence it accounts for, and its limitations.
Fri 4/12	**Field Trip to National Zoo and National Museum of Natural History**
Tues 4/16	**Engineering Genes**
	Cohen & Boyer, "Process for Producing Biologically Functional Molecular Chimeras," U.S. Patent No. 4,237,224, abstract + column 1 (Background of the Invention and Summary of the Invention) + columns 17-18 (the "claims")
	Excerpt from Bacon, *The New Atlantis*
E-Journal	Interpret the quote from Francis Bacon in light of the Cohen and Boyer patent.
Thurs 4/18	**Letters and Relationships**
	HHMI BioInteractive, "Creating Phylogenetic Trees from DNA Sequences" (website)
	Gross, "Reading the Evolutionary History of the Woolly Mammoth in Its Mitochondrial Genome," *PLoS Biol*
	Barbrook, Howe, Blake, & Robinson, "The Phylogeny of *The Canterbury Tales*," *Nature*

Tues 4/23 **Resurrecting Dinosaurs? and Designing and Engineering Life**

Elowitz & Lim, "Build Life to Understand It," *Nature*

Excerpt from Lander, "The Heroes of CRISPR," *Cell*

Andersen, "Welcome to Pleistocene Park," *The Atlantic*

Service, "Synthetic Microbe has Fewest Genes, but Many Mysteries," *Science*

Zimmer, "Creating Life as We Don't Know It," *Nautilus*

Warren, "Life's Genetic Alphabet Doubled," *Nature*

Notebook Scientists record their ideas, procedures, and data in a field or laboratory notebook so that they and others can evaluate and reproduce their work. The notebook also serves as a record to establish priority in disputes over discovery. Submit your notes from the gene expression (genetic engineering) lab. Include information on: the background, context, aims, design; approach, methods, procedures; data, observations, results; conclusions, implications, ideas for future work.

Thurs 4/25 **Zoo View + Touring Old and New Worlds**

Wed 5/1 **Final Exam**

FROM BEAST BOOKS TO RESURRECTING DINOSAURS (SPRING 2021)
READINGS, TOPICS, AND SELECTED ASSIGNMENTS

Tracking What Can't Be Seen

Tues 1/19 **Introductory**

Method: integration & collaboration

Names, language, definition

Representation, description, question, claims

Thurs 1/21 **Observation, Microscopy, Counting and Patterns**

Cavendish, *Philosophical Letters*, III.xiv

Hooke, *Micrographia*, Preface, ¶1 and Obs. XXXIX, "Of the Eyes and Head of a Grey Drone-Fly, and of Several Other Creatures"

Cavendish, *Observations upon Experimental Philosophy*. Obs. 3, "Of Micrography, and of Magnifying and Multiplying Glasses," and Obs. 9, "Of the Eyes of Flies"

Excerpt from Cohen, "Mathematics is Biology's Next Microscope, Only Better; Biology is Mathematics' Next Physics, Only Better," *PLoS Biol*

Journal Find an example of Cavendish's "simple" nature in any genre of your choice. Then find an example of "complex" nature as represented by an authority this week. Discuss how you might reconcile the two representations of "nature."

Tues 1/26 **Models as Representations, Models as Hypotheses**

HHMI BioInteractive, "The Double Helix" (video)

Watson & Crick, "A Structure for Deoxyribose Nucleic Acid," *Nature*

Brown, *Making Truth: Metaphor in Science*, chapter 2

Thurs 1/28 **Metaphors as Connection, as Description, as Question, as …**

Swenson, "The DNA Molecule," *Poetry*

BTS, "DNA" (video)

Journal Collect or access a set of observations or data—not yet encountered in this course—that concerns a beast or beasts (seen or unseen, real or unreal). Be sure to identify the "source" or provide a citation for your data. Present and/or describe the observations, and then address one or more of the following questions: What potential distortions might the set contain? What patterns do you see? What questions are raised? What conclusions do you draw?

Tues 2/2 **Expression, Dogmas, Origins**

Aberdeen Bestiary, Genesis section, "Adam Naming the Animals," 5r and 5v

Stated Clearly, "What is DNA?" and "What is a Gene?" (videos)

Shilatifard, "Medicine in the Time of Corona: Fundamental Molecular Research is 'Essential,'" *Science Advances*

Thurs 2/4 **Review**

Journal Identify five words you think are key to what we have been discussing. Define the five words. Present five images—models, metaphors, or others—that you think are key to what we have been discussing. Compare two of the images, describing their connections, representations, purposes.

Tues 2/9 **Test 1**

Thurs 2/11 **University Wellness Day**

<u>Nature Views and Zoos</u>

Tues 2/16 **Nature and the "New Science"**

Chaucer: *Parliament of Fowls*

Thurs 2/18 **Latin Source → Etymology, Allegory**

Pliny: *Natural History*, (III) X.iii—Varieties of Eagles; X.xi—The Cuckoo; X.xxiv—the Goose; X.li.¶1—The Mating of Pigeons

Isidore of Seville, *Etymologiae*, Birds, XII.vii.1-3, 9-10 (eagle), 21 (heron), 25 (kingfisher), 36 (bat?!), 51-52 (duck & goose), 74 (goldfinch/distelfink)

Bestiary: Of the Eagle, 61r & 61v; Of the Goose and Heron, 53r & 53v; Of Ducks, 59r (bottom & image)

Project Participate in the Great Backyard Bird Count (https://www.birdcount.org/). As a group of three, discuss your collective data, the birds, and your birding experiences. Create something that represents, interprets, and/or interrogates what you observed and/or your experience participating in the Bird Count. Write an artist statement that explains the context and intents of what you created.

Tues 2/23 **Greek Source: in Translation**

Aristotle, *History of Animals*, Bk 1, Part 1; Bk V, Part 13 (pigeon); Bk VI, Parts 6-7 (eagle & cuckoo)

Albertus Magnus, Introduction to Translation of *On Animals* by Kitchel & Resnick (selections on Canvas), Bk 23, "Turtur" (turtledove, including footnotes)

Thurs 2/25 **Scientific Method**

Bacon, *Novum Organum*—"Preface", Aphorisms I, VIII, XI-XIV, XVIII-XIX, XXXI, XLIV, XLIX, XC

Journal Write a proposal for a paper in which you choose one animal and discuss different ways of perceiving, understanding, or appreciating it. Describe and compare at least two different methods or perspectives, from among those introduced in the course thus far, to account for the representation, assumptions, and details of the animal's defining characteristics. Consider the sources and how each modifies or expands the description of its predecessor(s).

Tues 3/2 **Illustrations & Keys**

Merian, *Metamorphosis Insectorum Surinamensium* (*Transformations of the Insects of Suriname*), and "New Butterfly Species…"

Excerpt from Griffing, "Who Invented the Dichotomous Key? Richard Waller's Watercolors of the Herbs of Britain," *American Journal of Botany*

Look at a sample dichotomous key of insect orders

Thurs 3/4 **Zoo View**

Zoo View Assemble images of creatures that reflect ideas of classical natural historians, medieval and renaissance thinkers, and more recent and contemporary scientists. Then curate those representations by naming, describing, and/or organizing them according to different schemes and approaches used throughout history. Creativity is welcome. Include a statement that explains your intents and purposes.

Tues 3/9 **Test 2**

Thurs 3/11 **University Wellness Day**

Tues 3/16 **Classification, Naming, Order**

Excerpt from Millet, *A Children's Bible*

Linnaeus, *Systema Naturae*, 1st edition, chapter 2, "Observations on the Three Kingdoms of Nature" and chapter 5, "Observations on the Animal Kingdom"

Linnaeus, *Systema Naturae*, last edition, "Insects: Lepidoptera"

Paterlini, "There Shall Be Order," *EMBO Reports*

Thurs 3/18 **Hypothesis & Origins**

HHMI BioInteractive, *The Origin of Species: The Making of a Theory* (video)

	Excerpt from Darwin & Wallace, "On the Tendency of Species to Form Varieties…," comm. to Linnean Society of London
	McPherson, "Teaching & Learning the Scientific Method," *The American Biology Teacher*
Tues 3/23	**Trees**
	Excerpt from Wallace, "The Origin of Species and Genera," *Nineteenth Century*
	Darwin, "Classification," *On the Origin of Species*, 1st edition, chapter XIII
	"Patterns" and "Speciation," *Evolution 101* at evolution.berkeley.edu (website)
Project	Find and/or create a story that explains the origin of a creature's behavior or morphology. Your story should represent classical, medieval, and/or scientific thought and styles. Then, using words and pictures (and other relevant media?), present evidence—data and observations—that supports the claims (hypotheses) presented in your story. If you use sources, don't forget to cite them.
Thurs 3/25	**Darwin in Experiment & Poem**
	Nicholls, "The Seeds That Sowed a Revolution," *Nautilus*
	Darwin, "Does Sea-water Kill Seeds?" *Gardeners' Chronicle and Agricultural Gazette*
	Padel, "Salting the Seeds," *Darwin: A Life in Poems*
	McGrath, "Darwin's Descendant, On Origin of Poetry," *The New York Times*
Tues 3/30	**Letters & Relationships**
	HHMI BioInteractive, "Creating Phylogenetic Trees from DNA Sequences" (website)
	Gross, "Reading the Evolutionary History of the Woolly Mammoth in Its Mitochondrial Genome," *PLoS Biol*
	Thomas et al., "An 'Aukward' Tale: A Genetic Approach to Discover the Whereabouts of the Last Great Auks," *Genes*
	Barbrook, Howe, Blake, and Robinson, "The Phylogeny of *The Canterbury Tales*," *Nature*
Journal	Identify a claim or observation (about a creature) that we've read about or discussed in the course and that raises a question for you. Propose a study to investigate the claim or observation and address your question. In your proposal, include a background section that describes the context and implications of the study, the claim or observation you're examining, and the question raised. Then detail a method—an experiment or a means for gathering additional observations—that would help you test the claim and address the question. Finally, explain the outcomes you expect from your study. If you use sources, don't forget to cite them.
Thurs 4/1	**Mendel: Inheritance and Counting**
	SciShow, "Gregor Mendel: Great Minds" (video)
	Mendel, "Experiments in Plant Hybridization," comm. to Brünn Natural History Society

Lobo, "Genetics and Statistical Analysis," *Nature Education*

Tues 4/6 **Zoo View**

<u>Fantastic Beasts, Paradoxa, & . . .</u>

Thurs 4/8 **Mythic Beasts**

Roman: Nereids/aquatic monsters, Pliny, IX.iv; Phoenix, Pliny, X.ii; Fabulous Birds, Pliny, X.lxx; The Story of Medusa's Head (& Pegasus), Ovid, IV (first stanza of last entry in section)

Medieval: Bonnacon, Aberdeen Bestiary, 12R; Dragon and Basilisk, Aberdeen Bestiary, 65V and 66R, also contrast Chinese Dragon; Monoceros, Aberdeen Bestiary, 14V last 2 words, through 15R

Tues 4/13 **Hybrids & Paradoxa**

Pliny, Hybrid of Lions, VIII.xvii &/or hyenas VIII.xlv. Linnaeus, *Paradoxa*. Edward Steed, "Tree of Life"

Journal "Find" a monster that you think should be added to the Beasts class. Identify it. Describe it. Cite its source (unless you have created it). Include a passage and/or picture from any text in which your creature can be found. Be prepared to present it and to explain why you think it should be included.

Thurs 4/15 **More Hybrids: Genetic Engineering & Tangled Trees**

Cohen & Boyer, "Process for Producing Biologically Functional Molecular Chimeras," U.S. Patent No. 4,237,224, abstract + column 1 (Background of the Invention and Summary of the Invention) + columns 17-18 (the "claims")

Doolittle, "Phylogenetic Classification and the Universal Tree," *Science*

Tues 4/20 **Resurrecting Dinosaurs and Other Beasts**

Cramer, "Disextinction, Inc.," *Nature*

Novak, "De-Extinction," *Genes*, Introduction + Table I

Revive & Restore, "The Passenger Pigeon Project" (website)

Thurs 4/22 **New Worlds**

Bacon, *The New Atlantis* (excerpt)

Cavendish, *The Description of a New World, Called The Blazing-World* (excerpt)

Swift's *Gulliver's Travels*, chapters VIII-IX

Journal	As a starting point, use today's reading (as well as the rest of the course) to envision and create a new kind of world or a model for one. Describe what you have created and why. Represent it in a picture or model and/or other medium, in addition to words. Be prepared to present.
Tues 4/27	**Synthesis**
	Elowitz & Lim, "Build Life to Understand it," *Nature*
	Service, "Synthetic Microbe has Fewest Genes, but Many Mysteries," *Science*
	Zimmer, "Creating Life as We Don't Know It," *Nautilus*
	Warren, "Life's Genetic Alphabet Doubled," *Nature*
Thurs 4/29	**Zoo View**
Wed 5/5	**Final Exam**