

TCL TEACHING CLASSICAL LANGUAGES

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In This Issue:

**The MovieTalk:
A Practical Application of
Comprehensible Input
Theory**



**Squaring the Circle
and Saving
the Phenomena:
Reading Science in the
Greek Language Classroom**



**Beginner Latin Novels,
A General Overview**

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Table of Contents

Letter from the Editor	iv
The MovieTalk	70
A Practical Application to Comprehensible Input Theory Rachel Ash	
Squaring the Circle and Saving the Phenomena	85
Reading Science in the Greek Language Classroom Georgia Irby	
Beginner Latin Novels	154
A General Overview John P. Piazza	

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Letter from the Editor

Creating Engaged, Empathetic Students: Social Justice in the Latin Classroom

John Gruber-Miller
Cornell College

Martha Nussbaum, in her book *Cultivating Humanity*, argues that one of the tasks of the Humanities is the development of the distinctively human quality empathy. The word empathy, of course, comes from the Greek ἐμπαθής -ές, “affected emotionally, moved,” most often by human suffering or misfortune.

We can learn from the biographer and moralist Plutarch what this word means in his *Life of Alexander*. After defeating the Persian King Darius, Alexander the Great sees the king’s mother and wife and two unmarried daughters in captivity. Plutarch comments that Alexander is “more affected by their own misfortunes than by his own success” (καὶ ταῖς ἐκείνων τύχαις μᾶλλον ἢ ταῖς ἑαυτοῦ ἐμπαθὲς γενόμενος), Alexander reassures them that Darius is not dead and that they have no reason to fear what he may do to them. Plutarch’s example reminds us that Alexander was tutored by the philosopher Aristotle and highlights the Greek general’s compassion and ethical integrity in this instance.

If we, the inheritors of the classical world, are doing our job and introducing stories that move our students, then we are opening their imagination to ponder possible human responses to difficult situations. If we offer our students templates for virtuous action and negative models of behaviors to be avoided, then we are creating opportunities for our students to think about ethical issues and to imagine putting themselves in others’ shoes. The key is for teachers is to start with the past and then move to the present, to guide our students to learn to notice situations in antiquity that call for empathy and then to compare these lessons to the present day. By challenging our students to examine the ancient world through the lens of social justice, they will also be challenged to think about how they might see present inequities and injustices.

How do we help our students learn to reach out to those who are vulnerable or different or beset by suffering or injustice? One way is by asking students to con-

sider similar situations here and now. In the process of learning about ancient examples of exploitation or powerlessness or violence, my hope is that students realize that what they are learning about antiquity shapes and informs our actions here and now. By challenging our students to examine the ancient world through the lens of social justice, they will also be challenged to think about how they might see present inequities and injustices.

I have found that the definition of social justice articulated by Lee Anne Bell makes sense to me and my students. She stresses that social justice is both a process and a goal. As a process, we must “keep on keepin’ on,” continuing to make visible the slaves, women, and strangers who are so easy to ignore in our elite authored texts. The vision she lays out emphasizes the safety and security—both physically and psychologically—of all people, an equitable distribution of resources, self-determination by every person, and the interdependence and reliance of each person in the community on each other. This vision is the opposite of the rugged individualism of our present day and opposite the fear or despair that so many who are marginalized feel.

This vision is one of both pain and love, noticing the pain expressed in ancient texts in the lives of slaves, the working poor, the prostitute, the refugee, and other marginalized people and calling it to the forefront rather than ignoring it. It is a vision that recognizes the lack of agency that so many in the ancient world experienced and resolves to confront it and talk about it. It is also a vision of love, treating with dignity those who are experiencing misfortune and working with them as allies to find just and equitable solutions. This vision calls our students to shoulder a sense of social responsibility toward others in their community and in the larger world.

It is a truism, at least among the general public, that the ancient world is a world apart, a world with marvelous, fantastical stories that has no bearing on the present day. And if one reads the ancient world exclusively through the eyes of the elite authored texts that have come down to us, it is easy to see the world through the ruling classes, to naturalize the hierarchical world that the Greeks and Romans developed and to miss the plight of non-elites. It takes effort to read against the grain and to look for evidence for the lives of the working poor, the enslaved, the day laborer, and the refugee. Yet, the world of Greco-Roman antiquity also offers certain advantages for helping students recognize the dark sides of human interaction. The temporal, spatial, and cultural distance between the ancient world and the pres-

ent day makes it easier for students to explore a highly charged topic from a more dispassionate perspective before making a connection to a contemporary analogue.

Slavery in the ancient world is one place where it is possible to open up difficult conversations about slavery, human trafficking, and systemic injustice in our world today. Without the production of slaves powering agriculture and commercial establishments, the everyday activities of Greek and Roman households—not to mention the ancient economy—would have scarcely been possible. Similarly, there are multiple Latin texts that explore the plight of refugees and those fleeing in exile: Caesar’s *Gallic Wars*, Vergil’s *Aeneid*, and Cicero’s letters, especially *ad Atticum*, Book 3, *ad Quintum* 1.3-4, and *ad Familiares* 14.2-4. Another place to witness the cultural and linguistic heterogeneity of the Roman world can be found in Pompeii and other multi-ethnic cities. The varieties of Latin manifest at Pompeii and the bilingual inscriptions across the Mediterranean attest to the varieties of Latin or Greek spoken by different ethnic populations, much like the world Englishes spoken around the world by colonized peoples as well as indigenous communities (World Englishes on TED). For more social justice topics and units, see Glynn, Wesely, and Wassell.

While some of these examples align with more advanced classes, how do we bring questions of social justice to the foreground in a language class, including beginning classes? It starts with posing an essential question that shapes a unit and motivates curiosity among students. For example, instead of a unit on Roman food, a unit that describes the general types of foods eaten in the Roman world, the essential question might be “How do diet and dining practices reveal Roman social structures?” Such a question leads not just to what was eaten, but also by whom and under what circumstances. Similarly, in a unit on Roman education, the essential question posed might be “How does Roman education reveal a rigid class structure within Roman society and a lack of upward mobility?”

After posing an essential question, the next step is to narrow the focus of the unit to specific language tasks and concrete cultural products and practices. For example, beginning students might well be able to notice class-based differences in diet by comparing in Latin one or two recipes for the simple, traditional foods that Cato the Elder highlights in the *De Agricultura* with one or two by Apicius intended for the upper classes. Students could talk about which ingredients are available to farmers, to working city-dwellers, and to Roman elites (see Giacosa or Dalby and Grainger). In a unit on Roman education, students might read a simple dialogue

about getting ready for the day or coming home for lunch. In both dialogues, the boy (note the masculine bias) addresses a slave, thereby reinforcing the social hierarchy (Dickey 12-13, 26-27).

Finally, the third stage in creating a social justice unit is to link what students learned about the ancient world with ongoing issues of inequality in the modern world. For example, after comparing the availability and price of ingredients for the two dishes that students read in Cato or Apicius, one could also ask who prepares this food and where. How are those who prepare the food at home or in bars treated? In the ancient world, there might be male or female slaves who prepare meals, but they are typically slaves in elite households (see Green). How does gender inform who prepares food at home in today's world? What sort of treatment and pay do foodworkers receive in restaurants today (e.g., Chen)? Likewise, after exploring the limited literacy of Roman children and the preponderance of the apprenticeship model among Romans, it is a short step to ask students whether the lack of mobility seen in Roman society is paralleled in the United States.

In sum, applying a social justice lens to the ancient world teaches students what questions to pose and how to recognize social hierarchies and patterns of inequity. By comparing the ancient world with the 21st century, students sharpen their critical thinking skills and enhance their ability to see similar patterns from one time period to another. In making explicit the connections between the world of ancient Rome and the present day, students perceive the relevance of the ancient world to our own and are motivated to learn more. Finally, if given the opportunity to respond to an essential question, they learn to be purposeful and to develop a sense of responsibility for those who are marginalized. In short, they learn to become empathetic and caring citizens of the world.

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The MovieTalk: A Practical Application of Comprehensible Input Theory

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ABSTRACT

Teachers new to Comprehensible Input can incorporate a MovieTalk, target language discussion using a movie short as inspiration, easily into their existing curricula. This paper summarizes the theory and research behind Comprehensible Input and describes the relevance of that theory to the activity known as MovieTalk. The paper also provides examples of MovieTalk scripts, guidance in creating one's own MovieTalk script, and videos of MovieTalk demonstrations. Finally, the paper discusses the various options for delivery of a MovieTalk and activities to reinforce the vocabulary taught using the video.

KEYWORDS

Comprehensible Input, Latin, Second Language Acquisition, MovieTalk, Vocabulary

INTRODUCTION

Even before the advent of the internet, teachers, particularly those dedicated to Comprehensible Input theory, recognized video's potential in the language classroom and utilized the medium to bring interesting and understandable communication to their students. Since the internet has revolutionized information and text, short, compelling videos are easy to find, and can excite student interest and change student focus from the words being taught to the content being communicated; i.e., students will begin to care about the meaning of the words and forget they are listening to Latin. In a "MovieTalk," a teacher, using the target language at a level comprehensible to his or her students, narrates sections of a video while pausing the video strategically for discussion, questions, and educated predictions; this provides a natural, engaging means of teaching vocabulary, practicing grammatical forms, and encouraging communicative interaction in Latin. The videos provide both visual support and conversational focus, allowing teachers to practice forms

and vocabulary with students without becoming repetitive. For Latin teachers seeking to begin introducing spoken Latin into their classes, a MovieTalk is an ideal first step, an activity that requires minimal spontaneity but still allows for creativity and personalization, and a tool that can be customized to enhance any curriculum.

THE ARGUMENT FOR COMPREHENSIBLE INPUT

Although Comprehensible Input (CI) has become a buzzword in language education, teachers would be mistaken to disregard CI as yet another education fad; the theory behind CI is solidly built upon decades of hypotheses and their respective research, and is the source from which current Second Language Acquisition (SLA) theory has evolved. CI is comprised of six main hypotheses and the essence of the hypotheses¹ can be condensed into three fundamental pillars of CI: instruction should be comprehensible, compelling, and caring.

The importance of the first of these pillars, comprehensible language instruction, is supported by a multitude of studies. Stephen Krashen, whose ongoing research has influenced language education for almost half a century, explains that “we acquire language and develop literacy when we understand messages” and “acquisition happens gradually, and occurs best when texts are very comprehensible” (“Free Voluntary” 7-8). Krashen cites multiple studies in which comprehensible input leads to significant vocabulary gains for the students involved. Beniko Mason, another researcher into the effects of comprehensible input, describes a series of studies which “show that in vocabulary, grammar, and writing, the comprehension-based approach is far more efficient than either traditional or eclectic methods” (“Comprehension is Key” 373).

Even across the often conflicting theories about SLA and the way our brains process language, it is agreed that “successful instructed language learning requires extensive L2 input,” and for students of a second language, “the more exposure they receive, the more and the faster they will learn” (Ellis 7-8). According to James F. Lee, in his book *Tasks and Communicating in the Language Classroom*, “language

¹ Robert Patrick, 110-111, details the hypotheses, offered here in short: the Acquisition-Learning Distinction, the Monitor Hypothesis, the Natural Order Hypothesis, the Comprehension Hypothesis (also called the Input Hypothesis by Krashen; see Krashen “Comprehension Hypothesis Extended” 81), the Affective Filter Hypothesis, and the Compelling Hypothesis. These hypotheses suggest long-term language acquisition only occurs as a result of much repetition of interesting content at a comprehensible level in an unstressful environment and that focus on grammatical rules prevents acquisition.

or input that is modified to suit the capabilities of the learner is a crucial element in the language acquisition process,” i.e., “comprehensible input is essential to language acquisition” (5). Bill VanPatten, a leading researcher in the field of SLA, argues that “acquisition cannot happen in the absence of input” (“Creating Comprehensible” 25), and that “skill development [in language] happens not because of explicit teaching and intervention, but by providing appropriate opportunities” for students to experience and understand the language in context (“Two Faces” 10).² VanPatten calls the complex process of mapping language and linguistic rules in the brain “mental representation” and describes it as “the abstract, implicit, and underlying linguistic system in a speaker’s mind/brain” (“Two Faces” 2). He clarifies that this linguistic system (i.e. “internal grammar”) “is built up via exposure to comprehensible, communicatively oriented input--a position that is unquestioned in the field of SLA after four decades of research” (“Evidence is IN” 418).³ A Latin teacher using Comprehensible Input, who “consistently is delivering understandable messages in Latin,” is using current research in SLA as it is intended--to inform his or her teaching practice (R. Patrick 111).

The second pillar of CI, instruction that is compelling, suggests that, to create the most effective and efficient environment for language acquisition, teachers should provide comprehensible input that is “so interesting that all attention is focused on the message . . . so interesting that the acquirer ‘forgets’ that the input is in another language” (Krashen, “Free Voluntary” 9). Compelling input inspires students to read, research, and interact with the language outside of the classroom, and Krashen believes most language learners acquire language through interesting pursuits (“Compelling Input” 16):

2 It should be noted here that this paper treats the terms “input,” “comprehensible,” and “comprehensible input” as interchangeable with some precedent. Stephen Krashen equates them himself by renaming his Input Hypothesis the Comprehension Hypothesis (“Comprehension Hypothesis Extended” 81). Bill VanPatten, in *Key Terms in Second Language Acquisition*, writes “all major linguistic and psycholinguistic theories of SLA in use today assume some version of the Input Hypothesis; that is, these theories assume that input contains the data necessary for acquisition and that acquisition is partially a by-product of comprehension” (96). In sum, references to input when discussing SLA theory imply comprehension, because it is necessary.

3 In his article, “Why Explicit Knowledge Cannot Become Implicit Knowledge,” VanPatten further describes the importance of input to true linguistic competence in a language; the article’s illustration of phrasal hierarchies within the German language lays out in clear terms the difference between implicit linguistic knowledge (or “mapping”) and explicit grammatical rules, which he terms “descriptions of the consequences of underlying processes in language” (651).

An important conjecture is that listening to or reading compelling stories, watching compelling movies and having conversations with truly fascinating people is not simply another route, another option. It is possible that compelling input is not just optimal: It may be the only way we truly acquire language.

When teachers create content that intrigues students and excites their curiosity, students learn, because “when a CI teacher delivers understandable messages in Latin about topics that students are interested in, and the teacher keeps the stress in the room low, students forget that this is a language class” (R. Patrick 112). Students then simply enjoy speaking about and listening to a story, the news, or anything else the teacher finds to fascinate them, and learning Latin becomes a fortuitous side-effect.⁴

Creating a classroom culture that is caring, the third pillar of CI instruction, reduces anxiety in students, and the resulting low-stress environment increases language acquisition. Krashen, in his Affective Filter Hypothesis, building on the work of Dulay and Burt,⁵ proposes a connection between student stress and inhibited language acquisition (*Principles and Practices* 31):

Those [students] whose attitudes are not optimal for second language acquisition will not only tend to seek less input, but they will also have a high or strong Affective Filter--even if they understand the message, the input will not reach the part of the brain responsible for language acquisition, or the language acquisition device. Those with attitudes more conducive to second language acquisition will not only seek

⁴ An exciting trend in the Classical community is the movement that calls itself “Active Latin.” Thanks to the “compelling pursuits” of practitioners of Active Latin, Latin teachers have access to more resources, types of texts, and interesting material than any other time in recent history. There is a growing library of novellas, podcasts, and online resources such as [Legonium](#) (Latin stories told with Legos) and Jesse Craft’s [collection of Minecraft-based cultural videos](#) (narrated in Latin). In addition, [Teaching Latin for Acquisition](#) is a Facebook group of like-minded Latinists who share experiences and materials in equal parts.

⁵ Heidi Dulay and Marina Burt lay the groundwork for the Affective Filter Hypothesis starting in their essay “Remarks on creativity in language acquisition,” in which they describe “affective delimiters” as “conscious or unconscious motives or needs of the learner” that can act as a screen through which language has to travel in order to be acquired.

and obtain more input, they will also have a lower or weaker filter. They will be more open to the input, and it will strike 'deeper.'

The Affective Filter Hypothesis delineates an inverse connection between the stress students experience and the language students acquire; high stress blocks the subconscious process of acquisition.⁶

The hypothesis has an implied consequence for education, a fact recognized by Krashen himself: “the Affective Filter hypothesis implies that our pedagogical goals should not only include supplying comprehensible input, but also creating a situation that encourages a low filter” and therefore lowers anxiety and stress (31). A caring classroom environment incorporates practices that reduce student anxiety. In addition to using understandable and compelling messages in class, “humor, stories, personalization and creating personal connections with students bring the stress level down in the room” (R. Patrick 111), CI teachers should seek to keep students’ affective filter low, providing them with an environment that is as conducive to language acquisition as possible, and actions that are often labeled “caring” (i.e., learning about students and engaging them in conversation, incorporating humor and fun, and being sensitive to their needs), are the same actions that lower students’ affective filters. A caring classroom is one in which students feel safe, valued, and therefore open to language acquisition.

In short, the benefits of comprehensible, compelling, and caring instruction--and, by extension, Comprehensible Input--have been repeatedly substantiated through research. Mason agrees, “there has never been a language acquisition approach that has been validated to this extent both qualitatively and quantitatively, not only for its efficacy but also its efficiency” (“Comprehension is Key” 378). As language teachers, choosing to incorporate Comprehensible Input into our Latin instruction is choosing to build our programs on research and scholarship.

MOVIE TALK: A COMPREHENSIBLE BEGINNING

Comprehensible Input practices can seem overwhelming to any language teacher, but arguably even more so to Latin and Greek teachers, who often have

⁶ Krashen in “Free Voluntary Web Surfing” describes the process of acquisition as subconscious: “acquisition via comprehensible input also happens subconsciously; while it is happening, we are not aware that it is happening, and the competence developed this way is stored in the brain subconsciously” (9). High stress prevents this natural process and hinders competence.

little-to-no experience speaking the language they are teaching. A MovieTalk, however, is an approachable activity that can be prepared with as much or as little detail as a teacher chooses, and thus is ideal for language teachers beginning to explore CI practices.

The CI Connection

The MovieTalk was first developed by Ashley Hastings as a focused listening practice for ESL (English as a Second Language) students that would capitalize on the compelling nature of film while still providing the opportunity to control the input students received and make it comprehensible to them (“Preview”). In “Making Movies More Comprehensible: The Narrative/Paraphrase Approach,” Brenda Murphy and Ashley Hastings write, “Movies have the potential of being excellent sources of comprehensible input, since they usually feature a coherent plot, a set of main characters, and recurring environments” (25). Their Narrative/Paraphrase approach is a clear precursor to the current approach to the MovieTalk:

the teacher narrates the scenes in deliberate, clear, simple English, describing and commenting on the objects, characters, places, and actions that are on the screen at that very moment. This enables the students to associate what they hear with what they see, making the spoken input more comprehensible than it would be without the images.

Teachers are expected to pause the film for elaboration, make sure they use frequentative vocabulary, and ask questions to probe students’ understanding of the narration (25).

Murphy and Hastings are not alone; many teachers and language acquisition theorists see potential for compelling material in film. Swaffer and Vlatten state, “New materials, especially visual ones, often serve to motivate and interest students” (176), and Sturm calls movies “attractive to students accustomed to a multimedia environment” (246). Thus, as a medium with an intrinsically compelling nature, film becomes an ideal resource for any language teacher.

Movies also intrinsically make language more comprehensible. Swaffer and Vlatten explain, “As a multisensory medium, video offers students more than listening comprehension: Students have the opportunity to read visual as well as auditory messages,” and continues, “When compared with students who have only print

or auditory texts, learners supplied with video materials understand and remember more” (175). The images in a video provide context that students would lack in purely auditory or textual input. When CI teachers then create “activities that ensure multiple exposures to the language modeled in the film and that require learners to focus on linguistic detail as they abstract the ideas from the film, providing an ‘input flood’ . . . of targeted structures and vocabulary,” they provide students with an ideal condition for language acquisition (Bueno 320). In presenting a MovieTalk, the teacher uses paused images to scaffold the selected vocabulary, speaks slowly and clearly, and asks questions to gain repetitions of the highlighted words or phrases. Eric Herman, in his article “How to Use a MovieTalk to Teach with Comprehensible Input” agrees: “the combination of more comprehensible speech, pointing at the content in the visual, the teacher’s use of gestures, and establishing meaning for pre-selected target structures makes for high quality comprehensible input” (20). Because the teacher pauses the video for discussion, not only does this activity allow “the class to enjoy the richness of the frames, seeing things unnoticeable at full speed” but it provides time for questioning and repetition of vocabulary, an essential practice for CI and SLA (18).⁷

It is easy, therefore, to show that a MovieTalk fulfills the first two pillars of Comprehensible Input Theory: by its very nature, it is a comprehensible and compelling activity. The third pillar, caring, may seem more evasive. A caring environment, however, easily results from low-anxiety tasks and taking a direct interest in students. A MovieTalk, by nature, is low-stress, and it provides ample opportunity for personalization--a method for engagement in which a teacher asks students questions about their lives and tells them about his or her own. A teacher can “ask students questions about a time when they experienced what the characters experienced or were in a similar situation,” building an even stronger relationship with students and promoting a caring environment (M. Patrick, “Movie Talk”).

The true strength of a MovieTalk is that with very little outside force, a teacher can shape the activity into something that stands solidly on the three pillars of CI instruction, builds a sturdy foundation of vocabulary and language structures, and, when paired with follow-up activities, prepares students to read Latin.⁸

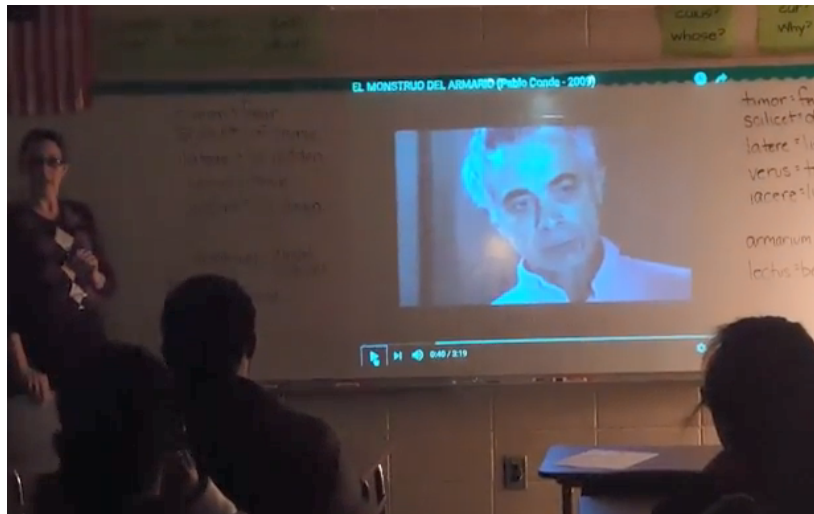
⁷ The greater the number of understandable repetitions in context, the better students will retain and acquire the vocabulary. Herman elaborates (20), “Studies suggest that the memory of a word requires dozens of exposures in meaningful contexts and many more exposures are needed to comprehend the word in a new context.”

⁸ I often use a MovieTalk just to introduce vocabulary or grammatical structures I want to focus on.

MovieTalk Basics

A MovieTalk utilizes a short video or a short section of a video as fodder for comprehensible discussion. In the example below, I had a student film a MovieTalk as I delivered it. The class is a relatively new one for me; when we took the video, I had only been their teacher for one week. Worth noting in the video is how often I clarified vocabulary meanings (especially as my students and I got to know each other's lexicons), and took the time to point at a word whenever I used it in the discussion. You may also note that I kept a script in my hand to remind me of pause points in the film as well as one or two questions to help me personalize the discussion. Lastly, especially because this class was so quiet in its responses, at times I changed my questions to ask for a vote so I could see that students were comprehending what I was saying, even if they were not used to much spoken Latin.⁹

A MovieTalk is an ideal first foray into Comprehensible Input and I have written here the steps I personally take to prepare a MovieTalk for my classes, as well as offering a worksheet for your own use and an example I used in my Latin II class.



If you prefer to view this video on YouTube, you will find it [here](#).

Most commonly I follow a MovieTalk with one of the listed reinforcement activities, and then an [embedded reading](#), ultimately leading to reading a Latin passage.

⁹ For another demonstration with a more lively class, you may be interested to see [Alina Filipescu demonstrate a MovieTalk in Spanish](#); in the video, take notice of the ways in which she engages her students, clarifies the meanings of words, refers to the visual many times, and ensures repetitions of key vocabulary. Also notice the interest the movie generates and the ease of the students in her class.

Preparing a MovieTalk

1. Choose a video. I often choose videos based upon vocabulary from a reading I want students to comprehend, though at times I choose videos because they introduce a theme or cultural topic. Either way, the video, or at least the section of the video you are planning to use, should be short, no more than 4-5 minutes, and I have used videos as short as 1.5 minutes with great success. It is important to be sure that the video is interesting and that the story or action does not lag, because you will be pausing the video at fairly regular intervals for discussion. It is also important not to overload the video with intended vocabulary; a good upper limit is six new words or phrases.¹⁰ For your benefit, I am including here the [living document](#) on which Miriam Patrick and I keep a record of short videos we find online and use or intend to use for MovieTalk in our own classes. The document lists the title, url, and a quick description of each talk, in addition to notes we make for each other regarding with what level and what unit we have used each movie short.

2. Choose your vocabulary. Once I have chosen a video, I list the vocabulary words I want students to learn from the MovieTalk. Then I make a second list (labeled “icing words”), which delineates additional words necessary to write sensible sentences for discussing the video. On the day of the MovieTalk, I write both lists on the board with their English meanings. I discuss the words with students before we turn to the video, making sure they are clear (so that the messages I deliver will be comprehensible), and I return to point at the new vocabulary whenever I use it in the MovieTalk.

3. Write your script. With the vocabulary list as my guide, I watch the video and pause it whenever I think the scene would create a good opportunity for Latin discussion using the target vocabulary. I record the time of the pause and write a Latin sentence for use once the video is paused, then proceed through the video to the next discussion opportunity. I am including the [script I wrote](#) for “[El Monstruo Del Armario](#)” (the MovieTalk I demonstrate above) here, as well as another [sample script](#) I wrote for “[A Corny Concerto](#).” Both include the vocabulary lists as well as my pause times and relevant discussion points. I am also including a [MovieTalk worksheet](#) for you to use for your own planning.¹¹

4. Teachers newly beginning CI should also script questions and discussion for their pause points ahead of time. This is a step that can be skipped once you are

¹⁰ I have no data to reinforce this number; it is purely based on my own anecdotal evidence.

¹¹ If you are unsure how to make a copy of a view-only file, I have written a guide [here](#).

comfortable speaking spontaneously with your classes, but until you reach that level of comfort, scripting questions and further discussion is nearly essential to success in a MovieTalk and many other CI-based activities. I am including a [sample of personalized questions](#) here; in the sample I have expanded the script for “In Armario” to include questions that inspire discussion. Preparing questions like these will help you ease into Comprehensible Input practice, and soon you will find that you no longer need such detailed scripts.

Delivering a MovieTalk

A MovieTalk can be delivered in several different ways. The first option offered below is the method I first learned, and the approach I think is the easiest when first beginning. The second option was developed by M. Patrick for a colleague who had been severely injured and needed substitute-ready plans. The third is a method I use almost exclusively now, which builds much more suspense, but requires more spontaneity.

1. Vocabulary-oriented delivery begins with a quick discussion of the vocabulary that will be used during the video (the vocabulary will already be posted on the board in preparation). The vocabulary discussion is followed by a viewing of the video with no discussion, though students are asked to look for opportunities to use the new vocabulary. In the second showing of the film, the teacher does not pause the video, but does general vocabulary labeling as opportunities arise in the video. I usually encourage students to call out vocabulary they notice, too. Finally, the third showing of the film incorporates pauses and discussion. I watch the timer in the corner of the video and pause the video according to my script. I then state the sentence I have written for that moment, and follow that by asking questions and discussing student answers. Once the video is ended, I move on to an activity that reinforces the target vocabulary (several options are included below).

2. The reading approach, in which the movie is not viewed until students have already learned the relevant vocabulary and read the plot of the movie as a story, is especially useful if a teacher needs to miss multiple days of school. The teacher writes the script and uses it to create one or two readings based on the movie. Vocabulary is previewed and practiced via worksheets that attempt to recreate some of the conditions of Comprehensible Input (though nothing can replace direct interaction). I am including M. Patrick’s [worksheet that I altered](#) for my own use as an example. After the vocabulary has been practiced, students read the story, and finally

they view the movie with real-time narration in Latin. The narration is comprehensible because students have been prepared for the narration by the worksheets and reading, and can be recorded ahead of time for use by a substitute. The final viewing is kept compelling by simply omitting the ending from all previous readings. In that way, there is still purpose for students when they are finally allowed to view the video.

3. Predictive viewing creates suspense within the first viewing of the video. This is the approach I use almost exclusively now, because it builds great suspense. Instead of allowing students to watch the video before starting discussion, the teacher pauses the video according to the script during the first viewing, begins discussion to practice the vocabulary, then asks students to predict what will happen next. Keith Toda demonstrates this approach in the video below; note that he simply introduces the situation, then asks student opinions about the film (Toda).

In the video, Toda is asking open-ended questions, which require at least some readiness to speak spontaneous Latin. If you are not comfortable with that, you could limit student choices: *Tua sententia, cur Piper currit? Currit Piper quod perterrita est an quod esurit?* Limiting options allows you to still have a script, yet create a voice for your students.

Some Reinforcement Please

The comprehensible and compelling nature of a MovieTalk means it is capable of being a stand alone activity or unit. I prefer, however, to follow a MovieTalk



If you prefer to view this video on YouTube, you will find it [here](#).

with reinforcing activities that create even more opportunities for repetition of target vocabulary. Some of my favorite activities to pair with a MovieTalk are listed below; they can all be achieved by creating a powerpoint of screen captures from a MovieTalk. Stopping the video at all of the same times I paused for discussion, I take a screen capture of the video and create a powerpoint with the images and their respective sentences. I have included a [sample here](#). These powerpoints are useful for multiple activities:

1. Use the powerpoint to review the video, this time asking different questions.
2. Hand out [copies of the powerpoint with the text removed](#). Ask students to
 - label the images with as much Latin vocabulary as they can.
 - look at the pictures in pairs and describe to each other in Latin what is happening in each picture.
 - point to the correct image when you read out the corresponding sentence. This is an easy way to check for understanding. If you prefer more physical movement, you can cut out the images previous to the activity, so they have to hold up the image when you read the sentence.
 - use the images as prompts as they write the story again in their own Latin.
3. Create a cloze worksheet from the powerpoint's screen captures that leaves out the focus vocabulary. I have included a sample [cloze worksheet](#) here.
4. Cut out copies of the powerpoint's screen captures and their respective sentences. Ask students to match the sentences to their images.
5. Cut out ten copies of the powerpoint's screen captures and their respective sentences. Mix all of the images together in one section of the room and mix all of the sentences together in another section of the room. Organize students into a picture relay race.. I have included a [sample as a template as well as instructions here](#).¹²

In addition to these options, M. Patrick recommends asking students to do timed writes over the plot of the MovieTalk or to retell the story in Latin in small

¹² The relay race is described in much more detail on my own blog post, "Picture Relay Races," which can be found [here](#).

groups. In “EDPuzzle and MovieTalk,” Toda offers directions for using EDPuzzle to create interactive videos to test student comprehension.¹³ Each of these options for reinforcement creates extra repetitions for the target vocabulary without reducing the compelling nature of the MovieTalk they supplement. They provide closure and prepare students to transition to the next pursuit, whether it be Catullus 70 or a discussion on Roman morality.

CONCLUSION

One pitfall emerges as teachers of Classical languages begin to research and experiment with Comprehensible Input practices: driven by the research and examples of others, teachers attempt to change too much too quickly and suffocate under the pressure of changing entire curricula while maintaining the requisite testing, grading, and records with which every teacher is tasked, and at the same time trying to learn an entirely new teaching practice and philosophy. Instead, incorporating a MovieTalk in between comfortable, well-practiced activities is an optimal first step, one which can be taken by any teacher at any level of experience. In this way, any teacher can begin to incorporate comprehensible, compelling, and caring practice into his or her curriculum.

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13 M. Patrick’s blog post describing MovieTalk can be found [here](#). Toda’s blog post describing MovieTalk can be found [here](#). Toda’s blog post describing EDPuzzle’s use with MovieTalk can be found [here](#).

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Squaring the Circle and Saving the Phenomena: Reading Science in the Greek Language Classroom¹

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ABSTRACT

Our students live in a world where scientific achievement and knowledge are profoundly significant, just as they were to the Greeks, and it becomes increasingly important to ensure that the language requirement is as enriching an experience as possible for all students, not only for students in the humanities, but also for those pursuing STEM tracks. Here we explore the significance of science in Greek culture together with the incorporation of Greek scientific texts in the beginning and intermediate Greek language classroom. Science (knowledge) was a seminal component of the Greek intellectual experience, and approachable “scientific” texts can be found in authors identified strictly as “scientists” (e.g., Euclid), as well as in the literary canon (e.g., Homer, Aeschylus). Appended is an extensive, generously annotated appendix of “scientific” texts drawn from a variety of authors and treating the major scientific discipline.

KEYWORDS

Aristotle, culture, epistemology, Greek pedagogy, Homer, medicine, Presocratics, science

GREEK “SCIENCE”

Our students live in a world where scientific achievement and knowledge are profoundly important, as it no less was to the Greeks. And, even at liberal arts colleges, the lure of lucrative careers in STEM fields draws many students away from the humanities. Thus it becomes increasingly important to ensure that the language requirement becomes as enriching an experience as possible, not only for the students in the humanities, but also for those pursuing medical and engineering tracks. The Greek legacy includes a vast repository of fascinating texts that cover many

¹ My sincere thanks to the students who so sanguinely participated in these experimental classes (Spring 2009, Fall 2012, Spring 2013) and to the anonymous reviewer for thorough, perspicacious, and salutary observations from which this article has greatly benefited. Any errors or omissions that remain are my own.

topics of interest and relevance to the modern reader. And, with a little imagination and care, language instructors can incorporate these riches to augment the canon in language classes at all levels. Of particular interest is the Greek “scientific” corpus. Employing scientific passages in the Greek language classroom helps restore the totality of the Greek intellectual experience, exposes the student to a variety of authors and styles, and resonates with the many students in STEM fields of study.

“Science” derives from the Latin verb *scio* (“I know”), whose Greek analog is ἐπιστήμη (understanding, skill, knowledge). The term is broad, vague, and anachronistic within the context of ancient Mediterranean thought, but nonetheless serves as a convenient shorthand. “Science” (“knowledge, understanding”) and philosophy arise when thinkers begin to inquire into the natural world, substituting vague assumptions for critical questions such as What is the nature of the world? What is the source of knowledge? What is the nature of existence, change, and coming-to-be? What is the nature and place of humankind within the cosmos?

Mindful of the world around them, the Greeks sought to explain the cosmos in order to take control over it and establish the primacy of humanity within the universe in accord with rational laws of physics. Heliocentrism, for example, was rejected on several grounds. Heliocentrism contradicts Aristotelian physics, according to which objects settle at their natural place, thus making the earth (the heaviest element) motionless at the center of the cosmos (Aristotle [384-322 BCE], *Physics* 3.8 [208b9-19]; *On the Heavens* 4.3 [310a30-35]). A moving earth, furthermore, should affect the motion of objects through the air, rendering it impossible for clouds or missiles, for example, to overcome atmospheric force and travel eastward against the earth’s westward rotation. Heliocentrism, additionally, contradicts common sense. We see and feel no effects of the earth travelling at high speed. And we observe no change in the relative position of the stars from year to year (stellar parallax) —the so-called “sphere of fixed stars” swirls as a unit around the poles annually like clockwork. Geocentrism was a perfectly adequate explanation for the workings of the cosmos (planetary retrograde motion, aside). Finally, heliocentrism undermined the Greek sense of self-worth. On the geocentric model, humans are at the center. Heliocentrism, contrarily, renders humans insignificant, like a “fleck of stellar dust” (Rihll 1999: 73).

Nonetheless, the Greeks were eager to understand the natural world, and their inquiries into natural philosophy resulted in thoughtful and imaginative theories of physics, cosmogony, astronomy, geography, anthropology, and many other

categories that today we classify as “science”. This inquisitive trajectory permeated every aspect of Greek technology,² art, and literature. Aristotle opened his discussion of human epistemology with the telling phrase that “all humans naturally seek to know” (πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει: *Metaphysics* 1[980a22]). Aristotle’s point was adroitly proven by Odysseus, Homer’s (750-700 BCE) clever, inquisitive, and “much-turning” (πολύτροπος) hero. In the epic’s prologue we hear that Odysseus had “seen the cities and learned minds of many men” (πολλῶν δ’ ἀνθρώπων ἶδεν ἄστεα καὶ νόον ἔγνω: *Odyssey* 1.3), a curiosity that is borne out in his encounters with the Lotus eaters (9.86-87), Polyphemus (9.172-176), the Laestrygonians (10.100-101), and Circe (10.151-152). Furthermore, despite warnings to the contrary, Odysseus told his men that Circe had instructed him to listen to the Siren’s song (οἷον ἔμ’ ἠνώγει ὅπ’ ἀκουέμεν: *Odyssey* 12.160). Odysseus’ epic flaw is perhaps not his pride, but rather his curiosity.

“Science”, moreover, transcends genre. Spheres of knowledge in antiquity were fluid, defying the imposition of modern disciplinary labels, and “science,” as the Greeks envisioned it, dovetails with other intellectual pursuits, such as technology (the application of scientific principles) and medicine (whose methods synthesized rational approaches with religion and magic). Intellectual specialization, moreover, was anathema to the ancients. Few ancient scholars explored any one area of research exclusively. There is much “science” (e.g., geography, astronomy, botany) and medicine in Homer. And many philosophers and scientists of the natural world wrote in verse, including Empedocles of Acragas (fl. 460-430 BCE), Xenophanes of Kolophon (fl. ca. 540-478 BCE), and Eratosthenes of Cyrene (276-194 BCE)—the choice of Anaximander of Miletus [fl. ca. 580-545 BCE] to employ prose was a bold one). The interests of Democritus of Abdera (fl. 440-380 BCE) included not only mathematics and physics (atomic theory), but also music and ethics. And Galen (129-215 CE), who considered himself a philosopher, explored the connection between “medicine” and “philosophy” in a treatise entitled “*That the best Physician is also a Philosopher*” (1.53-63K; see also Brain 1977). It is impossible to categorize an intellect like Aristotle who lectured widely on most areas of scientific inquiry, eschewing only mathematics, or Archimedes of Syracuse (fl. ca. 250-212

2 Monumental buildings adhered to a strict theory of aesthetics and mathematical ratio. The 4:9 integral ratio was common in the 5th century (Mertens 1984: 137, 144-145; 1993: 80-87; 2006: 143; Beard 2003; Senseney 2016: 639-40); the Parthenon’s many columnar refinements (entasis, curvature, inclination) resulted in perhaps the most spectacular example of *trompe l’oeil* created by human design.

BCE) who considered himself primarily a mathematician but is popularly known as a siege-craft engineer. Scholars are beginning now also to appreciate Aeschylus' (ca. 525/524 - ca. 456/455 BCE) engagement with natural philosophy (Irby-Massie 2008; Rose 2009; Glauthier forthcoming). Correlatively, works that are more purely "scientific" are often as elegant and stylish as works that we consider "literary." Archimedes' *Spiral Lines* is a complex multi-dimensional text that incorporates variety and suspense, straddling the physical and abstract, aiming to disorient and surprise the reader while stylistically paralleling the very mathematics that the author sought to explicate (Netz 2009).

Just like religion, art, and literature, scientific traditions develop from the social fabric of the cultures which produce and employ them. Rejected now is the triumphant emergence of "Greek rationality" out of intellectual infancy (Dodds 1951): the Greeks never dismissed the supernatural, but instead, as for example in the case of Plato's (ca. 390-348/7 BCE) Demiurge, they "rationalize[d] it, turning it paradoxically into the very source of the natural order, restricting its operation to a single primordial creative act which insures that the physical world would be not chaos but cosmos forever after" (Vlastos 1975: 97). While offering mechanistic explanations of natural phenomena (thunder or earthquakes) that were often ascribed to theistic causes, the Milesians maintained the divine nature of their first principles (thus positing a "reformed" theology: Lloyd 1979: 11; e.g. Anaximenes [fl. ca. 555-535 BCE], *TEGP* 36). Even in the "scientific" Aristotelian corpus, matters of theology received considerable attention (Barnes 1995: 67, 106). "Science" in the ancient world never lost its sense of wonder nor its connection with ethics and the divine, and "science" was perpetually negotiating the pervasive tension between tradition and innovation.

The agonistic nature of Greek society, furthermore, shaped the timbre, methods, and principles of Greek science, which was, above all, an exercise in debate and persuasion (Rihll 1999: 8-9). Greek thinkers aimed to sway their audiences of the truth of their (largely unprovable) theories. Greek thinkers, many of whom were autodidacts, also valued autonomy. And philosophical schools, where they did exist, were not formalized in the modern sense, but, rather, they represented groups of sympathetic thinkers. Even those who had studied under famous scholars often rejected the teachings of their mentors, preferring instead to carve out their own paths, citing, disputing, or ignoring the views of predecessors. Scientific methods were primarily theoretical, and experimentation was largely, though not exclusively, rejected, in accord with the long-standing prejudice against the baunistic occupations

(e.g., Plutarch [ca 46-120 CE], *Life of Marcellus* 14.6). In the framework of natural philosophy, however, Aristotle recognized and recommended empirical data and observation, long valued by medical practitioners and theorists (Mithridates VI's notorious immunity to all known poisons and venoms was the result of a long program of toxicological research combined with empirical trials on death-row prisoners: Pliny, *NH* 25.3, 5-7). But theory almost always persuaded, even when it was refuted by empirical evidence.

EMPLOYING "SCIENTIFIC TEXTS" IN THE GREEK CLASSROOM

Although Archimedes may be better reserved for an advanced class in Greek, many "scientific" texts are accessible to intermediate (and even beginning) Greek students. Only through reading unadapted texts of different styles does the student acquire any facility with the language, syntax, or vocabulary. And the efficacy of learning in context is recognized as a powerful pedagogical tool (Hoover 2000). More texts survive from antiquity that can be classified as "scientific" than of any other genre; the ancients considered these texts interesting, relevant, and useful, and reading them directly enhances the student's experience of Greek culture, history, and literature. Such texts, carefully selected, allow for discussions on culture and values, and they emphasize that the rules of syntax and prosody are not restricted to the canonical literary authors, but rather they are universally employed by authors who explore many topics. Presocratic fragments, in particular, are attractive for their brevity.³ They can challenge but do not overwhelm. And they can spark interesting discussions regarding the preservation and transmission of Greek texts (and biases therein). As with all Greek scientific thought, many of the primary sources are fragmentary and uncontextualized, and the earliest writers are distilled through later, often hostile, redactions: for example, Aristotle severely criticized his predecessors. What survives is a mere selection, and it may be impossible to determine how much has been lost.

For any instructor who may be apprehensive about Greek science, we strongly recommend Tracy Rihl's 1999 survey which includes a preface entitled "To the Scientifically Faint-Hearted Reader" (x-xii). Three points, in particular, merit mention here:

³ For Presocratic texts, the interested instructor is directed to Daniel Graham's excellent collection of Greek texts, commentaries, and translations in *Texts of Early Greek Philosophy (TEGP)*, Cambridge, 2010.

- “Understanding what is going on in most of Greek science is well within the competence of any intelligent person” (Rihll 1999: x).
- “Our task consists precisely in bringing the content of Greek mathematics (science) to light not by externally transposing it into another mode of presentations but rather by comprehending it in the one way which seemed comprehensible to the Greeks” (Klein 1968/1992: 127).
- “Not knowing much modern science can be an advantage, for then you do not have to unlearn what you have been taught in order to comprehend ancient science” (Rihll 1999: x).

Thus, anyone with a knowledge of ancient Greek is more than qualified to tackle Greek “science”.

I have successfully included units on Greek scientific texts with groups of elementary and intermediate level Greek language students at the College of William and Mary. Thus my students have engaged with a seminal component of Greek culture which they otherwise would not have explored. In devoting several weeks of an intermediate-level Greek poetry class exclusively to “scientific” passages, my aim was two-fold: 1) to investigate the scientific content of standard “literary” writers; and 2) to scrutinize the literary merit of so-called scientific writers. Students were able to draw from scholarly commentaries and professorial notes to help them navigate the exigencies of “advanced,” fragmentary, or Presocratic Greek.

I offer a few caveats. Vocabulary can be obscure and technical. Thus prudent glossing is paramount. Additionally, students often find philosophy enigmatic, not so much in terms of grammar and syntax (Platonic and Aristotelian prose is fairly straightforward) but in trying to unpack layers of meaning and interpret elliptical philosophical thought. Thus meaningful contextual notes are essential. Finally, although it is no task to find interesting selections brimming with compelling accounts of science, its sociology, its successes and failures, passages must be selected with circumspection in order to ensure comprehensibility. The lengthy, complex sentences of Strabo of Amaseia (ca. 30 BCE - 24 CE), for example, meander as the author distilled centuries of geographical knowledge handed down through 2nd- and 3rd-hand layers of aggregate and contradictory sources, a stylistic paradigm that can challenge even the expert and is needlessly daunting to the beginner.

In order to explore the scientific merit of the literary canon, my students tackled Prometheus’ exhortation on his gifts to humanity (the sciences and technology) in

Aeschylus' *Prometheus Bound* 436-506 (we do not here raise the question of authorship: see further Irby-Massie 2008: 135-136); and Sophocles' choral ode to humanity (*Antigone* 334-383). Sophocles' ode emphasizes the inquisitiveness and cleverness of mankind, the very traits that define "philosophy" (love of wisdom) and provide the cornerstone of ἐπιστήμη. Both passages succinctly and eloquently lay the foundations for appreciating what science was in the ancient world. Prometheus enabled the human race to understand the natural world, and, with his gift of rational thought (γνώμη: 456), he rescued humankind from an intellectual infancy (νηπίους: 443): "First of all, though they had eyes to see, they saw to no avail (βλέποντες ἔβλεπον μάτην); they had ears, but they did not understand (κλύοντες οὐκ ἤκουον); but, just as shapes in dreams (ὄνειράτων), throughout their length of days, without purpose they wrought all things in confusion" (447-50). Prometheus' greatest gift to humankind was the gift of discernment (ἔθηκα καὶ φρενῶν ἐπηβόλους: 444). Although mythology guides the plot, this passage is, fundamentally, about the intellectual, rational, and scientific development of humankind. In tandem with Aeschylus, we read selections from Heraclitus (fl. ca. 510-490 BCE), whose contemporaries "could not recall" what they had done while they slept. Even when awake, Heraclitus' men grasped *Logos* only through channels of perception "as though through windows" (διὰ τινῶν θυρίδων: *TEGP* 171), calling to mind Aeschylus' "shapes in dreams."

We also spent several sessions on Empedocles, looking at one short fragment (*TEGP* 26, on the four roots that comprise the material world) and one long fragment (*TEGP* 41, on the cycle of change). We read the texts aloud in meter—dactylic hexameters, a meter familiar to students who had translated lengthy selections from Homer. And we analyzed the poem syntactically and rhetorically, finding much of the grammar and syntax employed by Homer and the tragedians, and many familiar rhetorical devices: anaphora, hyperbaton, polysyndeton, and others. The vocabulary is sufficiently repetitive, and the Greek is reasonably straightforward. Empedocles, in fact, makes an excellent thematic and stylistic counterpoint to the epic poets, especially Hesiod. Empedocles' fragments are epic in tone and meter, treating not only the creation and nature of the world, but also the fall of man and the steps necessary for humankind's restoration to grace. In other words, Empedocles (who, nonetheless, promoted himself as a living god: *TEGP* 174) offers a "rational" version of Hesiod's five ages.

Scientifically relevant passages can be found in the familiar, canonical authors: references to the stars abound in Homer, the tragedians, and lyric poets, among

others. Supplementary material can inform class discussion on astronomy, scientific astrology, or even celestial navigation. For example, the beautiful star-cluster the Pleiades became a standard in star-lore: it appeared on the shield of Achilles (*Iliad* 18.486), and was observed by Odysseus on his journey from Calypso's island (5.272). It quickly became an important constellation in the agricultural calendar (Hesiod, *Works and Days* 383, 572), as well as a seasonal sign (as in Theocritus 13.25), etc. Although six stars are visible, there was robust debate on the number of stars in the cluster—most authorities have seven, but Ptolemy designated only four stars (*Almagest* 7.5 [H90]). Additionally, there was no agreement on the nature of the Pleiades: cluster or constellation. Aratus of Soloi (ca. 300-240 BCE) recognized the Pleiades as a discrete star cluster (*Phaenomena* 254-55), as Hipparchus of Nicea (fl. ca. 140-120 BCE) seemed to do. Geminus (1st c. BCE) attached the Pleiades to Taurus' back (3.3) while Nicander of Colophon (fl. 150-110 BCE) associated the cluster with Taurus' tail (*Theriaca* 122-23). Here we have a simple, almost perfunctory, image, a "star", the Pleiades, which in turn is relevant to agriculture, astronomy, astrology, pharmacy, and navigation.

Let us consider another discipline, botany, evoked by plant names widely cited in the literary canon. For example, in the *Homeric Hymn to Demeter* 208-209, Demeter drank *κυκεῶν*, a cocktail of barley and water mixed with "delicate pennyroyal" (*γλήχωνι τρεΐνῃ*), a subtle, almost off-hand, detail. But a deeper look is in order. The pharmaceutical writer Dioscorides of Anazarbos (fl. ca. 40-80 CE) (3.31) informs us that pennyroyal (*γλήχων*—the same word used by the author of the *Homeric Hymn*) is a warming and thinning botanical with a number of useful applications including some that are gynecologically specific (see also Richardson 1974: ad loc; van de Walle and Renne 2001: 5-7): pennyroyal was recommended for drawing out the menses, the afterbirth, and embryos or fetuses. While pretending to be a post-menopausal woman, Demeter was, in fact, in the prime of her life—and the irony should not be lost on the careful reader. Demeter was mourning the loss of a child, perhaps—semiotically—a miscarriage. Dioscorides' remedies derive from a rich tradition of folk medicine of which the poet of the *Homeric Hymn* was no doubt aware. It is possible that this detail, Demeter's draught of *κυκεῶν* with its simple, specific, and frankly unappetizing ingredients, is meant to evoke a woman who has just given birth, or a woman who has just miscarried. *Κυκεῶν*, like so much in Greek literature, works in multiple registers. Incidentally, other uses for pennyroyal, according to Dioscorides, include relieving spasms and nausea, driving down dark

bowel matter, aiding those bitten by wild animals, and—applied to the nostrils like smelling salts—reviving people who have fainted. Pennyroyal also strengthens the gums, soothes inflammations, stops itching, and is suitable for gout and pimples, none of which, we can be almost certain, afflicted Demeter as Metaneira welcomed the goddess to the Eleusinian court. Although Dioscorides' vocabulary is technical and often obtuse, his syntax is straightforward, and the text is now accessible through an excellent English translation (Beck 2005).

Zoology is triggered by references to animals, easily augmented by Aristotle (especially *History of Animals*; *Parts of Animals*) or Aelian (*On the Nature of Animals*). Geography is elicited by almost omnipresent toponyms. The *Odyssey* and *Argonautica* are both tales of travel; in the catalogue of ships (*Iliad* 2.494-759), the poet lists by name 175 separate towns and places. Both Eratosthenes and Strabo considered Homer the “father of Geography” (1.1.11), and Strabo included geographical, cartographical, and topographical exegesis of most (if not all) of the places that are mentioned in the *Iliad* and *Odyssey*.

Additionally, a standard author for intermediate Greek, Euripides (480-406 BCE) tackled the intellectual tensions prevalent in Athens of the late 5th century BCE. For the playwright, intellectual ferment “was the air he breathed” (Ferguson 1972: 235-236). Euripides was deeply influenced by his contemporary, Anaxagoras of Clazomenae (fl. 480-428 BCE), a rationalist, materialist thinker who removed the gods further from the current understanding of the Attic world (Anaxagoras, for example, demythologized the sun by claiming that, far from being divine, it was merely a large, fiery stone: *TEGP* 37). Moreover, the agnosticism and skepticism that characterized Presocratic (Protagorean) initiatives to explain matter and motion were manifested in Euripides' realistic approach to drama and his exploration of human psychology (to give examples would be to list the entire corpus). And Euripides' treatment of the gods was complex and nuanced. Lefkowitz 2016 argues that, through his portrayal of the gods as “brutally fickle,” Euripides aimed not to undermine state religion but instead to remind the audience of the limitations of human cognizance. This sets Euripides firmly within the intellectual milieu that fostered, for example, the arguments of Parmenides of Elea (fl. ca. 490-450 BCE) against motion and true perception (*TEGP* 11). In addition, medical references (*pharmaka*, regimen, diet, exercise) abound in Euripides. And the language and ideas expressed in Euripides mirror the Hippocratic Corpus. Following the plague at Athens (430-26 BCE), Euripides' work became more deeply tinted with compelling and graphic

medical imagery, and the *Hippolytus*, which seems to date to this period, contains some highly specialized medical terminology (Craik 2001).

THE APPENDIX

The principles and theories of Greek “science” permeate Greek literature, and the possibilities for incorporating Greek scientific texts into a language class are myriad. In the appendix the reader will find a collection of passages, organized, for convenience, according to modern scientific/philosophical disciplines (Intellectual Inquiry, Cosmogony, Physics, Arithmetic and Geometry, Astronomy, Meteorology, Geography and Cartography, The Origin of Life, Botany, Zoology, Medicine and Healing, Pharmacy). In each section, a brief paragraph outlines the principal themes of the discipline together with several grammatical/syntactical (and rhetorical) “tags” to aid the instructor in planning lessons. Each section contains 5-8 annotated passages that present key themes or engaging examples. All technical vocabulary, specialized usage of common words, and any term not in the Dickinson College Greek Core has been glossed. Full principal parts are limited to adjectives and 3rd declension nouns. Glosses are also included for particularly challenging syntax. The notes have been constructed with an aim to elucidate both the language and the science of the texts for a language-learning audience, but not to overwhelm. They merely introduce, and, hopefully, the passages will inspire the reader to probe more deeply into the fascinating texts and topics presented below.

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APPENDIX. A BRIEF SELECTION OF SCIENTIFIC PASSAGES.

Note

The utility of the [Dickinson College Greek Core Vocabulary](#) cannot be overemphasized.

Many texts are available digitally:

[Perseus Hopper](#)

[Lacus Curtius](#)

and the [Loeb Classical Library](#) (available online to members of the *Classical Association of the Middle West and South*).

Further Reading

General Introductions and Handbooks

Irby, G. L., ed. *A Companion to Science, Technology, and Medicine in Ancient Greece and Rome*. 2 volumes. Boston, 2016. A collection of 60 chapters that explore many aspects of Greek and Roman mathematical and biological sciences in addition to topics in medicine, engineering, and the reception and transmission of Greco-Roman science.

Irby-Massie, G. L., and P. T. Keyser. *Greek Science of the Hellenistic Era: A Sourcebook*, with Paul Keyser. London, 2002. A collection of intriguing, key passages illustrating many aspects of the scientific advances in the two centuries following the death of Alexander of Macedon.

Keyser, P. T., and G. L. Irby-Massie, eds. *Encyclopedia of Ancient Natural Scientists: The Greek Tradition and Its Many Heirs*. London, 2008. An extensive collection of biographies of Greco-Roman scientific thinkers.

Lloyd, G.E.R. *Early Greek Science: Thales to Aristotle*. New York, 1970.

Lloyd, G.E.R. *Greek Science after Aristotle*. New York, 1973. Together Lloyd's two volumes have long been the standard introduction.

Rihll, T. E. *Greek science*. Oxford, 1999. An engaging introduction to the major disciplines of Greek science.

Some Disciplinary Surveys

Cuomo, S. *Ancient Mathematics*. London, 2001.

Dicks, D. R. *Early Greek Astronomy to Aristotle*. Ithaca, 1970.

Dilke, O. A. W. *Greek and Roman Maps*. Cornell, 1985.

Dueck, D. *Geography in Classical Antiquity*. Cambridge, 2012.

Evans, J. *The History and Practice of Ancient Astronomy*. Oxford, 1998.

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Gilhus, I. S. *Animals, Gods and Humans: Changing Attitudes to Animals in Greek, Roman and Early Christian Ideas*. London, 2006.

Graham, D. W. *Explaining the Cosmos: The Ionian Tradition of Scientific Philosophy*. Princeton, 2006.

Gregory, A. *Plato's Philosophy of Science*. London, 2001.

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King, H. *Greek and Roman Medicine*. London, 2001.

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Stough, C. L. *Greek Skepticism: A Study in Epistemology*. Berkeley, 1969.

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Texts and Commentaries

TEGP: Graham, Daniel W. *The Texts of Early Greek Philosophy: The Complete Fragments and Selected Testimonies of the Major Presocratics*. 2 vol. Cambridge, 2010. With Greek texts, English translations, and commentaries.

Long, A. A. and D. N. Sedley. *The Hellenistic Philosophers*. 2 vol. Cambridge, 1987. The second volume contains Greek and Latin texts with notes, arranged topically. For Epicurean physics, see 2.18-83; for Stoic physics, 2.264-341.

Kirk, G. S., J. E. Raven, M. Scholfield. *The Presocratic Philosophers*. 2nd ed. Cambridge, 1983. With Greek texts, English translations, and commentaries.

Kahn, C. H. *The Art and Thought of Heraclitus*. Cambridge, 1979. With Greek texts, English translations, and extensive commentaries.

Wright, M. R. *Empedocles: The Extant Fragments*. Duckworth, 1981. Greek text with extensive commentary.

Wright, M. R. *The Presocratics*. Duckworth, 1985. The major fragments in Greek with commentary, suitable as a primary textbook.

For the Presocratics Online

[Unicode texts](#) of Anaximander, Heraclitus, Parmenides, Zeno of Citium (fl. ca. 305-263 BCE), Empedocles (with translations in French and English).

For [Heraclitus](#) (with Greek text and English translation).

For Medical Writers

Many Hippocratic and Galenic texts can be found through the [*Corpus Medicorum Graecorum/Latinorum*](#).

The Perseus Hopper has Greek texts and English translations of about twenty Hippocratic texts (including the oath) but only one Galenic treatise (*On the Natural Faculties*).

The Loeb Classical Library features 10 volumes of Hippocratic texts and 5 volumes from Galen's body of work.

I. Intellectual inquiry and Human Ignorance: Epistemology

A complex and nuanced topic, epistemology aims to determine the nature of knowledge, its methods, how it relates to truth and belief, and its sources and scope.

The virtue of intellectual inquiry, which permeates Greek literature, is the hallmark of the Greek philosophical achievement. Greek thinkers were eager to explain the nature and source of knowledge, and soon they questioned whether sensory perception was reliable or fallible. Parmenides, an Eleatic philosopher in southern Italy, was perhaps the first to call into question the reliability of sensory perception, positing two co-existing versions of the cosmos: "the way of truth" (wherein change cannot occur) and "the way of persuasion" (the world of sensory perception in which humanity exists). Parmenides recognized that scientific investigation is a process of interpretation, as did Protagoras of Abdera (487-412 BCE) who had argued that human sensory perception was the best and most credible guide to "truth", but that the sensory world appears differently to different people, thus there is no baseline for determining what is "true." These questions were further investigated by Plato who recognized a distinction between Opinion (culled from the transitory world of the senses) and Knowledge (derived from timeless Forms, and represented by innate Ideas buried within the soul: see, e.g., *Theaetetus*, *Republic* 514a-520a). For Plato, the universal prototypes (Forms) existed apart from particular objects which were at best pale imitations. For Aristotle, however, who appreciated the value of empiricism and autopsy, knowledge of the particular guides and advances knowledge of the Universal (of essence). Epistemology remained a robust locus of debate for Stoic, Epicurean, Skeptic, and Neoplatonic thinkers.

The following passages explore the theme of human curiosity.

I.1. Aristotle, *Metaphysics* 1.1 (980a22). On the inquisitive nature of human beings.

Grammar/Syntax Tags: dative of specification, articular infinitive.

πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει.

Notes: εἰδέναι: infinitive of οἶδα; ὀρέγω: extend, reach at.

I.2. Homer, *Odyssey* 1.3. Odysseus' curiosity.

Grammar/Syntax Tags: genitive of possession, aorist.

πολλῶν δ' ἀνθρώπων ἴδεν ἄστεα καὶ νόον ἔγνω.

Notes: εἶδον: see (Homeric aorist); τό ἄστυ: town; ἔγνω: aorist of γινώσκω.

I.3. Aeschylus, *Prometheus Bound* 447-458. Prometheus' gifts to humanity include rational thought, science, and technology.

Grammar/Syntax Tags: subjective/objective genitives, uses of the dative case, substantives, pluperfect tense, concessive participles, α-privative.

οἱ πρῶτα μὲν βλέποντες ἔβλεπον μάτην,

κλύοντες οὐκ ἤκουον, ἀλλ' ὀνειράτων

ἀλίγκιοι μορφαῖσι τὸν μακρὸν βίον

ἔφυρον εἰκῇ πάντα, κοῦτε πλινθυφεῖς

δόμους προσείλους, ἦσαν, οὐ ξυλουργίαν:

κατώρυχες δ' ἔναιον ὥστ' ἀήσυροι

μύρμηκες ἄντρων ἐν μυχοῖς ἀνηλίους.

ἦν δ' οὐδὲν αὐτοῖς οὔτε χεῖματος τέκμαρ
οὔτ' ἀνθεμώδους ἦρος οὔτε καρπίμου
θέρους βέβαιον, ἀλλ' ἄτερ γνώμης τὸ πᾶν
ἔπρασσον, ἔστε δὴ σφιν ἀντολὰς ἐγὼ
ἄστρον ἔδειξα τάς τε δυσκρίτους δύσεις.

Notes: βλέπω: see; μάτην: at random, without reason; κλύω: hear; ὁ ὄνειρος: dream; ἀλίγκιος, -α, -ον (+ dative): resembling, like; ἡ μορφή: shape; φύρω: mix, confound, jumble; εἰκῇ: without a plan; κοῦτε: και οὔτε; πλινθυφής, -ές: brick-built; ὁ δόμος: home, house; πρόσσειλος, -ον: towards the sun, sunny; ἦσαν: 3rd plural Attic pluperfect of οἶδα ("know how to [build]..."); ἡ ξυλουργία: wood-working, carpentry; κατῶρυξ (-υχος): dug out, quarried, underground place; ναίω: dwell, inhabit; ἀήσυρος, -ον: springing lightly, blowing softly, light as air; ὁ μύρμηξ: ant; τό ἄντρον: cave; ὁ μυχός: nook, innermost corner; ἀνήλιος: sunless.

τό χειμα, -ατος: weather, winter; τό τέκμαρ: fixed sign; ἀνθεμώδης, -ες: blooming; τό ἔαρ: spring; κάρπιμος, -ον: fruit-bearing; τό θέρος, -εος: summer; βέβαιος, -ον: steady, firm (substantive); ἄτερ (+ genitive): without, apart from; πράσσω: pass through, pass over; ἔστε: up to the time that; ἡ ἀντολή: rising; τό ἄστρον: star; δύσκριτος, -ον: hard to interpret, difficult to discern; ἡ δύσις, -εως: setting.

I.4. Heraclitus, *TEGP* 10 = Clement of Alexandria (150-215 CE), *Miscellanies* 2.8.1. Heraclitus' contemporaries resemble Aeschylus' pre-Promethean humans.

Grammar/Syntax Tags: uses of the dative case, aorist participle, Ionic dialect.

οὐ γὰρ φρονέουσι τοιαῦτα πολλοί, ὁκοῖσιν ἐγκυρεῦσιν,
οὐδὲ μαθόντες γινώσκουσιν, ἐωυτοῖσι δὲ δοκέουσι.

Notes: ὁκοῖσιν: perhaps a variant of οἶσιν; ἐγκύρω: meet with, come upon; μαθόντες: aorist participle of μανθάνω; γινώσκουσιν: Ionic present tense of

γινώσκω; **ἑωυτοῖσι**: Ionic variant of ἑαυτοῦ, ἑαυτῆς, ἑαυτοῦ.

I.5. Sophocles, *Antigone* 343-360. In the famous “Ode to Man,” humanity’s cleverness is congenital. This passage contrasts with the views of Heraclitus and Prometheus but complements those of Aristotle and Odysseus.

Grammar/Syntax Tags: uses of the genitive case, instrumental dative, participles, middle/passive, contract verbs.

κουφονόων τε φῦλον ὀρνίθων ἀμφιβαλὼν ἄγει
καὶ θηρῶν ἀγρίων ἔθνη πόντου τ’ εἰναλίαν φύσιν
σπείραιοι δικτυοκλώστοις,
περιφραδῆς ἀνὴρ:
κρατεῖ δὲ μηχαναῖς ἀγραύλου
θηρὸς ὀρεσσιβάτα, λασιαύχενά θ’
ἵππον ὀχμάζεται ἀμφὶ λόφον ζυγῶν
οὔρειόν τ’ ἀκμῆτα ταῦρον.

καὶ φθέγμα καὶ ἀνεμόεν φρόνημα καὶ ἀστυνόμους
ὀργὰς ἐδιδάξατο καὶ δυσάλων
πάγων ὑπαίθρεια καὶ δύσομβρα φεύγειν βέλη
παντοπόρος: ἄπορος ἐπ’ οὐδὲν ἔρχεται
τὸ μέλλον: Ἄιδα μόνον φεῦξιν οὐκ ἐπάξεται.

Notes: κουφόνοος, -ον: light minded, thoughtless; τό φυλον: race, tribe; ὁ ὄρνις: bird; ἀμφιβάλλω: throw, snare (aorist participle); ὁ θήρ, θηρός: beast of prey; ἄγριος, -α, -ον: wild; ὁ πόντος: sea; ἐνάλιος, -α, -ον: in the sea; ἡ σπεῖρα: twisted net; δικτυόκλωστος, -ον: woven in meshes; περιφραδής, -ές: very thoughtful, very skillful; κρατέω: to overpower, subdue; ἡ μηχανή: contrivance, machine, craft; ἄγραυλος, -ον: dwelling in the field; ὄρεσσιβάτης: mountain-roaming (substantive); λασιάνην, -εως: with a shaggy neck; ὀχμάζω: grip, bear, carry; ἀμφὶ: on both sides; ὁ λόφος: withers, nape of the neck; τό ζυγόν: yoke; ὄρειος, -α, -ον: of the mountains; ἀκμής, -ήτος: untiring; ὁ ταῦρος: bull.

τό φθέγμα, -ατος: voice, speech; ἀνεμόεις, -εσσα, -εν: airy, windy, “swift”; τό φρόνημα, -ατος: mind, spirit, thought; ἀστυνόμος: city-protecting; ἡ ὀργή: natural impulse; δυσσαυλος, -ον: unhappy, inhospitable; ὁ πάγος: frost; ὑπαίθρειος, -ον: under the air; δύσομβρος, -ον: stormy; τό βέλος, -εος: missile, dart; παντοπόρος, -ον: all-inventive; ἄπορος, -ον: without resources; τό μέλλον: “what might occur”; ὁ Αἴδας -α: Hades (Doric genitive); ἡ φεῦξις, -εως: escape; ἐπάγω: bring on, urge on, teach, convince.

II. COSMOGONY

One of the organizing principles of Greek mythology is the creation of the world and how its various parts fit together. Hesiod’s cycle of Five Ages was replicated in some thinkers who envisioned multiple worlds (Democritus) or a cycle of worlds (Empedocles). Others questioned whether the world and its physical matter are created or eternal and if creation is static (Parmenides) or in a state of flux (Heraclitus).

II.1. Hesiod, *Theogony* 108-112. Hesiod’s *Theogony* is the seminal text for cosmological questions in the framework of Greek mythology. His account derives from near eastern traditions where the different elements are separated from each other as the world takes shape.

Grammar/Syntax Tags: objective genitive, substantive adjectives, participles, middle/passive, unaugmented aorist, uncontracted contract verb.

εἶπατε δ', ὥς τὰ πρῶτα θεοὶ καὶ γαῖα γένοντο

καὶ ποταμοὶ καὶ πόντος ἀπείριτος, οἶδματι θυίων,

ἄστρο τε λαμπετόωντα καὶ οὐρανὸς εὐρύς ὑπερθεν

οἱ τ' ἐκ τῶν ἐγένοντο θεοί, δωτήρες ἐάων

ὥς τ' ἄφενος δάσσαντο καὶ ὥς τιμὰς διέλοντο.

Notes: εἶπατε: aorist imperative of εἶπον, “tell”; ὥς: how; **πρῶτα:** first; **ὁ πόντος:** sea; **ἀπείριτος, -ον:** boundless; **τό οἶδμα, -ατος:** swell; **θυίω:** be inspired; **τό ἄστρον:** star; **λαμπετάω:** shine (uncontracted participle); **εὐρύς, εὐρεῖα,** εὐρύ: broad; **ὑπερθεν:** from above; **οἱ τ' ἐκ τῶν:** “and the gods [born] from them”; **ὁ δωτήρ, -ῆρος:** giver; **ὁ ἐύς, ἐῆρος:** good, brave, noble (substantive); **τό ἄφενος, -εος:** wealth, riches; **δατέομαι:** divide among (themselves) (un-augmented middle aorist); **διαιρέω:** divide (un-augmented aorist).

II.2. Heraclitus, *TEGP* 51 = Clement of Alexandria (150-215 CE), *Miscellanies* 5.104.3-5. Heraclitus believed in a world of flux.

Grammar/Syntax Tags: subjective genitive, partitive genitive.

πυρὸς τροπαί: πρῶτον θάλασσα, θαλάσσης δὲ τὸ μὲν ἥμισυ γῆ, τὸ δὲ ἥμισυ πρηστήρ.

Notes: ἡ τροπή: turn, change, alternation; ἥμισυς, -εια, -υ: half; **ὁ πρηστήρ, -ῆρος:** hurricane, waterspout with lightening.

II.3. Empedocles, *TEGP* 41.6-8 = Simplicius of Cilicia (ca. 490-560 CE), *Physics* 158. Empedocles posited a world of flux that vacillates not between elements (as in Heraclitus) but organizing principles (total mixture/total separation).

Grammar/Syntax Tags: neuter plural subject with singular verb, dative with compound verbs, participles, contract verbs.

καὶ ταῦτ' ἀλλάσσοντα διαμπερές οὐδαμὰ λήγει,

ἄλλοτε μὲν Φιλότητι συνερχόμεν' εἰς ἓν ἅπαντα,

ἄλλοτε δ' αὖ δίχ' ἕκαστα φορεύμενα Νείκεος ἔχθει.

Notes: ἀλλάσσω: give in exchange; διαμπερές: through and through, continually; οὐδαμά: never; λήγω: cease, abate, leave off; ἄλλοτε . . . ἄλλοτε: at one time . . . at another time; ἡ Φιλότης, -ητος: Love, Friendship; συνέρχομαι: come together; δίχη: in two, asunder; φορέω: bear along, shift (Doric, present middle participle); τό Νεῖκος, -εος: Strife; τό ἔχθος, -εος: hate.

II.4. Democritus, *TEGP* 53 = Hippolytus of Rome (170-235 CE), *Refutation* 1.13.3-4. Democritus envisioned a universe that supported several co-existing cosmoi.

Grammar/Syntax Tags: uses of the genitive case, dative of specification, irregular comparison, substantive adjectives, pronouns, passive infinitives, participles, indirect statement.

ἀπείρους δὲ εἶναι κόσμους καὶ μεγέθει διαφέροντας. ἔν
τισι δὲ μὴ εἶναι ἥλιον μηδὲ σελήνην, ἔν τισι δὲ μείζω τῶν
παρ' ἡμῖν καὶ ἔν τισι πλείω. εἶναι δὲ τῶν κόσμων ἄνισα
τὰ διαστήματα, καὶ τῇ μὲν πλείους, τῇ δὲ ἐλάττους, καὶ
τοὺς μὲν αὖξασθαι, τοὺς δὲ ἀκμάζειν, τοὺς δὲ φθίνειν, καὶ
τῇ μὲν γίνεσθαι, τῇ δὲ ἐκλείπειν. φθείρεσθαι δὲ αὐτοὺς
ὑπ' ἀλλήλων προσπίπτοντας. εἶναι δὲ ἐνίους κόσμους
ἐρήμους ζώων καὶ φυτῶν καὶ παντος ὕγροῦ.

Notes: the entire passage is an extended indirect statement depending on an understood Δημόκριτος ἔλεγε; ἀπείρος, -ον: boundless, infinite; τό μεγέθος: size; διαφέρω: differ; ἡ σελήνη: moon; μείζω: comparative of μέγας (alternate form of μείζονα); πλείω: comparative of πολὺς; ἄνισος, -η, -ον: unequal; τό διάστημα: interval; τῇ = τῇ; ἐλάττους: comparative of μικρός; αὖξανω: increase, strengthen, grow; ἀκμάζω: be in full bloom, be in their prime (cf. acme); φθίνω: decay, wane; ἐκλείπω: fail, die; φθείρω: destroy; προσπίπτω: fall upon, strike against; ἐνιοι, -αι, -α: some; ἐρήμος, -ον (+ genitive): destitute of; τό ζῷον: living creature; τό φυτόν: plant; ὕγρός, -ά, -όν: moist (substantive).

II.5. Aristotle, *On the Heavens* 2.1 (283b26-32). In contrast with Democritus, Aristotle posited an uncreated, eternal world.

Grammar/Syntax Tags: uses of the genitive case, pronouns, impersonal verbs, Aorist passive.

Ὅτι μὲν οὖν οὔτε γέγονεν ὁ πᾶς οὐρανὸς οὔτ' ἐνδέχεται
φθαρῆναι, καθάπερ τινὲς φασιν αὐτόν, ἀλλ' ἔστιν εἷς
καὶ αἰδῖος, ἀρχὴν μὲν καὶ τελευτὴν οὐκ ἔχων τοῦ παντός
αἰῶνος, ἔχων δὲ καὶ περιέχων ἐν αὐτῷ τὸν ἄπειρον χρόνον,
ἐκ τε τῶν εἰρημένων ἔξεστι λαβεῖν τὴν πίστιν, καὶ διὰ
τῆς δόξης τῆς παρὰ τῶν ἄλλως λεγόντων καὶ γεννώντων
αὐτόν·

Notes: ἐνδέχομαι: accept, admit, approve; φθείρω: destroy (aorist passive infinitive); καθάπερ: according as; αἰδῖος, -ον: eternal; ἡ ἀρχή: beginning; ἡ τελευτή: end; τοῦ παντός: (in the attributive position) whole, entire; ὁ αἰών, -ῶνος: lifetime, epoch, era; περιέχω: embrace; ἀπείρος, -ον: boundless, infinite; ὁ χρόνος: time; εἰρημένων: perfect middle participle of εἶρω: say; ἔξεστι: it is possible; ἄλλως: otherwise; γεννάω: produce, generate.

III. PHYSICS

The study of the natural world, physics, is the purview of all Greek thinkers, from Homer and Hesiod onward (in the poets, for example, we learn that earthquakes are caused by Poseidon, thunderbolts are under Zeus' authority). According to tradition, Thales of Miletus (fl. ca. 600-545 BCE) was the first Greek thinker to offer rational, atheistic explanations about what the world is made of and how it works. Subsequent thinkers, including his own students, contradicted and built on his theory—that one substance, water, can explain the physical universe and change within it. This sustained dialogue inspired a number of imaginative and clever hypotheses, culminating in the four element theory, approved by Aristotle, and the atomic theory, embraced by the Epicureans. Despite the fact that explanations were rational, no Greek thinker denied the existence of the gods or their role in the workings of the cosmos.

III.1. Anaximenes, *TEGP* 11 = Plutarch, *Miscellanies* 3. How all matter is created from air, which is divine by nature.

Grammar/Syntax Tags: dative of specification, extended prepositional phrases,

middle perfect participles, contract verbs, indirect statement, embedded clauses.

Ἀναξιμένην δέ φασι τὴν τῶν ὅλων ἀρχὴν τὸν ἀέρα εἶπεῖν,
καὶ τοῦτον εἶναι τῷ μὲν μεγέθει ἄπειρον, ταῖς δὲ περὶ
αὐτὸν ποιότησιν ὀρισμένον· γεννᾶσθαι τε πάντα κατὰ
τινα πύκνωσιν τούτου (ἀέρος) καὶ πάλιν ἀραίωσιν.

Notes: the entire passage is an extended indirect statement depending on φασι; ὁ ἀήρ, ἀέρος: air; ἄπειρος, -ον: boundless; ἡ ποιότης, -ητος: quality; ὀρισμένον: middle perfect participle of ὀρίζω: divide, define, limit; γεννάω: produce, generate; ἡ πύκνωσις, -εως: condensation; ἡ ἀραίωσις, -εως: thinning, rarefaction.

III.2. Xenophanes, *TEGP* 50 = John Philoponus (ca. 490-570 CE), *Physics* 125.27-32. Xenophanes posited a two element theory.

Grammar/Syntax Tags: middle/passive, correlative clauses.

γῇ καὶ ὕδωρ πάντ' ἔσθ' ὅσα γίνοντ' ἡδὲ φύονται.

III.3. Heraclitus, *TEGP* 49 = Aristotle, *On the Heavens* 1.10 (279b12-17). To simplify Heraclitus' thought, fire seems to be both the essential element and cause of change in the physical world.

Grammar/Syntax Tags: γίγνομαι, indirect statement.

ὥσπερ Ἡράκλειτός φησιν ἅπαντα γίνεσθαι ποτε πῦρ.

Notes: ὥσπερ: like, even as.

III.4. Empedocles, *TEGP* 26 = Aëtius (1st/2nd c CE) P 1.3.20; Sextus Empiricus (ca. 160-210 CE), *Against the Professors* 9.362, 10.315; Ioannes Stobaeus (5th c CE) 1.10.11; Hippolytus of Rome (170-235 CE), *Refutation* 7.29.4, 10.7.3; Eusebius of Caesarea (260/265 - 339/340 CE), *Preparation for the Gospel* 14.14.6; Diogenes Laërtius (180-240 CE) 8.76. The four-root theory was first expressed in Empedocles, where each element was associated with a god.

Grammar/Syntax Tags: instrumental datives, imperatives, relative clauses, ellipses of εἰμι.

τέσσαρα γὰρ πάντων ῥιζώματα πρῶτον ἄκουε·

Ζεὺς ἀργῆς Ἥρη τε φερέσβιος ἡδ' Αἰδωνεύς

Νῆστις θ' ἡ δακρύοις τέγγει κρούνωμα βρότειον.

Notes: τέσσαρες, -α: four; τό ῥίζωμα, -ατος: root, stem; ἀργῆς, -ῆτος: shining; φερέσβιος, -ον: life-giving; Αἰδωνεύς: representing earth, perhaps identified with Hades (Wright, fragment 7, ad loc.); Νῆστις: a water goddess from Sicily (Empedocles' homeland), perhaps associated with Persephone (Wright, ad loc.); τό δάκρυον: tear; τέγγω; soak, moisten; τό κρούνωμα: spring, fountain (a hapax legomena?); βρότειος, -ον: mortal, human.

III.5. Democritus, *TEGP* 10 = Aristotle, *Metaphysics* 1.4 (985b4-20). Democritus and his teacher Leucippus developed an atomic theory in the 4th century BCE. Having failed to secure Aristotle's imprimatur, atomism was widely rejected in favor of the four element theory.

Grammar/Syntax Tags: dative of specification, pronouns, substantives, τίθημι, εἰμι, ellipses of contract verbs, participial phrases, indirect statement.

Λεύκιππος δὲ καὶ ὁ ἐταῖρος αὐτοῦ Δημόκριτος στοιχεῖα μὲν τὸ πλήρες καὶ τὸ κενὸν εἶναι φασι, λέγοντες τὸ μὲν ὄν τὸ δὲ μὴ ὄν, τούτων δὲ τὸ μὲν πλήρες καὶ στερεὸν τὸ ὄν, τὸ δὲ κενὸν τὸ μὴ ὄν (διὸ καὶ οὐθὲν μᾶλλον τὸ ὄν τοῦ μὴ ὄντος εἶναι φασιν, ὅτι οὐδὲ τοῦ κενοῦ τὸ σῶμα), αἷτια δὲ τῶν ὄντων ταῦτα ὡς ὕλην.

καὶ καθάπερ οἱ ἐν ποιοῦντες τὴν ὑποκειμένην οὐσίαν τᾶλλα τοῖς πάθεσιν αὐτῆς γεννῶσι, τὸ μανὸν καὶ τὸ πυκνὸν ἀρχὰς τιθέμενοι τῶν παθημάτων, τὸν αὐτὸν τρόπον καὶ οὗτοι τὰς διαφορὰς αἰτίας τῶν ἄλλων εἶναι φασιν.

ταύτας μέντοι τρεῖς εἶναι λέγουσι, σχῆμά τε καὶ τάξιν καὶ θέσιν: διαφέρειν γάρ φασι τὸ ὄν ῥυσμῶ καὶ διαθιγῇ καὶ τροπῇ μόνον: τούτων δὲ ὁ μὲν ῥυσμός σχῆμά ἐστιν ἢ δὲ διαθιγὴ τάξις ἢ δὲ τροπὴ θέσις: διαφέρει γάρ τὸ μὲν Α τοῦ Ν σχήματι τὸ δὲ ΑΝ τοῦ ΝΑ τάξει τὸ δὲ Ζ τοῦ Η θέσει.

Notes: ὁ ἐταῖρος: companion, student; τό στοιχεῖον: a small upright post; in physics, referring to the irreducible components of the material world (e.g., “atoms”), first principle, element; τό πλήρες: the full; τό κενόν: the empty; τό ὄν: “what-is”; στερεός, -ά, -όν: solid; διό: wherefore, on which account; οὐθέν: not one; ἡ ὕλη: wood, matter, sediment.

καθάπερ: according as, just as; ὑποκειμένος, -η, -ον: underlying; τό πάθος, -εος: that which happens; γεννάω: produce, beget; τό μανόν: the rare; τό πυκνόν: the solid, the dense; τό πάθημα, -ατος: suffering, change; ἡ διαφορά: dislocation, moving here and there; μέντοι: indeed, to be sure.

τό σχῆμα, -ατος: shape, form; ἡ τάξις, -εως: order, arrangement; ἡ θέσις, -εως: situation, placement; διαφέρω: differ; ὁ ῥυσμός: regular motion; ἡ διαθιγὴ: contact; ἡ τροπή: rotation; Α and Ν are points on one line, representing two qualities of matter; Ζ and Η are points on a second line.

IV. ARITHMETIC AND GEOMETRY

Polis (community) life is impossible without number, which was among Prometheus’ gifts. Number is essential for equitable trade, fair taxes (see Herodotus [fl. ca. 445-420 BCE] 2.109), and for the management of households, businesses, and states. Accurate mensuration underlies the magnificent architectural achievements of the Greek world. Although Mesopotamia and Egypt had a strong tradition in the numerical arts, geometry was formalized in Greece in the 6th century BCE when Greek philosophers sought to determine general formulae for geometrical shapes and prove why those particular formulae were correct (the Egyptians could calculate volumes and verify their results, but only *ad hoc*). Consequently geometry was applied to other problems, as we shall see below, as well as to other sciences, especially astronomy. Among the interesting theoretical foci were the calculation of very large numbers (as in Archimedes’ *Sand Reckoner*), estimating the value of π , and “squaring the circle” (constructing a square with the same area as a given circle).

IV.1. Homer, *Odyssey* 4.411-413. Proteus, the shape-shifting old man of the sea, counted his seals by fives.

Grammar/Syntax Tags: compounds of εἶμι, middle/passives, reduplication, subjunctives.

φώκας μὲν τοι πρῶτον ἀριθμήσει καὶ ἔπεισιν:

αὐτὰρ ἐπὴν πάσας πεμπάσσεται ἡδὲ ἴδηται,

λέξεται ἐν μέσσησι, νομεὺς ὧς πώεσι μῆλων.

Notes: ἡ φώκη: seal; ἀριθμέω: count; ἔπειμι: go over; αὐτὰρ: but; ἐπὴν: when; πεμπάζω: count on five fingers; ἴδηται: aorist middle subjunctive of ὁράω; λέγω: lay; μέσσησι, epic dative plural of μέσος -η -ον; ὁ νομεύς, -έως: herdsman; τό πῶν, -εος: flock; τό μῆλον: sheep, goat.

IV.2. Aeschylus, *Prometheus Bound* 459-460. Among Prometheus' gifts to humankind were numbers and arithmetic.

Grammar/Syntax Tags: partitive genitive, ethical dative.

καὶ μὴν ἀριθμόν, ἔξοχον σοφισμάτων,

ἐξηῦρον αὐτοῖς.

Notes: ἔξοχος, -η, -ον: excellent, mightiest, pre-eminent; τό σόφισμα, -ατος: device, artifice, trick; ἐξευρίσκω: discover (aorist indicative).

IV.3. Plato, *Timaeus* 54b6-d3. A geometrical atomic theory consisting of four geometrical shapes—tetrahedron, octahedron, icosahedron, and cube—the first three of which can be broken down into component triangles and then recombined in order to form various solids.

Grammar/Syntax Tags: partitive genitive, middle/passives, participles, complementary infinitives, perfect tense, genitive absolute, relative clauses.

τὰ γὰρ τέτταρα γένη δι' ἀλλήλων εἰς ἄλληλα ἐφαίνετο

πάντα γένεσιν ἔχειν, οὐκ ὀρθῶς φανταζόμενα: γίγνεται μὲν γὰρ ἐκ τῶν τριγώνων ὧν προηγήμεθα γένη τέτταρα, τρία μὲν ἐξ ἑνὸς τοῦ τὰς πλευρὰς ἀνίσους ἔχοντος, τὸ δὲ τέταρτον ἐν μόνον ἐκ τοῦ ἰσοσκελοῦς τριγώνου συναρμοσθέν.

οὐκ οὖν δυνατὰ πάντα εἰς ἄλληλα διαλυόμενα ἐκ πολλῶν σμικρῶν ὀλίγα μεγάλα καὶ τοῦναντίον γίνεσθαι, τὰ δὲ τρία οἷόν τε: ἐκ γὰρ ἑνὸς ἅπαντα πεφυκότα λυθέντων τε τῶν μειζόνων πολλὰ σμικρὰ ἐκ τῶν αὐτῶν συστήσεται, δεχόμενα τὰ προσήκοντα ἑαυτοῖς σχήματα, καὶ σμικρὰ ὅταν αὖ πολλὰ κατὰ τὰ τρίγωνα διασπαρῇ, γενόμενος εἷς ἀριθμὸς ἑνὸς ὅγκου μέγα ἀποτελέσειεν ἂν ἄλλο εἶδος ἑν. ταῦτα μὲν οὖν λελέχθω περὶ τῆς εἰς ἄλληλα γενέσεως.

Notes: ἡ γένεσις, -εως: origin, generation; ὀρθῶς: rightly, clearly; φανταζόμαι: become visible, appear; τριγώνος, -ον: triangular; προαιρέω: bring forth, produce, prefer (perfect middle/passive); ἡ πλευρά, -ᾱς: rib, side; ἀνίσος, -ον: unequal; ἰσοσκελής, -ές: with two equal legs, isosceles; συναρμόζω: fit together (aorist passive participle).

δυνατός, -ή, -όν: able, strong, powerful; διαλύω: break off, dissolve (into elements); σμικρός = μικρός; τοῦναντίον = τοῦ ἐναντίον; πεφυκότα: perfect participle of φύω; λυθέντων: aorist passive participle of λύω; μειζόνων: comparative of μέγας; συνίστημι: combine; προσήκω: be at hand, be present, belong to; τό σχῆμα, -ατος: form, shape; διασπείρω: scatter, disperse (aorist subjunctive passive); ὁ ὄγκος: mass, body; ἀποτελέω: complete, render; λελέχθω: perfect middle/passive imperative of λέγω.

IV.4. Euclid (fl. 360-260 BCE), Definitions 1-4. Points and lines.

Grammar/Syntax Tags: dative with special adjectives, relative clauses, recessive accent.

σημεῖόν ἐστιν, οὗ μέρος οὐθέν. γραμμὴ δὲ μῆκος ἀπλατές.

γραμμῆς δὲ πέρατα σημεία. εὐθεῖα γραμμὴ ἐστίν, ἥτις ἐξ
ἴσου τοῖς ἐφ’ ἑαυτῆς σημείοις κεῖται.

Notes: τό σημείον: point; οἷ: where; οὐθέν: from οὐδεῖς; ἡ γραμμή: stroke, line; τό μήκος, -εος: length; ἀπλατῆς, -ές: without breadth; τό πέρας-ατος: limit, boundary; κεῖμαι: lie.

IV.5. Aristophanes (445-385 BCE), *Birds* 1001-1009. When two middle-aged Athenian men, frustrated at the litigious lifestyle of their city-state, decided to establish their own utopia in the sky, Νεφελοκοκκυγία (“Cloud Cuckoo Land”), a string of dissatisfied citizens came to seek asylum, including (a caricature of) the famous geometer Meton of Athens (fl. 440-410 BCE). Below is Meton’s proposed division of Νεφελοκοκκυγία into lots by using traditional surveying tools and techniques, where Aristophanes also alludes to the paradox of “squaring the circle.”

Grammar/Syntax Tags: uses of the dative case, future tense, subjunctives, contract verbs, genitive absolute, purpose clauses.

Μέτων: προσθεις οὖν ἐγὼ
τὸν κανόν’ ἄνωθεν τουτονὶ τὸν καμπύλον,
ἐνθεις διαβήτην—μανθάνεις;

Πισθέταιρος: οὐ μανθάνω.

Μέτων: ὀρθῶ μετρήσω κανόνι προστιθείς, ἵνα
ὁ κύκλος γένηται σοι τετράγωνος κἂν μέσῳ
ἀγορά, φέρουσαι δ’ ὥσιν εἰς αὐτὴν ὁδοὶ
ὀρθαὶ πρὸς αὐτὸ τὸ μέσον, ὥσπερ δ’ ἀστέρος
αὐτοῦ κυκλοτεροῦς ὄντος ὀρθαὶ πανταχῇ
ἀκτῖνες ἀπολάμπωσιν.

Notes: ὁ ἀήρ, ἀέρος: air; προστίθημι: put or place on or beside, impose, apply (aorist active participle); ὁ κανών, -όνος: rod, bar, ruler; ἄνωθεν: from above; καμπύλος, -ον: bent, curved (the “curved ruler” may sound like an oxymoron or refer to a sort of protractor); ἐντίθημι: insert, engraft (aorist active participle); ὁ διαβήτης, -ου: compass.

μετρέω: measure; τετράγωνος, -η, -ον: something with four angles (a square); κἂν = καὶ ἐν; ὦσιν: present subjunctive of εἰμί (continuing the purpose clause); ὁ ἀστήρ, -έρος: star; κυκλοτερής, -ές: round, circular (genitive singular); πανταχῇ: everywhere, in all directions; ἡ ἀκτίς, -ῖνος: ray, spoke; ἀπολάμπω: shine from, reflect light.

IV.6. Zeno, *TEGP* 16 = Aristotle, *Physics* 5.2 (233a21-28). The dichotomy argument against motion: an object cannot move because it must first touch an infinite number of points in a finite amount of time. Aristotle’s counter-argument is that nothing, neither time nor space, is composed of strictly indivisible elements.

Grammar/Syntax Tags: uses of the genitive case, articular infinitive, perfect tense, middle/passive infinitive, indirect statement.

διὸ καὶ ὁ Ζήνωνος λόγος ψεῦδος λαμβάνει τὸ μὴ ἐνδέχεσθαι τὰ ἄπειρα διελθεῖν ἢ ἄψασθαι τῶν ἀπειρῶν καθ’ ἕκαστον ἐν πεπερασμένῳ χρόνῳ. διχῶς γὰρ λέγεται καὶ τὸ μῆκος καὶ ὁ χρόνος ἄπειρον, καὶ ὅλως πᾶν τὸ συνεχές, ἥτοι κατὰ διαίρεσιν ἢ τοῖς ἐσχάτοις. τῶν μὲν οὖν κατὰ ποσὸν ἀπείρων οὐκ ἐνδέχεται ἄψασθαι ἐν πεπερασμένῳ χρόνῳ, τῶν δὲ κατὰ διαίρεσιν ἐνδέχεται· καὶ γὰρ αὐτὸς ὁ χρόνος οὕτως ἄπειρος.

Notes: διό: wherefore, on which account; ψεῦδος: false (modifying λόγος, but referring to the idea expressed by τὸ μὴ ἐνδέχεσθαι; λαμβάνω: to take, receive, understand; ἐνδέχομαι: admit, accept, assume, be possible (articular infinitive); ἄπειρος, -ον: boundless; διέρχομαι: pass through (aorist active infinitive); ἄπτω (+ genitive): fasten, join, engage with, touch; περαίνω: bring to an end, complete, “finite” (perfect middle/passive participle); ὁ χρόνος: time; διχῶς: doubly, in two ways; τό μῆκος,

-εως: length; συνεχής, -ές: continuous; ἡ διαίρεσις, -εως: division, divisibility; ἔσχατος, -η, -ον: uttermost, extreme, furthest; ποσός, -ή, -όν: of any number, of a certain quantity.

V. ASTRONOMY

The night sky has always been a source of wonder and curiosity. In practical terms, observing the heavens facilitates time-keeping (in order to regulate the civic and religious calendars) and enables an understanding of the connection between celestial bodies (sun, moon, planets) and natural phenomena (seasons and tides). But Greek curiosity transcended the mundane, and thinkers were eager to construct a model of the heavens that explained the seemingly erratic retrograde motion of the planets (“wanderers”) within the framework of a geocentric cosmos (i.e., “saving the phenomena”). Such a model also facilitated the prediction of eclipses, another of the goals of ancient astronomy. Although heliocentrism was suggested (famously by Aristarchus, ca. 280 BCE, but also by Seleucus of Seleucia, fl. 165-135 BCE), it was flatly rejected because of the lack of visible stellar parallax (the apparent displacement of stationary objects that results when the observer moves). The notion of a moving earth, furthermore, contradicted Aristotelian physics. The enduring model was developed by Plato’s contemporary, Eudoxus of Cnidus (fl. ca. 365-340 BCE), who proposed a complicated system of 27 concentric circles governing the motions of the heavenly bodies.

V.1. Homer, *Iliad* 18.483-89. The chief constellations are rendered on Achilles’ shield.

Grammar/Syntax Tags: uses of the genitive case, perfect tense, relative clauses, ellipses, anaphora.

ἐν μὲν γαῖαν ἔτευξ’, ἐν δ’ οὐρανόν, ἐν δὲ θάλασσαν,
 ἡέλιόν τ’ ἀκάμαντα σελήνην τε πλήθουσιν,
 ἐν δὲ τὰ τεύχεα πάντα, τὰ τ’ οὐρανὸς ἐστεφάνωται,
 Πληϊάδας θ’ Ὑάδας τε τό τε σθένος Ὠρίωνος
 Ἄρκτον θ’, ἣν καὶ Ἄμαξαν ἐπὶ κλησὶν καλέουσιν,

ἢ τ' αὐτοῦ στρέφεται καὶ τ' Ὠρίωνα δοκεύει,

οἷη δ' ἄμμορός ἐστι λοετρῶν Ὠκεανοῖο.

Notes: ἐν: construe the shield as the object; τεύχω: produce, make, fashion (Hephaistus is the subject); ἡέλιον = ἥλιον; ἀκάμος (-αντος): untiring; ἡ σελήνη: moon; πλήθω: be or become full; τείρεα Ionic form of τό τέρας, -ατος: sign, marvel, portent; τὰ τ': "with which" (internal accusative or accusative of respect); στεφανῶ: crown, put around as a rim (perfect indicative middle/passive); αἱ Πληϊάδες: the Pleiades, "seven Sisters", a star cluster at Taurus' nape, so-called because they rise at the beginning of the sailing season (πλέω); αἱ Ὑάδες: the Hyades, a star cluster in Taurus' head; τό σθένος, -εος: strength; ὁ Ὠρίων, -ωνος: the constellation Orion; ἡ Ἄρκτος: the Bear, Ursa Major (Callisto); ἡ Ἄμαξα: wagon (Ursa Major); ἡ ἐπὶ κλησις, -εως: additional name, "nickname"; αὐτοῦ: (adverb) in the same place, here, there; στρέφω: turn, twist, rotate (on an axis); δοκεύω: keep an eye, watch closely; οἷος, -α, -ον: alone, "most notably," according to Aristotle, *Poetics* 25 [1461a21])—the problem is that other constellations, likewise, remained above the horizon throughout the year; ἄμμορός, -ον (+ genitive): without a share in; τό λοετρὸν: bath, bathing place; ὁ Ὠκεανός: Ocean, the river that encircles the world in the Homeric cosmos.

V.2. Homer, *Odyssey* 5.269-275. Odysseus used the stars to navigate away from Calypso's island.

Grammar/Syntax Tags: uses of the dative case, middle/passive, imperfect tense, perfect tense, relative clauses, participial clauses.

γηθόσυνος δ' οὐρῶ πέτασ' ἰστία δῖος Ὀδυσσεύς.

αὐτὰρ ὁ πηδαλίῳ ἰθύνετο τεχνηέντως

ἥμενος, οὐδέ οἱ ὕπνος ἐπὶ βλεφάροισιν ἔπιπτεν

Πληϊάδας τ' ἐσορῶντι καὶ ὄψε δύνοντα Βοώτην

Ἄρκτον θ', ἣν καὶ Ἄμαξαν ἐπὶ κλησιν καλέουσιν,

ἢ τ' αὐτοῦ στρέφεται καὶ τ' Ὠρίωνα δοκεύει,

οἷη δ' ἄμμορός ἐστι λοετρῶν Ὠκεανοῖο.

Notes: γηθόσυνος, -η, -ον: joyful, glad; ὁ οὔρος: breeze, fair wind; πέτομαι: fly, make fly, “spread”; τό ιστίον: sail (Odysseus probably had a single sail on his “raft”: see L. Casson who argues that the craft is actually a ship: *Ships and Seamanship in the Ancient World*. Baltimore, 1971); δῖος, -α, -ον: noble, divine; αὐτὰρ: but; τό πηδαλίον: steering oar (an early incarnation of the tiller); ἰθύνω: make straight, run straight, guide straight (imperfect); τεχνήντως: skillfully; ἦμαι: sit (perfect middle participle); οἱ: dative of the reflexive pronoun ἐ; ὁ ὕπνος: sleep (we note that Odysseus’ shipboard naps inevitably led to disaster, see *Odyssey* 10.31-49, 12.338-365); τό βλέφαρον: eyelid; Πληιάδας: see passage above; εἰσοράω: look on (dative participle modifying οἱ); ὀψέ: after a long time, late; δύνω: sink, plunge, set; ὁ Βοώτης; a constellation in the northern sky that seems to chase Ursa Major (replacing the Hyades in the passage above); note the formulaic nature of the last three lines of this passage which are identical to the passage above.

V.3. Aratus, *Phaenomena* 254-258. Aratus’ work, composed in dactylic hexameters, was perhaps the most widely read book in antiquity (with translations into Latin penned by both Cicero and Germanicus). The Pleiades.

Grammar/Syntax Tags: dative of possession, passive, uses of the infinitive.

ἄγχι δέ οἱ σκαιῆς ἐπιγουνίδος ἦλιθα πᾶσαι

Πληϊάδες φορέονται. ὁ δ' οὐ μάλα πολλὸς ἀπάσας

χῶρος ἔχει, καὶ δ' αὐταὶ ἐπισκέψασθαι ἀφαιραί.

ἐπτάποροι δὴ ταί γε μετ' ἀνθρώπους ὑδέονται,

ἐξ οἷαί περ εἴδουσαι ἐπόψιαι ὀφθαλμοῖσιν.

Notes: ἄγχι (+ genitive): near; οἱ: referring to the constellation Perseus (Homeric dative, see V.2); σκαιός, -ά, -όν: left, westward; ἡ ἐπιγουνίς,

-ίδος: thigh; ἥλιθα: (adverb) very much, “tightly”, “in a cluster”; ἀπάσας: “all together”; ὁ χώρος: space; ἐπισκέπτομαι: number, count, consider (aorist middle/passive infinitive); ἀφαιρός, -ά, -όν: feeble, weak, faint; ἐπτάπορος, -ον: with seven paths; ὑδέω: call; ἕξ: six; οἶος, -α, -ον: alone; περ: all; ἐπόπιος, -η, -ον: visible.

V.4. Anaximander, *TEGP* 20 = Hippolytus of Rome (170-235 CE), *Refutation* 1.6.4. Eclipses.

Grammar/Syntax Tags: middle/passives, indirect statement, relative clauses, genitive absolute.

τὰ δὲ ἄστρον γίνεσθαι κύκλον πυρός, ἀποκριθέντα τοῦ κατὰ τὸν κόσμον πυρός, περιληφθέντα δ' ὑπὸ ἀέρος. ἐκπνοὰς δ' ὑπάρχει πόρους τινὰς αὐλώδεις, καθ' οὓς φαίνεται τὰ ἄστρον διὸ καὶ ἐπιφρασσομένων τῶν ἐκπνοῶν τὰς ἐκλείψεις γίνεσθαι.

Notes: construe the passage with an understood Ἀναξίμανδρος λέγει; τό ἄστρον: star; γίνεσθαι: present middle/passive infinitive of γίγνομαι (Ionic form); ὁ κύκλος: ring, circle; ἀποκρίνω: separate (aorist passive participle); περιλαμβάνω: encompass, surround (aorist passive participle); ὁ ἀήρ, ἀέρος: air; ἡ ἐκπνοή: exhalation, vent (in apposition with the subject); ὑπάρχω: begin, exist; ὁ πόρος: narrow, straight, passageway; αὐλώδεις: flute-like passage; διό: wherefore, on which account; ἐπιφράσσω: block up; ἡ ἔκλειψις, -εως: failing, “eclipse”.

V.5. Democritus, *TEGP* 64 = Aëtius (1st/2nd c CE) P 2.15.3, S 1.24.1e. The nature of the sun.

Grammar/Syntax Tags: indirect statement, participial clauses.

Δημόκριτος [τὸν ἥλιον] μύδρον ἢ πέτρον διάπυρον. τροπὴν δὲ γίνεσθαι ἐκ τῆς περιφερούσης αὐτὸν δινήσεως.

Notes: ὁ μύδρος: anvil, red-hot iron; ὁ πέτρος: stone, rock; διάπυρος, -ον: red-hot, enflamed, fiery; ἡ τροπή: turning, “solstice”; περιφέρω: carry around; ἡ δίνησις, -εως: whirling, rotation (the vortex is presumably caused

by the motion of the sun around the earth).

V.6. Archimedes, *Sand-Reckoner* 1.4-5. Aristarchus' astronomical theories, including heliocentrism.

Grammar/Syntax Tags: perfect tense, uses of the participle, indirect statement, relative clauses, alpha-privative.

Ἀρίσταρχος δὲ ὁ Σάμιος ὑποθεσίων τινῶν ἐξέδωκεν γραφάς, ἐν αἷς ἐκ τῶν ὑποκειμένων συμβαίνει τὸν κόσμον πολλαπλάσιον εἶμεν τοῦ νῦν εἰρημένου. ὑποτίθεται γὰρ τὰ μὲν ἀπλανέα τῶν ἄστρον καὶ τὸν ἄλιον μένειν ἀκίνητον, τὰν δὲ γὰν περιφέρεισθαι περὶ τὸν ἄλιον κατὰ κύκλου περιφέρειαν, ὅς ἐστιν ἐν μέσῳ τῷ δρόμῳ κείμενος, τὰν δὲ τῶν ἀπλανέων ἄστρον σφαῖραν περὶ τὸ αὐτὸ κέντρον τῷ ἀλίῳ κειμέναν τῷ μεγέθει ταλικάυταν εἶμεν, ὥστε τὸν κύκλον, καθ' ὃν τὰν γὰν ὑποτίθεται περιφέρεισθαι, τοιαύταν ἔχειν ἀναλογίαν ποτὶ τὰν τῶν ἀπλανέων ἀποστασίαν, οἷαν ἔχει τὸ κέντρον τᾶς σφαίρας ποτὶ τὰν ἐπιφάνειαν.

Notes: Σάμιος, -η, -ον: from the island of Samos, in the eastern Aegean; ἢ ὑπόθεσις: proposal, hypothesis; ἐξέδωκεν: aorist of ἐκδίδωμι: give out, “publish”; ὑποκειμένων: perfect middle/passive substantive participle of ὑπόκειμαι: lie under (“underlying principles”); πολλαπλάσιος: many times as, as large as; εἶμεν: Doric present infinitive of εἶμι; εἰρημένων: perfect middle participle of εἶρω: say (“what is now said”); ὑποτίθημι: place under, assume, suppose; ἀπλανής, -ές: not wandering (the planets are so-called because they seem to “wander” erratically in the comparison with the sphere of fixed stars); τὸ ἄστρον: star; τὸν ἄλιον: Doric for ἥλιος; ἀκίνητος: unmoved, motionless; τὰν γὰν: Doric for γῆ; περιφέρω: carry round; ὁ δρόμος: course; ἡ σφαῖρα: ball, sphere; τὸ κέντρον: sharp point, center; ταλικάυταν: Doric for τηλικούτος: of such an extent; ἡ ἀναλογία: mathematical proportion; ποτὶ: Doric for πρὸς; ἡ ἀποστασία: revolt,

departure, distance; ἡ ἐπιφάνεια: appearance, surface.

VI. METEOROLOGY

The ancient science of “Meteorology”, the study of μετέωρα (“things high up”), was much broader in scope than the modern discipline, focusing not on predicting weather patterns (they lacked the tools to measure temperature and barometric pressure with any accuracy), but instead on explaining meteorological phenomena, including comets, precipitation, rainbows (and even moonbows), winds, as well as phenomena that were not so “high up”—volcanic eruptions, for example, and earthquakes, thought to be caused by winds. Aristotle’s *Meteorology* survives, as does Theophrastus’ *On Winds* and pseudo-Theophrastus’ *On Weather Signs*. Among other things, Aristotle theorized that rainbows occur when sunlight is reflected at fixed angles from clouds. He also explained comets, meteors, the aurora borealis, and the Milky Way as phenomena of the upper atmosphere, caused by hot, dry exhalations from accreting air that occasionally burst into flame.

VI.1. Anaximenes, *TEGP* 26 = Aëtius (1st/2nd c CE) P 3.4.1, S 1.31.1. On the formation of clouds, rain, and snow (compare III.1, illustrating Anaximenes’ physics).

Grammar/Syntax Tags: genitive absolute, indirect statement, temporal clauses.

Ἀναξιμένης νέφη μὲν γίνεσθαι παχυνθέντος ἐπὶ πλεῖον τοῦ ἀέρος, μᾶλλον δ’ ἐπισυναχθέντος ἐκθλίβεσθαι τοὺς ὄμβρους, χιόνα δὲ ἐπειδὰν τὸ καταφερόμενον ὕδωρ παγῇ, χάλαζαν δ’ ὅταν συμπεριληφθῇ τι τῷ ὑγρῷ πνευματικόν.

Notes: Ἀναξιμένης (ἔφη); τό νέφος, -εος: cloud; παχύνω: thicken; ὁ ἀήρ, ἀέρος: air; ἐπισυνάγω: collect (aorist passive participle in genitive absolute; understand ἀέρος); ἐκθλίβω: squeeze, press; ὁ ὄμβρος: storm, thunder shower; ἡ χιών, -όνης: snow; ἐπειδὰν: whenever; τό καταφέρω: fall down; ὕδωρ: “rain”; πήγνυμι: stick, fix, “freeze” (aorist passive subjunctive); ἡ χάλαζα: hail; συμπεριλαμβάνω: gather together (aorist passive subjunctive); ὑγρός, -ά, -όν: moist; πνευματικός, -ή, -όν: of wind/air, windy, airy.

VI.2. Anaximander, *TEGP* 30 = Aëtius (1st/2nd c CE) P 3.3.1, S 1.291.1. The causes of various violent weather phenomena.

Grammar/Syntax Tags: genitive with prepositions, participles, aorist passive, indirect statement.

περὶ βροντῶν, ἀστραπῶν, κεραυνῶν, πρηστήρων, τε καὶ τυφῶνων. Ἀναξίμανδρος ἐκ τοῦ πνεύματος ταυτί πάντα συμβαίνειν· ὅταν γὰρ περιληφθὲν νέφει παχεῖ βιασάμενον ἐκπέσῃ τῇ λεπτομερείᾳ καὶ κουφότητι, τόθ' ἢ μὲν ῥῆξις τὸν ψόφον, ἢ δὲ διαστολὴ παρὰ τὴν μελανίαν τοῦ νέφους τὸν διαυγασμὸν ἀποτελεῖ.

Notes: ἡ βροντή: thunder; ἡ ἀστραπή: lightning flash; ὁ κεραυνός: thunderbolt; ὁ πρηστήρ, -ῆρος: windstorm, whirlwind, hurricane; ὁ τυφών, -ῶνος: typhoon; Ἀναξίμανδρος (ἔφη); ταυτί: strengthened Attic form of ταῦτα; συμβαίνω: be joined, meet, correspond with, happen, result; περιλαμβάνω: encompass, surround (aorist passive participle); τό νέφος, -εος: cloud; παχύς, -εῖα: thick; βιάζω: overpower by force; ἐκπίπτω: fall out, drive out; ἡ λεπτομέρεια: property of being composed of small particles; ἡ κουφότης, -ητος: lightness, ἡ ῥῆξις, -εως: breaking, bursting; ὁ ψόφος: noise; ἡ διαστολή: separation; ἡ μελανία: blackness; ὁ διαυγασμός: bright burst (of lightening); ἀποτελέω: bring to an end, complete, accomplish, effect.

VI.3. Pseudo-Theophrastus, *On Weather Signs* 32. How to determine weather conditions by observing thunder and lightening.

Grammar/Syntax Tags: genitive of time, superlatives, future tense, subjunctives, conditionals, temporal clauses.

Ἐὰν ἀστραπὴ πανταχόθεν γίνηται, ὕδωρ σημαίνει, καὶ ὅθεν ἂν αἱ ἀστραπαὶ πυκναὶ γίνωνται, ἐντεῦθεν πνεύματα γίνεται. θέρους ὅθεν ἂν ἀστραπαὶ καὶ βρονταὶ γίνωνται, ἐντεῦθεν πνεύματα γίνεται ἰσχυρά· ἐὰν μὲν σφόδρα καὶ ἰσχυρὸν ἀστράπτῃ, θᾶπτον καὶ σφοδρότερον πνεύσουσιν, ἐὰν δ' ἡρέμα καὶ μακρῶς, κατ' ὀλίγον. τοῦ δὲ χειμῶνος καὶ φθινοπώρου τούναντίον· παύουσι γὰρ τὰ πνεύματα αἱ

ἀστραπαί· καὶ ὅσῳ ἂν ἰσχυρότεραι γίνωνται ἀστραπαὶ καὶ βρονταί, τοσούτῳ μᾶλλον παύονται· τοῦ δ' ἔαρος ἦττον ἂν ταῦτὰ σημεῖα λέγω, ὥσπερ καὶ χειμῶνος.

Notes: ἡ ἀστραπή: lightening flash; πανταχόθεν: from all sides; ὕδωρ: “rain”; σημαίνω: indicate; πυκνός, -ή, -όν: thick, close; ὅθεν . . . ἐντεῦθεν: from where . . . from that place; τό θέρος, -εος: summer; ἡ βροντή: thunder; σφόδρα: (adverb) violently, excessively; θᾶττον: comparative of ταχύς; πνεύω: blow; ἡρέμα: (adverb) softly, gently; μανῶς: infrequently; κατ' ὀλίγον: gradually; ὁ χειμῶν, -ῶνος: winter; τό φθινόπωρον: autumn; τό ἔαρ: spring; ἦττων, -ον: weaker.

VI.4. Xenophanes, *TEGP* 72 = Scholium BLT on *Iliad* 11.27. The rainbow.

Grammar/Syntax Tags: objects complement, passive infinitives, relative clauses.

ἦν τ' Ἴριν καλέουσι, νέφος καὶ τοῦτο πέφυκε,
πορφύρεον καὶ φοινίκεον καὶ χλωρὸν ιδέσθαι.

Notes: ἡ Ἴρις, -ιδος: rainbow; τό νέφος, -εος: cloud; πέφυκε: perfect of φύω; πορφύρεος, -η, -ον: bright, glittering, dark red, purple, crimson; φοινίκεος, -έα, -εον: purple-red, purple, crimson; χλωρός, -ά, -όν: pale, pale-green, yellow; εἶδον: see (aorist middle infinitive).

VI.5. Aristotle, *Meteorology* 3.4 (375a18-22; 376b25-28). Moon Rainbows.

Grammar/Syntax Tags: objective genitive, comparatives, superlatives, relative clauses, temporal clauses.

μέγιστον δὲ σημεῖον τούτων ἡ ἀπὸ τῆς σελήνης ἴρις· φαίνεται γὰρ λευκὴ πάμπαν. γίνεταί δὲ τοῦτο ὅτι ἐν τε τῷ νέφει ζοφερόν φαίνεται καὶ ἐν νυκτί. ὥσπερ οὖν πῦρ ἐπὶ πῦρ, μέλαν παρὰ μέλαν ποιεῖ τὸ ἡρέμα λευκὸν παντελῶς φαίνεσθαι λευκόν·

γίγνεσθαι δὲ καὶ νύκτωρ ἀπὸ τῆς σελήνης ὀλιγάκις·

οὔτε γὰρ αἰὲς πλήρης, ἀσθενεστέρα τε τὴν φύσιν <ἢ>
ὥστε κρατεῖν τοῦ ἀέρος.

Notes: **τούτων:** i.e., contrasting colors in rainbows; **ἡ σελήνη:** moon; **λευκός, -ή, -όν:** light, bright; **πάμπαν:** wholly, altogether; **τό νέφος, -εος:** cloud; **ζοφερός, -ά, -όν:** dusky, gloomy; **μέλας, μέλαινα, μέλαν:** dark, black; **τὸ ἡρέμα:** the soft, the “dim”; **παντελῶς:** completely.

νύκτωρ: (adverb) by night; **ὀλιγάκις:** seldom; **πλήρης, πλήρες:** full; **ἀσθενής, -ές:** without strength, weak; **τὴν φύσιν:** in respect to its nature, naturally (accusative of respect); **ὁ ἀήρ, ἀέρος:** air.

VII. GEOGRAPHY AND CARTOGRAPHY

In antiquity, describing the world was a way of understanding the earth, and understanding was a way of imposing control over it. For the Greeks, geography followed three primary trajectories: human (straddling what we would call ethnography and anthropology), physical or descriptive (the nature and shape of the earth, and human’s place in it), and mathematical (size and distance between places). The Greeks believed that the earth was a sphere (Plato’s perfect geometrical shape: *Timaeus* 32c-34b), and many ancient thinkers calculated the earth’s circumference. Using simple trigonometry, Eratosthenes determined the earth’s circumference at 250,000 *stadia*, approximately 24,662 miles, just under the modern figure of 24,901 miles).

Several challenges obstruct our reconstruction of ancient geographical and cartographical thought. Representing the culmination of centuries of Greek geographical investigation, the only extant work of mathematical geography is the *Guide to Drawing Maps of the World* (more commonly, *Geography*) of Claudius Ptolemy (fl. ca. 127- after 146 CE). In addition, aside from the Roman *passus mille*, units of measurement were not standardized. At least three values for the *stadium* are known: Athenian (185 meters); Olympian (192.8 meters); Egyptian (157.5 meters). Also, because of the earth’s sphericity, cartographic data become distorted in two-dimensional formats. Thus, aiming to produce a more accurate map using new information gained by expansion of empire and trade links, Ptolemy devised a sophisticated grid of curved meridians and parallels in order to improve the accuracy of positioning distant locations.

Finally, there is also robust debate regarding whether physical maps, as we understand them, existed at all. Literary evidence, however, strongly suggests pictorial maps in monumental contexts (see Aristophanes VII.8, below), but it is likely that ancient maps lacked scale, and details attenuated as the map spiraled away from its center.

VII.1. Aristotle, *On the Heavens* 2.14 (297b24-31). Lunar eclipses prove the earth's sphericity.

Grammar/Syntax Tags: prepositions, imperfect tense, supplementary participles, optatives, causal clauses, ellipses.

Ἔτι δὲ καὶ διὰ τῶν φαινομένων κατὰ τὴν αἴσθησιν· οὐτε γὰρ ἂν αἱ τῆς σελήνης ἐκλείψεις τοιαύτας ἂν εἶχον τὰς ἀποτομάς· νῦν γὰρ ἐν μὲν τοῖς κατὰ μῆνα σχηματισμοῖς πάσας λαμβάνει τὰς διαιρέσεις (καὶ γὰρ εὐθεῖα γίνεται καὶ ἀμφίκυρτος καὶ κοίλη), περὶ δὲ τὰς ἐκλείψεις ἀεὶ κυρτὴν ἔχει τὴν ὀρίζουσαν γραμμὴν, ὥστ' ἐπεὶ περ ἐκλείπει διὰ τὴν τῆς γῆς ἐπιπρόσθησιν, ἢ τῆς γῆς ἂν εἴη περιφέρεια τοῦ σχήματος αἰτία σφαιροειδῆς οὕσα.

Notes: ἔτι: further (“there is further proof”); ἡ αἴσθησις, -εως: sense perception; οὐτε γὰρ: “if the earth were not spherical”; ἡ σελήνη: moon; ἡ ἐκλειψις, -εως: failing, “eclipse”; ἡ ἀποτομή: division into segments; ἡ μῆνη: moon; ὁ σχηματισμός: configuration; ἡ διαίρεσις, -εως: division; ἀμφίκυρτος, -ον: convex (gibbous); κοῖλος, -η, -ον: hollow, concave; κυρτός, -ή, -όν: bulging, convex; ὀρίζω: divide, separate, define, limit; ἡ γραμμή: stroke, line; ἐπεὶ περ: since; ἐκλείπω: an eclipse occurs; ἡ ἐπιπρόσθησις, -εως: interposition; ἡ περιφέρεια: circumference; τό σχῆμα, -ατος: shape; σφαιροειδής, -ές: spherical.

VII.2. Plato, *Phaedo* 109b. The extent of the inhabitable earth.

Grammar/Syntax Tags: pronouns, participles in indirect statement.

ἔτι τοίνυν, ἔφη, πάμμεγά τι εἶναι αὐτό, καὶ ἡμᾶς οἰκεῖν

τοὺς μέχρι Ἡρακλείων στηλῶν ἀπὸ Φάσιδος ἐν σμικρῷ
τινι μορίῳ, ὥσπερ περὶ τέλμα μύρμηκας ἢ βατράχους
περὶ τὴν θάλατταν οἰκοῦντας, καὶ ἄλλους ἄλλοθι
πολλοὺς ἐν πολλοῖσι τοιούτοις τόποις οἰκεῖν.

Notes: *πάμμεγας, -άλη, -α*: immense; *αὐτό*: refers to the earth; *ἡ στήλη*: block, monument, boundary post (here, the Strait of Gibraltar, where, according to tradition, Heracles opened up a passage between the Mediterranean and the Atlantic); *ὁ Φᾶσις, -ιδος*: a river in Colchis, on the eastern Black Sea, marking the eastern extent of Greek geographical knowledge in Plato's day; *σμικρός* = μικρός; *τό μόριον*: piece, portion; *τό τέλμα, -ατος*: swamp, marsh; *ὁ μύρμηξ, -ηκος*: ant; *ὁ βάτραχος*: frog; *ἄλλοθι*: elsewhere.

VII.3. Plato, *Phaedo* 110b. The earth is like a ball.

Grammar/Syntax Tags: dative of specification, perfect tense, subjunctives, conditional clauses, relative clauses.

λέγεται τοίνυν, ἔφη, ὦ ἐταῖρε, πρῶτον μὲν εἶναι
τοιαύτη ἡ γῆ αὐτὴ ἰδεῖν, εἴ τις ἄνωθεν θεῶτο, ὥσπερ αἱ
δωδεκάσκυτοι σφαῖραι, ποικίλη, χρώμασιν διειλημμένη,
ὣν καὶ τὰ ἐνθάδε εἶναι χρώματα ὥσπερ δείγματα, οἷς δὴ
οἱ γραφεῖς καταχρῶνται.

Notes: *ὁ ἐταῖρος*: companion, friend; *ἰδεῖν*: aorist active infinitive of εἶδον; *ἄνωθεν*: from above; *θεάομαι*: gaze; *δωδεκάσκυτος, -ον*: with twelve strips of leather; *ἡ σφαῖρα, -ας*: ball; *ποικίλος, -η, -ον*: many colored, dappled; *τό χρῶμα, -ατος*: color; *διαλαμβάνω*: divide, distinguish (perfect middle/passive participle); *ἐνθάδε*: here; *τό δείγμα, -ατος*: sample, pattern; *ὁ γραφεύς, -έως*: painter; *καταχράομαι*: make use of, apply.

VII.4. Strabo 1.1.11. Homer was the “father of geography.”

Grammar/Syntax Tags: genitive with special verbs, aorist passive participle, 3rd person imperative.

Νυνὶ δὲ ὅτι μὲν Ὅμηρος τῆς γεωγραφίας ἤρξεν, ἀρκείτω

τὰ λεχθέντα.

Notes: ἡ γεωγραφία: geography; ἤρξεν: aorist active indicative of ἄρχω (+ genitive); ἀρκέω: suffice, avail, defend (present, 3rd person imperative); τὰ λεχθέντα: aorist passive participle of λέγω.

VII.5. Anaximander, *TEGP* 6 = Agathemerios 1.1.1. The earliest maps.

Grammar/Syntax Tags: complementary infinitive, aorist of a compound verb, contract verbs, relative clauses, result clauses.

Ἀναξίμανδρος ὁ Μιλήσιος ἀκουστής Θάλεω πρῶτος
ἀπετόλμησε τὴν οἰκουμένην ἐν πίνακι γράψαι, μεθ' ὃν
Ἑκαταῖος ὁ Μιλήσιος ἀνὴρ πολυπλανῆς διηκρίβωσεν
ὥστε θαυμασθῆναι τὸ πρᾶγμα.

Notes: ὁ ἀκουστής, -οῦ: listener, student; ὁ Θάλης, Θάλεω: Thales of Miletus; ἀποτολμάω: dare, make a presumptuous attempt to; ἡ οἰκουμένη: inhabited region of the world; ὁ πίναξ, -ακος: board, plank, writing tablet (see also Herodotus 5.49.1, who used the same term to describe Aristagoras' map, with which the tyrant tried to generate support for a revolt against Persian rule in Ionia in 499/98 BCE); Ἑκαταῖος: ca. 550-475 BCE, wrote the first history of the world in Greek (in prose); πολυπλανῆς, -ές: far-roaming, widely travelled; διηκριβόω: render exactly; θαυμάζω: wonder, marvel (aorist passive infinitive).

VII.6. Homer, *Odyssey* 10.504-515. Circe's directions to the underworld.

Grammar/Syntax Tags: vocative, future tense, perfect tense, imperatives, subjunctives, contract verbs, ἴστημι.

διογενὲς Λαερτιάδη, πολυμήχαν' Ὀδυσσεῦ,
μή τί τοι ἡγεμόνος γε ποθὴ παρὰ νηὶ μελέσθω,
ιστὸν δὲ στήσας, ἀνά θ' ἰστία λευκὰ πετάσας
ἦσθαι: τὴν δέ κέ τοι πνοιὴ Βορέας φέρησιν.

ἀλλ' ὅπότε ἄν δὴ νηὶ δι' Ὠκεανοῖο περήσῃς,
 ἔνθ' ἀκτὴ τε λάχεια καὶ ἄλσεα Περσεφονείης,
 μακραί τ' αἴγειροι καὶ ἰτέαι ὠλεσίκαρποι,
 νῆα μὲν αὐτοῦ κέλσαι ἐπ' Ὠκεανῷ βαθυδίνῃ,
 αὐτὸς δ' εἰς Αἴδεω ἰέναι δόμον εὐρώεντα.
 ἔνθα μὲν εἰς Ἀχέροντα Πυριφλεγέθων τε ῥέουσιν
 Κώκυτός θ', ὃς δὴ Στυγὸς ὕδατός ἐστιν ἀπορρώξ,
 πέτρη τε ξύνεσις τε δύο ποταμῶν ἐριδούπων.

Notes: διογενής, -ές: Zeus-born; Λαερτιάδης: son of Laërtes; πολυμήχανος, -ον: resourceful, inventive; ἡ ποθή: desire; μέλω: be a matter of concern (present imperative); ὁ ἰστός: mast; στήσας: aorist of ἵστημι; τὸ ἰστίον: sail; λευκός, -ή, -όν: light, bright, white; πετάννυμι: spread wide (aorist active participle); ἤμαι: lie; κέ = ἄν; ἡ πνο(ι)ή: blowing, blast; ὁ Βορέας, -ου: North Wind (Doric genitive).

ὅποτε: when; ὁ Ὠκεανός: Ocean; περάω: drive through (aorist subjunctive); ἡ ἀκτὴ: promontory, headland; λάχεια: fertile; τό ἄλσος, -εος: grove; ἡ Περσεφόνεια: the queen of the underworld; ἡ αἴγειρος: black poplar; ἡ ἰτέα: willow; ὠλεσίκαρπος, -ον: shedding their fruit (before ripening); αὐτοῦ: (adverb) here; κέλλω: drive on, push ashore (aorist imperative); βαθυδίνης, -ες: deep-eddy; ὁ Αἰδης, -εω: the lord and realm of the underworld; ὁ δόμος: house; εὐρώεις, -εσσα, -εν: moldy, dank; ὁ Ἀχέρων, -οντος: river of pain; ὁ Πυριφλεγέθων: the river flaming with fire; ῥέω: flow; ὁ Κώκυτός: river of shrieking; ἡ Στύξ, Στυγός: Styx, the river of hate; ὁ ἀπορρώξ, -ῶγος: branch; ἡ πέτρη: rock; ἡ ξύνεσις, -εως: intersection; ἐριδούπος, -ον: resounding.

VII.7. Herodotus 4.36.2. Old fashioned maps.

Grammar/Syntax Tags: dative with special adjectives, contract verbs, future tense,

circumstantial participles, participial clauses.

γελῶ δὲ ὀρέων γῆς περιόδους γράψαντας πολλοὺς ἤδη
καὶ οὐδένα νοονεχόντως ἐξηγησάμενον: οἱ Ὠκεανόν τε
ρέοντα γράφουσι πέριξ τὴν γῆν ἐοῦσαν κυκλοτερέα ὡς
ἀπὸ τόρνου, καὶ τὴν Ἀσίην τῇ Εὐρώπῃ ποιούντων ἴσην.
ἐν ὀλίγοις γὰρ ἐγὼ δηλώσω μέγαθός τε ἐκάστης αὐτέων
καὶ οἷα τις ἐστὶ ἐς γραφὴν ἐκάστη.

Notes: γελάω: laugh; ὀρέων: Ionic form of the present participle ὀρῶν; ἡ περίοδος: a going around, way around, circuit (a narrative “map” of the world); νοονεχόντως: rationally, mindfully; ἐξηγέομαι: relate in full, dictate, explain; ῥέω: flow; πέριξ: all around (+ accusative); Herodotus rejected the theory of the circumambient Ocean; ἐοῦσαν: Ionic for οὔσαν; κυκλοτερής, -ές: made by round by turning (also rejected was the theory that the inhabited world was completely round); ὁ τόρνος: compass; ἐν ὀλίγοις (λόγοις); αὐτέων: Ionic genitive plural of αὐτός; ἡ γραφή: representation with lines (i.e., a drawing).

VII.8. Aristophanes, *Clouds* 202-215. Worried about his son’s expensive habits and hoping the boy would learn a trade (e.g., talking himself out of his mounting debts), a working Athenian man, Strepsiades, toured Socrates’ Φροντιστήριον (“think-tank”). While awaiting the headmaster there, a student explicated a map of the world on display in the school’s courtyard. The Peloponnesian War was in full swing when the *Clouds* was first produced, and this passage shows how maps could be manipulated to political ends.

Grammar/Syntax Tags: dative of specification, neuter (adverbial) adjectives, pronouns, contract verbs, infinitives of purpose.

Στρεψιάδης: τουτὶ δὲ τί;

Μαθητής: γεωμετρία.

Στρεψιάδης: τοῦτ’ οὖν τί ἐστι χρήσιμον;

Μαθητής: γῆν ἀναμετρῆσαι.

Στρεψιάδης: πότερα τὴν κληρουχικὴν;

Μαθητής: οὐκ, ἀλλὰ τὴν σύμπασαν.

Στρεψιάδης: ἀστεῖον λέγεις.

τὸ γὰρ σόφισμα δημοτικὸν καὶ χρήσιμον.

Μαθητής: αὕτη δέ σοι γῆς περίοδος πάσης. ὁρᾷς;

αἶδε μὲν Ἀθῆναι.

Στρεψιάδης: τί σὺ λέγεις; οὐ πείθομαι,

ἐπεὶ δικαστὰς οὐχ ὁρῶ καθημένους.

Μαθητής: ὥς τοῦτ' ἀληθῶς Ἀττικὸν τὸ χωρίον.

Στρεψιάδης: καὶ ποῦ Κικυννῆς εἰσὶν οὐμοὶ δημόται;

Μαθητής: ἐνταῦθ' ἔνεισιν. ἡ δέ γ' Εὐβοί, ὥς ὁρᾷς,

ἡδὶ παρατέταται μακρὰ πόρρω πάνυ.

Στρεψιάδης: οἶδ': ὑπὸ γὰρ ἡμῶν παρετάθη καὶ Περικλέους.

ἀλλ' ἡ Λακεδαίμων ποῦ 'σθ';

Μαθητής: ὅπου 'στίν; αὐτή.

Στρεψιάδης: ὥς ἐγγὺς ἡμῶν. τοῦτο πάνυ φροντίζετε,

ταύτην ἀφ' ἡμῶν ἀπαγαγεῖν πόρρω πάνυ.

Notes: τουτί: the deictic suffix –ι, which occurs several times in this passage,

indicates where the student is pointing on the map; **ἀναμετρέω**: measure carefully; **ἡ κληρουχική**: land for allotments; **σύμπας, σύμπασα, σύμπαν**: all, whole (earth); **ἀστεῖος, -α, -ον**: refined, elegant, witty, urbane; **τό σόφισμα, -ατος**: method; **δημοτικός**: common, for the people, democratic; **ἡ περιόδος**: see VII.7; **ἐπεὶ**: since; **ὁ δικαστής, -οῦ**: judge, juror; **κάθημαι**: sit, be seated; **ἀληθῶς**: truly, indeed; **Κικυννῆς**: the deme Kikynna; we observe that the student remained unperturbed by Strepsiades' irrelevant questions; **οἱμοὶ** = ο(ι) ἐμοὶ; **ὁ δημότης**: fellow demesman; **ἡ Εὐβοί(α)**: the island of Euboea lies along the coast of Attica and Boiotia; **παρατείνω**: stretch alongside; **πύρρῳ**: forward, in the distance; **ὁ Περικλῆς, Περικλέους**: when the cities of Euboea revolted in 446 BC, Pericles as commander and the men of Strepsiades' generation quashed their rebellion from the Delian League; **ἡ Λακεδαιμόν, -ονος**: the territory ruled by Sparta, Athens' foe in the Peloponnesian War; **ἐγγύς**: near; **φροντίζω**: take thought, consider; **ἀπάγω**: lead off, carry off, lead away (aorist infinitive).

VIII. THE ORIGIN OF LIFE

Where one comes from was (and remains) an important question, answered in a variety of ways, from migration to agricultural metaphors (see Botany, section IX). And this was among the topics considered in some detail by the Presocratics who sought to find rational explanations of how life began and how different species came to exist in their present forms. The most-developed theory was advanced by Empedocles, who envisioned several stages of life before whole-bodied creatures appeared. His system, however, relied on chance mutation, and was thus rejected by Aristotle (and later thinkers) who believed in an eternal universe populated with unchanging forms. Nonetheless, robust curiosity about the origin of life endured.

VIII.1. Anaximander, *TEGP* 20 = Hippolytus of Rome (170-235 CE), *Refutation* 1.6.6. On the origins of human and animal life.

Grammar/Syntax Tags: genitive with prepositions, dative with special adjectives.

τὰ δὲ ζῶια γίνεσθαι <ἐξ ὑγροῦ> ἐξατμιζομένου ὑπὸ τοῦ ἡλίου. τὸν δὲ ἄνθρωπον ἐτέρῳ ζώῳ γεγονέναι, τουτέστι ἰχθύι, παραπλήσιον κατ' ἀρχάς.

Notes: construe the passage with an understood Ἀναξίμανδρος λέγει; **τό ζῶον**: living creature, life form; **γίνεσθαι**: present middle/passive infinitive

of γίγνομαι (Ionic form); ὑγρός, -ά, -όν: moist; ἐξατμίζω: turn into vapor, draw up as vapor, evaporate; γεγονέναι: perfect active infinitive of γίγνομαι; τουτέστι: that is to say; ὁ ἰχθύς, -ύος: fish; παραπλήσιος -ον: coming close beside, resembling.

VIII.2. Empedocles, *TEGP* 118 = Simplicius of Cilicia (ca. 490-560 CE), *On the Heavens* 586.12, 587.1-2. Disembodied body parts joined in random ways to create living beings.

Grammar/Syntax Tags: genitive with special adjectives, genitive with special verbs, imperfect tense, contract verbs.

ἧι πολλαὶ μὲν κόρσαι ἀναύχενες ἐβλάστησαν,
 γυμνοὶ δ' ἐπλάζοντο βραχίονες εὐνίδες ὤμων,
 ὄμματα' τ' οἷα ἐπλανᾶτο πενητεύοντα μετώπων.

Notes: ἧι: there; ἡ κόρη: temple, forehead; ἀναύχην, -ενος: without a neck or throat; βλαστάνω: bud, sprout; γυμνός, -ή, -όν: naked, bare; πλάζω: wander, rove; ὁ βραχίων, -ονος: arm; εὖνις, εὖνιν (εὐνιδος) (+ genitive): bereft, bare; ὁ ὤμος: shoulder; τό ὄμμα, ὄμματος: eye; οἷος -η -ον: alone, solitary, only; πλανᾶω: wander, roam; πενητεύω: be poor, lack, be bereft; τό μέτωπον: space between the eyes, forehead.

VIII.3. Empedocles, *TEGP* 121 = Aelian (Claudius Aelian of Praeneste [ca. 175-235 CE]), *On Animals* 16.299. Monstrous early life forms.

Grammar/Syntax Tags: imperfect tense, perfect participles.

πολλὰ μὲν ἀμφιπρόσωπα καὶ ἀμφίστερν' ἐφύοντο,
 βουγενῇ ἀνδρόπρωρα, τὰ δ' ἔμπαλιν ἐξανέτελλον
 ἀνδροφυῇ βούκρανα, μεμιγμένα τῇ μὲν ἀπ' ἀνδρῶν
 τῇ δὲ γυναικοφυῇ, σκιεροῖς ἡσκημένα γυίοις.

Notes: ἀμφιπρόσωπος, -ον: double-faced; ἀμφίστερνος, -ον:

double-breasted; φύω: bring forth, produce; βουγενής, -ές: ox-natured; ἀνδρόπρωρος, -α, -ον: man-faced; ἔμπαλιν: back, in return; ἐξανατέλλω: cause to spring up; ἀνδροφυής, -ές: man-natured; βούκρανα: cow-headed; μίγνυμι: mix; τῇ: here, there; γυναικοφυής, -ές: woman-natured, σκιερός, -α, -ον: shady, dark-colored, shade-giving; ἀσκέω: adorn, furnish with; τό γυῖον: limb.

VIII.4. Plato, *Symposium* 189d-190a. In the *Symposium*, Plato explored many theories regarding the nature of love, including one here attributed to the comic-playwright Aristophanes on the original “third gender.”

Grammar/Syntax Tags: genitives, imperfect tense, perfect tense, contract verbs, aorist optatives, relative clauses.

πρῶτον μὲν γὰρ τρία ἦν τὰ γένη τὰ τῶν ἀνθρώπων, οὐχ ὥσπερ νῦν δύο, ἄρρεν καὶ θῆλυ, ἀλλὰ καὶ τρίτον προσῆν κοινὸν ὃν ἀμφοτέρων τούτων, οὗ νῦν ὄνομα λοιπόν, αὐτὸ δὲ ἠφάνισται. ἀνδρόγυνον γὰρ ἔν τότε μὲν ἦν καὶ εἶδος καὶ ὄνομα ἐξ ἀμφοτέρων κοινὸν τοῦ τε ἄρρενος καὶ θήλεος, νῦν δὲ οὐκ ἔστιν ἀλλ’ ἢ ἐν ὀνείδει ὄνομα κείμενον.

ἔπειτα ὅλον ἦν ἐκάστου τοῦ ἀνθρώπου τὸ εἶδος στρογγύλον, νῶτον καὶ πλευρὰς κύκλῳ ἔχον, χεῖρας δὲ τέτταρας εἶχε, καὶ σκέλη τὰ ἴσα ταῖς χερσίν, καὶ πρόσωπα δύο’ ἐπ’ αὐχένι κυκλοτερεῖ, ὅμοια πάντη: κεφαλὴν δ’ ἐπ’ ἀμφοτέροις τοῖς προσώποις ἐναντίοις κειμένοις μίαν, καὶ ὦτα τέτταρα, καὶ αἰδοῖα δύο, καὶ τᾶλλα πάντα ὡς ἀπὸ τούτων ἂν τις εἰκάσειεν.

ἐπορεύετο δὲ καὶ ὀρθὸν ὥσπερ νῦν, ὁποτέρωσε βουληθείη: καὶ ὁπότε ταχὺ ὀρμήσειεν θεῖν, ὥσπερ οἱ κυβιστῶντες καὶ εἰς ὀρθὸν τὰ σκέλη περιφερόμενοι κυβιστῶσι κύκλῳ, ὁκτὼ τότε οὗσι τοῖς μέλεσιν ἀπερειδόμενοι ταχὺ ἐφέροντο κύκλῳ.

Notes: ἄρρην, -εν: male; θήλυς, θήλεια, θήλυ: female; πρόσειμι: be added to; ἀφανίζω: cause to vanish, destroy (perfect middle/passive); ὁ ἀνδρόγυνος: hermaphrodite, androgyn; τό ὄνειδος, -εος: reproach, rebuke, insult.

στρογγύλος, -η, -ον: round, spherical; τό νῶτον: back; ἡ πλευρά, -ᾶς: rib, side; τό σκέλος, -εος: leg; τό πρόσωπον: face; ὁ αὐχὴν, -ένος: neck, throat; κυκλωτερής, -ές: made round by turning, stretched in a circle, round; πάντη: in every direction, in every way; τό οὖς ὠτός: ear; τό αἰδοῖον: genitalia; εἰκάζω: liken, compare, estimate, make a guess, imagine.

ὁποτέρωσε: in either of two directions; βουληθείη: aorist passive optative of βούλομαι; ὁπότε: when; ὁρμήσειεν: aorist passive optative of ὁρμάω; θέω: run; κυβιστάω: tumble head first; περιφέρω: carry around; τό μέλος, -εος: limb; ἀπερείδω: fix, settle, support.

VIII.5. Pausanias, *Description of Greece* 10.4.4. At Panopeus (near Chaeronea and Daulis in Boeotia), we can see the very origins of the human race.

Grammar/Syntax Tags: dative of possession, aorist optative, aorist passive infinitive, participles, contract verbs.

λίθοι κεῖνται σφισιν ἐπὶ τῇ χαράδρᾳ, μέγεθος μὲν ἑκάτερος ὡς φόρτον ἀποχρῶντα ἀμάξης εἶναι, χρῶμα δὲ ἐστὶ πηλοῦ σφισιν, οὐ γεώδους ἀλλ' οἷος ἂν χαράδρας γένοιτο ἢ χειμάρρου ψαμμώδους, παρέχονται δὲ καὶ ὀσμὴν ἐγγύτατα χρωτὶ ἀνθρώπου· ταῦτα ἔτι λείπεσθαι τοῦ πηλοῦ λέγουσιν ἐξ οὗ καὶ ἅπαν ὑπὸ τοῦ Προμηθέως τὸ γένος πλασθῆναι τῶν ἀνθρώπων.

Notes: σφεῖς: they, them (Pausanias' sources); ἡ χαράδρα: ravine, mountain stream; ὁ φόρτος: freight, cargo, load; ἀποχράω: suffice; ἡ ἄμαξα: wagon; τό χρῶμα, -ατος: color; ὁ πηλός: clay, earth; σφισιν: referring to the stones; γεώδης, -ες: earthy; χειμάρρους, -ουν: swollen in winter by melting snow, torrent; ψαμμώδης, -ες: sandy; ἡ ὀσμή: scent, odor; ἐγγύς: near; ὁ χρώς, χρωτός: skin; λείπω: leave, remain; ἅπας, ἅπασα, ἅπαν: all; πλάσσω: form, mould (aorist passive infinitive).

IX. BOTANY

Humankind cannot exist without plant life, and the Greeks depended on the “Mediterranean triad” (grain, olives, grapes) for both sustenance and economic livelihood. Many city foundation myths were inspired by agricultural motifs: e.g., the sown-men (“spartoi”) of Corinth, and the autochthonous Athenians. Athena’s very hegemony over her eponymous city, furthermore, was attributed to an agricultural gift—the cultivated olive. Plants had (and have) many uses—cooking, religion, medicine, cloth-dying, and perfume-making. It is thus important to recognize them, and to know their uses, how to collect and cultivate them, and how to prepare them. In Homer we find about fifty different plant names, and in Hesiod’s *Works and Days* botanicals mark the seasons. Herodotus and Xenophon commented on unusual plants or the absence of familiar plants in distant lands, and their accounts show an awareness of their differing climatological needs. Aristotle’s student Theophrastus was the first to consider plants in a systematic way, classifying them on analogy with his mentor’s organization of the animal world. Theophrastus described various parts of plants (roots, stems, branches, twigs, leaves, seeds) and their types (trees, shrubs, undershrubs, herbaceous plants).

There are challenges, however, to identifying plants cited by Greek authors. In Theophrastus (and others), some wild plants are nameless, foreign plants might lack Greek names, and vocabulary could be ambiguous (see Irwin in Irby, ed. 2016: 266)—one common word might be applied to plants of different species (there are three all-heals, *panacea*, in Theophrastus, *History of Plants* 9.11.1), different plants might have the same name (black versus white violet: Theophrastus, *History of Plants* 6.6.7), or a plant might have different names according to locality (narkissos/leirion: Theophrastus, *History of Plants* 6.8.3—lilies were also called leirion). Finally, the Linnaean system of classification adds an additional layer of remove from the Greek botanical approach.

IX.1. Homer, *Iliad* 14.346-349. The earth blooms when Hera seduces Zeus.

Grammar/Syntax Tags: genitive of source, ethical dative, unaugmented aorist, relative clauses of result.

ἡ ῥα καὶ ἀγκὰς ἔμαρπτε Κρόνου παῖς ἦν παράκοιτιν:
τοῖσι δ’ ὑπὸ χθὼν δῖα φύεν νεοθηλέα ποίην,

λωτόν θ' ἐρσήεντα ἰδὲ κρόκον ἦδ' ὑάκινθον

πυκνὸν καὶ μαλακόν, ὃς ἀπὸ χθονὸς ὑψόσ' ἔεργε.

Notes: ἦ: 3rd person imperfect of ἡμί speak; ἀγκᾶς: into his arms; μάρπτω: take hold; Κρόνου: Cronus; ὃς, ἦ, ὄν: (possessive adjective) his, her, its; ἡ παράκοιτις, -ιος: bedmate, wife; ἡ χθών, χθονός: earth; δῖος, δῖα, δῖον: godlike, divine; νεοθηλής, -ές: fresh-budding; ἡ πό(ι)α: grass; ὁ λωτός: clover, trefoil, melilot; ἐρσήεις, -εσσα, -εν: dewy; ἰδέ: and; ὁ κρόκος: crocus, saffron; ἠδέ: and; ὁ ὑάκινθος: hyacinth; πυκνός, -ή, -όν: thick, close; μαλακός, -ή, -όν: soft; ὑπόσε: aloft; ἔργω: enclose, shut in, confine (them).

IX.2. Theocritus, *Idyll* 13.39-43. The pool of the nymphs who abducted Hylas, Herakles' young companion. Theocritus' learned botanical catalogue is appropriate to the marsh setting.

Grammar/Syntax Tags: Doric dialect, imperfect tense.

τάχα δὲ κράναν ἐνόησεν

ἡμένω ἐν χώρῳ: περὶ δὲ θρύα πολλὰ πεφύκει,

κυάνεόν τε χελιδόνιον χλωρόν τ' ἀδίδαντον

καὶ θάλλοντα σέλινα καὶ εἰλιτενῆς ἄγρωστις.

ὔδατι δ' ἐν μέσσω Νύμφαι χορὸν ἀρτίζοντο.

Notes: τάχα: presently; ἡ κρίνα (Doric of ἡ κρίνη): well, spring, fountain; νοέω: perceive, take notice of (construe Hylas as the subject); ἡμένω: seated, "low-lying"; ὁ χώρος: place; τό θρύον: reed, rush; κυάνεος, -α, -ον: dark blue, glossy; τό χελιδόνιον: celandine; χλωρός, -ά, -όν: pale, pale-green, yellow; ὁ ἀδίδαντος: maidenhair ("unwetted" because moisture does not cling to the plant's surface); θάλλω: sprout, grow; τό σέλινον: celery; εἰλιτενῆς, -ές: spreading through the marshes; ἡ ἄγρωστις, -ιδος: dog's tooth grass; see also the commentary in R. Hunter, *Theocritus: A Selection*, Cambridge, 1999 (ad loc.) who notes that the "lushness" of the plants "grow over the normal division of the hexameter;" ὁ χορός: dance; ἀρτίζω: prepare.

IX.3. Theophrastus, *Causes of Plants* 2.11.7. Why crooked trees live longer.

Grammar/Syntax Tags: comparatives, middle/passives, adverbs, relative clauses, indirect statement.

ὥς δὲ Δημόκριτος αἰτιᾶται, τὰ εὐθέα τῶν σκολιῶν
βραχυβιώτερα καὶ πρωῒβλαστότερα διὰ τὰς αὐτὰς
ἀνάγκας εἶναι—τοῖς μὲν γὰρ ταχὺ διαπέμπεσθαι τὴν
τροφὴν, ἀφ’ ἧς ἡ βλάστησις καὶ οἱ καρποί, τοῖς δὲ
βραδέως, διὰ τὸ μὴ εὖρουν εἶναι τὸ ὑπὲρ γῆς, ἀλλ’
αὐτὰς τὰς ρίζας ἀπολαύειν, καὶ γὰρ μακρόρριζα ταῦτα
εἶναι καὶ παχύρριζα—δόξειεν ἂν οὐ καλῶς λέγειν.

καὶ γὰρ τὰς ρίζας ἀσθενεῖς φησιν εἶναι τῶν εὐθέων, ἐξ
ᾧ ἀμφοτέρων θᾶπτον γίνεσθαι τὴν φθοράν, ταχὺ γὰρ ἐκ
τοῦ ἄνω διέναι καὶ τὸ ψῦχος καὶ τὴν ἀλέαν ἐπὶ τὰς ρίζας
διὰ τὴν εὐθυπορίαν, ἀσθενεῖς δ’ οὕσας, οὐχ ὑπομένειν·
ὅλως δὲ τὰ πολλὰ τῶν τοιούτων κάτωθεν, ἄρχεσθαι
γηράσκειν διὰ τὴν ἀσθένειαν τῶν ριζῶν.

ἔτι δὲ τὰ ὑπὲρ γῆς, διὰ τὴν λεπτότητα καμπτόμενα
ὑπὸ τῶν πνευμάτων, κινεῖν τὰς ρίζας, τούτου δὲ
συμβαίνοντος ἀπορρήγνυσθαι καὶ πηροῦσθαι, καὶ ἀπὸ
τούτων τῷ ὅλῳ δένδρῳ γίνεσθαι τὴν φθοράν.

Notes: αἰτιᾶσθαι: offer a reason, allege, accuse; εὐθύς, εὐθέα, εὐθύ: straight (understand δένδρα: trees); σκολιός, -ά, -όν: curved, crooked (σκολιῶν [ρίζωμάτων]: “as compared with curved...”); βραχύβιος, -ον: short-lived; πρωῒβλάστος, -η, -ον: early-sprouting; ἡ ἀνάγκη: constraint, necessity; διαπέμπω: send up; ἡ βλάστησις, -εως: bud, sprout; ὁ καρπός: fruit; βραδύς, -εῖα, -ύ: slow; τό εὖρουν: good flow, abundance; ἡ ρίζα: root; ἀπολαύω: have enjoyment of, have benefit of; μακρόρριζος, -η, -ον: with long roots; παχύρριζος, -η, -ον: with thick roots; δόξειεν: construe Democritus as the subject.

ἀσθενής, -ές: weak; ἀμφοτέρων (αἰτίων) θᾶπτον: comparative of ταχύς;
 ἡ φθορά: destruction, ruin; δίδειμι: pass through, traverse; τό ψύχος, -εος:
 cold; ἡ ἀλέα: heat; ἡ εὐθυπορία: straightness of the course; ὑπομένω:
 remain, survive, persist; κάτωθεν: from below; γηράσκω: grow old.

ἡ λεπτότης, -ητος: fineness, thinness; κάμπτω: bend; συμβαίνω: happen;
 ἀπορρήγνυμι: break, snap; πηρόω: maim, mutilate; τό δένδρον: tree.

IX.4. Theophrastus, *Causes of Plants* 1.6.2. On grafting.

Grammar/Syntax Tags: superlatives, adverbs, substantives.

εὐλόγως δὲ καὶ ἡ ἀντίληψις μάλιστα τῶν ὁμοφλοίων,
 ἐλαχίστη γὰρ ἡ ἐξαλλαγή τῶν ὁμογενῶν, καὶ ὥσπερ
 μετάθεσις γίνεται μόνον·

Notes: εὐλόγως: reasonably; ἡ ἀντίληψις, -εως: exchange, receiving
 in return, reciprocation, “graft”; ὁμοιόφλοιος, -ον: with similar bark;
 ἐλαχίστος, -η, -ον: smallest; ἡ ἐξαλλαγή: alteration, change, variation;
 ὁμογενής, -ές: of the same kind, of the same character; ἡ μετάθεσις, -εως:
 change, transposition.

IX.5. Athenaeus, *Learned Banqueters* 2.61d-e. Mushrooms.

Grammar/Syntax Tags: superlatives, attributive articles, objective genitive,
 articular infinitive, contract verbs, indirect statement, circumstantial participles,
 recessive accent.

Δίφιλός φησι τοὺς μύκητας εἶναι εὐστομάχους, κοιλίας
 διαχωρητικούς, θρεπτικούς, δυσπέπτους δὲ καὶ φυσώδεις.
 τοιούτους δὲ εἶναι τοὺς ἐκ Κέω τῆς νήσου. πολλοὶ μέντοι
 καὶ κτείνουσι. δοκοῦσι δὲ οἰκεῖοι εἶναι οἱ λεπτότατοι
 καὶ ἀπαλοὶ καὶ εὐθρυπτοὶ οἱ ἐπὶ πτελέαις καὶ πεύκαις
 γινόμενοι·

ἀνοίκειοι δὲ οἱ μέλανες καὶ πελιοὶ καὶ σκληροὶ καὶ
 οἱ μετὰ τὸ ἐψηθῆναι καὶ τεθῆναι πησσύμενοι, οἵτινες

λαμβάνομενοι κτείνουσι. βοηθοῦνται δ' ἀπὸ ὑδρομέλιτος πόσεως καὶ ὀξύμέλιτος, νίτρου καὶ ὄξους· μετὰ τὴν πόσιν δὲ ἐμεῖν δεῖ. διόπερ καὶ δεῖ μάλιστα σκευάζειν αὐτοὺς μετὰ ὄξους καὶ ὀξύμέλιτος ἢ μέλιτος ἢ ἁλῶν· οὕτω γὰρ αὐτῶν τὸ πνιγῶδες ἀφαιρεῖται.

Notes: ὁ Δίφιλος: a third century BCE poet of New Comedy; ὁ μύκης, -ητος: mushroom; εὐστόμαχος, -ον: be good for the stomach; ἡ κοιλία: belly; διαχωρητικός, -ή, -όν: laxative; θρεπτικός, -ή, -όν: nourishing; δυσπέπτος, -ον: hard to digest; φουσώδης, -ες: flatulence causing; ἡ Κέως, Κέω (Doric genitive): Ceos, one of the Cycladic islands; μέντοι: indeed; κτείνω: kill, be fatal; λεπτός, -ή, -όν: peeled, husked, slender, delicate; ἀπαλός, -ή, -όν: soft to the touch, tender; εὐθρυπτος, -ον: easily broken; ἡ πτελέα: elm; ἡ πεύκη: pine.

ἀνοίκειος, -ον: not of the family, not suitable (i.e., these mushrooms are poisonous); μέλας, μέλαινα, μέλαν: dark, black; πελιός, -ά, -όν: black and blue, bruised; σκληρός, -ά, -όν: hard, unyielding; ἔψω: boil (aorist passive infinitive); τεθῆναι: aorist passive infinitive of τίθημι; πήσσω: harden, freeze; τό ὑδρομέλι, -ίτος: hydromel, honey and water; ἡ πόσις, -εως: drink; τό ὀξύμέλι, -ίτος: honey and vinegar; τό νίτρον: sodium bicarbonate; τό ὄξος, -εος: vinegar; ἐμέω: vomit; διόπερ: on which account; σκευάζω: prepare; τό μέλι, -ίτος: honey; ὁ ἅλς, ἁλός: salt; τό πνιγῶδες: (threat of) choking; ἀφαιρέω: take away, remove, diminish.

IX.6. Athenaeus, *Learned Banqueters* 2.61e-f. More on mushrooms.

Grammar/Syntax Tags: objects complement, neuter plural nominative with singular verb, relative clauses, indirect statement.

Θεόφραστος δὲ ἐν τῷ *Περὶ Φυτῶν Ἱστορίας* γράφει· ὑπόγεια δὲ τὰ τοιαῦτά ἐστι καὶ ἐπίγεια, καθάπερ οὖς καλοῦσιν τινες πέζιας, ἅμα τοῖς μύκησι γινομένους· ἄριζοι γὰρ καὶ αὐτοὶ τυγχάνουσιν. ὁ δὲ μύκης ἔχει προσφύσεως δίκην τὸν καυλὸν εἰς μῆκος, καὶ ἀποτείνουσιν ἀπ' αὐτοῦ ρίζαι. φησὶ δὲ καὶ ὅτι ἐν τῇ περὶ Ἡρακλέους στήλας

θαλάσση ὅταν ὕδατα πλείω γένηται, μύκητες φύονται
πρὸς τῇ θαλάσση, οὓς καὶ ἀπολιθοῦσθαι ὑπὸ τοῦ ἡλίου
φησί.

Notes: Περὶ Φυτῶν Ἱστορίας: Theophrastus' *Research on Plants* (fragment 399); ὑπόγειος, -ον: underground; ἐπίγειος, -ον: above ground; καθάπερ: according as, just as; ἡ πέζις, -εως: bullfist, "puff ball," "smoke ball"; ἄριζος, -ον: rootless; ἡ πρόσφυσις, -εως: growth, "rider"; δίκην: in the manner of; ὁ καυλός: stem; τό μήκος, -εος: length, "stem"; ἀποτείνω: stretch out, extend; ἡ ῥίζα: root; φησί: Theophrastus, *History of Plants* 4.7.2; Ἡρακλέους στήλας: Straits of Gibraltar (see above); πλείω: comparative adverb of πολύς; φύω: bring forth, produce; ἀπολιθόομαι: become stone.

X. ZOOLOGY

Greek thinkers would certainly have agreed with Claude Levi-Strauss, the French anthropologist who famously remarked that "animals are good to think [with]" (*Totemism*; London, 1964, p. 89). Animals were associated with gods who both protected them and accepted them as sacrifices (Poseidon, the father of horses, for example, was worshipped with offerings of horses by drowning, especially at Argos: Pausanias 8.7.2; see also Walter Burkert, *Structure and History in Greek Mythology and Ritual*, Berkeley, 1979: 113.). The hunt for a wild, dangerous beast (usually a lion or boar) was part of the standard heroic quest. Animals were bred, hunted, and eaten, and they were kept as pets (songbirds, goats, Maltese dogs). Dogs were admired for their loyalty (especially Argos, Odysseus' dog: *Odyssey* 17.300-27), and horses were cherished (the immortal horses of Achilles mourned for their deceased master: *Iliad* 17.426-56). Whether animals were ensouled was an early topic of debate, providing an argument in favor of vegetarianism for Pythagoras and Empedocles (*TEGP* 189). Although compassion was rare and most people believed that animals lacked reason (and therefore would not merit justice), Plutarch expressed concern over animal suffering and mistreatment, and he ascribed a rational soul to non-human animals.

Aristotle was the first thinker to study animals methodically, and he devised a taxonomy that prevailed until the Renaissance. Identifying more than 500 species of mammals and birds, 120 varieties of fish, and 60 types of insects, he categorized animals according to the presence or absence of various features (claws,

beaks, feathers, scales); what they ate; whether they were land- or sea- dwelling. He divided animals into two categories: blooded (viviparous and oviparous quadrupeds, marine mammals, birds, fish) and bloodless (mollusks, crustacea, testacea, insects).

X.1. Aristotle, *History of Animals* 2.1-2 (501b3-17). Teeth.

Grammar/Syntax Tags: partitive genitive, comparatives, articular infinitives, indirect statement, relative clauses, impersonal passives, correlatives, polysyndeton.

Ἄνθρωπος μὲν οὖν βάλλει τοὺς ὀδόντας, βάλλει δὲ
καὶ ἄλλα τῶν ζώων, οἷον ἵππος καὶ ὄρεὺς καὶ ὄνος.
βάλλει δ' ἄνθρωπος τοὺς προσθίους, τοὺς δὲ γομφίους
οὐδὲν βάλλει τῶν ζώων. ὅς δ' ὅλως οὐδένα βάλλει τῶν
ὀδόντων.

περὶ δὲ τῶν κυνῶν ἀμφισβητεῖται, καὶ οἱ μὲν ὅλως οὐκ
οἶονται βάλλειν οὐδένα αὐτούς, οἱ δὲ τοὺς κυνόδοντας
μόνον· ὥπται δ' ὅτι βάλλει καθάπερ καὶ ἄνθρωπος, ἀλλὰ
λανθάνει διὰ τὸ μὴ βάλλειν πρότερον πρὶν ὑποφυῶσιν
ἐντὸς ἴσοι. ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων τῶν ἀγρίων
εἰκὸς συμβαίνειν, ἐπεὶ λέγονταί γε τοὺς κυνόδοντας
μόνον βάλλειν. τοὺς δὲ κύνας διαγιγνώσκουσι τοὺς
νεωτέρους καὶ πρεσβυτέρους ἐκ τῶν ὀδόντων· οἱ μὲν
γὰρ νέοι λευκοὺς ἔχουσι καὶ ὀξεῖς τοὺς ὀδόντας, οἱ δὲ
πρεσβύτεροι μέλανας καὶ ἀμβλεῖς. ἐναντίως δὲ πρὸς
τὰλλα ζῶα καὶ ἐπὶ τῶν ἵππων συμβαίνει· τὰ μὲν γὰρ
ἄλλα ζῶα πρεσβύτερα γιγνόμενα μελαντέρους ἔχει τοὺς
ὀδόντας, ὁ δ' ἵππος λευκοτέρους.

Notes: βάλλει: shed, “lose”; ὁ ὀδοῦς, ὀδόντος: tooth; τό ζῶον: living creature, life form; ὁ ὄρεὺς, -έως: mule; ὁ ὄνος: donkey; πρόσθιος, -α, -ον: foremost, front (tooth); ὁ γομφίος: molar; ὁ/ἡ ὄς, ὄς: swine, pig; ὅλως: altogether, entirely.

ὁ/ή κύων, κυνός: dog; ἀμφισβητέω: disagree, dispute; ὁ κυνόδους, -οντος: dogtooth, canine; ὅπται: perfect middle/passive of ὁράω, “it has been observed”; καθάπερ: according as, just as; ὑποφύω: grow up from underneath; ἐντός: within; ὁμοίως: similarly; ἄγριος, -α, -ον: wild, savage; διαγιγνώσκω: discern exactly; πρεσβύτερος, -α, -ον: older; λευκός, -ή, -όν: light, bright, clear, white; ὀξύς, -εῖα, -ύ: sharp; μέλας, μέλαινα, μέλαν: dark, black; ἀμβλύς, -εῖα, -ύ: dull; ἐναντίως: on the contrary, in reverse.

X.2. Herodotus 2.71. The Hippopotamus.

Grammar/Syntax Tags: attributive articles, genitive of description, possessive genitive, result clauses.

οἱ δὲ ἵπποι οἱ ποτάμιοι νομῷ μὲν τῷ Παπρημίτῃ ἱροὶ εἰσι, τοῖσι δὲ ἄλλοισι Αἰγυπτίοισι οὐκ ἱροὶ. φύσιν δὲ παρέχονται ἰδέης τοιήνδε: τετράπουν ἐστί, δίχηλον, ὅπλαι βοός, σιμόν, λοφιὴν ἔχον ἵππου, χαυλιόδοντας φαῖνον, οὐρὴν ἵππου καὶ φωνήν, μέγαθος ὅσον τε βοῦς ὁ μέγιστος: τὸ δέρμα δ' αὐτοῦ οὕτω δὴ τι παχύ ἐστι ὥστε αὐτοῦ γενομένου ξυστὰ ποιέεσθαι ἀκόντια ἐξ αὐτοῦ.

Notes: ὁ νομός: pasture, abode, district; Πάπρεμις: a city in the western Nile delta; ἱρός = ἱερός; ἡ ἰδέα: form, shape, appearance; τετράπους, -πουν: four-footed; δίχηλος, -ον: cloven-hooved; ἡ ὀπλή: hoof; σιμός, -ή, -όν: snub-nosed; ἡ λοφία: mane; ὁ χαυλιόδους, -όδοντος: tusk; φαῖνον: neuter present participle of φαίνω; ἡ οὐρά: tail; τό δέρμα, -ατος: skin, hide; παχύς, -εῖα: thick; αὔος, -η, -ον: dried; τό ξυστόν: spear, lance, shaft; τό ἀκόντιον: javelin, spear.

X.3. Aelian, *On the Nature of Animals* 1.31. The porcupine.

Grammar/Syntax Tags: ethical dative, perfect middle/passives, contract verbs, indirect statement.

τὴν δὲ ὕστριχα ἀκούω ταῦτα μὲν οὐκ ἔχειν, οὐ μὴν ὅπλων ὑπὸ τῆς φύσεως ἀμυντηρίων ἀπολελεῖσθαι ἐρήμην. τοῖς γοῦν ἐπιούσιν ἐπὶ λύμῃ τὰς ἄνωθεν τρίχας οἶονεῖ

βέλη ἐκπέμπει, καὶ εὐστόχως βάλλει πολλάκις, τὰ νῶτα φρίξασα· καὶ ἐκεῖναί γε πηδῶσιν, ὥσπερ οὖν ἔκ τινος ἀφειμέναι νευρᾶς.

Notes: ὁ/ἡ ὕστριξιχος: porcupine; ταῦτα: i.e., claws and fangs; ἀμυντήριος, -ον: defensive; ἀπολείπω: leave, fail, fall short (perfect middle/passive infinitive); ἐρῆμος, -ον: destitute of; γοῦν: at any rate, at least; ἔπειμι: go toward, approach, attack, threaten (dative plural participle); ἡ λύμη: outrage, harm, “attack”; ἄνωθεν: from above; ἡ θρίξ, τριχός: hair; οἶονεῖ: as if, just like; τό βέλος, -εος: missile, arrow, dart; ἐκπέμπω: send out, discharge; εὐστόχως: aiming successfully; πολλάκις: often; τό νῶτον: back; φρίσσω: be rough, bristle (aorist active participle); πηδάω: leap; ἀφίημι: send forth (perfect middle/passive participle); ἡ νευρά: string, bowstring.

X.4. Strabo 16.4.14. Elephants as hydraulic engineers in East Africa.

Grammar/Syntax Tags: objective genitive, instrumental dative, genitive absolute.

ὑπέρκειται δὲ ἡ Λίχα, θήρα τῶν ἐλεφάντων: πολλαχοῦ δ' εἰσὶ συστάδες τῶν ὀμβρίων ὑδάτων, ὧν ἀναξηρανθειςῶν οἱ ἐλέφαντες ταῖς προβοσκίσιν καὶ τοῖς ὀδοῦσι φρεωρυχοῦσι καὶ ἀνευρίσκουσιν ὕδωρ.

Notes: ὑπέρκειμαι: lie above, be situated above; ἡ Λίχα: Licha is located near Deire and Arsinoe in Eritrea near the entrance to the Red Sea; ἡ θήρα: hunting area; πολλαχοῦ: in many places; ἡ συστάς, -άδος: cistern, reservoir; ὀμβριος, -ον: rainy, of rain; ἀναξηραίνω: dry up (aorist passive participle); ἡ προβοσκίς, -ίδος: trunk; ὁ ὀδοῦς, -όντος: tooth, tusk; φρεωρυχέω: dig a well; ἀνευρίσκω: discover, come upon, find.

X.5. Hanno, *Periplus Beyond the Pillars of Heracles* 18. In the 5th century BCE, the Carthaginian king Hanno led an expedition through the Pillars of Herakles and down the western coast of Africa for the purpose of founding colonies. The adventure was commemorated on an inscription consecrated in a Carthaginian temple of Cronus and eventually translated into Greek, preserved in a ninth century manuscript (*Codex Palatinus graecus* 398). Here we have the Gorilla women near Mt Cameroon.

Grammar/Syntax Tags: genitive with special adjectives, uses of the dative case,

imperfect tense, participles, complementary infinitives.

ἐν δὲ τῷ μυχῶ νῆσος ἦν ἐοικυῖα τῇ πρώτῃ, λίμνην ἔχουσα,
καὶ ἐν ταύτῃ νῆσος ἦν ἑτέρα, μεστὴ ἀνθρώπων ἀγρίων·
πολὺ δὲ πλείους ἦσαν γυναῖκες, δασεῖται τοῖς σώμασιν,
ἃς οἱ ἐρμηνέες ἐκάλουν Γορίλλας.

διώκοντες δὲ ἄνδρας μὲν συλλαβεῖν οὐκ ἠδυνήθημεν,
ἀλλὰ πάντες μὲν ἐξέφυγον κρημνοβάται ὄντες καὶ ἴστοις
μετρίοις ἄμυνόμενοι, γυναῖκας δὲ τρεῖς, αἱ δάκνουσαί
τε καὶ σπαράττουσαι τοὺς ἄγοντας οὐκ ἤθελον ἔπεσθαι·

ἀποκτείναντες μέντοι αὐτὰς ἐξεδείραμεν, καὶ τὰς δορὰς
ἐκομίσσαμεν εἰς Καρχηδόνα.

Notes: ὁ μυχός: nook, corner, recess; ἡ λίμνη: pool, marsh; μεστός, -ή, -όν:
full; ἐοικυῖος, -α, -ον (+ dative): similar (to); τῇ πρώτῃ (νῆσῳ); δασύς,
-εῖα, -ύ: hairy, shaggy; ὁ ἐρμηνεύς, -έως: interpreter.

συλλαμβάνω: collect, gather, catch; ἀδύναμαι: not be able; ἐκφεύγω: flee
away, escape; ἡ κρημνοβάτη, -ης: step-climber, rope-climber; τοῖς μετρίοις:
the reading as preserved makes no sense; supply πετρίοις (a variant of τό
πετραῖον: rock) for μετρίοις; ἀμύνω: keep off, ward off, defend; δάκνω:
bite, sting; σπαράσσω: tear, rend.

ἀποκτείνω: slay, kill; ἐκδέρω: strip the skin, flay; ἡ δορά, -ας: skinned hide;
κομίζω: carry away, preserve, carry off as a prize; ἡ Καρχηδόνα: Carthage.

X.6. Plutarch, *Beasts are Rational* 991e-f. Animals are autodidactic self-healers.

Grammar/Syntax Tags: pronouns, contract verbs, participles, complementary
infinitives, indirect statement, questions.

παρὰ τίνος γὰρ ἡμεῖς ἐμάθομεν νοσοῦντες ἐπὶ τοὺς
ποταμοὺς χάριν τῶν καρκίνων βαδίζειν; τίς δὲ τὰς χελώνας
ἐδίδαξε τῆς ἔχεως φαγούσας τὴν ὀρίγανον ἐπεσθίειν; τίς

δὲ τὰς Κρητικὰς αἶγας, ὅταν περιπέσωσι τοῖς τοξεύμασι,
τὸ δίκταμνον διώκειν, οὗ βρωθέντος ἐκβάλλουσι τὰς
ἀκίδας;

Notes: ἐμάθομεν: the speaker is Gryllus, one of Circe's pigs; νοσέω: be sick; χάριν: for the sake of (+ genitive); ὁ καρκίνος: crab (Dioscorides 2.10 cites eating river crabs as a treatment for venomous bites, and Pliny the Elder, *NH* 32.119 suggests crab oil to heal burns); βαδίζω: go, proceed; ἡ χελώνη: tortoise; ὁ/ἡ ἔχιδνα, -εως: viper; φαγεῖν: to eat; τό ὀρίανον: marjoram (see also Aristotle, *History of Animals* 9.6 [612a24] and Aelian, *On the Nature of Animals* 6.12); ἐπεσθίω: eat in addition; ὁ/ἡ αἶξ, αἰγός: goat; περιπίπτω: fall in with, fall afoul of, be wrecked; τό τόξενμα, -ατος: arrow; τό δίκταμνον: dittany; βιβρώσκω: eat (aorist passive participle); ἐκβάλλω: eject, expel; ἡ ἀκίς, -ίδος: point, barb, arrow.

XI. MEDICINE AND HEALING

Health is a universal concern. A patient's first recourse was usually the extensive body of traditional folk remedies, handed down through the generations, but two professionalized, symbiotic approaches were developed nearly simultaneously in the 5th century BCE in order to establish medical orthodoxy over magical alternatives (Nutton 2013: 105): rational, Hippocratic medicine; and incubation sanctuaries to Asclepius. The divine was never divorced from rational medicine, as evident in the Hippocratic Oath (excerpted in XI.5, below). Herophilus called drugs "the hands of the gods" (T249 vonStaden), and Galen, who joined the profession because Asclepius appeared to his ill father in a dream (*On Anatomical Procedures* 9.4 [10.609K]); *On the Order of my Books* [19.59K]), identified himself as a worshipper (θεραπευτής) of Asclepius. Theodicy (illness as divine punishment) was widely embraced, as we see in the opening episode of the *Iliad* (1.33-100) where Apollo had punished the Greeks with a plague for Agamemnon's offense to his priest. This is evident also in the case of Phineus who was blinded for his *hubris* (Apollonius of Rhodes, *Argonautica* 2.236-237), among many other examples.

A rich body of medical writings survives from antiquity, concentrated primarily in two large collections: the Hippocratic and Galenic *corpora*. Around sixty treatises are attributed to the Hippocratic school, ranging in date from the mid-5th to the 4th century BCE. Most are anonymous, and none is securely attributable to the historic Hippocrates of Cos. The Hippocratic texts preserve numerous approaches

from the philosophic and theoretical (e.g., *Airs, Waters, Places*) to the systematic recording of case histories (e.g., *Epidemics*). Although the Alexandrian *Museion* was a center of intellectual fervor in all academic areas, including medicine, and despite the advances in anatomical knowledge afforded by a brief window that legitimized human dissection (it is now debated if dissection was entirely abandoned after the Hellenistic era: Lesley Dean-Jones “Galen and the Culture of Dissection,” College of William and Mary, October 13, 2016), the works of Praxagoras of Cos, Herophilus of Chalcedon, Erasistratus of Ceos, and others are mostly lost, surviving only as scant fragments distilled through Galen’s hostile pen. A strict humouralist and great admirer of Hippocrates, Galen may have composed nearly 500 treatises covering many topics in medicine and pharmacy, systematizing and synthesizing previous medical theory. Perhaps a third of these survive in Greek or translated into Arabic, Syriac, and other languages.

XI.1. Aeschylus, *Eumenides* 656-667. Apollo’s defense of Orestes against the charge of murdering a kinsman (his mother) derives from contemporary embryological theory. The god even offered proof (in this passage) that the mother is NOT related to her child.

Grammar/Syntax Tags: objective genitive, ethical dative, future tense, aorist imperative, aorist subjunctive, aorist optative, substantive participles.

καὶ τοῦτο λέξω, καὶ μάθ’ ὥς ὀρθῶς ἔρῳ.

οὐκ ἔστι μήτηρ ἢ κεκλημένη τέκνου

τοκεύς, τροφὸς δὲ κύματος νεοσπόρου.

τίκτει δ’ ὁ θρώσκων, ἢ δ’ ἄπερ ξένῳ ξένη

ἔσωσεν ἔρνος, οἷσι μὴ βλάβῃ θεός.

τεκμήριον δὲ τοῦδέ σοι δείξω λόγου.

πατὴρ μὲν ἂν γέναιτ’ ἄνευ μητρός: πέλας

μάρτυς πάρεστι παῖς Ὀλυμπίου Διός,

οὐδ' ἐν σκότοισι νηδύος τεθραμμένη,

ἀλλ' οἶον ἔρνος οὕτις ἂν τέκοι θεά.

Notes: **μάθ'**: aorist imperative of μανθάνω; **ὀρθῶς**: correctly; **ἐρῶ**: future of λέγω; **κεκλημένη**: perfect middle/passive participle of καλέω; **ὁ τοκεύς, -έως**: one who begets, parent; **ὁ/ἡ τροφός**: feeder, rearer, nourisher, nurse; **τό κῦμα, -ατος**: anything swollen, wave, billow, pregnancy; **νεόσπορος, -ον**: newly sown (i.e., fetus); **θρόσκω**: mount, impregnate; **ἅπερ**: as (relative pronoun); **σώζω**: keep, preserve, protect; **τό ἔρνος, -εος**: sprout, shoot, embryo, fetus; **βλάπτω**: harm, injure; **τό τεκμήριον**: proof; **πέλας**: at hand, nearby; **ὁ μάρτυς**: witness; **ὁ σκότος**: darkness, gloom; **ἡ νηδύς, -ύος**: cavity, womb; **τεθραμμένη**: perfect middle/passive participle of τρέφω; **τέκοι**: aorist active optative of τίκτω.

XI.2. Galen, *On the Natural Faculties* 2.9. Four Humour Theory.

Grammar/Syntax Tags: partitive genitive, τις/τίς, participles, imperfect tense, contract verbs, indirect statement.

Ἄλλ' οὐθ' Ἱπποκράτης οὐτ' ἄλλος τις ὢν ὀλίγω πρόσθεν ἐμνημόνευσα φιλοσόφων ἢ ἱατρῶν ἄξιον ᾧετ' εἶναι παραλιπεῖν· ἀλλὰ τὴν κατὰ φύσιν ἐν ἐκάστῳ ζῳῷ θερμασίαν εὐκρατόν τε καὶ μετρίως ὑγρὰν οὖσαν αἵματος εἶναί φασι γεννητικὴν καὶ δι' αὐτό γε τοῦτο καὶ τὸ αἷμα θερμὸν καὶ ὑγρὸν εἶναί φασι τῇ δυνάμει χυμόν, ὥσπερ τὴν ξανθὴν χολὴν θερμὴν καὶ ξηρὰν εἶναι, εἰ καὶ ὅτι μάλισθ' ὑγρὰ φαίνεται. (διαφέρειν γὰρ αὐτοῖς δοκεῖ τὸ κατὰ φαντασίαν ὑγρὸν τοῦ κατὰ δύναμιν.)

ἢ τίς οὐκ οἶδεν, ὥς ἄλμη μὲν καὶ θάλαττα ταριχεύει τὰ κρέα καὶ ἄσηπτα διαφυλάττει, τὸ δ' ἄλλο πᾶν ὕδωρ τὸ πότιμον ἐτοίμως διαφθείρει τε καὶ σήπει; τίς δ' οὐκ οἶδεν, ὥς ξανθῆς χολῆς ἐν τῇ γαστρὶ περιεχομένης

πολλῆς ἀπαύστῳ δίψει συνεχόμεθα καὶ ὥς ἐμέσαντες αὐτὴν εὐθὺς ἄδιψοι γινόμεθα μᾶλλον ἢ εἰ πάμπολυ ποτὸν προσηράμεθα; θερμὸς οὖν εὐλόγως ὁ χυμὸς οὗτος εἴρηται καὶ ξηρὸς κατὰ δύναμιν, ὥσπερ γε καὶ τὸ φλέγμα ψυχρὸν καὶ ὑγρόν.

Notes: πρόσθεν: before; μνημονεύω: call to mind, mention; ὁ φιλοσόφος: lover of wisdom, philosopher; ὁ ἰατρός: healer, physician; ὤετ': imperfect middle/passive indicative of οἶμαι; παραλείπω: leave aside, omit (i.e., a discussion of the nature of the four humours); τό ζῷον: living creature, animal; ἡ θερμασία: heat, warmth; εὔκρατος, -ον: well-mixed, well-tempered; μετρίως: moderately; ὑγρός, -ά, -όν: moist; τό αἷμα, -ατος: blood; γεννητικός, -ή, -όν: generative, productive; θερμός, -ή, -όν: warm, hot; ὁ χυμός: juice, humour; ἡ ξανθός, -ή, -όν: yellow, red, brown, auburn, golden; ἡ χολή: bile; ξηρός, -ά, -όν: dry; μάλιστα: especially, for the most part; διαφέρω: differ; ἡ φαντασία: appearance.

ἡ ἅλμη: sea water, salt water; ταριχεύω: preserve, embalm; τό κρέας: flesh; ἄσηπτος, -ον: uncorrupted, not liable to decay; διαφυλάσσω: guard carefully, “preserve”; πότιμος, -ον: drinkable; ἐτοίμως: readily, immediately; διαφθείω: destroy utterly; σήπω: make rotten; ἡ γαστήρ, -έρος: belly; περιέχω: surround, embrace, contain; ἄπαυστος, -ον: incesing, never ending; τό δίψος, -εος: thirst; συνέχω: constrain, oppress; ἐμέω: vomit, throw up; ἄδιψος, -η, -ον: quenched, not thirsty; πάμπολυς, -πόλλη, -πολυ: very great; ὁ ποτός: (quantity of) drink; προσαίρω: take up (aorist middle indicative); εὐλόγως: reasonably; τό φλέγμα, -ατος: inflammation, heat, “phlegm”; ψυχρός, -ά, -όν: cold.

XI.3. Hippocratic *Regimen in Health* 1. Diet should correlate with the season in order to ensure a healthy balance of humors in the body.

Grammar/Syntax Tags: genitive of time when, superlative adverb with ὥς, contract verbs, impersonal verbs.

Τοὺς ιδιώτας ὥδε χρὴ διαιτᾶσθαι· τοῦ μὲν χειμῶνος ἐσθίειν ὥς πλεῖστα, πίνειν δ' ὥς ἐλάχιστα, εἶναι δὲ τὸ πόμα οἶνον ὥς ἀκρητέστατον, τὰ δὲ σιτία ἄρτον καὶ τὰ

ὄψα ὅπτα πάντα, λαχάνοισι δὲ ὡς ἐλαχίστοισι χρῆσθαι ταύτην τὴν ὥρην· οὕτω γὰρ ἂν μάλιστα τὸ σῶμα ξηρόν τε εἶη καὶ θερμόν.

Notes: *διαιτάω*: conduct one's life; *ὁ χειμών, -ῶνος*: winter (the recommended diet balances out winter's cold, wet properties); *ἐσθίω*: eat; *ἐλάχιστα*: superlative of *μικρός*; *τό πόμα* = *τό πῶμα, -ατος*: drink, draught; *ὁ οἶνος*: wine; *ἀκρατος, -η, -ον*: unmixed; *τό σιτίον*: grain, bread; *ὁ ἄρτος*: loaf; *τό ὄψον*: prepared food, meat; *ὀπτός, -ή, -όν*: roasted, broiled; *τό λάχανον*: garden herb, vegetable; *ἡ ὥρα*: season; *ξηρός, -ά, -όν*: dry; *θερμός, -ή, -όν*: warm, hot.

XI.4. Hippocratic, *Airs, Waters, Places* 12. Asia's climate is healthier than Europe's.

Grammar/Syntax Tags: partitive genitive, comparative adjectives, superlative adjectives, relative clauses, causal clause.

πολὺν γὰρ καλλίονα καὶ μέζονα πάντα γίνεται ἐν τῇ Ἀσίῃ, ἣ τε χώρα τῆς χώρας ἡμερωτέρη καὶ τὰ ἥθεα τῶν ἀνθρώπων ἡπιώτερα καὶ εὐοργητότερα. τὸ δὲ αἴτιον τούτων ἡ κρήσις τῶν ὠρέων, ὅτι τοῦ ἡλίου ἐν μέσῳ τῶν ἀνατολέων κεῖται πρὸς τὴν ἡῶ τοῦ τε ψυχροῦ πορρωτέρω. τὴν δὲ αὖξιν καὶ ἡμερότητα παρέχει πλεῖστον ἀπάντων, ὁκόταν μὴδὲν ἢ ἐπικρατέον βιαίως, ἀλλὰ παντὸς ἰσομοιρίῃ δυναστεύῃ.

Notes: *καλλίονα*: comparative of *καλός*; *μέζονα*: comparative of *μέγας*; *ἡμερος, -α, -ον*: tame, gentle, civilized; *τό ἥθος, -εος*: haunt, abode, disposition, character; *ἡπιος, -α, -ον*: gentle, favorable; *εὐόργητος, -η, -ον*: good-tempered; *ἡ κρήσις, -εως*: mixing, blending; *ἡ ὥρα*: season; *ἡ ἀνατολή*: rising; *ἡ ἡώς, ἡ οὔς*: dawn; *ψυχρός, -ά, -όν*: cold; *πορρωτέρω*: forward; *ἡ αὖξις, -εως*: growth, increase; *ἡ ἡμερότης, -ητος*: cultivation, mildness; *ἅπας, ἅπασα, ἅπαν*: all; *ὁκόταν*: whenever; *ἐπικρατέος, -η, -ον*: dominant; *βιαίως*: violently, forcibly; *ἡ ἰσομοιρία*: equal share; *δυναστεύω*: hold power over (present subjunctive).

XI.5. The Hippocratic oath is essentially a Pythagorean, religious document, wherein

Hippocratic physicians swore a binding vow to honor all the various Greek gods of health and healing and to avoid the religious crime of miasma (the act of shedding bodily fluids on the earth: see further, R. Parker. 1977. *Miasma*. Oxford). Here we have the opening lines.

Grammar/Syntax Tags: accusative of respect, objects complement, future infinitive, infinitive of purpose, genitive absolute.

ὄμνυμι Ἀπόλλωνα ἱητρὸν καὶ Ἀσκληπιὸν καὶ Ὑγίαν
καὶ Πανάκειαν καὶ θεοὺς πάντας τε καὶ πάσας, ἵστορας
ποιεῦμενος, ἐπιτελέα ποιήσιν κατὰ δύναμιν καὶ κρίσιν
ἐμὴν ὄρκον τόνδε καὶ συγγραφὴν τήνδε.

Notes: ὄμνυμι: swear; ὁ ἱητρός: healer, physician; ὁ Ἀσκληπιός: son of Apollo and the mortal woman Coronis, he was rescued from the womb of his unfaithful mother and raised by the centaur Chiron who taught him the art of healing; ἡ Ὑγία: one of Asclepius's six daughters, the personification of "Health"; ἡ Πανάκεια: one of Asclepius's six daughters, "Universal Remedy"; ὁ ἵστωρ, -ορος: one who knows, judge, expert; ἐπιτελής, -ές: brought to an end, fulfilled, completed; ἡ κρίσις, -εως: judgment, choice, interpretation; ὁ ὄρκος: oath, vow, object by which one swears; ἡ συγγραφὴ: writing, contract.

XII. PHARMACY

Intersecting with medicine, botany, zoology, geology, and cosmetics (e.g., perfumes, dandruff treatments), pharmacy is one of the oldest of the sciences. Drugs, "the hands of the gods" (Herophilus T249 von Staden), were compounded from simple and complex recipes of botanical, animal, and mineral substances that were used to heal (or harm) the body. Opium, for example, was among the many substances employed to treat aches and pains, including headaches. Salves were developed to improve vision or enhance the efficacy of bandages. Recipes are preserved for relieving hangovers, ringing in the ears, liver complaints, envenoming bites, and myriad other maladies. The notorious king Mithridates VI of Pontus (ruled ca. 120-63 BCE) reputedly immunized himself against all poisons by ingesting small amounts of toxins over time (Pliny, *NH* 25.3, 5-7). His name was bestowed on a

class of antidotes credited as his inventions (see Celsus 5.23.3 for an expensive, multi-ingredient compounded mithridatium).

Although many authors investigated the medicinal properties of common (and exotic) substances, one extant ancient text was devoted exclusively to pharmacy, *de Materia Medica* of Dioscorides of Anazarbus (1st century CE), who described over 1,000 botanicals, animal, and mineral products arranged according to their affects on the human body.

Pharmacy was never entirely divorced from folklore, and superstitions guided the collection and preparation of medicals. Theophrastus gave precise instructions for collecting botanicals, including standing to windward when gathering the fruit of the wild rose, gathering honeysuckle before the sun strikes the blossoms, eating garlic and drinking unmixed wine before collecting hellebore, but he rejected as superstitious the folk belief that peonies must be collected at night (*History of Plants* 9.8).

XII.1. *Homeric Hymn to Demeter* 206-209. Cykeon.

Grammar/Syntax Tags: genitive with special adjectives, dative with special adjectives, imperfect tense, indirect object, δίδωμι.

τῇ δὲ δέπας Μετάνειρα δίδου μελιδέος οἴνου
 πλήσας· ἥ δ' ἀνένευσ'· οὐ γὰρ θεμιτόν οἱ ἔφασκε
 πίνειν οἶνον ἐρυθρόν· ἄνωγε δ' ἄρ' ἄλφι καὶ ὕδωρ
 δοῦναι μίξασαν πῖμεν γλήχωνι τερείνῃ.

Notes: τῇ: Demeter; τό δέπας, -ας: goblet, bowl; Μετάνειρα: the queen of Eleusis; δίδου: imperfect indicative of δίδωμι; μελιδέος, -έος: honey-sweet; ὁ οἶνος: wine; πῖμπλημι: fill; ἀνανεύω: throw head back in refusal; θεμιτός, -ή, -όν: in accord with divine law; οἱ: dative of the reflexive pronoun ἐ; φάσκω: say, affirm; ἐρυθρός, -ά, -όν: red; ἄνωγα: command; τό ἄλφιτον: barley groats; μίγνυμι: mix (modifies Metaneira, understood as the object of ἄνωγε); πῖμεν: aorist infinitive of πίνω; ἡ γλήχων, -ωνος: pennyroyal; τέρεν, -εινα, -εν: soft, delicate.

XII.2. Dioscorides 3.31. Pennyroyal.

Grammar/Syntax Tags: aorist passive participle.

γλήχων· πόα γνώριμος, θερμαντική, λεμτυντική, πεπτική.
ποθεῖσα δὲ ἔμμηνα καὶ δεύτερα καὶ ἔμβρυα ἄγει·

Notes: ἡ γλήχων -ωνος: pennyroyal; ἡ πόα: grass, herb; γνώριμος, -ον: well-known; θερμαντικός, -ή, -όν: warming; λεμτυντικός, -ή, -όν: thinning; πεπτικός, -ή, -όν: promoting digestion; ποθεῖσα: aorist passive participle of πίνω; τό ἔμμηνον: menses, something that lasts or occurs monthly; τό δεύτερον: a second thing, “afterbirth”; τό ἔμβρυον: embryo, fetus.

XII.3. Hippocratic Corpus, *On Barrenness in Women* 30.1. Expelling an aborted fetus.

Grammar/Syntax Tags: 3rd person imperative, participial clauses.

μετὰ δὲ πινέτω ὀρίγανον καὶ γλήχωνα καὶ ἄλφιτον ἐν
ὔδατι ἐπιπάσσουσα, δάφνης φύλλα κόψας καὶ τρίψας
λεῖα, κόμμι παραμίξας, καὶ διεῖς ὔδατι, πίνειν διδόναι.

Notes: μετὰ: here the author has offered a third solution; τό ὀρίγανον: marjoram; ἐπιπάσσω: sprinkle on; ἡ δάφνη: sweet bay, laurel; τό φύλλον: leaf; κόπτω: cut, grind; τρίβω: rub, pound, grind; λεῖος -α -ον: smooth, minced, crushed (the author intends the mixture to be ground up very finely); τό κόμμι: gum; παραμίγνυμι: mix up together; διύημι: send through, let go through, dissolve.

XII.4. Aristotle, *On Marvelous Things Heard* 4. Goats self-medicate with dittany.

Grammar/Syntax Tags: aorist subjunctives.

Αἰ ἐν Κρήτῃ αἴγες ὅταν τοξευθῶσι, ζητοῦσιν, ὥς ἔοικε,
τὸ δίκταμον τὸ ἐκεῖ φυόμενον. ὅταν γὰρ φάγωσιν, εὐθὺς
ἐκβάλλουσι τὰ τοξέματα.

Notes: ὁ/ἡ αἴξ, αἰγός: goat; τοξεύω: shoot with an arrow (aorist passive subjunctive); τό δίκταμον: dittany; φαγεῖν: to eat (aorist subjunctive); εὐθὺς: immediately; ἐκβάλλω: expel, drop; τό τόξευμα, -ατος: arrow.

XII.5. Homer, *Odyssey* 10.302-306. Hermes offers the magical antidote moly to Odysseus about to encounter Circe.

Grammar/Syntax Tags: dative of specification, ethical dative, aorist participle.

ὥς ἄρα φωνήσας πόρε φάρμακον Ἀργεϊφόντης
 ἐκ γαίης ἐρύσας, καί μοι φύσιν αὐτοῦ ἔδειξε.
 ῥίζη μὲν μέλαν ἔσκε, γάλακτι δὲ εἵκελον ἄνθος:
 μῶλυ δέ μιν καλέουσι θεοί: χαλεπὸν δέ τ' ὀρύσσειν
 ἀνδράσι γε θνητοῖσι, θεοὶ δέ τε πάντα δύνανται.

Notes: φωνέω: speak; πόρω: offer; τό φάρμακον: a drug that can either heal or harm; Ἀργεϊφόντης: Argos-slayer, Hermes; ἐρύω: draw, pull, pluck; μοι: Odysseus (Odysseus is here recounting his adventures to the Phaeacian court); ἡ ῥίζα: root; μέλας, μέλαινα, μέλαν: dark, black; ἔσκε: imperfect Ionic form of εἰμί; τό γάλα, γάλακτος: milk, milky sap; εἵκελος, -η, -ον: like; τό ἄνθος, -ους: flower, bloom; τό μῶλυ: moly; μιν: him, her, it; ὀρύσσω: dig; θνητός, -ή, -όν: mortal, dying.

XII.6. Theophrastus, *History of Plants* 9.15.7. Moly. Notice how Theophrastus has described this exotic plant by comparing it with more familiar ones.

Grammar/Syntax Tags: dative with special adjectives, indirect statement, relative clauses.

τὸ δὲ μῶλυ (γίνεται) περὶ Φενεὸν καὶ ἐν τῇ Κυλλήνῃ. φασὶ δ' εἶναι καὶ ὅμοιον ᾧ ὁ Ὅμηρος εἶρηκε, τὴν μὲν ῥίζαν ἔχον στρογγύλην προσεμφερῇ κρομύῳ, τὸ δὲ φύλλον ὅμοιον σκίλλῃ· χρῆσθαι δὲ αὐτῷ πρὸς τε τὰ ἀλεξιφάρμακα καὶ τὰς μαγείας· οὐ μὲν ὀρύττειν γ' εἶναι χαλεπὸν, ὥς Ὅμηρός φησι.

Notes: Φενεόν: west of Corinth in the Peloponnese; τῇ Κυλλήνῃ: the second

tallest mountain in the Peloponnese; **εἶρηκε**: perfect active indicative of λέγω; **ἡ ῥίζα**: root; **στρογγύλος, -η, -ον**: rounded, spherical; **προσεμφερός, -ές** (+ dative): resembling; **τό κρομόν**: onion; **τό φύλλον**: leaf; **ἡ σκίλλα**: squill, sea onion; **τό ἀλεξιφάρμακον**: antidote, remedy; **ἡ μαγεία**: magic.

Beginner Latin Novels: A General Overview

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ABSTRACT

In recent years some Latin teachers have followed the lead of their modern language counterparts who have written and published simple novels, in order to provide beginning students with more reading opportunities despite having a small working vocabulary. The result has been a flood of new resources. Now, many teachers are wondering which novels to choose, and how to use them in their classrooms. This article describes what beginner novels are, and how they can be used in Latin classrooms, regardless of level or method. This is followed by a survey of the novels that are currently available.

KEYWORDS

extensive reading, comprehensible input, Latin novellas, chapter books, reading comprehension, embedded reading, multi-level classes, differentiated instruction, sheltered vocabulary, reading strategies, free voluntary reading, sustained silent reading

In their search for a wider variety of reading resources for their beginning students (those in the first two years of language study), teachers of foreign languages have in recent years written and published beginner novels, simple chapter books which strictly limit vocabulary to a small number of high-frequency words. These books have been very popular for teachers of many languages, regardless of the methods and textbooks they use. In just the past few years, there has been a flood of Latin novels which follow the same pedagogical principles as their modern language counterparts. Some of them are translations of already existing English stories or

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Spanish novels, but the majority are original, and deal directly or indirectly with classical themes. The emergence of these novels is the result of much collaboration, which in turn has given rise to more novels and a growing body of supplementary resources that teachers have at their disposal. Now that these resources are becoming widely available, the challenge for teachers of Latin is to determine where beginner novels might fit into their specific curriculum and goals. Toward this end, this article will discuss what beginner novels are and how they can be used by Latin teachers, followed by a survey of the novels that are currently available.

WHAT IS A BEGINNER NOVEL?

A beginner novel is a chapter book containing anywhere from 20 to 100 or more pages, which has been written specifically with students in their first two years of language study in mind (novice-mid through intermediate-low, using ACTFL standards). The vocabulary has been selected to represent high-frequency words, that is, words that learners are most likely to encounter in everyday conversation and more advanced reading.² Most of the novels in this category contain fewer than 250 unique words, (although this number varies, depending on whether alternate forms and cognates are counted separately). These novels may include illustrations to support comprehension of the story, but are not considered picture books or graphic novels *per se*. While vocabulary is always limited in these novels—a practice which ESL educators refer to as “[sheltering](#)”—grammatical complexity is generally not. Students and teachers can expect to encounter examples from a variety of noun and verb groups (including irregulars), as well as various tenses and subordinate constructions, throughout a beginner novel. Rather than *explained*, such constructions will simply be *defined* in that specific context. Beginner novels generally include a complete glossary of every word (and sometimes *every form* of every word) that is used in the book, with definitions. Words and constructions that students are less likely to know are glossed in the margins, or in a footnote on the page in which they appear. Some beginner novels also feature vocabulary lists organized by chapter at the end of the book.

² Most teachers and scholars of Latin will agree that “high-frequency” indicates words that are most commonly found in the most-read classical texts. [Dickinson College’s Latin Core Vocabulary](#) is one example of this. Within this context, Latin teachers are developing [sub-sets of high frequency words that are most likely to be used in classroom interactions](#).

HOW IS A BEGINNER NOVEL DIFFERENT FROM A TEXTBOOK OR GRADED READER?

Most of the resources that Latin teachers have at their disposal, even those aimed at first year students, tend to be vocabulary-intensive. It is assumed by the authors and/or textbook company that readers will need assistance with understanding a significant number of words in a given reading. Examples of this can be found throughout Latin textbooks, when ten or even twenty words and phrases are glossed in the space below a relatively short passage.

Beginner novels differ from textbooks and graded readers in both a quantitative way and a qualitative way. In terms of quantity, beginner novels are intended for students who already know most of the vocabulary (either through their previous language work, or by consciously pre-teaching specific vocabulary for a novel). In terms of quality, beginner novels are unique in that the number of new vocabulary words as well as grammatical complexity will not increase from chapter to chapter in a graded systematic way. While there may be a learning curve as students become acquainted with the novel during the first few chapters, there is not an intentional “stepping up” of new vocabulary in each subsequent chapter, as one would find in a textbook reading, or a reader meant to accompany a textbook. As a result, it is expected that students can read subsequent chapters as easily or more easily than the first few chapters.

This difference in approaches reflects the distinction made between *intensive* and *extensive reading*. In simplest terms, an intensive approach is one in which students are working hard with a conscious goal of improving one’s reading and analytical skills. Dan McCaffrey offers a description of an intensive approach that will surely resonate with Latin teachers: “Intensive reading seeks to uncover the inner workings of a text: its grammar, its formal and logical structure, its artistic and rhetorical techniques. This is the way we read a text we are preparing to teach in class” (114). As they read, students are generally working hard to notice, remember, analyze, and apply new vocabulary and grammar rules which are presented either before or after the reading in the textbook chapter. It is assumed that, without the additional help of definitions and explanations, a reading of this sort is well above the current reading level of its intended students.

Extensive reading, by contrast, describes reading for pleasure or for information, where the focus (the *conscious* focus on the part of the student) is not on the

language itself, but on the story, i.e., the content or message of a reading (Day and Bamford). Extensive reading, therefore, involves readings that do not challenge a student's ability to fully comprehend a text. Readings of this sort must contain at least 90% words that the reader already knows in order to be truly comprehensible (Nation; Schmitt, Jiang, and Grabe). The goal of requiring students to read in this way is to reinforce and advance language proficiency through the communication of accessible and interesting content. Because the texts are well within a reader's vocabulary knowledge and grammatical competence, students are more capable of engaging in extensive reading independently, either in or outside of the classroom.

HOW CAN I USE BEGINNER NOVELS?

One benefit of beginner novels is their flexibility: (1) they can be used to supplement and reinforce what students are learning in a textbook-based curriculum, and (2) they can be used to replace a textbook curriculum. Many teachers of modern languages, and some Latin teachers, build their entire curricula around novels (e.g., Maxim), in addition to other readings and activities taken from a variety of sources, including textbooks. Or 3) they can be used outside the primary curriculum as free voluntary reading (see FVR section below).

Another advantage that beginner novels provide to language teachers is more flexibility in dealing with students who are working at different levels. This is especially relevant to teachers of Latin, who are more likely to have two or more levels combined in one class or one room. Combined classes aside, a closer look at student preparedness and ability will often reveal that all classes are mixed-level classes. The result is that students can often be reading at a difference of as many as five grade levels even in their native language.

When the primary classroom resource is a textbook chapter, students who are not able to achieve comprehension of the intentionally graded reading are naturally going to experience difficulty. Strategies like [embedded readings](#) have been developed with a view to mitigating this difficulty. But the fact remains that often teachers have to work really hard to bring all students up to the level of the textbook. Another option is to divide the class into two or more separate classes. But this can place more of a burden on teachers and can undermine classroom cohesion.

When teachers use a beginner novel as a class reading, the common text in the classroom is now something that most students in the room can already read. And the learning goal is no longer such a basic task as simple comprehension, but

is now envisioned as increasingly complex interactions with the reading. It should be noted that adaptations of the reading in both the lower and higher directions may still be necessary or desirable, but the baseline resource is now something that all or most students can access. Raising the bar for the higher performers no longer means simply completing the assignment without assistance or going on to a different reading. Rather, these students will be asked to do more sophisticated language work, including providing spoken or written output which in turn helps their classmates (see [Nielsen](#) for an example of how easy novels offer advanced learners opportunities to achieve higher order thinking about the characters and the plot). The result of a truly differentiated approach to a beginner novel is that, regardless of specific student level and need, *everyone is on the same page*, and so everyone is part of the same conversation and community.

In my own classroom, the teaching of novels has grown out of the way I present any reading, that is, using a variety of strategies which support student comprehension and which allow students to demonstrate their understanding in a variety of ways. What all these strategies have in common, is that the successful reading of a chapter or a passage, or the entire novel itself, is not the end, but rather the beginning or midpoint of a process whose outcome is the *interpersonal and creative use of the language as communication*. Once basic understanding has been achieved, students are encouraged to use the text as a means to demonstrate a broader form of creative proficiency that is not limited to the book or the text or the vocabulary specific to that book. For example, once students demonstrate basic comprehension through a vocabulary quiz, written translation or summary, drawing or dramatic interpretation of a passage, a next step would be, e.g., for students to brainstorm, discuss, and/or write in the target language about the larger issues at play, such as [Roman virtues](#), as well as reflect on their own experience in comparison with the experience of a character in the reading. [Keith Toda](#) has also developed and shared many such reading-based activities specifically for use by Latin teachers, and has inspired many of my own practices. I have compiled descriptions of my activities and specific materials on [this web page](#). Lindsay Sears has clearly and concisely presented (and generously shared) her [curriculum for teaching the novel *Brando Brown Canem Vult*](#). This document can give teachers a clear glimpse into what the day-to-day process of reading a novel with a Latin class can look like. Other teachers and authors have created and shared sample lesson plans, activities, assessments, etc. for specific novels. Links to these resources, when available, will be included

in the discussion of specific novels below. For more examples of extensive reading activities, see Bamford and Day; Al Ghazali.

FREE VOLUNTARY READING (FVR)

Because beginner novels are designed to be read easily by beginners, they are also appropriate for independent reading by students in their second through fourth years of study (and sometimes later in their first year). Students may read chapters or entire books independently, depending on the teacher's goals and time restrictions. Some studies have suggested that students demonstrate the highest gains in proficiency through reading of self-selected texts. Whereas only a few years ago there were barely any Latin resources that a novice-intermediate level learner could pick up and read on their own, the emergence of beginner novels, as well as many shorter readings shared online, now offers Latin teachers a sizeable library for students to choose from. I have created a [webpage](#) that contains many such texts that are available online. Given the still limited number of Latin resources available, one might more accurately relate this practice to Sustained Silent Reading (SSR). However, because the goal is student enjoyment of reading through choice, FVR is still appropriate for this work-in-progress.

A number of modern language teachers, including [Mike Peto](#) and [Bryce Hedstrom](#), have outlined the process of setting up a FVR library, including the details of routines, student support, accountability and grading (see also Day and Bamford). I have followed the lead of these teachers in establishing my own FVR program, in which beginner novels play a central role. In my classroom, I have instituted a routine in which students begin class twice a week by choosing a book and reading silently for 8-12 minutes. They then spend 4 minutes writing in a reading log. At the end of each semester, students look over their reading logs and write a self-reflection on how FVR has helped them improve in their understanding of the language.

Students can choose from a variety of books which I have collected over the years. These include: Latin textbooks, older elementary readers, *Discitur Legendo* (a printed collection of NLE readings), [student-created myth storybooks](#) (see also Davidheiser), dual-language books like the Loeb Classical Library, childrens' books in Latin translation (Hinke), and other miscellaneous books. While I tend to limit the choices for students in their first year, it is nice to have a variety of texts for students to explore, so that they can find something that is of particular interest to them. The more books I have, the more likely students are to find something interesting. And

if the research on independent reading is true (Grabe; Jacobs et al.), then providing time and books during the school day may be the most effective thing I can do to promote my students' reading proficiency, and hopefully establishing a positive lifetime relationship with Latin books. See [this page](#) for a detailed description and links regarding my evolving FVR procedures.

CONTENT OF BEGINNER NOVELS

Teachers will find a wide variety of subject matter in the novels that are currently available. One concern that has been expressed by some members of the Latin teaching community is that of retaining the classical content of Latin curricula while making the necessary modifications in these materials for the sake of broader access. Many of the currently available beginner Latin novels are in fact based on classical themes. It should be noted, however, that even the novels whose content is not directly related to the ancient classical world offer compelling narratives on themes that are relevant to the lives of young learners, and can easily be related to universal themes in ancient literature. As a result, a knowledgeable teacher will be able to weave in ancient or classical examples of the situations, conflicts and characters that their class will encounter, even in a seemingly irrelevant story.

LATIN NOVELS CURRENTLY AVAILABLE

The purpose of this section of the review is to give teachers an overview of the specific novels currently available. This will include information about suggested level, plot, and unique and total word count. Please note that word counts may be estimated, and reflect different approaches which may exclude different forms, cognates, proper names, etc. Novels are listed in approximate order of difficulty, easiest first. Most of these novels are available through Amazon.com, but additional links have been provided for those that are not, or when supplementary resources are available. If school budgets prevent teachers from acquiring classroom sets, many in our community are willing to share and grant permission to copy or print classroom sets. Please contact these authors and/or publishers directly before deciding that you cannot afford to bring beginner novels into your classroom.

Rufus et Arma Atræ, and *Agrippina, Mater Fortis*, by Lance Piantaggini. [Poetulus Publishing](#).

Year 1-2. Rufus: in the first volume, Rufus, the younger brother of Piso (the title and protagonist of Piantaggini's book, see below), becomes involved in the case of some missing weapons from a gladiator fight. This adventure takes the reader through a tour of the monuments of Rome, providing teachers and students with many opportunities for cultural discussion and comparisons. Unique word count: 40. Total word count: 1440. Agrippina: this novel continues the story from the perspective of the mother, Agrippina. She has a secret and eventually reveals herself as a strong and brave character, inviting critical discussion of Roman social norms. Unique word count: 65. Total word count: 2870. The extremely low unique word count in these relatively long books (especially Agrippina) makes for large quantities of fluent reading in the first two years.

Pluto, Fabula Amoris, by Rachel Ash and Miriam Patrick. [Pomegranate Beginnings Publishing](#). Unique word count: 148. Total word count: 1114.

Years 1-2. Pluto tells the story of Persephone from the perspective of a young Pluto who, rather than the aggressor, is the underdog brother of Juppiter, and he ends up with an unexpected and very welcome guest in his lonely home. The book then shifts to the perspective of Persephone as someone who is torn between two worlds. I have taught this book during the second half of Latin 1, and students find the story engaging and entertaining. The supplementary materials available through the website Pomegranate Beginnings are very helpful for teachers to add variety to students' experience of the novel. A companion novel, *Eurydice*, is now available through the same website.

Marcus et Imagines Bonae Suae, by Magaly Rodriguez, translated by Lance Piantaggini and John Bracey. Unique word count: 143. Total word count: 1794. [TPRS Books](#)

Years 1-2. Whereas the Spanish version of this book takes place in Madrid, and the the French version in Paris, this Latin version takes place in modern day Rome. It begins with Marcus, a boy who finds his classes and teachers (especially his Latin teacher!) extremely boring. He then embarks on both real and imaginary adventures which take him outside of the confines of his tedious classes. Roman monuments include the Vatican Museum and the Olympic Stadium, and there is a guest appearance by soccer star Angelo Ogbonna.

Brando Brown Canem Vult, by Carol Gaab, translated by Justin Slocum Bailey. [Fluency Matters](#). Unique word count: 125. Total word count: 3700.

Years 1-2. Brandon wants a dog, but his mother won't let him. He gets a dog anyway, and tries to keep it without mom finding out. The nice thing about having a Latin version of a beginner novel as widely used as *Brandon Brown*, is that many resources already exist, for sale as well as shared freely, which Latin teachers can easily adapt for their purposes. In addition, many Latin teachers have already used this book during the 2016-17 academic year (e.g. [Keith Toda](#), and [Lindsay Sears](#)) and have shared their experiences and resources/strategies for those who want to use the book next year. There is also an official Latin teacher's guide available from the publisher.

Piso Ille Poetulus, by Lance Piantaggini. [Poetulus Publishing](#). Unique word count: 108. Total word count: 2935.

Years 2-3. This book could be used for students in their first year, or for third year students as an introduction to Hexameter verse, or anywhere in between, because of the low unique word count. Piso is a boy who loves to write and read poetry, but his father, a soldier, wants him to learn to fight. Throughout the book, the reader experiences various aspects of ancient Rome (different kinds of columns, famous monuments, the Muses, etc) through words, pictures, and Piso's Latin verses. The book ends with a short and accessible scansion lesson. Piantaggini has added online and CD audio files to support the verse work in this book in addition to his extensive [teacher resources for this book](#), both print and online.

Iter Mirabile Dennis et Debrae, by Christopher Buczek. Self published. Available through Amazon.com. Unique word count: 242. Total word count: 2800.

Years 2-3. Buczek tells the story of two friends who end up with a time machine, and decide to go back to Ancient Rome. There they encounter, among other historical figures, Julius Caesar and an Elephant, both of whom make trips back to the present. The time-travel theme allows for spin-off comparisons between ancient and modern cultures. I have used this book successfully with second year Latin students. Although there is not yet an official teacher's guide, Buczek has created supplementary materials which he is willing to share.

Filia Regis et Monstrum Horribile, Perseus et Rex Malus, Perseus et Medusa. By Stephen Olimpi. Available on Amazon.com. Unique and total word counts: Filia Regis: 125/3771; Perseus et Rex Malus: 300/3391; Perseus et Medusa: 300/3870.

Years 2-3. These three novels are simplified retellings of Greek and Roman myths.

Cloelia: Puella Romana, by Ellie Arnold. Self published. Available on Amazon.com, and free for pdf download (with teacher resources) via the [Latin Teacher Toolbox website](#). Unique word count: 200. Total word count: 4000.

Years 2-4. Ellie Arnold has successfully, in my opinion, created a resource which is accessible to intermediate readers in their second or third year of Latin, and which has an authentic ancient Roman context, with a variety of stories adapted from Livy. This book is unique in that it is written from the perspective of a female adolescent who is beginning to worry about the harsh realities of life as a woman in the Roman world. Two chapters directly address the issue of rape, and in another section, Cloelia's mother is very blunt with her about the fact that in wartime, soldiers capture and kill women and children too. Using this book, teachers can discuss a variety of important and relevant cultural issues in Latin or in English. I have taught this book during the first semester of Latin 3 as a "warm-up" for reading unadapted classical texts.

Dominus Quixotus, by Karen Rowan, translated by David Ring. [Fluency Fast Workshops](#). Unique word count: 270. Total word count: 1160 (applies to each version).

Years 2-4. This is another example of a Latin translation of a pre-existing beginner novel which has been used widely in modern language classes already. In his introduction, Ring makes a compelling case for including *Don Quixote* in a Latin curriculum, namely because of the influence that Latin literature had on Cervantes, and the influences from both traditions that continue into the present day. The format of this book is unique in that it includes two versions of the story, one told in the present tense and one with past tenses. This can potentially allow teachers to read the book with students at multiple levels or even at once with a mixed-level class.

Iter Icari and *Clavis Apollinis*, by William J. Simpson. Available on Amazon.com.

Iter Icari: 22 pages, 250 unique words. *Clavis Apollonis*: 25 pages, 167, unique words.

Years 2-3. Both novels combine Greek and Roman myths, with modern settings that students can relate to.

De Claustro Magico, by Michael Hirschler. Available on Amazon. Contains a full glossary with both English and German definitions. Unique word count: 235. Total word count: 800.

Years 3-4. A wealthy king wants the best for his daughter, particularly a husband for her who is not greedy. In order to judge the suitors, he places his treasures in a magic chest that knows true love.

Itinera Petri: Flammae Ducant, by Robert Patrick. [Pomegranate Beginnings Publishing](#). Unique word count: 347. Total word count: 4281.

Years 3-4. This novel follows the adventures of Petrus, who one day sees flames circling his head in the mirror, and hears a voice leading him on a mythical adventure. Although the book starts off in the present time, the images and characters Petrus encounters along the way invite comparisons with vocabulary and themes used in ancient Roman literature, as well as other stories and traditions across the world.

Other novels are either currently available, or are in their final edits. For a regularly updated list of beginner novels with links to additional supplementary resources, please visit johnpiazza.net/latin/novels. In addition, James Fassler (jim-bryan65) has reviewed many of these novels on Amazon, and provides a lot of helpful information to anyone interested in finding more Latin resources as a supplement or alternative to traditional textbooks.

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