



ST JOHN'S  
College

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## First Assignments

### **Seminar**

Your first seminar reading will be Homer's *The Iliad* (Books I–VI). While President Roosevelt sent you a copy upon your acceptance, you are by no means required to use that translation.

The Language and Math assignments listed here should be printed or downloaded:

### **Language**

We recommend that before the first class you memorize the Greek alphabet. If you feel that your mastery of English grammar is lacking, we suggest you review its important rules.

### **Mathematics**

Freshman math begins with Euclid's *Elements*. For the first class, please read the "Definitions, Postulates, and Common Notions" at the beginning of Book I.

### **Laboratory**

The first assignment will be reading "In the Laboratory with Agassiz" by Samuel H. Scudder from Volume 1 of the Freshman Lab Readings (selection attached).

We are pleased to announce that you will receive a copy of Euclid's *Elements* as a gift in the mail, welcoming you to the college community. This gift comes from the Dean and the Admissions Office.

C.A.E. Luschnig

AN  
INTRODUCTION  
TO  
ANCIENT GREEK

*A Literary Approach*

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Second Edition

*Revised by*  
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**Deborah Mitchell**

## The Greek Alphabet and the Structure of Greek

*In this lesson you will learn the letters and sounds of Greek, the diacritical marks, the classification of letters, the parts of speech, and useful definitions. You will be able to read words, recite the alphabet song, translate selected sentences, and read signs.*

## ALPHABET AND SOUNDS OF GREEK

The Greek alphabet has twenty-four letters (γράμματα: *grammata*), given below with their names, usual transliterations into the Roman alphabet, and a recommended pronunciation.

### The Alphabet

Character	Name	Transliteration	Pronunciation
A α	ἄλφα	alpha a	short: <i>cup</i> ; long: <i>father</i>
B β	βῆτα	beta b	b
Γ γ	γάμμα	gamma g (ng)	hard g, ng, <i>going</i>
Δ δ	δέλτα	delta d	d
E ε	ἒ ψιλόν	epsilon e	short e, <i>bet</i>
Z ζ	ζῆτα	zeta z	sd, <i>wisdom</i> ; dz, <i>adze</i>
H η	ἦτα	eta e	long ε ( <i>cf. French fête</i> )
Θ θ	θῆτα	theta th	t-h
I ι	ἰῶτα	iota i	short: <i>bin</i> ; long: <i>bean</i>
K κ	κάππα	kappa k, c	k
Λ λ	λάμβδα	lambda l	l
M μ	μῦ	mu m	m
N ν	νῦ	nu n	n
Ξ ξ	ξῖ	xi x	ks/x: <i>tacks, tax</i>
Ο ο	ὀ μικρόν	omicron o	short o: <i>pot (German Gott)</i>
Π π	πί	pi p	p
Ρ ρ	ῥῶ	rho r, rh	trilled r (as in Italian)
Σ σ, ς	σίγμα	sigma s	as in <i>say</i>
Τ τ	ταῦ	tau t	t
Υ υ	ὕ ψιλόν	upsilon y	French u; German ü
Φ φ	φῖ	phi ph	p-h
Χ χ	χῖ	chi ch	k-h
Ψ ψ	ψῖ	psi ps	hips
Ω ω	ὦ μέγα	omega o	go

# Vowels, Diphthongs, and Iota-subscript

## 1. Vowels

The vowels (φωνήεντα) are α, ε, η, ι, ο, υ, ω. Of these, α, ι, and υ are of variable quantity, that is, they can be either long or short. Of the others, ε (ἔ ψιλόν *plain e*), and ο (ὀ μικρόν *little o*) are always short; and η and ω (ὦ μέγα *big o*) are always long. Long vowels were originally pronounced for about twice as long as short ones. Vowel length affects pronunciation, accent, and the meters of poetry.

## 2. Diphthongs (δίφθογγοι) and Vowel Combinations

A diphthong is a combination of vowel sounds that starts as one vowel and, within the same syllable, changes gradually to another vowel.

The diphthongs in Greek are:

Diphthong	Transliteration	Pronunciation
αι	ai, ae, e	(ai) <i>aisle, high</i> [ī]
αυ	au	(au) <i>sauerkraut</i>
ει	ei, e, i	(ei) <i>sleigh</i> [ā]
ευ (also ηυ)	eu	(ε + υ)
οι	oi, oe, e, i	(oi) <i>coin, toy</i>
ου	ou, u	(ou) <i>soup</i> [oo]
υι	ui	(uy) (cf. <i>New York</i> )

(The combination υι in Attic Greek always occurs before another vowel and is pronounced as υ followed by the semi-vowel *y*; there is no exact English equivalent.)

## 3. The Long Diphthongs: Iota-subscript

When a long vowel (ᾱ, η, or ω) combines with ι to form a diphthong, the ι is (in most modern texts) written under the line: this is called *iota-subscript* or *ι-subscript*, α, η, ω. This is not an ancient custom, but dates from the Byzantine Age, when scholars were attempting to standardize the spelling of ancient Greek, although the pronunciation had changed over the years. Most but not all modern texts follow the Byzantine practice.

### **Note on ι-subscript**

In the Classical period, and in fact until the ninth century C.E., the capital letters were used for all formal writing. The small letters are simplified forms of these for faster writing, and began in the ninth century C.E. to be used as a formal (or book) hand. Before this time the long diphthongs were written with iota on the line with the other letters: ΑΙ, ΗΙ, ΩΙ, as in ΘΗ ΚΩΜΩΔΙΑΙ, ΘΗ ΤΡΑΓΩΔΙΑΙ (τῆ κομωδία, τῆ τραγωδία *for the comedy, for the tragedy*), and iota was pronounced: spelling originally represents pronunciation (i.e., language), but often becomes standardized (or fossilized) as pronunciation changes.

By the second century B.C.E. this iota had been lost from the pronunciation in Attica, and it gradually ceased to be written. The Byzantines put it under the line to show that it no longer affected the pronunciation. When this little iota occurs, it must be learned as part of the spelling. Thus, it is necessary to distinguish -η (a dative ending) from -ῆ (a nominative ending). After a capital letter, this ι is still written on the line in modern texts, Αι, Ηι, Ωι (= α, η, ω).

## Breathings

1. In Greek, the symbol  $\text{'}^{\text{h}}$ , though not a letter, represents one of the sounds of the language, the *h*-sound (or aspiration).
2. Every word beginning with a vowel or diphthong must be marked with either the  $\text{'}^{\text{h}}$  (rough breathing for *h*) or the  $\text{'}$  (smooth breathing for the absence of an *h*): εἰς (eis) *into*; εἷς (heis) *one*; ὁδός (odos) *threshold*; ὁδός (hodos) *road*. The breathing mark goes over the second member of a diphthong: οὐ *not*; οὗ *of whom*.
3. Words beginning with ρ and υ always have the rough breathing: ῥόδον *rose*; ὑπέρ *over* (hyper).

### *Note on the Breathings*

The alphabet given above is the Ionic alphabet, which was the one used by the Ionian Greeks and adopted by the Athenians (officially in 403 B.C.E.), and gradually by all the Greeks. Before this universal acceptance of the Ionic alphabet, a city-state might not only have its own dialect, but some even had their own versions of the alphabet. Now the Ionic alphabet is the one used both for Modern Greek and for classical Greek texts. The old Attic alphabet (and some others as well) used the H symbol for the *h*-sound (the aspiration), but the Ionians used the same symbol to represent the long *e*-sound: in their dialect, speakers tended to drop their *h*'s. In some places, a new symbol was developed to represent the *h*-sound, at first used only to differentiate words that were otherwise the same—such as ὄρος (horos) *boundary* from ὄρος (oros) *mountain*—but later adopted universally. This symbol was developed from the H, by splitting it in half: † (used in inscriptions from the Greek colonies in Southern Italy, †ορος). It was later adopted in the form  $\text{'}^{\text{h}}$  by the Alexandrian scholars from which it developed into our  $\text{'}^{\text{h}}$ , the rough breathing (πνεῦμα δασύ *hairy breath*). The Alexandrian grammarians also introduced the complementary † (which became  $\text{'}$  and then  $\text{'}$ ) to indicate the absence of aspiration (calling it πνεῦμα ψιλόν *plain breath, bald breath*) again to indicate the correct reading of words otherwise spelled the same. It is now conventional to mark every word beginning with a vowel or diphthong with a rough ( $\text{'}^{\text{h}}$ ) or smooth ( $\text{'}$ ) breathing. It must be learned as part of the spelling of the word. It is written beside (to the left of) a capital letter:  $\text{'}$ H,  $\text{'}^{\text{h}}$ H,  $\text{'}$ A,  $\text{'}^{\text{h}}$ A.

The rough breathing is pronounced and transliterated as the letter *h*; the smooth breathing is not heard and is not transliterated.

\*Note: in English the endings of personal names are often dropped.

The rough breathing is also used over an initial ρ, to indicate that it is aspirated. We represent this by trilling the ρ and transliterating ῥ as *rh*: ῥήτωρ (*rhetor*), *orator*.

## Classification of Consonants

The consonants (σύμφωνα) are divided into **Mutes** (or stops) and **Continuants** (including liquids, nasals, a spirant, and double consonants).

There are nine **Mutes** (ἄφωνα), divided according to (1) where they are produced, into labials, dentals, and palatals; and (2) the effort in breathing, into unvoiced, voiced, and aspirated (or rough).

The following chart shows the two classifications:

	Unvoiced	Voiced	Aspirated	Produced With
Labials	π	β	φ	the lips
Palatals	κ	γ	χ	the soft palate and tongue
Dentals	τ	δ	θ	the teeth and tongue

**Unvoiced** or voiceless (ψιλὰ) consonants are produced without vibration of the vocal cords.

**Voiced** consonants (called μέσσα in Greek) are produced with vibration of the vocal cords: the difference between τ and δ, or κ and γ, or π and β (*t* and *d*, or *k* and *g*, or *p* and *b*) can be felt if you place your fingers on your Adam's apple; you will feel δ, γ, and β, but not τ, κ, π.

**Aspirated** (δασέα) consonants are followed by a blast of air, or the *h* sound (ῑ), the rough breathing in Greek.

### *Note on the Aspirated Consonants*

The three aspirates, φ, θ, χ, are equivalent to the three unvoiced mutes π, τ, κ plus the *h* sound. This means that they are pronounced more or less as follows: φ like *ph* in *flop-house*; θ like *th* in *pot-head*; and χ like *kh* in *block-head*; except that in Greek the two sounds would be in the same syllable. Actually in English our initial *p* is aspirated (and so probably very much like Greek φ): if you hold your hand in front of your mouth when saying *put* or *pot*, you will feel a blast of air (which is the aspiration). Then try *spot* or *stop*, and you will find that *p* in these positions is much less heavily aspirated. The same is true of English *t* and *k* sounds, as in *top*, *stop*; *cat*, *scat*. English does not make the distinction in spelling between these two variants of *p*, *t*, *k*, but Greek does. An English speaker would have difficulty in hearing the difference between π and φ, τ and θ, κ and χ in the ancient pronunciations of these letters. Knowing that φ = π' ; θ = τ' ; χ = κ' will be helpful later on.

The **Nasals**. There are three nasals in Greek:  $\mu$  (a labial nasal),  $\nu$  (a dental nasal), and nasal  $\gamma$  (a palatal nasal).

**Nasal  $\gamma$** : when  $\gamma$  occurs before another palatal (i.e.,  $\gamma$ ,  $\kappa$ ,  $\chi$ , or  $\xi$ ), it is pronounced *ng* (as in *sing*):

Example	Translation	Description
ἄγγελος	<i>messenger (angel)</i>	$\gamma\gamma$ as in <i>anger</i> .
ἀνάγκη	<i>necessity</i>	$\gamma\kappa$ as in <i>ink, ankle</i>
σύγχορος	<i>partner in the chorus</i>	$\gamma\kappa$ as in <i>sink-hole, Bankhead</i>
Σφίγξ	<i>Sphinx</i>	$\gamma\xi$ as in <i>inks, Sphinx</i>

The **Liquids** are  $\rho$  and  $\lambda$ .

The only **Spirant** in Greek is  $\sigma$ . Note that sigma at the end of a word is written  $\varsigma$ , anywhere else  $\sigma$ . Some modern editors print the open or lunate form ( $\varsigma$ ) found in papyri for sigma in all its positions.

The **Double Consonants** ( $\delta\iota\pi\lambda\acute{\alpha}$ ):  $\zeta$ ,  $\xi$ , and  $\psi$ , are each two consonant sounds represented by one letter.

Labial mutes combine with sigma to become  $\psi$ :  $\pi$ ,  $\beta$ , or  $\phi + \sigma > \psi$ .

Palatal mutes combine with sigma to become  $\xi$ :  $\kappa$ ,  $\gamma$ , or  $\chi + \sigma > \xi$ .

The symbol  $\zeta$  represents the sound combination  $\sigma\delta$ . There is, however, some dispute over the pronunciation of this letter: it may originally have indicated the sound *dz* and it is pronounced in this way by most English-speaking Greek scholars. The continual change in language often makes it difficult to find exactly how a given letter was pronounced at a given time: either combination (*sd* or *dz*) is acceptable for classroom use.

# Euclid's *Elements*

## Book I

### Definitions

1. A *point* is that which has no part.
2. A *line* is breadthless length.
3. The extremities of a line are points.
4. A *straight line* is a line which lies evenly with the points on itself.
5. A *surface* is that which has length and breadth only.
6. The extremities of a surface are lines.
7. A *plane surface* is a surface which lies evenly with the straight lines on itself.
8. A *plane angle* is the inclination to one another of two lines in a plane which meet one another and do not lie in a straight line.
9. And when the lines containing the angle are straight, the angle is called *rectilineal*.
10. When a straight line set up on a straight line makes the adjacent angles equal to one another, each of the equal angles is *right*, and the straight line standing on the other is called a *perpendicular* to that on which it stands.
11. An *obtuse angle* is an angle greater than a right angle.
12. An *acute angle* is an angle less than a right angle.
13. A *boundary* is that which is an extremity of anything.
14. A *figure* is that which is contained by any boundary or boundaries.
15. A *circle* is a plane figure contained by one line such that all the straight lines falling upon it from one point among those lying within the figure are equal to one another;
16. And the point is called the *centre* of the circle.
17. A *diameter* of the circle is any straight line drawn through the centre and terminated in both directions by the circumference of the circle, and such a straight line also bisects the circle.

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Euclid's definitions, postulates, and common notions—if Euclid is indeed their author—were not numbered, separated, or italicized until translators began to introduce that practice. The Greek text, however, as far back as the 1533 first printed edition, presented the definitions in a running narrative, more as a preface discussing how the terms would be used than as an axiomatic foundation for the propositions to come. We follow Heath's formatting here. —Ed.

18. A *semicircle* is the figure contained by the diameter and the circumference cut off by it. And the centre of the semicircle is the same as that of the circle.
19. *Rectilinear figures* are those which are contained by straight lines, *trilateral* figures being those contained by three, *quadrilateral* those contained by four, and *multilateral* those contained by more than four straight lines.
20. Of trilateral figures, an *equilateral triangle* is that which has its three sides equal, an *isosceles triangle* that which has two of its sides alone equal, and a *scalene triangle* that which has its three sides unequal.
21. Further, of trilateral figures, a *right-angled triangle* is that which has a right angle, an *obtuse-angled triangle* that which has an obtuse angle, and an *acute-angled triangle* that which has its three angles acute.
22. Of quadrilateral figures, a *square* is that which is both equilateral and right-angled; an *oblong* that which is right-angled but not equilateral; a *rhombus* that which is equilateral but not right-angled; and a *rhomboid* that which has its opposite sides and angles equal to one another but is neither equilateral nor right-angled. And let quadrilaterals other than these be called *trapezia*.
23. *Parallel* straight lines are straight lines which, being in the same plane and being produced indefinitely in both directions, do not meet one another in either direction.

## Postulates

Let the following be postulated:

1. To draw a straight line from any point to any point.
2. To produce a finite straight line continuously in a straight line.
3. To describe a circle with any centre and distance.
4. That all right angles are equal to one another.
5. That, if a straight line falling on two straight lines make the interior angles on the same side less than two right angles, the two straight lines, if produced indefinitely, meet on that side on which are the angles less than the two right angles.

## Common Notions

1. Things which are equal to the same thing are also equal to one another.
2. If equals be added to equals, the wholes are equal.
3. If equals be subtracted from equals, the remainders are equal.
4. Things which coincide with one another are equal to one another.
5. The whole is greater than the part.

# “In the Laboratory With Agassiz”

by Samuel H. Scudder

It was more than fifteen years ago that I entered the laboratory of Professor Agassiz, and told him I had enrolled my name in the Scientific School as a student of natural history. He asked me a few questions about my object in coming, my antecedents generally, the mode in which I afterwards proposed to use the knowledge I might acquire, and, finally, whether I wished to study any special branch. To the latter I replied that, while I wished to be well grounded in all departments of zoology, I purposed to devote myself specially to insects.

“When do you wish to begin?” he

asked. “Now,” I replied.

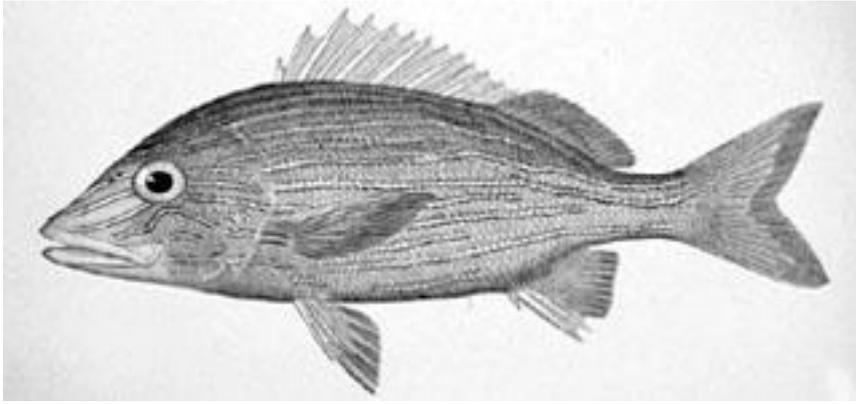
This seemed to please him, and with an energetic “Very well!” he reached from a shelf a huge jar of specimens in yellow alcohol. “Take this fish,” he said, “and look at it; we call it a *haemulon*; by and by I will ask what you have seen.”

With that he left me, but in a moment returned with explicit instructions as to the care of the object entrusted to me.

“No man is fit to be a naturalist,” said he, “who does not know how to take care of specimens.”

I was to keep the fish before me in a tin tray, and occasionally moisten the surface with alcohol from the jar, always taking care to replace the stopper tightly. Those were not the days of ground-glass stoppers and elegantly shaped exhibition jars; all the old students will recall the huge neckless glass bottles with their leaky, wax-besmeared corks, half eaten by insects, and begrimed with cellar dust. Entomology was a cleaner science than ichthyology, but the example of the Professor, who had unhesitatingly plunged to the bottom of the jar to produce the fish, was infectious; and though this alcohol had a “very ancient and fishlike smell,” I really dared not show any aversion within these sacred precincts, and treated the alcohol as though it were pure water. Still I was conscious of a passing feeling of disappointment, for gazing at a fish did not commend itself to an ardent entomologist. My friends at home, too, were annoyed when they discovered that no amount of *eau-de-Cologne* would drown the perfume which haunted me like a shadow.

In ten minutes I had seen all that could be seen in that fish, and started in search of the Professor — who had, however, left the Museum; and when I returned, after lingering over some of the odd animals stored in the upper apartment, my specimen was dry all over. I dashed the fluid over the fish as if to resuscitate the beast from a fainting fit, and looked with anxiety for a return of the normal sloppy appearance. This little excitement over, nothing was to be done but to return to a steadfast gaze at my mute companion. Half an hour passes — an hour — another hour; the fish began to look loathsome. I turned it over and around; looked it in the face — ghastly; from behind, beneath, above, sideways, at a three-quarters' view — just as ghastly. I was in despair; at an early hour I concluded that lunch was necessary; so, with infinite relief, the fish was carefully replaced in the jar, and for an hour I was free.



*Hæmulon elegans*, NOAA, Drawing by  
H. L. Todd

On my return, I learned that Professor Agassiz had been at the Museum, but had gone, and would not return for several hours. My fellow-students were too busy to be disturbed by continued conversation. Slowly I drew forth that hideous fish, and with a feeling of desperation again looked at it. I might not use a magnifying-glass; instruments of all kinds were interdicted. My two hands, my two eyes, and the fish: it seemed a most limited field. I pushed my finger down its throat to feel how sharp the teeth were. I began to count the scales in the different rows, until I was convinced that that was nonsense. At last a happy thought struck me – I would draw the fish; and now with surprise I began to discover new features in the creature. Just then the Professor returned.

“That is right,” said he; “a pencil is one of the best of eyes. I am glad to notice, too, that you keep your specimen wet, and your bottle corked.”

With these encouraging words, he added, “Well, what is it like?”

He listened attentively to my brief rehearsal of the structure of parts whose names were still unknowns to me: the fringed gill-arches and movable *operculum*; the pores of the head, fleshy lips and lidless eyes; the lateral line, the spinous fins and forked tail; the compressed and arched body. When I finished, he waited as if expecting more, and then, with an air of disappointment, “You have not looked very carefully; why,” he continued more earnestly, “you haven't even seen one of the most conspicuous features of the animal, which is a plainly before your eyes as the fish itself; look again, look again!” and he left me to my misery.

I was piqued; I was mortified. Still more of that wretched fish! But now I set myself to my tasks with a will, and discovered on new thing after another, until I saw how just the Professor's criticism had been. The afternoon passed quickly; and when, towards its close, the Professor inquired, “Do you see it yet?”

“No,” I replied, “I am certain I do not, but I see how little I was before.”

“That is next best,” said he, earnestly, “but I won't hear you now; put away your fish and go home; perhaps you will be ready with a better answer in the morning. I will examine you before you look at the fish.”

This was disconcerting. Not only must I think of my fish all night, studying, without the object before me, what this unknown but most visible feature might be; but also, without

reviewing my discoveries, I must give an exact account of them the next day. I had a bad memory; so I walked home by Charles River in a distracted state, with my two perplexities.

The cordial greeting from the Professor the next morning was reassuring; here was a man who seemed to be quite as anxious as I that I should see for myself what he saw.

“Do you perhaps mean,” I asked, “that the fish has symmetrical sides with paired organs?”

His thoroughly pleased “Of course! of course!” repaid the wakeful hours of the previous night. After he had discoursed most happily and enthusiastically — as he always did — upon the importance of this point, I ventured to ask what I should do next.

“Oh, look at your fish!” he said, and left me again to my own devices. In a little more than an hour he returned, and heard my new catalogue.

“That is good, that is good!” he repeated; “but that is not all; go on”; and so for three long days he placed that fish before my eyes, forbidding me to look at anything else, or to use any artificial aid. “Look, look, look,” was his repeated injunction.

This was the best entomological lesson I ever had — a lesson whose influence has extended to the details of every subsequent study; a legacy the Professor had left to me, as he has left it to many others, of inestimable value, which we could not buy, with which we cannot part.

A year afterward, some of us were amusing ourselves with chalking outlandish beasts on the Museum blackboard. We drew prancing starfishes; frogs in mortal combat; hydra-headed worms; stately crawfishes, standing on their tails, bearing aloft umbrellas; and grotesque fishes with gaping mouths and staring eyes. The Professor came in shortly after, and was as amused as any at our experiments. he looked at the fishes.

“*Haemulons*, every one of them,” he said; “Mr----- drew them.”

True; and to this day, if I attempt a fish, I can draw nothing but *haemulons*.



*Louis Agassiz, NOAA*

The fourth day, a second fish of the same group was placed beside the first, and I was bidden to point out the resemblances and differences between the two; another and another followed, until the entire family lay before me, and a whole legion of jars covered the table and surrounding shelves; the odor had become a pleasant perfume; and even now, the sight of an old, six-inch, worm-eaten cork brings fragrant memories.

The whole group of *haemulons* was thus brought in review; and, whether engaged upon the dissection of the internal organs, the preparation and examination of the bony framework, or the description of the various parts, Agassiz's training in the method of observing facts and their orderly arrangement was ever accompanied by the urgent exhortation not to be content with them.

"Facts are stupid things," he would say, "until brought into connection with some general law."

At the end of eight months, it was almost with reluctance that I left these friends and turned to insects; but what I had gained by this outside experience has been of greater value than years of later investigation in my favorite groups

Samuel H. Scudder, "In the Laboratory With Agassiz", *Every Saturday*, (April 4, 1974) 16, 369-370.