Introduction to Latin and Greek in Scientific Terminology

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# Introduction

## The idea of a scientific language

* Each part of the scientific community creates a language of its own, which makes it possible to hold productive discussions about the objects of their study.
* Much as we might try to avoid the use of ‘jargon’, technical language is frequently indispensable.

## What is science, anyway?

* Latin *scientia,* root **sci**-, from *scire,* 'to know' (*sciens,* 'knowing') + suffix -ia, ending for abstract nouns

## Why Greek and Latin?

* English, Latin and Greek have a common Indo-European ancestor.
* Many English words are based on Latin, either directly or through French.
* During the centuries since the scientific revolution, many scientists across Europe had some education in Greek and Latin.

## Learning Goals

* Acquire a working vocabulary of the fundamental Greek and Latin roots, prefixes, and suffixes key to understanding scientific terms.
* Develop competency in using unfamiliar words to communicate and comprehend scientific results in oral and written contexts.
* Gain the skills necessary to identify the Greek and Latin elements of scientific terminology and give their meaning.
* Understand the historical processes leading to the development of current scientific terminology.

## Assignments

* Test I (24 July): 20%
* Test II (7 August): 20%
* Pre-Lecture Analyses of Article Vocabulary: 10%
* In-Depth Analysis of Article Vocabulary (due 14 August): 15%
* Final Exam: 35%

## Vocabulary Analyses

* For each class, you are given a choice of two scientific articles (we will examine both in class). Pick one, and provide a list of ten words that you think have Greek and Latin words. The mark is pass/fail (based on whether you completed it with some level of intelligence).

## An example

* Hofmann, Rebecca, and P. Martin Sander. 2014. ‘The First Juvenile Specimens of *Plateosaurus Engelhardti* from Frick, Switzerland: Isolated Neural Arches and Their Implications for Developmental Plasticity in a Basal Sauropodomorph’. *PeerJ* 2 (July): e458. doi:[10.7717/peerj.458](http://dx.doi.org/10.7717/peerj.458).
* dinosaur
  + modern Latin, *dinosaurus*, from Greek δεινός/*deinos* (fearful, terrible) + σαῦρος/*sauros* lizard (*OED* s.v. 'dinosaur')
* morphometric
* plasticity
* …

## Citing a dictionary

* Provide an abbreviated form of the title, followed by s.v. (*sub verbo*, 'under the word'), and finally the headword (i.e. the word you looked up to find the entry).
* Examples: *OED* s.v. 'lecture'; *Taber's* s.v. 'nucleopetal'

## Readings

* No assigned textbook.
* All class readings are online.
* In addition, we will be looking each class at two scientific articles, which we will work to understand through using reference tools.

## Recommended Books (at the bookstore)

* *Taber’s Cyclopedic Medical Dictionary* (any edition)
* *Oxford Dictionary of English*
* Both of these books are available in online forms, but they're worth buying, since the ability to see adjacent entries at once is extremely useful, and some students find a printed book less distracting.

## General Class Structure

In three hours:

1. Introduction of new grammatical concepts
2. Split into groups to look up terminology for a scientific article.
3. Look at new vocabulary for the week.
4. Break.
5. Historical interlude.
6. Look at vocabulary from another article.

## What do I need to do to be successful?

* The main focus: memorize and understand vocabulary (you will be tested strictly on the lists provided).
* Participate in classes in order to learn how to use reference tools (key to assignments).
* Read assigned articles on the history of scientific terminology: information from these will appear on the tests and exam.

## Vocabulary Lists

* Typed lists will be provided corresponding to each class, and these should provide a convenient way of breaking up the work.
* Generally speaking, we will be concentrating on word roots (i.e. components of Greek and Latin words) rather than the full words.
* These should be fairly easy to import into your favourite software, print, etc.

## Memorize!

* Use whatever strategies work for you: write out flashcards (by hand), use computer-based software (Memrise, iVocabulary, etc.).
* We will be concentrating on *word roots:* the building blocks of words.
* This is essentially giving you a more efficient method for remembering what words mean: approaching the problem scientifically.

## What do I do with the readings?

* Scientific articles: you do *not* need to read these in full. We're only looking at these for deciphering their terminology.
* Course readings: emphasis on critical reading. Do not get bogged down with these.

## Academic reading is not like reading a novel.

## Critical Reading

* To make judgements about how a text is argued
* Requires standing back from text, reflecting on it from a distance
* Read twice: once to get basic understanding, again to get detailed knowledge
  + Look for '**ways of thinking**' rather than 'information'
  + Always ask '**how**', not 'what'

## Keys to Success

* **Do** ask, 'How does this text work? How is it argued? How is the evidence (the facts, examples, etc.) used and interpreted? How does the text reach its conclusions? How appropriate is the methodology?'
* **Do not**
  + extract or make lists of evidence, lists of facts, examples (when taking notes or highlighting)
  + ask, 'What information can I get out of this text?'

## SPAR

1. Survey (begin by skimming)
2. Process (understand the argument)
3. Ask (look for patterns)
4. Review (make brief notes)

# Guide to Reference Tools

## Oxford English Dictionary

* The most accessible and accurate resource for detailed information on the meaning and origins of words, and is updated continuously in its online form, which can be [accessed through the library](http://www.oed.com.myaccess.library.utoronto.ca/).
* Nonetheless, some of its entries have not been recently updated (some have escaped revision for over a hundred years), and it sometimes provides more specialized information than you need for a basic understanding of a word.

## Oxford Dictionary of English

* For simplified definitions and etymologies, and for checking current spelling, you may instead wish to use the *Oxford Dictionary of English,* which is available on [Oxford Dictionaries](http://www.oxforddictionaries.com) (with recordings of word pronunciation).
* There are also a number of other reliable dictionaries that include etymologies, but this is the most accurate one with easy access (and Canadian/British spelling).

## Oxford Latin Dictionary

* The most up-to-date and accurate Latin-English dictionary, but is not yet available online, and does not include authors beyond the second century. There is a second edition (2012), but its contents are mostly unchanged from the first edition (published between 1968 and 1982).
* It is usefully supplemented by the *Dictionary of Medieval Latin from British Sources,* which provides a much larger range of scientific vocabulary, and is expected to be made available online in the coming months.

## Lewis and Short

* This is a very old book (last updated in 1879; based on an even older dictionary from the seventeenth century)
* For many purposes, however, Lewis and Short’s *Latin Dictionary* is still the quickest reference tool, for two reasons:
  + It has much broader coverage of Latin (sparodically up to the Renaissance).
  + It is available online in various places; I suggest using [Logeion](http://logeion.uchicago.edu/).

## Liddell and Scott’s *Greek-English Lexicon*

* The most complete Greek-English lexicon.
* The version online is from 1940; a supplement to it was produced in 1996, but it doesn't make much of a difference for our purposes.
* Also on [Logeion](http://logeion.uchicago.edu/).

## Taber's

* An excellent medical dictionary that includes etymologies for many entries.

## Other technical dictionaries

* Haubrich, William S. 2003. *Medical Meanings: A Glossary of Word Origins.* 2nd ed. Philadelphia: American College of Physicians.
* Konstantinidis, Giannis, ed. 2005. *Elsevier’s Dictionary of Medicine and Biology: In English, Greek, German, Italian, and Latin.* 2 vols. Amsterdam: Elsevier.
* … and many more (see separate bibliography)

## How do I find an etymology?

1. If it's a common word, start with the *Oxford Dictionary of English*, which will give you the simplest derivation.
2. If it's not there, move on to the *Oxford English Dictinary*.
3. Look in a technical dictionary such as *Taber's* or Haubrich (or skip to 3). Sometimes this will not provide enough information.
4. Look in a Latin or Greek dictionary.

# The Greek Alphabet (first run)

## Α α

alpha

## Β β

beta

## Γ γ

gamma

## Δ δ

delta

## Ε ε

epsilon

## Ζ ζ

zeta

## Η η

eta

## Θ θ

theta

## Ι ι

iota

## Κ κ

kappa

## Λ λ

lambda

## Μ μ

mu

## Ν ν

nu

## Ξ ξ

xi

## Ο ο

omicron

## Π π

pi

## Ρ ρ

rho

## Σ σ/ς

sigma/final sigma

## Τ τ

tau

## Υ υ

upsilon

## Φ φ

phi

## Χ χ

chi

## Ψ ψ

psi

## Ω ω

omega

# Greek Bases, Prefixes, and Suffixes

## Bases, Prefixes, and Suffixes

* Bases are the main part of a word, and carry most of the word’s force. They are originally nouns or verbs, but they have lost their characteristic endings.
* Ex. **Erg**-, from Greek ergon, ‘work’, which gives us en-**erg**-y
* Prefixes, for the most part, are Greek and Latin prepositions that have become attached to the front of a word, and further specify its meaning.
* Example: Syn-, from Greek σύν/*syn*, ‘with’, gives us syn-**the**-sis, lit. ‘a putting together’
* Suffixes come at the end of a word, and like prefixes, they also modify the meaning of a stem. They also determine the part of speech (noun, verb, adjective etc.) of the word that is formed. We will return to these next class.

# New Vocabulary: Greek Prefixes

## a- (an- before vowels or h), ‘not’, ‘without’

* atheist, anaesthetic (*inducing a lack of sensation*)

## amphi-, ampho-, ‘both’, ‘on both sides of’, ‘around’

* amphibious, amphitheatre

## ana-, ‘up’, ‘back’, ‘again’

* analysis, anatomy, anachronism

## anti-, ‘against’, ‘opposite’

* antidote, antagonist, antarctic

## apo-, ‘from’, ‘off’, ‘away’

* apology, apostle, apheliotropism (*the habit in plants of bending away from the light*)

## cata-, ‘down’, ‘against’, ‘according to’

* catalyst, catastrophe, category, catholic (*universal*, i.e. ‘in respect of the whole’)

## dia- (di- before vowels or h), ‘through’, ‘across’, ‘between’

* diameter, diagnosis, diocese

## dys-, ‘bad’, ‘disordered’, ‘difficult’

* dysentery, dystrophy

## es-, eis- ‘inward’, ‘into’

* esoteric, esodic (or eisodic)

## ec- (ex- before vowels or h), ‘out’, ‘out of’, ‘outside’

* exodus, exodontist

## en- (em-, el-), ‘in’, ‘into’, ‘inward’

* energy, embryo, emphatic

## en- + anti-, ‘opposite’

* enantiopathy (the treatment of disease by contraries), enantiobiosis (the condition in which associated organisms are antagonistic to each other)

## endo-, ento- (end-, ent- before vowels or h), ‘within’, ‘inner’

* endocrine, entophyte, endarteritis, entoptic

## epi- (ep- before vowels or h), ‘upon’, ‘on’, ‘to’, ‘in addition to’

* epidemic, epidermis, epitaph

## eu-, ‘well’, ‘good’, ‘normal’

* eugenics, eulogy

## exo-, ecto-, ‘outside’, ‘external’

* exoskeleton, ectoparasite

## hyper-, ‘over’, ‘excessive’, ‘more than normal’

* hypercritical, hypertension

## hypo- (hyp- before vowels or h), ‘under’, ‘below normal’, ‘slightly’

* hypodermic, hypothesis, hyphen, hypesthesia

## meta-, ‘after’, ‘change’, ‘transfer’

* metamorphosis, metencephalon

## para- (par- before vowels or h), ‘beside’, ‘resembling’, ‘disordered’

* parasite, paratyphoid, parenthesis, paramedical

## peri-, ‘around’, ‘near’

* periscope, perimeter

## pro-, ‘before’, ‘in front of’, ‘forward’

* program, prologue, prostate

## pros-, ‘toward’, ‘in addition to’, ‘fronting’

* proselyte, prosthetic, prosencephalon

## syn- (sym-, syl-, sy-, sys-), ‘with’, ‘together’

* synthetic, symphony, systole, synonym

# Practice

## [‘The First Juvenile Specimens of *Plateosaurus Engelhardti*'](http://dx.doi.org/10.7717/peerj.458).

* cervical
* dorsal
* histological
* juvenile
* morphology
* morphometric
* ontogenetic
* plasticity
* postmortem
* sauropodomorph
* Triassic

# More Vocabulary: Stems

## **alg-**, 'pain'

* -algesia, 'sense of pain'
* nostalgia; analgesic (a drug acting to relieve pain)

## **arthr-**, 'joint', 'speech sound', 'articulation'

* arthritis; dysarthria (difficult or unclear articulation of speech that is otherwise linguistically normal)

## **bi-**, 'life'

* biography; biology; amphibious

## **ball-, bol-, -ble**, to throw, 'to put'

* ballistics; symbol; hyperbole; embolism

## **brady-**, slow

* bradycardia (abnormally slow heart action); bradykinin (a compound released in the blood in some circumstances which causes contraction of smooth muscle and dilation of blood vessels)

## **crypt-**, hidden

* crypt, cryptography, cryptaesthesia (extrasensory perception, esp. telepathy); cryptogam (flowerless plant)

## **drom-**, 'running', 'course'

* syndrome; hippodrome (a stadium for chariot or horse races);

## **ge-**, earth

* geology; geomancy; geophilous

## **hod-, od-**, road, 'way'

## **mne-**, to remember

## **morph-**, form

## **odont-**, tooth

## **phor-, pher-**, to bear, 'to go'

## **plex-**, stroke

## **pleg-**, paralysis

## **pod-, -pus**, foot

## **proct-**, anus, rectum

## **stol-, stal-, -stle**, to send, 'to contract'

## **stom-, stomat-**, mouth, 'opening'

## **trop-, trep-**, to turn, 'response to stimulus'

## **ur-**, urine, 'urinary system,' 'tail'

## **ure-**, to urinate

## **bul- (boul-)**, will

## **cardi-**, heart

## **cephal-**, head

## en**cephal-**, brain

## **chondr-, chondri-**, cartilage, 'granule'

## **dem-**, people, 'country'

## **derm-, dermat-**, skin

## **gam-**, marriage, 'union'

## **lecith-**, yolk

## **ophthalm-**, eye

## **ost(e)-**, bone

## **phyll-**, leaf

## **phyt-**, plant, 'growth'

## **plas(t)-**, to form, 'to mould'

## **som-, somat-**, body

## **thec(a)-**, case, 'sheath'

## **therm-**, heat

## **tom-**, to cut, 'section'

## en**tom-**, insect

## **top-**, place

## **troph-**, nourishment, 'development'

## **zo-**, animal, 'living being'

## **acou- (acu-)**, to hear

## **ambly-**, dull

## **anth-**, flower

## **chrom-, chromat-, chro-**, color

## **dactyl-**, finger, 'toe'

## **de-**, to bind

## **desm-**, ligament

## **enter-**, intestine

## **erg-**, work

## **esthe- (aesthe-)**, to feel, 'to perceive'

## **ger-, geront-**, old person, 'old age'

## **gnath-**, jaw

## **gno-**, to know

## **graph-**, to write

## **gram-**, thing written

## **hepat-, hepar-**, liver

## **kine- (cine-)**, to move

## **lex-**, to read

## **my-, mys-, myos-**, muscle

## **nephr-**, kidney

## **osm-**, smell

## **the-**, to put, 'to place'

# How much anatomical vocabulary is from Greek and Latin?

## About 89 per cent

* According to Turmezei (2012); 86% without post-classical Latin.