


**Lecture 17**  
**Greek Science, Technology, and Agriculture**



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**The Aegean World and the Rise of Hellenism**

**3200–2000 BCE** Bronze Age,  
Evidence of civilization in mainland  
Greece and neighboring islands

**2000–1600 BCE** First Greek-speaking Indo-Europeans  
Urban civilization in Crete  
Royal tombs at Mycenae, northeast  
Peloponnese

**1400–1300 BCE** Mycenaean kingdoms developed an  
agriculture including irrigation and  
the draining of Lake Coapis

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**1200–800 BCE** Greek Middle Ages  
Mycenaean culture gave way to  
Greek City States.

Period known to us from the stories  
of the *Iliad* and the *Odyssey*, epic  
poems attributed to Homer that tell  
the story of the Trojan Wars (lost  
city of Troy in present day Turkey).  
Part of Greek oral tradition.

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**750–450 BCE** **Period of Hellenism.**

Great period of Greek colonization probably instigated by the shortage of arable land on the Greek mainland.

Colonization extend as far west as Spain (Iberia) and as far east as Northern Boundary of the Black Sea.

As a result most of the famous Greek temples occur outside of Greece  
*Agrigento* in Sicily, *Paestum* (Italy)  
*Ephesus* and *Pergamont* (Turkey).

The Greek Miracle: innovation in the field of thought and technology.

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**5<sup>th</sup> Century BCE** **Golden Age of Greece**

Familiar to us through architecture (Parthenon) and magnificent art, chiefly statuary, mosaics, poetry, and the musings and thought's of the great Greek philosophers and playwrights.

Art typified by a divine realism including depictions of Gods and animals, horses, plants and agricultural practices.

Also a period of battles, plagues, famines, intolerance, civil war, and confrontation.

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**The Poseidon of Artemision**

Poseidon brandishing the trident with his raised right hand, possibly an original work of Kalamis, raised from the sea. Dated ca. 460 BCE.



Source: Harper Atlas of World History, 1992.

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**Discus thrower**



**Venus de Milo**

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**Greek Plow**



**Harvesting Olives**

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**Hellenism: Flourishing of the Arts and Sciences**

Greeks emphasized ideas rather than technology *per se*.  
Spread throughout the Mediterranean Basin via the  
Conquests of Alexander the Great.  
Powerful influence on Rome.  
Modern Western Culture is now a fusion of Greek  
culture, Babylonian and Egyptian science and  
technology, and Semitic religion.

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**Development of the Museum**

Original Temple of the Muses;  
(daughters of Zeus & Menemosyne or memory)  
Eventually Palace of culture  
The concept of organized centers of learning  
The University derives from this period

Muses

Cleio—history	Euterpte—lyric poetry
Thalei—comedy	Melpomene—tragedy
Tersichore—dance & music	Erato—erotic poetry
Polymnia—hymns	Urania—astronomy
Calliope—poetry	

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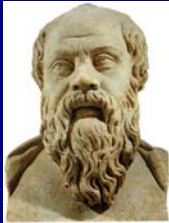
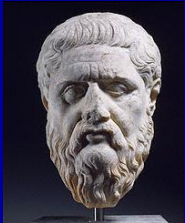
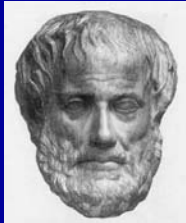
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**Greek Philosophers**

<b>Socrates</b> 470?–399 BCE	<b>Plato</b> 427?–347 BCE	<b>Aristotle</b> 384–322 BCE
		

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**Academy**

School of the philosopher Plato (427–327 BCE) located in a grove of trees

Groves of Academe: synonym for present day colleges and universities

Academics: College Professors  
The Academy: The University  
Academic Studies: University Curricular

Aristotle (384–322 BCE) student of Plato called his school the Lyceum, still the French word for school

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**Plato Teaching Geometry**

Roman mosaic, 1<sup>st</sup> century BCE

Source: Harper Atlas of World History, 1992.



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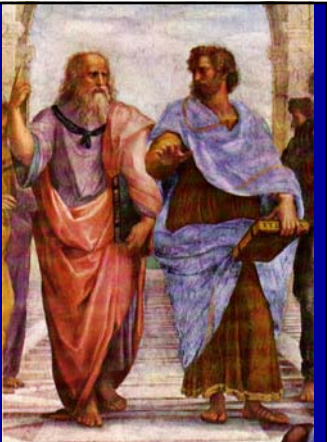
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**Plato and Aristotle**

Raphael 1509–1511



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**Beginnings of Science**

Origins of science date to the 6<sup>th</sup> century BCE via Greece, Palestine, Babylonia, India, and China.

A number of philosophers stand out.

Note that the word for *science*, derived from the Latin word *scientia*, to know, came much later.

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**Democritus of Abdera (ca 470?–362? BCE)**

Founder of the Atomic Theory

Also had theories on the nature of plants

Thought plant diversity was due to difference in the atoms of which they were composed



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**Hippocrates (460?–359? BCE)**

Disciple of Democritus, Father of Medicine.

First to expound the theory that disease had natural causes, not supernatural.

Considered that disease was caused by a balance of 4 fluids called humors (from which we get the term humor...good and bad): blood, phlegm, yellow bile, and black bile, based on color of ill people.

Concept persists in the following terms to describe distinctive temperaments:

- Sanguine—warm and ardent
- Phlegmatic—sluggish, apathetic
- Bilious—ill humor (choleric)

Understood the relation of diet to health.

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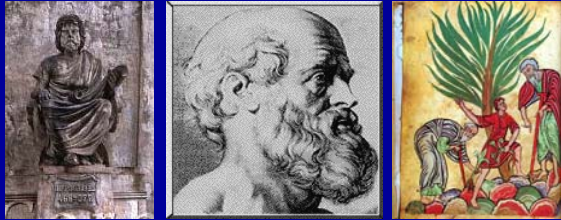
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History of Horticulture: Lecture 17

Herbs used in ancient Greece as medicine.  
Hippocratic school mentions 240 medicinal herbs.

Rhizotomoi: Greek rootdiggers  
Pharmacopulois : drug merchants, pharmacy is derived  
from the Greek word for remedy or drug.



Hippocrates

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**Aristotle (384–323 BCE) of Macedonia**

Writings are climax of the Golden Age of Greece  
Student of Plato (427–327 BCE)  
Teacher of Alexander the Great

Plato was interested in the search for ideas

Aristotle was involved in a search for facts and  
explanations

Important writings in physics (unfortunately many  
incorrect) persisted for almost 2000 years

e.g. the concept that speed of objects dropped is  
proportional to mass (finally disproved by Galileo)

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**Aristotle (384–323 BCE) of Macedonia**

The descriptive writings in biology were excellent  
*On Psyche, Histories of Animals, Generation of Animals, Parts of  
Animals.*

Writings on plants lost but Aristotle cited 5 of his own works.

Aristotle developed the concept of life force (*vitalism*, the idea  
that life is due to a force beyond the ordinary workings of  
chemistry and physics. Modern biology has been chipping away  
on this concept.

Concept persists and may only be discarded if life is actually  
created. Is science getting close?

The religious concept that humans are essentially different from  
other animals is an extension of vitalism. Modern Science views  
life as explainable by laws of chemistry and physics (anathema  
to religious believers who insists on a divine spark or soul).

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**Theophrastus of Eresus (371–287 BCE)**

Father of Botany

Legatee of Aristotle’s Lyceum, bequeathed the library

Writer of 227 treatises (on religion, politics, ethics, education, rhetoric, mathematics, astronomy, logic, meteorology, natural history)

Had over 2000 disciples (students) averaging 60 per year.

Two botanical works survived:  
*History of Plants* and *Causes of Plants* (may be lecture notes). These are the earliest books of this kind in world literature but surely not the first. Deal with 500–550 species.

Other works that survive include *On Stones* and *Character Sketches* (still good reading).

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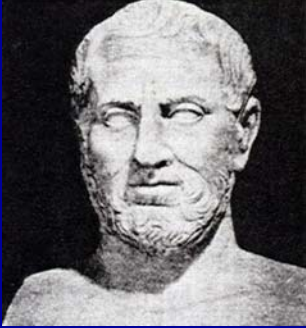
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**Theophrastus of Eresus (371–287 BCE)**



Portrait Roman Bust



Gerard’s Herbal  
2<sup>nd</sup> ed. 1616

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**Theophrastus of Eresus (371–287 BCE)**

*History of Plants (Historia de plantis, latin name)*

Largely descriptive

Distinguishes parts of plants.

Nine books:

1. Parts of plants and their nature classification
2. Propagation (especially trees)
3. Wild trees
4. Geographic botany, trees related to districts
5. Timber of various trees
6. Undershubs
7. Herbaceous plants
8. Cereals, pulses, summer crops
9. Juices of plants

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**Theophrastus of Eresus (371–287 BCE)**

*Causes of Plants, (De causis plantarum)*  
More philosophic but still full of facts.  
Six books:

1. Generation and propagation of plants
2. Things which help the increase of plants
3. Plantation of shrubs and preparation of the soil, viticulture
4. Goodness of seeds and their degeneration
5. Diseases
6. Savors and odors

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**Theophrastus of Eresus (371–287 BCE)**

Although much practical information, Theophrastus interested in plants for their own sake.

Given differences between plants or organs, how do we account for them?

What are the intentions of nature?

Classification endured for 2000 years.

Studied form and function, germination, distinguished monocots and dicots, leaf descriptions, codified names of 500 plants, considered ecological groupings, propagation.

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**Spontaneous Generation**

*Cases of spontaneous generation occur after spells of rain.*

*Rainy spells bring about cases of decomposition and alterations, the water penetrating far and wide, but feed what is formed and make it grow larger, while the sun warms and dries.*

*This being how most authorities account for the generation of animals as well.*

Note that Theophrastus appears skeptical

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**False Spontaneous Generations**

*And if the air (and rivers too) provides seeds which it carries down with the rain, the rain spells will be all the more prolific.*

*These forms of generation would not appear to be spontaneous, but a kind of propagation by sowing seeds or setting pieces in the ground.*

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**False Spontaneous Generation:  
From Unnoticed Seed**

*One might fancy that the generation of the fruitless trees is rather a spontaneous one, since these trees are neither set in the ground nor produced from seed, and it is a necessary consequence that they are produced spontaneously if they are not produced in either of these ways... The truth being that we fail to observe all the cases of growth from seed.*

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**Propagation: Grafting**

**Definition and descriptions**  
**Time of grafting (Autumn and Spring)**  
**Techniques and mechanics**  
**Effect of rain**  
**Scion vs. stock**

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**Alexander the Great**

Alexander, King of Macedon, son of Philip of Macedon student of Aristotle, extended Greek influence from the Greek isles to India and to Egypt.  
At death in 323 BCE kingdom was divided among his generals.  
Ptolemies were Greco-Egyptian rulers of Egypt from 323-30 BCE, Cleopatra, the last.  
Center of learning, shifted to Alexandria, Egyptian city on the delta of Egypt, one of the many named after him.  
Results in a fusion of Egyptian, Mideastern and Greek culture later to be important in the development of Christianity.  
The Greek school in Alexandria with its famous library was destroyed in 415, perhaps by fanatical Christians, a tremendous loss for all humankind.

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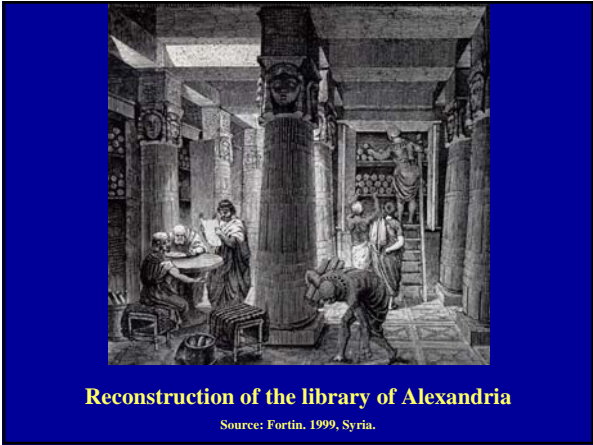
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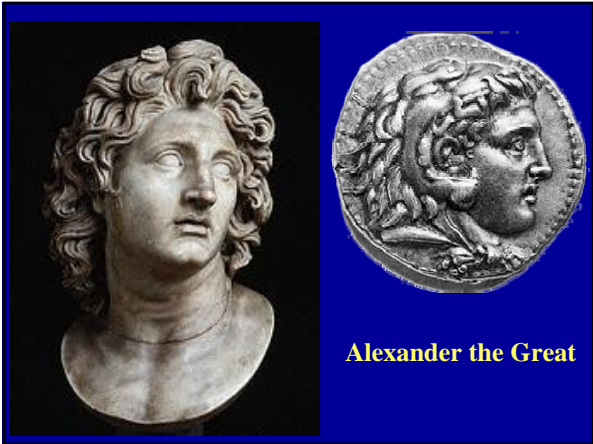
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**Images from the Greek World**



**Floral mosaic, Antioch**



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**Images of horticulture and war, Ephesus**



**Funerary horticultural wreath, Aphrodisias**



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**Flowers, Bergama, Asklepeion**



**Ionic column of acanthus leaves, Bergana, Asklepeion**



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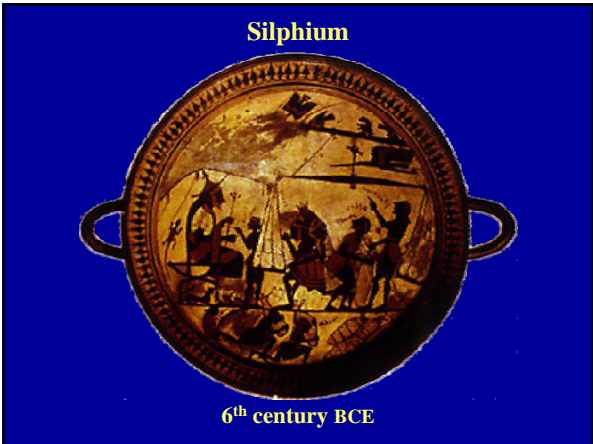
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