

Syllabus for PHI501, 'Aristotle and Geometry'  
Spring 2017

Principal texts to be studied

- Aristotle, *Posterior Analytics* I 1-10
- Euclid, *Elements* book I

Texts in Greek

- W. D. Ross (ed.), *Aristotelis: Analytica Priora et Posteriora* (Oxford Classical Texts; Oxford: OUP, 1964)
- L. Heiberg, E. S. Stamatis (eds.), *Euclides I: Elementa I-IV* (Bibliotheca Teubneriana; Leipzig: Teubner, 1969)

Translations and commentaries

- J. Barnes, *Aristotle: Posterior Analytics*, translated with a commentary, 2<sup>nd</sup> edition (Clarendon Aristotle Series; Oxford: OUP, 1994)
- T. L. Heath, *Euclid: The Thirteen Books of the Elements*, vol. I: books I and II, (New York: Dover, 1956)

In this seminar, I aim to examine Aristotle's theory of science as described in the first ten chapters of book I of the *Posterior Analytics*, using Euclid's *Elements* to illustrate Aristotle's scientific theory, and to examine to what extent the *Elements* lives up to the strictures Aristotle imposes on what a science is.

In particular, I will focus on the following questions:

- What is the meaning of Aristotle's definition of *episteme* in *Post An* I 2?
- What is the correct definition of *nous* in the *Post An*?
- What is the role of demonstration in the *Post An*?
- What are the different types of first principle in *Post An*?
- To what extent do the first principles in Euclid's *Elements* exemplify Aristotle's categorization of first principles?

- To what extent do Euclid's proofs of the results of geometry meet Aristotle's description of demonstration?

## Syllabus

### (1) Background

- Epistemology in Plato's *Meno*
  - To know what something is like, you have to know what it is;
  - To know something, you have to know why it is true.
- Aristotelian Syllogistic in *Prior Analytics*

### (2) The definition of *episteme* (understanding) in *Post An I 2*

- To know something is to know why it is true;
- To know something involves knowing it is necessary.
  - Why does a science contain terms for neither explanation nor necessity?
  - What is the role of *Post An I 1*?

### (3) Demonstration in *Post An I 2*

- *One way of having episteme is knowledge through demonstration (Post An I 2, 71b16-17). What are the six conditions for a syllogism to be a demonstration?*

### (4) *Post An I 3*

- Aristotle's arguments against circular demonstrations and infinitely long demonstrations.
- *Episteme* must come in two forms, demonstrative and non-demonstrative (also called *nous*).
  - Aristotle expresses this insight in another way, that there is episteme and the *source* or *principle* of episteme. What is the difference between this way of putting it, and the way of putting it where we have two forms of episteme (demonstrative and non-demonstrative)?

(5) The types of proposition which feature in science according to *Post An I 4*

- What does Aristotle mean by ‘of every case’;
- What does Aristotle mean by ‘in itself’;
- What does Aristotle mean by ‘universally’;
- The importance of the fourth type of ‘in itself’ proposition, and its interpretation;
  - Notice that ‘in itself’ drops out of the formulations of the science.

(6) What is *nous* in the *Posterior Analytics*? See especially I 3; I 33; II 19.

- How can it be defined?
- Advantages and disadvantages of David Bronstein’s definition of *nous* (see bibliography)?

(7) Necessity and the principles of science

- *Posterior Analytics* I 6: necessity in science;
- *Posterior Analytics* I 10: different types of principle.

(8) Euclid’s *Elements*

- Introduction to Euclid and the text of the *Elements*;
- Laying out the science with principles and theorems.
- Distinction between problems and theorems.

(9) Applying Aristotle to Euclid

- Can we match up the different types of first principles in Aristotle with those in Euclid?

(10) What is the nature of the problem-propositions, and is there a difficulty in capturing them in Aristotle’s system?

## Further Bibliography:

- Beere, Jonathan, and Morison, Benjamin, 'A mathematical form of knowing how in Greek geometry: the nature of the problem-propositions', manuscript
- Bronstein, David, *Aristotle on Knowledge and Understanding* (OUP, 2016)
- Burnyeat, Myles, 'Aristotle on Understanding Knowledge', in his *Explorations in Ancient and Modern Philosophy*, vol. 2 (CUP, 2012)
- Burnyeat, Myles, 'Episteme', in B. Morison and K. Ierodiakonou (eds.), *Episteme, etc.: Essays in Honour of Jonathan Barnes* (Oxford: OUP, 2011)
- Lorenz, Hendrik, 'Understanding, Knowledge, and Enquiry in Aristotle', in F. Sheffield and J. Warren (eds.), *Routledge Companion to Ancient Philosophy* (London: Routledge, 2013)
- Schwab, Whitney, 'Explanation in the Epistemology of the *Meno*', *Oxford Studies in Ancient Philosophy* XLVIII (summer 2015), 1-36