

6th London Ancient Science Conference – Paper Abstracts.

Prof. Peter Adamson (KCL), Galen on Void.

Galen describes the question of whether void exists outside the cosmos as a prime example of how philosophers waste their time. Yet he discussed the topic of void in numerous contexts. This paper attempts to piece together his remarks on void in the lost *On Demonstration*, drawing on fragmentary reports in Greek and Arabic. This evidence is considered alongside the treatment of void in Galen's extant medical works, in which he criticizes (and yet partially adopts) the views of Erasistratus.

Dr. Andrew Gregory (UCL), Parmenides and Cosmology.

There is a perennial problem of why Parmenides gave a description of the cosmos, several times longer and more detailed than the philosophical part of his poem which seems to deny the possibility of cosmogony and cosmology. Here I draw on some evidence from Plutarch to make a new suggestion as to why Parmenides gives a cosmology and suggest that there are important sufficient reason issues which link the first and second parts of the poem.

Dr. Frederica La Nave (Oxford), Antiphon and Squaring the Circle.

This paper focuses on Antiphon's attempt to square the circle, arguing that Antiphon's mathematical argument is philosophical in nature. The real reason why Antiphon denies the infinite divisibility of magnitude lies in his epistemology. Antiphon wants to defend the existence of a form of knowledge of reality. There are, I believe, two major factors behind Antiphon's attempt to square the circle: a probability based concept of logic and an interest in refuting arguments directed at denying any knowledge of reality (particularly that of Gorgias).

Dr. Massimo Raffa (Calabria), Teaching and Studying Harmonics after Ptolemy: some aspects of Porphyry's Commentary on Ptolemy's "Harmonics".

This paper aims at analysing the position of harmonic science in the framework of the so-called Middle and Neo-Platonism (II-IV cent AD) through the case of Porphyry's Commentary on Ptolemy's "Harmonics". Porphyry seems to introduce Ptolemy's work with an eye on the historical development of the discipline; and the way in which he does so may tell us something about the needs and expectations of his otherwise unknown dedicatee and, more broadly, other potential readers. Besides, his way of choosing and treating his sources can be accounted for as an attempt to place Ptolemy's treatise in the context of his own philosophical background. On this particular respect, there are some intriguing affinities between Porphyry and his master, Plotinus, that may shed new light on the chronology of the Commentary itself.

Dr. Ilana Wartenberg (UCL), The Old Testament as a source of medieval Hebrew mathematical vocabulary, Department of Hebrew and Jewish Studies.

In my talk I will elaborate on how medieval Jewish scholars created a Hebrew mathematical language by using ancient Jewish sources, the Old Testament serving as a main source of inspiration. I will focus on the works of the Spaniards Abraham ibn Ezra (12c) and Isaac ha-Israeli (14c).

Michalis Sialaros (Birkbeck), Some New Thoughts on Euclidean Lemmas

In Greek literature, the term 'lemma' is often used to designate a statement invoked to establish an argument. In Euclid's Elements, the term acquires a technical meaning: it identifies a number of mathematical propositions, which aim to further establish already proved propositions. A prevalent idea among contemporary scholars is to consider all 18 lemmas in the Elements as later scribal additions, aiming to improve Euclid's reasoning. Using the famous lemma of proposition XII.2 as a case-study, I propose to raise some arguments against this claim, and establish lemmas as a legitimate textual and conceptual characteristic of the early Greek mathematical writing.

Peter Griffiths (Independent Scholar), Ptolemy's Almagest is based on Ancient Explorations and Observations as well as on Mathematical Calculations

We now know that obliquity measures the 23.5 degree tilt of the Earth. This 23.5 degree obliquity also becomes apparent when the vertical angle of true North as measured by a position near the Pole Star is compared with the vertical angle corresponding to the length of a shadow cast at Noon at the Summer Solstice. Between the Solstice and the Equinox this 23.5 degree discrepancy is reduced to nil. This angle discrepancy seems to have been known to the Ancient Egyptians c4000BC and is discussed in Ptolemy's Almagest particularly in the diagrams on pages 80-82. The use of chord tables by Hipparchus (ff 161BC to 125BC) and Ptolemy c150AD improved the accuracy of converting lengths of shadows into angles of latitude and obliquity. Hipparchus accepted Pytheas's (325BC) measurement of shadow lengths at noon at various places between Marseilles and the Arctic Circle and converted these lengths into angles of latitude, so that North-South distances between locations could be established. On page 72 Ptolemy shows a Table of Inclination which shows how the 23.5 degree obliquity is to be apportioned over the 90 days separating the solstice from the equinox, this table shows $\sin d \times 23.5$ where d can indicate either the number of days or the number of degrees. The locations below the Arctic Circle of the dark/daylight ratios on pages 83-89 of the Almagest probably originate from Pytheas but the conversion to angles of latitude would probably have been effected by Hipparchus. The end result is quite a simple formula, at the Summer Solstice the ratio darkness: 12 equals $\cos L$ where L is the angle of latitude; if chord tables are used then $\cos L = 0.5cd(180-2L)$.

Eric Morelli (Emory University), Natural Exegesis: Plato's Timaeus as an Explanation of Explanation

The Timaeus contains fragments of a theory of explanation that Plato neither formulates fully nor claims as his own. He has Timaeus distinguish kinds of cause but represent their natures, functions, and relations mythically; argue for his distinction but in a manner more dogmatic and sophisticated than critical and philosophical; and raise the question of his account's foundation but put off the search for its answer. Timaeus describes his speech as a likely myth and a likely account, and Plato has Critias attribute its likelihood to its unverifiability. Is it unverifiable? Does Timaeus distinguish nature's real causes? How can we explain his theory of explanation, and how would Plato have explained it? Instead of directly presenting

a theory of explanation, Plato depicts a scientist explaining. My talk pursues the possibility that through this depiction Plato gives us a way of explaining explanation in terms of the natural operation of the explaining psyche. I demonstrate the nature and explanatory power of this approach by investigating the psychic significance of three prominent features of Timaeus' speech: the principle that everything that comes to be has a cause, the circularity of Timaeus' proof of god's excellence and the world's beauty, and his programmatic distinction between the works of intelligence, necessity, and intelligence persuading necessity.