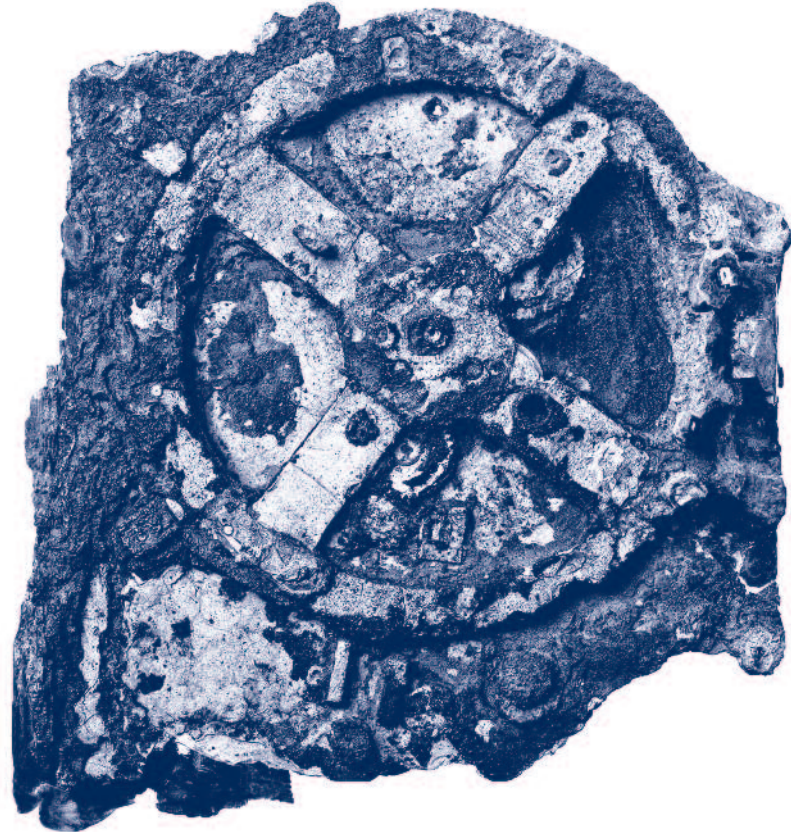


CONSTANTIN STIKAS

# ANTIKYTHERA MECHANISM

— THE BOOK —



UNWINDING THE HISTORY  
OF SCIENCE AND TECHNOLOGY

# CONTENTS

<b>14</b>	TIMELINE
<b>16</b>	DESCRIPTION OF THE ANTIKYTHERA MECHANISM
<b>19</b>	ALBUM
<b>63</b>	ARCHAEOLOGY AND THE SHIPWRECK
<b>65</b>	Eleni Kladaki-Vratsanou THE ISLAND OF SYMI, THE SPONGE DIVERS AND THE SHIPWRECK
<b>71</b>	Lefteris Tsavlis TO ANTIKYTHERA ON THE CALYPSO
<b>75</b>	Brendan Foley RETURN TO ANTIKYTHERA
<b>79</b>	Nikolaos Kaltsas THE ANTIKYTHERA TREASURE
<b>85</b>	George Kakavas THE JOURNEY CONTINUES...
<b>89</b>	RESEARCH AND MODELS
<b>91</b>	Ioannis Theofanidis 1934: FIRST ATTEMPT TO RECONSTRUCT THE ANTIKYTHERA MECHANISM
<b>93</b>	Derek De Solla Price – Charalambos Karakalos UNVEILING A NEW WORLD
<b>97</b>	Michael Wright FOLLOWING IN THE MAKER'S FOOTSTEPS
<b>103</b>	Mike Edmunds A BOLD STATEMENT ABOUT THE COSMOS
<b>109</b>	John Seiradakis THE RESEARCH IS WELL IN PROGRESS
<b>115</b>	Xenophon Moussas AT THE ROOT OF GLOBAL CIVILISATION
<b>123</b>	Yanis Bitsakis READING THE MULTIPLE LAYERS OF THE ANTIKYTHERA MECHANISM
<b>129</b>	Agamemnon Tselikas DID THE ANTIKYTHERA MECHANISM COME WITH A 'USER'S MANUAL'?
<b>133</b>	Alexander Jones A WITNESS OF THE ANCIENT ASTRONOMICAL KNOWLEDGE

## CONTENTS

<b>141</b>	Roger Hadland MODERN TECHNOLOGY REVEALS ANCIENT GREEK TECHNOLOGY
<b>145</b>	Tom Malzbender SHEDDING LIGHT ON HIDDEN DETAILS
<b>149</b>	<b>ANCIENT SCIENCE AND MODERN EXHIBITIONS</b>
<b>151</b>	Theodosios Tassios THE GREEKS WERE A 'TECHNOMANIAC' PEOPLE
<b>159</b>	Efthymios Nicolaidis THE ANTIKYTHERA MECHANISM CONQUERS CONTEMPORARY HISTORY OF SCIENCE
<b>163</b>	Girolamo Ramunni IN SEARCH OF THE PERFECT CYCLE
<b>167</b>	<b>HOROLOGY</b>
<b>169</b>	Dominique Fléchon CONNECTING THE PAST TO THE FUTURE, THROUGH THE PRESENT
<b>173</b>	Philip Poniz THE GREEKS' GIFT TO MODERN CIVILISATION
<b>179</b>	Aurel Bacs WE ARE NOT THE ONLY GENIUSES IN HISTORY!
<b>183</b>	Jean-Claude Biver THE ANTIKYTHERA MECHANISM TEACHES US HUMILITY
<b>187</b>	Mathias Buttet A NOVELTY MORE THAN 2,100 YEARS OLD
<b>193</b>	Stephen Forsey RECREATING THE COSMOS
<b>197</b>	<b>EDUCATIONAL PROJECTS</b>
<b>199</b>	Eric Robuchon, Catherine Garcia-Maisonier, Julie Duleau, Arnaud Maury 'DAD, TODAY I MADE AN ANTIKYTHERA MECHANISM AT SCHOOL!'
<b>207</b>	Andrew Carol AN ANTIKYTHERA MECHANISM CRAFTED WITH LEGO PARTS?
<b>212</b>	<b>INDEX</b>

# FOREWORD



**A.** You remember, don't you, how the Greek gods were concerned about the future of Humanity, and how they imagined that they would ward off evil by making a gift of Technology to the Humans (Plato, *Protagoras*, 321c): 'to devise man's salvation [...] stole the mechanical arts and fire', i.e. technical know-how and energy. It goes to show how highly the Greeks have always rated Technology! Therefore, it is not surprising that they envisioned Automata as early as the Homeric epics (in the houses of Greek gods, *Iliad* 18.375-376, 469-470, *et al.*) and Robots (vessels of the Phaeacians, *Odyssey* 8.555-563, and Hephaestus' metal handmaidens, *Iliad* Book XVIII 417-421). Hence the rapid development of Ancient Greek Technology, until its peak in the Hellenistic period, when the Greeks (and not just their gods) built automata, e.g. the moving automata of Hero of Alexandria (*On Automaton-Making*, IV or 247 ff.), and robots, such as the bronze handmaiden pouring wine and water into your drinking cup (Philo of Byzantium, *Pneumatica*, §30). In the context of this high-tech History, the invention and operation of the Analogue Computer of celestial bodies comes as no surprise, whether it is by Archimedes (according to the interpretation given to Cicero's testimony in *De Re Publica*, 14, 22) or it is the Antikythera Mechanism.

**B.** You have seen how this latter Mechanism has creatively energised our modern times.

- Modern Science is seeking answers to a number of historical and epistemological issues as a result of the questions raised by the Mechanism.
- Modern Technology is developing new imaging and algorithmic methods for the study of the Mechanism as well as new techniques for the continuation of searches in the area of the shipwreck.
- Modern Horology is becoming inspired and 'innovating through tradition' – witness the incredible hybrid by Hublot...
- Education has drawn inspiration – but entrepreneurship has also developed in some circles.
- Even the Fine Arts have been affected, to judge from the installation that has, I hear, been erected near the coast of Antikythera.

However, it seems to me that the main effect of the Mechanism on contemporary life is a more respectful perception of Technology as a culmination of Ancient Greek Civilisation and, consequently, a more fundamental understanding of the role of Innovation itself – then and now.

**C.** So this book comes along now, describing a large part of the beautiful adventure of finding and studying the Mechanism. And here I am with the unexpected fortune to be the first reader of the contents of the book – once more verifying the old saw about how we never stop learning. Here is what I learnt and what I admired – and I hope other readers will feel the same way, too.

- First, the professional dedication and integrity of the sponge divers who brought the findings of the wreck to the surface.
- Then, the care and generosity shown at the time by an impoverished Greek state determined to save the antiquities.
- The knowledge and the academic work by the Greek Archaeologists, then and now.
- The decisive contribution of the first gamma-ray images by my dear departed friend C. Karakalos.
- The long and persistent study by the pioneers D.S. Price and M. Wright.
- The breakthrough in the study of the Mechanism achieved by the interdisciplinary Greek-British team, with Scientists and Engineers of international standing; their contribution cannot be praised highly enough...
- The long list of Greek and international exhibitions that have already been staged in 12 cities, the most important of all being the one at the National Archaeological Museum of Athens (2012-2014).
- The contribution of academic research, but also the use of the Mechanism in education in general.
- Finally, I was greatly excited by the addition of the Mechanism to the illustrious creations in the global History of Watchmaking...

I finished reading the book enriched by all the above – and for this I owe many thanks to Mr Constantin Stikas, who conceived and created it.

Theodosios P. Tassios  
*Member of the Academy of Sciences of Turin*  
*President of the Association*  
*of Ancient Greek Technology Studies*

# INTRODUCTION

---



Though it is difficult to understand exactly how the Antikythera Mechanism worked or what its place is in the history of mankind, it may also be hard to believe that it even actually existed.

This is, after all, why it has been the object of wild conjecturing ever since it was first presented internationally as a computer in the mid-1970s, when its existence was even attributed to... alien visitors!

Before its serendipitous discovery in 1901 the Antikythera Mechanism was a non-existent object even for scientists and historians. So for centuries we were safe in the assumption that the ancient Greeks were not technologically advanced; that gears first appeared in Italy during the Renaissance; that what the ancient Greeks knew about the motion of celestial bodies was entirely incorrect, etc.

Upon its discovery, ignorance was replaced by mystery. And what a mystery! Not the kind invented by writers, but the deeper mystery that only real life can devise.

The Mechanism was not found in the ruins of an ancient temple or palace. Nor was it found inside a great tomb, buried next to its once mighty owner. It was discovered by accident at the bottom of the sea, where it had remained for over 2,000 years, corroded by sea water and covered in seaweed. It was part of the greatest treasure ever discovered in a shipwreck, amidst some of the finest specimens of ancient Greek art. And it was found by a team of Symiot sponge divers looking for some seafood for their lunch. It was also the sponge divers –and not maritime archaeologists– who retrieved the shipwreck findings in what was the first underwater excavation in history.

Moreover, there were inscriptions on it. In fact, it is the only ancient object that has ever been found to come inscribed with a manual!

Hence we are dealing with a completely unexpected object, an object that runs counter to what we know about ancient technology, while it remains a unique specimen in many of its features. As a result, even the scientific community has found it difficult to put it into perspective and has been slow to absorb its multidimensional significance. Even in Greece, it took the efforts of Professor Theodosios Tassios, who compiled a long list of technological marvels of antiquity, for the scientific community to realise the extensive presence of technology in ancient Greece.

Today, if anyone tries to ‘unravel the mystery’ and decides to probe deeper into the subject, they will soon find themselves faced with findings and conclusions that will confuse them even more: ‘The Mechanism is the predecessor of the gearbox in automobiles.’ ‘The Mechanism was not unique in its time’ – but, had it not been found by accident, no one would even have imagined that such an advanced item could have existed 2,100 years ago. ‘The indications for the motion of the Moon on the Mechanism are subject to Kepler’s third law’ – which was formulated 1,800 years after the Mechanism was built (with Kepler being totally unaware of the Mechanism’s existence)! ‘The Mechanism contains an indication for what we call the Equation of Time’ – several centuries before this term was introduced. ‘The Mechanism is the first mechanical computer’!

Naturally, many prominent scientists of various disciplines have studied and are still studying the mystery, and some have dedicated decades of their life's work to it, often with impressive results.

However, how much of this knowledge has reached its final recipient, Mr Everyman? How much of this knowledge has been absorbed and become part of our lives; or helped us to better understand who our ancestors were, what they were capable of making, and the relative value of what we can make today? How would things be different if that knowledge had not disappeared for about one thousand years?

The Antikythera Mechanism rewrites the history of mechanics, of science, of technology, of the fabric of our lives – and yet there was not a single book with all this knowledge together in one place.

That was how I came up with the idea of writing a book that would answer this need.

The concept was simple.

On the one hand, the book presents the maximum of information and scientific knowledge based on the evidence that research has produced with the help of technological advancements in the last decade, as well as historical evidence – and it all comes straight from the most prominent protagonists of international research regarding the Mechanism.

On the other hand, it presents, for the first time in such a clear and well-documented manner, the connection between the Antikythera Mechanism and the history of horology, as seen by the most eminent historians, engineers and experts in the field of horology, the history of which is now rewritten and establishes the Mechanism as the first known link in a 'chain' that extends to our own era, with the manufacturing of the most impressive and complex astronomical timepieces of our time.

All of the book's scientific and historical knowledge is offered through the answers given by the most distinguished researchers of the field to specific questions in interviews, looking for answers that help us understand what really interests and concerns us all. I think this approach can lead to better results for the intended readership of this book than the standard presentation for academic journals or museum catalogues.

Well, is the Antikythera Mechanism related to the gearbox in cars, to Kepler's third law? What delayed the spread of technological knowledge already acquired by ancient Greeks, creating a gap of a thousand years in history? And, finally, is this the same knowledge that reaches all the way to modern-day wristwatches and other modern devices and applications? Did the ancient Greeks invent the computer?

In the book's novel approach, the most profound and sophisticated scientific research conducted by outstanding scientists is presented in an extensive and creative manner, while the material also reaches out to the book's readers and answers their questions, poses new ones, fills them with strength, pride and inspiration. It even becomes a game, both constructive and instructive – a game played in the classroom or with LEGO bricks.

It is said that the Antikythera Mechanism brings together everything the ancient Greeks knew about astronomy up to the day the device was built. In a similar way, as luck would have it,

*Antikythera Mechanism – The Book* was being printed –after more than two and a half years of preparation– on the very day that the third –and extremely promising– underwater excavation of the shipwreck site was initiated by the Greek Ephorate of Underwater Antiquities in collaboration with Brendan Foley and his team. The book thus recorded all the knowledge gathered up to that point from the processing of the findings of the first two underwater excavations – the one by Symiot sponge divers in 1900-1901 and the one in 1976 by oceanographer Jacques-Yves Cousteau’s team.

In addition, in tune with what is in my opinion the Antikythera Mechanism’s supreme symbolism, *Antikythera Mechanism – The Book* is a paean to Innovation.

Its pages become the point of convergence for many different worlds – for archaeologists, astrophysicists, philosophers, historians, scholars, Horology engineers and experts, business leaders, and even for children...

What distinguishes and links them all is not so much what they have gained from their professional and scientific progress and from the study of the Mechanism, but what they have not lost in the course of their lives. What they have not lost is their most precious possession: it is their ability to innovate, i.e. their ability to dare to be their own selves!

This symbolism of the Antikythera Mechanism sets it apart as a proven tool for sparking children's interest in science and technology, and fuelling their love for innovation.

My daughter Sophia is eight and a half years old. Recently she firmly stated that she is going to be an archaeologist and an engineer! As the Mechanism will be puzzling scientists for many generations to come, it will also be inspiring children, encouraging innovative thinking and creative curiosity.

I sincerely hope you will enjoy reading this book.

Constantin Stikas

Inspired by Philip Poniz, who says in his interview that the Antikythera Mechanism is the Greeks’ gift to our modern civilisation, I wish to express my thanks and appreciation to the two Swiss gentlemen, Jean-Claude Biver and Mathias Buttet, for reciprocating the gift, by bringing the Antikythera Mechanism dynamically to the forefront of global interest with their creative work and generous support. My thanks are also especially due to Yanis Bitsakis, who initiated me into the wonderful world of the Mechanism and was the book’s scientific editor and advisor. In addition, the wonderful foreword by Professor Theodosios Tassios is a great honour for me, and for that I thank him warmly.





# INDEX

- al-Biruni 14, 161  
Alepotrypa cave 72  
Alexandria 14, 108, 113, 161, 177, 190, 191  
Allen, Martin 44, 143  
Almagest 14, 160  
Ammianus Marcellinus 175  
Anastasiou, Lina 113  
Anaximander 117, 202  
Anaximenes 117  
Andronicus of Cyrrhus 116  
Antikythera Mechanism Research Project 15, 45, 103, 104, 109, 110, 115, 123, 134, 141, 142, 145, 146, 208  
Antisthenes 82  
Apple 57, 207  
Arago, François Jean Dominique 170  
Aratus 176  
Archimedes 6, 14, 86, 99, 108, 111, 116, 118, 119, 120, 121, 152, 153, 154, 157, 160, 170, 175, 176, 177, 190, 192, 195  
Archytas 170  
Arcturus 113  
Aristarchus 86, 177  
Aristotle 14, 111, 116, 118, 153, 156, 170  
Astrarium 53, 107, 170, 171, 178  
astrolabe 14, 92, 107, 116, 124, 125, 130, 164, 170, 171, 182  
Astrolabium Galileo Galilei 171  
Augsburg 171  
Autolycus of Pitane 154, 155
- Babbage Difference Engine 208  
Babylonia 14, 16, 139, 202  
Bacs, Aurel 179-182  
Bate, David 44, 143  
Beauvais 171  
*Belopoeica* 152  
Berner, G. A. 170  
Berthoud, Ferdinand 177  
Besançon 171  
Bion of Borysthenes 82  
Bitsakis, Yanis 15, 17, 44, 78, 92, 104, 110, 123-128, 131, 143, 158, 160, 163, 164, 188, 189, 190, 194, 200, 203, 205  
Biver, Jean-Claude 128, 181, 182, 183-186  
Blancpain 185  
Bourges 171  
Boxer of Antikythera 73  
Breguet, Abraham-Louis 184, 185, 191  
Bromley, Allan 15, 98, 126  
Buttet, Mathias 84, 88, 112, 120, 123, 127, 128, 181, 183, 187-192, 206
- California 127, 146  
Calliope (caique) 67  
Callippus 14, 17, 86, 101, 136, 189, 191  
Calypso 12, 71, 72, 73, 74, 76  
Cardiff University 103, 104  
Carman 105  
Carol, Andrew 13, 57, 207, 208, 209  
CERN 200  
Chais, Costas 69  
Chartres 171  
Chatzinikolaou, Charoula 68  
Chatzinikolaou, Sevasti 69  
Chauvigny college 203, 204  
Cicero 6, 14, 81, 108, 120, 121, 153, 154, 176, 177, 202  
Claudius Claudianus 154  
Cleisthenes 158  
Coll, Raymond 74  
Copernicus 13, 138, 139, 171, 174  
Corinth 14, 112  
Cousteau, Jacques-Yves 15, 35, 71, 72, 73, 74, 76  
Crawley, Alan 143  
CT scanner 15, 44, 45, 80, 110, 141, 142, 143  
Ctesibius 116, 152, 153, 157, 170, 177  
Cyclopes 156  
Cyprus 111, 113
- Daedalus 176  
Däniken, Erich von 125, 146, 174
- Demokritos, Democritus (National Centre For Scientific Research) 94, 125  
Diakogeorgakiou, Yagos 69  
Diodorus 175  
Diomedes 81  
Dionysius 152, 175  
Diros 72  
Dodoni 127  
Dokos 72  
Dondi, Giovanni de' 14, 53, 107, 162, 170, 171, 178  
Duleau, Julie 203, 204
- Economou, Antonis 68, 70  
Edmunds, Mike 12, 17, 80, 89, 103-108, 110, 127, 143  
Egyptian calendar 16, 94, 185, 202, 209  
Eleusis 111  
Elgin, Lord 67, 78  
Ephesus 81, 86, 110  
equation of time 102, 114, 138, 161, 165, 194  
Eriksson, Kjell 119  
Euclid 155  
Eudoxus 86, 153, 176  
Eupalinos 160  
Euterpe (caique) 67  
Evans 105  
Exeligmos 136, 189, 191, 209  
Exosuit 36, 37, 76, 77, 78
- Falco, Albert 74  
Fasakis, Nikitas 69  
Feleris, Pandelis 44  
Fléchon, Dominique 13, 167, 16-172  
Foley, Brendan 10, 12, 37, 63, 75-78, 87  
Forsey, Stephen 4, 13, 167, 181, 193-195  
Fotaras, Yannis 69  
Freeth, Tony 44, 104, 110, 126, 127, 142, 146
- Gaius Sulpicius Gallus 176, 177

## INDEX

- Galen 105  
 Galileo Galilei 135  
 Garcia-Maisonnier, Catherine 13, 197, 199, 200, 201, 203, 205  
 geocentric 17, 135, 189, 205  
 Georgoudakis, Manolis 131  
 Gleave, John 106  
 Greubel Forsey 181, 193  
 Greubel, Robert 181, 194  
 Giacoletto, Ivan 74
- Hadland, Roger 13, 44, 89, 110, 127, 141-144  
 Haviaras, Dimosthenis 68  
 Hellenic Ephorate of Underwater Antiquities 15, 72, 74, 75, 76, 77, 78  
 Hephaestus 6, 161, 164, 176  
 Hero of Alexandria 6, 116, 119, 130, 152, 157, 170, 172, 176  
 Hewlett-Packard 104, 127, 145  
 Hill of the Nymphs 160  
 Hipparchus 14, 16, 86, 113, 117, 118, 119, 120, 136, 137, 154, 160, 202  
 Hockley, Peter 143  
 Horologion 116  
 Horologium 162  
 Housefield, Godfrey 142  
 Hublot 4, 6, 15, 58, 59, 77, 84, 88, 123, 127, 128, 161, 164, 171, 178, 180, 181, 182, 183, 184, 185, 186, 187, 188, 190, 192, 195, 206  
 Huygens, Christiaan 107
- Immser, Philippus 107  
 inscription 16, 17, 45, 81, 104, 112, 126, 127, 128, 130, 131  
 Isthmia 116, 127  
 Iversen, Paul 127
- Janvier, Antide 171  
 Jones, Alexander 17, 105, 110, 127, 133-140, 158  
 Jupiter 17, 134, 135
- Kakavas, George 85-88  
 Kalafatis, Konstantinos 69  
 Kaltsas, Nikolaos 79-84  
 Karagiannis, Merkouris 69  
 Karakalos, Charalambos 15, 45, 93-95, 125, 158
- Karouzos, Christos 82  
 Kartelias, Nikos 72  
 Katsaras, Vasilios 69  
 Kepler 8, 9, 113, 118, 135, 161, 165, 166, 171, 200, 202  
 Kladaki-Vratsanou, Eleni 4, 12, 63, 65-70  
 Koch, Hans 171  
 Kolonas, Lazaros 73  
 Kontos, Dimitris 4, 31, 33, 38, 39, 67, 68, 69, 70, 92  
 Kontos, Fotis 69  
 Koumpourios, Filimonas 69  
 Kourkouvelis, Dimitris 76, 78  
 Kourouniotis, Konstantinos 38  
 Kritikos, Giorgos 69  
 Kritzas, Charalambos 72, 121  
 Kythera 67, 68, 78
- L'Isle-Jourdain 199, 203  
 Leverhulme Trust 104, 110  
 Li Keqiang 87  
 Liezi 176  
 Lindiakos, Fotis 31, 33, 67, 68, 69  
 Lindiakos, Ilias 69  
 Lindiakos, Nikolas 69  
 Lykopantis, Ilias 68, 69  
 Lykoudis, Stylianos 31, 40, 70
- Macmillan, Stephen 44  
 Makris, Gerasimos 45  
 Malzbender, Tom 13, 89, 110, 145-147  
 Mangou, Eleni 15, 44, 80, 110  
 Marcellus 153, 176  
 Mars 17, 134, 135, 174  
 Mastoridis, Fotis 66  
 Maury, Arnaud 205  
 Mercury 17, 82, 101, 134, 194  
 Metochites, Theodore 131  
 Meton, Metonic cycle 14, 17, 59, 94, 95, 106, 111, 120, 127, 136, 154, 160, 185, 189, 191, 201, 202  
 Metris 143  
 Metzger, Jeremias 171  
 Michaloutsos, Stavros 69  
 Michel, Henri 92  
 Moon 14, 16, 17, 94, 95, 99, 101, 104, 106, 113, 116, 117, 118, 120, 126, 130, 134, 135, 136, 137, 138, 144, 153, 154, 174, 176, 177, 181, 185, 188, 189, 190, 191, 194, 201, 202, 204, 209
- Mountiadis, Giorgos 69  
 Mountiadis, Kyriakos 69  
 Moussas, Xenophon 12, 44, 89, 104, 110, 115-122, 126, 143, 208, 210  
 Muller, Franck 184  
 Musée des Arts et Métiers 15, 163, 164, 181, 206  
 Mykali 31, 68, 70, 92
- National Archaeological Museum of Athens 15, 20, 42, 49, 68, 70, 79, 80, 81, 82, 83, 85, 86, 87, 88, 92, 104, 110, 111, 122, 123, 124, 128, 146, 158, 159, 162, 164, 184  
 Neugebauer, Otto 161  
 Newton, Isaac 118  
 Nicolaidis, Efthymios 13, 149, 159, 160-162  
 Nonnus 104
- O'Brien, Edward 78  
 odometer 152, 177  
 Odysseus 26, 81  
 Oechslin, Ludwig 126, 154  
 Oikonomou, Nikos 110  
 Olympiad 16, 59, 117, 209  
 Olympic Games 14, 15, 116, 137, 138, 185, 209  
 Oppian 70
- Panhellenic games 17, 127  
 Papakalodoukas, Ioannis 69  
 Papakalodoukas, Sotiris 69  
 Papathanasopoulos, George 72  
 Pappus 118, 119  
 Parapegma 16, 17, 101, 112, 113, 136, 161, 165  
 Parthenon 67, 78, 106  
 Patek Philippe 171, 184  
 Pavlopetri 78  
 Perseus 82  
 Philo of Byzantium 6, 152, 170, 176  
 Philosopher of Antikythera 14, 24, 68, 80, 82, 124  
 Piliou, Ioannis 69  
 pin-and-slot 16, 99, 113, 203, 210  
 Pizarro, Oscar 78  
 planetarium 14, 15, 95, 99, 118, 124, 125, 126, 130, 153, 154, 171, 193, 194, 204, 205  
 Plato 6, 116, 118, 174, 176  
 Pliny 81

## ANTIKYTHERA MECHANISM - THE BOOK

- Plutarch 175  
 Pnyx 160  
 Poniz, Philip 4, 10, 13, 167, 173-178  
 Pons, Grégory 192  
 Posidonius 14, 81, 86, 120, 140  
 Price, Derek de Solla 15, 16, 54, 92, 93-95, 98, 104, 107, 110, 125, 126, 134, 158, 170, 173, 174, 175, 194  
 Ptolemy 14, 113, 131, 134, 135, 136, 138, 139, 153, 160  
 Puteoli 69, 81  
 Pythagoreans 118
- Ramsey, Andrew 143  
 Ramunni, Girolamo 13, 149, 163-166  
 Rediadis, Periklis 83, 92  
 Rehm, Albert 15, 92, 124, 158  
 Return to Antikythera 15, 36, 37, 77, 128  
 Rhodes 14, 66, 81, 108, 112, 113, 119, 120, 127  
 Richard Mille 194  
 Robuchon, Eric 200-203, 206
- Samaras, Antonis 87  
 Saros 14, 16, 17, 106, 111, 136, 189, 191, 202, 209  
 Saturn 17, 134, 135  
 Schlottheim, Hans 171  
 Seiradakis, John 12, 89, 104, 109-114, 138  
 Sextus Empiricus 154  
 Simossi, Aggeliki 77
- Sotiriou, Alexandros 78  
 sphere of Archimedes 14, 99, 118, 153, 157, 177  
 Stais, Valerios 68  
 Stais, Spyridon 15, 68, 69, 70  
 Stamatis, Evangelos 119  
 Stathakopoulos, Christos 143  
 Sun 14, 16, 17, 94, 95, 99, 101, 102, 104, 105, 106, 107, 112, 113, 114, 116, 117, 124, 130, 134, 135, 136, 137, 138, 144, 153, 154, 176, 177, 188, 189, 190, 191, 194, 204, 209  
 Svoronos, Ioannis 15, 40, 92, 124  
 Symi 14, 33, 65, 66, 67, 68, 69, 70, 92
- Talos 156, 176  
 Tasoulas, Kostas 87  
 Tassios, Theodosios 8, 10, 13, 112, 126, 149, 151-158  
 Taton, René 160  
 Tatoulis, Petros 110  
 Thales of Miletus 86, 153, 176  
 Theodoulou, Theotokis 76, 77  
 Theofanidis, Ioannis 15, 55, 91-92, 124, 158  
 Theofanidis, Ioannis (Dannys) 15, 91-92  
 Theofanidis, Jason 92  
 Throckmorton, Peter 69  
 Tompion, Thomas 178  
 tourbillon 180, 181, 185, 189, 190, 191  
 Tourtas, Alex 78  
 Tsavlis, Lefteris 12, 63, 71-74
- Tselikas, Agamemnon 12, 89, 110, 116, 126, 127, 129-131  
 Tzefronis, Manolis 78  
 Tzortzos 69
- Venizelos, Eleftherios 39, 70  
 Venus 17, 101, 134, 135, 194  
 Vicentini, Mogi 200  
 Vitalis, Vasilis 74
- Wallingford, Richard of 107  
 Wikander, Orjan 154  
 Wilson, A. I. 153  
 Woods Hole 15, 36, 37, 78  
 Wright, Michael 15, 17, 55, 56, 97-102, 106, 107, 110, 126, 127, 134, 140, 152, 160, 194, 200, 205
- X-Tek 104, 127, 142, 143  
 Xenikakis, Kostas 110
- Youth of Antikythera 14, 22, 69, 80, 81, 82, 87, 88, 124
- Zafeiropoulou, Mary 44, 80, 175  
 Zodiac 14, 16, 17, 94, 95, 99, 104, 107, 113, 117, 134, 135, 174, 185, 190, 194  
 Zonza, Marc 74  
 Zouroudis, Vasilios 69  
 Zuckerman, Bruce 146

## PHOTO CREDITS

**19** Vassiliki Varvaki. **20-21** Antikythera Mechanism Research Project / National Archaeological Museum, Athens. Hellenic Ministry of Culture and Sports – Archaeological Receipts Fund. **22-29** National Archaeological Museum, Athens. Hellenic Ministry of Culture and Sports – Kostas Xenikakis. **30-31** National Archive of Monuments. **32** *Bottom*: National Archaeological Museum, Athens. Hellenic Ministry of Culture and Sports – Archaeological Receipts Fund. **33** Filiratos Pachos. **34-35** Lefteris Tsavlis. **36-37** Return to Antikythera. **38-39** National Archive of Monuments. **42-43** National Archive of Monuments. **44-45** *CT slice*: Antikythera Mechanism Research Project. *Other photographs*: Roger Hadland. **46** Professor Th. P. Tassios's archive. **47** Antikythera Mechanism Research Project. **48-49** National Archaeological Museum, Athens. Hellenic Ministry of Culture and Sports - Archaeological Receipts Fund. **50-51** National Hellenic Research Foundation. **54** Jeffrey Price. **55** *Top left*: Yanis Bitsakis. *Top right*: Michael Wright. *Bottom*: John Seiradakis. **56** Eric Robuchon, Catherine Garcia-Maisonnier. **57** Andrew Carol. **58-61** Hublot. **167** Steve Collender. **215** Constantin Stikas.