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## **Antikythera Mechanism**

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### **Antikythera Mechanism - Episode 51 full story transcript**

#### **Geek Counterpoint - Hosted by Lorem Ipsum**

I'm not quite sure how much people have been following this. I've been a buff of the Antikythera Mechanism for years.

There's been some new news released on this interesting little gizmo late in 2006. If you're interested in it you've probably heard about it. If you haven't really noticed this machine before it probably slipped right on passed you. But at any rate its an interesting and historically very significant little device...and normally doesn't get talked about much in terms of the whole flow of technology and its history. So i thought it would be an interesting subject for a little bit of context. Let's start when this thing was discovered.

Early in 1900 a ship of sponge divers took shelter from a storm at a small island called Antikythera which is roughly midway between the Greek mainland and the island of Crete. And being sponge divers, after the storm broke they decided they might as well look for some sponges around where they were before they set sail for home. And while they were diving they stumbled across the wreck of a very old ship on the ocean floor in about 40m of water. The deck of the ship was just littered with statues and other very old luxury items.

An interesting anecdote which may or may not be truthful depending on which account of the discovery you believe is that the statues scared the living daylights out of the diver who found the ship. Basically when his captain winched back on board the ship apparently babbling about he called a heap of dead naked women, which were basically ancient statues. At any rate, the captain of the sponge vessel, Captain Condos, told the Greek government about the discovery and at the government's behest went back with his crew to salvage what they could in 1901.

In the interim local divers had looted some amounts of material. Fortunately only minor amounts of material; mostly anchors and some small statues. Basically things that they could easily get to the surface. Since this was long before the invention of scuba diving this was all free diving; hold your breath and go down 40m and come back up. So that definitely helped to limit the amount of damage that these pot hunters basically could do.

But at any rate the salvage of the Antikythera wreck was the first real underwater archaeology that was undertaken so it wasn't done by anything resembling modern methods

but it was still done with care given the perspective on archaeology at the time. And again this was a good 40 years before the invention of scuba diving.

So the way the salvage was done was the divers doing the salvage had to hold their breath for 10 minutes. And so you had a couple of minutes to go down, you had 5 minutes of bottom time and then a very rapid ascent back to the surface with no decompression stop.

Ten divers worked on salvaging the wreck. Because of the lack of decompression stops and doing freedives basically to 40m plus in depth, one of the 10 divers died and two more were permanently disabled in the process.

At any rate, turns out the ship was a Roman merchant vessel of 300 plus tonnes and about 50m long. So a pretty big guy for the time. And had sunk on a well used trade route from the eastern to the western Mediterranean. Based on coins that were recovered at the time from the wreck it was deemed to have sunk somewhere around 85 to 60BC. And later analysis of wood from the ship shows that it was probably made much earlier maybe even around 200BC.

The ship sank about 25m from a cliff so there are a number of theories as to why it sank. There's some speculation that maybe it ran aground in a storm and sank near where it hit. There's also speculation that the ship may have sunk because of its age. Also possibly because it was overloaded with treasures as it was carrying some particularly large statues.

Included in what was brought up from the ship was a rather uninteresting lump of corroded bronze and wood with some protruding things that looked sort of like gear teeth. And as this lump dried out shortly after reaching the surface since, again, marine archaeology was a new thing so nobody really knew what to do with wood that was brought up. As this lump was dried out, what was left of the the woodframe crumbled into dust and the bronze portion which was covered with a couple of thousand years of corrosion and marine growth broke into a number of pieces.

The mechanism at first was thought to just be broken pieces of statuary of some kind. It was only 8 months after the thing was brought to the surface that an archaeologist realised the lumps of brass were originally something mechanical. And even after this was realised the mechanism was almost overlooked. The statues and coins that were recovered drew an awful lot more attention. I guess it was just what people were expecting to see.

So when the mechanism was first discussed the majority of experts thought well maybe it's some sort of an astrolabe. A navigational instrument which hadn't been seen before 625AD. A number of others thought the mechanism was too complicated to be an astrolabe while another large group thought that the artisans who made the statues found on the wreck couldn't have been sophisticated enough to build even an astrolabe.

The device itself is amazingly small. In metric units 33cm high, 17cm wide, 9cm thick. In imperial units 13 inches high, 6.7 inches wide and 3.5 inches thick approximately since nobody's really quite sure what the original size was. Basically it's about the size of a good sized dictionary. And the gears are made of a low tin bronze. Almost pure copper.

At any rate, this interesting little device then essentially disappeared into obscurity a second time for about another 50 years. In the meantime it was being very painstakingly cleaned of a lot of accumulated marine growth.

About 1950 the mechanism was finally available for real study. And in 1951 a British physicist and historian of science named Derek de Solla Price went to the Athens museum to do a little bit of inside study on the fragments taken from the wreck. And Price was familiar himself with the construction of medieval astrolabes. And so looking at the device and what few astronomical inscriptions were visible on the surface set him off to really try and study and figure out what this machine was.

And in June of 1959 Price had an article called *An Ancient Greek Computer* as the lead article in *Scientific American* of that month. And in that article Price proposed that the Antikythera Mechanism was a device for calculating the motions of stars and planets which would make it really the first known analog computer; essentially it was an Orrery.

This was so out of the blue and so unthinkable to the experts of the time that one professor claimed that someone in the middle ages must have accidentally dropped a medieval machine into the sea at the same spot and it just sort of wound up on the wreck accidentally. The whole idea that the ancient Greeks could have done something this sophisticated just didn't at all fit the normal conceived pattern of technology development for the time.

At any rate, in 1971 the Oakridge National Laboratory in the US published an article on the use of high energy gamma rays to examine the interiors of metallic objects. And so Price who by now was the first Avalon Professor of the History of Science at Yale University teamed up with Carolumpos Caracalos, a professor of nuclear physics at the Greek National Centre of Scientific Research. And Caracalos had gamma and X-ray photographs made of the mechanism which allowed the two of them to puzzle out some of the gears arrangements and also based on lettering styles to estimate the date of construction as being somewhere around 87BC.

Now from the few inscriptions that could be read on the device which at the time were just a couple hundred characters of text, Price decided that the device was linked closely to Geminus of Rhodes. Rhodes being an island off the southern coast of modern day Turkey and likely had been built there. Aside from the text similarity to a surviving book by Geminus, the presence of pottery from Rhodes among other items from the wreck supported Price's approximate date and the whole idea that it was built on Rhodes.

Price also noted that Rhodes was a centre for astronomical thought. And a little bit of an aside. To give you a little bit of history on Rhodes, the Greek astronomer Hipparchus, whose widely considered to be the greatest astronomer of ancient times, is thought to have worked at Rhodes from around 140 to 120BC. And later the philosopher Poseidonius set up a school on Rhodes which among other things continued Hipparchus' astronomical traditions.

At any rate, in 1974 Price wrote a small book called *Gears from the Greeks: The Antikythera Mechanism, a Calendar Computer from Circa 80BC*, where he presented a model of how the mechanism could have worked. This was the first theoretical attempt at reconstructing the device. Unfortunately, what Price was working from - just traditional gamma and X-ray images, essential just 2D images of the device - so they left a lot of room for imagination in the reconstruction. And unfortunately too Price apparently massaged some of the data to

make things work out the way he expected them too. And so in the process he came up with a reconstruction that's been called 'unnecessarily complicated' and as a result historians and archaeologists pretty much ignored the book and he died in 1983.

Meanwhile in the 1970s more coins were found at the site of the wreck by Jacques Cousteau which have allowed the date of the shipwreck to be refined a bit to be sometime shortly after 85BC.

In the 1980s Michael Wright who at the time was Curator of Mechanical Engineering at the Science Museum in London and later of the Imperial College in London made a completely new study of the original fragments together with Allan Bromley. Bromley, who was a scientist at Sydney University in Australia, wanted to study the machine with X-ray tomography which essentially builds up 3-D images from a number of X-rays taken at various angles.

Now, since what's left of the mechanism is too fragile to move from the museum where it's kept in Athens and Bromley couldn't afford to ship a CAT scan machine to Athens, Wright basically built a simple CAT scanner on the site. And working from the data collected by their scans Wright developed a reconstruction and it's considerable different from that that Price came up with. The arrangement of the surviving gears isn't as Price described to the function of some dials on the back of the device are different than what Price thought.

There is also evidence that more mechanisms has been lost from under the front dial and that the dial display was more elaborate than previously thought. Basically the working model that Wright developed demonstrates that it could've been a full up Orrery. Corresponding to those mentioned in ancient literature but that had kind of been poo-pooed as being essentially the ancient version of science fiction.

Now the recent news that just came out in November comes from yet a third group studying the device and this group has given itself the name of the Antikythera Mechanism Research Project. I hope you all understand i'll just abbreviate this to just AMRP for the rest of this episode.

The AMRP is a joint program including Cardiff University in the UK, the National and Kapodistrian University of Athens, the Aristotle University of Thessaloniki in Greece, the National Archaeological Museum of Athens, a company called X-Tek Systems in the UK and Hewlett Packard of the US. And is funded by the Leverhulme Trust and supported by the Cultural Foundation of the National Bank of Greece. That's a mouthful isn't?

At any rate, the AMRP announced in Athens in October of 2005, that new pieces of the Antikythera Mechanism had been found and the total count of fragments of this mechanism is now up to 82. Most of the new pieces had been stabilised but were awaiting conservation which basically means they were back in the warehouse of the museum.

So what AMRP did was build a microfocus computerised tomographer at the museum. Microfocus basically means that the X-rays all sort of come out of a very very tiny focal spot which allows you to do much higher resolution CAT scans essentially. The system itself that they built weighed over 7.5 tonnes while all the equipment that they wound up shipping to Athens weighed over 12 tonnes. That's a fair amount of gear that they took down. And in the

process it allowed them to generate detailed 3-D X-ray images of the device, even more detailed than Michael Wright came up with.

And the AMRP's first results from the scans that they took were announced at an international conference in Athens on the 30th November and the 1st December in 2006.

Now at the same time a lot of these results were published in the 30th November issue of the journal *Nature* including a reconstruction of the mechanism based on all this nice high-resolution X-ray tomography that AMRP did. What this new work essentially did was double the amount of repeatable text which basically means it went from about 1000 to 2000 characters of text that now can be read. In the process, correcting some prior transcriptions and also a new translation was done. Mind you some of the lettering is less than 2mm high and there are no spaces breaking up words so deciphering all this text is no small feat especially when some portions of it are still missing.

The new work based on the AMRP scans now propose that the mechanism must of had originally at least 37 gears of which 30 still survive and could be used to predict the position of the sun, moon and probably the planets; at least the five the Greeks knew of. On the front face of the device were graduations for the solar cycle and the zodiac along with pointers that would indicate the position of the sun, moon and lunar phase. It's the inscriptions that talk about stationary points of the planets and such that cause people to speculate that planetary motions were probably also part of the device. Although part of the device, at least for the time being, is still lost. On the back of the mechanism a couple of spiral pointers indicated the state of a couple of other astronomical cycles: the Saros cycle which is a period of about 18 in the geometry of the sun, moon and earth which is a handy thing to have if you are trying to predict eclipses. And also something called the Callipic cycle which had 940 cycles spread over about 76 years also useful in terms of predicting earth, moon, sun geometry.

At any rate, to sort of wrap all this stuff up, the Antikythera Mechanism was a stunning piece of work for its time. The mechanism's level of miniaturisation and complexity in its parts are really comparable to those of the 18th century clocks. So you can imagine why this was a pretty hard sell among the archaeological community. This thing just was way ahead of its time in many ways. There are, for what it's worth, no signs of rework. No evidence of any mistakes in the device. So there are really no signs to suggest that the design changed as the mechanism was built. It wasn't a prototype. It wasn't a one-off. It must have had a number of predecessors. Based on scans of the gears it was likely repaired in at least one place so obviously it actually saw daily use, it was a sort of decorative object.

Price dated it to 87BC, the AMRP thinks the date now based on the style of text on the device probably dates at more between 150 and 100BC. Since the shipwreck occurred somewhere between 80 and 60BC the device had to be in use for at least a few years, probably decades before it was lost at sea.

One of the really amazing things about this mechanism is just how stubbornly its lessons have been fought. Cicero who was a Roman statesman in the 1st century BC wrote about a couple of devices similar to the Antikythera Mechanism. The first was built by Archimedes and brought to Rome after Archimedes at the siege of Syracuse in Sicily in 212BC and apparently the device showed the motions of the sun, moon and five planets. Cicero also says another similar device was built 'recently' by his friend Poseidonius and showed the movements of the sun, moon and five known planets at the time. But since both these devices

were located in Rome at least 50 years after the Antikythera shipwreck neither one of them could be the Antikythera Mechanism. So the device had to be the product of a technology that existed in the Greek world for really hundreds of years.

The development of science and technology rarely follows a simple linear path. The real mystery here is how such an established, really advanced technology could almost drop off the face of the planet. Some of the technology seems to have made its way to the muslim world where simpler but still somewhat similar devices were made for hundreds of years and then that knowledge may have made its way back to the west at the birth of the Renaissance. But still the level of sophistication that is seen in the Antikythera Mechanism wouldn't be seen again for more than 1000 years.

Again, for folks who like viewing the development of science and technology as sort of a straight linear process this deadend almost in technology is a tough thing to swallow just because it has so little follow-up for a long, long time.

The mechanism also has some odd little ironies attached to it. One of them being it was discovered by divers on their way home from Tunisia in North Africa to Syme which is a small island north of Rhodes. And they only stopped at Antikythera to take shelter from a storm. Meanwhile the mechanism was probably built in Rhodes and may well have gone to the bottom of the ocean during a similar storm off the coast of Antikythera. So there is sort of an odd bit of circularity there.

Another irony in its history is that mechanism is awfully hard to puzzle out due to damage done by more than 2000 years of immersion in sea water. But at the same time the sea water also protected the mechanism because along with the craft value of bronze you know it was easily remelted for reuse. Bronze at the time of the mechanism's construction was used for low denomination coinage. So as a result bronze finds from antiquity and in particular from ancient Greece are very rare. Really most of the more significant historical bronze finds have been made underwater where they have escaped being remelted and reworked.

Fortunately for all of us AMRP isn't just going to sit on what they've collected from the device. They plan on forming an archive of data on the mechanism as research gets completed on various parts of it. Apparently this should start by the end of 2007. So stay tuned i would say there'd be some more interesting news coming out on the Antikythera Mechanism over the course of the year. And again, once all these nice scans are online then it'll pretty much open up for anybody to peruse at their leisure and maybe make their own new discoveries about.

So that's pretty much it for this week. Again, as is usually the case i've got copious links in the show notes if you'd like to dive more into this there's a lot of interesting new material online courtesy of the AMRP folks and others. If you'd like to comment on this; if you follow the links in the blog post for this episode at [geekcounterpoint.net](http://geekcounterpoint.net) you can go straight to the forums or you can send me feedback through the contact page on the website. There's lots of ways to get feedback in and to join in on the whole discussion on this so that's it for this week.

And again, as always, thank you very much for your time.

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## Following is the Antikythera Mechanism story in point form:

### The discovery

- \* Early in 1900, ship of sponge divers took shelter from a storm at the small island of Antikythera, roughly midway between Greek mainland & island of Crete.
- \* After the storm broke, decided to look for sponges before they set sail for home. While diving, stumbled across the wreck of a ship on the ocean floor in about 40 meters of water, carrying statues and other luxury items.
- \* Interesting anecdote -- the statues scared the daylights out of the diver who found the ship. When his captain winched him back on his ship, he was babbling about a "heap of dead naked women."
- \* The captain of the sponge vessel (Cpt. Kondos) told the Greek government about the discovery, and at the government's behest went back to salvage what they could in 1901. Fortunately, local divers had looted only minor amounts of material in the interim, primarily the anchors and some small statues.
- \* Salvage of Antikythera material was first real underwater archaeology ever undertaken, not done by anything resembling modern methods, but still done with care. Well before invention of SCUBA diving, divers held their breath for the 10 minute dive duration. As a result, bottom time was limited to 5 minutes per dive; ascents were rapid, with no decompression stops. Ten divers worked to salvage the wreck; one died, two more were permanently disabled in the process (well before decompression sickness was understood).
- \* Ship was a Roman merchant vessel of 300+ tons, about 50 meters long, and had sunk on a well-used trade route from Eastern to Western Mediterranean. Based on coins recovered from the wreck, it probably sank around 85 - 60 BC. Later analysis of wood from the ship shows it was made much earlier -- around 200 BC. Sank about 25 meters from a cliff; may have run aground in a storm and sank nearby. Also speculation that the ship sank because of its age, and possibly because it was overloaded with treasures (including some particularly large statues).
- \* Included in the haul was a lump of corroded bronze and wood, with some protruding gear teeth. As this dried out, shortly after reaching the surface, what was left of the wood frame crumbled, and the bronze portion (covered in corrosion and marine growth) broke into a number of pieces.
- \* The mechanism was at first thought to be broken pieces of statuary. It was only 8 months after its discovery that an archaeologist realized the lumps of brass were originally a mechanism. Even after this, the mechanism was nearly overlooked -- the statues and coins that were recovered drew far more attention. When the mechanism was first discussed, the majority of experts felt it must be some sort of astrolabe -- a ship's navigational instrument not known before 625 AD. Others thought the mechanism was too complicated to be an astrolabe, while some thought the artisans who made the statues found in the wreck could not have been sophisticated enough to build even an astrolabe.
- \* The device itself is surprisingly small, about 33 cm (13 in) high, 17 cm (6.7 in) wide, and 9 cm (3.5 in) thick. It's made of a low-tin bronze, nearly pure copper.
- \* In any event, the mechanism then disappeared into obscurity a second time, for another 50 years. In the meantime, it was being painstakingly cleaned of much of its accumulated marine growth.

## 20th century studies

### Derek Price

\* In 1951, a British physicist and historian of science named Derek De Solla Price went to the Athens Museum for his own analysis of the fragments taken from the Antikythera wreck. Price himself was familiar with construction of medieval astrolabes, and the complexity of the device and the astronomical inscriptions visible on the surface led him to eight years of informed study.

\* In June 1959, Price's "An Ancient Greek Computer" was the lead article in *Scientific American*. Price proposed the theory that the Antikythera mechanism was a device for calculating the motions of stars and planets, which would make the device the first known analog computer. The idea was sufficiently unthinkable to the experts of the time that one professor claimed someone in the Middle Ages must have coincidentally dropped a machine of that era into the sea at the same spot off Antikythera's coast.

\* In 1971 the Oak Ridge national laboratory published an article on the use of high-energy gamma radiation to examine the interiors of metallic objects. Price, who by now was the first Avalon Professor of the History of Science at Yale University, teamed up with Charalampos Karakalos, professor of nuclear physics at the Greek National Centre of Scientific Research. Karakalos had gamma- and X-ray photographs made of the mechanism, which not only allowed them to puzzle out some of the gears' arrangements, but also to estimate its date of construction as being approximately 87 BC.

\* From the few inscriptions that could be read on the device (just a few hundred characters of text), Price decided that the device was linked closely to Geminus of Rhodes (island off the southern coast of modern-day Turkey), and likely had been built there. Aside from the text's similarity to a surviving book by Geminus, the presence of Rhodian pottery among other items from the wreck supported Price's deduction and date. Price also noted that Rhodes was a center for astronomical thought. Hipparchus (Greek astronomer, considered to be the greatest of ancient times) is thought to have worked at Rhodes from around 140 to 120 BC. Later, the philosopher Posidonius set up a school in Rhodes which continued Hipparchus' astronomical traditions.

\* In 1974, Price wrote "Gears from the Greeks: the Antikythera mechanism - a calendar computer from ca. 80 B.C.", where he presented a model of how the mechanism could have functioned. This was the first theoretical attempt at reconstructing the device. Unfortunately, Price was working from just traditional gamma- and X-ray images (2D), so it left room for imagination in the reconstruction. Apparently, Price also massaged some of the data, and in the process came up with a reconstruction that's been called "unnecessarily complicated." As a result, historians and archaeologists largely ignored the book, and he died in 1983.

\* Meanwhile, in the 1970's, more coins found at the site of the wreck by Jacques Cousteau have allowed the date of the shipwreck to be modified to sometime shortly after 85 BC.

### Michael Wright

\* In the 1980's, Michael Wright, at the time Curator of Mechanical Engineering at The Science Museum, London, and later of Imperial College, London, made a completely new study of the original fragments together with Allan Bromley. Bromley, a computer scientist at Sydney University in Australia, wanted to study the machine with X-ray tomography, which essentially builds up 3-D images from cross-sections.

\* Since the mechanism's fragments are too fragile to move from the museum, and Bromley couldn't afford to ship a CT machine to Athens, Wright built a simple CT scanner on the site.

\* Working from the data collected by their CT scans, Wright developed an entirely different reconstruction. The arrangement of the surviving gearing is not as Price described. The function of both back dials is changed. There is evidence that further mechanism has been



lost from under the front dial and that this dial display was more elaborate than previously supposed. Wright's working model demonstrates the possibility that it might have been a fully-elaborated orrery, corresponding to those mentioned in ancient literature.

### **New news -- Antikythera Mechanism Research Project**

- \* AMRP -- a joint program between Cardiff University, the National and Kapodistrian University of Athens, the Aristotle University of Thessaloniki, the National Archaeological Museum of Athens, X-Tek Systems UK and Hewlett-Packard USA, funded by the Leverhulme Trust and supported by the Cultural Foundation of the National Bank of Greece.
- \* It was announced in Athens on 21 October 2005 that new pieces of the Antikythera mechanism had been found. There are now 82 fragments. Most of the new pieces had been stabilized but were awaiting conservation.
- \* AMRP built a microfocus (small X-ray focal spot) computerised tomographer at the museum. The CT system itself weighed over 7.5 tons, while the whole set of equipment weighed over 12 tons. This allowed the generation of detailed, 3D X-ray images of the device.
- \* The AMRP's first results were announced at an international conference in Athens on November 30 and December 1, 2006.
- \* In parallel, on 30 November, the journal Nature published a new reconstruction of the mechanism based on the high resolution X-ray tomography performed by the AMRP. This work doubled the amount of readable text (from about 1,000 to 2,000 characters), corrected prior transcriptions, and provided a new translation. Since some of the lettering is less than 2 mm high, and there are no spaces breaking up words, decyphering the text is no small feat.
- \* The new work proposes that the mechanism originally had at least 37 gears, of which 30 still survive, and was used for prediction of the position of the sun, moon, and probably planets.
- \* On the front face were graduations for the solar cycle and the zodiac together with pointers that indicated the position of the sun and the moon, and the lunar phase. Based on the inscriptions, which mention the stationary points of the planets, the authors speculate that planetary motions may also have been indicated here.
- \* On the back, two spiral pointers indicated the state of two further important astronomical cycles: the Saros cycle, the period of approximately 18 years separating the return of the sun, moon and earth to the same relative positions (essential in eclipse prediction); and the Callippic cycle that spread 940 cycles over approximately 76 years.

### **Wrapup**

#### **By any measure, the Antikythera mechanism was a stunning piece of work for its time.**

- \* The mechanism's level of miniaturization and complexity of its parts are comparable to those of 18th century clocks.
- \* No signs of rework, no evidence of any mistakes. No signs to suggest that the design changed as the mechanism was built. So the mechanism wasn't a prototype, and must have had a number of predecessors.
- \* Based on scans of the gears, it was repaired in at least two places -- so it obviously was in use, not a decorative object. Dated by Price to 87 BC, by AMRP to 150-100 BC; shipwreck occurred between 80 and 60 BC so it was in use for at least a few years, possibly decades.

#### **One of the amazing things about the mechanism is how stubbornly its lessons have been fought.**

- \* Cicero, a Roman statesman in the 1st century BC, wrote about two devices similar to the Antikythera mechanism. The first was built by Archimedes and brought to Rome after Archimedes' death at the siege of Syracuse (in Sicily) in 212 BC. The device showed the motions of the sun, moon and five planets were shown by the device. Cicero also says that another such device was built 'recently' by his friend Posidonius, "... each one of the revolutions of which brings about the same movement in the sun and moon and five wandering stars [planets] as is brought about each day and night in the heavens..."
- \* Since both these devices were located in Rome at least 50 years after the Antikythera shipwreck, neither could be the Antikythera mechanism. So the Antikythera device had to be the product of a technology that had existed in the Greek world for hundreds of years.
- \* Development of science & technology rarely follows a simple, linear path. But one mystery here is how such an established, advanced technology could nearly drop off the face of the planet. Some of the technology seems to have made its way to the Muslim world, where simpler but similar devices were made for hundreds of years. This knowledge then may have made its way back to the West at the birth of the renaissance. Still, the level of sophistication seen in the Antikythera mechanism wouldn't be seen again for more than a thousand years.
- \* One of the odd little ironies of this mechanism -- it was discovered by divers on their way home from Tunisia (N. Africa) to Syme, a small island north of Rhodes. Only stopped at Antikythera to take shelter from a storm. Mechanism was likely built in Rhodes, and may well have sunk during similar storm off coast of Antikythera.
- \* Another irony -- mechanism is hard to puzzle out, due to damage done by 2000+ years of immersion in sea water. Yet the water also protected the mechanism -- along with the craft value of bronze (easily remelted for reuse), bronze was used for low-denomination coinage at the time the mechanism was built. As a result, bronze finds from antiquity are rare -- many of the more significant historical bronze finds have been made underwater, where they escaped being remelted and reworked.
- \* AMRP plans on forming an archive of data on the mechanism as research is completed. This should start by the end of 2007, so stay tuned...

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## **Sources and background material**

### **Background**

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