Concho Valley Archeological Society Newsletter

January 2013

New Officers voted in at Christmas Party

First, we would once again like to thank Karla Clark for all her work and wonderful food at the CVAS Christmas party. The party had great attendance, the band was great and the food delicious.

We voted in new officers at the party and they are; President: Callan Clark, Vice President: Tom Ashmore, Secretary: Ginger Hudspeth, Treasurer: Peter Norris.

CVAS Artifact Cataloging

A big thanks to the twenty CVAS Members that helped with the lab at Fort Concho on Saturday. With the good turnout of energetic workers we finished the lab work in record time. Thanks to Fort Concho for providing hot coffee and donuts, and for a warm place to conduct the lab work. Sorry you were so fast that you finished before noon and worked yourselves out of a free hamburger meal. Oh well, Bob, maybe next time.

As we begin another year in the CVAS, thanks to the members who have volunteered there time to be officers and committee members. Your leadership is greatly appreciated.

A special thanks to all of the officers and committees that served during the past year. Job well done!

Larry

Great software Opportunity for all CVAS members

I ran across a website that was linked to from the official Microsoft website for non-profit organizations. This website has substantial discounts for major software packages available to members of non-profit organizations. As an example, they offer a 50-site license for Microsoft Office 2010 for $21. That means every member of our organization could download this software for free once we obtained the license. This will be especially useful for members to pass information back and forth in a format that is equivalent. We have had some problems in the past with officers trying to pass information back and forth using various software applications and versions, making it difficult.

We are in the process of processing all the proper paperwork and will then purchase this first software license. Once that is done I will provide everyone a step-by-step instructional guide via email for getting the download from the site.

Annual Dues

It's time again to pay annual membership dues. If you haven't already, you can fill out the form on the back of the newsletter, mail it or take it to a meeting. We also have the form available on our website.

CVAS Christmas Party

Upcoming Events—Iraan & CVAS

Jan 19th – Iraan Archeology Society Field Trip – Oasis Ranch in Terrell County to record two rock art shelters with TAS Rock Art Task Force. The Lodge and Bunkhouse has been reserved for those wishing to stay overnight on Friday and / or Saturday nights.
Jan 24th—CVAS meeting
Jan 26th – Iraan Archeology Society Banquet Speaker will be Andy Cloud, Director of CBBS (contact C.A. or Callan for more information).
Also, we are working on a couple of projects for February and March, but we cannot announce them yet, as we need to firm everything up with the land owners.

January Meeting Presentation

I asked Cory Robinson to speak to us on January 24th and he has confirmed his intentions. His subject is Fort Concho and some new info that he has discovered reading the archives. When I spoke to Cory about this subject I became very intrigued by the new information and decided that this would be a good subject for our meeting. We look forward to seeing you there...........c.a. maedgen

Cataloging Lab at Ft Concho

After finally satisfying the state of Texas with all the necessary paper work, the CVAS trailer is now officially in CVAS' name. We have been issued a new license tag and have our trailer license fee paid for one year. The license ownership reads CVAS as the owner. We owe a thanks to C.A. Maedgen for his work on getting this transfer accomplished.

Decoding an ancient computer

By Tony Freeth, Scientific American

The following is excerpted from a much more detailed article you can find at:
http://www.cs.virginia.edu/~robins/Decoding_an_Ancient_Computer.pdf

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If it had not been f or two storms 2,000 years apart in the same area of the Mediterranean, the most important technological artifact from the ancient world could have been lost forever. The first storm, in the middle of the 1st century B.C., sank a Roman merchant vessel laden with Greek treasures.

The second storm, in A.D. 1900, drove a party of sponge divers to shelter off the tiny island of Antikythera, between Crete and the mainland of Greece. When the storm subsided, the divers tried their luck for sponges in the local waters and chanced on the wreck.

Months later the divers returned, with backing from the Greek government. Over nine months they recovered a hoard of beautiful ancient Greek objects—rare bronzes, stunning glassware, amphorae, pottery and jewelry—in one of the first major underwater archaeological excavations in history.

One item attracted little attention at first: an undistinguished, heavily calcified lump the size of a phone book. Some months later it fell apart, revealing the remains of corroded bronze gearwheels—all sandwiched together and with teeth just one and a half millimeters long—along with plates covered in scientific scales and Greek inscriptions. The discovery was a shock: until then, the ancients were thought to have made gears only for crude mechanical tasks. Three of the main fragments of the Antikythera mechanism, as the device has come to be known, are now on display at t he Greek National Archaeological Museum in Athens. They look small and fragile, surrounded by imposing bronze statues and other artistic glories of ancient Greece. But their subtle power is even more shocking than anyone had imagined at first.

I first heard about the mechanism in 2000. I was a filmmaker, and astronomer Mike Edmunds of Cardiff University in Wales contacted me because he thought the mechanism would make a great subject for a TV documentary. I learned that over many decades researchers studying the mechanism had made considerable progress, suggesting that it calculated astronomical data, but they still had not been able to fully grasp how it worked. As a former mathematician, I became intensely interested in understanding the mechanism myself.

Edmunds and I gathered an international collaboration that eventually included historians, astronomers and two teams of imaging experts. In the past few years our group has reconstructed how nearly all the surviving parts worked and what functions they performed. The mechanism calculated the dates of lunar and solar eclipses, modeled the moon's subtle apparent motions through the sky to the best of the available knowledge, and kept track of the dates of events of social significance, such as the Olympic Games. Nothing of comparable technological sophistication is known anywhere in the world for at least a millennium afterward. Had this unique specimen not survived, historians would have thought that it could not have existed at that time.

As our group began its efforts, we were hampered by a frustrating lack of data. We had no access to the previous x-ray studies, and we did not even have a good set of still photographs. We asked Hewlett-Packard in California to perform state-of-the-art photographic imaging and X-Tek Systems in the U.K. to do three-dimensional x-ray imaging. After four years of careful diplomacy, John Seiradakis of the Aristotle University of Thessaloniki and Xenophon Moussas of the University of Athens obtained the required permissions, and we arranged for the imaging teams to bring their tools to Athens, a necessary step because the Antikythera mechanism is too fragile to travel.

Unexpectedly, the x-rays revealed more than 2,000 new text characters that had been hidden deep inside the fragments. (We have now identified and interpreted a total of 3,000 characters out of perhaps 15,000 that existed originally.)

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Decoding an ancient computer

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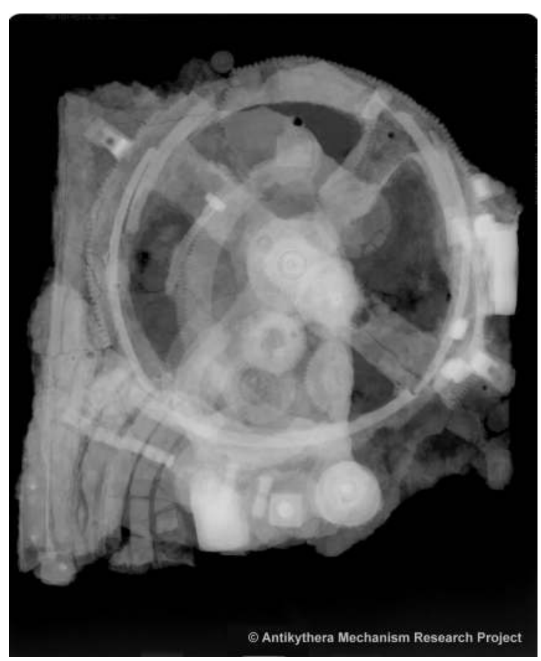
I began to examine the CT scans as well. Certain fragments were clearly all part of a spiral dial in the lower back. An estimate of the total number of divisions in the dial's four-turn spiral suggested 220 to 225. The prime number 223 was the obvious contender. The ancient Babylonians had discovered that if a lunar eclipse is observed—something that can happen only during a full moon—usually a similar lunar eclipse will take place 223 full moons later. Similarly, if the Babylonians saw a solar eclipse—which can take place only during a new moon—they could predict that 223 new moons later there would be a similar one (although they could not always see it: solar eclipses are visible only from specific locations, and ancient astronomers could not predict them reliably). Eclipses repeat this way because every 223 lunar months the sun, Earth and the moon return to approximately the same alignment with respect to one another, a periodicity known as the Saros cycle.

Between the scale divisions were blocks of symbols, nearly all containing Σ (*sigma*) or *H* (*eta*), or both. I soon realized that Σ stands for Σεληνη (*selene*), Greek for "moon," indicating a lunar eclipse; *H* stands for Ηλιοσ (*helios*), Greek for "sun," indicating a solar eclipse. The Babylonians also knew that within the 223-month period, eclipses can take place only in particular months, arranged in a predictable pattern and separated by gaps of five or six months; the distribution of symbols around the dial exactly matched that pattern. I now needed to follow the trail of clues into the heart of the mechanism to discover where this new insight would lead. The first step was to find a gear with 223 teeth to drive this new Saros dial. A previous study had estimated that a large gear visible at the back of the main fragment had 223. With plausible tooth counts for other gears and with the addition of a small, hypothetical gear, this 223-tooth gear could perform the required calculation. But a huge problem still remained unsolved and proved to be the hardest part of the gearing to crack. In addition to calculating the Saros cycle, the large 223-tooth gear also carried the epicyclic system: a sandwich of two small gears attached to the larger gear in teacup-ride fashion. Each epicyclic gear also connected to another small gear. Confusingly, all four small gears appeared to have the same tooth count—50—which seemed nonsensical because the output would then be the same as the input.

After months of frustration, I remembered that it was previously observed that one of the two epicyclic gears has a pin on its face that engages with a slot on the other. The idea was that the two gears turned on slightly different axes, separated by about a millimeter. As a consequence, the angle turned by one gear alternated between being slightly wider and being slightly narrower than the angle turned by the other gear. Thus, if one gear turned at a constant rate, the other gear's rate kept varying between slightly faster and slightly slower. I realized that the varying rotation rate is precisely what is needed to calculate the moon's motion according to the most advanced astronomical theory of the second century B.C., the one often attributed to Hipparchos of Rhodes.

There was one further complication: the apogee and perigee are not fixed, because the ellipse of the moon's orbit rotates by a full turn about every nine years. The time it takes for the body to get back to the perigee is thus a bit longer than the time it takes it to come back to the same point in the zodiac. The difference was just 0.112579655 turns a year. With the input gear having 27 teeth, the rotation of the large gear was slightly too big; with 26 teeth, it was slightly too small. The right result seemed to be about halfway in between. So I tried the impossible idea that the input gear had 26 1/2 teeth. I pressed the key on my calculator, and it gave 0.112579655—exactly the right answer. It could not be a coincidence to nine places of decimals! But gears cannot have fractional numbers of teeth. Then I realized that 26 1/2 × 2 = 53. In fact, Wright had estimated a crucial gear to have 53 teeth, and I now saw that that count made everything work out. The designer had mounted the pin and slot epicyclically to subtly slow down the period of its variation while keeping the basic rotation the same, a conception of pure genius.



We also realized that the epicyclic gearing system, which is in the back of the mechanism, moved a shaft that turned inside another, hollow shaft through the rest of the mechanism and to the front, so that the lunar motion could be represented on the zodiac dial and on the lunar phase display. All gear counts were now explained, with the exception of one small gear that remains a mystery to this day.

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Decoding an ancient computer

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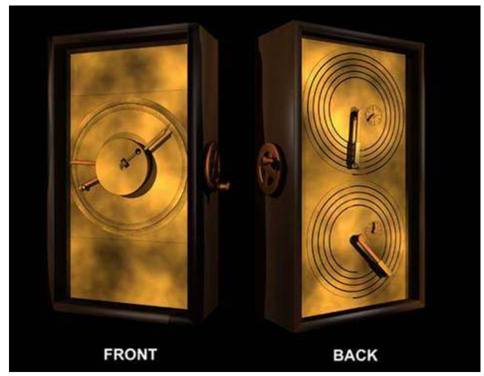
The Antikythera mechanism was built around the middle of the 2nd century B.C., a time when Rome was expanding at the expense of the Greek-dominated hellenistic kingdoms. The device was operated by turning a crank on its side, and it displayed its output by moving pointers on dials located on its front and back. By turning the crank, the user could set the machine on a certain date as indicated on a 365-day calendar dial in the front. (The dial could be rotated to adjust for an extra day every four years, as in today's leap years.) At the same time, the crank powered all the other gears in the mechanism to yield the information corresponding to the set date. A second front dial, concentric with the calendar, was marked out with 360 degrees and with the 12 signs representing the constellations of the zodiac. These are the constellations crossed by the sun in its apparent motion with respect to the "fixed" stars—"motion" that in fact results from Earth's orbiting the sun—along the path called the ecliptic. The front of the mechanism probably had a pointer showing where along the ecliptic the sun would be at the desired date.



The dial on the upper back might be a lunar calendar, based on the 19-year, 235-lunar-month cycle called the Metonic cycle. This calendar is named after fifth-century B.C. astronomer Meton of Athens—although it had been discovered earlier by the Babylonians—and is still used today to determine the Jewish festival of Rosh Hashanah and the Christian festival of Easter. Later, we would discover that the pointer was extensible, so that a pin on its end could follow a groove around each successive turn of the spiral.

Further research has caused us to make some modifications to our model. One was about a small subsidiary dial that is positioned in the back, inside the Metonic dial, and is divided into four quadrants. The first clue came when I read the word "*NEMEA*" under one of the quadrants. Alexander Jones, a New York University historian, explained that it refers to the Nemean Games, one of the major athletic events in ancient Greece. Eventually we found, engraved round the four sectors of the dial, most of "*ISTHMIA,*" for games at Corinth, "*PYTHIA,*" for games at Delphi, "*NAA*," for minor games at Dodona, and "*OLYMPIA,*" for the most important games of the Greek world, the Olympics. All games took place every two or four years. Previously we had considered the mechanism to be purely an instrument of mathematical astronomy, but the Olympiad dial—as we named it—gave it an entirely unexpected social function.

The question of where the mechanism came from and who created it is still open. Most of the cargo in the wrecked ship came from the eastern Greek world, from places such as Pergamon, Kos and Rhodes. It was a natural guess that Hipparchos or another Rhodian astronomer built the mechanism. But text hidden between the 235 monthly scale divisions of the Metonic calendar contradicts this view. Some of the month names were used only in specific locations in the ancient Greek world and suggest a Corinthian origin. If the mechanism was from Corinth itself, it was almost certainly made before Corinth was completely devastated by the Romans in 146 B.C. Perhaps more likely is that it was made to be used in one of the Corinthian colonies in northwestern Greece or Sicily. Sicily suggests a remarkable possibility. The island's city of Syracuse was home to Archimedes, the greatest scientist of antiquity. In the first century B.C. Roman statesman Cicero tells how in 212 Archimedes was killed at the siege of Syracuse and how the victorious Roman general, Marcellus, took away with him only one piece of plunder—an astronomical instrument made by Archimedes. Was that the Antikythera mechanism? We believe not, because it appears to have been made many decades after Archimedes died. But it could have been constructed in a tradition of instrument making that originated with the eureka man himself.

Many questions about the Antikythera mechanism remain unanswered—perhaps the greatest being why this powerful technology seems to have been so little exploited in its own era and in succeeding centuries.

Archaeologists return to ancient Greek 'computer' wreck site

http://www.guardian.co.uk, by Jo Marchant, 2 Oct 2012

In 1900, Greek sponge divers stumbled across "a pile of dead, naked women" on the seabed near the tiny island of Antikythera. It turned out the figures were not corpses but bronze and marble statues, part of a cargo of stolen Greek treasure that was lost when the Roman ship carrying them sank two thousand years ago on the island's treacherous rocks.

It was the first marine wreck to be studied by archaeologists, and yielded the greatest haul of ancient treasure that had ever been found. Yet the salvage project – carried out in treacherous conditions with desperately crude equipment – was never completed. So this month, armed with the latest diving technology, scientists are going back.

Between 1900 and 1901, the sponge divers retrieved a string of stunning antiquities, including weapons, jewellery, furniture and some exquisite statues. But their most famous find was a battered lump that sat unnoticed for months in the courtyard of Athens' National Archaeological Museum, before it cracked open to reveal a bundle of cogwheels, dials and inscriptions.

It has taken scientists over a hundred years to decode the inner workings of those corroded fragments, with x-ray and CT scans finally revealing a sophisticated clockwork machine used to calculate the workings of the heavens (video).

Dubbed the Antikythera mechanism, it had pointers that displayed the positions of the sun, moon and planets in the sky, as well as a star calendar, eclipse prediction dial and a timetable of athletics events including the Olympics.

It's a stunning piece of technology that revolutionises our understanding of the abilities of the ancient Greeks. Nothing close to its complexity is known to have been created for well over a thousand years afterwards, and the emergence of mechanical clocks in medieval Europe.

There are questions that remain unanswered, such as where it's from and who built it (Posidonius, a philosopher who lived on Rhodes during the first century BC, is one candidate, while the third century BC genius Archimedes may have invented this type of device). But one of the most intriguing mysteries relates to the wreck on which it was found. What's still down there?

The wreck lies in around 60 metres of cold, rocky, current-swirled water – not an easy place to visit. The sponge divers who salvaged its cargo worked in clunky metal diving suits with little understanding of the dangers of diving at such depth. By the time they abandoned their project, two of them had been paralysed by the bends, and one was dead. They left behind stories of abandoned treasures, including giant marble statues that rolled down the steep slope from the wreck and out of reach.

The undersea explorer Jacques Cousteau spent a couple of days at the wreck site in 1978 and brought up some precious smaller items, including some coins from the Asia Minor coast, which suggested that the ship sailed from there around 70-60 BC (probably carrying war booty from Greek colonies back to Rome). But even with their sleek scuba gear, Cousteau's divers could spend only brief minutes on the seabed without risking the bends.

No one has been back since. Now, after years of negotiations with the Greek authorities, Brendan Foley, a marine archaeologist based at Woods Hole Oceanographic Institution in Massachusetts, finally has permission to dive at Antikythera. He's working with Greek archaeologists including Theotokis Theodoulou of the Ephorate of Underwater Antiquities.

This week, the team begins a three-week survey using rebreather technology, which recycles unused oxygen from each breath and allows divers to stay deeper for longer. The aim is to survey the wreck site properly for the first time, to find out once and for all what has been left down there – and to check down the slope, to 70 metres depth or more, to see if those stories of runaway statues are true.

Any items found on the wreck site could provide further clues to the origin or ownership of the ship. And not all of the pieces of the Antikythera mechanism were ever found. It's a long shot, but those missing bits could still be on the seabed.

This isn't what gets Foley most excited about the project, however. His team will also dive around the entire island, a distance of about 17 nautical miles, using James Bond-style propellers to cover ground quickly. Foley hopes this could reveal a whole clutch of previously unknown wrecks.

The island of Antikythera sits in the middle of what has been a busy trade route since ancient times: a treacherous shard of rock notorious for downing ships in a storm. In Roman times, it was also an infamous centre for pirates. So it's a good bet that there are plenty of other wrecks here, from all periods of history.

On a two-day reconnaissance survey in June this year, Foley and his team discovered the wreck of a British warship called HMS Nautilus, lost in 1807, plus a range of ancient anchors, ceramics and a 19th-century naval gun.

This suggests the area hasn't been looted (which makes sense given the difficulty of diving here), so any new wrecks found could be pristine. "Everyone is very, very excited," Foley says of the upcoming mission. "This ought to be extraordinary."

He also points out that the Antikythera ship, with its valuable cargo, is unlikely to have been travelling alone. When it sank, others in its fleet may have gone down too. Could one of them have been carrying another Antikythera mechanism? For the past hundred years, this awe-inspiring device has stood alone, our only glimpse into a technology lost for millennia. That might – just might – now change.

WE'RE ON THE WEB AT CVASSANANGELO.ORG

Meeting Location

Please remember that our meetings are now in the classroom at the Fort Concho Living History Stables, **236 Henry O. Flipper St. We enter through the side door.**

2013 Membership Application

Name____

Address______________________________________

City________________________________

Zip_________ Phone__________________

Cell___________________

Family members_____________________________________

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Email_________________________________

Individual	**$15**	☐
Family	**$20**	☐
Student or military N/C		☐

(active military only)

I pledge I will not intentionally violate the terms or conditions of any current or future state or local statute concerning cultural resources or engage in the practice of buying or selling artifacts for commercial purposes, or engage in the willful destruction of archeological data, or disregard proper archeological field techniques

Signature____________________________ Date___________

Mail to: CVAS, 4063 Green Meadow Dr., San Angelo, TX 76904