

EPILOGUE: Following his official retirement from Dartmouth College on June 30, 1996, Professor Malmström has taught a number of adult education courses for the ILEAD Program of Dartmouth, including “How Time Began in America”, “The Polynesian World”, “The Making of Europe”, and, in the fall term of 2010, a course he titled “Solving Ancient Mysteries” which summed up his investigation of a number of questions that have intrigued him at different stages in his career. In response to student requests for him to itemize the results of his wide-ranging inquiries, he prepared the following chronology that was distributed to them on the occasion of his ‘second retirement’ from, and final class at ILEAD, on November 10, 2010.

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**“Solving Ancient Mysteries”: A Chronology
of the Research Findings of V. H. Malmström,
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- 1973 -- SCIENCE published my paper on Izapa as the birthplace of so-called Maya calendar in its September 7 issue; I had ‘discovered’ the site by comparing clues from my readings, but had not yet visited it; three principal factors were involved in my conclusion: **astronomy** – Izapa is located at latitude 14.8° N. where the zenithal sun passes overhead on August 13th, the day on which the Maya believed the present world began; **geography** – it is also located in the Pacific lowland where animal species such as the alligator, iguana, and monkey (all represented by day-names in the calendar) are native, i.e., its ecological niche is ‘correct’; and **history** – it is an archaeological site which traces its origin to the pre-Classic period, i.e., prior to 300 AD, when evidence of time-keeping in the Maya region first appears, so its chronology is also ‘correct’
- 1974 -- Izapa confirmed not only as birthplace of 260-day sacred calendar, but also of 365-day secular calendar; although site is internally oriented toward Tacaná, second highest volcano in region, it also is oriented to the summer solstice sunrise over Tajumulco, the highest mountain in Central America; Because it is situated in an area that was originally inhabited by a people speaking Tapachulteca, one of

- the Zoquean languages, it was also recognized as a creation of the **Zoques** rather than of the Maya
- 1975 -- Discovery that the major site of **Teotihuacán** outside of Mexico City is oriented to the August 13th sunset; I had my students work out the orientation of the steps of the Pyramid of the Sun, and they found them aimed at an azimuth of 285.5°; I then had them calculate the declination of the sun that corresponded to that date, which turned out to be 14.8° N. latitude; this meant nothing to them until I explained that zenithal passage of sun took place over that latitude on August 13th, and that this was the location of Izapa; These calculations proved that the sacred calendar was already known on Mexican plateau by the year -150, date of Pyramid of the Sun's construction
- 1975 – While measuring possible alignment of two stone sculptures near main pyramid at Izapa, I discovered that the one which I and my students identified as the head of a turtle had strong **magnetic properties** (one pole in snout, other at back of head); it had earlier been identified as a 'frog' by New World Archaeological Foundation, but its magnetic properties had been overlooked; now recognized as probably the oldest magnetic artifact in world, the journal *NATURE* published my article describing it on February 5, 1976
- 1976 – Employing Dartmouth's computer facilities, I determined several critical dates in the evolution of Mesoamerican calendrical systems; summary article published in *Journal for the History of Astronomy*, published by Cambridge University \
- Pinpointed the origin of the 260-day sacred almanac to August 26, -1358 by matching its starting date of 1 Imix to the equivalent of our Gregorian date of August 13 (The Julian Calendar would have been thirteen days out of synch with the 'real world' had it existed at that time.)
- Fixed the origin of the 365-day secular calendar to July 4, -1323, the Julian equivalent of our present Gregorian occurrence of the summer solstice (June 22), which was calibrated by the sunrise over Tajumulco, the highest volcano in Central America as seen from Izapa; The first name-day of the secular count (0 Pop) coincided with the summer solstice on that date
- Confirmed that the origin of the Long Count took place on September 18, -236 (a date first suggested by John Teeple in 1930) but dismissed by J.E.S. Thompson;

Whereas Teeple used a count of 73 katuns, I chose to find how many times in Maya history a katun had ended on a Cumku date; of the three times that it took place, this was the only date that made any sense – the first was too early and the third was too late

Learned that the Maya revised the beginning of their New Year to July 26, thanks to a clue from the notorious Bishop Landa; although he didn't know why they celebrated it on that day, I suspected that they had merely copied the older Zoque practice of marking the zenithal passage of the noon sun by moving it to a latitude more in keeping with their own geographic location in the Yucatan; this proved to be the case, because such an event occurs at latitude 19.5° N. on that day, and that is the location of only one major Maya archaeological site, namely Edzná in the state of Campeche; the first time this could have occurred on a day named 0 Pop was in the year 48 A.D., because the Maya calendar had to clear the “five unlucky days” of Uayeb first

- 1976 – Postulated that a northward advance of the Zoque peoples (“Olmecs?”) across the Tehuantepec Gap in the 12th century BCE was responsible for driving a wedge between the Maya-speaking tribes of the Gulf Coast, the Huastecs to the north and the Yucatecs to the south and east; such a dating would be consistent with the glottochronological studies of Swadesh that suggested their separation took place about that time
- 1976 – The examination of detailed maps of Mexico revealed that most of the major archaeological sites in Mesoamerica are **oriented to one of the solstices and/or to the August 13th sunset**, especially those of known Olmec origin; these included Teotihuacán, which is oriented to the winter solstice sunrise over Orizaba, by means of a hypothesized ‘relay station’ on an intervening mountain ridge to the southeast
- 1977 – Field work in Mesoamerica, ranging from northern Mexico to El Salvador, visually confirmed the map studies of the previous year
- 1978 -- Discovered solstitial alignments at Trollakistan and Ales Stenar archaeological sites in Sweden; **Megalithic** origin hypothesized for both; (Trollakistan proven to be of Megalithic origin by Swedish archaeologist a couple of years later; origin of

Quartzite (sandstone) blocks used for ‘bow’, ‘stern’, and ‘rudder’ stones of Ales Stenar ‘ship setting’ established as having come from sea-side quarry near town of Simrishamn some 20 miles (30 km) to north east, whereas ‘gunnels’ were composed of reddish granite glacial erratics dragged to top of 100 ft. ridge overlooking Baltic Sea; determined that bow stone marks azimuth of winter solstice sunrise, and stern marks summer solstice sunset; also noted that Ales Stenar lies at only latitude in Northern Hemisphere where sunrise and sunset are exactly 90° apart at solstices

1979 – Discovered that Ranstena (Askeberga) archaeological site in Sweden is oriented to winter solstice sunset over Billingen (mountain); also identified it as **Megalithic** site, due to massive size of the 24 stones that comprise it; although Swedish archaeologists maintain the site is of Iron Age origin and that the mammoth stones were brought in from the west across the clay lake-plain, I argue instead that because the local geology differs from the east to the west of the site, the stones had to be brought in from the east and, in that case, were most likely rafted down the Tidån river to the location of a ford (still identified by the place name, Tidavädd (meaning “Tidån ford”), scarcely a kilometer away from where the actual ‘ship setting’ stands today

1979 -- Discovery that Edzná was **earliest Maya astronomical center**; Its location adjacent to the largest agricultural lowland (aguada) in Yucatan revealed that the Maya had chosen the most favorable location in their region as the site of their earliest major urban center

Had already confirmed that Maya had changed the beginning of their New Year there from August 13th to July 26th, most likely in the year 48 AD

Discovered that entire site was oriented to August 13th sunset;

Discovered that pyramid labeled “La Vieja” marked northernmost setting point of moon, most probably used as **lunar observatory** to assist in prediction of eclipses; dated by Ray Matheny of Brigham Young University to -150

Hypothesized that this was **site visited by Bishop Landa** when he burned Maya books in 1553

- 1979 – Discovery that the major pyramids at Tikal were all conceived and built as part of an integrated ‘**astronomical matrix**’ in which each of the structures marked a key date of the Maya calendar; the alignment from Temple I to Temple III marked the solstices, with I marking the sunrise position and III marking sunset; Temple I to IV marked the August 13th sunset, and IV to III marked the winter solstice sunrise over the latter’s triple-tiered roof comb that itself marked the summit of Victoria Peak, the highest mountain visible from Tikal; although Temple II was recognized as having served chiefly as an esthetic counterweight to Temple I, an alignment from Temple V to Temple II marked the most westerly position of the Maya’s equivalent to a polestar, Kochab; angled at 8° W of north, the latter essentially duplicates the Olmec orientation at La Venta some 1800 years earlier
- 1979 -- Discovery of **magnetic properties** of so-called “Fat Boy” sculptures at La Democracia, Guatemala; later picked up by TIME magazine, Das Bild in Germany, etc.
- 1983 -- Confirmed spread of Zoquean languages into Popoluca and Mixe areas; the existing scattered linguistic pockets were formed as people fled into adjacent mountain regions due to the later Aztec advance; making use of Swadesh’ diagnostic word-list, I was able to find a two-thirds convergence between the Popoluca and Zoque languages, but only about a fifty percent similarity between the Zoque language and the more isolated Mixe tongue; the origin of the Zoques in the Pacific coastal plain of Mexico also explains the presence of words from adjacent languages to their south (such as **Xinca and Lenca**) in their vocabulary, as reported by Campbell and Kaufman in a 1976 paper
- 1985 – A year’s sabbatical allowed me to ‘fill in’ my mental map of the world somewhat, with extended visits to Hawaii, New Zealand, Australia, China, Indonesia, Thailand, India, Brazil, Argentina, Chile, and Scandinavia
- 1987 to 2002 – Period of extensive travel and lecturing on cruise ships, especially in Europe, Caribbean, South America, West and South Africa, and Pacific
- 1991 – Discovered that known **Megalithic** sites of Carnac (1) and Stonehenge (2) are also located at latitudes where a **90° angle** exists (1) between extreme moon rising and setting positions,

and (2) between extreme sun rising and moon setting positions or extreme moon rising and sun setting positions; having already determined that Ales Stenar marked the latitude of 90° separation between extreme sun rising and setting positions; this confirmed the Megalithic origin of Ales Stenar for me, although Swedish archaeologists maintain that it dates to the Iron Age (i.e., 400-1050 AD)

- 1993 – Reached area where hypothesized ‘**relay station**’ lay on ridge between Teotihuacán and Orizaba and discovered numerous shards of ritual Aztec pottery (**subsequently confirmed by Dartmouth anthropologist Deborah Nichols**) indicating that the site had served as a location of some archaeological importance in earlier times
- 1995 – Using computer simulations, postulated that both the early Polynesian settlement of the Marquesas Islands (i.e., 300 AD) and their acquisition of the sweet potato from its South American hearth (i.e., Northern Peru – Southern Ecuador) resulted from voyagers using the rising azimuth of **Aldebaran** as their navigation guidepost; similar simulations revealed that the rising azimuth of **Adhara** probably served as the Polynesian guide between the Marquesas and Easter Island, where ‘overshooting’ the mark would have led them to make a landfall in south-central Chile instead (**confirmed by the discovery of chicken bones near Concepción, Chile in 2007**)
- 1997 – Many of my earlier ‘discoveries’ were first described in print early this year with the publication of my book titled “**Cycles of the Sun, Mysteries of the Moon: The Calendar in Meso-american Civilization**” by the University of Texas Press; these included, for example, the recognition of the fact that the celebration of the feast day of the patron saint of Mexico, “Our Lady of Guadalupe” on December 12th actually commemorated the Aztec sun-goddess Tonantzin on the winter solstice of the Julian calendar (page 213); (This finding was elaborated in a more extensive paper by Dr. Jesus Mora and a colleague from INAH some five years later.)
- 2002 – Postulated that the Chontalpa region of Tabasco, although lacking any evidence of Olmec or early Maya settlement, most likely was occupied as early as the adjacent floodplain areas of Veracruz state, and that massive changes in drainage may have

been responsible; the latter were chiefly due to the subsidence of the earth's crust beneath the compound delta of the Grijalva and Usumacinta river mouths, but may have been exacerbated by heavier precipitation in the later Classic period which contributed to the mainland demise of the Maya "Old Empire" civilization and the subsequent shift of its "New Empire" to the drier north of the Yucatán; supporting evidence is the **abandonment of the lower course of the Rio Grijalva** (now the Rio Seco) and the fact that **the foundations of the former port of Comalcalco are now standing in 15 cm (6 inches) of water**

2009 – Discovered that Scottish archaeological site of Callanish is oriented to Tirga Mor (mountain) on Isle of Lewis at winter solstice sunset; because it was founded before the Swedish site of Ranstena, it obviously served as a model for the latter, which is located within 25 miles (40 km) of its same latitude, and was likewise oriented to the highest topographic feature within view at the winter solstice; beyond the latitude of Callanish, the midsummer full moon 'disappears' every 19 years, as Gerald Hawkins earlier suggested, although he believed that Callanish was oriented to Clisham, the highest mountain on Lewis instead;. thus both this site and Ranstena must have marked the **northern limit of the oekumene**, or habitable world, as far as the Megalithic peoples were concerned; site was chosen most likely because initial progress of Megalithic people along coast of Harris took place on outer, Atlantic side rather than via the more protected Minch to the east, allowing them to observe Tirga Mor en route; implies more favorable weather conditions at time of their arrival (no doubt during so-called 'climatic optimum' described by Scandinavian climatologists)

2010 – Discovered that Eratosthenes, unable to measure true length of overland distances in stadia anywhere in Egypt, used an **'arbitrary' value of 700 units** to define 1 degree of latitude and thereafter keyed all his measurements to data most likely derived by first determining the location of both Alexandria and Cairo using trigonometry; assuming that Eratosthenes had employed the so-called Royal Egyptian stadion that measures 157.5 meters as his 'spatial yardstick' and multiplied this by his chosen module of 700 for one degree of latitude, I found that

both his calculated distance between the two cities and of Cairo's location to the east of Alexandria were very accurate; yet, when I substituted a value of 600 for 1 degree of latitude and the length of the stadion used in Attica (185 meters) as his distance measure, I found that Eratosthenes' results would have been **even more accurate** had he used these options from Greece instead; thus, his choice was not 'arbitrary' but was a modification of a value he had learned while in Athens

2010 – Discovered that both Callanish in Scotland and Ranstena in Sweden replicate the functions of Stonehenge in that they each demonstrate a 90° angle between the summer solstice sunrise position and the lunar *minimum* setting position, as well as between the lunar *minimum* rising position and the summer solstice setting position, and thereby confirm the Megalithic origin of Ranstena

2011 – While reviewing and testing Gerald Hawkins' theory of eclipse prediction at Stonehenge (as presented in his book titled "Stonehenge Decoded" --New York: Doubleday and Son, 1965) I observed that, while the 56 Aubrey holes found at the site may have been used to count the number of years in a lunar cycle composed of two intervals of 19 years and one interval of 18 years (i.e., 38+18), as Hawkins suggested, they likewise could have served as the smallest common denominator in counting the number of lunations, or full moons, in a saros cycle, a total of 223 such events being marked by just one less than four full circuits of the ring, i.e. $56 \times 4 = 224 - 1$. If the count proceeded for 12 lunations more, it would reach a total of 235, marking the passage of exactly 19 tropical years, each of 365.2422 days, which equated with the Metonic period and defined the return of a solar eclipse on the same day of the calendar year as it occurred 19 years earlier; that this interval was celebrated by the priests in Britain (most likely at Stonehenge) was known to the Greek historian Diodorus as early as the first century of the CE, but my research showed that it may well have been discovered as much as two millennia earlier by the Britons because it involved the heliacal rising of the Pleiades, which are so faint that they would not likely have been seen unless they came up at least a half hour before the sunrise – a situation that dated to between -2500 and -2000 BC