# TUSTRUP STENDYSSERNE

## *& THE FIBONACCI CODE*

by Dr Neil L. Thomas
"B.Sc. (Eng) London, Ph.D. Monash, M.I.E.Aust, C.Eng."

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**IN APPRECIATION** For Olé Holm Jensen and Helga Kvaale, whose help in 1982 made this book possible.

**About the Author:**
Dr Neil L Thomas, a chartered engineer in the Australian oil and gas industry, made field trips to Ireland, Wales, England, Scotland, the Netherlands, Denmark, France, the Middle East, Egypt, India, China, Canada and the USA. Years of research led to an understanding how the myths and folklore of north-west European peoples complement prehistoric monuments, the evidence fits together like a jigsaw.

**Review: -**
"Dr Thomas like many Australians with Celtic surnames before him went searching for his ancestors, only to stumble across an entirely pre-Celtic civilisation. His casual interest rapidly deepened, after twelve years of intensive scholarship he presented a brilliant PhD thesis – perhaps even definitive – in its interpretation of Britain and Ireland's Neolithic culture. From the vantage point of his training in engineering and mathematics, Dr Thomas obtained a fresh perspective of the design and function of the megalithic circles in Britain and Western Europe. Dr Thomas believes these ancient Britons worshipped the Sun and Moon, and probably gods corresponding to the three primary gods of the Norse pantheon – Odin Thor and Freyr. Stonehenge is the best-known of Britain's Neolithic relics."
Graeme O'Neill, retired Science Correspondent, 'The Age' newspaper, Melbourne.

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# PROLOGUE

**Welcome to Tustrup Stendysserne**

A first time visitor to Jutland's Tustrup stendysserne arrives to see an assembly of large and a scattering of smaller stones situated in the Djursland countryside. Several groups are perceived. A few may suggest the idea "What is all the fuss about?"

But do not be too ready to make a judgement. The "Old People" who created Tustrup stendysserne more than five thousand years ago were very knowledgeable and skilled. Between the endpapers of this booklet are explanations and copius information that endeavours to explain why each of the original stone placements was positioned to meet their particular purpose in the grand scheme of things.

**The Book and its Title**

The sub-title of this book '& the Fibonacci code' appears to link Denmark's important stendysserne ancient monument at Tustrup, Jutland with Italians and secret codes. Those words were carefully chosen to link today's romantic knowledge and experiences with the

actual beginnings of mathematics. There is a reason. The contents of the book are a compact history lesson; a very bright light shone in Denmark five millennia ago! Do you like detective stories?

To aid your appreciation of this book and its contents, the story has been arranged from the known to the unknown. From the present we know about, history is history, prehistory extends a long way into the distant past. The contents of "About Tustrup Stendysserne *& the Fibonacci Code*" is packed with new discoveries, the booklet's contents is a compact history lesson; a bright light shone in Denmark more than five thousand years ago!

Ancient mathematics began with very simple straight-forward counting techniques on fingers and thumbs. The first innovation was the use of numbers to perform additions and subtractions for commercial reasons. Two thousand and more years ago mathematician philosopher Pythagoras lived in a Greek city and geometrician Euclid taught at the world's first university in Alexandria, Egypt. Ever since their time the twin subjects were taught in much the same way in European schools and universities. The mathematical study of geometric figures had a basis in the theorem of Pythagoras concerning triangles where one corner is a right angle: "the square of the hypotenuse (linear value) equals the sum of the squares of the other two sides". A most quoted example is the right angled triangle whose side measures are in the ratio 3, 4, 5.

**Life's Ten Numbers**

On the anniversary of our birth family celebrations are a very important day for baby and all involved. A second year on and the new person can talk and ask for the things it wants. Another year and three year old boy children enjoy running as fast and as far as they can, enjoying new found freedom. Girl children learn how to communicate and find ways to persuade others to do their bidding. They learn a great deal in the next two years; aged five they enjoy the company of others of their own age, play games and use their brains to imagine situations. Education begins a more formal process and experience widens far beyond their immediate family. Daily schedules are obeyed, self-help in many things are learnt and the child absorbs knowledge and many skills. Eight years of age is the

time when boys and girls become distinct individuals and their own person. Teenage years begin about thirteen; many social skills and knowledge are acquired. The wider world beckons by twenty-one, the young adult is ready to take on the world.

At thirty-four, the fully fledged adult has his or her own family and is well-established in life, future prospects are a reality. Parental responsibilities occupy their minds, the couple's own children are growing into people in their own right. Their children become adults. Aged fifty-five with the children off their hands, distant destinations beckon. New facets of life appear, worldly experiences become a reality. By the age of eighty-nine life is generally much slower, and leisure is a firm part of life, recollections and reminiscences are frequent subjects in conversations with their peers.

Which brings your author to the point of all that. These ten key-note ages in everyone's life are 1, 2, 3, 5, 8, 13, 21, 34, 55 and 89. Perhaps that is why Stonehenge was designed and built in that way four and a half millennia past.

**Fibonacci, the man**

Leonardo da Pisa (c.1170-1250) was a thirteenth century Italian mathematician mostly referred to by the name Fibonacci. He lived in Mediterranean cities and is well known for his book "*Liber Abaci*" the "Book of Calculations" published in 1202. He was a leading figure in the movement to introduce the Hindu-Arabic number glyphs and the decimal system into Europe. The progressive arithmetic series named after him is described in *Liber Abaci* chapter twelve; 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, etc., a series derived by the addition of the previous two numbers to achieve the next, for example 1+2=3, 2+3=5, 3+5=8, 8+13=21 and so on. Stonehenge is a combination of eighty tall sarsen columns and linear dimensions that fully conform to nine items of the Fibonacci arithmetic progression series; 1, 2, 3, 5, 8, 13, 21, 34, 55, 89.

## ANCIENT MEASUREMENTS

This monograph principally concerns the Tustrup stendysserne, the important ancient monument in Djursland, Denmark, a prehistoric

site visited by many visitors every year. It was at the centre of metropolitan activities in ancient Denmark in the fourth millennium BC, more than five thousand years ago. The stendysserne epitomises the eventual achievement about 3100 BC of the sophisticated mathematical step to manipulate numbers for their own sake to achieve an aim.

An important objective is to explain the mathematical basis of the stendysserne designs and to emphasise the building blocks upon which they rest, linear dimensions in earlier times named Celtic foot and fathom. The 'Celtic foot' was quoted in Dr William Stukeley's books 'Roman Prints' 1758 and '*Itinerarium Curiosum*' 1776 published in London. For consonance and ease of recall I have varied the name from 'Celtic foot' to *'fut'* equal to 332 millimetres. The 'fathom' value was determined by Professor Alexander Thom in the nineteen sixties resulting from his statistical analysis of lengths obtained during land surveys of about 150 ancient monuments in Britain. He coined the linear unit term '*megalithic rod*' as explained in his title 'Megalithic Sites in Britain' published by the Oxford University Press in 1967. For easier comprehension linked to historical reasons I have re-named the linear unit '*faethm*', equal to 2.073 metres.

I have found in prehistoric times the size of the community gathering place, a structure and a henge, was equally simply described in terms of the length of the base line perimeter around a site, or the sum of lengths of a building's walls. The ancients' favoured unit was 33 x 2.073 metres = 68.4 metres. This unit I have termed the '*furlang*'. It is the height from head to heel of the Long Man of Wilmington in Sussex, England. This outline figure of a man holding two vertical staves portrays, I believe, the ancient surveyor of prehistoric millennia, the Druidman. This work concerns the consistent application of these selected linear values and symbolism in the millennia BC. Thirty-three was used for thousands of years to adjectivally attribute regal and sacred qualities to persons or places and artefacts. Two and a half and thirty-three were employed as multiplicands of the '*fut',* '*faethm*' and '*furlang*' to achieve larger linear values.

Development of the ancient measurement table has been the subject of innumerable observations of linear values. The *fut, faethm, pace, furlang* and *country mile* are most significant. Observe the 2½ and 33 multiplication factors from lesser units of measurement to the next higher value: -

**Ancient Measurement Table**

| | |
|---|---|
| One Celtic foot | = the *fut,* 332 mm, Wm Stukeley's foot |
| 2½ *fut* | = the *pace,* 830 mm, Thom 'megalithic yard' |
| 2½ *pace* | = the *faethm,* 2.073 metres. |
| 33 *faethms* | = the *furlang,* 68.4 metres. |
| 33 *furlangs* | = the *country mile,* 2.257 kilometres, = 1.402 English statute miles |
| 2½ *country miles* | = 1 *country league*, 5.64 kilometres. |

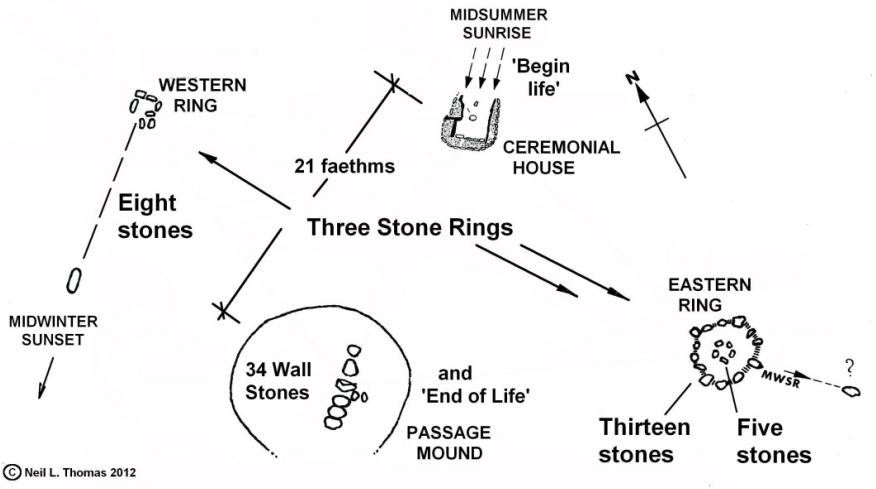
The phonetic consonance of *fut, faethm*, *furlang* are three linear measures named with a flavour of historic times. The name *faethm,* the O.E. "*fæþm*" derived from Beowulf c.750 AD, the first tale written in early English. The *furlang* is an early spelling version of 'furlong' the English 220 statute yards measure, now given the metric meaning; 33 x 2.073 metres = 68.4 metres. The English words *pace* and *country mile* and the *country league* have been adopted as expedient until more consonant names are found. The *pace* of 83 centimetres is rounded value, a millimetre more than Professor Thom's megalithic rod of 829 mm linked to his *megalithic yard* of 2.073 metres, a unit I now term the *pace*. Try pacing 83 cm yourself.

## KUML 1955

**Dr Poul Kjaerum**

Dr Kjaerum's archaeological report in the 1955 issue of Kuml, the journal of The Archaeological Society of Jutland, is the basis of this monograph on the features of the Tustrup stendysserne, an ancient monument of about 3100 BC, the Danish Neolithic period.

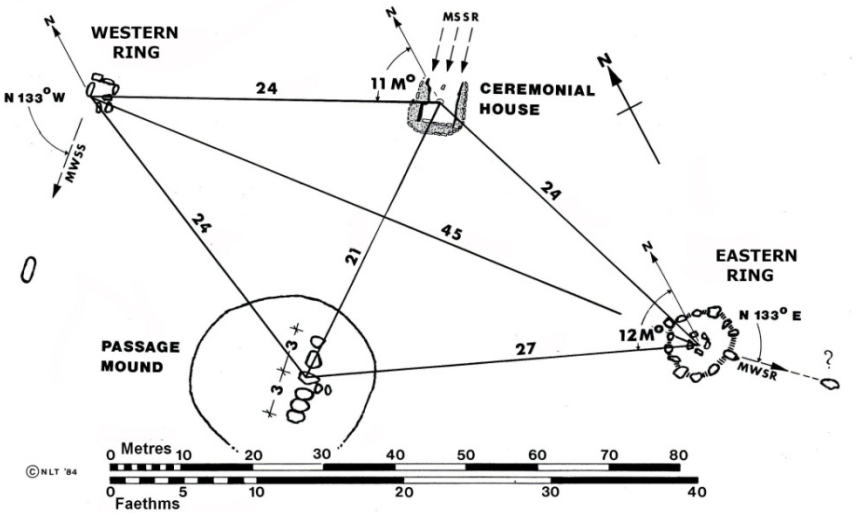
Included in the Paper was a basic diagram which has served to develop this annotated illustration of the stendysserne features: -




**TUSTRUP STENDYSSERNE FIVE FEATURES**

**Notes: -**

1. The original items shown in Dr Kjaerum's report on his 1954-5 archaeological work, the Ceremonial House, two concentric Eastern circles, a Passage Mound, the Western circle and its single megalith in the south-west are supplemented by directional arrows and additional wording.
2. During the 1982 visit by Mr Olé Holm Larsen of Jutland and Mr Neil L Thomas of Australia they observed a single prone megalith in position in an eastern adjacent private field marked on this illustration by an oval and a ? query mark. This megalith is thought be an indicator of the mid-winter sunrise bearing and should be considered part of the whole. Confirmation is required.
3. The indicated True North direction has an important bearing on the following discussions.




**TUSTRUP STENDYSSERNE PARALLELOGRAM**

## Notes

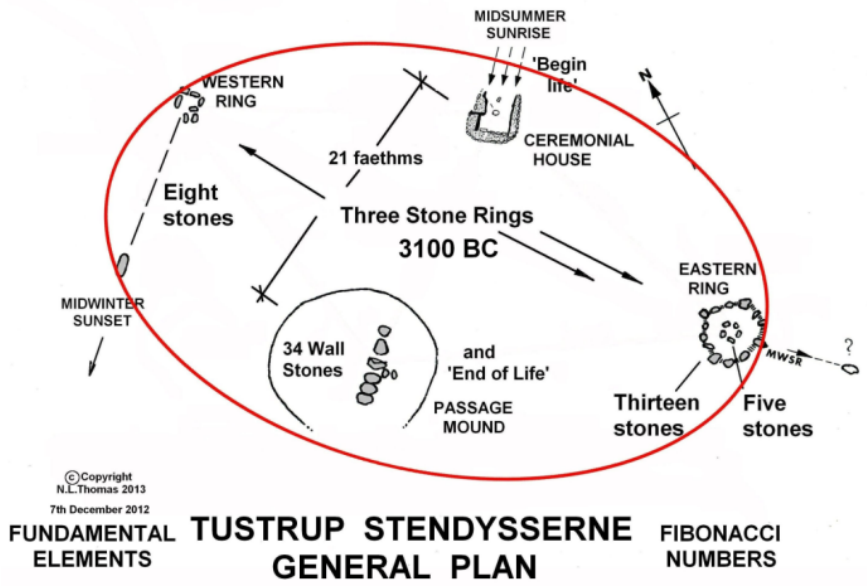
1. Dr Poul Kjaerum showed a scale bar in metres, an additional bar in *faethms* is added below the annotated illustration. A *faethm* = 2.073 metres.
2. In a figure termed a skewed parallelogram, twin digit numbers 21, 24, 27, 45 adjacent to dimension lines that join the four major items. These digits indicate the distances between the items in *faethms*. Observe the sum of all six dimensions is 165 *faethms*, exactly five times thirty-three, five *furlangs*. This linear quantity is the same as the perimeter of the inner edge of the ditch surrounding the very large calendar building Stanton Drew c.2900 BC in England.
3. Observe the indicated directions of mid-summer sunrise and mid-winter sunset as they relate to the Ceremonial House and the single megaliths at the left and right of the illustration.
4. Degrees of angular bearing from true north are shown as $M^{0}$, sixty fourths of a circle.

5. The next illustration shows a computer drawn oval whose locus is tangential to the five stendysserne components. The Ceremonial House forecourt extended beyond the wall zone indicated.

## FIBONACCI

**Number of Items**

The numbers of items comprising the stendysserne parallel the terms of the Fibonacci progressive arithmetic series. All are enclosed by an oval whose long and short axes are in the ratio 13 : 8.




The oval perimeter measures close to eight *furlangs,* a similar measure to the Stonehenge ring of fifty-six Aubrey Holes built about the same time 3100 BC in Britain.

- The above illustration identifies the number of items comprising the unique stendysserne itself, **1**.

- Two particular features are present, the Ceremonial House and the Passage Mound, considered to represent the second Fibonacci arithmetic series item, **2**.
- Three stone rings/assemblies are indicated, **3**.
- The twin eastern inner stone rings group has an inner grouping of five inward leaning megaliths. Five items comprise the whole group of stendysserne elements. **5**.
- The western assembly stone ring has seven inward leaning megaliths and one at the lower left, thought to indicate the bearing of mid-winter sunset when viewed from the western assembly. It is considered to have been an individual part of the eight megaliths forming a circle moved to emphasise the MWSS bearing, **8**.
- The eastern outer ring comprises thirteen larger megaliths, one is a pointer to the mid-summer sunrise. The whole is in-filled with smaller packing stones between the larger stones to stabilise the assembly. **13**.
- The linear distance from the passage mound to the eastern ring is **21** *faethms*.
- A count of the Passage Mound entry and interior wall slabs equals **34**.
- The Passage Mound **34** to the Ceremonial House is **21** *faethms*, the sum is **55.**

So far the sequence of numbered items is **1, 2, 3, 5, 8, 13, 21, 34, 55** which are nine terms in the Fibonacci progressive arithmetic series, first espoused by Leonardo da Pisa in the thirteenth century when he was a prime figure in the movement to introduce the Hindu-Arabic numbering glyphs into Europe. He is now mostly referred to as "Fibonacci" and the arithmetic series is named after him. The progression is derived by the addition of the previous two numbers to achieve the next, for example 1+2=3, 8+13=21 and on.

# PERIMETERS

**Summary of Perimeter Measures**

Another common feature in both Britain and Denmark onwards from c.3100 BC was a practice of designing a feature such that its outer perimeter length was measured in whole number *furlangs*. For example the perimeter of the Tustrup stendysserne oval closely approximates eight *furlangs* and the summation of the skewed parallelogram portions equals five *furlangs.* This would appear to be an intentional choice by the designer, a skilful achievement for the curved oval locus to be geometrically close to double the other straight line summation in the Fibonacci tradition.

| Site Name | Measure, furlangs |
|---|---|
| Canterbury city outer perimeter, Kent | thirty-three |
| Hindwell palisade perimeter, Wales | thirty-three |
| West Kennet Avenue length, Avebury | thirty-three |
| Avebury ditch edge | seventeen |
| Durrington Walls ditch edge nr Stonehenge | seventeen |
| Tustrup stendysserne oval | eight |
| Silbury Hill base perimeter, nr Avebury | seven |
| Djoser's pyramid base perimeter, Egypt | seven |
| Stanton Drew ditch edge, Somerset | five |
| Tustrup stendysserne parallelogram | five |
| Stonehenge Aubrey Holes, 3100 BC | four |
| Parthenon perimeter, Greece | three |
| Durrington Walls southern circle | two |
| The Sanctuary outer ring Avebury | two |
| Mount Pleasant ditch edge, England | two |
| Woodhenge outer ring, next to Stonehenge | two |
| Stenness of Brodgar ditch edge, Orkney | two |
| Hollingbourne Henge ditch edge, Kent | two |
| Le Grand Dolmen, France | one |
| Long Man of Wilmington height, Sussex | one |

# CONCLUSION

- Arithmetic and geometry, surveying and building as skill functions were in use in Denmark in the fourth millennium BC, more than two hundred years before the dawn of the Old Kingdom in Egypt about 2900 BC.
- The symbolic values attributed to and the adjectival use of the number thirty-three has endured for more than five millennia to mean or imply regal, ultimate, heavenly and Otherworldly.
- Mathematical properties were employed in Denmark three thousand years before Pythagoras and Euclid.
- The ring of Aubrey Holes not far from England's Stonehenge was contemporary with the Tustrup stendysserne c.3100 BC. Both have very similar design bases, linear measures and the Fibonacci progressive arithmetic series numbers.
- The linear measurement unit '*faethm*' used in the skewed parallelogram was also integral to Stonehenge in England.
- The '*furlang'* measure was used as a measure of the stendysserne oval perimeter. The '*furlang'* measure was also used at Stonehenge in England.
- Mathematical knowledge employed in the design of Tustrup stendysserne included an understanding of the technical requirements to draw an oval.
- The numbers and arrangement of stone circles, wall slabs and linear distances at the stendysserne accord with nine items in the
- progressive arithmetic series **1, 2, 3, 5, 8, 13, 21, 34, 55.**
- Successive pairs of Fibonacci terms as vulgar fractions, the larger divided by the smaller, equal the Golden Number Ratio of 1.62. The Tustrup oval design proportions were in this ratio.

**Commonality of Purpose**

A number of quite visible archaeological and thematic factors are seen to be shared by communities on opposite sides of the North Sea. The distances and prospects of extended sea voyages could appear too difficult to comprehend at first, but a few moments reflection

soon shows the Neolithic peoples were evidently skilled sailors as well as ancient monument builders.
Tustrup stendysserne, the positioning of the individual features, the constituents of each, the linear measurements employed are considered the first example in prehistory of mathematical knowledge exhibited to this sophisticated standard, far above purely counting procedures. The design oval encompassing all the stendysserne elements had a significant influence on the individual positions. The skewed parallelogram and distances between items was equally important.

The eight Fibonacci progressive arithmetic series terms were arranged in harmony to serve the purposes of forecasting the solstice sunset and sunrise, to provide a welcome to the new in the open arms of the Ceremonial House and eventually a home for the old in the Passage Mound chambers.

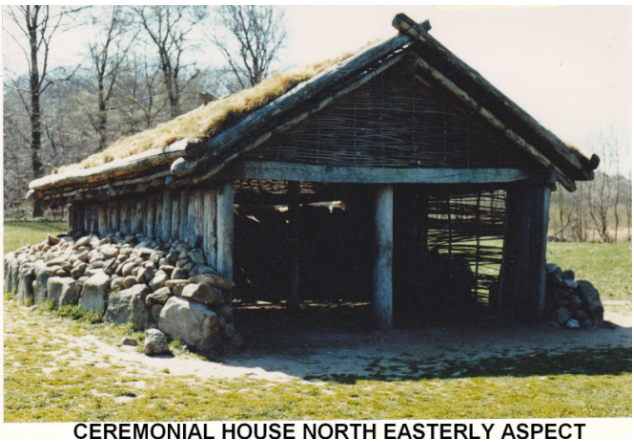
On the way through life's journey, everyone can expect to pass the anniversary birthdays 1, 2, 3, 5, 8, 13, 21 34, 55, even to 89 if good health allows.

## TUSTRUP STENDYSSER 1982 PHOTOGRAPHS

### BY MR OLÉ H. LARSEN & MR NEIL L. THOMAS,

TUSTRUP, DJURSLAND
Ceremonial House

A reconstructed ceremonial house was built in the grounds of the Moesgard museum, south of Arhus, Jutland in the 1960's. The illustration shows the north easterly aspect.



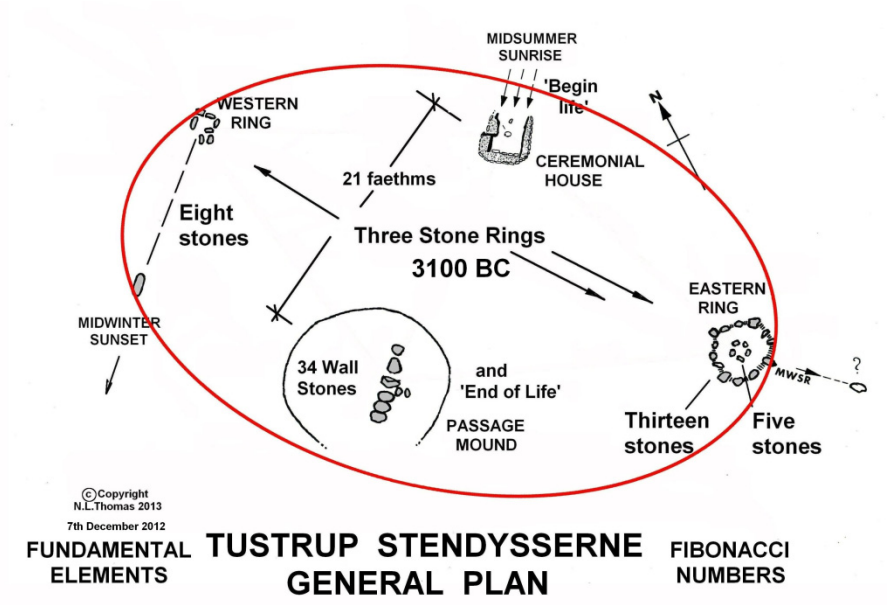
CEREMONIAL HOUSE NORTH EASTERLY ASPECT

**TUSTRUP WESTERN RING AT RIGHT, SEVEN STONES.
EIGHTH STONE AT LEFT PONTS TO MID WINTER SUNSET**

**TUSTRUP WESTERN RING STONES
LEANING INWARDS**

EASTERN RING, FIVE INNER STONES LEAN INWARDS

EASTERN OUTER RING POINTER STONE TO MWSR


MIDSUMMER
SUNRISE
'Begin
life'
WESTERN
RING
21 faethms
CEREMONIAL
HOUSE
Eight
stones
Three Stone Rings
3100 BC
EASTERN
RING
MIDWINTER
SUNSET
34 Wall
Stones
and
'End of Life'
PASSAGE
MOUND
Thirteen
stones
Five
stones
MWSR
?
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FUNDAMENTAL
ELEMENTS
TUSTRUP STENDYSSERNE
GENERAL PLAN
FIBONACCI
NUMBERS