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The Bush Barrow and Clandon Barrow Gold Lozenges and the Upton Lovell Golden Button: A Possible Calendrical Interpretation

Claude Maumené

Abstract: The Bush and Clandon Barrow gold lozenges and the Upton Lovell golden button, discovered in burial grounds near Stonehenge and Mount Pleasant in southern England, were most frequently thought to be ornamental breastplates designed to show the high level political or religious status of the wearers. The author attempts to demonstrate that a purely decorative interpretation must be rejected and proposes a complementary evaluation of these items which all show similar decorations. Counting the lines and interpreting the patterns on both breastplates and button have led to the proposal that these objects were made to facilitate counting, memorisation and transmission of the numbers of days of one or several synodic cycles of Venus, Mars and Jupiter, in agreement with a number of Moon and Solar cycles. In terms of anthropology, the symbolic lozenge shape associated with fertility and fecundity, appeared in many the cultural areas of ancient Europe. Venus, appearing alternately as an evening and morning star, is also an essential symbol of life, death and rebirth. This may be important within the funerary context of the culture of Wessex.

Introduction

Bush Barrow is an early Bronze Age burial site (1900–1700 BCE) situated on the extreme west of the Normanton Down cemetery, close by the Stonehenge stone circle. This burial mound which ranks among the major sites of the Stonehenge complex was excavated in 1808 by William Cunnington.¹ Clandon Barrow which is situated around fifty miles from Stonehenge, west of Dorchester, in the parish of Winterborne St Martin, near the Maiden Castle site and around 4 miles from the archaeological site of Mount Pleasant Henge was first excavated by Edward Cunnington in 1882. Upton Lovell Barrow, also called the Golden Barrow, located less

¹ S. Needham, A. J. Lawson and A. Woodward, “‘A Noble Group of Barrows’: Bush Barrow and the Normanton Down Early Bronze Age Cemetery Two Centuries On”, *The Antiquaries Journal* 90 (2010): pp 1–39.

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than twelve miles southwest of Stonehenge, on the banks of the River Wylde, was excavated by William Cunnington in 1803 and again in 1807. The Bush and Clandon Barrow gold lozenges and the Upton Lovell golden button, all golden objects from the Bronze Age (2000–1650 BCE), are held to be archetypal of the ‘Wessex culture’.² Needham and Woodward consider that the Wessex group does not represent a precise cultural entity, but rather the result of multiple connections to foreign lands.³ Later Needham *et al* argue that these burial deposits of the Early Bronze Age Period 3 (1950-1750/1700 BCE), on Normanton Down, can be seen as representing a dynastic succession that controlled access to Stonehenge during this period and presided over the ceremonies therein.⁴

The Bush Barrow lozenge

Being unsure of the exact position of the body found in the barrow, Needham *et al* have proposed a reconstruction of the grave layout, based on Cunnington’s accounts.⁵ They suggested that the body would have been crouched on its left side. By the right side of the body was a mace, with the handle being embellished with bone zigzag mounts. Three worked sheet gold objects were also found – a large diamond shaped lozenge resting on the man’s chest and a large belt-hook lying by his waist, both finely decorated; as well as another small diamond shaped lozenge, which may have been mounted on the handle of the mace.

The lozenge itself has been the object of a precise description by Anthony Johnson:

The face carries a series of concentric lozenges engraved at equally spaced intervals, each defined by a series of four precise, closely spaced parallel grooves. The smaller zone carries two pairs of lines that divide the very centre into a pattern of further nine small, equally sized lozenges. The border between the outside and first inner lozenge is filled with a series of single inscribed zigzag lines which create a pattern of nine interfaced triangles on each of the sides.⁶

² S. Needham and A. Woodward, ‘The Clandon Barrow Finery: A Synopsis of Success in an Early Bronze Age World’, *Proceedings of the Prehistoric Society* 74 (2008): pp. 1–52.

³ Needham and Woodward, ‘The Clandon Barrow Finery’.

⁴ Needham *et al.*, ‘A Noble Group of Barrows’.

⁵ Needham *et al.*, ‘A Noble Group of Barrows’.

⁶ A. Johnson, *Solving Stonehenge, The New Key to an Ancient Enigma*, (London: Thames & Hudson, 2008), p. 180.

The second smaller lozenge angle presents a simplified ornamentation, composed of four concentric lozenges. The positioning of the largest Bush Barrow lozenge on the corpse does indeed suggest, at first sight, a decorative function, but this does not exclude a symbolic value. If one accepts the denomination of regalia used by Needham *et al*, as similar to emblems of royalty, a symbolic interpretation can be sought.⁷ The relationship between royalty and the calendar deserves mention: ‘*Describere annum*’ is indeed a task which tradition attributes to the religious kings of Rome.⁸ By analogy, the idea of the possession of objects of a ‘calendrical’ nature, in the hands of an elite, also of Indo-European origin, which make it possible to harmonise the relations between nature and society and regulate sacred and profane time, does not seem farfetched.

The Clandon Barrow lozenge

The Clandon Barrow lozenge was associated with other objects and especially with the head of a mace encrusted with five gold bosses. The quality of this golden lozenge, in particular, the precision required for its outline and the sophisticated nature of its various geometrical patterns has been emphasised by John North.⁹ The pattern of the Clandon Barrow Lozenge is similar in style to that of the Bush Barrow lozenge, but differs in the lack of zigzags on the rim of the object. An inspection of the golden objects of the Wessex culture by Joan Taylor pointed out the similarity of the cross pattern found on the Upton Lovell button and the Clandon Barrow lozenge.¹⁰ In addition, given the relative proximity of the archaeological sites from which the Bush Barrow and the Clandon Barrow lozenges come, Taylor suggests that both might have been made by the

⁷ S. Needham, A. Woodward and J. Hunter, ‘The Regalia from Wilsford G5, Wiltshire, (Bush barrow)’, in A. Woodward *et al.*, *Ritual in Early Bronze Age Grave Goods* (Oxford: Oxbow Books, 2015), p. 235.

⁸ P. M. Martin, ‘La fonction calendaire du roi à Rome et sa participation à certaines fêtes’, *Annales de Bretagne et des pays de l’Ouest* 83, no.2 (1976): pp. 239–44.

⁹ J. North, *Stonehenge: A New Interpretation of Prehistoric Man and the Cosmos* (New York: The Free Press, 1996), pp. 511–13.

¹⁰ J. Taylor, ‘Early Bronze Age Technology and Trade, the evidence of the Irish Gold’, *Expedition Magazine* 21, no. 3 (1979): p. 25. [online] <https://www.penn.museum/sites/expedition/early-bronze-age-technology-and-trade/> [accessed April 2017].

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same craftsman.¹¹ Elsewhere Johnson has proposed, using computer modelling to find the ‘most likely method used’ to configure the form of the Bush Barrow and the Clandon Barrow lozenges, that they were respectively based on pure geometric forms: a hexagon and a decagon.¹²

The Upton Lovell button

The Upton Lovell button was found with other objects under a bowl barrow, called ‘The Golden Barrow’, alongside some burnt human bones.¹³ The cremations were accompanied by very rich burial goods; a necklace of ‘about 1000’ amber beads with spacer plates, a group of eleven (originally thirteen) gold drum-shaped beads, a large sub-rectangular golden sheet plaque decorated with incised lines, two golden sheet cap-ends or ‘boxes’, a grape cup, two urns (one lost), a bronze awl and a large conical button of shale.¹⁴

The cone shaped button decorated with zigzags and circles in groups of three or four, forms a set with a disc of the same diameter as that of the base of the button. The latter is decorated with bars assembled in chevrons following a quadripartite pattern, recalling the central part of the Bush Barrow lozenge. The conical part fits back together with the shale core. This one may have been used as a form of design by the goldsmith. On the golden button itself eight circular lines are to be seen, but there were ten lines originally. It does seem that the base of the golden button may have been damaged and the first series of circles might be incomplete. Indeed, ten lines are visible on the shale core.

Previous interpretations

In 1988 Thom, Ker and Burrows suggested seeing, in the zigzag alignments of the Bush Barrow lozenge, indicators of the position of the Sun and the Moon on significant dates in the year.¹⁵ By so doing they incorporated ideas of Alexander Thom, who proposed a prehistoric

¹¹ J. Taylor, *Bronze Age Goldwork of the British Isles*. (Cambridge: Cambridge University Press, 1980), p. 46 ; J. Coles and J. Taylor, ‘The Wessex Culture: A Minimal View’, *Antiquity* 45 (1971): pp. 6–13.

¹² Johnson, *Solving Stonehenge*, pp. 180–81.

¹³ Needham *et al.*, ‘Upton Lovell G2e, Wiltshire’, p. 220.

¹⁴ Needham *et al.*, ‘Upton Lovell G2e, Wiltshire’, p. 220–29.

¹⁵ A.S. Thom, J.M.D. Ker and T.R. Burrows, ‘The Bush Barrow Gold Lozenge: Is it a Solar and Lunar Calendar for Stonehenge?’, *Antiquity* 62 (1988): pp. 492–502.

division of the year into sixteen parts.¹⁶ This calendrical interpretation was later refuted by John North who considered that the size of the object and its fragility could not allow for the determination of precise azimuths.¹⁷ Similarly, Clive Ruggles estimated that the proposed orientations do not correspond to the pattern represented on the lozenge; ‘several of the alignments actually fall between the markings, while many of the markings do not fit any of the alignments at all’.¹⁸ He also remarked that if the Bush Barrow lozenge had an astronomical function such as that proposed by Archibald Thom, other lozenges of the same type would exist, saying ‘Why should only this one function as a calendrical device?’¹⁹ Instead he preferred to conclude that the function of the object was purely ornamental.²⁰ Needham had a similar opinion; ‘gold is used almost exclusively for ornamentation during the early metal age’.²¹ However he mentioned another possibly ritualistic meaning by saying, ‘although maces and similar regalia could equally have had more ‘collective’ religious-cum-ceremonial connotations, as has been suggested elsewhere for lunular or precious cups’.²²

However the calendrical hypothesis expressed by Archibald Thom has recently been defended by Thomas Gough who indeed supports the thesis that the directions, defined by the regular zigzag pattern, and corresponding to sixteen different epochs of the year, are correct at more or less 0.5°.²³ He stresses in particular the accuracy of the acute 81° angle of the lozenge which represents exactly the angle formed by the solstices between each other on the latitude of Stonehenge.²⁴ This hypothesis was

¹⁶ A. Thom, 1967, *Megalithic Sites in Britain* (Oxford: Oxford University Press, 1967), p.109–12.

¹⁷ North, *Stonehenge*, pp. 508–10.

¹⁸ C.N.L. Ruggles, *Ancient Astronomy: An Encyclopaedia of Cosmologies and Myth* (Santa Barbara: ABC-CLIO, 2005), pp.52–54.

¹⁹ Ruggles, *Ancient Astronomy*, pp. 52–54.

²⁰ Ruggles, *Ancient Astronomy*, pp. 52–54.

²¹ S. Needham, ‘Discussion: Reappraising “Wessex”’, in A. Woodward and J. Hunter, with D. Bukach, S. Needham and A. Sheridan, *Ritual in Early Bronze Age Grave Goods: An Examination of Ritual and Dress Equipment from Chalcolithic and Early Bronze Age Graves in England* (Oxford: Oxbow books, 2015), p. 255.

²² Needham, ‘Discussion: Reappraising “Wessex”’, p. 255.

²³ T. T. Gough, ‘Further Evidence for the Existence of Prehistoric Celestial Alignments in Western Scotland: Calendrical Alignments on the Island of Mull’, *Mediterranean Archaeology and Archaeometry* 14, no 3 (2014): p. 254.

²⁴ Gough, ‘Further Evidence’, pp. 254–55.

also defended by Euan MacKie in 2009. MacKie's argument relies partly on the diversity of evidence and especially on the similarity of the acute angle of the Bush Barrow lozenge with the 82° angles form by the two golden arcs, along the sides of the Nebra disk (Fig. 1).²⁵ The Nebra sky disk is a bronze disk found in Germany and dated from the Bronze Age (c. 1600 BCE); it is decorated with gold patterns interpreted generally as a sun or full moon, a lunar crescent, and stars. According to both MacKie and Gough, the Bush Barrow lozenge could be a small version of a large wooden lozenge with angles carved on it, to help with setting out long sight-lines marking the main points of the prehistoric solar calendar.²⁶

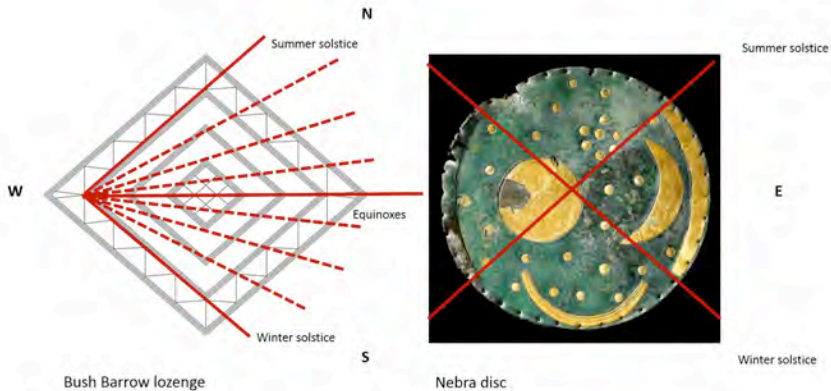


Fig. 1. The Bush Barrow lozenge (left) and Nebra disc (right). The figure illustrates how both artefacts have been interpreted as solar calendars, with height subdivisions in the case of the lozenge. The lines are passing through the inner points of the zig-zag pattern and according to the sunrise direction indicate the different epochs. Photo: D. Bachman.²⁷

²⁵ E. MacKie, 'The Prehistoric Solar Calendar: An Out-of-fashion Idea Revisited with New Evidence', *Time and Mind: The Journal of Archaeology, Consciousness and Culture* 2, no. 1 (2009): pp. 9–46.

²⁶ MacKie, 'The Prehistoric Solar Calendar', p. 32; Gough, 'Further Evidence', p. 254.

²⁷ D Bachman, 'Nebra Sky Disk', 2006. [online] https://commons.wikimedia.org/wiki/File:Nebra_Scheibe.jpg, [accessed Apr. 2017].

Another purely numerological interpretation based on the value of the lesser and the larger angle of different lozenges was proposed by Keith Critchlow.²⁸ The acute angles of the small and the large Bush Barrow lozenges (respectively 60° and 80°) represent one-sixth and two-ninths of a circle and the obtuse angle of the Clandon Barrow lozenge (102.75°) two-sevenths, according to Critchlow.²⁹ This proposal was criticised by John North who considered the switching from the lesser angle in some cases to the larger angle in others, as a sleight of hand, only to obtain the desired fraction of a circle.³⁰

Another possible astronomical interpretation

This paper proposes that in the Bush Barrow and Clandon Barrow lozenges and in the Upton Lovell Button (respectively Fig. 2, 4, 5) forms of memorisation or of transmission of the amount of days corresponding to the apparent cycle of the planets, especially that of the planet Venus, as well as those of Mars and Jupiter, can be seen.

The general idea that guided the selection of the three artefacts is that objects with common characteristics (the same materials, the same context of discovery, the same period and same geographical origin) have every chance of being produced by the same culture and with the same intention. On the diagram of form-cum-function relations of the golden objects of the first half of the second millennium of England and Ireland proposed by S. Needham, these three objects are very close to one another and share also the same degree of sophistication.³¹ Examples available for other objects that meet the above criteria are rare. So the selection was limited to these three objects for examination.

The artefacts themselves reveal the advanced knowledge of geometrical shapes of those who designed and produced them. Associated closely with the culture of Stonehenge III (c.2000 BCE) their ingenuity is beyond any doubt. The proximity and the contemporaneity of the Bush Barrow, the Upton Lovell mounds and the Stonehenge site, as well as other wood or stone rings, suggest that the designers of these objects possessed sophisticated knowledge, above all astronomical, relating to the movements of the Sun and the Moon as demonstrated convincingly by

²⁸ K. Critchlow, *Time Stands Still: New Light on Megalithic Science* (London: Gordon Fraser, 1979) p. 240.

²⁹ Critchlow, *Time Stands Still*, p. 240.

³⁰ North, *Stonehenge*, p. 508.

³¹ Needham, 'Discussion: Reappraising "Wessex"', p. 258.

Lionel Sims.³² The knowledge of the cycles of the planets in Wessex culture, supported by this paper although feasible, has, for the time being, not been confirmed. However the cycle of Venus was known to the Babylonians during the same period of time. The Venus tablet of Ammisaduqa refers to the record of astronomical observations of Venus (heliacal risings and settings) probably compiled around the mid-seventeenth century BCE.³³

Other evidence of encoded astronomical knowledge

Anthropology also enables us to confirm that objects of a proven calendrical nature have existed within cultures without writing systems. An example is provided by a lunar calendar used by the natives of the former kingdom of Dahomey in Africa, kept in the Musée de l'Homme (Paris).³⁴ It is a band of cloth stitched with thirty elements (seeds, kernels, hard fruit, pebbles and so on) succeeding one another in length, symbolically illustrating the thirty days of the period.

Archaeology has also discovered other artefacts for which the calendrical function is firmly established. Terracotta objects belonging to the Cycladic civilisation of the beginning of the Bronze Age (Early Helladic period I), whose function is unknown, called 'Frying pan vessels', would, according to Tsikritsis *et al's* recent work, have encoded mathematical and astronomical knowledge.³⁵ Analysis of the engraved symbols has revealed a symbolic script describing phenomena relating to cycles of the planets, the Sun and the Moon.³⁶

Similarly, the Trundholm 'Sun chariot' disc (Denmark, Nordic Bronze Age, ca. 1800–1600 BCE) has been interpreted as a representation of the

³² L. Sims, 'The "Solarization" of the Moon: Manipulated Knowledge at Stonehenge', *Cambridge Archaeological Journal* 16, no. 2 (2006): p. 200–3, p. 191.

³³ E. Reiner and D.E. Pingree, *Babylonian Planetary Omens*, Vol. 3 (Volume 2 of Bibliotheca Mesopotamica Babylonian Planetary Omens) (Leiden, Brill, 1998), p. 1.

³⁴ G. Ifrah, *Histoire Universelle des chiffres – L'intelligence des nombres racontée par les nombres et le calcul*, (Paris: Robert Laffont, Coll. Bouquins, 1994), p. 61.

³⁵ M. Tsikritsis, X. Moussas and D. Tsikritsis, 'Astronomical and Mathematical Knowledge and Calendars During the Early Helladic Era in Aegean "Frying Pan" vessels', *Mediterranean Archaeology and Archaeometry* 15, no.1 (2015): pp. 135–49.

³⁶ Tsikritsis *et al.*, 'Astronomical and mathematical knowledge and calendars', pp. 135–49.

Sun or of the full Moon, whose decorations depict a calendrical count.³⁷ The ritual conical golden hat known as the ‘Berlin Gold Hat’ (Swabia or Switzerland, Bronze Age 1000–800 BCE), could represent a lunisolar calendar. A detailed analysis indicates that the decorations (mostly discs of concentric circles, sometimes of wheels) permit determination of the dates for both lunar and solar periods. However, the solution for deciphering them has not yet entirely been found.³⁸

According to Joseph Loth, in the Irish laws, there is always question of periods of three nights, of nine nights, not to mention a longer period. According to him, there was a week of nine days and a sidereal month of 27 days divided into three novenas. The use of the novena in the Celtic world and the existence of traces of antique calendars all based on ten months of 36 days, in China, in Armenia, and more near to us in the Etruscan civilization and in ancient Rome, may help to understand why days may have been grouped by nine and 36.³⁹

The symbolism of the lozenge shape

With regard to the Bush Barrow lozenge, John North had already highlighted the symbolic value of the lozenge shape, extensively used from Ireland to Persia and even beyond.⁴⁰ According to Marija Gimbutas ‘The lozenge and triangle with one or more dots are encountered on shrine walls, vases, seals, and typically on the pregnant belly or other parts of the

³⁷ K. Randsborg, ‘SPIRALS! Calendars in the Bronze Age in Denmark’, *Adoranten* 2009: pp. 1–11 [online] www.rockartscandinavia.com/images/articles/randsborga9.pdf [Accessed Nov. 2016]; A.C. Sparavigna, ‘Ancient Bronze Disks, Decorations and Calendars’ [online] <https://arxiv.org/pdf/1203.2512> [Accessed Nov. 2016].

³⁸ W. Menghin, ‘Der Berliner Goldhut und die goldenen Kalendarien der alteuropäischen Bronzezeit’ *Acta Praehistorica et Archaeologica*, Potsdam, Unze, no. 32 (2000): pp. 31–108.

³⁹ C. Maumené, ‘Interprétation de la division de l’espace à Larchant selon le calendrier gaulois’, *Acte de la société Belge d’études Celtiques*, Bruxelles, Vol XIV, no. 1 (2010): pp. 59–90 ; L. Weibao, ‘New Evidence for the Ten-month Calendar’, *Publication of the Yunnan Observatory* (1996–01); L. Weibao, ‘Advance in the Research on the Ten-month Solar Calendar’, *Progress in Astronomy* (1997–01); L. Weibao and J. Chen, ‘Examination of the “Seats of the Five Emperors” in Traditional Chinese Constellations’, *Astronomical Research & Technology* (2010–02); see also the importance of the novena in the Irish Celtic culture in J. Loth, ‘L’année celtique dans les textes irlandais’, *Revue Celtique*, (1904): pp. 134–37.

⁴⁰ North, *Stonehenge*, p. 503.

Pregnant Goddess, starting in the 7th millennium BC.⁴¹ Gimbutas also suggests that the lozenge is a representation of the vulva of these goddesses. Moreover, she proposes associating the point frequently present in the middle of the lozenge with the notion of maternity, or even to the image of semen, with the lozenge representing the field sown.⁴² For Johanna Stuckey, given that clay representations in the shape of a vulva have been discovered in Mesopotamia in temples dedicated to Ishtar, and that the same symbol is represented on certain seals in the tomb of that very same goddess; their connection to the goddess is coherent.⁴³ Besides, Pizzimenti holds that Ishtar is a goddess whose astral correspondence is the female version of the planet Venus.⁴⁴ For the Minoans, lozenge series are also present on the apron of the snake goddess, who is sometimes identified as the Phoenician goddess Astarte.⁴⁵

On an anthropological level, a back-apron or a string skirt, decorated with lozenge patterns, was still worn recently in Eastern Europe, by young pubescent girls, showing the community they have reached sexual maturity and may be courted with view to marriage.⁴⁶ Nowadays, female Turkish weavers believe the lozenge is a symbol of the feminine sex.⁴⁷ Moreover in the Niğde region nomads call the motif *dudak* (the lips), a term familiarly

⁴¹ M. Gimbutas, 'Le langage de la déesse', *Des femmes*, Antoinette Fouque, 2005, pp. 171–72.

⁴² Gimbutas, 'Le langage de la déesse', p. 172.

⁴³ J. Stuckey, 'Of Omegas and Rhombs: Goddess Symbols in Ancient Mesopotamia and the Levant', *MatriFocus, Cross-Quarterly for the Goddess Woman, Lammas 5/6* (2006): [online]

<http://www.matrifocus.com/LAM06/spotlight.htm> [accessed Nov. 2016].

⁴⁴ S. Pizzimenti, 'The Astral Family in Kassite Kudurrus Reliefs. Iconographical and Iconological Study of Sîn, Šamaš and Ištar astral representation', in *Proceedings of 55 RAI*, Paris 6th–9th July 2009.

⁴⁵ G. A. Owens, "'All Religions are One" (William Blake 1757–1827), Astarte/Ishtar/Ishassara/Asasaramé: The Great Mother Goddess in Minoan Crete and the Eastern Mediterranean', *Cretan Studies 5* (1996): pp. 207–18.

⁴⁶ E. W. Barber, 'On the Antiquity of East European Bridal Clothing', in Linda Welters, ed., *Folk Dress in Europe and Anatolia: Beliefs about Protection and Fertility* (London: Bloomsbury Academic, 1999), pp. 13–32; E. W. Barber and P. T. Barber, *When They Severed Earth from Sky: How the Human Mind Shapes Myth* (Princeton, NJ: Princeton University Press, 2005), pp. 68–70.

⁴⁷ M. A. Gallice and A. Diler, 'Fragments d'un langage oublié – La symbolique dans les kilims', [online] http://www.kilims.fr/brochure_ada-symbolique.pdf [accessed Nov. 2016], p. 8.

applied to the female sex organ.⁴⁸ The lozenge also appears in bands on one of the best known bell beakers dating to before 2500 BCE, found in West Kennet Long Barrow, near Avebury.⁴⁹ A lozenge divided into four appears in the book of Kells (miniature folio 7), which is believed to have been created c. 800 AD, and is represented as a brooch, on the right-hand shoulder of the most ancient representation of the Virgin in the scriptural art of Western Europe.⁵⁰ The most pertinent and closest parallel is probably those lozenges seen in passage grave art. G. Robin, in his work on the rock art of the Neolithic tombs around the Irish Sea, has listed all the signs engraved.⁵¹ The quadrangular signs (lozenge or square) are present on 19% of the engraved slabs, and most often associated with chevrons.⁵²

These numerous examples underline the relationship between the lozenge shape and the idea of fertility, fecundity, and maternity, as well as death and rebirth. However, this enumeration does not pretend to demonstrate that the symbolism of the lozenge is entirely transcultural, but in the absence of precise cultural evidence from Wessex, this paper proposes the use of analogy to suggest some possible meaning of the lozenge, as an echo of some other cultures.

Early Counting methods

The methods used by the craftsmen are straightforward and would have been understood by populations ignorant of writing systems. They are based on elementary counting techniques for any set of objects, used here for the recording of days. This practice does not require any knowledge of abstract reckoning; a numeration can easily be made just by matching. George Ifrah refers to the principle of correspondence, unit by unit, which makes it easy to compare two collections of beings or objects with or without the same nature, without using abstract counting.⁵³ He backs up

⁴⁸ Gallice and Diler, 'Fragments d'un langage oublié', p. 8.

⁴⁹ Wiltshire Museum, 'Bell Beaker', [online] <http://www.wiltshiremuseum.org.uk/galleries/index.php?Action=4&obID=121&prevID=&oprevID=>, [accessed April 2017].

⁵⁰ N. Niamh, 'Brooch or Cross? : The Lozenge on the Shoulder of the Virgin in the Book of Kells', *Archaeology Ireland* 10, No. 1, (1996).

⁵¹ G. Robin, *L'architecture des signes – L'art pariétal des tombeaux néolithiques autour de la mer d'Irlande* (France : Presse Universitaires de Rennes, 2009), p.76, p. 91.

⁵² Robin, *L'architecture des signes*, p. 76, p. 91.

⁵³ G. Ifrah, *Histoire Universelle des chiffres – L'intelligence des nombres racontée par les nombres et le calcul* (Paris: Robert Laffont, Coll. Bouquins, 1994), p. 42.

this assumption by evoking for example the rosary, which accompanies the recitation of litanies.⁵⁴ Each bead corresponds to a prayer. In this manner there is no need for abstract enumeration in order to recite the litanies without mistake.

Primary counting systems originally used simple forms such as notches.⁵⁵ These types of systems rapidly reach their limits when coming close to large numbers. Faced with this difficulty, human beings had to count by packs, using the idea of replacing ordinary pebbles by differentiable objects or images of various sizes, matching conventional forms; such as, for instance, a stick for the unity, a flat ball for a group of ten, a small ball for a group of a hundred.⁵⁶ This principle which relied on simple hardware intermediates, proved to be of great help when a large number of objects needed to be accounted for.⁵⁷

By analogy the present paper proposes to link days to the decorative elements of the various objects in question. Based on the pairing principle the 36 zigzag (triangles) placed on the circumference of the Bush Barrow lozenge will be linked to 36 successive days (Fig. 2). Each side of the lozenge presents nine triangles or changes of direction. Another option is to count the sticks which are included in the broken line, assuming that the double sticks in each of the acute angles have to be counted as one, like the two other angles where they are combined. With regard to the Clandon Barrow lozenge and the Golden Barrow button, since there are no triangles, the successive days have been matched to sticks. The counting of the days can be done by going through the perimeter of the lozenge. At the end of the first rotation 36 days have passed and a new series of 36 days begins.

The pack counting principle leads to linking the nine triangles displayed on each side of the Bush Barrow lozenge, to one of the adjacent line of the same length. On this point, it is worth pointing out that Hunter and Woodward have underlined the perfect accuracy of the layout: the lengths of the nine successive triangles, correspond exactly to the length of the adjacent continuous groove.⁵⁸ An uninterrupted unit would be worth nine triangles or sticks, so the complete perimeter of the lozenge would equal 36 triangles (Fig. 2).

⁵⁴ Ifrah, *Histoire Universelle des chiffres*, pp. 43–44.

⁵⁵ Ifrah, *Histoire Universelle des chiffres*, pp. 161–68.

⁵⁶ Ifrah, *Histoire Universelle des chiffres*, pp. 69–72.

⁵⁷ Ifrah, *Histoire Universelle des chiffres*, pp. 41–61, pp. 69–74.

⁵⁸ Needham, 'The Regalia from Wilsford G5', p. 238.

In an additive numeration system, the value proper to each sign is independent of its position. To represent nine days it is enough to juxtapose nine triangles (or sticks), or a long line. To represent 36 days, drawing four lines corresponding to the perimeter of the lozenge is enough. By applying this principle one obtains 144 days (4×36) per series of four concentric lozenges (Fig. 3). This grouping by periods of 4×36 days, a unit of 144 days, could be explained simply as a means of facilitating numbering. The cycle of Venus (very close to 576 days) then corresponded to $4 \times 4 \times 4$ novenas, or 4×4 periods of 36 days or 4 periods of 144 days. It is also recognised that four is the limit which makes it possible to identify at first glance a given number of aligned analogous elements. Reaching beyond all of them blurs our minds and the global vision is no longer of any help, according to Ifrah.⁵⁹

Analysis

1. The Bush Barrow lozenge

Based on the methodological principles described above, each perimeter would come to a total of $4 \times 9 = 36$ days (Fig. 2 and 3). Otherwise, a series of 36 squares can be observed on a plate made from a bone covered by a sheet of gold, from a group of mounds on the Normanton Down, very close to the Bush Barrow mound.⁶⁰ The pattern presents the shape of a grid of 6×6 squares. Two squares seem to have been sacrificed after the initial outline, for the benefit of a circular notch made on the top part of the pattern.

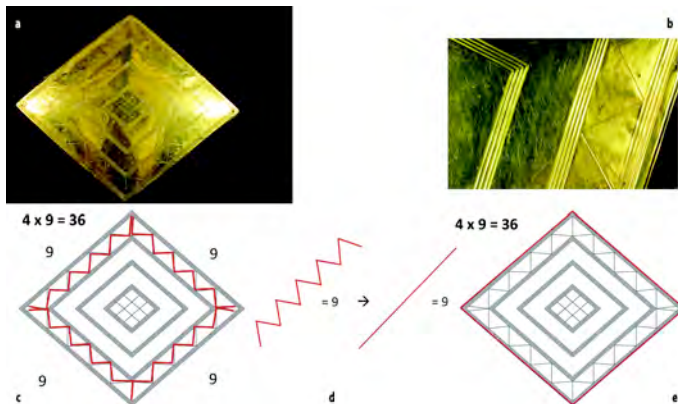


Fig. 2 The Bush Barrow lozenge, Photos: © Wiltshire Museum, Devizes.

⁵⁹ Ifrah, *Histoire Universelle des chiffres*, p. 33.

⁶⁰ Needham, ‘Discussion: Reappraising “Wessex”’, p.194–95.

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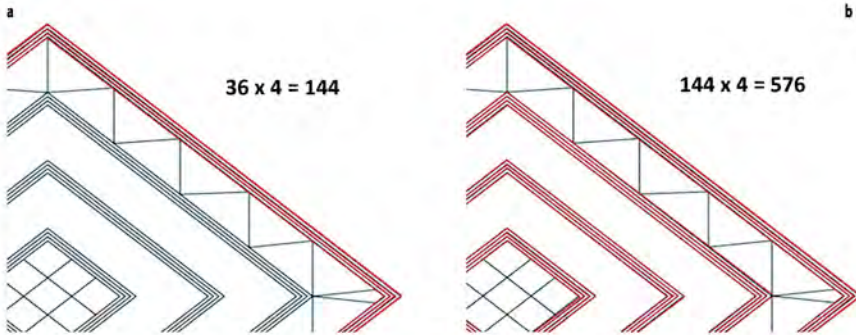


Fig 3 The Bush Barrow lozenge

As said above, on the Bush Barrow lozenge, the concentric lozenges are grouped together in 4's with each series adding up to an overall of 144 days. The four series of concentric lozenges form a total number of 576 days.

$$[((4 \times 9) \times 4) \times 4] = [((36) \times 4) \times 4] = [144 \times 4] = 576$$

The total of 576 days is very close to the value of the first synodic period of the planet Venus, on average 583.92 days where a synodic period represents the time for a celestial body to return to the same position relative to the Sun, as seen by an observer from Earth.

Using the inferior conjunction of Venus as a marker, the remaining lozenges in the central part of the patterns could represent the eight (or nine days if we include the ninth lozenge in the middle) during which the planet disappears in the west to reappear later at the east. The conjunction of Venus with the Sun occurs when the planet passes between the Sun and the Earth. During this period Venus disappears in the light of the Sun and reappears when it moves far enough away.

$$[((4 \times 9) \times 4) \times 4] + 8 = 584$$

Hence, if this hypothesis is correct, the astronomer-priests of Stonehenge were aware of the cycle of Venus and observed its inferior conjunction which initialises a new cycle. Pursuing this interpretation, it is possible that the small lozenge decorated with four concentric lozenges may have worked as an ensemble along with the large lozenge. It could

correspond to the repetition of four cycles of Venus, still according to the principle of the base, with the ultimate aim to reach a higher rank of numbers. With each of the four concentric lozenges representing a cycle of Venus, we would obtain:

$$584 \text{ (or } 585) \times 4 = 2336 \text{ (or } 2340 \text{ days)}$$

This number of days (2340) would also correspond to 3 synodic periods of Mars, another astronomical fact that might also be illustrated in the Clandon Barrow lozenge.

2. The Clandon Barrow Lozenge

Here each unity is matched to a day. The enumeration is also made, clockwise, following an intuitive progression along the perimeter of the central lozenge, inspired by the natural movement of the Sun or the Moon. The complete perimeter would thus represent 4×24 days giving a total of 96 days (Fig. 4 a, b).

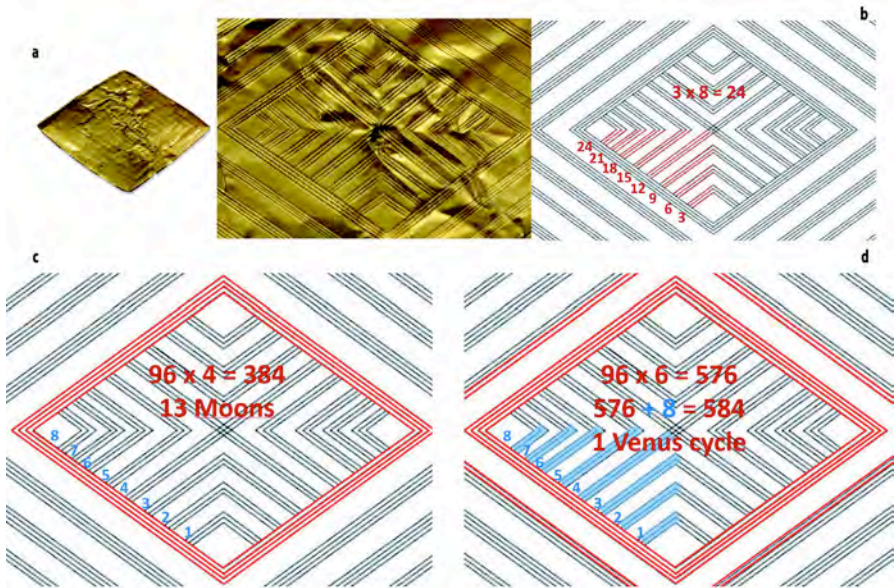


Fig. 4. The Clandon Barrow Lozenge, Photo: Dorset AONB with permission of Dorset AONB.⁶¹

⁶¹ The Clandon Barrow Lozenge [online]

http://www.dorsetaonb.org.uk/assets/downloads/South_Dorset_Ridgeway/Resources/Image_bank/Gold_lozenge_from_Clandon_Barrow.jpg [accessed April 2017].

It is to be noted that the central motif is partially asymmetrical. The medians divide the central lozenge into four sectors which are alternately composed of three or four series of chevrons grouped by three. It appears that the goldsmith's intention was to represent 24 sticks on each side of the lozenge, not a number respecting a perfectly symmetrical pattern. If that had been his intention, he would have preferred to consistently represent three sets of chevrons in each sector (or four), but not an alternation of three and four series. This infringement of a perfect symmetry runs counter to a non-functional purely ornamental hypothesis. So the goldsmith's choice, based on the number 24 appears to have been intentional.

Each perimeter would represent $4 \times 24 = 96$ days. Applying the principle of pack counting, each series of four perimeters would represent $4 \times 96 = 384$ days. Now, 384 is a number of astronomical interest since it represents a precise estimation of the duration of thirteen Moons (Fig. 4 c).

$$384 = 13 \times 29.5309 + 0.0983$$

The theoretical error is just 2 hours 21 minutes and few seconds for a lapse of more than one year. Note that 384 days for thirteen lunar months represents a better estimation than 354 days for twelve lunar months. It is also to be observed that $384 \times 2 = 768$, a total close to the span in days of the synodic period of Mars (the synodic period of Mars is observable between two successive oppositions), with an average 780 days with variations from 765 to 800 days. So after 768 days, Mars is potentially opposed to the Sun or is about to be so in the following days.⁶² Mars is opposed to the Sun when the planet is visible all night and respectively rises and sets in opposition to the rising and setting of the Sun in the locality. This event can be observed and its computation is straightforward.⁶³ The organisation by unit of 768 days (2×384) could have potentially increased the interest in this by warning of the next return of Mars to a remarkable phase of its cycle (such, for instance, as its opposition to the Sun).

Also note that $96 \times 6 = 576$. An average of eight days, are missing to complete a synodic period of Venus. To put it in another way, 576 days,

⁶² M.J. Powell, 'The Naked Eye Planet in the Night Sky (and How to Identify them)' [online] <http://www.nakedeyeplanets.com/> [accessed October 2016].

⁶³ R.D. Purrington, 'Heliocal Rising and Setting: Quantitative Aspects', *Archaeoastronomy, Journal for the History of Astronomy* 12, no. xix (1988): pp. 72–84.

from its heliacal rising in the east (its first appearance in the morning sky), Venus appears for the last time in the west in the evening sky, before returning after an average of eight days in the morning sky. These eight missing days could be materialised by (and could be the reason for) the eight series of three unities depicted on each side of the central lozenge ($576 + 8 = 584$) (Fig. 4 d). So the overall pattern would respond to the formula given below and would come to a total of $584 \times 4 = 2336$ days i.e., four cycles of Venus.

$$[(24 \times 4) \times 6] + 8] \times 4 = [576+8] \times 4 = 584 \times 4 = 2336$$

This complete total itself is very close to three cycles of Mars, since,

$$2336 = 2340 - 4 = (780 \times 3) - 4$$

3. The Upton Lovell button

Should our analysis seem, at first sight, to be highly speculative, it can be tested with reference to a third object selected according to the criteria proposed above: the Upton Lovell button. The latter conical shaped object matches a disc of the same diameter, forming the base of the button, decorated with bars assembled in chevrons, following a similar structure to that of the central part of the Bush Barrow lozenge. The conical part is decorated by ten circular lines, grouped following the series: $4 + 3 + 3$. The number retained is that of the matrix. At the edges of the button, on its base, is a succession of zigzags incised between the first two series of circles, corresponding to a series of forty sticks or triangles (Fig. 5 a, b, c).

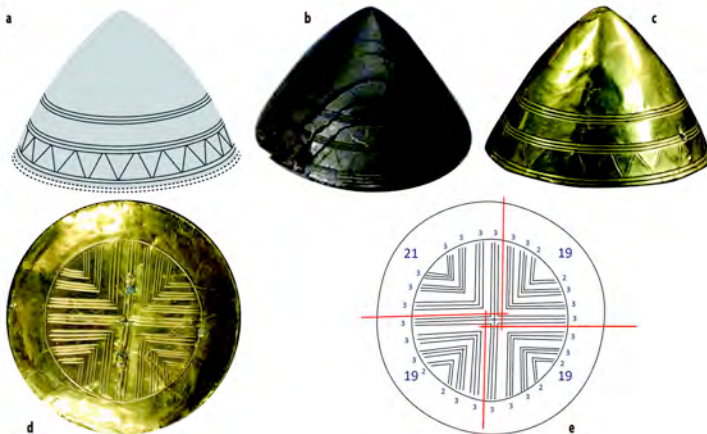


Fig. 5 The Upton Lovell button (a,c), its shale matrix (b) and its base (d,e), Photos: © Wiltshire Museum, Devizes.

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On the disc forming the base of the button, the number of bars making up the chevrons is respectively, for the four areas: 19 + 19 + 19 + 21, coming to a total of 78, obtained by crossing the perimeter of the circle delimiting the motif. It is important to note that the chevrons are in groups of two or three. For three of the four sections, the total of 19 is obtained by adding: 3+3+2+2+3+3+3 = 19. The total of 21, corresponding to the last section is obtained by the sum of 3+3+3+3+3+3+3 = 21 (Fig. 5 d, e).

Here again the principle of symmetry is not totally respected. The sector comprising 21 unities is deliberately made up of three chevron series only. Therefore, this suggests that the goldsmith's intention was to depict 78 unities and not the 76 or 84 which scrupulous respect of the symmetry would have called for. Applying the rule of counting in series retained in the Barrow lozenge case, allows us to combine the bars on the base of the button with the round line patterns of the button itself. The total leads to a precise approach of the span of the synodic period of Mars, that is to say 780 days, obtained simply by multiplying the ten circles of the button by the 78 unities on its base:

$$10 \times 78 = 780$$

Moreover, and in the same way the chevrons of the Bush Barrow lozenge were combined with the lines forming the sides of the concentric lozenges, we can match the forty triangles decorating the outside part of the button with the ten adjacent, concentric lines. This brings us to a total of 400, within one day of the synodic period of Jupiter. The precise synodic period of Jupiter amounts to 398.9 days.

$$398.9 = 40 \times 10 - 1.1 = 400 - 1.1$$

Analysis of the conical Upton Lovell button tends to consolidate the calendar hypothesis, since it seems to encode the durations of the synodic periods of Mars and of Jupiter.

Discussion

To support this hypothesis, it needs to be emphasised first of all that these objects are all apparently symmetrical, but that they are sufficiently well designed so that a slight asymmetry can be seriously considered. Mouchet suggests that symmetry can be sought to facilitate memorisation as well as

transmission.⁶⁴ But in the present case, it is the irregularities of the patterns examined, the infringements of a perfect symmetry, which reveal a functional intent. Indeed, the Bush Barrow lozenge, like the Upton Lovell button, both present irregularities betraying the will of their creators to materialise one number rather than another, one structure rather than another; a rupture with perfect symmetry which also represents a complex phenomenon, in the simplest way.

For the Bush Barrow lozenge, an arrangement of 4 x 24 bars in groups of three has been retained to graduate each side of the central lozenge, making a four-part, entirely symmetric division, based on the medians, impossible. In the case of the Upton Lovell button or more precisely of the disc at its base, the four-party arrangement corresponds to a total of 78 unities, using the 19+19+19+21 series. Here the intention to total 78 and not 76 (4 x 19) or 80 (4 x 20) is clearer. So the hypothesis which assigns a purely decorative function to these artefacts must be complemented by an additionally plausible hypothesis of a 'scientific' aim, to use a term from Mouchet.⁶⁵

To defend this functional hypothesis this paper suggests reliance on the standards proposed by Frank Ventura to determine the strong as well as the weak points of an iconographic interpretation.⁶⁶ These standards are: i) the fitness within the whole context of what is known about the culture, what Ventura calls 'internal evidence'; ii) preference for interpretation implying concrete processes rather than the use of higher order concepts and abstract thinking; iii) external evidence (where internal evidence is lacking), such as well-established interpretations of analogous artefacts from other cultures and iv) interpretations that lead to testable hypothesis.⁶⁷

If we apply these standards to our interpretation we can say: i) there is no reason to believe that the men who built Stonehenge were not able to observe the courses of the wandering stars and to record them; ii) this record is based on primitive techniques, term-to-term correspondence and the principle of the basis or grouping; iii) from an ethnographic point of view, other objects have been described or interpreted as having an

⁶⁴ A. Mouchet, *L'élégante efficacité des symétries* (Dunod, 2013), pp. 13–21.

⁶⁵ Mouchet, *L'élégante efficacité des symétries*, pp. 13–21.

⁶⁶ F. Ventura, 'Reading Messages from the Past: Interpreting Symbols of Possible Archaeoastronomical Significance in Malta', in *The Materiality of the Sky*, Proceedings of the 22nd Annual SAC Conference, (Ceredigion, Wales: Sophia Centre Press, 2016), pp. 3–19.

⁶⁷ Ventura, 'Reading Messages from the Past', pp. 3–19.

astronomical function; iv) the proposed model is tested successfully on several similar objects.

Conclusion

The robustness of this paper's proposition rests on the fact that three objects, selected according to criteria as objective and independent as possible, respond to the same astronomical model. These different artefacts, which demonstrate encoded planetary cycles, strengthen the functional and astronomical hypothesis. To further test the theory, one of the few similar objects known, the gold rectangular Upton Lovell plate could be analysed in the future. Although incomplete and damaged, there is a potential cycle of 360 days and 584 days.

So at the end of this journey, a new hypothesis is put forward relating to the function of these artefacts. The intention of their creators, by calling on simplified numerical representations, could have been to facilitate the memorisation and the transmission of knowledge relating to the planetary cycles, among which Venus may have occupied a preeminent place. Beyond the 'scientific' connotation assigned to the objects, they may also have been used in rituals or for the establishment of ceremonial dates. If associated with Venus, it is reasonable to consider that these rituals may have been connected to the cult of fertility, of fecundity, but also, given the context in which they were discovered, to death and to rebirth.

The hypothesis put forward may lead to new findings concerning other objects of the same workmanship and cultural origin. The repetition of results might enable the progressive rejection of the idea of a purely aesthetic function for these objects and promote more attention to the counting of patterns which seem *a priori* to be purely ornamental. To extend the corpus, the criterion of integrity and good state of conservation that we had implicitly retained may have to be abandoned. Other selection criteria could be modified to extend the study to an even longer series, even at the risk of confusing objects of different origin and function.

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