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# The Chevroches zodiacal cap and its Burgundy relations

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**Abstract.** The excavation of an unexplored secondary agglomeration in Chevroches (France), from 2001 to 2002 has led to the discovery of a bronze dome of a type unknown in the Ancient world. It is inscribed with three lines in Greek transcribing Egyptian and Roman months, and the twelve signs of the Zodiac. This paper presents the first observations and some other finds from similar objects in Burgundy.

**Keywords.** Burgundy, mechanisms, Zodiac, astrology

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## 1. Introduction

The Gallo-Roman site of *Chevroches* is located in the North West of the region of Burgundy in the Nièvre department (Fig. 1). During the Roman period, the site was part of the *Eduens'* territory. Their former celtic capital, *Bibracte* (Mont Beuvray) became *Augustodunum* (Autun). *Chevroches* turns out to be a previously unknown small Gallo-Roman town that extended over four hectares.



**Figure 1.** Aerial view of the archaeological site of Chevroches. © F. Devevey (2002).

The site is very rich, as the Roman occupation lasted from the second quarter of the 1st century until the 5th century. Iron and bronze metalworking was an important activity during the 4th century and was organised by large workshops installed in small zones delineated by streets. Many noteworthy elements of furniture made of bronze, iron or lead have been discovered: tools, domestic elements, harnesses, bars and scrap from the forge, elements of finery and even a decorative element of an openwork sheath (Fig. 2).



**Figure 2.** Zenithal view of area 1020 where the disc was discovered. © INRAP (2001).

Chevroches has become one of the most important archaeological sites uncovered by preventive excavations in the region (Devevey 2005).

A rich collection of objects originating from metallic deposits is preserved, with the financial help from the Archaeological Museum of Dijon and from the French Ministry of Culture (SRA Bourgogne).

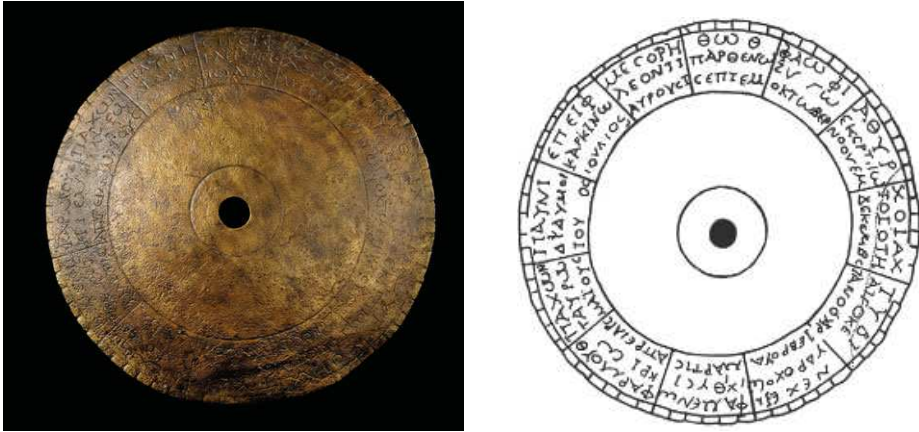
The restoration team of the laboratory of metal archaeology at Jarville-Nancy discovered that an object, first classified as a decorative *phaleræ* (of a harness?), was in fact a particularly rare “scientific item”. An initial analysis of this enigmatic piece is provided by Devevey et al. (2006).

## 2. Description of the disc

The piece is a curved disc which is divided into 12 equal sectors, and in each sector one can read three layered series of engraved words, all in Greek letters (Fig. 3a):

- the external line corresponds to the 12 Egyptians months;
- the median line states the 12 signs of the Zodiac in the dative case;
- the inner line presents the 12 Roman months, see Fig. 3b.

Most of the words are abbreviated. We can start the reading of this curved disc by *Thoth*, the first Egyptian month, which begins on our 28th day of August (or 29 for leap years). This object doesn’t consider the 5 epagomenal days (6 for leap years since the Julian calendar reform). The civic Egyptian calendar counted regular months of 30 days, which had the consequence of adding 5 to 6 days to the end of each year. Hence, the concurrence between Roman and Egyptian months remains approximate (see Fig. 4).



**Figure 3.** (Left) The disc of Chevroches (© INRAP 2005). (Right) Graphical sketch (© C. Magister-Vernou/MAD 2006).

### 3. The manufacturing process

It is interesting to try a restitution of the fabrication process :

- An artisan first manufactured the form of the curved disc by hammering out a bronze slab (around 100 mm in diameter), giving it its rounded aspect. (Fig. 5);
- An experienced engraver then chiseled three approximate concentric circles. The exterior circle is the least well-preserved. It is deleted in 2 places (abrasion?, see Fig. 5). A circular hole of 5 mm was pierced through the top of the object. It is lightly off-centre from the other circles putting into perspective the accuracy of this ‘scientific object’;
- The engraver divided the surface between the second circle and the periphery of the curved disc in 3 equal parts of 30° each. They then defined the perimeter of the instrument by subdividing each of the 12 parts delimited previously into 6 equal graduations (Fig. 6);
- In last step, the inscriptions have been engraved. Indeed the engravings of some letters are above certain lines or circles previously engraved.
- Then this curved disc was probably fixed onto a (spherical?) support, shown through the tin soldering visible on the inferior face of the object. The instrument may have been held in place along the length of its diameter way and on a part of its edge. From a deformation on its lateral part it can be shown that this object may have been extracted from its support when it was discarded (Fig. 7).

The use of the Greek alphabet, the references to Egyptian signs of the Zodiac and Roman months, shows an attempt at making a correspondence between the Egyptian and Roman calendars. Someone with solid knowledge of astrology may have used this rare object. If the practice came from a long tradition, its procedures are very complex to analyse. Finally, future work on archaeological metal at Chevroches will perhaps find other documents related to this disc.

Further important details include:

- Place of manufacturing: the technique of embossing metals is a speciality in Celtic areas, so it could well have been fabricated in Gaul. Patrice Cauderlier (Université de Bourgogne, Ecole Normale Supérieure, Paris), suggests that the object is inspired by an Egyptian model, created in the style of the Alexandrian School, given its use of the Greek language and its abbreviations.
- The date of fabrication: from the epigraphic study (Cauderlier) : end of the 3rd century.

	Ligne	Inscription	Lecture de l'inscription	Interprétation (P. Cauderlier)	Signification Traduction
01	extérieure médiane * intérieure	ΘΩΘ ΠΑΡΘΕΝΩ ΣΕΠΤΕΜ	θωθ ΠΑΡΘΕΝω ΣΕΠΤΕΜ	ΘΩΘ ΠΑΡΘΕΝΩ ΣΕΠΤΕΜ(ΒΡΙΟΣ)	Thôt Vierge Septembre
02	extérieure médiane * intérieure	ΦΑΩΦΙ ΖΥΓΩ ΟΚΤΩΒΕΡ	ΦΑωΦΙ ΖΥΓω ΟΚΤωΒΕΡ	ΦΑΩΦΙ ΖΥΓΩ ΟΚΤΩ(ΒΡΙΟΣ)	Phaôphi Balance Octobre
03	extérieure médiane * intérieure	ΑΘΥΡ ΕΚΙΡΤΙΩ ΝΟΟΥΕΜ	ΑΘΥΡ ΚΙΡΠΠω ΝΟΟΥΕΜ	ΑΘΥΡ ΣΚΟΡΠΙΩ ΝΟΥΕΜ(ΒΡΙΟΣ)	Hâthyr Scorpion Novembre
04	extérieure médiane * intérieure	ΧΟΙΑΧ ΤΟΙΟΤΗ ΔΕΚΕΜΒΕ	ΧΟΙΑΧ ΤΟΞΟΤΗ ΔΕΚΕΜΒΕ	ΧΟΙΑΧ ΤΟΞΟΤΗ ΔΕΚΕΜΒΡ(ΙΟΣ)	Choiak Sagittaire Décembre
05	extérieure médiane * intérieure	ΤΥΒΙ ΑΙΓΟΚΕ ΙΑΝΟΟΎΑΡ	ΤΥΒΙ ΑΙΓΟΚΕ ΙΑΝΟΟΥΎΑΡ	ΤΥΒΙ ΑΙΓΟΚΕΠΩ ΙΑΝΟΥΑ(ΡΙΟΣ)	Tybi Capricorne Janvier
06	extérieure médiane * intérieure	ΜΕΧΕΙΡ ΥΔΡΟΧΩ ΦΕΒΡΟΥΑ	ΜΕΧΕΙΡ ΥΔΡΟΧΩ ΦΕΒΡΟΥΑ	ΜΕΧΕΙΡ ΥΔΡΟΧΩ ΦΕΒΡΟΥ(ΑΡΙΟΣ)	Méchir Verseau Février
07	extérieure médiane * intérieure	ΦΑΜΕΝΩ ΙΧΘΥΣΙ ΜΑΡΤΙΟ	ΦΑΜΕΝω ΙΧΘΥΣΙ ΜΑΡΤΙΟ	ΦΑΜΕΝΩΘ ΙΧΘΥΣΙ ΜΑΡΤΙΟΣ	Phaménouth Poissons Mars
08	extérieure médiane * intérieure	ΦΑΡΜΟΥΘ ΚΡΙΩ ΑΠΡΕΙΑΡ	ΦΑΡΜΟΥΘ ΚΡΙω ΑΠΡΕΙΑΡ	ΦΑΡΜΟΥΘΙ ΚΡΙΩ ΑΠΡΕΙΑ(ΙΟΣ)	Pharmouthi Bélier Avril
09	extérieure médiane * intérieure	ΠΑΧΩΝ ΤΑΥΡΩ ΜΑΪΟΥΣ	ΠΑΧωΝ ΤΑΥΡω ΜΑΪΟΥΣ	ΠΑΧΩΝ ΤΑΥΡΩ ΜΑΪΟΥΣ	Pachôn Taureau Mai
10	extérieure médiane * intérieure	ΠΑΥΝΙ ΔΙΑΥΜΟΙ ΙΟΥΙΟ	ΠΑΥΝΙ ΔΙΑΥΜΟΙ ΙΟΥΙΟ	ΠΑΥΝΙ ΔΙΑΥΜΟΙΣ ΙΟΥΝΙΟΣ	Payni Gémeaux Juin
11	extérieure médiane * intérieure	ΕΠΕΙΦ ΚΑΡΚΙΝΩ ΙΟΥΛΙΟΣ	ΕΠΕΙΦ ΚΑΡΚΙΝω ΙΟΥΛΙΟΣ	ΕΠΕΙΦ ΚΑΡΚΙΝΩ ΙΟΥΛΙΟΣ	Epiph Cancer Juillet
12	extérieure médiane * intérieure	ΜΕΣΟΡΗ ΛΕΟΝΤΙ ΑΥΓΟΥΣΤ	ΜΕΣΟΡΗ ΛΕΟΝΤΙ ΑΥΓΟΥΣΤ	ΜΕΣΟΡΗ ΛΕΟΝΤΙ ΑΥΓΟΥ(ΣΤΟΣ)	Mésoré Lion Août

Ligne extérieure : mois égyptien (Thôt est le 1<sup>er</sup> mois de l'année égyptienne)

Ligne médiane au datif : signe zodiacal

\* : sans iôta adscrit

Ligne intérieure : mois romain

Claudine Magister Vernou

Figure 4. Transcription of the inscriptions by P. Cauderlier & C. Magister-Vernou (2006).

- The date of burying: the stratigraphic context : 340 / 350.



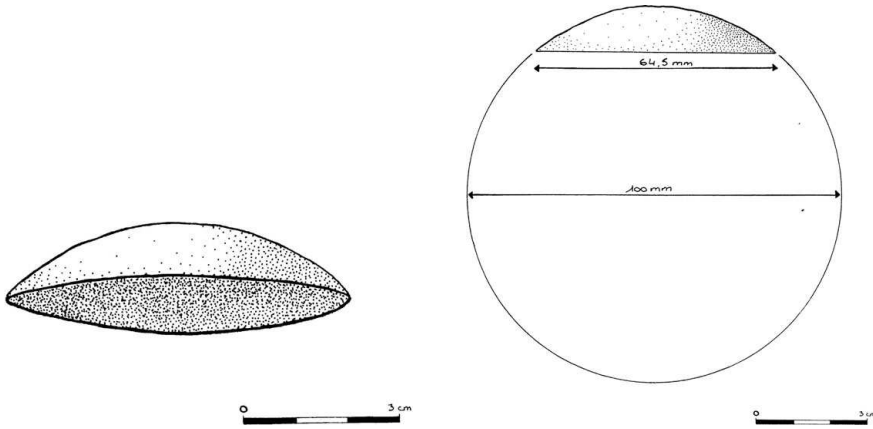


Figure 5. Phases 1 and 2 of the manufacturing process (C. Magister-Vernou/MAD 2006).

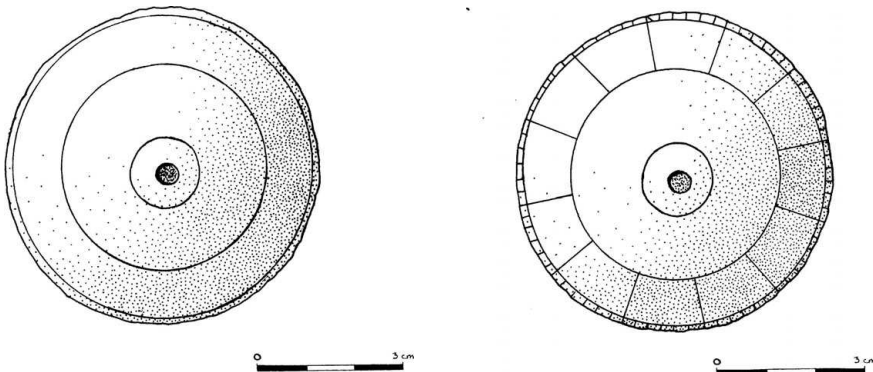


Figure 6. Phase 3 of the manufacturing process (C. Magister-Vernou/MAD 2006).

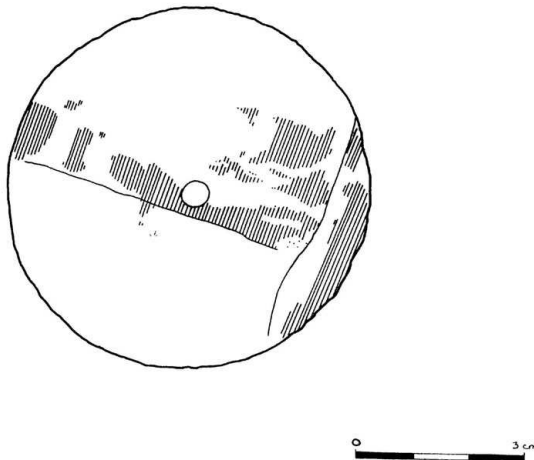


Figure 7. The other side of the disc (C. Magister-Vernou/MAD 2006).

#### 4. Possible usages

##### 4.1. Hypothesis 1: an astrological device

The astrologer began by overlaying his map of the sky (drawn on papyrus or on a wooden tablet for example) with the ecliptic's median plan (oriented on the top of the sky), and

then he installed two signs of the Zodiac. With the help of tables (such as the widely used *Theon's* tables), he determined the middle and the bottom of the sky, and then he established the position of the planets by looking at his map. By rotating the table by  $180^\circ$ , he wrote the name of the zodiacal signs. With an instrument like the curved disc of Chevroches, the astrologer could transfer the data of the day to establish his customer's horoscope or to look up the positive and negative dates (very much like the *Tryphon's* horoscope kept at the University of Oxford, cf. Neugebauer & Van Hosen 1959). The practice of this discipline, however, is complex and requires the assimilation of specific notions, which would take too long to develop in this paper. This astrological (?) curved disc is indeed extraordinary; it seems to be a unique object of its type in the ancient world. However, other testimonies of astrological practices during the Roman period are attested, and among these stands out two folding ivory diptychs found in the Grand site (Vosges, France) by J.-P. Berteaux and the end of the 1960s. These diptychs show a sky map organised in Zodiacs where the figures are emphasised in the dimple, by red, black and gold (Buisson & Abry 1993).

#### 4.2. *Hypothesis 2: an element of a complex mechanism*

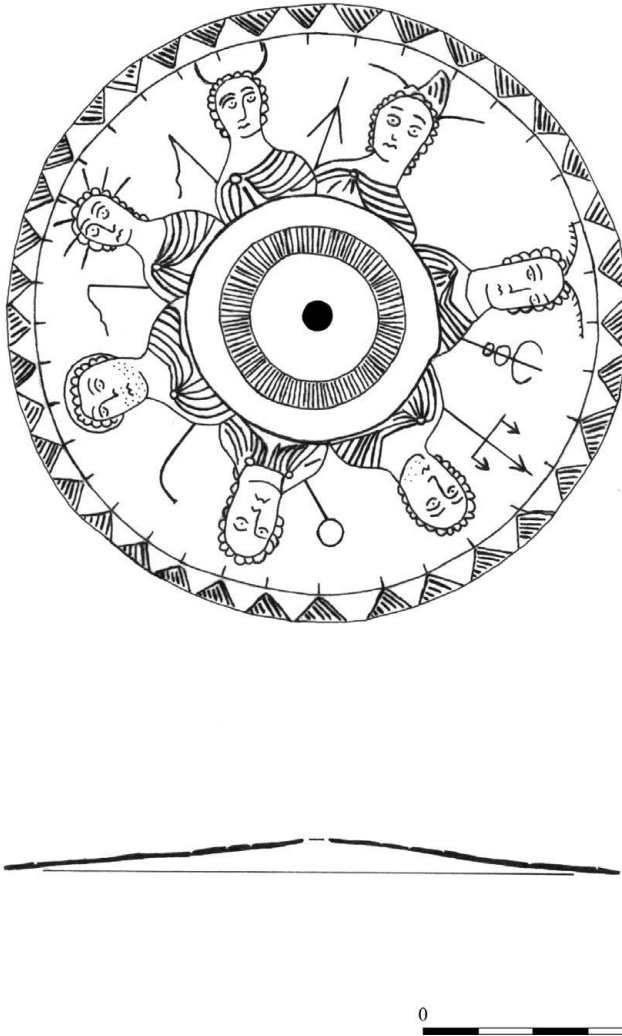
This mechanism could be used for astronomical issues, to calculate and predict the movement of planets for instance. The traces of tin soldering on the curved disc entices us to think about a more complex mechanism, which could be related to the Chevroches curved disc, known as the Alesia diary (Espérandieu 1933). This object is a thin circular bronze slab of 11 cm in diameter discovered in 1933 in an excavation at Alise Sainte Reine (Burgundy). It was conserved at the Palais du Roure collection, in Avignon. Recently we (C. Vernou and C. Magister) studied it and found that one can see 7 characters engraved on it, which correspond to the 7 days of the week: 1– the Moon, 2– Mars, 3– Mercury, 4– Jupiter, 5– Venus, 6– Saturn, 7– the Sun or Apollo. We also notice 37 hatched triangles and 37 smooth triangles, which according to P. Cauderlier would correspond to the decans of the nights and days (Fig. 8). This representation seems like the front plate of a Byzantine sundial-calendar, from the end of the 5th century, conserved at the Science Museum of London (Field & Wright 1985).

There are also similarities with another astronomical artefact, recently re-discovered. C. Vernou –whilst searching for similar objects found in the region since the 19th century– found a drawing of a curious object coming from the Roman sanctuary built at the source of the Seine river (Baudot 1842-1846). It is a disc cut into 14 nicks, pierced in the centre, and where the name of the 7 planets is engraved face to face (Fig. 9). The planets are indicated by the three first letters of the deities corresponding to the 7 weekdays. We can read (from right to left): *lun* (ae) or Diana, *mar* (tis), *mer* (cury), *iov* (is), *ven* (eris), *sat* (urnus), *sol* (is) or *Apollo*. This diary was probably positioned to see one name at a time (in a small window ?), and each name was replaced by another name, by turning the “disc” on its axis. It reminds on the arbor with ratchet from the Byzantine sundial-calendar conserved at the Science Museum (Field & Wright 1985, plate 6, p. 31).

This object from Dijon will soon be exhibited and published over 150 years after its discovery.

#### 4.3. *Hypothesis 3: an element of armillary sphere / globe / anaphoric clock*

There are only three celestial globes which survive from Greco-Roman times. All three globes reproduce all or most of the constellations known in Greco-Roman culture. These are: the well-known Farnese Globe, the Mainz Globe; and the recently-discovered Kugel Globe (Cuvigny 2004). Of these only the Farnese Globe is a large globe. Both the Mainz Globe and the Kugel Globe are miniature globes (part of armillary spheres?). Debo-

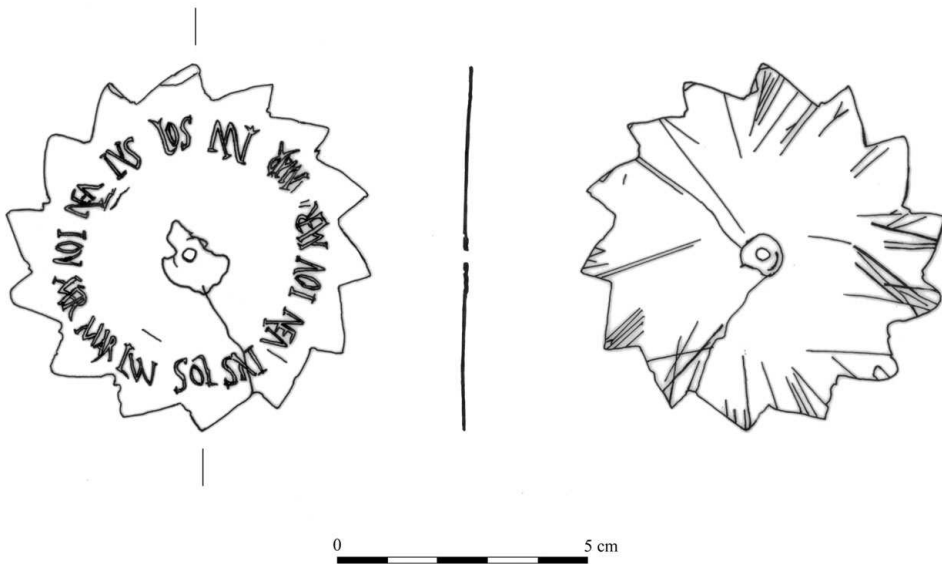


**Figure 8.** The *Semainier d'Alésia* (C. Magister-Vernou/MAD 2006).

rah Warner mentions also the existence of a fragment of a metal planisphere from an anaphoric clock dating to the 2nd century (Warner 1979). In Grand at the end of the 18th century, another fragment of an anaphoric clock was found and identified but appears to have been lost (Berteaux & Gury 1990).

Further studies on this unique disc will be carried out by a research group recently created on *Instruments et mécanismes antiques en Gaule Romaine* which will also collect and study recent finds (from archeological excavations) as well as old finds, “lost” in museums and private collections, and to understand their use (horoscopes, astronomical calculations, calendars, etc.).





**Figure 9.** The double *Semainier* from the sources of the Seine river (C. Magister-Vernou/MAD 2008).

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