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The winter solstice and the Mithraeum at Brocolitia, Carrawburgh

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Abstract: Here we discuss the orientation of the Mithraeum at Brocolitia, Carrawburgh, an auxiliary fort on the Hadrian's Wall. As we can see using software giving the sunrise and sunset directions on satellite maps, the orientation of the temple and the direction of the sunrise on winter solstice are in good agreement. It means that, probably, the orientation of the temple was chosen to recall the birth of Mithras on December 25.

Keywords: Archeology, Archeoastronomy, Solar Orientation, Solstices, Satellite Images, Google Earth.

In Roman times, Carrawburgh was an auxiliary fort on the Hadrian's Wall, called Brocolitia [1]. As told in [1], the fort used the Wall itself as its northern rampart and was built parallel to it but detached. We can easily see the fort in satellite images, for instance, in those of Wikimapia (Figure 1).



Figure 1: The auxiliary fort on Hadrian's Wall of Brocolitia (Courtesy: Wikimapia).

As explained by [1], “only the fort's earthworks are now visible, the Wall at this point and the fort's north ramparts having been demolished for the construction of General Wade's early 18th-century military road (now the B6318)”. At the south-west corner of the fort, we can see the remains of the

Brocolitia Mithraeum, that is, a temple of the mystery cult of the Roman god Mithras. “Like most other mithraea, the Brocolitia temple was built to resemble a cave, and also had the usual anteroom, and a nave with raised benches (podia) along the sides. At Brocolitia, the anteroom and nave were separated by a wattle-work screen, the base of which was found exceptionally well preserved” [1].

The cult of Mithras, such as that of the Sol Invictus who was the patron of the soldiers, was very popular in the Roman army. Both Sol Invictus and Mithras, who were often identified in the same god [2], are linked to the winter solstice [3-5]. Actually, the followers of Mithras worshipped the New Year on December 25, to celebrate the birth of Mithras [6].

The Mithraeum at Brocolitia has a remarkable orientation. Using the SunCalc.net software, a software providing on satellite maps the direction of sunrise and sunset on any day of the year, we can easily see that the building is in good alignment along the sunrise on December 25 (Figure 2). In fact, there is a very small difference between the direction of the sunrise on December 25 and that of the sunrise on the winter solstice (December 21). Using <http://aa.usno.navy.mil/data/docs/AltAz.php>, we can evaluate the difference in 0.2 degrees. However, we have to consider that the apparent size of the sun is 0.5 degrees and therefore, an observer is able to distinguish the difference spots on the horizon where the sun is rising, on the days of 21 and 25 December, concluding that the sun has inverted its apparent motion. The horizon seen by an observer at Brocolitia, towards the sunrise on the winter solstice, is shown in the Figure 3.



Figure 2: Thanks to SunCalc.net, we can see the direction of sunrise and sunset on any day of the year. The yellow line gives the direction of the sunrise and the red line that of the sunset. The orange curve is representing the apparent motion of the sun in the sky. In this image, we can see that the direction of the nave of the Mithraeum at Brocolitia is in good agreement to that of the sunrise on December 25.



Figure 3: Thanks to Google Earth, Street View mode, we can also explore the site and the horizon towards the sunrise on the winter solstice.

The example here proposed is very important. To the author's knowledge, this is the first example of a Mithraeum having an orientation towards the sunrise on the winter solstice. It is also interesting the fact that we have it in the Roman Britannia, where we have already found two examples of Roman military camps oriented according to sunrise/sunset on solstices [7,8] (examples of Roman towns oriented to solstices are given in [9-14]). These forts are the Hardknott fort of Mediobogdum and the fort of Segontium. Here in the Figure 4 and 5, we give the orientation of these two forts, with respect to the sunrise and sunset on solstices.



Figure 4: Two Suncalc.org snapshots combined to see the sunrise and sunset directions on solstices at the Roman fort of Segontium. Here the orange line represents the sunrise and the red line the sunset.

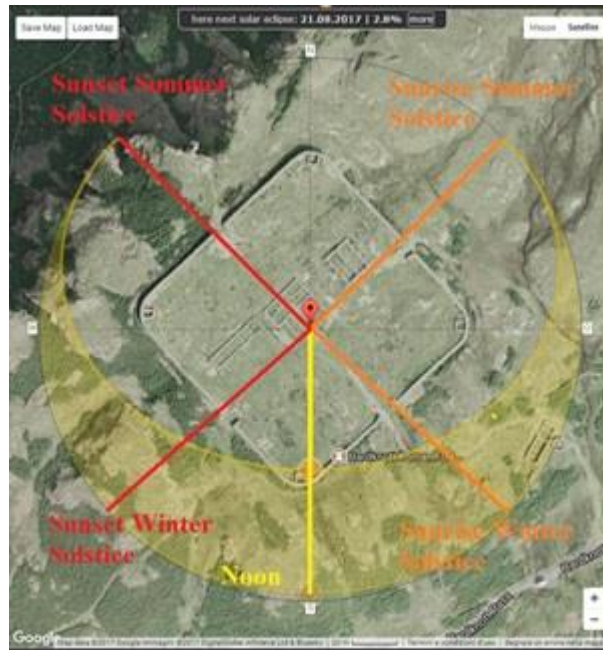


Figure 5: The same as in the Figure 4 for the Hardknott Roman fort.

In [7], we concluded that, for Mediobogdum, the surveyors of the Roman army had decided the best strategic place for the military camp and given it a perfect square figure, aligned to solstices. In this manner, they had the opportunity of paying homage to the gods ruling the sky and the sun, may be, the Sol Invictus, patron of the soldiers, or Mithras. We can repeat the same for Segontium, the Roman fort of Caernarfon, a town and port on the eastern shore of the Menai Strait, in the North Wales. The fact that Segontium could have been oriented according to the winter solstice by the followers of Mithras is supported by another important fact: the existence of a temple of Mithras, the Caernarfon Mithraeum, near the fort. For this reason, It could be interesting to investigate the orientation of this and other Mithraea too, to see if the orientation of the nave along the sunrise on the winter solstice is common to these temples or is a special feature of the Mithraeum at Brocolitia.

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On 12 Sep. 2017, Owen Jarus, from Toronto, was so kind to inform me that Roger Beck, in his paper entitled "Mithraism Since Franz Cumont" (in *Aufstieg und Niedergang der römischen Welt II.17.4, 2002-2115, 1984*), at p. 2034, proposed Brocolitia Mithraeum being constructed to have an illumination by the rising sun at the winter solstice. This article is available (in digital form) from De Gruyter Editor site. So it is possibility to read the discussion that Beck made in it. He told that the most interesting monument from Carrawburgh is the altar of Sol. He told also that it is possible that the mithraeum was constructed in such a way "as to allow a beam of natural light - from the rising sun at the time of the winter solstice - to illuminate the interior in a significant way". Beck imagined a hierophany where the light of the sun was passing through the doorway and an inner screen "to graze the front of the statue of Cautes with his raised torch and to fall on the altar", for instance.