

CARLO MAXIA, GIOVANNI FLORIS

ASTROARCHAEOLOGY AND NURAGIC MEGALITHISM

Since 1968 (Maxia, 1970) in studying the total and annular eclipses of the sun that passed over Sardinia during the Nuragic and ensuing periods (above all the Carthaginian and Roman), we have been surprised by the fact that, during the Nuragic period, eclipses occurred much more frequently than in the successive periods. In fact, from "Canon der Finsternisse" (Oppolzer, 1887) we know that in Sardinia between the years 1130 B.C. and 533 B.C. (i.e. 597 years) there were 18 solar eclipses (total and annular) at an average of one every 33.16 years; that is, in one generation whose average age was 30—35 years there was one eclipse. It is also interesting to note that in the period between 690 B.C. and 533 B.C. (i.e. 157 years) there were 7 solar eclipses (of which 3 were total) at an average of one every 22.43 years. It is not difficult therefore to imagine how this period before the Carthaginian invasion influenced the destiny of these peace-loving people of shepherds who feared the death of the Sun-god and saw in it the inevitable end with the eclipse, even though lasting only for a few minutes. We can imagine the waiting for the end of the world in the Dark Ages as a similar terror; or even to the present where the threat of the nuclear bomb gives rise to eschatological prophecies.

Of these extraterrestrial phenomena, which have always aroused a great deal of interest in the human race, we must also consider lunar eclipses, playing their own part in influencing the sensitive imagination of the people.

According to Oppolzer we note that between the years 1130 B.C. and 533 B.C. there were 27 lunar eclipses which took place in the years of

solar eclipses: on the average one lunar eclipse every 18.40 years. During these 597 years, a double lunar eclipse took place in the same year as a solar eclipse on 12 occasions, on an average of one every 49.75 years.

It is interesting also to note that following the solar eclipse in 533 B.C. until after 1000 A.D., there were only 14 solar eclipses (3 total) visible over the island within the space of 1577 years with, on the average, one eclipse every 112.64 years. These occurred in the years 393 B.C., 379 B.C., 233 B.C., and then in 212 A.D., 234 A.D., 272 A.D., 306 A.D., 334 A.D., 359 A.D., 540 A.D., 666 A.D., 698 A.D., 787 A.D. and 1044 A.D.

From these data it can be seen that following the solar eclipse in 233 B.C., which occurred a few years before the Roman invasion of the Island, a good 445 years passed before another solar eclipse was visible from the Island. We can conclude from this that the Nuragic descendants, free from being terrorised for more than 20 generations by a solar eclipse, no longer considered the Sun-god as being associated with the Nuraghe of their ancestors and looked for another cult which would, besides satisfying their intimate religious sentiment, also provide for the necessities of everyday life, which would be made less difficult by the intercession of a god.

From the above astronomic phenomenon we could well suppose that between the solar eclipse and the Nuraghe there was a direct link. The Nuraghe, in this case, could have been built following a solar eclipse with the intention of appeasing the god (which could in this case have been none other than the sun) hoping in this way to

persuade him not to leave the world in darkness. According to this theory, when the frequency of solar eclipses visible from the island was greater, then the construction of the Nuraghe (or temples to the Sun-god, of more than 11,000 built, not more than 6,000 remain) should have also been more regular: these could have been feasibly built in less than ten centuries. In this way, every tribe or clan, using every able male under the guidance of the architect-priest, could have built, on an average of one in every generation, its own offering to the Sun-god. The Nuraghe, from this interpretation, reveals its sacred and transcendental purpose, and not as being constructed as a means of defence (like a normal *ante-litteram* medieval fortress) as was maintained for over a century by Sardinian archaeologists (and those from the mainland of Italy), slaves to an antiquated and obsolete historicism.

Naturally we can only demonstrate that archaeologists who upheld the theory that the Nuraghe were constructed as a means of defence and habitation and who tried by fraudulent means to get this theory accepted (even in encyclopaediae), played their part in completely falsifying the true nature of the Nuraghe civilization, the only autochthon civilisation of the Island.

Continuing intensively our investigations of the Nuraghe with the collaboration of Astronomer Dr. E. Proverbio (Maxia and Proverbio, 1972-1973), we turned our attention to the orientation of the entrance to the ground floor of the Nuraghe (observing almost a thousand examples) which faced South-South-West corresponding precisely with the azimuth of the rising of Rigel (alfa Cen), Sirius (alfa C/ma) and Rigel (beta Ori) that is with 3 of the stars within our hemisphere of greatest magnitude *m*. Other directions favoured correspond to the direction of the sun at midday and of the astronomic azimuth of the winter solstice (which as has been shown by Maxia and Proverbio, 1972-1973) was almost constant at $+58$ throughout the period between 2,000 B.C. and the birth of Christ.

From the same AA., above quoted, we present the following table which shows the intervals N , in years, calculated from the ratio $N = 2000 \frac{d}{v}$ during which we can presume that the relative Nuraghe were constructed:

Direction	v	d	Am	p	N
Winter solstice	0°,4	2°±2°	60°±2°		
Rigel	11°	3°±2°	70°±2°	(750±350)B.C.	550±350
Sirius	5°	3°±2°	68°±2°	(700±500)B.C.	1200±500
Rigel	44°	13°±2°	26°±2°	(1100±100)B.C.	600±100

The figures relating to the winter solstice have not been included as the observation errors considered to be of the order $\pm 2^\circ$ are much greater

than the variation calculated for this direction over the last 2,000 years B.C.

At the beginning of our observations, we made a very pertinent discovery: it was found that the apex stone of the tholos of a certain number of Nuraghe could easily be removed and replaced (Maxia, 1970). At the start we maintained that the room of the Nuraghe (only the upper one in the case of a nuraghe with a window) could have suddenly been illuminated by a beam of light with incredible effect for the liturgy of ceremonies taking place in the said room. Later, however, bright light we concentrated our attention upon the fact that the appering in this way in the dark room of the Nuraghe was dependent upon the summer solstice (when the sun reaches its zenith). It was necessary, however, to prove whether this hypothesis was in fact correct (as demonstrated by the measured angles). Therefore we waited for last year's summer solstice. The experiment took place in two Nuraghe, Aiga (Abbasanta) and Biriola (Aidomaggiore) both of which allow, without damage to the vault-like construction of the Nuraghe, the removal of the apex stone of the *tholos*.

About 10 days before the summer solstice (to be precise: 11 A. M. June 8th, 1974) we witnessed a splendid confirmation of our theory in the Aiga Nuraghe, the phenomenon being repeatable for almost a month; and likewise in the Biriola Nuraghe.

It is clear that the appearance of the Sun and therefore of the god for those people who were present in the central room and who waited in awe, according to the prophecies of the priest, must have been a phenomenon of exceptional grandeur and pathos. As we have in fact ascertained, the ray of light (once the apex stone is removed) begins to descend the wall in the direction of the central niche (facing North) until it reaches the lintel of the niche from whence, at the climax, to the floor where it takes the shape of the *tholos*. An object or person standing in this niche becomes completely floodlighted, seeming to be the actual source of the light contrasting strongly with the surrounding darkness. Therefore the apparition of the god was a realistic event for all onlookers, and not for one person only as in the case of the apparition of the Virgin Mary in 1958 to the girl Bernardette Soubirous in the Cave of Lourdes. The fact that the god condescended to visit its temple (the Nuraghe) in just one period of the year (the summer solstice), and for a certain lapse of time, must have had a strong effect on the faith of the Nuragic people who were present and who would have propagated the event to make the priest an unchallengeable authority, particularly in the formulation of prophecies and oracles. In this case the priest did not appear to be exalted or possessed by the god which spoke through him (as in Ancient Greece) but as a personification of the solar god which shone from him.

It is not difficult to imagine on the other hand seeds (ensuring fertility) or individuals suffering from seemingly incurable illnesses being cured by

such event suggesting such power as to seem miraculous and supermatual. From the darkness of the Nuraghe the solar god, descending from heaven yet remaining impalpable and incorporeal, burst forth its enlightened and radiant strenght in the presence of believers who beholding it, absorbed it into an inner force, psychic and permanent.

Studying the Nuraghe we have found other numerous and important megalithic infrastuctures (unknown to Sardinian archaeologists). We refer to the sacrificial altars, to the solar stones and to the sacred well (Maxia and Fadda, 1972-1973; Maxia, 1973-1974). It is interesting to note that one part of the sacrificial altar (the main part used for the sacrificing of bulls) faced towards the summer solstice or towards the winter solstice in such a way that with the setting of the sun upon them, they were turned into astronomie observatories.

The solar stones (for a description thereof, see published papers, for example in "Frontiera") are characterized more for their symbolism and sacred nature (as the cross of Christianity) than for their orientation, in connection with other megalithic constructions (Nuraghe, sacred wells, sacrificial altars). In many cases the sacred wells provided, without doubt, a continued supply of an indispensable necessity of life and for the liturgy of sacred functions. In other cases, though (for example the wells at St. Cristina, Paulilatino; St. Vittoria, Serri; St. Anastasia, Sassari; Funtana Coberta, Ballao) they must have been used, as we have shown for the first time, for reflecting on their water surface through a small opening, the lght of the moon at its maximum declination. On the same occasion we also discovered that from the bottom of the steps of the well at S. Chistina, Sirius of Canis Majoris, appeared right in the centre of the opening of the stairway. This being so only in concurrence with the maximum declination cannot be casual, bearing in mind also the fact that several Nuraghe have the opening facing directly towards Sirius.

Finally, again with the well of S. Cristina, we were able to confirm that during the spring and autumn equinox 1974, when observing from the bottom of the steps, the sun shone into the bottom of the well; the light appearing square in shape and coming right through the centre of the opening of the well. Thus we had the experimental confirmation that some sacred wells (particularly S. Cristina at Paulilatino) were in reality astronomic observatories during the Nuragic civilizations being used to this and even during the Carthaginian domination to observe the sun, the moon and Sirius of Canis Majoris.

For this we must consider Sardinia as the western island of the sun for its thousands of temples (Nuraghe) built to the Sun-god by a peaceful and pious people of shepherds, known as such by the Romans (see 18th song in Dante's Purgatory); as the sacred island by the Phoenicians, who called it Cadossene; as the Island of the sun sought after by Aeneas driven by gales off the African coast where Carthage was founded and as the Island of the sun (not Sicily as was wrongly claimed) where

the hungry friends of Ulysses irreverently killed the cows sacred to the diurnal god.

SUMMARY

The application of astronomical techniques to the investigation of archaeological finds offers new possibilities for research into the ancient civilizations of protohistory. This new approach is based on the hypothesis, which is supported by several historical and ethnological arguments, that the observation of celestial phenomena played an important part in the cultural development of megalithic civilizations. Present methods of astroarchaeology are based on the accurate observation of directions and angles in archaeological finds, and on the correlation of the results with the calculated positions of celestial bodies in various epochs.

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Prof. Carlo Maxia
Dr. Giovanni Floris,
Institute of Anthropology
University of Cagliari
Via G. T. Porcell, 2
09100 Cagliari (Italy)