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Astronomical gleaming from ancient times

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***Abstract*---**The archaeological disposition of the Prehistoric period is evident after examining many of the rock arts, petroglyphs, and other sources from various regions. Bomai Rock art showing stars might be an earlier representation of the stars of the Orion constellation. The painted grey ware from the protohistoric site of Mehrgarh has a representation of the Sun in four quadrants. The Harappan Civilization had many representations that had an astronomical affinity. The seals may be representing different constellations. Ring stones with small, drilled holes were used to find the position of the sun during various months, to determine Uttarayana, Dakshinayana, or the associated climate concerning the apparent motion of the Sun.

***Keywords*---**constellations, petroglyphs, Orion, Auriga, Harappan civilization, bomai, ring stones, Pleiades.

Introduction

The early humans might have imagined stars in the form of constellations depicting animals. It may not be like the notion of constellations that are currently accepted. There were an inquisitive curiosity and vision regarding the origin of the Universe as evident from the Vedic phrases like "*Forth from his navel came mid-air the sky was fashioned from his head, Earth from his feet, and from his car the regions. Thus, they formed the worlds*" (Rigveda 1.90.1.4). They have an understanding that the core of a star or the Sun is hot 'with flames of fire that burn and blaze' and the constellations are merely disappearing from the eyes due to the rays of the Sun ("the constellations pass away, like thieves, together with their beams, before the all-beholding Sun"). The stars or *nakshatras* were prayed for a boon ('I worship seeking the twenty-eight-fold for its favour'). The cosmogenic outlook of humans is portrayed in many of the cave paintings. The reasons for creating petroglyphs are complex and scholars are still deducing and interpreting the possible meanings. Sometimes they associate with ritualistic perspectives and as cultural symbols where traditional ceremonies take place. Many a time they

orient towards horizon or surroundings, the intention of which was not casual or random. They might be also used as markers of a specific tribe or clan or the travel history or migration of people. There were representations of astronomical phenomena along with mundane routine activities like hunting. Primitive techniques of measuring the distance between stars were employed by the people. There is much evidence of portraying the position of the Sun with seasons or the phases of the moon. Harappan civilization assimilated many of the astronomical aspects into their town planning and in their seals, which were used for economic activities.

History of Research

Bomai petroglyph was interpreted with the astronomical observation by early researchers (Iqbal, Vahia, Masood, & Ahmad, 2009) (Malla, 2017). Some researchers reported the Bomai petroglyph without mentioning any celestial significance to it. (Paray & Wani, 2016). The protohistoric site of Mehrgarh was discovered in 1974 by the French archaeologist couple, Jean-Francois Jarrige and Catherine Jarrige and they had extensive research on the site. Seal from Mohenjodaro: “Proto Siva” or horned headgear deity was differently interpreted by different researchers (Joshi, Parpola, Lahdenpera, & Anttila, 1987). Similarly, Seal from Mohenjodaro depicting worship was also studied with different perspectives by different researchers (Mackay, 1938). Ring stone from Mohenjodaro was reported in the fieldwork carried out by Maula, in 1984.

Points of Interest

Bomai Rock art showing stars

Bomai is a village in the Sopai taluka of the Baramulla district of Kashmir with coordinates 34.37N, 74.39E. Here is a petroglyph where three stars are represented in a line. The star represented towards the left is having the same size as the lower one of the lines. The middle one in the line is slightly larger compared to others. It is interpreted here that these are the representation of the stars of the Orion constellation (Image 1). This is surely one of the earliest examples of the representation of stars of a constellation.

Mehrgarh Painted grey ware pottery

A painted grey ware pottery bowl, roughly corresponding to the period 3200-2600 BCE, found from Mehrgarh, shows, the representation of stars with rays in four quadrants. It is interpreted here, that this is a representation of the sun, in four positions, signifying the prediction of seasons.

During December, the northern hemisphere is tilted away (due to the axial tilt of the Earth) from the Sun. This is called Winter Solstice (Sun will be standing at its farthest position in the Southern hemisphere or rises far in the south-east around Dec 22). During this time,

Image 1: Bomai Rock art Petroglyph. Courtesy: (Paray & Wani, 2016)[1]

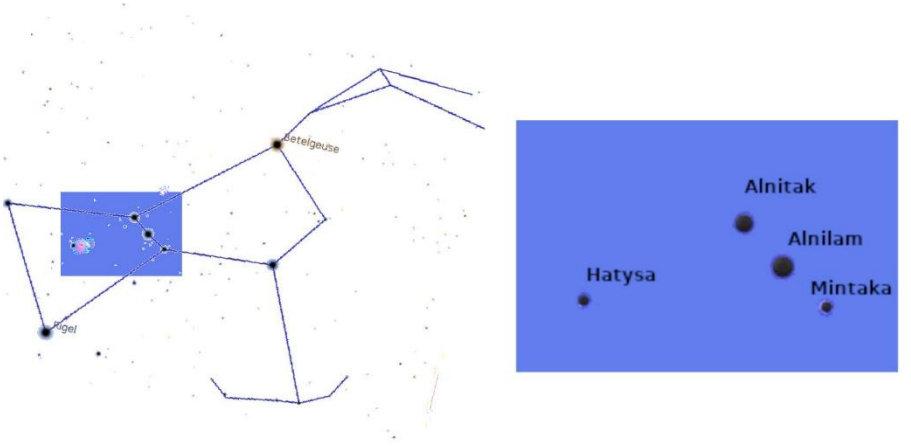

Image 2: Interpretation of Bomai art as a representation of the stars of Orion.

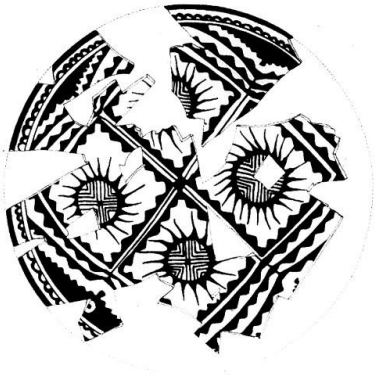

Image 3: Star with rays in four quadrants, painted on grey ware from Mehrgarh. Courtesy: (Jarrige & Jarrige, 1995).

the northern hemisphere receives lesser sunlight (due to longer inclination and lesser surface area to sunlight) and hence winter. The day in the northern hemisphere is shorter, compared to the southern hemisphere. From here, it appears that the Sun starts northward motion, towards Summer Solstice and this journey is called *Uttarayana.* During the Summer Solstice, the Sun will be standing farthest in the northern hemisphere or rises far in the north-east, characterized by longer days and summer in the northern hemisphere and winter in the southern hemisphere (due to the axial tilt of the northern hemisphere towards the Sun). This happens around June 22. From this point, it appears that the Sun starts the southward movement of *Dakshinayana.* So, within a latitude of +23.5 and -23.5 degrees, the Sun crosses or passes directly overhead at local noon, two times, that is during Uttarayana and Dakshinayana, and are called Zero Shadow Days. This also means the apparent movement of the Sun's path (Ecliptic) touches the celestial equator (corresponding to the plane of the Earth's equator) two times, one at around March 21 (called the Vernal Equinox) and the other around September 22 called as the Autumnal Equinox. The former is characterized by the Spring season and the latter is characterized by the autumn. During the equinoxes, night and day are of the same length.

Horned head gear deity' seal from Mohenjodaro

The seal represents a deity with horned headgear in yogic posture, surrounded by animals and symbols on top. This has been called 'Proto-Siva' (Wheeler, 1946) and 'Prajapathi Brahma' (Abhyankar, 1993) It is interpreted here (Image 4) that the deity itself may be a constellation, surrounded by other constellations and stars. The two semi-circular portions of the headgear may be a representation of the Sun or the Moon.

There are twelve divisions on the horn, which may signify the twelve months of a year, that may be either based on the Sun or the Moon. The hands have a pattern of the graded design with four small divisions each separated by longer marks. Altogether eleven marks can be seen on the right hand. These graded marks might show the phases of the moon, each long mark may represent the phases, and shorter marks the days to reach the corresponding stage of phases, from the new moon to the first quarter or from the waxing gibbous phase to the full moon. The animals depicted, rhinoceros, bison, elephant, tiger, and others might be the associated constellations.

Image 4: Seal from Mohenjodaro: "Proto Siva" or horned head gear deity in Yogic Posture.Image Courtesy: (Joshi, Parpola, Lahdenpera, & Anttila, 1987)

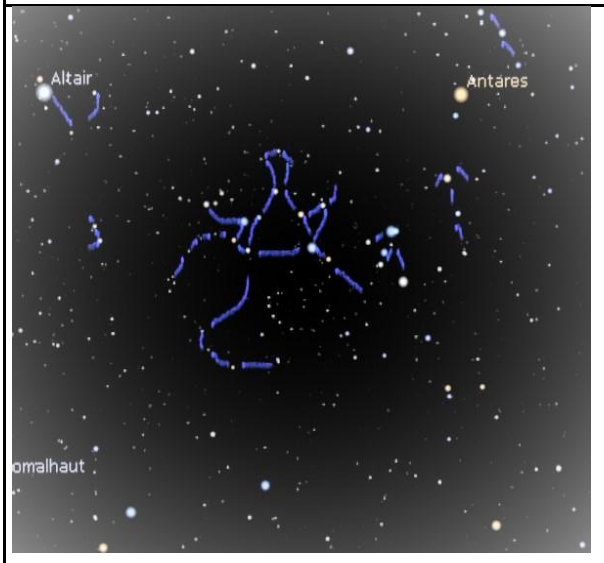

Image 5: Representation of the horned head gear deity as Sagittarius constellation along with others.

Mohenjodaro Seal depicting worship

A steatite seal (Image 6) was found from the Mohenjodaro DK area, which depicts a worship scene, where a horned deity standing between two branches of a pipal tree is being worshipped by a kneeling person, with a human head like a thing on a small stool. A giant ram is represented beside him and below there are seven figures in a kind of ritual dancing or procession.

Several scripts or symbols are placed at the top of the seal and one at the base of the pipal tree. The seal has a grooved and a perforated boss where its edges are slightly rounded for the square seal. It has a dimension of 4.06 X 3.95cm with 0.08cm thickness. (Mackay 1938).

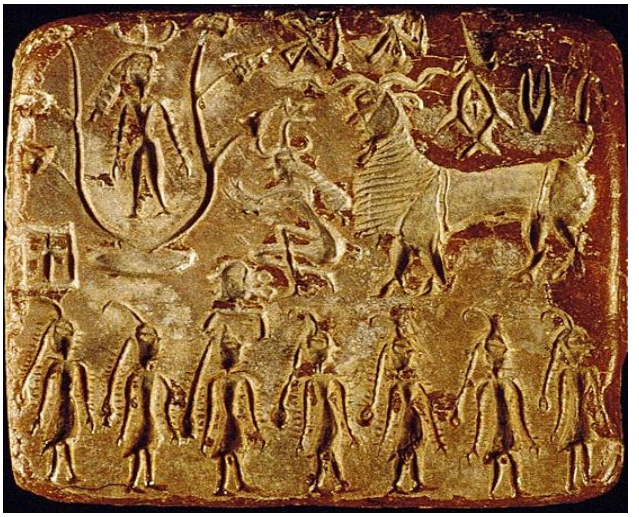

Image 6: Seal from Mohenjodaro depicting worship; Image Courtesy: (Mackay, 1938).

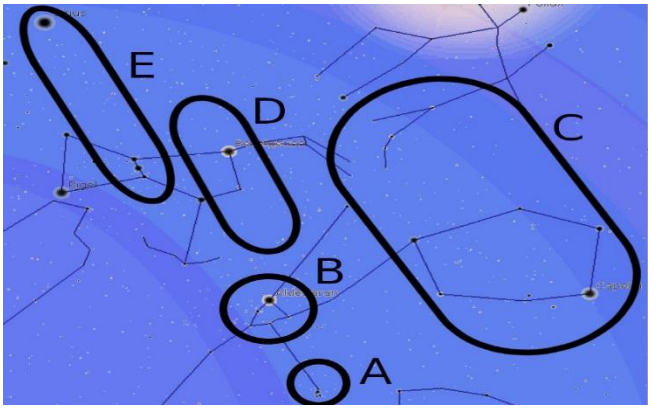

Image 7: Assimilation of the subjects of the Mohenjodaro seal depicting worship as constellations.

In ancient Egypt, the heliacal rising of Sirius (goddess Sopdet) is associated with the annual flooding of the Nile (Wilkinson, 2003)[2]. The flood brought fertility to the soil and hence she is venerated as the fertility goddess. It can be assumed that the rising of Sirius might be a new year since the days between its rising will have 365 days or a solar year. The same convention might have been followed by the people of Indus Saraswathi valley during the time, and it is interpreted here (through the seal) (Image 7) that they were worshipping the Sirius star who is represented between pipal branches (E), by the kneeling figure (D, the star Betelgeuse), the head on the stool as the star Aldebaran (B), the giant ram as the constellation Auriga (C) and the seven figures in procession (A) as the seven stars of Pleiades (Sterope, Merope, Electra, Maia, Taygeta, Celaeno, and Alcyone).

Marked ring stones from Mohenjodaro

Two “ring stones” found from Mohenjodaro, showed small, drilled holes on one side (Maula, 1984) beside the central circle. There are two holes, each one on opposite sides of the circle extending lengthwise (Image 8).

It is interpreted that these ring stones with drilled holes might have been used for finding out the position of the sun during various months, to determine *Uttarayana, Dakshinayana,* or the associated climate concerning the apparent motion of the Sun. The effect of the Sun in the northern hemisphere and the Southern hemisphere is already discussed in the previous chapter. The observation might be done during a fixed time, say during noon, by aligning the two holes of the ring stone in the north-south direction. Then the apparent movement of the sun is represented as small holes probably referring to movements during months, by marking it in the corresponding northeast or southeast quadrants. The entire movement of the sun from its north to south and vice versa might be recorded for making a solar calendar incorporating the various positions of the Sun. This might be enriched by observing the various positions of the sun about constellations (zodiac constellations).

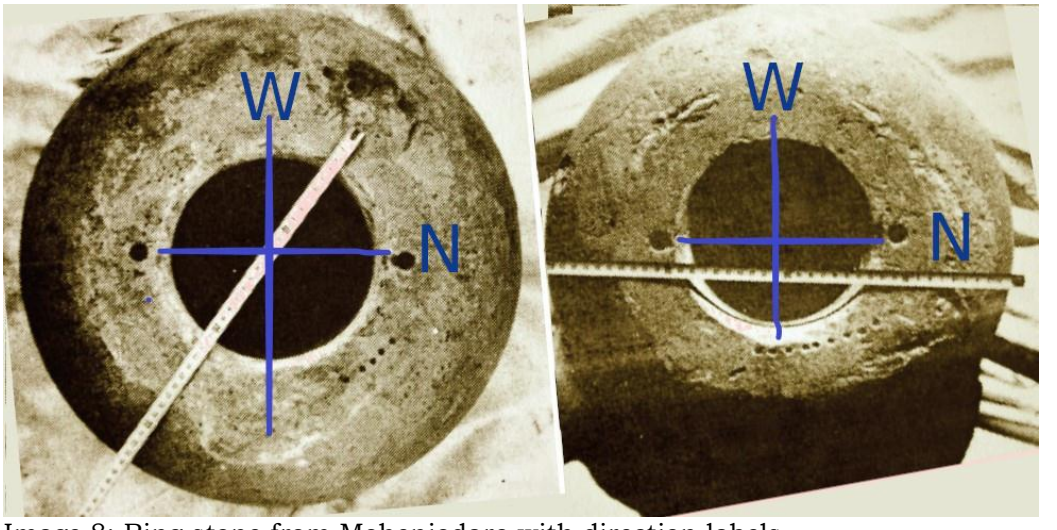

Image 8: Ring stone from Mohenjodaro with direction labels.
Image courtesy from (Maula, 1984).

Conclusion

To conclude, it is worthy to mention, that the reflections of astronomical observations of ancient people can be visible in many of their representations like the petroglyphs of Bomai, representation of stars on pottery, which was found from Mehrgarh and similar. People of the Indus Civilization were good observers of the celestial objects, from which they sewed a life, containing their astronomical observations**.** The Indus deity seal from Mohenjodaro, itself, might be a representation of constellation and so is the complex representation of the “Proto Siva” seal from Mohenjodaro. Similarly, a seal from Mohenjodaro depicting

worship is interpreted as the conjunct constellations of the Pleiades, Auriga along with the bright stars Aldebaran, Betelgeuse, and Sirius. The marked ring stones from Mohenjodaro are another excellent example showing the tracking of the movement of the Sun.

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