ASPECTS OF GOND ASTRONOMY

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Abstract: The Gond community is considered to be one of the most ancient tribes of India with a continuing history of several thousand years. They are also known for their largely isolated history which they have retained through the millennia. Several of their intellectual traditions therefore are a record of parallel aspects of human intellectual growth, and still preserve their original flavour and have not been homogenised by the later traditions of India. In view of this, the Gonds provide a special window to the different currents that constitute contemporary India. In the present study, we summarise their mythology, genetics and script. We then investigate their astronomical traditions and try to understand this community through a survey of 15 Gond villages spread over Maharashtra, Andhra Pradesh and Madhya Pradesh. We show that they have a distinctly different view of the sky from the conventional astronomical ideas encountered elsewhere in India, which is both interesting and informative. We briefly comment on other aspects of their life as culled from our encounters with different members of the Gond community.

Keywords: India, Gonds, indigenous astronomy.

1 INTRODUCTION

The Gonds are the largest of the Indian tribes, with a population of between 4 and 5 million spread over northern Andhra Pradesh, eastern Maharashtra, eastern Madhya Pradesh, Jharkhand and western Orissa (Führer-Haimendorf and Führer-Haimendorf, 1979). While their precise history cannot be dated to a period earlier than AD 890 (Deogaonkar, 2007: 37), their roots are certainly older.

2 THE GONDS

2.1 The Origin of the Gonds

Mehta (1984: 105-215) has studied the Gonds from different perspectives, and also their history and mythology in detail. Based on linguistic and other data he considers them to be an ancient community, and one of the oldest tribes in India, with their roots going back to a pre-Dravidian arrival in south India around 2000 BC. He identifies later Brahman influences in their stories. Based on ideas of totem poles and other signs of early religion he makes a very strong case to consider them as one of the earliest inhabitants of central India, with the core in the Kalahadi region of Orissa. Interestingly however, the Gonds consider themselves to be later entrants into God’s world through the penance of Shiva’s son Karta Subal (Mehta, 1984: 177). It has also been suggested that they were descendants of Ravan (Mehta, 1984: 205). Aatram (1989: 141-143) has suggested a connection between the Gonds and the reference to the Kuyevo tribe in the Rig Veda.

The history of the Gonds suggests that they occupied large stretches of land in central India and were its primary rulers from AD 1300 to 1600 (Deogaonkar, 2007: 34-55). However, one of the conspicuous aspects of the Gond lifestyle has been that they did not transform from farmers using the simplest farming techniques to an urban, settled population until very recently. Moreover, they did not evolve into a formal civilisation, living in cities, with elaborate trading practices, and become a large non-agricultural population. This may have been due to a lack of any need to create surpluses, conserve resources and rationalise their population groups (e.g. see Vahia and Yadav, 2011). The reasons for this need to be studied separately.

Sociologically, the Gonds ruled large parts of central India before the rise of the Mughal Empire in Delhi. Several forts and other relics from the Gond Kingdom suggest their dominance over central India during this period. The fact that they built forts and not castles also suggests a lack of desire to move from agricultural roots to urbanisation. Their current lifestyle is also indicative of farming traditions rather than aggressive kingdom-building. The impact of acculturation since their original roots and their subsequent integration into respective state linguistic and religious traditions has resulted in a recent strong desire to revive their original traditions and preserve their group identity.

2.2 The Geographical Spread of the Gonds

The Gonds are mainly divided into four tribes: Raj Gonds, Madia (Maria) Gonds, Dhurve Gonds and Khatulwar (Khutwad) Gonds. Deogaonkar (2007: 15-16), quoting Mehta (1984), lists the major areas of the Gonds to be:

- Central India
- Maharashtra
- Andhra Pradesh
- Eastern Madhya Pradesh
- Western Orissa
1. The Bastar region in Madhya Pradesh on the Godavari Basin
2. The Kalahandi region of Orissa
3. The Chandrapur region of Maharashtra
4. The Adilabad region of Andhra Pradesh
5. The Satpuda and Narmada regions of Madhya Pradesh
6. The Raipur region in Madhya Pradesh, including Sambalpur in Chhattisgarh, and the Sagar region in Madhya Pradesh
7. The Elichipur region in the Amravati District of Maharashtra

Their population size has increased from about 100,000 in the 1860s (Deogaonkar, 2007: 23) to about 3.2 million in the 1941 census (Agrawal, 2006: 35) and to 4.1 million in 1961 (Deogaonkar, 2007: 13). Their population as per the 1991 census was 9.1 million (after Wikipedia). Compared to this, the population of India as a whole rose from about 250 million (of undivided India) in 1870 to 360 million in 1950 and 490 million in 1965 (Maddison, 1989: 129). The population of India in 1991 was 850 million (after Wikipedia). The relatively steep increase in their population (which is rising faster than the general population of India) suggests that the Gonds originally lived in low-density population groups over large tracts of land and had a low life expectancy. However, there has been a change in this trend: integration into the larger Indian population, subsequent lifestyle changes and a significant improvement in their general well-being have resulted in increased longevity of the Gond population.

2.3 Genetic and Linguistic Data on the Gonds

Genetically the Gonds are a mix of Dravidian and Austro-Asian populations (Balgir, 2006; Gaikwad et al., 2006; Pingle, 1984, Pingle and Fürer-Haimendorf, 1987; Sahoo and Kashyap, 2005), while some genetic markers are unique to this population. In particular, two genetic markers, loci D3S1358 and FGA, show departure from the Hardy-Weinberg equilibrium in the Gond tribe. These are also markedly different from those of seven neighbouring populations (4 tribes and 3 castes—two middle castes and one Deshasth Brahmin caste) (Dubey et al., 2009) indicating that the Gonds have been able to maintain their genetic isolation, with little intermixing with neighbouring tribes.

Linguistic studies of the Gond language show that Gond tribes comprising the Madia-Gond, a hunter-gatherer population, harbour lower diversity than the Marathi tribal groups, which are culturally and genetically distinct. The Proto-Australoid tribal populations were genetically differentiated from castes of similar morphology, suggesting different evolutionary mechanisms operated within these populations. The populations showed genetic and linguistic similarity, barring a few groups with varied migratory histories. The microsatellite variation showed the interplay of socio-cultural factors (linguistic, geographical contiguity) and micro-evolutionary processes. Gond culture and language therefore can be considered isolated, and the level of contamination or modification by interaction with other tribes seems to be low. This is seen from the fact that while they use local names for the numbers 9 and 10, they continue to maintain their original number-name associations for the numbers 1 to 8. This is also reinforced by the fact that they continue to ignore the current Pole Star (Polaris), and do not seem to have a specific name for it (see further discussion on this point below). This evidence of isolation therefore permits us to study their indigenous beliefs without having to allow for cultural contamination.

2.4 The Religion and Customs of the Gonds

In religious terms, there are nine distinct groups of gods whose lineages are followed by all Gonds. Their primary god is Bada Deo or Mahadev (Pen) who is conventionally thought to be Shiva of the Hindu traditions. But at an operational level, there are nine groups of gods, and these are referred to by numbers (1 to 7, 12 and 16). However, references to twelve gods (from 1 to 12) named simply as Undidev Saga, Ranudev Saga all the way to Padvendev Saga (the 10th God), Pandundev Saga (the 11th God) and Panderdev Saga (the 12th God) can also be found, and they all have names. Each Gond is a follower of one of the numbered groups of gods. Members belonging to the lineage of the even-numbered group of gods were originally permitted to marry only those belonging to the odd-numbered group of gods, but this tradition is now changing. In addition, the Gonds have further subdivisions by surname and gotra (clan).1 Conventionally there are believed to be 750 distinct gotras, a number that is marked on their flag (see Kangali, 1997: 183-185).

According to the 2007 Gondvana Kiran Calendar the Gonds have 24 major festivals, and these are listed in Table 1. The last column only gives the approximate Gregorian month, since synchronisation of solar and lunar months is only done periodically. Consequently, in a specific year, the New and Full Moon may fall in the previous or the following Gregorian month to the one mentioned here.

Gond customs also vary significantly from classical Hindu customs. Conventionally, Gonds bury their dead with the head of the body facing south in most regions, but to the west in some areas. They consider north to be a direction of ill omen that brings disaster. By contrast, south is considered to be a holy direction. This is the
reverse of Hindu convention. A small stone marks the location of a burial. However, traditions of creating hero stones closer to home, and common community worship, are also known. In one community, we were also given reference to other gods, which included Kali, Kankali, Maikali, Jango, Lingo, Jari-Mari, Maanko, Tadoba, Vagoba, Guru and Pahandi-Kupar (Kangali, 1997). Their primary temples worship snakes and Mahadeo, but temples dedicated to weapons and other iron tools, and to memorials of Rani Durgavati, also can be found. The primary symbol of worship is a complex fertility symbol (Figure 1). It is interpreted as having a feminine representation at the bottom followed by the male lingam, and with Earth and the Sun on top, all interconnected in some representation and shown separately on flags etc.

2.5 The Gond Script

There is significant confusion about the existence of a Gond script and both Deogaonkar (2007: 123) and Mehta (1984: 173) suggest that there is no Gond script at all. However, we came across examples of Gond writing in several places. We found examples of a calendar written in the Gond language (i.e. in Gondi), with the first sheet (Figure 2) discussing the Gond script. In line with the unique features of scripts of the Subcontinent, it also merges the vowels and consonants to create complex signs which require careful reading but can retain subtle aspects of pronunciation.

The page reproduced here in Figure 2, and the calendar, have the writing of names and numbers relating to the calendar in the original script, its transliteration and translation. As an example, we list the days of the week transliterated from Gondi in Table 2, and in Table 3 we list the names of the months. This is claimed to be the original text, but it is not clear when and how the present structure was finalised.

![Figure 1: The religious symbol of the Gonds.](image-url)
Table 2: Days of the week in Gondi and in other languages.

<table>
<thead>
<tr>
<th>Day of the week</th>
<th>Name in English</th>
<th>Name in Hindi</th>
<th>Name in Telugu</th>
<th>Name in Gondi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sunday</td>
<td>Ravi vaar</td>
<td>Aadhi Vaaramu</td>
<td>Purva net</td>
</tr>
<tr>
<td>2</td>
<td>Monday</td>
<td>Som vaar</td>
<td>Soma Vaaramu</td>
<td>Nalla net</td>
</tr>
<tr>
<td>3</td>
<td>Tuesday</td>
<td>Mangal vaar</td>
<td>Mangala Vaaramu</td>
<td>Surka net</td>
</tr>
<tr>
<td>4</td>
<td>Wednesday</td>
<td>Budh vaar</td>
<td>Budha Vaaramu</td>
<td>Surva net</td>
</tr>
<tr>
<td>5</td>
<td>Thursday</td>
<td>Guru vaar</td>
<td>Guru Vaaramu</td>
<td>Mudha net</td>
</tr>
<tr>
<td>6</td>
<td>Friday</td>
<td>Shukra vaar</td>
<td>Sukra Vaaramu</td>
<td>Nilu net</td>
</tr>
<tr>
<td>7</td>
<td>Saturday</td>
<td>Shani vaar</td>
<td>Senni Vaaramu</td>
<td>Aaru net</td>
</tr>
</tbody>
</table>
Stylistically, the script differs significantly from other Indian scripts including Indus, Devanagari and the Dravidian group of languages, although it includes signs for consonants (such as a deep \(N\)) which are no longer used in Hindi but are common in Marathi. We obtained three different calendars from the three different regions of Andhra Pradesh, Maharashtra and Madhya Pradesh. The calendar from Andhra Pradesh was wholly in Telugu while the one from Maharashtra was in Gondi and Marathi, and the one from Madhya Pradesh was in Hindi and Gondi. The numerals used in these calendars are given in Table 4. In the listing of months and days, the calendars of Madhya Pradesh and Maharashtra agree in detail (except for some obvious printing errors), but they differ significantly in the signs for the numbers 5 and 6. The Gonds have separate names for the numbers 1 to 10; after that they use the system of tens first followed by the numerals (i.e. 10 and 3 for 13, not 3 and 10 which is used in Hindi, for example).

2.6 The Myths of the Gonds

Deogaonkar (2007: 123-130) has briefly discussed the myths and folk literature of the Gonds, while Mehta (1984: 167-306) has discussed their myths and subtle regional differences in detail. Interestingly, all the recorded myths are related to terrestrial aspects, and stories of Great Floods and the virgin birth of the goddess are very common. Mehta (1984:181) considers the Gond hero Lingo to be the equivalent of Moses of the Jews who, with the mercy of the Bada Deo, his wife Gangudevi the Great Goddess, freed them from the curse of captivity and led them to freedom. According to Mehta (1984: 37), the Bada Deo (also called Pen) is synonymous with Mahadeo and Shiva. Mehta (1984: 38) also refers to the Bada Deo’s wife as Parvati, but this association is not obvious. The image of the Bada Deo differs from the conventional image of Shiva in many significant ways. For one, he is a creator who, after having initially banished the Gonds for bad behaviour turned around to assist them to the extent of taking on rivalry with Indra to create the Gonds (Mehta, 1984: 180). The Bada Deo also assists Lingo in a variety of ways.

It is interesting that in their analyses of Gond myths and beliefs neither Deogaonkar (2007) nor Mehta (1984) makes any reference to astronomical or cosmogonical ideas. The closest they come are in their discussions of the Great Floods, or the inability of the “... Sun, Moon and Stars to assist Lingo in locating the banished Gonds.” (Mehta, 1984: 184). They take the terrestrial world to have been in existence forever, their land being the land of seven mountains and twelve hills (Mehta, 1984: 178). They also suggest that the Earth is held on the head of Patar Shek (Mehta, 1984: 187). The Gond calendar from Andhra Pradesh (see Note 2) states that according to the Gonds

The gift of nature, which gives astronomical, magnetic and gravitational pull makes the Earth move from right to left, that is, in an anticlockwise direction. (our English translation).

Beyond this, there are no records of Gond astronomical ideas.

However, since they held sway over large tracts of land and administered them, they must have had calendrical and other time-keeping systems. Such systems are most often rooted in astronomy, and hence observational astronomy must have been an important aspect of the science of the Gond people. Since they were never integrated into the dominant cultural and population groups of India until recently, their knowledge presumably contains the seeds of an

<table>
<thead>
<tr>
<th>Day of the week</th>
<th>Name in English</th>
<th>Name in Gondi</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>January</td>
<td>Pado man</td>
</tr>
<tr>
<td>2</td>
<td>February</td>
<td>Padu man</td>
</tr>
<tr>
<td>3</td>
<td>March</td>
<td>Pandu man</td>
</tr>
<tr>
<td>4</td>
<td>April</td>
<td>Undo man</td>
</tr>
<tr>
<td>5</td>
<td>May</td>
<td>Chindo man</td>
</tr>
<tr>
<td>6</td>
<td>June</td>
<td>Kondo man</td>
</tr>
<tr>
<td>7</td>
<td>July</td>
<td>Naalo man</td>
</tr>
<tr>
<td>8</td>
<td>August</td>
<td>Sayo man</td>
</tr>
<tr>
<td>9</td>
<td>September</td>
<td>Saro man</td>
</tr>
<tr>
<td>10</td>
<td>October</td>
<td>Yero man</td>
</tr>
<tr>
<td>11</td>
<td>November</td>
<td>Aro man</td>
</tr>
<tr>
<td>12</td>
<td>December</td>
<td>Naro man</td>
</tr>
</tbody>
</table>

### Table 3: Months of the year in English and in Gondi.

Table 4: Numerals in the Gond script, and in Maharashtra and Madhya Pradesh.

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Style in Maharashtra</th>
<th>Style in Madhya Pradesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Undi</td>
<td>[U]</td>
<td>[U]</td>
</tr>
<tr>
<td>2</td>
<td>Rand</td>
<td>[R]</td>
<td>[R]</td>
</tr>
<tr>
<td>3</td>
<td>Munda</td>
<td>[M]</td>
<td>[M]</td>
</tr>
<tr>
<td>4</td>
<td>Nalung</td>
<td>[N]</td>
<td>[N]</td>
</tr>
<tr>
<td>5</td>
<td>Sayung</td>
<td>[S]</td>
<td>[S]</td>
</tr>
<tr>
<td>6</td>
<td>Sarung</td>
<td>[S]</td>
<td>[S]</td>
</tr>
<tr>
<td>7</td>
<td>Yerung</td>
<td>[Y]</td>
<td>[Y]</td>
</tr>
<tr>
<td>8</td>
<td>Arung</td>
<td>[A]</td>
<td>[A]</td>
</tr>
<tr>
<td>9</td>
<td>Narung</td>
<td>[N]</td>
<td>[N]</td>
</tr>
<tr>
<td>10</td>
<td>Pad</td>
<td>[P]</td>
<td>[P]</td>
</tr>
</tbody>
</table>
independently-developed perspective of the Universe. In order to understand this, we studied the astronomical knowledge of the Gond people. In this study we focussed solely on understanding their astronomical traditions and ideas. As we have observed in our study, the limited description of Gond mythology is only a partial truth, and the skies form an integral part of their life—as would be expected.

3 THE PRESENT STUDY

From 25 to 31 March 2011 we visited 15 Gond villages spread over an area of 2000 km² around the Nagpur region in the states of Maharashtra, Andhra Pradesh and Madhya Pradesh, covering six of the seven regions mentioned in Section 2.2. In Figure 3 we show the area surveyed and the path that we followed. All 15 villages lay within the latitude range 19.5° and 21.8° North.

Details of the villages visited, persons contacted and the astronomical knowledge they supplied are given below. In order to ensure that all of us were talking about the same region of the sky, we carried a laptop and a LCD projector and whenever it was necessary we projected an image of the sky on the walls so that constellation identifications could be confirmed. While this approach was successful on most occasions, there were villages where the audience could not fully identify with the projected sky. The 15 villages visited by us are now discussed individually.

1: Karambi
State: Maharashtra
Location: About 22 km from the Shankarpur village of Chimur Tehsil in Chandrapur district, 100 km east of Nagpur, near Nagbhid.
Date of visit: 25 January 2011
Person contacted: Kirthivat Tivalsingh Atram.
Astronomical knowledge: They know the Belt of Orion as Tipan and the Pole Star as Lagni Sukum or ‘the bright one’. Sukum means ‘star’ and Lagni means ‘the one that shines’. The Sun and the Moon are called Lingo and Jango respectively.

2: Nimni
State: Maharashtra
Location: Post Jamkola, Taluka Zari, District Yeotmal. Via the Pandharkawada-Ghonsa-Wani road, 25 km from Pandharkawada. The village has 60 to 65 Gond houses. The other houses belong to Kolam tribesmen.
Date of visit: 25 March 2011
Persons contacted and their ages: Mahadeo Anandrao Kudmethe (56) and Sanjay Masram (28).
Astronomical knowledge: A star is called Sukum. Saptarshi (Katul and Kalhen), Samdur (sea) a group of four stars in the shape of a quadrilateral (probably Auriga), comes overhead at 4 am, rains arrive and farming begins. They know the Belt of Orion as Tipan. 4 am, pahili chandani, heralds the beginning of the working day. Evening is known as dohan chan-
3: Matharjun
State: Maharashtra
Location: Post Matharjun, Taluka Zari Jamni, District Yeotmal. On the Pandharkawda-Shibla-Matharjun road, and the village is 28 km from Pandharkawda. There are about 170 Gond houses.
Date of visit: 25 March 2011
Persons contacted: Shyamrao Aatram (65), Gopalrao Maraskolhe (65), Punaji Madavi (70), Deorao Dongaru Madavi (70) and Karu Keshav Madavi (80).
Astronomical knowledge: Shukra (a canonical star that appears at sunset in the east) is called Jevan-sukum. They know Tipan (the Belt of Orion), and next to it are Medi (a star pattern where there is a bright star in the centre and other stars in a circle appearing like the set up for crush grains etc. using a bullock, locally known as Khala; but the constellation association is unclear) and Tiva (meaning a stool on which a farmer stands to thresh the grains by dropping them on the ground in the wind), which is identified with a constellation pattern just south of Sirius. They have rudimentary knowledge of how to predict the seasons by the presence of different star formations. They know a constellation called Katul (meaning a cot) as part of the constellation that we recognise as Saptarshi (or the Big Dipper). The first four stars that make the cup of Saptarshi are Katul, which is imagined as a cot with four legs made of the following precious metals: gold, silver, inferior silver and copper. The last three stars of Saptarshi are called Kalner (meaning thieves) and represent three thieves who want to steal the cot when the old lady falls asleep. Hence the old lady never sleeps (possibly indicating that the constellation never sets—as was the case in this region of India until 1000 BC, when Saptarshi was partly circumpolar). They know another constellation that they called Samdur (a quadrilat-
from Kartik to Maho and the prevailing constellations are Medi (rising between 9 and 10 pm), the central star of Khala (a grain-crushing device), Tiva (a stool) and Kotela (a bat). In June at sunrise they can see Tipan (the Belt of Orion), Topli (Gamma and Beta Orionis), Samudar (Alpha, Beta, Gamma and Kappa Cassiopeia), Medi (Taurus) and Tiva (Canis Major)—confirmed by our projection of the night sky. They know that the monsoon arrives when Tipan appears at sunset. They know the Orion sequence with Kotela (a bat for thrashing grain) identified with modern-day Lepus, and can identify a basket (tokali). They know of comets as Kayshar (a broom—the Pleiades) and shooting stars as star excreta (Sukir Pelkta). A month is called Vata and extends from New Moon to New Moon. The northern direction is considered inauspicious.

5: Kharmat
State: Maharashtra
Location: Post Kharmat, taluka Pombhurana, District Chandrapur, via Rajura, Kohari, Gondpimpri, Kharmat, 57 km from Rajura (GPS location 19° 48′ 6.5″ N and 79° 39′ 1.3″E).
Date of visit: 26 March 2011
Persons contacted: Sitaram Kisan Madavi (75), Sambhashiv Shivarama Madavi (62) and eleven other members of the Gond tribe.
Astronomical knowledge: They know Katul, Jevan Sukum (the first star seen in the east at night, indicating dinner time). Similarly there is Pahat Sukum (the last star to be seen in the west at sunrise), Naagarda (Orion), Sagur (the Milky Way) seen at midnight, Irukmar (a star seen at 3 am) which indicates the season for collecting Mahua (Madhuca longifolia). They know a constellation Kutpari or Mogari which they identify with the modern Pleiades, and refer to a comet as Kayshar (a broom) and a shooting star as Chandani Pelkta. They know the 12 months of a year; the intercalary month after completing three years; and can count to 7 in Gondi and after that in Marathi. They call the Sun Purbaal and the Moon Nalend, and East is Sukrat. Their burials are in a North-South direction. They still remember a major flood that occurred about 3,500 years ago. At the end of the flood crows brought soil to create the Earth, and hence the crow is worshipped. They ‘predict’ the arrival of the monsoon by seeing clouds in the west. New Year Punal (Nava) Saal starts at Gudi Padwa.

6: Wamanpalli
State: Maharashtra
Location: Post Lathi, Taluka Gondpimpri, District Chandrapur. Via Gondpimpri, Dhaba, Sonapur, 35 km from Gondpimpri on the banks of the Vardha (across the river from Andhra).
Date of visit: 27 March 2011
Persons contacted: Sainath Kodape (28, the Village Sarpanch), Kawdu Raju Gadaam (70), Urkudabai Sukru Veladi (65), Bhiva Kondu Talandi (66), Ganpat Dharma Sedmake (78), Urkuda Paika Sedmake (60) and Gopala Tanu Madavi.
Astronomical knowledge: They know that stars are called Sukum. They know the constellation termed Tipan by others by a different name, and call it Naagarda (which means ‘plough’) and identify it with the modern-day Belt of Orion. They know Saptarshi with an imagery and mythology that is similar to other regions namely, the cot is called Sedona Katul, and the three thieves are called Muvir Kaler. They correctly identify the legs of the cot. In the sky they can also see Irukma Mara (the tree of Mahua, Madhuca longifolia), Pahat Sukir (the Morning Star), Jevan Sukir (the Evening Star), Dhruva (clearly an after-thought and addition since the Gonds have no word or reference to it, and many other villages denied its existence), Kutpari (the Pleiades), Kayshar (the broom = comet) and the Milky Way as Pandalan or Sagur or Murana Sagur (the path of animals). Their list of months is the same as the generic list. The Moon is called Nalen. From New Moon to Full Moon is called Avas, and from Full Moon to New Moon is Punvi. The lunar calendar is followed, and they recognise the intercalary month. A shooting star is Sukir Pelkta (star excreta). Human burial is North-South. The burial itself should be far from home, but a memorial stone can be set close to home, with a terracotta or wooden horse that is worshipped for generations when convenient. None of these memorial stones we saw were more than a hundred years old, indicating that ancestor worship is forgotten after a generation or so.

7: Khadaki
State: Maharashtra
Location: Post Mendha, Taluka Nagbhid, District Chandrapur. Via Nagbhid, on the Nagbhids-Mendha-Khadaki path. On the Nagpur-Brahmapuri Road about 12 km from Brahmapuri.
Date of visit: 27 March 2011
Persons contacted: Shreshrao Mansaran Naitam (38, Up-sarpanch), Narayan Bisan Madavi (70) and Barikrao Sitaram Naitam (65).
Astronomical knowledge: They know Shukra as a generic evening star. Tipan (Orion), Mongari (the bat = Pleiades), Jevan Chandani (the first star of evening), Saptarshi, Scorpius (Vinchu), a comet as Kayshar (which is vaguely regarded as a portender of bad luck), the Milky Way (aakash ganga) and a meteor shower (ulkha). They believe that the world moves counter-clockwise as do the planets, whirlwinds and whirlpools, and the oil-extracting bull-run grinding device common in India. Their burials are in the North-South direction to the East of the
village (but this latter choice seems to have been made more out of local geographical necessity rather than some custom). Burials include personal utensils and other belongings. Now-a-days they include dolls made from edible flour. The grave of an old man is marked by a vertical stone, while other graves are left unmarked. They worship their ancestors in the form of horses. They recognise the intercalary month.

8: Yelodi
State: Maharashtra
Location: Post Dhabe Pawani, Taluka Arjuni Morgaon District Gondia. Via Brahmapuri-Wadse, Arjuni Morgaon-Navegaon Bhandh and Dhabe Pawani, on the Dabe Pawani-Chikalgad Road, 5 km from Dhabe Pawani and 28 km from Arjuni.

Date of visit: 28 March 2011
Persons contacted: Jairam Manku Salame (75), Kaaru Devsu Duge (65), Charandas Nagaru Kumare (60), Pandhani Istar Walke (70), Jagan Mansaram Walke (70), Baliram Dhondo Ghumake (70), Sadashiv Laxman Kokote (65), Govinda Bakshi Uike (80), Tukaram Madku Karpate (67) and Goma Ghegu Alone (60).

Astronomical knowledge: They have a vague idea of Jevan Chadani (the Evening Star), Pahat Tara (the Morning Star), Saptarshi (Katul and Kalhen), Orion (Nangal, visible in the east every day), Thengari (the bat = the Pleiades) and Topli (Lepus). They know Sagar (the Milky Way), and the Moon as Nanleg and the Sun as Bera. Their burials are oriented East-West, with the head to the East.

9: Zashinagar
State: Maharashtra
Location: Post Palasgaon chutia, Taluka Arjuni Morgaon District Gondia via Navegaon bandha and the Dhabepaulani-Chichgad Road, 16 km from Navegaon.

Date of visit: 28 March 2011
Persons contacted: Antaram Modu Bhogare (78) and Sitaram Chamhro Hodi.

Astronomical knowledge: They know the Moon as Nalen and the Sun and Vera. They know Saptarshi as Sedona Katul and Kaler. They know that the first leg of Katul is made of gold. They know the early morning star as Vinya Huko (‘Huko’ means ‘star’). They know the first star of the night as Jevan Sakun. They know Nangal, and they refer to the Milky Way as Hari, or the ‘road’. They know about Bohari (Kayasur) or Jhadani (but they could not point one out). A shooting star is called Huko Pelkata. They know the names of each month. They have heard about the Gondi lipi (script) but have no idea what it is like. They know of the equinox, and they bury the dead East-West with head to the East.

10: Mohagaon
State: Maharashtra
Location: Post Supalipa, Taluka Aamgaon, District Gondia via Gondia, Dohegaon, Adasi, Gudma, Sitepar and Mohogaon.

Date of visit: 28 March 2011
Persons contacted: Ramalali Ukey (69), Beniram Yadu Ukey (55) and Nimalabaai Uiley (50).

Astronomical knowledge: They know Nangar (Orion’s Belt) and can point it out. They know Pahat Sukir (a Morning Star that rises every morning at 4 am). They know Saptarshi. They do not know the Pole Star, Polaris. They know Kotela (Taurus or the Pleiades) and Topli (Lepus). They call the Milky Way Saragpath. The Sun is Din and the Moon is Chandal. They know names of the months. A comet is called Kayasaar. They know that a glow called Kondor appears around the Moon, and if it is close to the Moon the rain is far away but if it is far from the Moon then the rain is nearby. They bury the dead in a North-South direction, and they sometimes include burial goods such as clay pots for use in the afterlife.

11: Kaweli
State: Madhya Pradesh
Location: Post Chalisbodi, Block Parswada, Tehsil Baihar, District Balaghat. Via Balaghat-Banjari-Kanatola-Kaweli. Banjari is 21 km from Balaghat on the Baihar Road. From Banjari to Kaweri is 9 km.

Date of visit: 29 March 2011
Persons contacted: Sohansingh Bilaising Uiykey (41), Munnalal Zarusing Bhalavi (70) and Himatsing Mohan Ukey (40).

Astronomical knowledge: They know the Morning Star rising at 4 am and the Evening Star. They say that Nangar (the plough) rises every evening. They know Katul and Kalhad (Saptarshi). They know the Pleiades as Kayshar (Bahi), the broom. They know Jewan Tara (a late evening star). They think the Pole Star rises at 4 am. They know Nangar but think it rises every evening or morning. They know Saptarshi. They refer to a shooting star (meteor) as star excreta, and have heard of comets but do not know much about them. They can identify the months of the year. They know that one month runs from New Moon to New Moon and every third year is a ‘Dhonda’ year when an intercalary month is added; no marriage can occur during this month. They know of the glow around the Moon and can identify it. The Sun is Din and the Moon is Chandal. They have not heard of eclipses. They count from one to seven in Gondi, and they bury their dead with the body aligned North-South.

12: Chalisbodi
State: Madhya Pradesh
Location: Post Chalisbodi, Block Parswada,
Thesil Bhaihar, District Balaghat. Via Balaghat-Banjari-Kanatola-Kawelli. Banjari is 25 km from Balaghat on the Bhaiar Road, and the distance to Kawelli is 4 km. It is 35 km from Balaghat and 13 km from Banjari.

Date of visit: 29 March 2011

Persons contacted: Gorelal Madavi (60), Mohanlal Tekam (55), Radheshyam Warkale (52), Mohparsingh Markam (35) and Ramesing Tekam (34).

Astronomical knowledge: They know of the Pole Star that is seen every day. They know Sedona (old woman’s) katul (cot) and Kalhad (Mund kalhed, i.e. thieves). They know Nangar, that is like a plough, and Kotela. In addition, they know of Purad and Mes (a bird and its egg) as stars east of Sirius. The story goes that the man in Orion throws stones in the form of the Pleiades so that they will fall on the bird and kill it. What the story does not record is if he was successful. They know the Evening and Morning Stars. They can count to 7 in Gondi, and they claim that Aimdi is 10 and Padi or Padvakati is 100. They count 12 months of a year, and the leap month. They bury their dead facing North-South. They know of comets as Jhada and shooting stars as stellar excreta. They refer to a rainbow as Gulel, the bow of a bow and arrow. They know of the glow around the Moon. They know Pada din (increasing day), and Chirdur din (decreasing day). To them the Milky Way is Sadak, and they have heard of the Gondi script.

13: Kopariya

State: Madhya Pradesh
Location: Post Ramnagar, Block Mohagaon, Thesil Mandala, Julla Mandala.
Date of visit: 30 March 2011

Person contacted: Shivsingh Charusing Parateti (70).

Astronomical knowledge: They know Nangir (Orion), can point it out and know that it rises around 8 pm in April and brings rain. They know Drhuva Tara. They know Mangal Tara, which is the morning star. They know Poyi (a noble man), his wife (poyatara) and his kotwal as the three stars that form the tail of Saptarshi. The Kutil is the path of salveshan and the three approach it for their personal salvation after doing good deeds on Earth. They know the Morning and Evening Star. They have heard of Scorpius, and know of the Pleiades as Kotela. They refer to the Sun and the Moon as Dinad and Chandal respectively. They know comets as Baahari (the broom) and shooting stars as Tara Uruganta. They know of the glow around the Moon and its interpretation. A month goes from New Moon to New Moon, but in contrast they claim that each month has exactly 30 days; they do not know that an intercalary month is added after three years. They bury their dead oriented North-South.

14: Sailakota

State: Madhya Pradesh
Location: Post Kanihiwada, Block Seoni and district Seoni. Salikota is 26 km from Sivani.
Date of visit: 31 March 2011

Person contacted: Sabalsingh Kaureti (72).

Astronomical knowledge: They know about Saptarshi but are confused about the story. They know Bahri and pointed it out in the sky as the Pleiades. They know of the Sun as Din and the Moon as Chandal. They know the Milky Way, and believe that shooting stars occur when souls fall back to Earth. They refer to a comet as a broom (bahari). They know of the glow around the Moon and can interpret it correctly in terms of its relation to rain. They do not know about eclipses. They can count a little in Gondi and can recite the months. They know that the Gondi script probably exists. They bury their dead in a North-South direction.

15: Lodha

State: Maharashtra
Location: Post Karwahi, Tehsil Ramtek, District Nagpur. Via Manegaon tek, Karwahi, Lodha, Pindkepar. 11 km from Manegaontek.
Date of visit: 31 March

Persons contacted: Munsi Saddi Bhalavi (75) and Parasram Munsi Bhalavi (45).

Astronomical knowledge: They know the Morning Star and the Evening Star, Saptarshi, Kaysar (the Pleiades), Scorpius (?), Purad and the glow around the Moon. They refer to shooting stars as stellar excreta, the Moon as Chandal, the Sun as Suryal or Din and the Milky Way as Sari. They know the months of the year, about leap years and about the numbering system. They bury their dead North-South (where South is termed Rakshas Disha).

4 ANALYSIS OF THE OBSERVATIONS

In Table 5 we list major aspects of astronomy known to the Gonds. In most cases, the information was corroborated from more than one village, although in some cases the precise detail of the name varied as a result of local linguistic differences. In April 2012 a select group of 23 villagers from the three districts of Adilabad, Yeotmal and Chandrapur were invited to the Raman Science Centre in Nagpur, and asked to explain the night sky in the planetarium. The associations discussed below therefore represent accurate identifications.

In Table 6 we list the villages in which we were told the same or largely similar stories or identification names of various objects.
Table 5: A list of the major astronomical ideas of the Gonds.

<table>
<thead>
<tr>
<th>Standard Terms</th>
<th>Local Names</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Sun</td>
<td>Lingo, Purbaal, Bera, Vera, Din, Dinad, Suryal</td>
<td>There is no knowledge of solar eclipses.</td>
</tr>
<tr>
<td>Moon</td>
<td>Jango, Chantal, Nalen or Nalen, New Moon to Full Moon is Avas, and Full Moon to New Moon is Purvi.</td>
<td>There is no knowledge of lunar eclipses.</td>
</tr>
<tr>
<td>Glow around the Moon</td>
<td>Kondor</td>
<td>Often a glow is seen around the Moon. If the glow is close to the Moon, the rain is far away while if it is far from the Moon the rain is expected.</td>
</tr>
<tr>
<td>Duration of the month</td>
<td>The month runs from New Moon to New Moon.</td>
<td>There is no long-term calendar. Every 3rd year has a 13th month for solar-lunar synchronisation. New Year begins at毕业后Padwa though in earlier times the dates were probably different.</td>
</tr>
<tr>
<td>Months of the year, and the leap month</td>
<td>Vata (month), Punal (Nava) Saal (New Year) is on Gudi Padwa though older practice was different. A leap month is called Dhonda. Increasing length of the day is called Pada din and decreasing length of the day is called Chirdir din.</td>
<td>January = Pus, February = Maho, March = Ghuradi (Umadi Amavasaya marks the New Year), April = Chaita, May = Bhaavai, June = Bud Bhaavai, July = Aakadhi, August = Pora, September = Akarpur, October = Divali, November = Kaartika, December = Sati. At the end of every three years the New Year is delayed by 1 month by adding a Ghoda. A month runs from New Moon to New Moon and no calculations are done. Sometimes a lihi, (Lunar Mansion) particularly Amavasaya, can extend to 2 days. Long-term memory does not go beyond 3 years.</td>
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<tr>
<td>Directions</td>
<td>Silalin (East), Farayin (West), Kalvada (North) and Talvada (South).</td>
<td>Directions are important to the Gonds largely for burial rituals. We did not come across any evidence where they use the stars for navigation. In one village they knew of the northward and southward movement of Sun and its relation to the seasons.</td>
</tr>
<tr>
<td>Burial practices</td>
<td></td>
<td>Burials are most often marked by adding a Ghoda. A month runs from New Moon to New Moon and no calculations are done. Sometimes a lihi, (Lunar Mansion) particularly Amavasaya, can extend to 2 days. Long-term memory does not go beyond 3 years.</td>
</tr>
<tr>
<td>A rainbow</td>
<td>Kamarpattha, Gulel</td>
<td>It is also called the bow of a bow and arrow.</td>
</tr>
<tr>
<td>A star</td>
<td>Sukum, Sukir, Huko, Tara, the adjective Lagni (‘bright’) is also used. Sukra is also used.</td>
<td>These are generic names for all stars. These terms are also used to describe diffuse moonlight or starlight. Chandani is also a generic name for starlight or moonlight.</td>
</tr>
<tr>
<td>The Morning and Evening Stars (The planet Venus).</td>
<td>Jevan Tara (‘dinner star’), is also called Shukra Tara or Pahlii (first) chandani), and pahat sukum (sukum, (star of early morning), Shukra, Mangal Tara. The Evening Star is also called Dohan Chandani and indicates the time to milk the cow. One group from the Matarjun region was categorical that this star rose with the Sun either in the morning or the evening.</td>
<td>Jevan (meal) is a generic star that rises every evening in the east, indicating dinner time. Jevan/Pahlii etc. tara is a generic early morning star that is overhead at 4 am! indicating the time to start working.</td>
</tr>
<tr>
<td>Comets</td>
<td>Jhadani, Bhimi Saat, Kayshar, Jhadu, Bahari</td>
<td>A comet is believed to be the sword-like weapon of the gods, and is considered a good omen in that the gods are protecting humans by cleaning up the mess that was created by bad events, either by killing evil (using the sword) or sweeping away the evil (with a broom).</td>
</tr>
<tr>
<td>Shooting stars</td>
<td>Ulka, Sukum Pelika, Sukir Pelika, Huko Pelkat, Tara Urungla.</td>
<td>In general shooting stars (meteors) are called excreta of stars, or are thought of as souls that are falling from their holy places in the sky.</td>
</tr>
<tr>
<td>Milky Way</td>
<td>Dhor Sari, Rasta, Sagur, Murana Sagur, Marg, Pandhan, Hari (‘the road’), Sadak.</td>
<td>The Milky Way is known as the great path of animal migration.</td>
</tr>
<tr>
<td>The Pole Star</td>
<td>Dhuva Tara, Mout Tara</td>
<td>Polaris was reported in three villages, using a Sanskrit name, which suggests that it is a later addition. Mout Tara is the umbilical star.</td>
</tr>
<tr>
<td>Constellations</td>
<td>Sedona (old lady’s) Katul (cot) and Kalher or Kalhed (theeven), [muvir = three] Kalhed, Kalin. Buddha chi khat and chur. In another story the</td>
<td>It is believed that the first four stars of the Saptarshi form the bed of an old lady and that the legs of this bed consist of gold, silver, earrings silver and copper, in an anti-clockwise direction from the star of contact to the trailing three that form the three thieves who are trying to steal the bed. In turn they keep the old lady from falling</td>
</tr>
</tbody>
</table>
three thieves are replaced by Poyi (a noble man), poyatar (his wife) and Kotwal (his assistant) going towards their salvation. It is believed that if the old lady sleeps, i.e. if Saptarshi sets, the Earth will come to an end. This refers to the circumpolar nature of Saptarshi. Saptarshi is the primary reference point from which all constellations are located.

16 Auriga Samdur This is visible in the last week of May at 4 am indicates the arrival of the monsoon season. The constellation is overhead in early July at 4 am in the morning. If Auriga is bright at that time, it is assumed that the monsoon will be good and the Gonds sow water-demanding crops like cotton, but if Auriga is dull they assume that the monsoon will be weak and as a result they sow crops that will need less water.

17 Orion and its Belt Tipan, Naagarda, Nangir, Nangal. The Belt of Orion is called Tipan (3 stars) while along with the sword of Orion, it is called Naagarda. The eastern shoulder of Orion, Lepus and Sirius, it refers to farming activities. The arrival of Tipan in the early night sky therefore is an indication of the arrival of the farming season.

18 Sirius region Topli The basket is indicative of the basket of seeds which is used for sowing in the fields ploughed by Tipan.

19 Taurus Medi, Kotalia In one village (Karambi) it was pointed out at night.

20 The Pleiades Mogan, Mongari, Kutparsi, Thengari, Mundari. These are stars west of Sirius in Canis Minor. This implement is used to drop the husk and seeds in the wind so that the husk flies away and the seeds are collected at the bottom of the implement. The myth of Purad (a bird) with Mes (two eggs) was recorded in only one village. Orion throws a stone which will hit the bird, so that the hunter can steal the eggs. Note that Purad is to the east of Orion so the stone must follow a curved trajectory.

21 Scorpius Michu Michu is responsible for producing the dead body, Murda, mentioned in 23 below.

22 Leo Murda (the dead body), Duf (the drum bearer), Shika (the procession leader), Ladavaya (the procession of crying women) The body of Leo is considered the body of a dead person with the head located at Eta Leonis and one hand indicated by Algibea. The other hand is Regulus. The legs are formed by Delta Leonis and Theta Leonis.

Delta Leonis (Aselli Australis) is the pall bearer. Stars in Virgo form the funeral procession. The procession moves from west to east. The whole procession of death is found in the sky.

23 The tail of the Scorpion Khala This constellation has a bright star in the centre of a circular pattern with faint stars surrounding it. It represents the animal-powered large grinding circles used in villages.

24 Irukmar, Irukna Mara This star is seen at 3 am, indicating the season to pick Mahua (Madhuca longifolia) flowers (i.e. March-April).

26 Centaurus Khayan.

Table 6: Concepts encountered in Gond villages listed according to their frequency of occurrence.

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<tr>
<th>Serial No.</th>
<th>Village (see pages 34-38)</th>
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<td>Purad or Hola (Canis Major)</td>
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Rainbow | Y | | | | | | | | | | | | | | 1

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Figure 4: The region of Ursa Major.

Figure 5: The region of Orion.

Figure 6: The region of Taurus.

Figure 7: The region of Leo.

In Figures 4 to 9, we present maps of the sky with the Gond constellations marked on them.

### 5 CONCLUSIONS

The Gond community is clearly an ancient civilisation in its own right dating to a period well before the arrival of Dravidians in south India. Their genetics, lifestyle and mythologies all confirm this. In the present study we have analysed their astronomical beliefs and knowledge. Even our brief survey confirms that their astronomical beliefs were not influenced by later developments that occurred in India, and are sustained by various ancient ideas.

The stories and other astronomical information we collected can be divided into the following categories:

- Daily time-keepers – the Sun, the Moon, Jevan Tara, Pahat Sukum, the glow around the Moon
- Calendrical – constellation rise times, seasons
- Expression of human activities – Tipan and related star groups, Murda
- Mythological – comets, the Milky Way, shooting stars
- Cosmogonical – Saptarshi

It is clear that the Gond people used astronomy for a variety of purposes from simple daily and annual time-keeping to projecting their life in the skies and cosmogony. Note that all their festivals are based on the lunar calendar (Table 1). However, they do not seem to have used it for navigation. We also did not find a single instance where they numbered their calendars beyond the three years needed to add the intercalary month. Clearly, given the scope of Gond
Another marked feature of their astronomy is the absence of gods or super-humans, except for Saptarshi. This again suggests that in spite of having an agrarian lifestyle, the Gonds were not given to grandiose speculations about the heavens and events occurring in the sky.

Another aspect of the observations is the Gonds’ lack of interest in constellations such as Cassiopeia, Aquila, Gemini, Bootes, Cygnus and Sagittarius. These contain bright stars yet the villagers could not even identify them in the planetarium. It is significant that apart from Sagittarius, all of these constellations lie in the northern sky, north of the northern-most point of sunrise (Mahendra Wagh, private communication), which suggests a lack of interest in northern constellations where the Sun does not travel.

The naming of Polaris as the umbilical star suggests cosmogonical ideas based on the Pole Star as the centre of the Universe and humans. Such an interpretation of the heavens is also found in the Surya Siddhanta.

One more interesting feature of Gond astronomy is that their observations extended all the way down to Crux and Grus, confirming that the Gonds were keen observers of their own local sky and did not import astronomical ideas from people living elsewhere.

As regards planets, they seem to have noticed only Venus and identified it as both the Morning and the Evening Star.

All in all therefore, it seems that Gond astronomy had its roots in early farming needs and was designed several thousand years ago when Polaris was not yet the Pole Star and Saptarshi was circumpolar, which happened around 1000 BC. This reinforces the general consensus that the origin of the Gonds is much older than previously thought. There also seems to have been little later modification of this basically utilitarian approach to life and environment which is a hallmark of Gond traditions.

It would be useful to follow up this study in greater detail, and also endeavour to compare the astronomical views of the Gonds with those of other Indian tribes.

6 NOTES

1. In Hindu society, the term Gotra means clan. It broadly refers to people who are descend-ants in an unbroken male line from a common male ancestor (after Wikipedia).
2. In Madhya Pradesh the Gond calendar is designed by Chaitanya Kumar Sinha of Ra-janandgaon. In Maharashtra it is published by Tiru Moreshwar Tukaramji Kumare and Tiru Sampatji Kannake Ballarshah and is printed by Ohmkar Graphics in Chandrapur.
3. This is a deep N, produced by using the soft (back) of the palate rather than the ‘normal’ N that is produced by using the hard (front) of the palate.
4. A short film about this April 2012 visit of the Gonds to the planetarium at the Raman Science Centre in Nagpur can be viewed at: www.tifr.res.in/~archaeo

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8 REFERENCES

Dubey, B., Meganathan, P.R., Easaawarkanth, M., Vasulu, T.S., and Haque I., 2009. Forensic STR profile of two endogamous populations of Madhya Pradesh, India. Legal Medicine, 11, 41-44.
Mehta, B.H., 1984. The Gonds of Central Indian Highlands. Volumes 1 and 2. New Delhi, Concept Publishing Company (all references in this paper are to Volume 1).

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