

## ASTRONOMY OF THE PARDHI TRIBE OF CENTRAL INDIA

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**Abstract:** We report on the astronomical ideas and beliefs of the Pardhi tribe of central India. Pardhi tribesmen were classified as a criminals by the British during the colonial era, and even though this label was scrapped after independence, the stigma remains. Consequently their lives often are based on scavenging, which gives them a unique perspective of the heavens. Their images of the sky are preoccupied with imagery of plants, animals and birds, far more so than with any other Indian tribe. While they do have some beliefs in common of other tribes in their region, there is a significant degree of originality that is commensurate with a community that has long traditions. One unique feature of the Pardhi is a bird trap that is based on the configuration of stars in the constellation Taurus, and they view the entire Orion region as a hunting scene.

**Keywords:** India, Pardhi tribe, astronomical systems and beliefs, bird trap

### 1 INTRODUCTION

In a series of papers, we have reported the astronomical beliefs of a variety of tribes of central India. The tribes we have studied are the Gonds (Vahia and Halkare, 2013), Banjaras and Kolams (Vahia et al., 2014), the Korku (Vahia et al., 2016) and the Cholanaiakans (Vahia et al., 2017a). The principle results from these studies are summarised in Vahia and Halkare (2017) and Vahia et al. (2018) and their relevance to the general development of our understanding of nature is discussed in Vahia et al. (2017b).

In general, all these tribes have traditions about the Sun, the Moon and some stars and asterisms (Vahia and Halkare, 2017; Vahia et al., 2018). The complexity of their astronomical beliefs correlates well with their periods of settlement, suggesting that beyond the basics of the Sun, the Moon and stellar observations, astronomy was principally a leisure-time activity.

While many Indian tribes do not recognise constellations (in the Western sense), they do divide stars into small groups or asterisms. For example, the Big Dipper portion of Ursa Major is seen by many as a bed, with thieves or groups

of people trying to steal that bed (see e.g. Figure 1). Meanwhile, the Milky Way is considered to be a pathway for animals, or human ancestors. Most Indian tribes are aware of comets and meteors. Comets are generally referred to as brooms or stars with tails, while in most Indian communities meteors (shooting stars) are seen

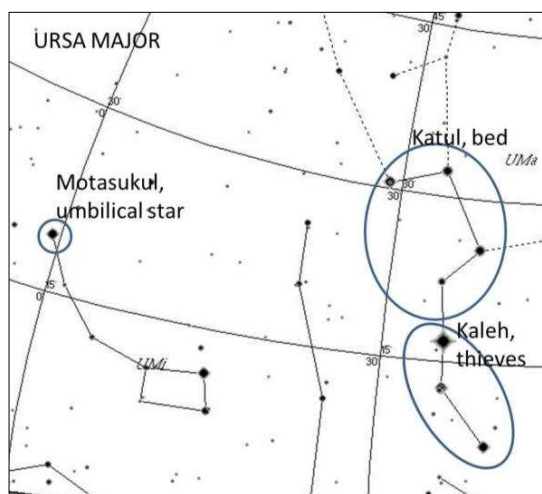


Figure 1: The Big Dipper according to the Gonds (after Vahia and Halkare, 2013: 41).

stellar excreta (and it is quite embarrassing to mention them.)

The afore-mentioned Indian tribes comprised a mix of Austro-Asians and Ancestral Indo-Europeans who had been settled in different regions of Central India as farmers over several millennia (Vahia et al., 2017b). Some, like the Gonds, had a long history of settlement, while others, such as the Banjaras, are only now settling down and acquiring agricultural skills and experience—and this is clearly reflected in their astronomical beliefs (Vahia and Halkare, 2017; Vahia et al., 2018). Many of these tribes have an intimate knowledge of local plants and their uses (Jain et al., 2010).

In this paper we report on the astronomical knowledge and beliefs of the Pardhi tribe of Central and Western India (see Figure 2).

## 2 THE PARDHI TRIBE

A brief description of the tribe can be found in 'Pardhi in India' (2019). In British India, the Pardhi was classified as a criminal tribe in 1871,

and even though this label was formally removed (de-notified) after independence (Bokil, 2002), a mutual distrust of the overall Indian population has remained, resulting in relatively poor development of the Pardhi community (ibid.; D'Souza, 1999). The Pardhi therefore have not been studied in the same degree of detail as many other tribes, but their general characteristics are given in Table 1.

The Pardhi still bear the stigma of originally being branded as criminals, and so they tend to live in isolated, economically disadvantaged areas. Their communities find refuge in remote regions of Maharashtra, particularly in central Maharashtra, on the outskirts of towns and villages (see [pardhisamaj.blogspot.in/2012/01/pardhi-samaj.html](http://pardhisamaj.blogspot.in/2012/01/pardhi-samaj.html)).

The Pardhi are known by various names in different regions. In Pardhi language they are called Waagharis. Most Pardhi sub-castes—including the Bhil Pardhi, Chiche Pardhi, Dhangar Pardhi, Faase Pardhi, Gaay Pardhi, Ghisaadi Pardhi, Ghod Pardhi, Haran Pardhi, Laman Pardhi, Langot Pardhi, Maang Pardhi, Paal

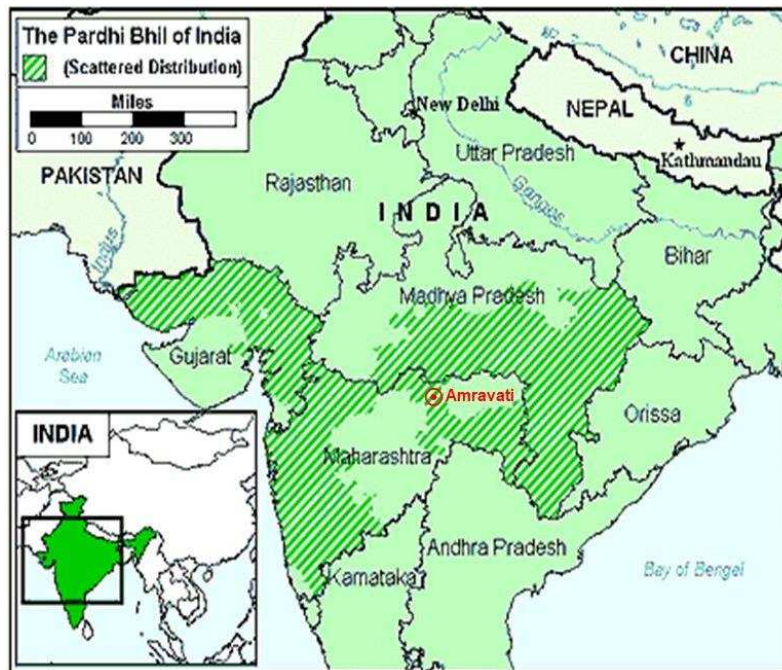


Figure 2: A map showing the geographical distribution of Bhil Pardhi in central and western India (after Pardhi in India, 2019).

Table 1: Principle characteristics of the Pardhi Tribe.\*

|                 |                                                                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alternate Names | Bahelia, Chita Pardhi, Langot Pardhi, Paidia, Paradi, Paria, Phans Pardhi, Takankar, Takia                                                                                                                      |
| Population      | 49,300 (2001 census).                                                                                                                                                                                           |
| Location        | Maharashtra: Solapur, Satara, Sangli and Kolhapur districts; Karnataka: small border areas, Bijapur and Belgaum districts; widely scattered in Gujarat and Madhya Pradesh.                                      |
| Classification  | Indo-European, Indo-Iranian, Indo-Aryan, 'Central zone', Bhil                                                                                                                                                   |
| Dialects        | Haran Shikari, Neelishikari, PittalaBhasha, Takari. Probably more than one language (Lango). Possibly a dialect of Bhili.                                                                                       |
| Other Comments  | A 'Scheduled Tribe' in Gujarat, Karnataka, Madhya Pradesh and Maharashtra, and a 'Scheduled Caste' in Madhya Pradesh. They differ from the Paradh, who speak Kachchi. They have their own traditional religion. |

\* Data taken from <https://www.ethnologue.com/language/pcl>

Pardhi, Raj Pardhi, Rajput Pardhi and Shika J. Pardhi—still lead nomadic lives. Only the Gav Pardhis took to farming and settled well during British rule, and they now have a sizable population in the Amravati District.

Due to discrimination, extreme poverty, and lack of education, employment and social ethics, some Pardhi were—and still are—compelled to hunt for food or lead a life of crime. This social rift has forced the tribe to remain entrenched in practicing traditional customs.

The Pardhi worship nature and goddesses rather than gods. They worship ‘dhani’ and ‘j-rane’ by sacrificing goats. They claim descent from Rana Pratap and Prithwiraj Chauhan, with an original home in Gujarat and Rajasthan.

In view of the strained relations between the Pardhi tribe and the rest of the Indian community, the Pardhis are aggressive and possessive of their identity and resent any contact that may lead to their being misunderstood. As a result, genetic and other data about the tribe are difficult to come by, but limited genetic studies do suggest that they are Indo-European in origin (Clark et al., 2000; Cordaux et al., 2003). This is reinforced by a study of their language. The Pardhi's home language is akin to Hindi that is spoken in rural Gujarat and Rajasthan. It is a corrupt guttural mixture of dialects in which Gujarati predominates. It has a strong family likeness to ‘Baori-bhasha’ (Ghodke, 2016; Grierson, 1907), and seems to be a crude mix of Gujarati and Bhil languages plus a little Marathi. This suggests that the Pardhi belong to the Bhil tribal community, with roots in Gujarat.

Because they refuse to become part of the Indian caste system the Pardhi remain isolated.

They prefer hunting, begging, or even stealing for a living, rather than submitting to a social system that they consider demeaning and degrading. Those who make a living by thievery steal items that they can trade or sell. (Pardhi in India, 2019).

The Pardhi interest in nature around them is

unique in many ways, but while they are known to be users of plants for medical purposes (Jain et al., 2010) their perspective is limited to survival. Accordingly, in the context of astronomy, their knowledge derives from a casual interest rather than any attempt to either extract information from the skies or to use astronomical information for philosophical or cosmogonical purposes.

### 3 FIELD DATA

Our studies were conducted in Central India near the city of Amravati (for the location see Figure 2). Isolated tribal villages were identified and visited and detailed interviews were conducted. Information about the villages is given in Table 2, and Figure 3 shows Pardhi from the village of Ajanti Beda (number 10 in Table 2). The person middle centre in the blue shirt is the first author of this paper and the person on his right (with the white shirt) is the paper's second author.

Principal Pardhi astronomical beliefs are listed in Table 3 along with the number of villages in which the stories were reported. Note that those living in Saur, Hartala and Hiwara BK (i.e. villages 1–3) were cultivators, whereas Pardhi in all other villages visited were hunters and gatherers (and we have colour-coded them accordingly in Tables 2 and 3). It is important to explore whether the astronomical beliefs of these two ecologically-disparate populations differ significantly or if they are similar and therefore date from an era when *all* Pardhi practised hunter-gathering. This interesting topic is discussed below in Section 4.1. In this context, it is pertinent to note that the name ‘Pardi’ comes from the Marathi word ‘paradh’, which means “hunting” (Pardhi in India, 2019).

Pardhi terms relating in one way or another to the environment are listed in Table 4, and the principle astronomical beliefs of the Pardhi are summarised in Table 5. Some of their beliefs, such as Ursa Major being a cot or the Milky Way a pathway, are common to other tribes of Cen-

Table 2: Locations of farming (green) and hunter-gather (blue) Pardhi villages visited by us.

| No. | Village                | Location |           |
|-----|------------------------|----------|-----------|
|     |                        | Latitude | Longitude |
| 1   | Saur                   | 21.13128 | 77.66459  |
| 2   | Hartala                | 20.92794 | 77.55524  |
| 3   | Hiwara BK              | 20.76909 | 77.63295  |
| 4   | Wadura Beda            | 20.73698 | 77.63948  |
| 5   | Daryapur               | 20.92244 | 77.33165  |
| 6   | Darapur                | 20.95990 | 77.54480  |
| 7   | Shinganapur            | 20.94254 | 77.48958  |
| 8   | Khairi Donoda          | 21.12697 | 77.53389  |
| 9   | Mangarul Chavhala Beda | 20.60211 | 77.81094  |
| 10  | Mukinpur Beda          | 20.45000 | 77.83654  |
| 11  | Ajanti Beda            | 20.50772 | 77.81672  |
| 12  | Zombadi Beda           | 20.53931 | 77.83636  |
| 13  | Jagatpur Beda          | 20.55201 | 77.75824  |
| 14  | Wadgaon                | 20.74462 | 77.60653  |



Figure 3: A photograph showing two of the authors of this paper together with people from a typical Pardhi village, in this case Ajanti Beda (No. 11 in Table 2) near Ner town in the Yeotmal district of Maharashtra (photograph: Ganesh Halkare)

Table 3: Astronomical beliefs of the Pardhi (farming villages in green and hunter-gatherer villages in blue).

| No. | Belief                                                                                  | Village |   |   |   |   |   |   |   |   |    |    |    |    |    | Total |
|-----|-----------------------------------------------------------------------------------------|---------|---|---|---|---|---|---|---|---|----|----|----|----|----|-------|
|     |                                                                                         | 1       | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |       |
| 1   | Ursa Major                                                                              |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Cot of an old lady                                                                      |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 13    |
|     | Three dead men                                                                          |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 1     |
|     | Three thieves                                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 6     |
|     | A person of the Pardhi Tribe                                                            |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 2     |
|     | Three birds: Teetar, Bater and Lawada                                                   |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 1     |
| 2   | Orion                                                                                   |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Three deer (Orion's Belt)                                                               |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 7     |
|     | As a Trikanth (Orion's Belt)                                                            |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 8     |
|     | A person of the Pardhi Tribe                                                            |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 3     |
|     | Two hunting dogs                                                                        |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 1     |
| 3   | Taurus region                                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Triangular-shaped net for trapping birds                                                |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 7     |
| 4   | Pleiades                                                                                |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Flock of Juggle Babbler birds                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 13    |
| 5   | Two stars near the Pleiades, $\kappa$ 2 Tau and $\nu$ Tau or $\eta$ Aur and $\zeta$ Aur |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Two eggs                                                                                |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 6     |
| 6   | Scorpius                                                                                |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | Cobra or snake                                                                          |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 12    |
| 7   | Milky Way                                                                               |         |   |   |   |   |   |   |   |   |    |    |    |    |    |       |
|     | As a path                                                                               |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 10    |
| 8   | Comet                                                                                   |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 11    |
|     | Omen (G = Good, B = Bad)                                                                |         |   |   |   |   | B | B | B | B |    |    | B  | B  | B  | 7     |
| 9   | Meteors                                                                                 |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 14    |
|     | Omen (G = Good, B = Bad)                                                                | B       | B |   | B | B | B | B | B | B |    |    | B  | B  | B  | 11    |
| 10  | Sun                                                                                     |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 14    |
| 11  | Moon                                                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 14    |
|     | Halo around the Moon                                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 5     |
|     | Weather forecast using the Moon halo                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 2     |
| 12  | Venus                                                                                   |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 14    |
| 13  | Mars                                                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 9     |
|     | Conjunction of Venus and Mars                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 9     |
| 14  | Solar eclipse                                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 10    |
| 15  | Lunar eclipse                                                                           |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 10    |
|     | Story about eclipses                                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 6     |
| 16  | Omen (G = Good, B = Bad)                                                                | B       | B | B | B |   | G | G | G | B |    |    | B  | B  | B  | 11    |
|     | Rainbow                                                                                 |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 11    |
| 17  | Mushroom-like object                                                                    |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 8     |
|     | Directions                                                                              |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 9     |
| 18  | Calendar                                                                                |         |   |   |   |   |   |   |   |   |    |    |    |    |    | 5     |

tral India. However, several beliefs are unique to the Pardhi, and reflect their own isolated intellectual development.

In particular, their imagery of birds and animals is far more prevalent than in other tribes, as might be expected if the ancestral population was solely dependent on hunting and gathering for its survival. They identify the Belt of Orion with three deer, the Orion Nebula with two hunting dogs, Taurus as a trap for catching birds, the Pleiades as a flock of birds, stars in Taurus as birds' eggs, and four stars with different birds that are common in the Amravati region. Their beliefs are either completely original or rarely found in other tribes. The Kolams identify the Pleiades as a flock of birds and the Gonds see a bird's egg and nests in Taurus. However, the Padhi association of Orion with deer, the rainbow with mushrooms and Taurus as a bird trap are all unique. This is the only tribe we have studied where the design of a bird trap was inspired by a constellation (see Figure 4).

#### 4 DISCUSSION

##### 4.1 Hunter-Gathers Versus Farmers

As indicated in Section 3, above, the Gav Pardhis in the Amravati District are farmers whereas all other Pardhi groups studied still rely on hunting and scavenging for their sustenance. It therefore is illuminating that the only entry in Tables 4 and 5 with possible farming associations is the presence of a halo around the Moon to forecast the weather. But knowing the onset of the monsoon would not only be of value to farmers but also to hunter-gatherers (see Kori-settar and Ramesh, 2002). The entries in Tables 4 and 5 suggest that Pardhi astronomical terminology was standardised in an era when *all* Pardhi practised hunting-gathering. The various birds mentioned in Table 5, along with bird's eggs, deer, snakes and hunting dogs all indicate a hunter-gatherer ecology. That there are no words directly relating to farming perhaps is not surprising given that those Pardhi who practise farming adopted this lifestyle less than a century ago, and we know from other studies (e.g. see Orchiston and Orchiston, 2018) that it takes several hundred years for astronomical systems to evolve and new terminology to be introduced following a major ecological change.

##### 4.2 Human Ecology and Birds and Animals in the Pardhi Skyworld

Ethnoastronomical studies in other parts of the world have revealed a close correlation between astronomical beliefs and ecological precepts (e.g. see Clarke 2014; 2015; Fuller et al., 2014; Leaman et al., 2016).

Tables 6 and 7 list animals and birds of diet-

ary importance to the Pardhi recorded during our fieldwork. Only a relatively small number of animals are hunted frequently, and only one of these—the Spotted Deer—was deemed important enough to feature in the Pardhi night sky—along with dogs that are used in the hunt.

On the other hand, birds would appear to make a major contribution to the diet, with thirteen different species hunted regularly, and an



Figure 4: A type of net known as Mangari, which was used by the Pardhi for catching small birds. The top image shows the net folded up ready to transport, and below, fully laid out in order to clearly illustrate its design and structure. The Pardhi named the triangular-shaped Hyades asterism in Taurus after this net (Photographs: Ganesh Halkare).

equal number taken seasonally (subject to availability). All are captured in nets, with several different varieties of net reserved for small birds and for medium-sized birds. Where information exists, the names of the nets associated with specific birds are listed in the right hand column in Table 7.

Table 4: The environmentally-related vocabulary of the Phase Pardhi.

|    | Pardhi Word                                                                                                                       | Marathi Meaning | English Meaning                   |
|----|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------|
| 1  | सूर्यासंबर /सुर्याखंभर / हेटल्यावई /वंद / वंध / निकलतो / <i>Suryasambar / Khuryakhambar / Hetlyawai / vand / Vandh / nikalato</i> | पूर्व           | East                              |
| 2  | उपल्यावई / डूबतो /बाईड / <i>upalyawai / Dubato / baend</i>                                                                        | पश्चिम          | West                              |
| 3  | डोंगरी / ओलाऊ / डोंगरावू / <i>Dongari / olau / dongarau</i>                                                                       | उत्तर           | North                             |
| 4  | राक्षसबाकू / दखनी / दखनाऊ / माहुरी / हेटवास / <i>rakshasbaku / Dakhani / dakhana / Mahuri / Hetawas</i>                           | दक्षिण          | South                             |
| 5  | वई / <i>Vai</i>                                                                                                                   | दिशा            | Direction                         |
| 6  | बाकू / <i>Baku</i>                                                                                                                | मुख             | Mouth                             |
| 7  | खऊ / खळू / <i>khau / khalu</i>                                                                                                    | खळे             | Glow around the Moon              |
| 8  | हिलगोई / <i>Hilagoi</i>                                                                                                           | भोरपक्षी        | Ring Dove                         |
| 9  | ब / <i>ba</i>                                                                                                                     | दोन             | Two                               |
| 10 | इंडा / <i>inda</i>                                                                                                                | अंडी            | Eggs                              |
| 11 | हम्बेल / कावडता / <i>hambel / Kavadata</i>                                                                                        | नाग             | Cobra / Snake                     |
| 12 | चईतमहिनी / <i>chaitmahino</i>                                                                                                     | चैत्रमहिना      | First month of Hindu calendar     |
| 13 | मसोटी / <i>masoti</i>                                                                                                             | स्मशान          | Graveyard                         |
| 14 | मचवा / <i>Machava</i>                                                                                                             | स्मृतीदगड       | Memorial stone                    |
| 15 | भारतल्ली / <i>Bhartalli</i>                                                                                                       | स्मशानविधी      | Ritual performed at the graveyard |
| 16 | माथो / <i>Matho</i>                                                                                                               | डोक             | Head                              |
| 17 | भतरा / <i>Bharata</i>                                                                                                             | दगड             | Stone                             |
| 18 | दन / <i>Dan</i>                                                                                                                   | दिवस            | Day                               |
| 19 | रात / <i>Rat</i>                                                                                                                  | रात्र           | Night                             |
| 20 | चलन / <i>Chalan</i>                                                                                                               | तारकाभ्रमण      | Rotation of stars                 |
| 21 | गिराण / <i>Giran</i>                                                                                                              | ग्रहण           | Eclipse                           |
| 22 | तरण / त्रण / <i>Taran / Tran</i>                                                                                                  | तिन             | Three                             |
| 23 | बाधीराखो / <i>badhirakho</i>                                                                                                      | बांधून ठेवलेला  | Tied                              |
| 24 | गाठळू / <i>Gathalu</i>                                                                                                            | खाट             | Cot                               |
| 25 | बाम्बलो / <i>Bambalo</i>                                                                                                          | वारूळ           | Ant house                         |
| 26 | पातालतुमंडी / <i>Patalumadi</i>                                                                                                   | जडी / आळबी      | Mushroom                          |
| 27 | बोहारो / <i>Boharo</i>                                                                                                            | अपशकून          | Bad omen                          |
| 28 | हल्या / <i>Halya</i>                                                                                                              | हेला            | Male buffalo                      |
| 29 | बोकड्या / <i>Bokadya</i>                                                                                                          | बोकड            | Male goat                         |
| 30 | मेढा / <i>Medha</i>                                                                                                               | मेंढा           | Male sheep                        |
| 31 | डोंडो / <i>Dondo</i>                                                                                                              | शेपूट           | Tail                              |
| 32 | मांगडी / <i>Mangadi</i>                                                                                                           | दायी            | Midwife                           |
| 33 | बेडा / <i>beda</i>                                                                                                                | वस्ती           | Place of temporary shelter        |
| 34 | असन्यान / <i>Asanyan</i>                                                                                                          | स्नान           | Bath                              |
| 35 | आडी / <i>Aadi</i>                                                                                                                 | तिरपे           | Tilted                            |

Table 5: Pardhi astronomical terms.

| No. | Pardhi Word in Deonagari and Roman Alphabets                                                     | Description                                                                                                     | Astronomical Reference                                                                   |
|-----|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| 1   | बुडीनू खाटलू / बुढिनू खाट / बुडीनू गाठळू / <i>budinu khatalu / budhinu khat / budinu gathalu</i> | A cot of old lady                                                                                               | The Big Dipper in Ursa Major                                                             |
| 2   | चावंड्यो / <i>chavandeyo</i>                                                                     | A person from the Gaon Pardhi tribe with the surname Chauhan who worshipped the goddess Chavanda                | Alioth (ε UMa)                                                                           |
| 3   | खोड्याच्यो / <i>Khodyaryo</i> / पिंपळाच्यो / <i>Pimplajyo</i>                                    | A person from the Gaon Pardhi tribe with the surname Solanke who worshipped the goddess Pimpalaj / Khodyar Devi | Mizar (ζ UMa)                                                                            |
| 4   | कोरोब्यो / <i>korobyoy</i>                                                                       | A person from the Gaon Pardhi tribe with the surname Pawar who worshipped the goddess Korobyoy                  | Alkaid (η UMa)                                                                           |
| 5   | तेतर / <i>Teetar</i>                                                                             | Teetar bird, i.e. Grey Francolin ( <i>Francolinus pondicerianus</i> )                                           | Alioth (ε UMa)                                                                           |
| 6   | बटेर / <i>Bater</i>                                                                              | Bater bird, i.e. Black-breasted Quail ( <i>Coturnix coromandelica</i> )                                         | Mizar (ζ UMa)                                                                            |
| 7   | लावडा / <i>Lawada</i>                                                                            | Lawada bird, i.e. Rock Bush Quail ( <i>Perdica argoondah</i> ) <sup>1</sup>                                     | Alkaid (η UMa)                                                                           |
| 8   | मेलेला माणस / तरण चोर / <i>Melela manas / Taran chor</i>                                         | Three dead men / Three thieves                                                                                  | The three trailing star of Ursa Major i.e. Alioth (ε UMa), Mizar (ζ UMa), Alkaid (η UMa) |

|    |                                                                                                                                                                                        |                                                               |                                                                            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------|
| 9  | तिरा हरिणे / तिन हरण / तरण हरन्या / त्रन हरन्या / Tira harine / Tin haran / Taran Haranya / Tran Haranya                                                                               | Three deer                                                    | Orion's Belt                                                               |
| 10 | त्रिरकांडू / Trirkandu                                                                                                                                                                 |                                                               | Orion's Belt                                                               |
| 11 | पारधी / pardhi ( बावरी or वाघरी / Bawarior Waghari )                                                                                                                                   | A person from the Pardhi tribe                                | Rigel (β Ori )                                                             |
| 12 | बो कुत्र्या / दोन कुत्रे / Bo kutrya / Don kutre                                                                                                                                       | Two hunting dogs                                              | The Orion Nebula                                                           |
| 13 | मंगरी / Mangari                                                                                                                                                                        | A triangular-shaped net for trapping birds                    | Taurus region                                                              |
| 14 | लावडानू खालू / लावडानी खाडू / लावडानू खाडू / लावडानी झूंड / Lawadanu khalu / Lawadani khadu / Lawadanu khadu / Lawadani zund                                                           | A flock of Jungle Babbler birds (Argya striata )              | Pleiades                                                                   |
| 15 | हिलगी / हिलगोई / Holagi / Hilagoi                                                                                                                                                      | Hilagoi bird, i.e. Ring Dove (Streptopelia decaocto decaocto) | Not identified exactly, but somewhere in the Pleiades-Taurus-Auriga region |
| 16 | सापनी फनी / फनी निकळ्यो / नागनु फनु / नागनु फन / नागनी फनी / Sapani fani / Fano nikalyo / Naganu fanu / Naganu fan / Nagani fani                                                       | A cobra or snake                                              | Scorpius                                                                   |
| 17 | ब इंडा / Ba inda                                                                                                                                                                       | Two bird's eggs                                               | Two stars near the Pleiades: either κ2 Tau and υ Tau or η Aur and ζ Aur    |
| 18 | खगर / सडक / रस्ता / दांडी / जावानु दांडी / Khagar / Sadak / Rasta / Dandi / Javanu Dandi                                                                                               | Path                                                          | The Milky Way                                                              |
| 19 | सुकर / सुक्कर / शुक्र चोत्री / पादरी चोत्री / पायटनी चोत्री / हागन्या तारा / जगीन तारा / Sukar / Sukkar / Shukrar Channi / Padari Channi / Payatani Channi / Hagarya Tara / Jagin Tara | Morning Star / Evening Star                                   | Venus                                                                      |
| 20 | सुकरी / सुक्करी / Sukari / Sukkari                                                                                                                                                     |                                                               | Mars                                                                       |
| 21 | सुकर / सुक्कर / शुक्र चोत्री / Sukar / Sukkar / Shukrar Channi                                                                                                                         | Morning star / Evening Star                                   | Sirius (sometimes)                                                         |
| 22 | डोन्डो फुटी म्यो / डोन्डो फुट्यो / इगन तारा / Dondo futi gyo / Dondo futyo / Igan Tara                                                                                                 | Star having Tail                                              | A comet                                                                    |
| 23 | तारो तुट्यो / तारा तुटी गी / चोत्री तुटी / Taro tutyo / Tara tuti gi / Channi tuti                                                                                                     |                                                               | A meteor                                                                   |
| 24 | चांद / दादाजी / वडो / Chand / Dadaji / Wado                                                                                                                                            |                                                               | The Sun                                                                    |
| 25 | चांद / चांदर / Chand / Chandar                                                                                                                                                         |                                                               | The Moon                                                                   |
| 26 | सुकर / Sukar                                                                                                                                                                           |                                                               | A star                                                                     |

Table 6: Animals hunted by the Pardhi.

| No. | Animal                                                                              |                                 |             | Frequency of Hunting |
|-----|-------------------------------------------------------------------------------------|---------------------------------|-------------|----------------------|
|     | Appearance                                                                          | Common Name                     | Pardhi Name |                      |
| 1   |  | Wild boar (sus scrofa)          | dukar       | Frequently           |
| 2   |  | Indian hare (Lepus nigricollis) | datti       | Frequently           |
| 3   |  | Monitor lizard (Genus Varanus)  | ghorapad    | Frequently           |

|   |                                                                                    |                                         |                 |                |
|---|------------------------------------------------------------------------------------|-----------------------------------------|-----------------|----------------|
| 4 |   | Spotted Deer ( <i>Axis axis</i> )       | <i>cheetal</i>  | Frequently     |
| 5 |   | Black Buck (Antelope cervicapra)        | <i>aakharik</i> | When available |
| 6 |   | Sambar ( <i>Rusa unicolor</i> )         | <i>sambar</i>   | When available |
| 7 |  | Indian wild dog ( <i>Cuon alpinus</i> ) | <i>nori</i>     | When available |

Table 7: Birds hunted by the Pardhi.

| No. | Bird                                                                                |                                                                            |                              | Frequency of Hunting | Name of Net Used   |
|-----|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------|----------------------|--------------------|
|     | Appearance                                                                          | Common Name                                                                | Pardhi Name                  |                      |                    |
| 1   |  | Common Quail ( <i>Coturnix coturnix</i> )<br>[Small bird]                  | <i>Ghagas or ghagri bati</i> | Frequently           | Kandalo or Mangari |
| 2   |  | Grey Francolin ( <i>Francolinus pondicerianus</i> )<br>[Medium-sized bird] | <i>Teetar</i>                | Frequently           | Khandari           |

|    |                                                                                     |                                                                           |                       |            |                       |
|----|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------|------------|-----------------------|
| 3  |    | Common Bustard-Quail<br>( <i>Coturnix suscitator</i> )                    | Tooru or<br>Tiboti    | Frequently |                       |
| 4  |    | Rock Bush Quail<br>( <i>Perdula argoondah</i> )<br>[Small bird]           | Kalu lawadi           | Frequently | Kandalo or<br>Mangari |
| 5  |    | Grey Partridge<br>( <i>Perdix perdix</i> )                                | Goretro               | Frequently |                       |
| 6  |    | Black-breasted Quail<br>( <i>Coturnix coromandelica</i> )<br>[Small bird] | Bater                 | Frequently | Khandari              |
| 7  |   | Common Buttonquail<br>( <i>Turnix sylvaticus</i> )                        | Tooru or<br>Tiboti    | Frequently |                       |
| 8  |  | Yellow-legged Buttonquail<br>( <i>Turnix tanki</i> )                      | Titur or<br>Kaletroyo | Frequently |                       |
| 9  |  | Ring Dove<br>( <i>Streptopelia decaocto</i> )<br>[Medium-sized bird]      | Holagi                | Frequently | Khandari              |
| 10 |  | Jungle Babbler<br>( <i>Argya striata</i> )<br>[Small bird]                | Gaghau                | Frequently | Mangari               |
| 11 |  | Painted Sandgrouse<br>( <i>Pterocles indicus</i> )                        | Batto                 | Frequently |                       |

|    |                                                                                     |                                                           |             |                |  |
|----|-------------------------------------------------------------------------------------|-----------------------------------------------------------|-------------|----------------|--|
| 12 |    | Red Junglefowl<br>( <i>Gallus gallus</i> )                | Kombodo     | Frequently     |  |
| 13 |    | Painted Francolin<br>( <i>Francolinus pictus</i> )        | Kaletroyo   | Frequently     |  |
| 14 |    | Rufous Turtle Dove<br>( <i>Streptopelia orientalis</i> )  | Chitrong    | When available |  |
| 15 |   | Blue Peafowl<br>( <i>Pavo cristatus</i> )                 | Panano      | When available |  |
| 16 |  | Common Pigeon ( <i>Columba livia</i> )                    | Pareva      | When available |  |
| 17 |  | Indian Pond Heron<br>( <i>Ardeola grayii</i> )            | Chir Banglu | When available |  |
| 18 |  | Indian Nightjar<br>( <i>Caprimulgus asiaticus</i> )       | Chibla      | When available |  |
| 19 |  | Indian Spot-billed Duck<br>( <i>Anas poecilorhyncha</i> ) | Badak       | When available |  |

|    |                                                                                     |                                                          |          |                |  |
|----|-------------------------------------------------------------------------------------|----------------------------------------------------------|----------|----------------|--|
| 20 |    | Great Stone-curlew<br>( <i>Esacus recurvirostris</i> )   | Teraki   | When available |  |
| 21 |    | Yellow-wattled Lapwing<br>( <i>Vanella malabaricus</i> ) | Teraki   | When available |  |
| 22 |    | Indian Courser<br>( <i>Cursorius coromandelicus</i> )    | Gedam    | When available |  |
| 23 |   | Black Ibis<br>( <i>Pseudibis papillosa</i> )             | Chamkho  | When available |  |
| 24 |  | Eastern Great Egret<br>( <i>Ardea alba modesta</i> )     | Bagala   | When available |  |
| 25 |  | Great Indian Bustard<br>( <i>Ardeotis nigriceps</i> )    | Badekhyo | When available |  |
| 26 |  | Black-winged Stilt<br>( <i>Himantopus himantopus</i> )   | Tultulo  | When available |  |

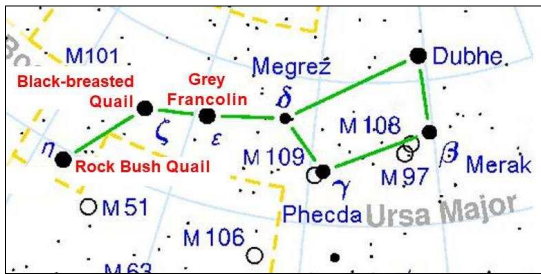
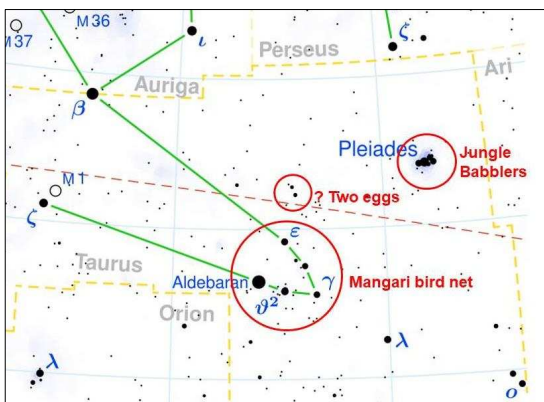


Figure 5: The 'Big Dipper' region of Ursa Major, showing three birds in the Pardhi skyworld (map: Wayne Orchiston).

It is notable that of the 26 birds listed in Table 7, the Grey Francolin, Black-breasted Quail, Rock Bush Quail, Ring Dove and Jungle Babbler all are important elements in the diet of the Pardhi and they also feature in their night sky. The first four birds are associated with individual stars in Ursa Major (Figure 5) or Taurus, while the Jungle Babbler is related to a prominent asterism, the Pleiades. But the Pardhi sky contains further avifaunal links, with two stars near the Pleiades identified as bird's eggs, while the Hyades is seen as the Mangari style of net (Figure 4) that is used to capture Ring Doves and Jungle Babblers. Its celestial positioning in such close proximity to the Jungle Babblers is illuminating (see Figure 6).

In various parts of the world, ethnoastronomers have documented clear associations between celestial birds and animals and the lifestyles of their terrestrial counterparts. Thus, in an elegant study of the Aboriginal Australians from Ooldea, Leaman et al., (2016) found that breeding habits (e.g. mating/breeding, laying/birthing, fledgling/whelping) of different birds are linked to the heliacal or acronychal rising or setting, or meridional transit, of their respective celestial correlates. Leaman et al. (2016: 72–73) concluded that

... Aboriginal people from Ooldea deliberately selected certain prominent stars and asterisms to match the breeding cycles of the terrestrial animals they represent.



alent of *sat-bhai*. In books it gets called the Jungle Babbler. (Finn, 1903: 15).

While the little Jungle Babbler may have been seen as 'disreputable' by nineteenth century British colonials, it clearly was held in high esteem by those Pardhi who decided to place it in their skyworld many thousands of years ago!

## 5 CONCLUDING REMARKS

In this paper we report the astronomical beliefs of the Pardhi tribe of Central India. Originally classified as a Criminal Tribe by the British, it continues to suffer the stigma of that listing and has therefore struggled to settle down and find fruitful employment without attracting unnecessary attention.

This shows up in their astronomical beliefs in several ways. While they have some concepts that they share with other tribes, their impression of the sky is far more animistic, and includes deer and hunting dogs in Orion, and four different species of birds and two bird's eggs in the Taurus or Ursa Major. They also use a net inspired by the Hyades in Taurus to catch two of these four bird species, and the net is conveniently positioned in their skyworld near to these birds. This celestial bird net does not feature in the astronomical systems of any of the other central Indian tribes that we have studied.

Some Pardhi now practise agriculture, while most villagers continue to survive through hunting and gathering, but all of the ecological terms found in the Pardhi astronomical record relate to hunting and gathering. This indicates that the current astronomical base of the Pardhi was established at a time in the past when *all* Pardhi were hunters and gatherers. Precisely when was this?

It is estimated that there are about 460 tribal communities in India (see Singh, 1992), and during the 1991 census these comprised 8.08% of the total Indian population (Singh, 1994). Individual tribes vary in size from a few hundred to a few million. They

... speak languages belonging to all four of the major language families represented in India (Austro-Asiatic, Dravidian, Indo-European and Tibeto-Burman) ... [and] are generally thought to be the aboriginal inhabitants of the Indian sub-continent that were present in the region before the arrival of Indo-European speakers. (Cordaux et al., 2003: 254).

Although there is evidence that *Homo erectus* hominids occupied the Indian subcontinent during the Early Pleistocene (e.g. see Pappu et al., 2011; Sonakia and de Lumley, 2006), groups speaking Austro-Asiatic and Tibeto-Burman languages are believed to have been the first 'modern humans' (*Homo sapiens sapiens*) to

settle in India, around 50,000–60,000 years ago (Barnabas et al., 2006; Basu et al., 2003; Kumar and Reddy, 2003). Dravidian-speakers arrived later, followed by the Indo-Europeans, possibly around 3,500 years ago (Cordaux et al., 2004)—though this date is hotly debated.<sup>2</sup>

Therein lies the problem: whereas the genetic evidence points clearly to the Pardhi (and other tribes) evolving from the original Austro-Asiatic settlers (Clark et al., 1999; Cordaux et al., 2003), the Pardhi and most other Central Indian tribes now speak Indo-European languages. This indicates that they deliberately abandoned their ancestral language and adopted the language of the newly-arrived Indo-European speakers once the latter settled in Central India. This wholesale language switch is termed a 'language shift', and clear-cut Indian examples have been documented by Chaubey et al. (2008). Long before the arrival of the Indo-European-speakers in Central India the Pardhi had related their 'skyworld' to hunting and gathering—and especially the avifaunal opulence of their terrestrial environment—and when they elected to speak an Indo-European language it was merely a matter of adopting substitute terminology. Fortunately, they did not have to change their entire astronomical knowledge base.

Yet this change illustrates that indigenous astronomical systems are not static: they are dynamic, and—as with other elements of culture—can evolve with the passage of time. This being the case, we may wonder if those Pardhi who are now farmers will eventually try to re-invent their sky-world so that it reflects their current ecological situation. We suspect that this will never happen. Such a change will require several hundred years (cf. Orchiston and Orchiston, 2017), and in the interim the Pardhi will continue to suffer acculturation; the young will be exposed to 'modern' astronomical concepts and terminology (through schooling, television, newspapers, magazines, etc.); and the elderly will die without passing on their traditional astronomical knowledge to the next generation.

We believe that if the Pardhi astronomical base does evolve over the coming centuries it will be to reflect changing relationships with particular birds, but specifically their capture and their dietary role in Pardhi society. If the emphasis in hunting shifts from the Jungle Babbler and Ring Dove to other birds, will any of the nets used to take these birds also end up in the Pardhi night sky?

## 6 NOTES

1. Although our informants in Village 12 identified the Lawada bird as the Jungle Babbler (*Argya striata*), we question this. Admittedly,

the Pardhi refer to a flock of Jungle Babbler birds as *Lawadanu khalu*, *Lawadani khadu*, *Lawa-danu khadu* or *Lawadani zund* (Table 5) but a single Jungle Babbler is *Gaghau* (Table 7), whereas the Pardhi name for the Rock Bush Quail is *Kalu lawadi*. Given that a small flock of Jungle Babblers is already represented in the Pardhi night sky, we prefer to identify the Lawada bird as the Rock Bush Quail, a bird that also was important in the Pardhi diet.

2. This 'standard scheme' relies on a combination of archaeological, linguistic and genetic evidence, and refers only to major large-scale migrations. Given the specific focus of this paper, we have not included possible later small-scale migrations of Muslims from the Middle East (see Gutala et al., 2006; Terreros et al., 2007).

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Chandrapur, and he also works with anti-superstition groups. He has a special interest in painted rock shelters and has presented four papers on the subject at the Indian history congress. He is also an amateur astronomer and astronomical telescope maker. He is now involved in the study of the astronomy of Indian tribes.



**Professor Wayne Orchiston** was born in Auckland (New Zealand) in 1943, and has BA Honours and PhD degrees from the University of Sydney. He formerly worked in optical and radio astronomy in Australia and New Zealand. He is now at the National Astronomical Research Institute of Thailand in Chiang

Mai, and is an Adjunct Prof-essor of Astronomy in the Centre for Astrophysics at the University of Southern Queensland in Australia. Wayne has supervised a large pool of graduate students in history of astronomy. He has wide-ranging research interests, and has published on aspects of Australian, Chinese, English, French, German, Georgian, Indian, Indonesian, Iraqi, Italian, Japanese, Korean, New Zealand, South African, Thai, Turkish and US astronomy. One of his research fields is Indian, Maori and Thai ethnoastronomy.

Wayne's recent books include *Eclipses, Transits, and Comets of the Nineteenth Century: How America's Perception of the Skies Changed* (2015, Springer, co-authored by Stella Cottam); *New Insights from Recent Studies in Historical Astronomy: Following in the Footsteps of F. Richard Stephenson. A Meeting to Honor F. Richard Stephenson on His 70th Birthday* (2015, Springer, co-edited by David A. Green and Richard Strom); *Exploring the History of New Zealand Astronomy: Trials, Tribulations, Telescopes and Transits* (2016, Springer); *John Tebbutt: Rebuilding and Strengthening the Foundations of Australian Astronomy* (2017, Springer), *The Emergence of Astrophysics in Asia: Opening a New Window on the Universe* (2017, Springer, co-edited by Tsuko Nakamura); *The History of World Calendars and Calendar-making. Proceedings of the International Conference in Commemoration of the 600<sup>th</sup> Anniversary of the Birth of Kim Dam* (2017, Yonsei University Press, co-edited by Nha Il-Seong and Richard Stephenson); and *Growth and Development of Astronomy and Astrophysics in India and the Asia-Pacific Region. Proceedings of the 9<sup>th</sup> International Conference on Oriental Astronomy* (2018, Tata Institute of Fundamental Research and the Hindustan Book Agency, co-edited by Aniket Sule and Mayank Vahia).

Wayne has been very active in the IAU for several decades, and was responsible for founding the Transits of Venus and Historic Radio Astronomy Working Groups. In August 2018 he became President of Commission C3 (History of Astronomy). He co-founded the *Journal of Astronomical History and Heritage* in 1998, and is the current Editor. He also serves as the Editor of Springer's Series on Historical and Cultural Astronomy. In 2013 the IAU recognised Wayne's international contributions to astronomy by naming minor planet 48471 'Orchiston' after him.



**Professor Mayank Vahia** was until recently a scientist at the Tata Institute of Fundamental Research, Mumbai, and is now Dean of Mathematical Sciences at the Narsee Monjee Institute of Management Studies in Mumbai. He completed his PhD at the University of Mumbai in 1984 and began his career at the Tata Institute of Funda-

mental Research with an interest in cosmic rays. He was involved in an experiment that was flown on NASA's Space Shuttle Space Lab 3 mission in 1986. After that he widened his interests and worked on high energy (X-ray and Gamma Ray) telescopes that were flown on Russian and Indian satellites. For the past fifteen years or so he has been interested in the origin of astronomy in India and has studied the astronomical aspects from early rock art, megaliths,

coins, architecture, ancient texts and the astronomy of some of Indian's oldest tribes. He has published about 260 papers, around 60 of which are in the history of astronomy and history of science. He also has published two books: *History of Indian Astronomy: A Handbook* (2016, Indian Institute of Technology and Tata Institute of Fundamental Research, co-edited by K. Ramasubramanian and Aniket Sule), and *Growth and Development of Astronomy and Astrophysics in India and the Asia-Pacific Region. Proceedings of the 9<sup>th</sup> International Conference on Oriental Astronomy* (2018, Tata Institute of Fundamental Research and the Hindustan Book Agency, co-edited by Wayne Orchiston and Aniket Sule).

Mayank also spearheaded India's participation in the International Astronomy Olympiad, a programme that he initiated in India and that has guided about 30 students to pursue their studies in science for a career.