

## **DHRUVA THE ANCIENT INDIAN POLE STAR: FIXITY, ROTATION AND MOVEMENT**

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(Received 1 February 2010; revised 24 January 2011)

Ancient historical layers of Hindu astronomy are explored in this paper with the help of the Purāṇas and the Vedic texts. It is found that Dhruva as described in the *Brahmāṇḍa* and the *Viṣṇu purāṇa* was a star located at the tail of a celestial animal figure known as the Úíúumâra or the Dolphin. This constellation, which can be easily recognized as the modern Draco, is described vividly and accurately in the ancient texts. The body parts of the animal figure are made of fourteen stars, the last four of which including Dhruva on the tail are said to never set. The *Taittirīya Āraṇyaka* text of the *Kṛṣṇa-yajurveda* school which is more ancient than the above Purāṇas describes this constellation by the same name and lists fourteen stars the last among them being named Abhaya, equated with Dhruva, at the tail end of the figure. The accented Vedic text *Ekâgni-kāṇḍa* of the same school recommends observation of Dhruva the fixed Pole Star during marriages. The above Vedic texts are more ancient than the *Gr̥hya-sūtra* literature which was the basis for indologists to deny the existence of a fixed North Star during the Vedic period. However the various Purāṇic and Vedic textual evidence studied here for the first time, leads to the conclusion that in India for the Yajurvedic people Thuban ( $\alpha$ -Draconis) was Dhruva the Pole Star *c* 2800 BC.

**Key words:** Dhruva, Draco, Pole Star, Precession, Purāṇa, Úíúumâra, *Taittirīya Āraṇyaka*, Thuban, *Yajurveda*

### **INTRODUCTION**

The legend of Dhruva who as a young boy observed long penance to achieve the exalted position of the fixed North Star is a widely known children story in India. The origin of this legend can be traced to the *Viṣṇu purāṇa* which

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describes the story in detail. Dhruva is also important in traditional Hindu marriages when the bride is made to view the Pole Star so that she can be strong and fixed in her new home. At present the curiosity of a child to see Dhruva would be satisfied by pointing the star Polaris ( $\alpha$ -Ursa Minor)<sup>1</sup>. This seems natural since the meaning of the word Dhruva as fixed and steadfast is reasonably well matched by Polaris (Fig.1). However the Purāṇas did not mean the present Pole Star to be Dhruva in their descriptions. This throws up several interesting questions about the identity of the original Dhruva, the Pole Star referred not only in the Purāṇas but also in the Vedic literature.

The genre of literature called *Purāṇa* in Sanskrit is vast as it is ancient. There are eighteen major and an equal number of minor texts under this category. It is the usual practice to explain the word *Purāṇa* as ancient legends handed over from generations, whereas *Itihāsa* in contrast meant history. It is surmised that some type of nucleus Purāṇa should have existed from the Vedic period, since the *Chândogya Upaniṣad* refers to *itihāsam, purāṇam* as important subjects of study. The present day bulky texts are likely the results of repeated additions over time to the original text. This development seems to have happened in different parts of India, since some of the Purāṇas have strong regional flavour. Nevertheless, one can easily discern a substratum of cosmology, creation, dissolution, ancient genealogy of kings, sages and vintage astronomy common to all the Purāṇas. Almost all the Purāṇas contain historical elements some of which can be dated to the early centuries of the Common Era, matching roughly with the Gupta period. When the texts were fixed in writing for the first time newer material valid for the time and place might have been added by the copyists. But what is interesting is that the texts also contain material which by no means can be reconciled with the early centuries of the Common Era. The detailed description of the star Dhruva in the constellation named Úíúumâra is a case in point.

It is known from modern astronomy that due to precession of the axis of the earth, the North Celestial Pole (NCP) executes a circle in space moving at the rate of nearly one degree in 72 years, such that for an observer on earth the NCP would get associated with different fixed stars in different epochs of time. It is also known that during the early centuries of the Common Era no bright star had occupied the position of NCP. The declination of Polaris in 500 AD was 81°. Even though it could represent the northern direction, it attained the position of the Pole Star only after another 1000 years. Thus it is amply clear that the Dhruva

of the Vedic religion and of the *Purâṇa* was some star other than  $\alpha$ -Ursa Minor. Again it is known from modern astronomy that the star Thuban or  $\alpha$ -Draconis held the position of the Pole Star for a long period starting from *c* 3000 BC. This fact was pointed out by Jacobi<sup>2</sup> in the 19<sup>th</sup> century for arguing a date more ancient than 1500 BC, for the *Ṛgveda*. He was referring to the Gṛhya Sūtra literature which codifies the religious practices including the marriage ritual that is still followed by a section of the Hindu society. These codes prescribe ritualistic observation of Dhruva as a fixed star, but at the late date when they were compiled long after the Vedic canons, there would have been no proper Pole Star to see and develop a law for the orthodox Hindus. Jacobi's argument was that the ritual should have originated at a time when  $\alpha$ -Draconis or Thuban was the fixed star to be called Dhruva by the Vedic people. The argument though logical was opposed by a few influential indologists eventually dismissing the claim of Jacobi without any detailed analysis of available evidences. With this in the background, the present paper takes a fresh look at the identity of the classical Dhruva of Hindu scriptures. The *Purâṇas* which describe the legend of Dhruva are considered first. This is followed by investigating the links, of this legend to the *Taittirîya Âraṇyaka* which preserves the oldest and clear description of a constellation matching with an animal figure called Úiúumâra. This constellation finds mention also in the *Pañcaviṃśa Brâhmaṇa* of the *Sâmaveda*.

#### **BRAHMÂNDA PURÂNÂ (BR. P)**

All the *Purâṇas* contain the basic story of the young boy Dhruva, who by his penance got the boon of being fixed in the north as a star. Since the meaning of the word Dhruva which appears several times as early as in the *Ṛgveda* is unequivocally accepted as *fixed, certain, unchanging*, it is implicit in the *Purâṇic* story, the boy Dhruva was identified with the eponymous Pole Star which was fixed in the north. This fact becomes interesting since all the texts provide cogent information on its observable location in the sky. But quite objectively they also mention the self rotation of Dhruva as the driving force for other celestial bodies to move around the NCP. This theory of Dhruva, not only embeds rudiments of Hindu astronomy but also indicates that the effect of precession had been noticed by the *Purâṇas*. It is known that no absolute dates can be put forth for the various ancient Sanskrit texts. But mention of Dhruva as fixed and then stating that it was also subject to change hints at the possibility of arriving at plausible relative chronology for the particular descriptions. There is a view that the *Brahmânḍa*

was the original out of which the *Viṣṇu Purāṇa* and the *Vāyu Purāṇa* bifurcated with further variations<sup>3</sup>. We consider here the *Br. P* first and later look at variant information from a few other texts. In the first chapter of *Br. P* a list of the contents to be covered is provided. This promises some astronomy related to Dhruva as,

*sūryādînâm syandanânâm dhruvâdeva pravartanam/  
kîrtyante úíúumârasya yasya pucche dhruvaḥ stithaḥ || (1.84)*

The movement of sun and other celestial bodies is explained as induced from Dhruva, who resides at the tail of the Úíúumâra.

This theory is further expounded in chapters 21-24 in considerable detail. We restrict our attention here to statements directly concerning Dhruva.

*tatomandataram nâbhyâm cakram bhramati vai tathâ/  
mṛṭpiṇḍa iva madhyastho dhruvo bhramati vai tathâ ||  
triṃúanmuhûrtânevâhuḥ ahorâtram dhruvo bhraman/  
ubhayorkâṣṭhayormadhye bhramate maṇḍalâni tu ||  
kulâla cakranâbhiúca yathâ tatraiva vartate/  
dhruvastathâhi vijñeyastatraiva parivartate|| (Ch 21.v 94, 95,96)*

Like the lump of clay at the centre of the potter's wheel moves slowly sitting at the navel, Dhruva rotates. Dhruva moves in circles day and night consisting of 30 *muhûrtas* in the middle of the two directions (north and south). Like the navel of the potter's wheel stays in the same place, so also Dhruva should be known to be rotating there itself.

Chapter 21 containing 176 verses gives an archaic account of sun's motion, with definitions of seasons, equinox and solstice. It introduces the cosmography of Mt. Meru connecting the earth and the heaven like a vertical pole in the north, around which all celestial bodies are modeled to move in circular paths. It ends with identifying Viṣṇupada (Viṣṇu's place or foot) in the north above the Seven Sages (U.Major) wherein Dhruva, Dharma and others are located. The next chapter starts by defining the position of Dhruva as

*bhûtasammohanam hyetadvadato me nibodhata |  
pratykṣamapi dṛíyam ca sammohayati yatprajâḥ||  
yo'yam caturdúam pucche úaiúumâre vyavasthitaḥ |  
uttânâpâdaputro'sau meḍhîbhûto dhruvo divi||*

*sa vai bhrâmayate nityam candrâdityau grahaiḥ saha /*

*bhramantamanugacchanti nakṣatrâṇi ca cakravat || (Ch 22. v5, 6,7)*

Listen to this (explanation of mine) which is real and observable but mystifying people. He, who is at the tail of the (constellation) looking like a Úúumâra; Dhruva the son of Uttânapâda, has become the main pivot of the pole in the sky. Verily, he rotates the sun, the moon and the planets continuously. The stars follow him who is himself moving like a wheel.

In the above the narrator (Sûta) is explaining a real observation of the sky to explain the ancient theory of Dhruva as controlling the celestials and their motion. The phrase ‘*caturdúam pucche*’ appears in some texts but the *Matsya Purâṇa* has the correct word *caturdaúarṣeṣu*, meaning *among the 14 stars*. The word *úaiúumâra* is a derivative of *úúumâra*. Hence this word would mean *like Úúumâra*. Since Dhruva as a north star is said to be at the tail of this figure, *úúumâra* should be a constellation in the northern sky. The text further elaborates the self circling motion of Dhruva and that of the stars (*târâḥ*) and the *nakṣatras* around him. The point to be noted is the differentiation between the general stars and the *nakṣatras*. The latter are the 27 ecliptic asterisms or star groups and Dhruva was never one among them. There are 84 verses in this chapter, much of which is devoted to develop a physical model for the motion of Sun seen in the day linked to Dhruva seen only in the night. The northern and southern sojourn of Sun also had to be explained within this model. The details need not concern us here other than noting that Sun’s chariot is said to have only one wheel, the axle of which is connected to the axle in Dhruva by two strings of light which take care of the change in the orbit of Sun around the earth. We may speculate that the analogy of the potter’s wheel was unable to mimic the observed motion of the sun and hence the double axle model and connection to Dhruva with unseen strings was proposed to simulate action at a distance. This change is also seen in the example of the oil mill (*taila-pîḍâ cakra*) known colloquially as *ghâṇi*, with a locally spinning central pole, proposed as another model for understanding the motion of the stars around Dhruva. The next chapter is important to the history of Indian astronomy as it explains the lunar number 3339, first appearing in the *R̥gveda*. This number is presented as the count of deities approaching Moon to drink his essence (*soma-pâna*) every night sequentially in the dark fortnights. This naturalistic number has been demonstrated to be the 18-year eclipse period number by the present author<sup>4</sup>. There are other interesting statements such as *Dhaniṣṭhâ* (β-Delphini) being the first among the *nakṣatras*, along with the names

of the five year cycle of the *Vedāṅga Jyotiṣa*. Towards the end of the chapter the text describes the location of Dhruva along with other near by stars making up the animal figure Úíúumâra.

*evam dhruva-nibaddho'sau sarpaate jyotiṣāṅgaṇaḥ |*  
*saiṣa târāmayaḥ proktaḥ úíúumâro dhruvo divi ||*  
*sâkâraḥ úíúumâraúca vijñeyaḥ pravibhâgaúāḥ | (Ch 23.v 99, 101b)*

In this fashion all the celestial bodies move being bound to Dhruva. In the sky he is (in) the starry Úíúumâra. This Úíúumâra should be known by its shape and divisions.

The chapter ends with a good description of the Úíúumâra constellation enumerating the constituent stars numbering fourteen. This is perhaps one of the earliest examples of a star group being represented and named by an animal figure.

*uttānapâdastasyâtha vijñeyaḥ sottarâ hanuḥ |*  
*yajñodharastu vijñeyo dharmo mûrdhānamâúritaḥ ||*  
*hṛdi nârāyaṇaḥ sādhyo aúvinou pûrva pâdayoḥ |*  
*varuṇaúcaryamâcaiva paúcime tasya sakthini ||*  
*úíúumam samvatsarastasya mitraúcapānamâsritaḥ |*  
*pucche agniúcamahendraúca mârîcaḥ kaúyapo dhruvaḥ ||*  
*târakâḥ úisumârasya nâstam yâti catuúṭayam ||*  
*agnîndra kaúyapānam to caramo'sau dhruvaḥ smṛtaḥ ||*  
*(Ch 23 v.102-104, 105b, 107b)*

His (Úíúumâra's) upper jaw should be understood as Uttānapâda. Yajña (*Kratu*) is known as the lower jaw and Dharma as the head. At the heart is Nârāyaṇa (Sādhyā). The twin Aúvins occupy the fore legs while Varuṇa and Aryamâ are at the hind legs. Samvatsara is the genital and Mitra occupies the seat. In the tail are Agni, Mahendra, Mârîca-Kaúyapa and Dhruva. The (previous) four stars of the Úíúumâra never set. Dhruva is remembered as the last one after Agni, Indra and Kaúyapa.

### VIṢṆU PURĀṆA (VP)

The *Viṣṇu Purāṇa*, one of the important religious texts, relates the earthly story of Dhruva with poetic embellishments and devotional fervour. In the *Br. P*

the boon for Dhruva to be in the sky as the Pole Star is given by Brahma, where as in the *VP*, Viṣṇu is said to give the boons. Interesting mythological information provided in the *VP* is that Dhruva's mother Sunīti stays with him always closely in the sky as a companion star. This provides a constraint on the identification of Dhruva in the Úíúumâra constellation. In the description making up the constellation fourteen stars are mentioned as in *Br.P*. The only difference being the word *mârīcaḥ* qualifying Kaúyapa is missing in the *VP*. The cosmological functions assigned to Dhruva in the *VP* are same as in the *Br. P*. Both mention Dhruva as the fourth after Agni and that the last four stars ending with Dhruva do not set.

#### ***BHĀGAVATA PURĀNA***

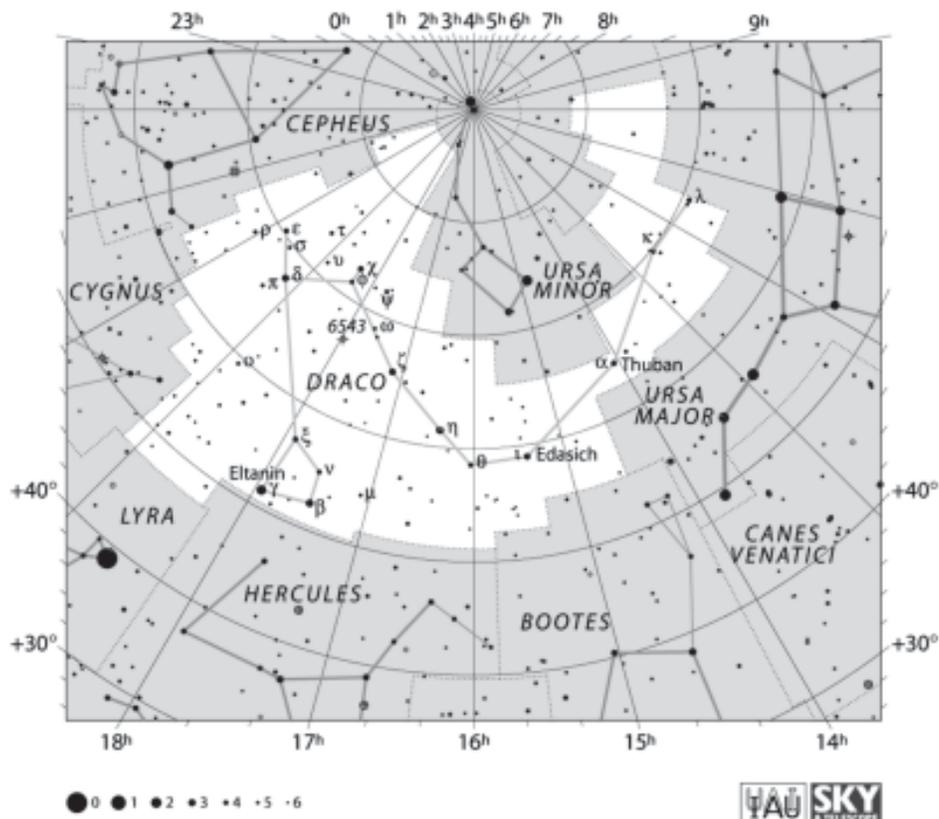
This is again a highly respected text with mysticism and Vedānta philosophy presented in an ambience of devotion to Viṣṇu and his incarnations. The position of Dhruva is described in the 23<sup>rd</sup> Chapter of the 5<sup>th</sup> Book, quite unusually in prose. The basic statements are same as in *VP* but not all the names of the fourteen stars of the Úíúumâra are given. Dhruva is first associated with stars Agni, Indra, Prajâpati, Kaúyapa and Dharma and is compared to a fixed object or pillar (*sthânu*) around which heavenly bodies rotate driven by Time. Dhruva's rotation as the driving force is conspicuously absent in this text. Further the text quite categorically states that *some people* meditate on the figure of Úíúumâra as the body of Vâsudeva. These people are said to think of Dhruva being at the end of the tail; Prajâpati, Indra, Agni, Dharma along the trunk of the tail, Dhâta at the root of the tail, and Saptarṣi (U.Major) at the waist. The text further describes how the coiled figure has to be imagined with Sun, Moon, *nakṣatras* and all the planets at the various places of its universal body. What is important for our present discussion is that this latter description of Úíúumâra is an imaginary extension of the observable constellation, used *by some* in yogic meditation (*kecanaiḥ tajjyotiḥ anīkam úíúumâra samsthâna bhagavato vâsudevasya yogadhâraṇâyâm anuvamayanti*).

In the *Devī Bhāgavata* the description of Dhruva is an exact restatement of the *Bhāgavata* in verse form. Here also some people are said to imagine the Úíúumâra constellation in an extended form to cover the whole sky as the divine body of Viṣṇu. (8.18; verses 11-26). Whatever may be the inspiration for this extension, it is easy to observe that the *Br. P* and the *VP* do not induce extraneous implications into Dhruva but say that it can be seen in the sky at the end of the Úíúumâra figure. Later texts appear to be economical with the physical picture but

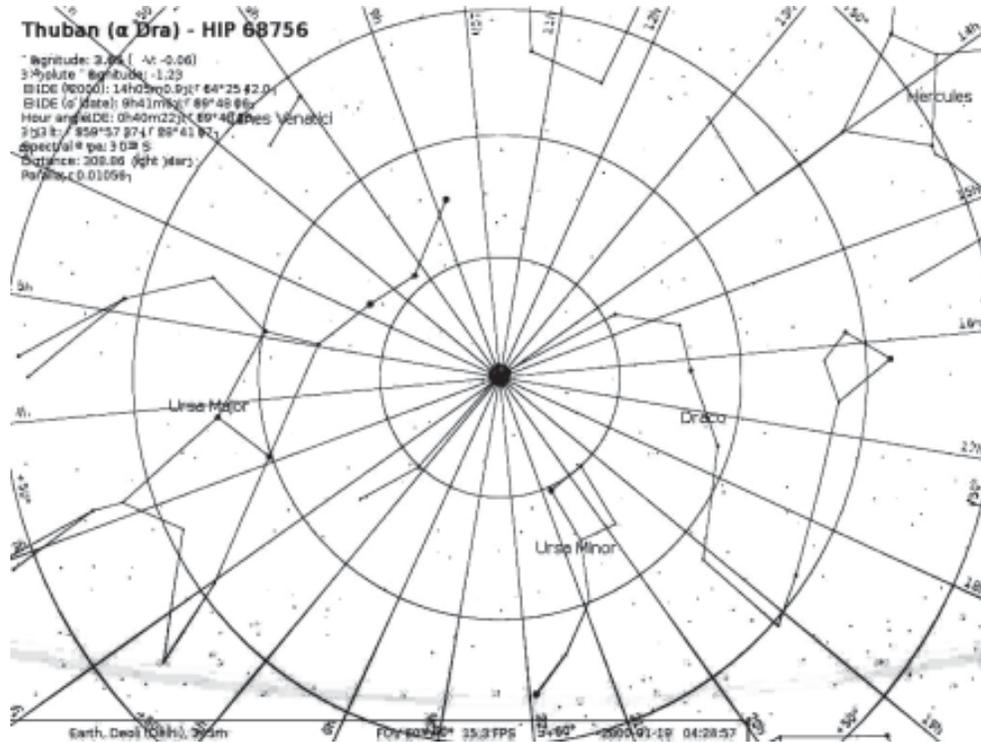
liberal with the mystical and philosophical concepts at the cost of astronomy.

### CONSTELLATION ÚÍÚMÂRA

It is noted that all the ancient Purâṇas declare that Dhruva was at the end of the tail of Úíúumâra comprising of fourteen stars in a particular order along the body of the animal figure. The other well known northern star group was the Saptarṣi (U. Major) with seven well identifiable stars. Even though one can not be sure of the way the ancients assembled the various stars to get the figure of Úíúumâra (the Dolphin or the Porpoise) it is easy to observe that it can be matched only with the modern constellation Draco, the Dragon (Fig. 1 and 2). Since Thuban ( $\alpha$ -Draconis) was the Pole Star in ancient times one is forced to



**Fig. 1.** Constellation Draco. Sky picture with  $\alpha$ -Ursa Minor as the Pole Star (c 2000 AD) (<http://www.iau.org/static/public/constellations/>)



**Fig. 2.** Constellation Draco. Sky picture with Thuban as the Pole Star (c 2800 BC)

seriously consider the identification of Dhruva with this star as being at the tail end of the figure. This also has star 10-Dra of magnitude 4.55 identifiable with Sunîti, very near Dhruva as mentioned in the *VP*. But Thuban, here identified with Dhruva was not precisely at the NCP when *Br. P* and *VP* developed their theories based on its circumpolar nature. The word Dhruva as already pointed out means *true, certain, unchanging* and *fixed*. The texts use words *sthânu, medhî, nâbhi* to qualify Dhruva reflecting a sense of fixity and centrality. Nevertheless they also mention the daily circular motion of Dhruva as observable. Hence we have to infer that the star had shifted by more than a degree from the NCP for its circling motion to have been recognized by naked eye observations. This apparent contradiction indicates that the nomenclature Dhruva for this North Star should have gained popularity in a period before the theories of *Br. P* and *VP* got formulated. The star should have acquired its name from its quality of being fixed but it might have had a different name or even no name in more ancient times. This

question leads us to the accented Vedic texts to look for the constellation Úíúumâra and the meaning of the word *dhruva*.

### VEDIC CONCORDANCE

In the Vedic texts, starting from the *R̥gveda*, the word *dhruva* and its derivatives occur many times in the unique sense of being *fixed* and *unchanging*. For example in the *R̥gveda* hymns (1.73, 4.5, 6.52, 7.88, 10.173) the word has the meaning of *firm, steadfast, immovable*, connected with objects like earth, mountains, and the sky. We can say that a fixed star in the northern sky known by the name Dhruva is not mentioned in the earliest known literature of India, namely the *R̥gveda*. In the *Yajurveda* and *Atharvaṇa Veda Saṃhitā* books, cardinal directions are specifically named. In this nomenclature invariably *ud̥ici* stands for north and *dhruvâ dik* refers to the lower direction in the sense of *fixed* earth. However, in the *Taittir̥ya Āraṇyaka (TA)* of the *Kṛṣṇa-Yajurveda* a change in this notation is seen. The phrase *adharâyai diúe (TA II.20.1)* is used to denote the lower direction instead of the more common *dhruvâyai diúe*. In this we see a transition in the meanings of words which might have become necessary due to some special reasons. This text also contains interesting astronomical information which can not be discussed here in detail. The text takes the concept of *mahâmeru* for granted and mentions that Kaúyapa (a star as per the *Br. P.*, also called Prajâpati) does not leave the *Meru (TA I.7.1)*. This could be a metaphorical reference to the circumpolar nature of the star which was on the tail of the Úíúumâra constellation for describing which a full hymn is devoted.

....*dharmo m̥urdhânam brahmottarâhanuḥ yajñō'dharâ viṣṇurh̥dayam samvathsaraḥ prajananam aúvinau p̥urvapâdâvatirmadhyam mitrâvaruṇâvaparapâdau agniḥ pucchasya prathamam kâṇḍam tata indrastataḥ prajâpatirabhayam caturtham sa vâ eṣa divyauúâkvara-úúumâraḥ .....dhruvastvamasi dhruvasya kṣitamasi tvam bhûtânâm adhipatirasi tvam bhûtânâm úreṣṭho'si tvâm bhûtânyupaparyâvartante.....úúukumârâya namaḥ || (TA. II.19.1)*

....Dharma is the head, Brahma is the upper jaw, Yajña is the lower jaw, Viṣṇu is the heart, Saṃvatsara is the genital, Aúvins are the fore legs, Atri is the center, Mitra and Varuṇa are the hind legs. Agni is the first stem of the tail, then Indra, then Prajâpati and Abhayam is the fourth. This is the shining celestial Úíúumâra.....You are Dhruva, you are the place of Dhruva.....You are the Lord of the Beings (*Bhûtâḥ*); you are the best among them. Beings go round near you ..... Salutations to the boy-child.

This hymn lists fourteen stars along the body of the figure of the Dolphin unequivocally said to be shining in the sky. The stars have almost the same names as in *Br. P* with some interesting variants. The sequence of Agni, Indra, Prajâpati and Abhaya as the fourth on the tail is what is repeated in the *Br. P* and the *VP* with the substitution of Kaśyapa and Dhruva for the third and the fourth positions. The hymn also refers to this Dolphin as the seat of Dhruva. The hymn is more about the celestial Dolphin but the equivalence of Abhaya and Dhruva is evident. The traditional commentaries by Bhâskara and Sâyaṇa also accept the above equivalence. The text of *TA* is among the so called *forest books* supposed to be learnt in the seclusion of a forest, as it contains secret mystical and naturalistic meanings at the same time. The mystical aspects of the above Úúúumâra hymn are linked to the *Nîlarudropaniṣat* of the *Atharvaṇa Veda*. The play on the word Úúúumâra finally concluded as úúúukumâra (boy-child) could have been the inspiration for the *VP* to develop the legend of the fear less boy child Abhaya equated with Dhruva, who eventually found a permanent place in the sky as the Pole Star near to Viṣṇu who is at the heart of the Dolphin. This explanation is a slight expansion of the commentary of Sâyaṇa on the hymn. The *Br. P* and the *VP* have preserved the same ancient picture contained in the above hymn along with the concept of Mt. Meru. There is a clear shift in this Vedic text in the use of the word *dhruva*. It not only preserves the older name Abhaya for the fixed star but also equates this with the name Dhruva which name has been retained till present times for the Pole Star in Indian languages.

In another accented text *Ekâgni-kâṇḍa* also belonging to the *Kṛṣṇa-yajurveda*, hymns of the marriage ritual are given. The hymn for observing and addressing Dhruva is

*dhruvakṣitiḥ dhruvayoniḥ dhruvamasi dhruvatasthitam /*  
*tvam nakṣatrâṇâm methyasi sa mâm pâhi pṛtanyataḥ || (I.9)*

Here the quality of Dhruva as a star is said to be fixed. Dhruva is praised as the *methi* or the fixed column to which the *nakṣatras* are bound. The commentator Haradatta explains the word *methi* as *khalevâli*, a thick wooden peg fixed in the ground, to which animals are tied so that they do not stray away. This *methi* became the *medhî* a pole or column in the *Purâṇas*, highlighting the fixity of the star Dhruva even if it was only a memory in their time. Thus we see an evolution in the cosmic role of Dhruva from being a fixed Pole to which other stars were tied to one who by his rotation could drive Sun and other celestial

bodies in their orbit. As we go back in time naturally uncertainties increase, but beyond doubt the composers of the above *Yajurveda* texts knew Abhaya *alias* Dhruva as the *Pole Star*; that is a star which was like a pole to tie and keep in place the *nakṣatra* (sidereal zodiac) in a circular path. By back computations or using modern software such as Stellarium, which includes effects of precession, nutation and proper motion, we get the date of  $\alpha$ -Draconis being the Pole Star as 3200-2400 BC. In this long period, the declination of this star varied from  $87^{\circ} 56'$  to  $87^{\circ} 36'$ , reaching  $89^{\circ} 53'$  in 2830 BC. The naming of the Vedic star *Abhaya* (No-fear) as *Dhruva* (Fixed, Certain) in the *Ūūumâra* should have happened during this period, which gives a broad relative chronology (Fig.2). By 1900 BC the separation of Dhruva from NCP increased to  $5^{\circ}$  and the circumpolar nature of the star would have been evident to observers of the night sky. Thus, a conservative lower estimate for the North Star to have acquired the name Dhruva would be *c* 2400 BC. The declination changed to nearly  $82^{\circ}$  by 1500 BC and the drift of the star away from the NCP should have been glaringly evident to observers in India. Thus in the *Maitrâyaṇî (Maitrî) Upaniṣad* (I.4) one of the important question posed by King Bṛhadratha to Sage Ūâkâyanya was, ‘why Dhruva drifts, why the air strings holding the celestial bodies dip (*kim....dhruvasya pracalanam...vâtarajjûnâm nimajjanam*)’. Implicit in this enquiry is the statement: ‘the North Star understood by us as fixed has changed its position’; an unmistakable reference to the effect of precession as noted by King Bṛhadratha. This Upaniṣad (VI.14) also contains astronomical statements to the effect that the northern course of sun started at the middle of the *Dhaniṣṭhâ* star division. This corresponds to a few centuries before the *Vedâṅga Jyotiṣa* which states that the winter solstice coincided with Sun at the beginning of star *Dhaniṣṭhâ* ( $\beta$ -Delphini). This is a well discussed topic with the said observation dateable to *c* 1400 BC<sup>5</sup>. Thus the drifting of the Pole Star mentioned by King Bṛhadratha above is consistent with a date *c* 1500 BC. The *Mahâbhârata* (Bhîṣma Parvan, Ch.3, v.17) mentions the movement of Dhruva the Pole Star as a bad omen before the Great War. This statement as also the most probable date of the war is in harmony with the above period<sup>6</sup>.

### DISCUSSION

The above review and analysis is a representative description of Dhruva in the Purâṇas and before them in the Yajurveda texts. The characterization of Dhruva as a central pivot and pole for purposes of explaining the motion of the

heavenly bodies should have led to the name of the astronomical coordinate *dhruvaka* of the *siddhânta* astronomers even though there was no recognizable star at the NCP in the beginning of the Common Era<sup>7</sup>. Important as this is for the history of Indian astronomy, we side step this point to discuss the ancient sky picture given in the above texts. The constellation of *Úiúumâra* consisting of fourteen observable stars that make up a figure very much like a coiled dolphin or porpoise is well preserved in the *Purâṇa* and the Vedic literature. The process by which this figure was perceived is not available but the *Pañcaviṃśā Brâhmaṇa* of the *Sâmaveda* has an interesting legend hinting at the cosmography behind the *Úiúumâra*. It is said that initially this was a *R̥ṣi* or seer of the same name in the ocean. After having praised Indra by the *úarkara Sâman* song the seer attained the sky as the constellation of that name. The word *úarkara* means constellation which appears to be a variant of the word *úâkvara* with the same meaning as seen in the *TA*. The text further says that the *Úarkara Sâman* is meant for crossing the ocean<sup>8</sup>. This could be an oblique reference to the circumpolar nature of the bright stars of this constellation which helped ancient mariners to cross the seas. The physical meaning of the legend would be that the constellation looking like a dolphin moves and sets in the Milky Way the celestial ocean.

It has been common practice to translate the word *úúúumâra* as Gangetic porpoise, however inappropriate this may be. But the above evidences indicate that the ancient meaning was more as a sea whale or dolphin. With all the above details, recognition of the constellation as the modern Draco should be obvious. However, Allen<sup>9</sup> in his classic book on star names gives two meanings to *úúúumâra* namely, Draco and Delphinus, the latter being nowhere attested in the ancient literature. The reason for this can be traced to the faulty rendering of the *Purâṇas* by some translators. For example the *Matsya Purâṇa* arranged by Singh has a footnote that makes *úúúumâra* to mean ‘the zodiac personified and no other than the child Viṣṇu’<sup>10</sup>. Dutt in his translation of the *VP* takes fancifully *úúúumâra* in one place as the stellar sphere<sup>11</sup>. Even the modern translation of the *Br:P* by Tagare<sup>12</sup> adds a wholly unnecessary footnote citing the *Bhâgavata* that ‘all the stars and constellations are located as different parts of the body of this heavenly porpoise’. However, as seen previously the *Bhâgavata* mentions that *only some people* for meditation follow such a procedure and as far as the *Br:P* text is considered such an interpretation remains absurd.

If one were to blindly follow the vulgate English translations of the *Purâṇas* taking the zodiac or the constellation Delphinus (*Makara*) or the whole of the sky

as the *Úúúmâra* there is hardly any case for Dhruva to be the Pole Star. But as per the original texts in the *Br.P* and the *VP* there is no way to conceive the constellation other than placing the fourteen stars on the body of a dolphin for its visual picture. The further statement that four of the stars on the tail, with Dhruva as the fourth do not set clearly makes these stars to be circumpolar. The one to one correspondence between the Vedic and the Purâṇic description leads us to the conclusion the constellation meant as *úúúmâra* should be the Draco in the northern sky. Referring to Fig. 1, the ancient description stopped with Thuban without including the *kappa* and *lambda* stars. The names of the stars at the head can be easily recognized. Dharma and Brahma in Vedic parlance from the *TA* can be identified as  $\gamma$ - and  $\beta$ -Draconis (magnitude 2.24 and 2.79) respectively. The Purâṇas changed Brahma to Uttânapâda so that his son Dhruva (Abhaya) remains at the end of the same figure, along with his mother Sunîti identifiable as 10-Dra of magnitude 4.55. A star of magnitude 3.73 at the head is Grumium or  $\chi$ -Draconis that can be identified as Yajña or Kratu. The two Aúvins at the forelegs may be near the  $90^0$  bend of the figure. The brightest in the constellation is  $\eta$ -Draconis, probably known as Agni or Samvatsara. We can guess the identity of the other stars but this is not important for the present discussion.

The above details help us to see the controversy about Dhruva being the ancient Pole Star from a different perspective. The arguments for and against Dhruva being the Pole Star during the Vedic times have been succinctly presented by Law in his book on the age of the *R̥gveda*<sup>13</sup>. Jacobi somehow referred only to the late marriage codes for presenting his case. His opponents prejudiced as they were against dating the *R̥gveda* to any period before 1500 BC, treated Dhruva as an independent entity mentioned only in the *Gṛhya Sûtra* without any connection to the Vedic *Úúúmâra*. Typical was the dismissal by Whitney<sup>14</sup> when he wrote "...any star not too distant from the pole would have satisfied both the newly wedded woman and the exhibitor; there is no need of assuming that the custom is one handed down from the remote period when  $\alpha$ -Draconis was really very close to the pole, across an interval of two or three thousand years during which there is no mention of pole-star, either in Veda or in Brâhmaṇa." Keith<sup>15</sup> who translated several Vedic texts working in the Colonial Office, was derisive of the Hindu marriage ritual and commented "...the argument from the pole star assumes an accuracy in the demands of the primitive Indian wedding ritual which is wholly unnatural." While criticizing the *Úatapatha Brâhmaṇa* text mentioning that the Pleiades do not slip from the east he wrote "a passage which consists of

foolish reasons for preferring one or other of the *nakṣatras*; we are in the same region of popular belief as when in the Sûtra literature the existence of Dhruva, a fixed polar star, is alleged.” He added a foot note, as though not satisfied with his arguments (p 79); “The pole star, Dhruva, appears in the *Gṛhya Sûtras* only.” Whitney and Keith were obviously ignorant of the *Taittirîya Âraṇyaka* text as the basis for the Vedic statements implying the existence of Abhaya-Dhruva on the tail of the Draco and the *Ekâgni* text as the traceable Vedic source for the Hindu marriage rites. These texts could not have been as late as the sûtra literature generally assigned to *c* 500 BC. Another influential scholar of yesteryears, Winternitz<sup>16</sup> ignored the evidences in the *Br.P* and the *TA* to comment “... We cannot deny the possibility of one of the lesser stars in the Little Bear having been visible (about 1250 BC and even later still) as the Pole Star in the clear Indian firmament.” It remains a puzzle why he ignored the constraint of Dhruva being said to be along with thirteen other stars on the body of a figure looking like a dolphin. If some scholars thought that the Little Bear was part of the tail of the ancient *úúumâra* constellation they should have presented hard evidences from the Vedic and Purâṇa texts to support their beliefs.

The above discussion brings out that there are sufficient positive evidences in the ancient Sanskrit texts to identify the Hindu Dhruva with the star Thuban. Knowledge of Dhruva as an immovable star located on the *úúumâra* either by direct observation or as part of traditional wisdom passed on from the past is well preserved in the Vedic *Taittirîya Âraṇyaka* and *Ekâgni* texts. The absence of reference to a fixed north star in the *Ṛgveda* does not vitiate the above inference. In fact this points to the still more ancient nature of the *Ṛgveda Samhitâ*. To discuss whether this can be a method for dating the Vedic compositions is beyond the scope of the present work. We have to accept, at the least minimum, that votaries of a particular Vedic group in India beheld and preserved a sky picture of a dolphin like figure with fourteen stars, the last star on the tail looking fixed without any observable motion with respect to other stars, some time in the 4<sup>th</sup>-3<sup>rd</sup> millennium BC.

Purâṇas basically claim to present ancient legends. Hence such textual parts of the *Br.P* referring to the *Úúumâra* need not be dated as being very ancient. This point necessitates another look at the identity of Dhruva. Is it possible the *Br.P* took some star other than  $\alpha$ -Draconis as the self rotating Dhruva, which could have been still lying on the extended tail of the constellation? Such a possibility cannot be denied, since *Br.P* can be interpreted to state 15 stars, by

counting Mârîca and Kaúyapa separately, on the body of the Dolphin. The only eligible candidate for this possible alternate Purâṇic identification of Dhruva is  $\kappa$ -Draconis, which was nearest to the NCP in 1300 BC with declination  $85^{\circ}13'$ . This possibility does not in any way affect the conclusions about Dhruva being known as a fixed star in the Vedic period.

### CONCLUSION

Any attempt to trace the history of Indian astronomy can not overlook the Purâṇas and the vast Vedic literature starting from the *Ṛgveda*. The identification and constraints for locating Dhruva, the ancient Pole Star, as vividly described in the *Brahmâṇḍa Purâṇa* and the more ancient *Taittirîya Âraṇyaka* of the *Yajurveda* are presented in this article. The latter text presents the oldest description of a constellation comprising of fourteen stars lying in the sky named the úúumâra or the Dolphin. The *Pañcavimúa Brâhmaṇa* mentions this Dolphin as being helpful in navigating oceans which naturally should be an allusion to the circumpolar nature of the stars of this constellation. Textual evidences show that the original name for Dhruva was Abhaya configured to be seated at the tail end of the celestial Dolphin. Long before the *Gṛhya Sûtra* literature that indologists used as the source to prove the alleged lateness of the concept of Dhruva the Pole Star in India, the *Taittirîya Âraṇyaka* had a hymn equating Abhaya and Dhruva, none other than the star  $\alpha$ -Draconis (Thuban) that was nearest to the North Celestial Pole during the period 3200-2400 BC.

### ACKNOWLEDGEMENT

Discussions with V.H.Sateeshkumar, Baylor University, USA were helpful. Thanks are due to Vishal Agarwal for sending the Sanskrit commentaries on the *Taittirîya Âraṇyaka*.

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