

# **Title** Ancestral Dravidian Languages in Indus Civilization: Ultraconserved Dravidian Tooth-word Reveals Deep Linguistic Ancestry and Supports Genetics

## **Abstract**

Ever since the discovery of Indus valley civilization, scholars have debated the linguistic identities of its people. This study analyzes numerous archaeological, linguistic, archaeogenetic and historical evidences to claim that the words used for elephant (like, 'pīri', 'pīru') in Bronze Age Mesopotamia, the elephant-word used in the Hurrian part of an Amarna letter of ca. 1400 BC, and the ivory-word ('pīruš') recorded in certain sixth century BC Old Persian documents, were all originally borrowed from 'pīlu', a Proto-Dravidian elephant-word, which was prevalent in the Indus valley civilization, and was etymologically related to the Proto-Dravidian tooth-word '\*pal' and its alternate forms (\*pīl'/\*pi!/\*pel'). This paper argues that there is sufficient morphophonemic evidence of an ancient Dravidian '\*pi!/\*pīl'-based root, which meant 'splitting/crushing', and was semantically related to the meanings 'tooth/tusk'. This paper further observes that 'pīlu' is among the most ancient and common phytonyms of the toothbrush tree *Salvadora persica*, which is a characteristic flora of Indus valley, and whose roots and twigs have been widely used as toothbrush in IVC regions since antiquity. This study claims that this phytonym 'pīlu' had also originated from the same Proto-Dravidian tooth-word, and argues that since IVC people had named their toothbrush trees and tuskers (elephants) using a Proto-Dravidian tooth-word, and since these names were widely used across IVC regions, a significant population of Indus valley civilization must have used that Proto-Dravidian tooth-word in their daily communication. Since 'tooth' belongs to the core non-borrowable ultraconserved vocabulary of a speech community, its corollary is that a significant population of IVC spoke certain ancestral Dravidian languages. Important insights from recent archaeogenetic studies regarding

possible migration of Proto-Dravidian speakers from Indus valley to South India also corroborate the findings of this paper.

## **1 Introduction**

### **1.1 Indus Valley Civilization and Its Linguistic Diversity**

Indus valley civilization (IVC), stretching across almost one million square kilometers of Pakistan, Afghanistan, and the North-Western part of India (Kenoyer, 2010), was the most expansive of chalcolithic civilizations. Right from the discovery of IVC and its enigmatic script, several scholars have tried to trace the types of languages spoken in IVC. Types of languages presently spoken in the IVC regions are: Indo-Aryan (e.g., Punjabi in Punjab with dialects Siraiki and Lahnda, Sindhi in Sindh, Hindi, Marwari, Gujarati in eastern parts of Greater Indus Valley); Dardic (e.g., Shina, Khowar, Kohistani); Iranian (e.g., Baluchi, Dari, Pashto, and Wakhi in western parts of Greater Indus Valley); Nuristani in northeastern Afghanistan; Dravidian; Brahui (spoken in Baluchistan and Sindh); and Burushaski (a language isolate) spoken in northernmost Pakistan close to the Chinese border (Parpola, 2015 p.163-164).

Since the ancient world was generally more multilinguistic (12,000-20,000 languages existed before spread of agriculture, compared to some 7000 human languages of present times) (Pagel, 2009), ancient IVC too arguably hosted more languages than today. This makes it unlikely that all the languages spoken in its 1,00,0000 square-kilometer expanse belonged to only one linguistic group, whether Proto-Indo-Aryan, Proto-Dravidian or Proto-Austroasiatic. Languages of various groups, including some presently extinct languages (Masica, 1979), might have coexisted in IVC for ages, influencing and shaping one another.

## **1.2 The Perennial Puzzle Regarding IVC Languages: How Archaeologists, Linguists, Historians and Genetic Anthropologists Approach the Problem**

### **1.2.1 Arguments from Archaeology and Linguistics**

Incommoded by the absence of any deciphered written record composed in IVC (Indus script is still undeciphered), scholars hold vastly different opinions regarding types of languages spoken in IVC. Once an advocate of the idea of a 'Para-Munda' (not 'Proto-Munda') speaking IVC (Witzel, 1999, 2000, 2009), Witzel, presently prefers keeping the question of 'original' Indian language(s) 'open', till better reconstructions of Dravidian and Munda languages, and investigation of substrate words of ancient indigenous languages present in North-Indian Indo-Aryan languages are done (Witzel, 2019). While many linguists (Parpola, 2015; Driem, 1999; Osada, 2006) have opposed the Austroasiatic-related hypotheses regarding IVC's languages, Southworth (2004 p.325-328) shares Witzel's 'Para-Munda' theory, despite vigorously advancing the idea of prehistoric Dravidian influence on various languages presently spoken in IVC regions (e.g., Sindh, Gujarat, Maharashtra). Although some scholars claim that IVC language(s) belonged to some Proto-Indo-Aryan/Early-Indo-European language group (Renfrew, 1987 p.185-208; Rao, 1982), many others (e.g., Krishnamurti, 2003 p.501; Parpola 1994) defend a Proto-Dravidian speaking IVC. Parpola (1988; 1994; 2015) proposes Proto-Dravidian etymologies of suspect substrate words (e.g., *kiyāmbu*, *śakaṭam*, *oṃ*, *kinnara*) present in Vedic texts, and certain suspect Indic words found in Mesopotamian texts (the 'magilum' boats of Meluhha); suggests that some of the fish-like signs of Indus script

represented the Dravidian fish-word 'mina', to spell out certain Dravidian theophoric astral names prevalent in IVC; and adduces additional anthropological and ethnographic proofs of Dravidian influence, including Dravidian kinship and cross-cousin marriage rules practiced in the presently Indo-Aryan speaking societies of IVC regions (e.g. Gujarat). Though the prehistoric existence of 'Language X', an unknown primordial language not of proto-Indo-Aryan, Proto-Dravidian, or Proto-Munda type, was suggested by Masica's (1979) analysis of various agricultural terms prevalent in some North-Indian languages, Masica (1991, p.40) has later commented that the Dravidian stock is "a strong but as yet unproven contender for the languages of the Harappans".

Despite many such scholarly works, very few linguistic evidences, enjoying enough archaeological support to irrefutably identify the language(s) of IVC, have been offered so far. The situation is even more complicated due to several unresolved questions around the prehistoric spatio-temporal expanse of some major linguistic groups of present India (Indo-Aryan, Dravidian, and Austroasiatic), and their influences over one another. Dravidian-group languages, despite being spoken mostly in southern India (e.g., Tamil, Telugu, Kannada, Malayalam), also have scattered representations in India's North-Western (Brahui), North-Eastern (Kurux, Malto), and Central (e.g., Kolami, Naiki, Parji, Ollari, Gadaba) parts, indicating that Dravidian speakers possibly had much greater pre-historic presence in Northern India, including IVC regions (Southworth, 2004). Moreover, Mathematical linguistic studies confirm that Proto-Dravidian existed in the time of IVC (Pagel et al., 2013; Kolipakam et al., 2018). Similarly, though Austroasiatic languages (e.g., Mundari, Santali, Khasi) are currently spoken mostly in North-Eastern India, presence of the isolated Austroasiatic language Korku amidst Dravidian-speaking Gondis and other Indo-Aryan speakers in Madhya Pradesh and Maharashtra, indicates the possibility of a wider Austroasiatic presence in pre-historic India

(Southworth, 2004). Such uncertainties about spatio-temporal expanse assail even Indo-Aryan languages, the most dominant language-group of present North India, which has provided us with Ṛgveda and Atharvaveda, the oldest Indian texts composed in Sanskrit. Whether Indo-Aryan languages entered India from outside after IVC's decline, or were present in India since or from before the IVC era and were spoken in IVC, are questions that have enjoyed almost 200 years of scholarly attention (Bryant and Patton, 2005), along with innumerable amateurish attempts, often motivated by identity-politics.

### **1.2.2 Arguments from Archaeogenetics**

Parallel to archaeology and linguistics, archaeogenetics can immensely help us reconstruct the linguistic pre-history of a region. For example, a recent cross-disciplinary archaeogenetic study (Narasimhan et al., 2019), not only infers “a likely genetic signature for people of the IVC” (p.2), but also suggests interesting theories regarding Proto-Dravidian's spread. This study postulates that having different proportions of Iranian-farmer-related ancestry and Ancient-Ancestral-South-Indian related ancestry “was a characteristic feature of many IVC people” (p.12). It states that after “IVC's decline, this population mixed with northwestern groups with Steppe ancestry, to form ‘Ancestral North Indians’ (ANI), and also mixed with southeastern groups to form ‘Ancestral South Indians’ (ASI), whose direct descendants today live in tribal groups in southern India” (p.1). It argues that “[m]ixtures of these two post-IVC groups— the ANI and ASI—drive the main gradient of genetic variation in South Asia today” (p.1).

Most relevantly, this archaeogenetic study states that quite possibly “Proto-Dravidian was spread by peoples of IVC along with the Indus Periphery Cline ancestry component of the ASI [Ancestral-South-Indian]” (p.13). [Here Indus Periphery Cline refers to the ethnicity of eleven IVC-era individuals whose remains were recovered from burials of two sites in cultural

contact with IVC. These individuals are conjectured to be migrants from IVC, as their genomes do not fit the genomes of the core population found in their burial-sites, but fit well with genomes of 86 Post-IVC (1200-800 BC) people living near the headwaters of river Indus, and also genomes of diverse present-day South-Asians]. However, Narasimhan et al. do not deny the alternative possibility that “Proto-Dravidian was spread by the half of the ASI’s ancestry that was not from the Indus Periphery Cline and instead derived from the south and the east (peninsular South Asia)” (p.13).

Another related genomic study (Shinde et al., 2019) analyzes the genome of one IVC-era individual from Rakhigarhi, a longstanding Indus settlement, and discusses how that individual shared the same Iranian-farmer-related ancestry as of Indus Periphery Cline individuals, but little if any Steppe pastoralist-derived ancestry, and how this Iranian-farmer-related ancestry had diverged from the western Iranian people since at least 8000 BC.

Genetic ancestries and languages not being always linearly correlated, these studies, although quite helpful, do not suffice for a sure call regarding the dominant linguistic group(s) extant in IVC. For, they do not tell us which language(s) were spoken by the IVC’s ancestors, after their ancestors, and predecessors of western Iranian people had split around 8000 BC. Nor can the genetic data surely say if Dravidian languages originated in IVC or in the southern Indian peninsula.

### **1.3 How the Present Paper Solves a Part of the Puzzle**

This study seeks to resolve a crucial part of this perennial puzzle of South Asian prehistory, through establishing the certain existence of ancestral Dravidian language(s) in IVC. In the absence of any deciphered written documents of IVC, we have no direct way of identifying Harappan languages. So, the only feasible starting point is finding some proto-words which meet most of the following criteria:

- i) Historical and linguistic evidence indicates that IVC was the most likely origin of those proto-words
- ii) Archaeological evidence indicates that the objects signified by those proto-words were prevalently produced and used in IVC
- iii) Those proto-words' etymologies can be traced back to one of the language-groups present in the Indian sub-continent using the most stringent criteria prescribed in historical linguistics.
- iv) Historical and linguistic evidence should prove that the identified language-group was present in the Indian sub-continent in the IVC era.
- v) Archaeogenetic data should prove that present speakers of this language group are significantly genetically related to the IVC population.
- vi) The proto-words should be etymologically related to the stable non-borrowable basic-vocabulary of a language, which can trace out a language's ancestry.

Fortunately, we do have such proto-words. Since IVC had a thriving trading relationship with Persian Gulf and Mesopotamia, this study has searched through ancient Near-Eastern texts, hoping to find certain fossilized foreign words which had their origin in IVC. The logic is that when we import a foreign commodity not locally produced, we usually call it by its foreign name. This intuitive approach has been duly rewarded, as it is found that the words 'pīru'/'pīri' and their various dialectal variations, which signified elephant in Akkadian and ivory ('pīrus') in Old-Persian, are perfect tools for the present endeavor. My study argues that since archaeological data strongly associates Near Eastern ivory-objects of middle-third to early-second millennium BC with Asian elephants and IVC traders (Frenez, 2018a; Olijdam and David-Cuny, 2018), and since the ivory-words (e.g., 'ab', 'abu', 'āb', 'beḥu', 'netcheḥ-t') used

in ancient Egypt (the only other major source of prehistoric ivory), (Budge, 1920), has no phonetic connection to 'pīru', these 'pīru'-based words could likely have originated in IVC.

Strong linguistic evidence corroborating the above hypothesis comes from ancient Indic languages. In several Dravidian languages, 'pīlu', 'pella', 'palla', 'pallava', 'piḷḷuvam', 'pīluru', etc., signify elephant (Narain, 1991 p.25; Kittel, 1894; Brown, 1903; Madras Tamil lexicon, 1924-36). Moreover, in present Dravidian languages, the most popular word for female elephant is 'piḍi' (Burrow and Emeneau, 1984), which is also reconstructed as a Proto-Dravidian word '\*piḍ-i' (Starostin, 2006-2013). Now, cerebral 'ḷ', 'ḍ', and 'ṛ' are intimately allied and highly interchangeable in Dravidian languages (Caldwell, 1875 p.33,59). For example, the word for fowl is pronounced as 'kōṛi', 'kōḍi', and 'koḷi' in Tamil, Telugu, and Kannada respectively. Even for the very term 'draviḍa' (from which 'Dravidian' is derived), that meant southern Indian people and their country in ancient Sanskrit, Buddhist, and Jain texts, there were other forms such as 'dramiḷa', 'dramila', and 'damiḷa', among which the 'ḷ' based form 'damiḷa' was more ancient according to Krishnamurti (2003, p.2). Thus, '\*-i' being a Proto-Dravidian feminine gender marker (Krishnamurti, 2003 p.213), 'piḍ-i' (female elephant), is closely related to Tamil 'piḷḷuvam' where the cerebral 'ḷ' is preserved, or Telugu 'pīluru' where the cerebral 'ḷ' is replaced by 'l' (as also observed by Bagchi, 1933). Pīlu is also attested as 'elephant' in Sanskrit and the middle-Indo-Aryan language Pali, whereas 'pillakā' is recorded to mean 'female elephant' in Sanskrit, whose male form, though not recorded, must have been 'pillaka' (Monier-Williams, 1872 p.628,630; Tin, 1920 p.151).

The difference between 'r' in the Akkadian and Old-Persian word 'pīru', and 'l' in the Indic word 'pīlu', is explicable by the fact that other than appearing in some rare loan-words, the phoneme 'l' is often found to be absent in many ancient Iranian languages, where outlandish 'l's were often spelled and pronounced as 'r's —e.g. in Old-Persian, Babylon was

called Bābiru (Klein et al., 2017; Testen, 1997 p.582; Windfuhr, 2009)—. Since people of ancient Persia had functioned as intermediaries between Mesopotamian and IVC traders (Olijdam and David-Cuny, 2018; Leemans 1960, p.5; Oppenheim, 1954), while exporting IVC's ivory, they had arguably spread the Indic elephant-word ('pīru' < 'pīlu') to Mesopotamia as well. Since Akkadian is one of the earliest Semitic languages to have had contact with ancient Iranian languages, Akkadian speakers conceivably borrowed the word in its ancient Iranian form. Later and elsewhere more direct contact to non-Iranian sources possibly led to borrowing of the original 'l'-variant. Thus, certain early Seleucid cuneiform texts (c. 300 BC) used 'pīlu' not old Akkadian 'pīru' (Stolper, 1994 p.20-22), whereas Middle Iranian languages such as Middle Persian and Parthian used 'pīl' as their elephant-word (Durkin-Meisterernst D, 2004).

Exploring the etymology of this ivory/elephant word 'pīlu', I find unmistakable evidence that root-words for 'tooth', used in Dravidian languages across North, Central and South Dravidian families, are 'pal', 'pella', 'pallu', 'palu' etc. (Burrow and Emeneau, 1984), whose connection with elephant/elephant-tusk words, such as 'pīlu', 'pillakā', 'palla', 'pella', (Narain 1991; Kittel, 1894), cannot be merely coincidental. Two most unfailing taxonomical features of elephants are trunks and tusks. The most popular Sanskrit word for elephant is 'hastin'/'hastī', as the elephant-trunk seemed like a 'hasta' (hand) to Vedic people (Macdonell and Keith, 1912b p.172). But elephant's another moniker 'dantin' or 'tooth-haver' in Sanskrit (Bopp, 1856 p.763), is etymologically rooted in the ancient 'danta'-based Indo-Aryan and Indo-Iranian tooth-words. 'Danta' and 'dantan' meant tooth in Ṛgveda (Macdonell and Keith, 1912a p.339) and Avesta (Reichelt, 1911 p.234,263) respectively, whereas words derived from 'danta' mean tooth in most of the present-day North Indian languages. Similarly, 'abu'-based Egyptian elephant-words are related to the Egyptian tooth-words 'abaḥi' and 'ābeḥ'

(Budge, 1920). Intriguingly, along with female elephant 'piḍ-i', whose Tamil form 'piṭi' is attested to in *Tolkāppiyam* (Murugan, 2000 p.636), female-hog was also called 'piḍi-vandi' in the tenth century Kannada classic work on Mahābhārata, called *Pampa Bharatha* (Burrow and Emeneau, 1984). Now, just like elephant-word 'palla', the word for hog is also 'pandri', "(literally, 'a tusker'), from the radical pal, a tusk" (Caldwell, 1875 p.30). So, use of 'piḍ-i' (phonologically and semantically related to 'piḷuvam' and 'pīlu') for both female hog and female elephant, the females of tuskers, cannot be coincidental. Thus, the relation between Proto-Dravidian tooth-word and the Dravidian 'pal'/'pīl'-based elephant-words must be deeply etymological, not accidental.

Another revealing and independent evidence of pīlu's connection with the meaning of tooth comes from the widespread Indic phytonym of *Salvadora persica*, known in the western world as 'toothbrush tree', and in Arabic countries as 'miswak' tree; 'miswak' meaning 'tooth-cleaning-stick' (Haque and Alsareii, 2015). The obvious reason behind such tooth-related names of this tree is that its branches and roots have been used since antiquity as natural toothbrush, contain as they do several biologically active chemical constituents, considered highly beneficial for oral hygiene (Haque and Alsareii, 2015; Kumar, Rani et al., 2012). Given this, when speakers of several Indic languages call *Salvadora persica* as 'pīlu', we need have no doubt that just like the elephant-word 'pīlu', this phytonym too is related to the Proto-Dravidian tooth-word. Revealingly, Indian epic *Mahābhārata* (Ganguli, 1883-96) frequently associates the 'pīlu' tree with regions of Indus river basin (see Section-3.3.1), proving that the 'pīlu' phytonym was prevalent in Indus valley since antiquity. Moreover, Chinese travelogues of Hiuen Tsang (AD 629) tell us how an ancient toponym of Northwestern India contained the 'pīlu' word, and how certain associated legends were related with meanings of 'tooth', 'toothbrush tree', and 'elephant' (Beal, 1884 p.xcvi,67). Phytonyms, zoonyms and toponyms

being crucial cultural indicators, these evidences prove the etymological depth and spread of 'pīlu' in greater Indus valley since prehistory.

My next concern is explaining how all this provides a crucial clue for exploring IVC languages. As a basic-vocabulary-item of a speech-community, which "normally does not feel any pressure to change or to resist change", 'tooth' is included in the following:

- Morris-Swadesh's 100 basic-vocabulary-items (Swadesh, 1971 p.282-284 Table-A.1);
- Leipzig-Jakarta list of the least borrowable vocabulary, computationally created by gleaming empirical data from forty-one representative languages selected from all continents, which shares 62 items with Swadesh list;
- ASJP list of "40 most stable and effective [vocabulary] items with respect to language classification" (Holman et al., 2008 p.337), created by analysing words corresponding to Swadesh's (1971) basic meaning-items collected from 245 languages (128 languages of 23 language families of the Eastern Hemisphere, 117 languages of 46 families of the Western Hemisphere); and
- Dolgopolsky's list of 23 most stable vocabulary items (Tadmor et al., 2010).

Moreover, tooth, a frequently used 'ultraconserved' vocabulary-item with cognate classes in various language families, can help us trace the deep linguistic ancestry across different Eurasian languages (Pagel et al., 2013). Now, if peoples across IVC regions had named their toothbrush-tree and tuskers with close derivatives of a Proto-Dravidian tooth-word, then they must have used that tooth-word, indicating that the basic vocabulary-items for a significant population of IVC must have been Proto-Dravidian. Thus, ancestral Dravidian languages must have been prevalent in IVC. Here, it is important to note that this study cautiously refrains from either proving or disproving the presence of any other language-group in this likely multilingual civilization.

All these points are elaborated in Section-3 and Section-4, along with a detailed discussion of how certain archaeological and linguistic evidences corroborate suggestions of certain archaeogenetic studies regarding the existence of ancestral Dravidian people in IVC.

## **2 Methods**

This is an interdisciplinary research that does critical analysis of various archaeological, historical, linguistic and genetic evidence, to join many yet unconnected dots about the linguistic identities of the people of IVC. The methodology is sufficiently outlined in introductory Section-1.3. Since no other experimental or statistical analysis is done, this section needs no further detail.

## **3 Results**

### **3.1 IVC's Elephant-Word: Archaeological and Textual Evidence**

As Tavernier (2007 p.35) states: "Despite the fact that Akk. [Akkadian] pīru, 'elephant', is attested earlier than its OP [Old-Persian] equivalents and a possible Semitic origin of pīru looks more probable at first sight, the expression's origin must be sought for in India". Deferring my linguistic arguments supporting Tavernier's insight to Section-3.2, I would adduce historical and archaeological evidence to prove that 'pīru'/'pīlu'-based ivory/elephant words were at least as old as IVC, and had most likely travelled to Near East from IVC.

#### **3.1.1 The Age of the Elephant-Word Pīru**

The usage of 'pīru' and its dialectal variations to signify 'elephant' can be traced back at least to the Old-Babylonian period (c. 2000-1600 BC) from its use in an Akkadian wisdom tablet (Lambert, 1960 p.272-273). 'Pīru'-based elephant-words have occurred in various Mesopotamian texts, such as: a 716 B.C. Assyrian tablet (Lambert, 1960 p.212-219); a Standard-Babylonian-Tablet VI of Babylonian Gilgamesh epic, and an older Middle-Babylonian version of it (George, 2003 p.334-335,621); inscriptions of various Assyrian kings, including, Tiglath-Pileser I (1114–1076 BC), Tiglath-Pileser III/IV (745–727 BC), Sennacherib (704-682 BC), and Esarhaddon (680-668 BC) (Budge and King, 1902 p.85-86,139; Rogers, 1912 p.316,344,354). Moreover, in an Old Persian inscription of King Darius I, the word used for ivory is 'pīruš', whereas in the Elamite version of the inscription it is written as 'pi-hi-ra-um', the '/hi/' possibly used to lengthen the pronunciation of '/i/' (Lecoq, 1997 p.237; Vallat 1970, p.159; Tavernier, 2007 p.35). Intriguingly, the Hurrian part of an Amarna letter of c. 1400 BC, had used another dialectal form 'ši-(in)-be-e-ru' of the Akkadian ivory-word šinni pīri (Moran 1992, p.65-68; Speiser 1940-41 p.46). Supplementary-file-S1's Section-A contains more details about the aforementioned references.

As confirmed by the Assyrian dictionary (Roth, 2005 p.418-420) and the aforesaid references, 'pīru' for 'elephant' was recorded since the Old Babylonian period (c. 2000-1600 BC) which overlaps with the latest phases of urbanized IVC (c. 2600-1900 BC). Coinage of this word must have happened much earlier than its first appearance in written Mesopotamian records. Thus, despite the existence of Sumerian descriptive elephant-words such as 'til-lu-ug' (lion-killer) and 'am-si' (wild-ox with a horn) (Lewis and Llewellyn-Jones 2018), pīru-based appellatives for elephant were truly prevalent, as they were used through millennia in Akkadian, Hurrian, Old Persian (for ivory), and even Elamite languages.

### **3.1.2 The IVC Origin of the Elephant-Word Pīru**

Having established that the Akkadian elephant-word 'pīru' was at least coeval with IVC, I posit that 'pīru'-based elephant appellatives being first discovered from Mesopotamian records, there are two alternative possibilities of coinage to consider:

- i) Elephants were indigenous to Mesopotamia, and Mesopotamians had themselves coined the 'pīru'-based words;
- ii) Elephants being foreign to Mesopotamia, Mesopotamians had possibly borrowed the 'pīru'-based words from their ivory trading partners.

Choosing between these possibilities is complicated. For, at different periods Mesopotamians had used different sources of ivory, which included ivory imported from Tilmun/Dilmun, Meluhha, Magan, ancient Egypt, and also the ivory of the 'local' 'Syrian elephants'. Considering the Old-Persian ivory-word 'pīruš', these same questions would also be posed regarding ancient Persia's source of ivory. Following conjectures seek to answer these questions.

### **Conjecture-1: Syrian Elephants Were Not an Indigenous Species of Mesopotamia**

All elephants of our present geological era belong to two major groups, i) African elephants (*Loxodonta Africana*), and ii) Asian, also known as Indian, elephants (*Elephas maximus indicus*), which genetically diverged from each other since about 7.6 million years ago (Rohland et al., 2007). Regarding 'local' elephants of Mesopotamia, only 'Syrian elephants' (*Elephas maximus asurus*), which grazed 'between the plain of Jabbul and the Khabur basin' (Moorey, 1994 p.117), could be considered. But, though the terminology of 'Syrian elephant' makes sense in a geographical way, they were genetically not different from the Asian species, being actually "herds of an isolated sub-species of Asian elephant", who almost certainly lived in the "restricted ecological zones of northwestern Syria" from c. 1700 to 700 BC (Frenez, 2018a p.18). Historical testimony of their existence comes from hunting

records of various Assyrian and Egyptian kings, during 16th-8th century BC, whereas physical proof of their presence comes from various non-anthropogenic natural deposits of elephant remains found from Gavur Gölü of Turkey and Habbaniyah swamp of Iraq, parts of greater Syria (Moorey 1994, p.117; Çakırlar and Ikram, 2016). The following longish quote of Çakırlar and Ikram (2016) clearly reveals that the Syrian elephants were most probably Indian elephants, which were imported by Mesopotamian elites with the help of IVC traders:

In Southwest Asia, the earliest representations of elephants appear in art and mythological literature, originating from eastern Lower Mesopotamia, and date to the end of the 3rd millennium BC [...] The style of depiction, though, seems to derive from that of the Indus Valley [...] This strongly suggests a second-hand knowledge of elephants, rather than first-hand, real-life experience. From Greece to Arabia, no single reference to, or depiction of, an elephant or elephant parts, ante-dates these first finds from the end of the 3rd millennium BC. This consolidates other evidence that shows that the Holocene elephants of Southwest Asia were not endemic to the region and that the Early Bronze Age peoples of the region knew about them only through their contact with India, or possibly Egypt. The latter is less likely as these animals were no longer indigenous there by that time, although remembered [...] [citations omitted].

A corroborating evidence regarding non-African origin of Syrian elephants is that not only the elephant molars of Gavur Gölü deposit, but also the preserved molars and tusks found from Izzaya, Kinet Höyük and Alalakh (located in Hatay Province on the Mediterranean coast of Turkey, i.e. part of greater Syria), like “all other elephant molars found in the region” are “easily recognizable as belonging to Asian elephants” (Çakırlar and Ikram, 2016 p.172,175). Now, Syrian elephants were most likely imported from IVC only since circa 1700 BC, i.e., Post-IVC period, whereas ivory was being worked on in IVC since at least 5500 BC (Moorey 1994, p.116) and was being imported from IVC to Mesopotamia since the middle of 3rd millennium

BC (Leemans, 1960). Therefore, the possibility of coinage of the elephant-word 'pīru' at Mesopotamia is very thin.

### **Conjecture-2: IVC Was the Exclusive Source of Mesopotamia's Ivory in Middle-third to Early-second Millennium BC**

While Nile Delta and the southern Levant had a thriving culture of manufacturing and exchanging objects made of hippopotamus-ivory, Mesopotamia has mostly used elephant-ivory, as recorded in various Mesopotamian trade-documents (Massa and Palmisano, 2018) — “hippopotamus does not appear to be represented outside Egypt on any objects of Near Eastern origin that may be regarded as wholly independent of an Egyptian connection, nor has a term for it yet been confidently recognized in Akkadian or Hebrew or cognate languages” (Moorey, 1994 p.115) —.

From mid-third up to early-second millennium BC, Sumerian and Akkadian cuneiform sources foreground three foreign lands: Makkan/Magan (Oman Peninsula), Meluhha (Greater Indus Valley), and Dilmun (Bahrain Islands of Persian Gulf), as provenances of at least forty-two traded commodities, including elephant-ivory (Gelb, 1970; Crawford, 1998). Supplementary-file-S1's Section-B details the reasons for associating Meluhha of middle-third to early-second millennium BC with greater Indus Valley.

Among earliest cuneiform records mentioning ivory along with its geographical origin, the Third Dynasty (c. 2112-2004 BC) Ur-texts (UET-III 761, 764, 768, 757, 777) record certain multicolored ivory birds of Meluhha ('Gun-mušen Me-luh-ha') (Leemans, 1960 p.33), providing a direct evidence regarding the IVC-origin of Mesopotamia's ivory. Although such figurines are not yet found in Mesopotamia, a comparable ivory bird is excavated from Tell Abraq of Magan, where source of ivory was India (Potts, 2000 p.100,131).

Despite Meluhha's frequent mentions as provenance of various commodities (e.g., gemstones, timbers), records of ivory-birds are the only textual evidence that directly associates Meluhha with Mesopotamia's ivory. However, Magan and Dilmun are mentioned repeatedly as sources of Mesopotamian ivory. But, as shown below, both these places had imported their ivory from IVC.

### **Magan's source of ivory**

Magan, the crucial source of Mesopotamia's copper, was also mentioned as its ivory trading partner. "In the years 2027-2025 BC, a merchant named Lu-Enlilla, living at Ur, was charged with purchasing copper, ivory, semi-precious stones and ochre from Magan ..." (Potts, 2000 p.54). The Ur-III tablet UET-3 751 registers 38 minas of ivory among other items imported from Magan (Laursen and Steinkeller, 2017 p.58). But elephants were not autochthonous to Magan. In the zoo-archaeological analysis of more than 100,000 pieces of fairly well-preserved animal bones found from a long sequence of settlements (c. late-third millennium to 300 BC) in Tell Abraq of Magan (Uerpmann, 2001), no elephant bone is mentioned. Despite this absence of local elephants, "Tell Abraq has probably yielded more ivory combs than any other site in the Near East", some of which were decorated with typical Harappan style "dotted-circles", whereas some others contained "long-stemmed tulip" designs typical of ancient Bactria (Potts, 2000 p.100). According to Potts, the source of Tell Abraq's ivory "must have originally been the Indian elephant". Close trade ties between Magan's Tell Abraq and IVC are proven through Harappan-type cubical chert-weights found in the fortification at Tell Abraq, and Harappan-style pottery found at several of its settlements (Potts 2000, p.130). However, the ivory combs with distinctive tulip-designs were possibly imported from Bactria (northern Afghanistan and southern Uzbekistan) (Potts, 2000). But Frenez (2018a p.19) confirms that Bronze age Bactria's ivory, "might have reached the

Oxus Civilization sites only from the Indus Valley, where the exploitation of *Elephas maximus* and its ivory dates back to the aceramic Neolithic, ca. 7000–5500 BC, and became widespread during the Bronze Age”. Thus, even if some of Tell Abraq’s ivory combs were imported from Bactria, their ultimate origin was IVC. Another possibility is that certain itinerant ivory carvers of IVC present in Tell Abraq crafted combs from raw IVC ivory, and decorated them with Harappan or Bactrian designs according to the local elites’ taste (Frenez, 2018b p.393).

Many other settlements of Oman Peninsula (e.g., coastal settlements Umm an-Nār, Ra’s al-Ḥadd, Ra’s al-Jinz; interior settlements Bat, Salut, Bidbid), had pronounced presence of IVC artefacts, including Indus-style pottery (black slipped jars, fine painted wares, pedestalled dishes, perforated jars); copper axes; carnelian-beads; and ivory combs (Frenez, 2018b; Laursen and Steinkeller, 2017). Indus pottery, in particular black-slipped jars, constituted “one-third of the inventory” in Ra’s al-Jinz (Laursen and Steinkeller, 2017 p.19). where an Indus-style ivory comb, featuring common Harappan “dotted circles”, was found along with an Indus valley painted jar; a Harappan-style inscribed copper stamp seal with classic unicorn motif; and bitumen fragments from a coating of a boat, in Buildings I and II (Tosi and Cleuziou, 2007 p.237 fig. 253; Laursen and Steinkeller, 2017 p.19) — the archaeological context clearly relating the ivory comb with IVC.

These evidences prove that Magan’s elephant-ivory was either directly or indirectly sourced from IVC.

### **Dilmun’s source of ivory**

After Ur-III dynasty’s collapse, Dilmun replaced Magan as Mesopotamia’s major trading partner (Oppenheim, 1954 p.15; Laursen and Steinkeller, 2017 p.50-64). Interestingly, other than dates, most of the items listed as reaching Ur from Dilmun in the late-third to early-second millennium BC, (e.g., semiprecious stones including lapis lazuli and carnelian, ivory

and ivory objects, copper, silver, red gold, white corals, timbers), “came to Dilmun from elsewhere for onward shipment” (Moorey, 1994 p.xxii). Many of these items, such as lapis lazuli, carnelian, timbers (Moorey, 1994), and “fish-eye-stones” (Donkin, 1998 p.50; Howard-Carter, 1986) were imported from IVC. Regarding ivory, various Isin-Larsa period (c. 2000-1800 BC) cuneiform texts of Ur refer to rods, combs, inlays, boxes, spoons, and 'breastplates' made of ivory, which were donated to temples by merchants (e.g. Ea-nāsir) returning from Dilmun (Moorey, 1994; Oppenheim, 1954 p.6-12; Ratnagar, 1981 p.111-116). Now, the “prime candidate” for Dilmun’s elephant-ivory (local dugong-ivory was also used) is Meluhha (IVC), “where a population of Indian elephants was living and [was] actively exploited” (Olijdam and David-Cuny, 2018 p.420). The extremely close trade ties between Dilmun and IVC are manifest from: (i) prevalence of IVC’s metric system in Dilmun; (ii) influence of IVC’s ideological concepts on Dilmun’s glyptic tradition; (iii) extensive transfer of pyrotechnical knowledge between Indus and Dilmunite craftsmen that presupposes their prolonged mixing ; and (iv) existence of a steady supply chain for various IVC materials that needed “intimate personal links” between the Dilmunite and Indus traders (Olijdam and David-Cuny, 2018; Ratnagar, 1981 p.24,184-186). Relevantly, an important second-millennium BC “seal-cutter’s workshop” of Dilmun, which was operational for more than two centuries, contained “unfinished beads, pieces of ivory and worked shell related to production processes, a flake of obsidian, as well as small nodules of haematite, a piece of unworked carnelian, and gypsum crystals”, along with five Indus-type weights in its premises (Olijdam and David-Cuny, 2018 p.414-415). This co-occurrence of ivory with such signature IVC products is a crucial evidence of the IVC origin of Dilmun’s ivory. Moreover, after the fall of Larsa and Hammurabi dynasties, Dilmun declined into a place known mostly for its agricultural products, not for ivory, gemstones and other luxury items (Oppenheim, 1954 p.16). This further proves Dilmun’s

dependence for such products on IVC, as IVC's decline happened at the same period, causing cessation of its long-distance maritime trade.

### **Iran's source of ivory**

After elimination of Persian Gulf, Syria, and Africa as provenances of Mesopotamia's ivory in mid-third to early-second millennium BC comes Iran, where Darius's sixth century BC Susa inscriptions used a 'pīru'-based word to signify elephant-ivory. Now, as Moorey says (1994 p.116), the "evidence for the existence of native elephants in Iran in antiquity is tendentious and unconvincing". In the various zoo-archaeological studies conducted on pre-historic Iranian fauna, elephants are almost never mentioned (Karami et al., 2008; Young and Fazeli 2008; Harrington 1977; Hashemi et al., 2016). This silence on native pachyderms in Iran is explicable by the anti-elephant emotion found in ancient Zoroastrian texts, where the outlandish appearance of elephants was considered evil (Daryaee and Malekzadeh, 2017). In *Bundahišn* (The Book of Primal Creation), elephants are said to be a part of the demonic world, whereas in 'Pahlavi Rivāyāts' accompanying the *Dādestān ī Dēnīg*, and another middle Persian text *Dādestān ī Mēnōg ī Xrad*, the cultural hero Yima/Jam is praised for not accepting elephants from the demons, in exchange of their local cattle (Daryaee and Malekzadeh, 2017). Possibly because of this cultural resistance, even till the end of Achaemenid empire (c. 330 BC) Iranians had kept themselves quite distant from elephants (Kistler, 2007 p.25-30). (See Section-4.4 and corresponding Supplementary-Section for details).

### **Abundance of elephant-ivory in IVC**

In stark contrast to this absence of indigenous elephants in Mesopotamia, Iran, and Persian Gulf, elephants abounded in India since prehistory. Archaeologically, the earliest evidence for the working of an Asian elephant's tusks is a grooved tusk (c. 5500 BC) found at

Mehrgarh, a longstanding Indus settlement since the Neolithic era (Moorey, 1994 p.116). Later, “[a] seal and a gaming piece of elephant ivory from Mundigak (III) in Afghanistan, c. 3000 BC, are the earliest ivory artefacts so far discovered outside India” (Moorey, 1994 p.116). Since Afghanistan “was devoid of wild elephants” (Sukumar, 2003 p.75), and Mundigak had interactions with early phases of IVC (Cortesi, 2008 p.23), these must have been IVC’s ivory too. As Ratnagar (1981 p.111-116) says, “ivory was plentiful” in several Indus settlements (e.g., Harappa, Mohenjo-Daro, Chanhudaro, Lothal, Surkotda), and was “used for objects of everyday use such as containers, combs, kohl-sticks, pins, awls, hooks, toggles, gamesmen, ‘batons’, rods, scales, plaques, dice, inlay, furniture fittings and personal ornaments”. Intriguingly, ivory was “so common at Mohenjo-daro, that bone took second place to it” (Ratnagar, 1981 p.113). Moreover, the accurately carved elephants with manger and blankets, occurring in several Indus seals and tablets, depict a culture where elephants were not only hunted, but also tamed and trained (Ratnagar, 1981 p.114; Frenez, 2018 p.19). Additionally, India has an enormous amount of religious, economic, and historical texts — e.g., *Rāmāyana*, *Mahābhārata*, canonical Buddhist and Jain texts, several Sanskrit literary works, *Arthaśāstra*, ancient Tamil text *Cilappatikāram/Silappathikaram*) — where ivory carving, ivory artefacts, ancient ivory markets, king’s control on elephant forests, and guilds of ivory-carvers and ivory-dealers are repeatedly mentioned (Dwivedi, 1976 p.16-27). “On the contrary, there are no representations of such a majestic and awe-inspiring animal in the Near East, Central Asia and the Iranian Plateau until much later periods, with the exception of a few iconographies evidently influenced by contacts with the Indus Valley” (Frenez, 2018a p.19).

Considering these evidences, and the fact that following “the disruption of the trade connections with the Indus valley via the Persian Gulf, in Mesopotamia archaeological

evidence for ivory becomes sparse” (Massa and Palmisano, 2018 p.73), we can confidently claim that IVC was the main source of elephant-ivory for Bronze Age Near East.

### **3.2 The Proto-Dravidian Root of IVC’s Ivory-word**

Since archaeological evidence proves that IVC was the main source of Near East’s elephant-ivory, it is logical to infer that the similar ‘pīru’-based ivory/elephant-words used across different Near Eastern languages (Akkadian, Hurrian, Elamite, and Old-Persian) were borrowed from languages spoken in ancient India.

This hypothesis gets direct vindication from the words phonetically related to ‘pīlu’, which signified ‘elephant’ in Pali (Tin, 1920 p.151), and in various Dravidian languages: like ‘pīluru’ in Telugu (Brown, 1903); ‘piḷḷuvam’, ‘pillakā’ in Tamil (Madras Tamil lexicon, 1924-36); ‘palla’, ‘pallava’, ‘pīlu’ in Kannaḍa (Kittel, 1894). (Check Section-1.3 regarding the transformation of Indian ‘pīlu’ to Iranian ‘pīru’). Moreover, in Tamil, ‘piḷḷiru’ means “to roar, as an elephant” (Madras Tamil Lexicon, 1924-36). Thus, despite the present popularity of other Dravidian elephant-words (e.g., yāṇai, ēnuga, āne, āna), the ‘pīlu’/‘pal’ based elephant words too have far-reaching presence in Dravidian languages.

Now, as Kittel (1894 p.958,960,xxi) explained, the etymology of the Kannaḍa elephant-word ‘palla’ is “one with tusks”, since ‘pal’ means both tooth and tusk in Kannaḍa, and ‘pallava’, meaning ‘young of an elephant’, is derived from the same root. Furthermore, words for tooth in the Dravidian languages of Tamil, Malayalam, Kannaḍa, Koḍagu, Tulu, Telugu, Naikri, Naiki of Chanda, Parji, Pālu Kuṛumba, Gadba, Gondi, Koḍa, Maḍa, Kuṛux, and Malto are: ‘pal’, ‘pallu’, ‘palli’, ‘paru’, ‘palu’, ‘pel’, ‘palka’, etc. (Burrow and Emeneau, 1984). Considering the continued and widespread use of ‘pal’-based tooth-words in both North-

Dravidian and South-Dravidian, “two branches which have had no direct contact with each other in recent centuries” (Southworth, 2004 p.236), ‘\*pal’ is reconstructed as the Proto-Dravidian tooth-word (Starostin, 2006-2013; Krishnamurti, 2003:47) (see Supplementary-File S1’s Section-C). So, it is no special pleading to contend that just as Sanskrit elephant-word ‘dantin’ is derived from Sanskrit tooth-word ‘danta’ (Bopp, 1856 p.763), and Egyptian ‘abu’-based elephant-words are related to Egyptian tooth-words ‘abaḥi’ and ‘ābeḥ’ (Budge, 1920), the Dravidian ‘pil’/‘pīl’/‘pal’-based elephant-words are also directly related to Proto-Dravidian tooth-words.

Let me establish the popularity of these words in ancient Indian subcontinent with historical and linguistic evidence, before delving into the Proto-Dravidian etymology of the ‘pīl’-based elephant/ivory words.

Hiuen Tsang’s travelogue reveals that the ancient city Kapisa of Indus valley had used a toponym Pīlusāra (Pi-lo-sa-lo) for a mountain (‘siang-kien’ in Chinese, where ‘siang’ meaning ‘elephant’), and that local legend relates this mountain to a "spirit that takes the form of an elephant, hence the name" (Beal, 1884 p.67). This legend also describes the loyalty shown by this elephant-spirit to Lord Buddha, possibly signifying the mutual acceptance between Buddhism and the existing local religion. Since ancient toponyms related to religious beliefs generally use native words, ‘pīlu’ must have prevailed as an elephant-word in the IVC regions of Afghanistan since antiquity. Interestingly, sixth century AD inscriptions found from western India’s Gujarat (Saṅkhēdā plate of Śāntilla) and Maharashtra (Svamīrājā’s Nagardhan copper-plates) contains official designations ‘mahāpīlupati’ and ‘pīlupati’ which mean “great master of elephants” and “master of elephants” respectively, whereas as these designations were found also in Gupta dynasty’s inscriptions of eastern India (Vainyagupta’s 507 A.D. copper-plate from Gunaighar of Bangladesh) and have survived till twelfth century as found

from various copperplate grants of Bengal's Sen dynasty (Sircar, 1965 p.343; Dhruva, 1892 p.22-23; Majumdar, 1929 p.66,186). The Nagardhan copper-plate designates an elder member of a corporation of elephant-riders as 'pīlu-pati', but calls the elephant-physician as 'hastī-baidya' (Chakraborti, 1974). This cohabitation of the Indo-Aryan elephant-word 'hastī' with the non-Indo-Aryan (Pollock, 2011 p.43) elephant-word 'pīlu' suggests that the 'pīlu'-based term was too prevalent in this context to be replaced by a Sanskrit word. The prolonged usage of 'pīlu' as an elephant-word is also manifest in its use in constructing other related words. For example, as attested in Sanskrit, 'pīlu' also means "a group of palm trees", and "palm tree's stem" (Monier-Williams, 1872 p.630), possibly because palm tree's stem resembles an elephant's leg (Bandyapadhyay, 1933-1946 p.1334-1337).

Intriguingly, as identified by Sylvain Levi et al. (1929), the ancient city 'Paloura' ('pal' + 'ura') mentioned in Ptolemy's 'Geography' (c. 150 AD), was the same as Dantapura (Mahābhārata's Dantakūra country), the capital of ancient Kaṅga (famous for elephant breeding), and the toponym's meaning was certainly "city of ivory" — 'pal' (Dravidian) and 'danta' (Indo-Aryan) meant 'ivory'; 'ura'/'kūra' (Dravidian) and 'pura' (Indo-Aryan) meant 'city' — (see Supplementary-File-S1's Section-D for details). According to Levi (1929, p.175), this alternation of Paloura-Dantapura "shows that in the time of Ptolemy the Dravidian language was disputing the territory of Kalinga with the Aryan dialect". In my opinion, this dispute started much earlier, since in Mahābhārata's Dantakūra, Dravidian 'pal' was replaced by Sanskrit 'danta', but the Dravidian toponymic suffix 'kūra' was yet to be substituted. This use of a Dravidian ivory-word in an eastern Indian toponym is extremely significant, since regions of eastern India were famous for elephant-breeding since antiquity, as known from various references found from *Mahābhārata*, Arthaśāstra, and also the ancient elephant-

related treatises called *Gajaśāstram* and *Hastyāyurveda* written by sage Pālakāpya (Geetha 2013; Shastri, 1919 p.312) (see Supplementary-File-S1's Section-E for details).

Now, 'Pīlu' was not a Sanskrit or Munda word. The authoritative account of the c. seventh century Mīmāṃsā philosopher Kumārila Bhaṭṭa informs us that 'pīlu' meant a tree in the 'Aryan' speech, but elephant in the 'Non-Aryan' 'mleccha' languages (Bandyapadhyay, 1933-1946 p.1336; Pollock, 2011 p.43). Indeed, 'pal'/'pīl'-based words never denoted elephants in Vedic texts (Macdonell and Keith 1912a, 1912b). *Atharvaveda* merely contains a mysterious toponymic reference to a heaven called 'pīlumati' (Kuiper, 1948), along with a single phytonymic reference to some 'pīlu' tree (Macdonell and Keith 1912a p.535; Mayrhofer, 1996 p.138). Thus, the entry of the elephant-word pīlu in classical Sanskrit must be a late inclusion, a borrowing from non-Indo-Aryan native languages (see Supplementary-file-S1's Section-F). Similarly, the words used for elephant or tusk in the Austroasiatic Munda languages of India, display no remotest connection with the 'pal'/'pīl' based elephant words (SEAlang Munda Etymological Dictionary; Anderson, 2008). Regarding the possible Proto-Munda origin of the word 'pīlu' in the toponymic word 'pīlumati' of *Atharvaveda*, Kuiper tentatively throws in some possible semantic roots related to 'star', but hazards no Proto-Munda connection relating to the meaning of 'elephant', 'tusk', or 'ivory' (Kuiper, 1948 p.71). In fact, these 'pal'/'pīl' based elephant/ivory words are not etymologically deducible from any of the general features of elephant's anatomy or disposition (namely, 'trunk', 'tusk', 'size', 'destructivity') using the lexicon of any Indo-Aryan/Austro-Asiatic languages of India.

As mentioned above, Dravidian languages provide a direct etymological root of the '\*pal'-based elephant and ivory words. Kannada elephant-words 'palla' and 'pallava' are derived from Proto-Dravidian tooth-word 'pal', using derivative suffixes 'a' and 'ava' respectively (Kittel, 1894). But, since the Proto-Dravidian tooth-word is reconstructed as

‘\*pal’, not ‘pīl’/‘pil’, Dravidian grammars cannot directly explain the Dravidian elephant-words ‘pillakā’, ‘piḷḷuvam’ or ‘pīluru’ as derived from the Proto-Dravidian tooth-word. But Southworth (2004 p.10) helps here that reconstructed uniform invariant proto-languages are instances of “necessary idealization”, where differences between regional or social dialects, and formal and informal ways of speaking are not considered. In Section-3.2.1 below, I argue that there is ample evidence of the existence of an alternate “\*pīl”-based form of the Proto-Dravidian tooth-word: which was present in some ancestral Dravidian dialects, but is replaced by the ‘pal’/‘pel’-based tooth-words in current Dravidian languages. However, its vestiges remain in related verbs (‘splitting/renting’ etc.), and also in some alternate pronunciations of Dravidian phytonyms derived from the Proto-Dravidian tooth-word. Section-3.2.2 briefly discusses the formation of the elephant-word ‘pīllu’/‘pīlu’ from this tooth-word.

### **3.2.1 ‘Pīl’/‘Piḷ’/‘Pil’: Alternative Proto-Dravidian Root-words for Tooth**

#### **A. Evidence based on the relationship between words for ‘split’/‘bite’/‘crush’ and ‘tooth’:**

Dravidian languages often show a direct semantic and phonological relation between nouns for human limbs, and verbs associated with actions of such limbs: e.g., ‘\*kaṇ’ ‘eye’: ‘kāṇ’ ‘to see’; ‘\*kay’ ‘hand’: ‘\*key’ ‘to do’ (Krishnamurti, 2003 p.196). Now, in South-Dravidian (e.g. Tamil, Malayalam, Kannada, Telugu) and Central-Dravidian (Gadba, Parji) languages, ‘piḷ’/‘pil’-based words (e.g., ‘piḷ’, ‘piḷa’, ‘piḷaruka’, ‘piḷigu’, ‘pili’, ‘pīluru’) mean: to tear, split, pierce, cleave asunder, divide, crush, crack, to be rent or cut, be broken to pieces, etc. (Burrow and Emeneau, 1984; Brown 1903). Occurrence of these cognates in both South and Central Dravidian, gives this verbal root a Proto-Dravidian stature (Krishnamurti, 2003 p.7). Now, these ‘pil’-based words most likely have a semantic relationship with ‘tooth’, tooth being the most primitive tool, main limb, used for crushing and tearing food, or the flesh of an opponent. Note here the close relation between the Vedic Sanskrit noun ‘jāmbha’ (‘tooth’,

‘tusk’, and ‘jaw’) and its related verb ‘jambh’ (‘snap’, ‘shatter’, ‘crush’, ‘smash’; Indo-European root *\*g̑embʰ*), or the Vedic Sanskrit verb ‘daṃś’ (‘biting’), and its related noun ‘daṃṣṭra’ (‘fang’, ‘large tooth’, ‘tusk’) (Mayrhofer, 1992 p.572-573,688). These instances strongly make the case for an alternate ‘pīl’-based Dravidian tooth-word present in ancestral Dravidian languages/dialects.

### **B. Evidence based on phonological vowel variation in Dravidian cognate words:**

Alternatively, ‘pel’/‘pīl’ could have been just phonological variations of the tooth-word ‘pal’, used in different dialects of the ancestral Dravidian languages spoken in different parts of IVC. Phonological variations in the Dravidian names of jack-fruit tree (*Artocarpus integrifolia*), and their tooth-related etymology, revealingly corroborate this hypothesis. Jackfruit-tree is named by ‘panasa’ and its cognates in many Dravidian languages: e.g. ‘panas’ (Kannada, Telugu), ‘penac’ (Parji), ‘panis’ (Gadba) (Burrow and Emeneau, 1984). Kittel (1894, p.xxiii) identifies ‘panasa’ as a Dravidian word borrowed in Sanskrit, and proposes that the Dravidian tooth-word ‘pane’, which means “pointed tooth, is at the root of the terms, referring to the jack fruit as covered with nail-like points”. Similarly, in Sanskrit and many other Indo-Aryan languages (e.g., Bengali, Odiya, Hindi) jack-fruit is called ‘kñāṭhal’, ‘kaṇṭakiphala’, ‘kaṇṭaphala’, ‘kaṭhal’ and ‘katahal’, each of which refers to its skin of pronounced ‘kaṇṭaka’/‘kaṇṭa’, or thorns (Turner, 1962-1966; Masica, 1979 p.92). Since jackfruit is also called with various ‘pal’-based cognate words in several Dravidian languages: ‘palavu’, ‘palā’ (Tamil), ‘palasu’, ‘halasu’ (Kannada), ‘palaci’ (Koḍagu), I propose that these names too allude to the numerous tooth-like points on jack-fruit skin, and are etymologically rooted in the ‘Proto-Dravidian’ tooth-word *\*pal*. The phonological transition “pal-ac-~\*pan-ac”, and the Proto-Dravidian stature of this phytonym, is also suggested by Krishnamurti

(2003, p.12,123). Now, interestingly, jackfruit tree is also called ‘pilā’ (Tamil), ‘pilāvu’ (Malayalam), ‘pila’, and ‘pela’ (Tulu, Koḍagu) (Burrow and Emeneau, 1984; Kittel, 1894; Krishnamurti, 2003). As stressed by Subrahmanyam (1983 p.23) the words ‘pal-avu’, ‘pil-avu’, ‘pal-ā’, and ‘pil-ā’ can be segmented into root-words ‘pal’ and ‘pil’ and derivative suffixes ‘avu’ and ‘ā’ respectively. Thus, paralleling ‘pal-avu’ & ‘pil-avu’, or ‘pal-ā’, ‘pil-ā’ & ‘pel-a’, the tooth-based phytonyms of jackfruit tree clearly give us alternative root-words for tooth, i.e. ‘pal’, ‘pil’ and ‘pel’. Now, since the syllable structure of Proto-Dravidian is often “preserved intact in Old Tamil and Malayalam” (Krishnamurti, 2003 p.92), the presence of the ‘pil’-related root in both Tamil and Malayalam supports the conjecture that ‘pil’-based tooth-words were used in some Proto-Dravidian dialects. Interestingly, in Central-Dravidian Parji, where vowels ‘a’ and ‘ā’ are often pronounced and ‘e’ and ‘ē’, the tooth-word is ‘pel’ (Burrow and Bhattacharya, 1953), whereas in North-Dravidian Malto the tooth-word is ‘pāl’ (Mahapatra, 1976 p.26), demonstrating how different vowels could be used in cognate tooth-words.

In fact, such alternation between ‘ā’, and ‘i’ (and some other vowels) in the word-initial syllable, can be found in various other cognate words across Dravidian languages, which is arguably a common feature of Dravidian phonology. For example, as recorded by Burrow and Emeneau (1984), Krishnamurti (2003 p.123), and Subrahmanyam (1983 p.247,333):

i) ‘Dream’: ‘kaṇavu’ (Tamil, Malayalam), ‘kana’ (Kannaḍa, Tulu), ‘kināvu’ (Malayalam), ‘konof’ (Toda), ‘kenaci’ (Koḍagu), ‘kala’ (Telugu, Kolami, Naiki of Chanda); ‘kelay’ (*Koṇḍa*, Parji) etc.

ii) Male cattle (buffalo, goat, sheep) and ‘heifer’: ‘kaṭavu’ (Tamil), ‘kaṭā’ (Tamil, Malayalam), ‘kiṭā’ (Tamil), ‘kiṭāvu’ (Malayalam), ‘kiṭāy’ (Tamil), ‘kaḍasu’ (Kannaḍa), ‘kaṭacci’ (Malayalam), etc.

Now, though the proto-forms for ‘cattle’ and ‘dream’ are reconstructed as ‘\*kaṭ-aca’ and ‘\*kan-ac’ (Krishnamurti, 2003 p.123), the ‘i’/‘e’-based alternate forms that exist in modern Dravidian languages, could have existed in ancestral Dravidian dialects too, making a strong case for the existence of the tooth-word ‘pīl’ in certain ancestral Dravidian languages.

### **3.2.2 The Morphophonemics of the Elephant-word ‘Pīlu’:**

Regarding the morphophonemics of elephant-words ‘pīlu’/‘piḷḷu’, phonologically ‘u’ is the most frequent Dravidian enunciative suffix, and the last consonant of the base it gets appended to, often gets doubled (Caldwell, 1875 p.17). Thus, along with “vil”, its euphonical variants “vilu” (“vil-u”), and “villu” also mean “bow” in various Dravidian languages (Burrow and Emeneau, 1984). This explains phonologically how the enunciative ‘u’, added to root ‘pīl’/‘piḷ’ can form ‘pīl-u’, as well as ‘piḷḷu’ with doubled “l”.

Analysing ‘pīlu’ morphologically, as Caldwell (1875, p.89-90) observes, in the ancient stage “there was no difference in any instance between the verbal and the nominal form of the root in any Dravidian dialect”, and each root could be used as a verb, a noun, as an adjective without any additional formative suffixed to it (Tamil ‘col’/‘śol’ as verb means ‘to speak’, as noun means ‘a word’). However, gradually, when the dialects became more cultivated, certain grammatical separations started. For example, often to make a verbal noun, the root-verb’s vowel gets lengthened: e.g. ‘min’ means ‘to shine’ & ‘mīn’ means ‘star’ (Caldwell 1875, p.91). Thus, in the ancestral Dravidian languages prevalent in Northern India, the verb ‘piḷ’ (‘to split, pierce, crush’) might have got its vowel lengthened to form the tooth-word ‘pīl’, which eventually formed the adjectival noun ‘pīlu’/‘pīlu’, meaning ‘tusk’/‘elephant’. The verb ‘piḷ’ could also have formed ‘piḷḷu’ (cf. Tamil ‘piḷḷuvam’) by reduplicating the final consonant, to form a derivative noun of a verbal theme (Caldwell 1875,

p.102). A similar example of such verbal nouns is the Dravidian verb 'vil' meaning 'to expand, to stretch', and its related nouns 'vil'/'vilu'/'villu' meaning 'bow' (Burrow and Emeneau, 1984). Intriguingly, a Central-Indian tribe existing since prehistoric era (mentioned in Nārada-purāṇa, Rāmāyaṇa and Mahābhārata), who are traditionally famous as archers and show significant genetic affinity (the Bhils of Gujarat) with other Dravidian and Munda tribes, allegedly derive their ethnonym 'Vil'/'Bhil'/'Bhilla', meaning 'bowmen', from this same Dravidian root 'vil' (Chaubey et al., 2017; Caldwell, 1875 p.464). The tooth-word 'pīl' has somehow got replaced by the 'pal'/'pel'/'pāl'-based forms in current Dravidian languages. However, 'pīlu', and its cognates still mean 'arrow' in Kannada and other Dravidian languages (Kittel, 1894; Burrow and Emeneau, 1984), possibly because arrow is a weapon that pierces through its target ('pil' meaning 'to split, pierce, crush'). Since various Dravidian verbs such as 'uruvu', 'ganḍeṅ', 'kuḷi', 'tai' etc., which mean 'to pierce/to penetrate', are defined as 'to pierce through (as arrows)' (Burrow and Emeneau, 1984), the etymology of the arrow-word 'pīlu' cannot possibly be anything else.

Thus, considering that the Telugu word 'pīluru' means not only the verb "to tear", but also 'elephant', and "a kind of forest tree" (surely "pīlu", the tooth-brush tree, see Section-3.3) (Brown, 1903), and comparing this with the Sanskrit word 'rada' that means both 'tearing/splitting/rending', and 'tooth/tusk', and the derived elephant-words 'radi' (tusked) and 'dvi-rada' (two-toothed/two-tusked) (Kittel, 1894 p.818,1331), I confidently claim that 'pil'/'pīl'-based root-words, that meant both 'splitting/crushing' and 'tooth/tusk', has similarly germinated the tooth-related meanings of 'elephant' and 'tooth-brush tree'. Also, as mentioned before, considering the interchangeability of cerebral 'l' and 'ḍ' in Dravidian languages and the Proto-Dravidian feminine marker 'i', the popular Dravidian elephant-word

‘piḍ-i’ is directly related to the root-word ‘piḷ’ (Caldwell, 1875 p.33,59; Krishnamurti, 2003 p.213).

Interestingly, the Indian elephant-faced-god Gaṇeśa is called ‘Piḷḷāri’ in Telugu (Brown, 1903 p.764); and ‘Piḷḷaiyar’ in Tamil (Narain, 1991 p.25). As suggested by Bagchi (1933) and Narain (1991), and as emphatically argued by Dhavalikar (1990), ‘Piḷḷaiyar’ is derived not from the Dravidian child-word ‘piḷḷa’, but from Dravidian tooth/tusk words (see Supplementary-file-S1’s Section-G).

### **3.3 ‘Pīlu’: A Proto-Dravidian Tooth-based Phytonym Prevalent in IVC**

This section analyzes the ‘pīlu’-based ancient phytonym of *Salvadora persica*, and provides another line of textual, archaeobotanical, and linguistic evidence that not only reaffirms the etymological link of ‘pīlu’ with the meaning of ‘tooth’, but also links the word locationally with the regions of Indus basin and establishes the word’s antiquity.

#### **3.3.1 The Tooth-Brush Tree ‘Pīlu’: Its Tooth-based Etymology and Ancient Habitat**

Even though ‘pīlu’ was never used to denote elephant in Vedic literature, in *Atharvaveda* pīlu finds mention (Macdonell and Keith, 1912a p.535) as a tree on whose fruits doves fed (“Tvamindra kapotayachhinnapakṣāya vañcate śyāmākam pakvaṃ pīlu cha varasma akṛṇorbahuḥ” *Atharvaveda*:20.135.12). Now, most of the phytonyms attested in Vedic texts, like ‘aśvattha’ and ‘pippala’ (*Ficus religiosa*), ‘palāśa’ (*Butea frondosa*), ‘bilva’ (*Aigle marmelos*), ‘kharjūra’ (*Phoenix sylvestris*), ‘tila’ (*Sesamum*), and ‘śalmali’ (*Salmalia malabarica*), have survived in India with minimal phonological changes. Likewise, *Atharvaveda*’s ‘pīlu’ (phonological variations: ‘pīl’, ‘pīlo’, ‘pilvu’, ‘piludi’, ‘pilun’ etc.) has remained the commonest Indic name for two closely related plants of *Salvadoraceae* family,

i.e., *Salvadora Oleoides* and *Salvadora persica* (or *Salvadora indica*), in various ancient and modern languages of North-India, such as Prakrit, Sanskrit, Hindi, Gujarati (Turner, 1962-1966 p.466), Marathi, Punjabi, Bengali (Odedra, 2009 p.315; Watt, 1893 p.447), Odiya (Praharaj, 1931-1940 p.4874), and Urdu (Fallon, 1879 p.396). Among the languages of Pakistan and Afghanistan, in Balochi, *Salvadora persica* is called 'pīlo'/'pīlu' (Burkill, 1909 p.47,121), whereas in Pashto it is called 'plewan' (Watt, 1893 p.447-449). Moreover, both in Ayurveda, a traditional Indian medicine system (Khare, 2008 p.574), and Tibb Yūnānī, a Perso-Arabic traditional medicine system (Ahmad et al., 2009), *Salvadora persica* is mostly referred to as 'pīlu' and 'pilun' respectively.

This antiquity of the phytonym 'pīlu', along with its spread and preponderance over all other North Indian common names of these trees (e.g., jhak, kotungo, jhal, khabbar, kharjal), demand investigation into its etymology. Revealingly, the English common name of *Salvadora persica* is 'toothbrush tree'. In Middle East and the wider Islamic community, it is famous as 'miswak' (and its dialectal derivatives), which means 'tooth-cleaning stick' (Haque and Alsareii, 2015). These phytonyms are rooted in the use of *Salvadora persica*'s twigs, root, and stem as toothbrush since antiquity, as they contain several bioactive components with significant antimicrobial activity against various oral and dental pathogens (Haque and Alsareii, 2015). Since *Salvadora persica* is a more widespread species (found in Africa, India, Iran, Israel, Jordan, Oman, Pakistan, Saudi Arabia, Sri Lanka, Syria, Yemen, etc.), compared to *Salvadora oleoides* (found mostly in India and Pakistan) (Orwa et al., 2009), the former tree's medicinal qualities have been more extensively investigated. However, *Salvadora oleoides* is also traditionally used as toothbrush in both Pakistan and India (Odedra, 2009 p.428; Burkill, 1909 p.47; Gratzfeld and Khan, 2015), as its root and stem possess various antimicrobial agents (Kumar, Dhankhar, et al., 2012).

Now, focusing on *Salvadora persica*, since both its English and Arabic names are rooted into its use as toothbrush, by corollary its ancient Indic name “pīlu”, being phonologically identical to the Proto-Dravidian words used for ivory/elephant in IVC, must have shared the same tooth-based etymology. This hypothesis gets strong corroboration from the travelogue of the Chinese Buddhist pilgrim Sung-Yun (c. 500 C.E.), which records the following old legend from Udyana, an ancient kingdom situated in Indus Valley: "Buddha once purifying (his mouth), planted a piece of his chewing stick (dantakashtha) in the ground; it immediately took root, and is at present a great tree, which the Tartars call Po-lu [...] The Pīlu tree *Salvadora persica*" (Beal, 1884 p.xcvi). This legend confirms that people of this Indus Valley region used a ‘pīlu’-based name for *Salvadora persica* and associated its sticks mainly with dental care. Thus, the phytonym ‘pīlu’ and the aforementioned toponym ‘Pīlusāra’ establish the prevalent use of Dravidian tooth-based words to denote ‘elephant’, and ‘toothbrush tree’, in Greater Indus valley since antiquity.

In this context *Mahābhārata* provides an invaluable ethnohistorical testimony that a huge forest of ‘Pīlu’ trees existed in Indus valley since time immemorial. Here an expatriate ‘Vahika’ man (*Mahābhārata* defines ‘Vahika’ as people who lived near river Indus and its five tributaries), wistfully reminisced about his native land as: “Crossing the Sutlej and the delightful Iravati, and arriving at my own country [...] in the forests, having many pleasant paths of Sami and Pīlu and Karira!” (Ganguli, 1883-96 Book-8, Section-44). Additionally, *Mahābhārata* describes the location of a country named Aratta as a place: “where forests of Pīlus stand, and those five rivers flow, viz., the Satadru, the Vipasa, the Iravati, the Candrabhaga, and the Vitasta and which have the Sindhu for their sixth” (Ganguli, 1884-96 Section-44).

*Mahābhārata's* abovementioned testimony is fully supported by modern botanical and palaeobotanical Studies. Pīlu trees (*Salvadora spp.*), that generally flourish in arid places, saline lands and coastal regions, are one of the “key characteristic species of Pakistan’s tropical dry thorn forest”, which was “the prevailing woodland type in the lower hills, sandy desert areas and flood plains of most parts of the Indus basin” (Gratzfeld and Khan, 2015 p.10). “Palaeobotanical studies carried out in Harappa [...] have revealed wood fragments of *Prosopis cineraria*, *Acacia spp.*, *Salvadora spp.*, *Capparis spp.*, *Ziziphus spp.*, *Tamarix spp.*, *Dalbergia sissoo* and *Populus euphratica*”, indicating that many of the floras of present-day Pakistan exists since prehistory (Gratzfeld and Khan, 2015 p.21). Interestingly, *Salvadora spp.* are among the trees that had been most regularly exploited for wood by the IVC people, as their remains “dominate charcoal assemblages thus far analysed from the Greater Indus Valley” (Fuller and Madella, 2001 p.356, Saraswat, 1991 p.526, Saraswat, 2002 p.203). In present India, Pīlu’s natural habitat comprises mostly regions of IVC (e.g., Punjab, Rajasthan, Gujarat, Haryana), and to some extent the saline soiled parts of Konkan Coast, and Andhra Pradesh (Khare, 2008 p.574; Watt, 1893 p.447-449).

### **3.3.2 Analyzability of the Common Names of *Salvadora spp.***

Getting sceptical regarding the etymological traceability of the Indic common names of *Salvadora spp.*, one may question whether ‘pīlu’ has an accidental similarity with the Dravidian tooth-word ‘\*pal’, rather than being an etymologically rooted tooth-related coinage. Now, many of the common names *Salvadora spp.* are evidently analysable. For example, in Gujarat and Punjab, pīlu is also called ‘mithi jar’ and ‘khari jar’ (Watt, 1893 p.447-449; Odedra, 2009 p.32). While ‘mīṭha’/‘mīṭhum’ means salt in Gujarati and Marathi, in Hindi and several other Indo-Aryan languages ‘khār’/‘kṣārā’ signifies salt (Turner, 1962-1966).

According to Odedra (2009 p.32) these salt-based names are related to the taste of pīlu sticks. However, these could also be related to the trees' natural saline-soil habitats. Similarly, pīlu's Tamil name 'kalarva' most likely meant 'the tree that grows in black saline soil', as the Proto-Dravidian words such as '\*kaḷu' and '\*kaḷar' mean 'saline soil', and the characteristic saline soil of the Sindh region of Indus valley, a natural habitat of pīlu, is called 'kalar' (Parpola, 2015). Intriguingly, these three phytonyms are semantically similar to *Salvadora persica*'s another English name 'saltbush tree'. Thus, 'pīlu', the ancient and most wide-spread Indic name of *Salvadora persica*, must have been a deliberate tooth-based coinage, which is semantically comparable to its most popular English and Arabic names, i.e. 'toothbrush tree' and 'miswak' ('tooth-cleaning-stick').

### **3.4 Tooth: A Non-borrowable Stable Ultra-conserved Vocabulary Item, A Credible Witness for the Proto-Dravidian Speakers in IVC**

The above sections argued that a significant segment of the IVC people must have spoken some ancestral Dravidian language(s), since they had used etymologically related Proto-Dravidian words in various meaning domains: such as body-parts (tooth), trade-commodities (ivory), fauna (elephant), and flora (toothbrush tree). But one may ask whether just one Proto-word and its associated derivative words can single-handedly determine the prehistoric linguistic affinity of a region.

Now, since a large portion of nouns of a language is often borrowed from other languages, just any noun cannot be used to identify a language's genealogy and ancestry. Here Swadesh's concept of 'basic/core vocabulary' (1950; 1971), typically linked to 'stability, universality, simplicity, and resistance to borrowing' (Tadmor et al., 2010), in historical and

comparative linguistics, comes to our rescue. Generally, the 'cultural items' of our vocabulary (e.g. the semantic fields of religion, clothing, house, social and political relations) show high percentages of borrowing from other languages (Tadmor et al., 2010). In contrast, certain culture-free meaning domains, like the semantic fields of sense perception, spatial relations, body parts, and kinship, are quite resistant to borrowing (Tadmor et al., 2010 Table-3).

As an important and often-mentioned body-part, 'tooth' belongs to this culture-free non-borrowable basic vocabulary list. It finds mention as the 43rd item in Swadesh's list (1971 p.283-TableA.1) of 100 items, which are extensively used as a diagnostic list for glottochronological analysis across the world; gets included in the Leipzig-Jakarta list (Tadmor et al., 2010) as an important core-vocabulary item with a very low borrowability score and a high age score (see 'The World Loanword Database', <https://wold.cld.org/meaning/4-27#2/24.2/-4.9>); secures 15th most stable position in the ASJP list (Holman et al., 2008); and 9th rank in Dolgopolsky's list (Dolgopolsky, 1986).

As explained by Holman et al. (2008 p.334), "the words for more stable items can be identified because they have a greater tendency to yield cognates within groups of closely related languages than words for less stable items". This explains why 'pal'/'pel' based tooth-words are found to be cognates across almost all the Dravidian languages of North, Central, and South stalk (see Section-3.2).

A recent linguistic study by Pagel et al. (2013) shows how certain frequently used words achieve a remarkable degree of replication fidelity and thus can remain 'ultraconserved' for thousands of years across genetically related languages. These scholars have computed cognate class-sizes for 188 items in Swadesh's initial 200 item vocabulary list across seven Eurasian language families. According to Pagel et al. (2013, Table S1), proto-forms of tooth-words are found to be cognates in three language families: Proto-Altaic, Proto-

Dravidian, and Proto-Chukchi-Kamchatkan. The underlying database used by them (<https://starling.rinet.ru>: Starostin, 2006-2013), documents these proto-forms as ‘\*pala’ for Proto-Altaic, ‘\*pal’ for Proto-Dravidian, and ‘\*val’ Proto-Chukchi-Kamchatkan, indicating that the Proto-Dravidian tooth-word belongs to the most conserved, ancient, and stable set of words that exist in the Eurasian vocabulary, and its testimony should be sufficient to establish a speech community’s linguistic identity.

## **4. Conclusion**

This paper not only seeks to solve one of the most sought-after puzzles of Indology (Section-4.1), but also offers certain etymologies (Sections 4.3-4.4), that explain some apparent inconsistencies baffling many Indian epigraphers for years. Moreover, it discusses how the linguistic and archaeological evidence presented in this paper buttresses an intriguing possibility indicated in recent genetic-anthropological studies, i.e. the North-to-South migration of Proto-Dravidian (Section-4.2).

### **4.1 Proto-Dravidian in IVC**

This paper has argued that the ‘pīlu’-based words, which were used to convey the meanings of ivory, elephant and toothbrush tree in IVC, had originated from the Proto-Dravidian tooth-word which can be reconstructed as ‘\*pal’/‘\*pāl’. Thus, considering that people from various parts of IVC had used a Proto-Dravidian tooth-word as a mostly non-borrowable stable part of their vocabulary, we should acknowledge that a significant portion of the IVC population spoke ancestral Dravidian language(s).

## **4.2 Proto-Dravidian Possibly Migrated from IVC to South-India: Genetic Evidences and Linguistic Missing Links**

In present India, there are four major language groups: Indo-Aryan, Dravidian, Austroasiatic, and Trans-Himalayan. Here, North-Indians “primarily speak Indo-European languages and have relatively high proportions of West Eurasian-related ancestry”; South-Indians “primarily speak Dravidian languages and have relatively low proportions of West Eurasian ancestry” (Reich, 2018 p.130); Austroasiatic Munda speakers who are concentrated in the central and eastern parts show East-Asian paternal ancestry (Y haplogroup O2a) in high percentages (Tätte et al., 2019); whereas the “Tibeto-Burman in northeastern India, coincides with a high proportion of immigrant East Asian Y-chromosome O3 types” (Peter and Renfrew, 2011 p.1390). These facts clearly show that language and genetics are strongly correlated in this subcontinent, and reaching the origin of one might reveal the origin of the other.

Now, since South-Indian Dravidian speakers are the ones who inherit the most from the ASI genetic lineage, —certain Dravidian speaking tribal groups (e.g., Palliyar, Yanidi, Ulladan, Gugavellalar, Irula, Pulliyar, Adiyar, and Malayan) can be taken as nearly direct descendants of the ASI (Narasimhan et al., 2019 p.10, Supplementary p.290)—, it is natural to infer that origins of ASI ancestry and ancestral Dravidian languages would likewise coincide. But, ASI itself was a mixed population with around 25% of Iranian-Farmer-related ancestry, and high percentages of ancestry from ancient indigenous South Asians (Reich, 2018 p.149), and was formed by the Post-IVC migration of IVC people and their mingling with the people of South and East India (Narasimhan et al., 2019). Thus, Narasimhan et al. (2019 p.13) could not decide whether Proto-Dravidian was spread by the “peoples of the IVC along with the Indus Periphery Cline ancestry component of the ASI” or “by the half of the ASI’s ancestry that

was not from the Indus Periphery Cline and instead derived from the south and the east (peninsular South Asia)". An important reason behind this dilemma is that while in many cases language changes in already populated regions have strongly correlated with immigrant Y chromosomes, showing patrilingual dispersals of 'father tongues' (e.g. the Indian Austroasiatic languages, Iceland's Scandinavian languages), there are contrasting cases like Eskimo speakers in Greenland, and Tibetic language speaking Balti in Pakistan, where mother tongues have prevailed despite considerable intrusion of immigrant Y chromosomes (Peter and Renfrew, 2011; Driem, 2013) of other speech communities. Therefore, even if genetic data proves a North-to-South migration of the contributors of ASI ancestry, it cannot directly establish whose language had prevailed in present South India.

Thus, if ancestral Dravidian languages had really migrated from IVC to South India, we need to prove mainly two things to establish the same:

**Point-A:** The ASI ancestry was formed mostly by the North-to-South movement(s) of the IVC people, not the South-to-North movement(s) of ancient South Indians.

**Point-B:** Ancestral Dravidian languages were already present in IVC before the southward movement of IVC people.

Since point-A is already substantiated through various genetic studies, but is not yet widely accepted among linguists and Indologists (see opinions of different scholars in Bryant and Patton 2005; Hock and Bashir, 2016), I have briefly re-evaluated the genetic evidence, but have kept that in Supplementary-File-S1's Section-H.

Regarding Point-B, below I shall discuss how a recent genetic study on the Dravidian speaking Brahui people supports it, and how 'pīlu' adds its mite in this context. Also, in Supplementary-File-S1's Section-I, I discuss how the computed dates of Proto-Dravidian and branching of Dravidian languages (Kolipakam et al., 2018; Krishnamurti, 2003) correlate with

the Post-IVC migration timings, and how certain ethnohistorical testimony of Indic religious texts support the migration theory.

## **Brahui and 'Pīlu': Fillers of the Linguistic Missing Links in Dravidian Pre-history**

### **Brahui:**

Brahui people, the only Dravidian-speaking population of present Pakistan, reside in Pakistan's Balochistan province, near Mehrgarh, one of the oldest IVC settlements (Pagani et al., 2017). Despite being separated from the Dravidian-speaking populations of southern India and Sri-Lanka, and overwhelmingly influenced by neighbouring Indo-European languages, Brahui language still carries Dravidian signature in around 300 of its lexical items, which include certain core non-cultural vocabulary items such as personal pronouns, interrogatives, a few kin terms, and verbs denoting basic concepts (Southworth, 2004 p.12-13). This is why some scholars argue that Brahui was one of the indigenous ancient Dravidian languages spoken in IVC (Hock and Bashir, 2016). But some other scholars, especially Elfenbein (1987), contend that Brahui language does not contain Old Iranian loans as expected of a language that stayed in the region since prehistory, but shows mostly influences from Baluchi, Pashto, and Sindhi, which according to them indicates that Brahui people had migrated to Pakistan from South only around 1000 C.E. (Hock and Bashir, 2016; Bryant and Patton, 2005). Certain linguists also debate against the Proto-Dravidian stature of Brahui (Krishnamurti, 2003). However, as explained in Supplementary-File-S1's Section-J, rather than depending on the linguistic arguments that claim that the Brahui phenomenon is the result of a late North-ward migration of some Dravidian speaking tribe, this study gives more weightage to the empirical genetic research results discussed below that prove that the Brahui were a pre-existing population of Indus valley.

Recent genetic findings show that while the Brahui people have “an ancient Dravidian genetic substrate”, as “shared by all the Pakistani populations”, they “do not show a higher genetic affinity with Dravidian Indians than any of their neighbouring Indo-European-speaking Pakistani populations” (Pagani et al., 2017 p.270-271). Now, if the Brahui people had really migrated from South, in c. 1000 CE, they would have shown much higher genetic affinity with the present South Indians than the other Pakistani communities, which they do not. Thus, genetic evidence conclusively affirms that “the ancestors of the Brahui people were a pre-existing Dravidian-speaking group in Pakistan”, who were gradually assimilated by their Indo-European neighbours, “while their language was preserved” (Pagani et al., 2017 p.270-271).

### **Pīlu’s testimony**

As argued throughout this paper, three factors indubitably prove Point-B, that Proto-Dravidian was present in IVC much before the formation of ASI: i) the Proto-Dravidian root of ‘pīlu’; ii) various archaeological, paleo-botanical, ethnohistorical and linguistic evidence that ‘pīlu’ as a zoonym and a phytonym were coined by the ancient people of IVC; iii) the credibility of the Proto-Dravidian tooth-word for tracing the deep linguistic ancestry of its speakers.

Another evidence of the North-to-South migration of Proto-Dravidian languages possibly comes from ‘kalarva’, one of the most popular Tamil names of *Salvadora* spp. As mentioned in Section-3.3.2, the saline ‘kalar’ soil of Sindh is a natural breeding ground of *Salvadora* spp. (Parpola, 2015). Since ‘kalarva’ is arguably connected to the Proto-Dravidian word ‘kalar’ (black soil), this Proto-Dravidian phytonym has most likely travelled from Sindh (a presently Indo-Aryan speaking IVC region in North-western India and Pakistan) to Tamil Nadu (South India).

### 4.3 Etymology of the 'Pīlu' Phytonym Was Undecided till Date

Analysing the etymological discussion by Emeneau (1963) and probing the existing literature, I find that the present study is possibly the first study that explains the etymology of the commonest ancient Indic name of *Salvadora* spp., while adding another word in the list of the Dravidian loan-words present in the earliest Vedic texts. Here it is important to note that another tree *Careya arborea* shares the phytonym 'pīlu' with *Salvadora persica* (Kittel, 1894). However, unlike *Salvadora* spp., the most common name of *Careya arborea* is 'kumbhi', not 'pīlu' (Khare, 2008 p.130). In my opinion, the etymology of the 'pīlu' name of *Careya arborea* is most likely rooted in the fact that it is one of the plants that Asiatic elephants ('pīlu') extensively feed on (Mohapatra et al., 2013), whereas this tree also depends significantly on elephants for effective long-distance seed dispersal (Sekar et al., 2015). The validity of this etymology is buttressed by the fact that another important plant *Dillenia indica*, whose fruits elephants extensively feed on too (Mohapatra et al., 2013; Sekar et al., 2015), is commonly known as 'elephant apple'. Since *Careya arborea's* phytonym is not directly related to tooth, it is not discussed in detail in the present study.

### 4.4 Persian re-popularization of 'pīl' and the word's Indian origin

Despite the illuminating article by Bagchi (1933), Indian philologists have often held an opinion that the Arabic/Persian word 'fil'/'pīl' has been borrowed as elephant-word 'pīlu' in the Indian languages (e.g., Sircar, 1965 p.326). Starting from thirteenth century, the Islamic empires of India (first Sultans then Mughals) have re-popularized the Persian elephant-word 'pīl' by terms like 'pīlkhana', i.e. 'elephant stable' (Ray, 2009). This possibly influenced some Indian philologists to compare the Gupta period official designations 'pīlupati'/'mahāpīlupati' with some other known designations of Iranian influence (e.g., 'Divirapati', 'Gañjavara'), since

for centuries before their time of analysis, Indo-Aryan elephant-words had mostly taken over northern Indians' active vocabulary, making 'pīlu' relatable mainly to the Perso-Arabic terms 'pīl'/'fīl'. In Supplementary-file-S1's Section-K, I have discussed that if one analyses the distribution of 'pīru' and 'pīlu' in old and new Near Eastern languages, and correlates the c. 300 BC Seleucid administrative cuneiform texts that used the 'pīlu' variant, and the Seleucid elephant army that comprised only Indian elephants received from Chandra Gupta Maurya (Stolper, 1994 p.20-22; Kistler, 2007 p.64-65), one may harbour reasonable doubt regarding the Iranian influence in the coinage of designations 'pīlupati'/'mahāpīlupati', which have so successfully survived in eastern Indian Sanskrit inscriptions for at least six centuries (Gupta dynasty to Sena dynasty), without getting replaced by any other elephant-word. Supplementary-file-S1's Section-K reiterates with additional historical and linguistic evidence that irrespective of the origin of 'pīlupati', the word 'pīlu' had surely travelled to Persia and Iran from Indus valley, not otherwise, and its root was of purely Indian origin.

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## **6 Supplementary materials:**

Supplementary file S1 is attached with this article.

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## **Competing Interests:**

The author declares no competing interests.

## **Data availability**

This article has only analysed information collected from published books and articles, which are all listed in the References section above. No other data is generated or used.

## Supplementary Materials:

### Supplementary-File S1

#### S1-Section-A: Ancient Near Eastern Texts that Used ‘pīr’-based elephant/ivory words

An Akkadian wisdom tablet found in Nippur contained the following text: “The donkey of Anshan/. . . The cat of Meluhha/The elephant of the steppe which . . . bites off/the willow as if it were a leek” (Lambert, 1960 p. 272-273). Here, the word for elephant was “pi-i-ir” (pīr). Analyzing its form of language, Lambert (Lambert, 1960) concludes that this wisdom text was composed in the Old-Babylonian period (c. 2000-1600 BC). Another large Assyrian tablet of c. 716 BC contains a popular saying, where an elephant, again mentioned as “pe-e-ru” (pīru), tells a mosquito about its puny insignificance (Lambert, 1960 p. 212-219). Similarly, in the Standard Babylonian Tablet VI of the Babylonian Gilgamesh epic, as well as an older Middle Babylonian version of it, “pīru” was used to signify ‘elephant’ (George, 2003 p. 334-335,621). Besides, in the inscriptions of various Assyrian kings, such as Tiglath-Pileser I (1114–1076 BC), Tiglath-Pileser III/IV (745–727 BC), Sennacherib (704-682 BC), Esarhaddon (680-668 BC) etc., elephants, elephant hide and ivory are mentioned as “pîrê” (plural), “pîrâni” (plural), “mašak pîri”, “šin pîri”, “šinni pîri” etc., where “mašak” and “šinni” mean skin and tooth respectively, and pîri and its dialectal versions mean elephant (Budge and King, 1902 p. 85-86,139; Rogers, 1912 p. 316,344,354).

Still another important document is the famous DSf tablet of King Darius I, which is found in trilingual forms from several copies (approximately thirteen Old Persian, twelve Elamite and twenty-seven Babylonian instances), and also some slightly variant inscriptions

(e.g. DSz and DSaa tablets) (Lecoq, 1997 p. 237). In these inscriptions King Darius boasts of the exquisite materials imported from different parts of his newly conquered empire, to build his palace at Susa, and records ivory as brought from Kush, Nubia, Arachosia, *and* India. As mentioned in the main article, in the Old Persian tablets, the word used for ivory is “pîruš”, whereas in the Elamite versions it is written as “pi-hi-ra-um” (Vallat 1970, p. 159). In one of the Amarna letters (c. 1400 BC) sent by Tušratta (a Mitanni king ruling over the Hurrian people of Mesopotamia) to his son-in-law Nimmureya or Amenhotep-III (an Egyptian king), we find that the parts written in Hurrian language used another dialectal form “ši-(in)-be-e-ru” of the Akkadian ivory-word šinni pîri (Moran 1992, p. 65-68; Speiser 1940-41 p. 46).

## **S1-Section-B: The Identification of ‘Meluḥḥa’ as Greater Indus Valley**

The mention of the multicolored ivory birds of Meluhha (Leemans, 1960 p. 33) in the cuneiform records of the Third Dynasty of Ur, is the only textual reference yet found that directly relates IVC with Mesopotamia’s imported ivory. This makes it important to understand why the references to Meluhha found in the Mesopotamian texts of middle-third to early-second millennium BC must be associated with Indus Valley and its peripheral regions. There has been a lot of debate among scholars regarding the location of Meluhha, some arguing that Meluhha was situated in some African region such as Sudan, Nubia, or Ethiopia (see Gelb, 1970; Leemans, 1968). Gelb (1970) identifies Meluhha as the “northern shore of the Persian Gulf and of the Arabian Sea” denoting “Iran and India, extending east of ancient Elam and Ansan up to and including the Indus Valley”. According to Leemans (1968 p. 226), “the indications of Meluhha’s being the coastal region of the Indus civilization”

accumulate “to such an extent that this localization is almost proved”. He also states that later, “after the 15th century B.C., evidently Ethiopia was indicated by the name of Meluhha in the cuneiform texts”, which is a name-shift, comparable to the meaning shift of the name of “Indians” to refer to the Ethiopians and Himyarites, as found in the Greco-Roman texts of third century A.D. (Leemans, 1968). This name-shift of Meluhha from Indus valley to Ethiopia was possibly caused by the fact that after IVC’s decline, and the cessation of its maritime trade, the commodities that were imported from Meluhha, started coming from African regions (Leemans, 1968). Now, archaeological and textual evidences suggest that “the Meluhhaeans came to Mesopotamia and not the Sumerians to India” (Leemans, 1968). Thus, the location of Meluhha “was soon forgotten after the Meluhhaeans had ceased to come” (Leemans, 1968). As Gelb (1970) explains, both historical and mythical geography abounds with such examples of changes and extensions of topographic meanings. However, in middle-third to early-second millennium B.C., Meluhha must have referred to parts of IVC, not Ethiopia or Nubia (Gelb, 1970; Leemans, 1960; Leemans, 1968; Parpola, 2015), and this identification is mainly based on the following points:

- i) The spatial proximity of Meluhha to Mesopotamia and Persian Gulf, as deduced from the conquest records of the Sargonic king Rîmus, fits Indus valley, not Ethiopia or Nubia
- ii) The repeated mention of Meluhha as the origin of the lapis lazuli stones and the kidney-shaped carnelian stones imported into Mesopotamia, which were signature products of ancient IVC, as established by a plethora of archaeological evidence, strongly supports this identification.

- iii) Meluhha was repeatedly mentioned along with Magan as the source of the Sissoo timber, and *Dalbergia Sissoo* is a tree *native to* mainly India and parts of Arabia.
- iv) Many other archaeological indicators, including the seafaring skills of the Meluhha traders, the archaeological evidences indicating IVC's extensive maritime trade, the existence of Lothal, an important IVC port, where many of the commodities mentioned to be imported from Meluhha were abundant, support this identification.
- v) Some scholars compare the word 'Meluhha' with 'mleccha' due to phonological similarity (Leemans, 1968). The word "mleccha" was often used by the "Indo-Aryan" Vedic people of ancient India, to refer to the other Indic people who spoke a different language, and did not respect the Vedas and the "Aryan" way of life (Leemans, 1968 p.223). Witzel (1999) shows that the Vedic text Śatapatha Brāhmaṇa uses a verb 'mlecha-ti', meaning 'to speak in Barbarian fashion', and explains how the Middle Indo-Aryan variants 'milakkha' and 'milakkhu', found in Pali, facilitate the comparison by having a sound-shape more akin to Meluḥḥa. Parpola (1994, p.170) proposes that the "cognate Pali word milakkha 'barbarian' suggests that Sanskrit mlēccha goes back to \*mlēkṣa" and could be reconstructed as a Proto-Dravidian word "\*Mēl-akam" meaning 'highland'. Parpola(1994, p.170) relates this etymology with the "Sumerian characterization of Meluḥḥa as 'highland'". Witzel (1999) too argues that the word 'mlēccha' has evolved from a 'self-designation' to a 'name of foreigners', and its introduction into Vedic had begun in Meluḥḥa, in Baluchistan-Sindh.

## **S1-Section-C: The Proto-Dravidian Stature of the Tooth-word**

### **“\*Pal”**

Southworth (2004 p.12) argues that for making prehistoric inferences about languages, establishing a “genetic relationship” between them, and reconstructing a Proto-Language, the satisfactory proof “depends on both the quantity and quality of the etymologies”. In this case, the quantity part is satisfied by the sheer count of Dravidian languages that share the cognate forms of “pal”/“pel” based tooth-words. Quality-wise, for Proto-Dravidian words, “the most reliable reconstructions are those with cognates in SD [South-Dravidian] and ND [North-Dravidian] (Kuṛux–Malto–Brahui), the two branches which have had no direct contact with each other in recent centuries” (Southworth, 2004 p. 236). This ensures that the cognates shared by the compared Dravidian languages are not results of recent diffusion or borrowing, but ancient inheritance. Now, revealingly, in both of the North-Dravidian languages Malto and Kuṛux, the words used for tooth is “pāl” and “pall” (Mahapatra, 1976 p.26), just as in their southern counterparts. Moreover, as would be discussed elaborately in Section-3.4, tooth is part of the core vocabulary of a speech community, and is thus resistant to borrowing or changing for thousands of years, which makes it a perfect semantic unit for tracing back proto-words. Therefore, “\*pal” can be confidently reconstructed as the Proto-Dravidian tooth-word, as already done in the Dravidian Etymological Database (Starostin, 2006-2013).

## **S1-Section-D: 'Paloura'/'Dantakūra'/'Dantapura': Territorial disputes between Dravidian and Indo-Aryan languages and the 'City of Ivory'**

Indologists Sylvain Levi et al. (1929) show how the ancient city 'Paloura' mentioned in Ptolemy's 'Geography', could be equated with Dantapura (*Mahābhārata's* Dantakūra country), the capital of ancient Kaṅga — comprising parts of modern Odisha and Andhra Pradesh — literally meaning 'city of tooth' or 'city of ivory' ('pura': city, 'danta': tooth/ivory). He establishes Paloura's etymology as the conjugation of the Dravidian tooth-word 'pal' and a common Dravidian toponymic suffix 'ūr', which means 'city' or 'village' (Kannada 'ūru', Tamil 'ūra'). Analyzing the 'kūra' part in Dantakūra that alternates with 'pura', Levi shows how some ancient toponyms had a 'kūra' suffix, which could be related to the Dravidian word 'kuḍi' meaning 'town' (Kittel, 1894 p.434). Another old Kannada word 'kuṛike' meant village (Kittel, 1894 p.447). Interestingly, several Dravidian place-names in modern Karnataka (e.g., Betkur, Halkur, Tumkur, Nandikūru, Barkuru) and Andhra Pradesh (e.g., Agamothkur, Bhuthkur, Chillakur, Birkoor) end with 'kūr'/'kur'/'kūru'. Levi (1929, p.175) aptly states that the "alternance Paloura-Dantapura [...] shows that in the time of Ptolemy the Dravidian language was disputing the territory of Kalinga with the Aryan dialect". However, I shall argue that this dispute started much earlier, as in *Mahābhārata's* Dantakūra, the Dravidian 'pal' was replaced by Sanskrit 'danta', but the Dravidian toponymic suffix 'kūra' was yet to be substituted. The use of a Dravidian toponymic suffix in the Epic Period in the region of Odisha, further proves the prehistoric spread of Dravidian languages in places beyond southern India. As Levi (1929, p.164) identifies, even though the Buddhist scriptures attempt to provide a "pretended history" for the etymology of Dantapura, relating it to Buddha's tooth relic preserved in Kaṅga, Dantapura was associated in the Jain literature with various ivory-related legends. Also, according to Kautilya's *Arthasāstra*, ancient Kaṅga was famous for elephant breeding — "Elephants bred in countries, such as Kaṅga, Aṅga, Karūśa, and the East are the best" (Shamasastri, 1929 p.49). So, this capital of Kaṅga must have been named after ivory by its indigenous inhabitants. Paloura being the popular name was thus picked up by Ptolemy, instead of the Sanskritized name 'Dantapura'.

## **S1-Section-E: Evidence of the Elephant-savviness of Prehistoric North-Eastern India**

As recorded in *Mahābhārata*, the kings who brought gifts of ivory-artifacts to the monarch Yudhiṣṭhira at Indraprastha, mostly hailed from eastern India. They included king Bhagadatta of Prāgjyotiṣa and Vanga. Bhagadatta brought “a number of swords with handles made of the purest ivory” (Ganguli, 1883-96 Section-L); fought in the Kurukṣetra battle sitting astride his elephant, leading an army of ten-thousand elephants; and earned praises as “the foremost of all wielders of the elephant-hook” (Ganguli, 1883-96 Section-23)— all indicating that ancient Prāgjyotiṣa and Vanga, mostly corresponding to modern Assam, West Bengal, and Bangladesh (Chakrabarti and Chakrabarti, 2013), were teeming with elephants, and their people had first-hand knowledge of elephant-handling since antiquity.

As mentioned before, the abundance of elephants in eastern India gets another dependable corroboration from Kautilya's *Arthasāstra*: “Elephants bred in countries, such as Kaḷiṅga, Aṅga, Karūśa, and the East are the best” (Shamasastri, 1929 p.49). Interestingly, the noun ‘Kāḷiṅga’, that means ‘of a country, its people and prince; belonging to Kalinga’ (Kalinga consisted of a large part of modern Odisha and northern part of Andhra Pradesh), also means ‘an elephant’ (Kittel, 1894 p.414), possibly due to the fact that some of the finest breeds of ancient Indian elephants were from Kaḷiṅga.

Interestingly, the ancient elephant-expert Pālakāpya, the mythical author of the ancient elephant-related treatises called *Gajaśāstram* and *Hastyāyurveda* (Geetha 2013), also hailed from a country watered by the sea-bound Lauhitya (Brahmaputra) river, i.e., current Bangladesh (Shastri, 1919 p.312). Moreover, Pālakāpya had allegedly transferred his knowledge of treating elephants to king Romapāda or Lomapāda of Aṅga (Shastri, 1919).

Aṅga was an ancient kingdom of Eastern India, which according to Kautilya, was famous for breeding elephants (Shamasastri, 1929 p.49).

It is important to note that the 'Pāla' part of the name of sage Pālakāpya, has been used as a crucial evidence of an ancient tooth-based Dravidian elephant-word by Bagchi (1933). However, not fully persuaded by Bagchi's proposed etymology, I desist from employing it to buttress my argumentation. For more details, see Supplementary-file-S1's Section-L.

## **S1-Section-F: Why 'pīlu' succeeded as a phytonym but failed as a zoonym to secure its place in Vedic and Epic Sanskrit, and to survive in later era**

Since this paper claims that 'pīlu' was one of the most popular elephant-words of prehistoric and historic North-Western India, prevalent at least till 600 A.D., an important question arises regarding the complete absence of 'pīlu' as an elephant appellative in both Vedic and Epic Sanskrit texts. Indeed, as a phytonym, 'pīlu' has not only secured its place in the earliest Vedic (Atharvaveda) and epic texts (Mahābhārata), but has also managed to remain the most popular common name for the toothbrush tree (*Salvadora* Spp.) across the Northern half of the Indian subcontinent. But as zoonym it has not been so successful in its survival. There are various possible explanations for this:

- i) As Masica (1979, p.124) has observed, "the Aryans, in addition to retaining most of their names for familiar animals, tended to bestow their own names on unfamiliar domestic animals of the new country as well (the water buffalo, the camel, the ass, and the elephant—though the last seems to be a partial

calque), rather than borrow them—quite different from their attitude toward plants”. In my opinion, naming an animal based on its physical features or utilitarian aspects is a much easier and tempting job than naming various plants of a new country. For, knowing the herbal qualities and other subtle features of a plant would need a longer lived experience (‘erlebnis’/ ‘erfahrung’). Thus, had Indo-Aryan speakers really come to the subcontinent from outside, they would have been awestruck in no time by a massive animal with outlandish physical features like tusks and a trunk. So, they could easily name that animal using their own language, calling it ‘hastin’ (having a hand i.e. a trunk) or ‘dantin’ (having tusks). But, mastering the special utilities of different plants of a forest, and distinguishing one plant from another based on their herbal qualities and subtle visual differences, are not as easy or arresting, and demand centuries of observation and experiments. As proposed by Jules Bloch and Paul Thieme (in Bryant, 2001 Kindle-Location 1763-1766), among the ‘peculiar’ words found in early Vedic texts, which must have come from Prakrits or other “low” culture vernaculars, “plants and agricultural terms” particularly abound, “since such words would have been the daily subject matter of the tribes and “lower” social groups who tilled the soil” and “gathered the flora and herbs”. Possibly these are the reasons that phytonyms often survive much longer than zoonyms. For example, most of the phytonyms collated and authenticated in Vedic texts, such as ‘aśvattha’ and ‘pippala’ (*Ficus religiosa*), ‘palāśa’ (*Butea frondosa*), ‘bilva’ (*Aigle marmelos*), ‘kharjūra’ (*Phoenix sylvestris*), ‘tila’ (*Sesamum*), and ‘śalmali’ (*Salmalia malabarica*), have survived in India till date with minimal phonological changes. On the contrary,

as Masica observes, “the striking thing is the replacement in the course of the later evolution of Indo-Aryan of many of the older Aryan terms (e.g., of aja- 'goat', avi- 'sheep', words for 'colt', 'calf', 'kid', 'lamb', and, most important of all, asva- 'horse') with new terms either internally derived or borrowed, typically with an originally diminutive, pejorative, or otherwise specialized meaning”.

- ii) The other reason that the Vedic texts have often avoided indigenous non-Indo-Aryan vernacular words is possibly that “these are sacerdotal hymns describing ritualistic techniques that were preserved by a culturally distinct group of specialists who, like any elite, took pains to isolate their speech from common vulgarisms” (Bryan, 2001 Kindle-Locations 1624-1626). As mentioned in the main article, the “authoritative account of the c. seventh century Mīmāṃsā philosopher Kumāṛila Bhaṭṭa informs us that ‘pīlu’ meant a tree in the ‘Aryan’ speech, but elephant in the ‘Non-Aryan’ ‘mleccha’ languages (Bandyapadhyay, 1933-1946 p.1336; Pollock, 2011 p.43)”. Thus, sociolinguistic puritanism of the Aryan elites must be the reason that the popular elephant-word ‘pīlu’ could find no place in their religious texts. Moreover, in the Vedic texts, elephants were anyway not given importance at all, and were mentioned only a few times (Macdonell and Keith, 1912a, 1912b).
- iii) The present substitution of the Dravidian word ‘pīlu’ by the Indo-Aryan term ‘hasti’/‘hāthi’ in North-India, and its reduced scope of usage in a phonologically closely related word ‘piḍ-i’ that signify female elephant and female hog in various Dravidian languages of present South India, is a trend not unprecedented in the history of unexplained replacement of Indic zoonyms —

due to the interchangeability of cerebral 'l' and 'd' in Dravidian languages and the Proto-Dravidian feminine marker 'i', 'piḍ-i' is directly related to the root-word 'pil' (Caldwell, 1875 p.33,59; Krishnamurti, 2003 p.213)—. A similar and greater apparent linguistic anomaly “is the replacement of aśva- 'horse', the animal introduced by the Aryans and deeply associated with their communal rituals, by the non-Aryan term ghoṭaka” (Masica, 1979 p.125). Similarly, “in English, for most purposes, the older Germanic 'dove' has been replaced by the French 'pigeon'” (Masica, 1979 p.61). Thus, the other presently popular elephant-words cannot deny 'pīlu' its ancient popular stature. As discussed in the main article, the Tamil word 'piḷiru' means “to roar, as an elephant”. In Sanskrit 'pīlu' also means “palm tree's stem” possibly because it resembles an elephant's leg (Bandyopadhyay, 1933-1946 p.1334-1337). These words show the prolonged usage of the 'pīlu'-based elephant-words in the Indian subcontinent.

## **S1-Section-G: Piḷaiyar possibly originated from the “pil”-based**

### **Dravidian words for tusk and tusker:**

The Indian elephant-faced-god Gaṇeśa is called Piḷāri in Telugu (Brown, 1903 p. 764) and “Piḷaiyar” in Tamil (Narain, 1991 p. 25). As suggested by Bagchi (1933) and Narain (1991), and as emphatically confirmed by Dhavalikar (1990), Piḷaiyar “is obviously derived from the Dravidian words pallu or pella” ('pil', in my opinion), which signify “tooth, that is, the tusk of the elephant ...”. These scholars acknowledge that in many Dravidian languages including Tamil, “piḷa” means child, and accordingly, Piḷaiyar should mean “noble child”. But Narain

aply points out that, in Sinhalese, an Indo-European language of Sinhal (modern Sri Lanka), which is geographically and ethnoculturally very close to Tamil Nadu, Gaṇeśa is called “Pulleyar”. Here, unlike Tamil, “Pulleyar” does not mean “the son”, but as applied to Gaṇeśa, “the elephant lord of the forest” (Narain, 1991). Moreover, the Sanskrit names of Gaṇeśa are “Hastīmukha” (elephant-faced), “Dantin” (having tusk), “Ekadanta” (having a single tusk), “Vakratunda” (having a curved trunk) etc., each of which refers to the god’s elephant-like physical characteristics (Narain, 1991). Thus, “Piḷḷaiyar” and Piḷḷāri too were likely derived from the Dravidian “pil”-based elephant/tusk-words. Their phonological similarity with the Dravidian child-word “piḷḷa” has possibly led to the current meaning of “noble child”, an example of the shifting grounds of etymology. However, this is not the central plank of my etymological propositions regarding “pīlu”.

## **S1-Section-H: The ASI ancestry was formed mostly by the North-To-South movement(s) of the IVC people: the genetic evidence**

One of the main differentiating factors between the ANI and the ASI, the two primary source populations of the Modern Indian Cline that formed in the second millennium BC, is that unlike ASI, ANI had high percentages of Steppe ancestry. But, intriguingly, both ANI and ASI had Iranian-farmer-related ancestry, around 50% and 25% respectively (Reich, 2018). I would emphatically argue that the North-to-South migration of the genetic contributors of ASI in early second millennium is the only explanation regarding the Iranian-farmer-related ancestry in the present Dravidian speaking groups, who had been endogamous for thousands of years. For example, “genetic analysis suggests that the Vysya people from Andhra Pradesh have experienced negligible gene flow from neighboring groups in India for an estimated 3,000 years”, and yet they show high percentage of ancient ANI admixture i.e. 37.9 +/-1.8 (Moorjani et al., 2013). Now, the “admixture between Iranian farmer-related and AHG-

related [Andamanese-hunter-gatherers] ancestry” was the most plausible genetic characteristics of the IVC people, and the date of this admixture was approximately “~5400 to 3700 BCE” indicating that “AHG and Iranian farmer–related groups were in contact well before the time of the mature IVC at ~2600 to 1900 BCE” (Narasimhan et al., 2019). Moreover, the formation of ASI is also strongly correlated with IVC’s decline after c. 1900 BC, as indicated by the average dating of the ANI admixtures in present day Dravidians (Moorjani et al., 2013), and the genomic features of the Austroasiatic speaking group Juang (Narasimhan et al., 2019). Thus, the Vysya’s ancestors must have obtained their share of Iranian-farmer-related ancestry at IVC regions, before they had moved to South India and became strictly endogamous. Alternatively, ancient Iranian farmers would have had to travel in huge numbers to the eastern coast of South India, to copulate with the Vysyas’ ancestors so as to leave such strong genetic footprint, which is an absurd scenario, not supportable by any archaeological, ethnolinguistic, or genetic evidence (after ~6000 BCE the ancient individuals from Iran started having substantial Anatolian farmer–related ancestry, in contrast to South Asians who have very little Anatolian farmer–related ancestry, negating any possibility of such later large-scale Iranian migration to South Asia (Narasimhan et al., 2019)). Another intriguing evidence of the North-to-South migration of IVC people is that the ANI admixtures are “typically more recent in Indo-Europeans (average of 72 generations) compared to Dravidians (108 generations)” (Moorjani et al., 2013). This apparently counter-intuitive phenomenon is explained by the fact that the ancestors of the Dravidian people had migrated from North India, where earlier waves of such mixture with Iranian farmers had happened since before mature IVC period (Reich, 2018; Narasimhan et al., 2019). But, after their gradual migration to Southern regions, the people that stayed back in northern India, were subjected to several subsequent waves of mixture, as those Northerners “and people with much more West Eurasian ancestry, came into contact repeatedly along a boundary zone” (Reich, 2018). Intriguingly, the archaeobotanical evidence given by Fuller (2007), also shows that the “non-native taxa adopted into cultivation” in a few sites of South India included the Harappan elements such as wheat and barley by ca. 1900 BC (though Fuller has not drawn the same conclusion from this data). This precisely

coincides with the time period of IVC's decline, and the proposed south and east-ward migrations of IVC peoples.

## **S1-Section-I Temporal Coincidence Between Dravidian Branching and Formation of ASI: Some Linguistic and Ethnohistorical Evidence**

A Bayesian phylogenetic study of the Dravidian language family (Kolipakam et al., 2018), that uses dates of earliest inscriptions found for various Dravidian languages as lower-bounds for calibration, and known relation between the language sub-groups for monophyletic constraints, puts the median-root-age and first diversification of the Dravidian languages at around 2500-2000 BC, which coincides with Southworth's (2004) evaluations based on linguistic reconstructions. Krishnamurti too estimates the "tentative date of Proto-Dravidian around the early part of the third millennium". He cites a reference from *Aitareyabrāhmaṇa* (7:3:18; c. seventh century BCE) where "the Aryan sage Viswāmitra cursed his fifty older, disobedient sons to live as hunter-gatherers with the names Andhra, Śabara, Puṇḍra, Pulinda and Mūtiba", and shows (Krishnamurti, 2003, p.501) how 'Andhra' corresponds to a Dravidian speaking tribe, whose language 'Āndhra' (Pre-Telugu) was attested along with Dramila (Pre-Tamil) as 'vibhāṣa', opposed to Sanskrit and Prakrits in Bharata's *Nāṭyaśāstra* (4th century BC). At present Telugu is the official language of the Indian state Andhra Pradesh. According to Krishnamurti (2003, p.501), certain Dravidian tribes, who did not assimilate with the 'Aryan' society, were "slowly pushed toward the periphery of the Indo-Gangetic plain and many had moved toward east and south even by the end of the second millennium". Krishnamurti estimates the split of South-Dravidian-I (Pre-Tamil dominant) and South-Dravidian-II (Pre-Telugu dominant) at around 11th-12th century BC., which closely match Kolipakam et al.'s (2018, Fig. 5) estimates. These dates, along with these ethno-historical references, fit very well with the Post-IVC population migrations, the continued formation of ASI over centuries (Narasimhan et al., 2019), and the phased formation of the present-day Dravidian languages in South India.

## **S1-Section-J: The Brahui Migration Problem, Preferring Genetics Over Linguistics**

In the case of Brahui language, there is a broad scholarly consensus regarding its classification as a Dravidian language. So, here the debate focuses on how a Dravidian language exists surrounded by Indo-Aryan speaking populations on all sides: whether it remained there since prehistory, or was brought into the region through recent migrations in historical times. Thus, since here my concern is with migration of people, I repose more trust in the genetic evidence, rather than loan-word analyses of the present version of Brahui, which being gathered from both native and non-native bilingual or trilingual Brahui speakers, is “essentially a calque of Baluchi clothed for the most part in Brahui forms” (Hock and Bashir, 2016). Brahui is an endangered non-literary language, where we do not have enough documents to see how the language has changed over thousands of years. While the loan-word analyses are very important, the alleged desiderata of Old Iranian words cannot possibly override the hard evidence of genetics that the Brahui speakers have no higher genetic connection with the South Indian Dravidian speakers than other Indo-Aryan speaking populations of Pakistan, and thus cannot be late immigrants (Pagani et al., 2017). Even Elfenbein (1987), the most celebrated proponent of the theory of recent migration of Brahui speakers, has stressed in his iconic 1987 paper that unfortunately “the complete dearth of any real historical or archeological evidence precludes any attempt to suggest a definite answer to the [Brahui] problem, working [sic] as we must mainly from linguistic data”. He has also given a disclaimer that his arguments based on linguistic loan-word analyses are intended to “sketch outlines of a better characterization” of the Brahui problem, “without attempting anything definitive by way of a solution”. So, even after being equipped with hard genetic

evidence presently, regarding prehistorical presence of Brahui-speakers in IVC region, we should possibly not give it short shrift, favouring linguistic speculations.

## **S1- Section-K: The elephant-word ‘pīlu’ travelled and re-travelled from India to Near East at different eras of prehistory and history**

Some crucial linguistic and historical evidence that ‘pīru’/‘pīlu’ was a borrowed word that entered Iranian and Akkadian lexicon from India, possibly comes from analyzing the distribution of ‘pīru’ and ‘pīlu’ in ancient and later Near Eastern languages, and also from correlating the usage of ‘pīlu’ in Seleucid cuneiform texts with the fact that Seleucus’s famous army of elephants comprised Indian elephants received from Chandragupta Maurya, and their Indian trainers (Stolper, 1994 p.20-22; Kistler, 2007 p.64-65). As mentioned before, the Old Persian (O.P) and Elamite versions of king Darius I’s sixth century inscriptions (Lecoq, 1997 p. 237; Vallat 1970, p. 159) have attested ivory as ‘pīruš’ and ‘pi-hi-ra-um’ respectively, whereas Akkadian texts have called elephant as ‘pīri’ and ‘pīru’ since Old Babylonian period (Lambert, 1960; Budge and King, 1902 p. 85-86,139; Rogers, 1912 p. 316,344,354). In O.P., Babylon was also called ‘Bābiru’, and the phoneme ‘l’ was restricted to only a few foreign personal names and toponyms (Testen, 1997 p.582). Moreover, “the character <l> is the only element in the O.P. script which is clearly modelled on a Mesopotamian cuneiform symbol” (Testen, 1997 p.582). Since this absence or marginalisation of phoneme ‘l’ is the characteristics of many Iranian languages (Windfuhr, 2009; Klein et al., 2017), if ‘pīru’ was an original Iranian word, why would it at all get replaced by ‘pīlu’/‘pīl’ in Middle Persian and New Persian languages (Durkin-Meisterernst D, 2004)? Moreover, curiously, the Seleucid cuneiform texts of third century BC did not use the ‘r’-based Akkadian form ‘pīru’, but the ‘l’-based form ‘pīlu’ to refer to the elephant iconographies in the reverse of the Seleucid coins,

whereas they used a proper Akkadian word for the lions (Stolper, 1994 p.20-22). (In Akkadian language 'pīlu' originally meant limestone, and as recorded in the Assyrian dictionary (Roth, 2005 p.410-420), the Seleucid texts are possibly one of the earliest Akkadian texts to use 'pīlu' for elephant). A logical explanation of this is that since the Seleucid elephant army included only Indian elephants and their trainers, and since the Seleucid empire included Afghanistan and came in direct contact of Indians and their elephants in the Indus valley region in c. 305 BC (Kistler, 2007 p.82), the Seleucid people most likely picked up the Indian version of the elephant-word 'pīlu' prevalent in the fourth century BC Indus valley, and used the same in their administrative texts. The possibility that the Greek people picked up the 'pīlu' form from the Iranians of c. 300 BC is very thin, as even at the time of Darius III (c. 330 BCE), Iranians were apparently neither accustomed to the sight of elephants (considered as demonic Ahriman's creatures), nor were comfortable in handling them or using them for war (Kistler, 2007 p.25). Darius III, the last king of the Achaemenid Empire, while getting defeated by Alexander, managed to get only fifteen Indian elephants brought to join his huge army of forty thousand Persian cavalry and four-thousand foot soldiers at Gaugamela, whereas the trainers of those elephants were also Indians (Kistler, 2007 p.25-30). Thus, till 330 BCE, common Iranians were not sufficiently exposed to elephants, and their limited interaction with pachyderms was mostly mediated by Indian elephant-trainers. On the other hand, Alexander had a tough fight with an Indian king Porus, who allegedly used two hundred war elephants, many of which were captured by Alexander (surely along with their Indian trainers) after his victory in the battle of Hydaspes (Kistler, 2007 p.31-36). Thus, the Greek army, from the very beginning, has interacted with Indian elephant trainers, not Iranians.

The Iranian languages of later period slowly adapted the original 'l'-based form of this elephant word, possibly from their increased direct contact with the elephant-savvy people

of northwestern Indian subcontinent. For example, in the eastern Iranian language Sogdian, where 'l' is a marginal phoneme occurring in only a few foreign words (Yoshida in Windfuhr, 2009 p.286-290), the elephant-word pil was borrowed as 'pīδ', evidently with substitution of the foreign 'l' by 'δ'.

The presence of the toponym Pīlusāra in Afganistan's Kapisa, which was related to a legend of a mountain spirit that took the form of an elephant, i.e., pīlu, (Beal, 1884 p.67), strongly corroborates the above hypotheses. The legend says that this elephant-spirit Pīlusāra had shown considerable loyalty and hospitality to Lord Buddha and his followers (Beal, 1884 p.67), evidently symbolizing mutual acceptance of Kapisa's ancient religious beliefs and the new Buddhist beliefs introduced to that place. Thus, the name Pīlusāra most likely had existed in Afghanistan, long before the Buddhist period. Since the traditional Iranian belief system, as manifest in ancient Zoroastrian texts, has considered elephant as an evil and foreign animal (Daryaee and Malekzadeh, 2017), even till 330 BC (Kistler, 2007 p.25-30), it is simply not acceptable that the name Pīlusāra, for an elephant-spirit, was coined by any Iranian influence. Moreover, Pīlusāra, being the name of just a small mountain, earlier associated with a local elephant-spirit, and later associated with a Buddhist stūpa made by Mauryan king Ashoka (Beal, 1884 p.67), could not imaginably tempt a foreign imperial power (here Kushanas) to replace its traditional name with an Iranian word. Such change of names only happens for politically or commercially significant places.

Now, baffled by the popularity of the official designations 'mahāpīlupati'/'pīlupati', containing the non-Indo-Aryan elephant-word 'pīlu', Indologist Sircar (1965 p.358) hazarded the explanation that this word was popularized by the Kuṣaṇas and later adopted by the Guptas. But 'mahāpīlupati'/'pīlupati' is not, first, yet found in any Kushana inscription, leaving no pressing reason to believe that this term 'pīlu' was coined by Kushanas. Rather, it could be

influenced by a designation already popular in India, among the indigenous elephant-trainer tribes, that got picked by the Gupta dynasty. Moreover, as Sircar (1965, p.353) himself explains, even if a designation is first found in Kushana inscriptions, it does not necessarily mean that it was coined by the Kushanas. It might also be an indigenous, extant designation, adapted by Kushanas. Sircar (1965, p.353) also points out that the designation 'Daṇḍanāyaka', found in Kushana inscriptions, was possibly an indigenous one, as it was popular also in southern India unlike the other Iranian designations such as 'Divirapati' or 'Gañjavara', and was also found in a first century A.D. Gunji inscription of Madhyapradesh, far from the Kushana influence. Similarly, the designations 'Mahākṣatrapa'/'Kṣatrapa' found in Kushana inscriptions were not coined by Kushanas, but were reused by them from the already existing designations popular in North-Western Indian subcontinent, first introduced by the Achaemenids of sixth century BCE, derived from the Old Persian term 'Kshthrapāvan' (Sircar, 1965 p.333). Hence, the 'pīlu' part of 'pīlupati' could have been picked by the Kushanas from the elephant-savvy local people present in the northwestern part of the Indian subcontinent, just the way it might have been picked by the Seleucid people in the end of fourth century BCE. The successful survival of 'pīlupati' for at least six centuries, in the Sanskrit inscriptions of the Gupta era to the Sena era in Eastern India should possibly indicate that 'pīlu' was perceived by the monarchs as an indigenous word already included in Sanskrit, who thus never felt much impetus for replacing it with other Indo-Aryan elephant-words. Moreover, 'pīlu' as an Iranian word does not explain the presence of the popular Tamil word 'pīḷu', which means "to roar, as an elephant" (Madras Tamil Lexicon, 1924-36), southern India being far away from the imperial influence of the Kushanas.

Using various zoo-archaeological and historical evidence, this paper has already established that elephants were not indigenous to Iran, Bactria, Mesopotamia and Persian

Gulf in mid-third to early-second millennium BC, and that at this period IVC was the main source for near-East's ivory. The anti-elephant emotion found in ancient Zoroastrian texts, where the cultural hero Yima/Jam is praised for not accepting elephants from the demons in exchange of their local cattle (Daryae and Malekzadeh, 2017), supports the theory that elephants were considered foreign and evil in ancient Iran. Moreover, the archaeological evidence discussed in the main article suggests that the ivory of IVC has traveled to Mesopotamia mostly through IVC's maritime trade with Persian Gulf, not the land route through Iran. Thus, it is most unlikely, that the common 'pīru'-based appellatives for elephants, which were used in Akkadian, Hurrian, Old Persian (for ivory), and Elamite languages, would be coined in some Iranian language. This paper has also shown the analyzability of 'pīlu' as both phytonym and zoonym, using Dravidian root-words related to the meaning of 'tooth' and 'splitting/crushing/piercing'. These arguments are also supported by various genetic and ethnohistorical evidence regarding the existence of Proto-Dravidian speakers in the IVC regions, who contributed to the formation of the Ancestral-South-Indian population of India. Thus, I humbly believe that there should not be any doubt regarding the Indian root of 'pīlu'.

## **S1- Section-L: Sage Pālakāpya and the Alleged Elephant-word "Pāla"**

Some linguists have proposed an interesting theory regarding an elephant-related etymology of the name of sage Pālakāpya, a mythical contemporary of king Daśaratha of the Indian epic Rāmāyaṇa. Sage Pālakāpya was the author of the acclaimed ancient treatises related to elephants, their diseases and treatment, called *Gajaśāstram* and *Hastyāyurveda* (also known as *Pālakāpya*) (Geetha, 2013; Shastri, 1919 p. 312). Though these treatises have many mythological elements, they show a strong connection with practical knowledge of

elephants. As Shastri, a Sanskrit scholar, explains, sage Pālakāpya himself supposedly traces his name's etymology to king Romapāda/Lomapāda of Aṅga: "My name is Pālakāpya. I take care of elephants and nourish and cherish them, hence my name is Pāla and the suffix Kāpya denotes the gotra or family in which I was born" (Geetha, 2013). Now, analyzing Shastri's article, Bagchi (1933) had concluded that "pāla is evidently the word for elephant ...". Here Bagchi associates "pāla" with the tooth/tusk-word "pal", and claims that the "attempt in the legend to connect the word with the Sanskrit root Pāla is a late one". Now, Shastri has argued that since the sage's gotra (patrilineal lineage) "Kāpya" is not included in *Gotra-pravara-nibandha-kadambakam*, a comprehensive list of 4500 'Aryan' gotras, it could have been a non-Aryan lineage popular in the sage's birthplace, some region of present Bengal. Shastri further observes that a "close study of Pālakāpya will warrant the supposition that it is a translation from some other language and that it does not always follow the rules of Sanskrit Grammar". Therefore, even if the existing translated Sanskrit texts are dated to 5th-6th century BC (Shastri, 1919), the original non-Sanskrit texts could have been much older. Now, had the word "pāla" in Pālakāpya really signified "elephant", then the aforementioned evidence would have indicated that ancient Indians, who dealt firsthand with elephants, had composed elephant related texts in their own language. This could have possibly been some Dravidian language, as according to Bagchi, Pālakāpya, the alternative name of *Hastyāyurveda*, employed a "pal"-based elephant-word. This would also have nicely supported the popularity of the "pal"-based elephant-words in India since antiquity.

However, in my humble opinion, this etymology might be flawed in this particular context. As per a verse in Matangaleela (12. 30. 157), the etymology of Pālakāpya's name is given as:

"Pālanat gajayuthasya kāpyagotrodbhavo yatha

Pālakāpya itiṣrīmān nāmadheyam chakāra saḥ” (Geetha, 2013)

In *Hastyāyurveda (Ānandāśrama Sanskrit Series, 1894)* too, similar verses (155-156) give

Pālakāpya’s etymology:

“Pālayiṣyati dharmātmā rogārtānvriśaduḥkṣitan

Pālanadgajayuthasya kāpyo gotreṇa eva cha

Evaṃ divyavachaḥ śrutva śrīmatastasya dhīmataḥ

Pālakāpya itiṣrīmānnāmadheyam chakāra saḥ”

Now, in both of these Sanskrit treatises, the “Pāla” part of Pālakāpya’s name is semantically associated with the lexical root “pāla”, which means “protection” or “protector” in many Indo-Aryan languages (Turner, 1962-1966). For example, this word is used as ‘protector’ in Rāmāyaṇa, and as ‘herdsman’ in Manu, Mānava-Dharmaśāstra (Turner, 1962-1966). In Prakrit, Kumaunī, Kashmiri, Nepali, Panjabi etc. “pāla”/“pāl”/“pālsi”/“pālo” mean “keeper”, “shepherd”, “guard”, “herdsman” etc. In Kalasha language paló(i) means cattle-shed (Turner, 1962-1966). In Dardic languages such as Bashkarīk and Shina, *pālo* means “young of animal” (Turner, 1962-1966). In Sanskrit and other Indo-Aryan languages “pālan” means “protecting”, “nourishing” (Turner, 1962-1966). In Assamese, Bengali, Gujarātī and Oṛiyā “pāl” means “flock” or “herd”. Now, since Pālakāpya hailed from ancient Bengal, and was the protector of the elephant herd, his name should have the “protector”/“shepherd” related connotation, not a meaning that was a synonym of elephant. As rightly translated by Shastri (1919), the etymology of the name was “My name is Pālakāpya. I take care of elephants and nourish and cherish them, hence my name is Pāla”. Such “pāla”-based names are very common in North India (e.g. gōpāl means cattle-keeper, which is a very popular name of Lord Kṛṣṇa). However, since Pālakāpya was from Bengal region, I should also mention that in North-Dravidian Malto language, spoken near Bengal’s Rajmahal hills, the Dravidian tooth-word was “pāl”, not “pal”

(Mahapatra, 1976 p. 26; Caldwell, 1875 p. 518). But, whether this “pāl” also meant elephant, cannot be established with present data, especially not in the context of sage Pālakāpya. Thus, I do not see a secure linguistic basis to support Bagchi’s elephant-based etymology, which, if valid, would have in this case greatly supported my hypotheses.