

# Indo-Aryan migration

**Indo-Aryan migration** models<sup>[note 1]</sup> discuss scenarios around the theory of an origin from outside South Asia of Indo-Aryan peoples, an ascribed ethnolinguistic group that spoke Indo-Aryan languages, the predominant languages of North India. Proponents of Indo-Aryan origin outside of South Asia generally consider migrations into the region and Anatolia (ancient Mitanni) from Central Asia to have started around 1500 BCE, as a slow diffusion during the Late Harappan period, which led to a language shift in northern South Asia. The Iranian languages were brought into Iran by the Iranians, who were closely related to the Indo-Aryans.

The Proto-Indo-Iranians from which the Indo-Aryans and the Iranians developed, formed as a distinguishable culture at the Central Asian steppes north of the Caspian Sea as the Sintashta culture (2100–1800 BCE),<sup>[2][3][4]</sup> present-day Russia and Kazakhstan, and developed further as the Andronovo culture (1800–1400 BCE),<sup>[5]</sup> around the Aral Sea. The proto-Indo-Iranians then migrated southwards to the Bactria-Margiana Culture, from which they borrowed their distinctive religious beliefs and practices. The Indo-Aryans split off around 1800–1600 BCE from the Iranians,<sup>[6]</sup> whereafter the Indo-Aryans migrated into Anatolia and the northern part of the South Asia (modern Afghanistan, Bangladesh, India, Pakistan and Nepal), while the Iranians moved into Iran, both bringing with them the Indo-Aryan languages

Migration by an Indo-European people was first hypothesized in the late 18th century, following the discovery of the Indo-European language family, when similarities between western and Indian languages had been noted. Given these similarities, a single source or origin was proposed, which was difused by migrations from some original homeland.

This linguistic argument is supported by archeological, anthropological, genetical, literary and ecological research. Genetic research reveals that those migrations form part of a complex genetic puzzle on the origin and spread of the various components of the Indian population. Literary research reveals similarities between various, geographically distinct, Indo-Aryan historical cultures. Ecological studies reveal that in the second millennium BCE widespread aridization lead to water shortages and ecological changes in both the Eurasian steppes and south Asia,<sup>[web 1]</sup> causing the collapse of sedentary urban cultures in south central Asia, Afghanistan, Iran, and India, and triggering lage-scale migrations, resulting in the merger of migrating peoples with the post-urban cultures.<sup>[web 1]</sup>

The Indo-Aryan migrations started in approximately 1800 BCE, after the invention of the war chariot, and also brought Indo-Aryan languages into the Levant and possibly Inner Asia. It was part of the diffusion of Indo-European languages from the proto-Indo-European homeland at the Pontic–Caspian steppe, a large area of grasslands in far Eastern Europe, which started in the 5th to 4th millennia BCE, and the Indo-European migrations out of the Eurasian Steppes which started approximately in 2000 BCE.<sup>[7][1]</sup>

The theory posits that these Indo-Aryan speaking people may have been a genetically diverse group of people who were united by shared cultural norms and language, referred to as *aryā*, "noble". Diffusion of this culture and language took place by patron-client systems, which allowed for the absorption and acculturation of other groups into this culture, and explains the strong influence on other cultures with which it interacted.

## Contents

### Fundamentals

Linguistics: relationships between languages

Archaeology: migrations from the steppe Urheimat

Anthropology: elite recruitment and language shift

Genetics: ancient ancestry and multiple gene flows

Literary research: similarities, geography and references to migration

Ecological studies: widespread drought, urban collapse, and pastoral migrations

### Development

Similarities between Sanskrit, Greek, Latin, Persian, Celtic and German

- Homeland
- Aryan race
- "Aryan invasion"
- Aryan migration
- Future directions

**Linguistics: relationships between languages**

- Comparative method
- Proto-Indo-European
- Arguments against an Indian origin of proto-Indo-European
  - Diversity
  - Dialectical variation
  - Substrate influence

**Archaeology: migrations from the steppe Urheimat**

- Stages of migrations
  - Diffusion from the "Urheimat"
  - Anthony – multiple migrations
- Central Asia: formation of Indo-Iranians
  - Sintashta-Petrovka culture
  - Andronovo culture
  - Bactria-Margiana culture
- Two waves of Indo-Iranian migration
- First wave – Indo-Aryan migrations
  - Mittani
  - North-India – Vedic culture
    - Migration into northern India
    - Gandhara grave culture
    - Spread of Vedic-Brahmanic culture
  - Indus Valley Civilization
    - Decline of Indus Valley Civilisation
    - Continuity
    - Relation with Indo-Aryan migrations
  - Inner Asia – Wusun and Yuezhi
    - Wusun and Yuezhi
- Second wave – Iranians

**Anthropology: elite recruitment and language change**

- Elite dominance
- Renfrew: models of "linguistic replacement"
- David Anthony: elite recruitment
- Michael Witzel: small groups and acculturation
- Salmons: systematic changes in community structure

**Genetics: ancient ancestry and multiple gene flows**

- Ancestral groups
  - Common maternal ancestry
  - "Ancestral North Indians" and "Ancestral South Indians"
  - Additional components
  - Male-mediated migration
- North-south cline
- Scenarios
  - Pre-agricultural migrations
  - Agricultural migrations
    - Near-Eastern migrations
    - Haplogroup R1a and related haplogroups
  - Indo-European migrations
    - Genetic impact of Indo-Aryan migrations

## Literary research: similarities, geography and references to migration

### Similarities

Mitanni

Iranian Avesta

Geographical location of Rigvedic rivers

Textual references to migrations

Rigveda

Srauta Sutra of Baudhayana

Later Vedic and Hindu texts

## Ecology

## Controversy

"Indigenous Aryans"

Hindu nationalism

Racism

Dalit response

## See also

## Notes

## References

## Sources

Printed sources

Web-sources

## Further reading

## External links

# Fundamentals

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The Indo-Aryan Migration theory is part of a larger theoretical framework. This framework explains the similarities between a wide range of contemporary and ancient languages. It combines linguistic, archaeological and anthropological research.<sup>[9][10]</sup> This provides an overview of the development of Indo-European languages, and the spread of these Indo-European languages by migration and acculturation.<sup>[10]</sup>

## Linguistics: relationships between languages

The linguistic part traces the connections between the various Indo-European languages, and reconstructs the proto-Indo-European language. This is possible because the processes that change languages are not random, but follow strict patterns. Especially sound shifts, the changing of vowels and consonants, are important, although grammar (especially morphology) and the lexicon (vocabulary) may also be significant. Historical-comparative linguistics thus makes it possible to see great similarities between languages which at first sight might seem very different.<sup>[10]</sup> Various characteristics of the Indo-European languages argue against an Indian origin of these languages, and point to a steppe origin of these languages.

## Archaeology: migrations from the steppe Urheimat

The archaeological part posits an "Urheimat" at the Pontic steppes, which developed after the introduction of cattle at the steppes around 5,200 BCE.<sup>[10]</sup> This introduction marked the change from foraging to pastoralist cultures, and the development of a hierarchical social system with chieftains, patron-client systems, and the exchange of goods and gifts.<sup>[10]</sup> The oldest nucleus may have been the Samara culture (late 6th and early 5th millennium BCE), at a bend in the **Volga**.

A wider "horizon" developed, called the Kurgan culture by Marija Gimbutas in the 1950s. She included several cultures in this "Kurgan Culture", including the Samara culture and the Yamna culture, although the Yamna culture (36th–23rd centuries BCE), also called "Pit Grave Culture", may more aptly be called the "nucleus" of the proto-Indo-European language.<sup>[10]</sup> From this area, which already included various subcultures, Indo-European languages spread west, south and east starting around 4,000 BCE.<sup>[11]</sup> These languages may have been carried by small groups of males, with patron-client systems which allowed for the inclusion of other groups into their cultural system.<sup>[10]</sup>

Eastward emerged the Sintashta culture (2100–1800 BCE), where common Indo-Iranian was spoken.<sup>[6]</sup> Out of the Sintashta culture developed the Andronovo culture (1800–1400 BCE), which interacted with the Bactria-Margiana Culture (2300–1700 BCE). This interaction further shaped the Indo-Iranians, which split at c. 1800–1600 BCE into the Indo-Aryans and the Iranians.<sup>[6]</sup> The Indo-Aryans migrated to the Levant, northern India, and possibly south Asia.<sup>[12]</sup> The migration into northern India was not a large-scale immigration, but may have consisted of small groups<sup>[13][note 2]</sup> which were genetically diverse. Their culture and language spread by the same mechanisms of acculturation, and the absorption of other groups into their patron-client system.<sup>[10]</sup>

## Anthropology: elite recruitment and language shift

Indo-European languages probably spread through language shifts.<sup>[15][16][17]</sup> Small groups can change a larger cultural area,<sup>[18][10]</sup> and elite male dominance by small groups may have led to a language shift in northern India.<sup>[19][20][21]</sup>

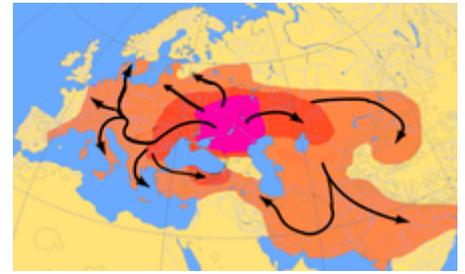
David Anthony, in his "revised Steppe hypothesis"<sup>[22]</sup> notes that the spread of the Indo-European languages probably did not happen through "chain-type folk migrations", but by the introduction of these languages by ritual and political elites, which were emulated by large groups of people,<sup>[23][note 3]</sup> a process which he calls "elite recruitment"<sup>[24]</sup>

According to Parpola, local elites joined "small but powerful groups" of Indo-European speaking migrants.<sup>[15]</sup> These migrants had an attractive social system and good weapons, and luxury goods which marked their status and power. Joining these groups was attractive for local leaders, since it strengthened their position, and gave them additional advantages.<sup>[25]</sup> These new members were further incorporated by matrimonial alliances.<sup>[26][16]</sup>

According to Joseph Salmons, language shift is facilitated by "dislocation" of language communities, in which the elite is taken over.<sup>[27]</sup> According to Salmons, this change is facilitated by "systematic changes in community structure", in which a local community becomes incorporated in a larger social structure.<sup>[27][note 4]</sup>

## Genetics: ancient ancestry and multiple gene flows

The Indo-Aryan migrations form part of a complex genetic puzzle on the origin and spread of the various components of the Indian population, including various waves of admixture and language shift. There is "general agreement" that north and south Indians share a common maternal ancestry.<sup>[28][29][30][31]</sup> A series of studies show that South Asia harbours two major ancestral components,<sup>[32][33][34]</sup> namely the *Ancestral North Indians* (ANI) which is "genetically close to Middle Easterners, Central Asians, and Europeans", and the *Ancestral South Indians* (ASI) which is clearly distinct from ANI.<sup>[32][note 5]</sup> These two groups mixed in India between 4,200 and 1,900 years ago (2200 BCE–100 CE), whereafter a shift to endogamy took place,<sup>[34]</sup> possibly by the enforcement of "social values and norms" by the "Hindu Gupta rulers".<sup>[36]</sup>



Scheme of Indo-European migrations, of which the Indo-Aryan migrations form a part, from ca. 4000 to 1000 BCE according to the Kurgan hypothesis:

\* The magenta area corresponds to the assumed *Urheimat* (Samara culture, Sredny Stog culture and the subsequent Yamna culture).

\* The red area corresponds to the area which may have been settled by Indo-European-speaking peoples up to ca. 2500 BCE.

\* The orange area corresponds to 1000 BCE.

Source: Christopher I. Beckwith (2009), *Empires of the Silk Road* Oxford University Press, p.30<sup>[8]</sup>

Moorjani et al. (2013) describe three scenarios regarding the bringing together of the two groups: migrations before the development of agriculture (before 8,000–9,000 years before present (BP); migration of western Asian<sup>[note 6]</sup> people together with the spread of agriculture, maybe up to 4,600 years BP; migrations of western Eurasians from 3,000 to 4,000 years BP<sup>[37]</sup>

While Reich notes that the onset of admixture coincides with the arrival of Indo-European language,<sup>[web 2]</sup> according to Moorjani et al. (2013) these groups were present "unmixed" in India before the Indo-Aryan migrations.<sup>[34]</sup> Gallego Romero et al. (2011) propose that the ANI component came from Iran and the Middle East,<sup>[38]</sup> less than 10,000 years ago,<sup>[web 3][note 7]</sup> while according to Lazaridis et al. (2016) ANI is a mix of "early farmers of western Iran" and "people of the Bronze Age Eurasian steppe".<sup>[39]</sup> Several studies also show traces of later influxes of maternal genetic material<sup>[28][web 4]</sup> and of paternal genetic material related to ANI and possibly the Indo-Europeans.<sup>[32][40][41]</sup>

## Literary research: similarities, geography and references to migration

The oldest inscriptions in Old Indic is found in northern Syria in Hittite records regarding the Hurrian-speaking Mitanni.<sup>[42][43]</sup> The religious practices depicted in the *Rigveda* and those depicted in the *Avesta*, the central religious text of Zoroastrianism, show similarities.<sup>[43]</sup> Some of the references to the Sarasvati in the *Rigveda* refer to the Ghaggar-Hakra River,<sup>[44]</sup> while the Afghan river Haraxvaiti/Harauvati/Helmand is sometimes quoted as the locus of the early Rigvedic river.<sup>[45]</sup> The *Rigveda* does not explicitly refer to an external homeland<sup>[46]</sup> or to a migration,<sup>[47]</sup> but later Vedic and Puranic texts do show the movement into the Gangetic plains.

## Ecological studies: widespread drought, urban collapse, and pastoral migrations

Climate change and drought may have triggered both the initial dispersal of Indo-European speakers, and the migration of Indo-Europeans from the steppes in south central Asia and India.

Around 4200–4100 BCE a climate change occurred, manifesting in colder winters in Europe.<sup>[48]</sup> Steppe herders, archaic Proto-Indo-European speakers, spread into the lower Danube valley about 4200–4000 BCE, either causing or taking advantage of the collapse of Old Europe.<sup>[49]</sup>

The Yamna horizon was an adaptation to a climate change which occurred between 3500 and 3000 BCE, in which the steppes became drier and cooler. Herds needed to be moved frequently to feed them sufficiently, and the use of wagons and horse-back riding made this possible, leading to "a new more mobile form of pastoralism".<sup>[50]</sup>

In the second millennium BCE widespread aridization led to water shortages and ecological changes in both the Eurasian steppes and south Asia.<sup>[web 1][51]</sup> At the steppes, humidization led to a change of vegetation, triggering "higher mobility and transition to the nomadic cattle breeding".<sup>[51][note 8][note 9]</sup> Water shortage also had a strong impact in south Asia, "causing the collapse of sedentary urban cultures in south central Asia, Afghanistan, Iran, and India, and triggering large-scale migrations".<sup>[web 1]</sup>

## Development

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### Similarities between Sanskrit, Greek, Latin, Persian, Celtic and German

When the British started to colonize India in the 18th century, they had to impose a legal system on both the British merchants and the Indians. The Indians already had a legal system, which was unknown to the British colonizers. To integrate these systems, the British had to learn Sanskrit, a task which was given to Sir William Jones. He learned Sanskrit, and studied Sanskrit texts, at the ancient Hindu university at Nadiya. He noted the similarities of Sanskrit with Persian, English, Latin, Greek and Gothic. After three years of studies, in an announcement to the Asiatic Society of Bengal, he made the famous statement:

The Sanskrit language, whatever be its antiquity, is of a wonderful structure; more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident; so strong

indeed, that no philologist could examine them all three, without believing them to have sprung from some common source, which, perhaps, no longer exists: there is a similar reason, though not quite so forcible, for supposing that both the Gothic and the Celtic, though blended with a very different idiom, had the same origin with the Sanskrit; and the old Persian might be added to the same family, if this were the place for discussing any question concerning the antiquities of Persia.<sup>[52]</sup><sup>[web 5]</sup>

Jones concluded that all these languages originated from the same source.<sup>[52]</sup>

## Homeland

Most scholars assumed a homeland either in Europe or in Western Asia, and Sanskrit must in this case have reached India by a language transfer from west to east.<sup>[53]</sup><sup>[54]</sup>

Some scholars favoured an Indian "homeland". In 19th century Indo-European studies, the language of the Rigveda was the most archaic Indo-European language known to scholars, indeed the only records of Indo-European that could reasonably claim to date to the Bronze Age. This primacy of Sanskrit inspired some scholars, such as Friedrich Schlegel, to assume that the locus of the proto-Indo-European homeland had been in India, with the other dialects spread to the west by historical migration. This was however never a mainstream position even in the 19th century.<sup>[53]</sup><sup>[54]</sup>

With the 20th-century discovery of Bronze-Age attestations of Indo-European (Anatolian, Mycenaean Greek), Vedic Sanskrit lost its special status as the most archaic Indo-European language known.<sup>[53]</sup><sup>[54]</sup>

## Aryan race

In the 1850s Max Müller introduced the notion of two Aryan races, a western and an eastern one, who migrated from the Caucasus into Europe and India respectively. Müller dichotomized the two groups, ascribing greater prominence and value to the western branch. Nevertheless, this "eastern branch of the Aryan race was more powerful than the indigenous eastern natives, who were easy to conquer".<sup>[55]</sup> By the 1880s, his ideas had been "hijacked" by racist ethnologists. For example, as an exponent of race science, colonial administrator Herbert Hope Risley (1851–1911) used the ratio of the width of a nose to its height to divide Indian people into Aryan and Dravidian races, as well as seven castes.<sup>[56]</sup><sup>[57]</sup>

Müller's work contributed to the developing interest in Aryan culture, which often set Indo-European ('Aryan') traditions in opposition to Semitic religions. He was "deeply saddened by the fact that these classifications later came to be expressed in racist terms", as this was far from his intention.<sup>[58]</sup><sup>[note 10]</sup> For Müller the discovery of common Indian and European ancestry was a powerful argument against racism, arguing that "an ethnologist who speaks of Aryan race, Aryan blood, Aryan eyes and hair, is as great a sinner as a linguist who speaks of a dolichocephalic dictionary or a brachycephalic grammar" and that "the blackest Hindus represent an earlier stage of Aryan speech and thought than the fairest Scandinavians".<sup>[59]</sup> In his later work, Max Müller took great care to limit the use of the term "Aryan" to a strictly linguistic one.<sup>[60]</sup>

## "Aryan invasion"



Portrait of the elderly Max Müller by George Frederic Watts, 1894–1895



A 1910 depiction of Aryans entering India, from Hutchinson's "History of the Nations"

The excavation of the Harappa, Mohenjo-daro and Lothal sites of the Indus Valley Civilisation (IVC) in the 1920,<sup>[61]</sup> showed that northern India already had an advanced culture when the Indo-Aryans migrated into the area. The theory changed from a migration of advanced Aryans towards a primitive aboriginal population, to a migration of nomadic people into an advanced urban civilization, comparable to the Germanic migrations during the Fall of the Western Roman Empire or the Kassite invasion of Babylonia.<sup>[62]</sup>

This possibility was for a short time seen as a hostile invasion into northern India. The decline of the Indus Valley Civilisation at precisely the period in history in which the Indo-Aryan migrations probably took place, seemed to provide independent support of such an invasion. This argument was proposed by the mid-20th century archaeologist Mortimer Wheeler, who interpreted the presence of many unburied corpses found in the top levels of Mohenjo-daro as the victims of conquest wars, and who famously stated that the god "Indra stands accused" of the destruction of the Civilisation.<sup>[62]</sup>

This position was soon left by the scholarly community, noticing that no evidence was found, and that the skeletons were found to be hasty interments, not massacred victims.<sup>[62]</sup> Wheeler himself also nuanced this interpretation in later publications, stating "This is a possibility, but it can't be proven, and it may not be correct."<sup>[63]</sup> Wheeler further notes that the unburied corpses may indicate an event in the final phase of human occupation of Mohenjo-Daro, and that thereafter the place was uninhabited, but that the decay of Mohenjo-Daro has to be ascribed to structural causes such as salinisation.<sup>[64]</sup>

Nevertheless, although "no informed Western scholar speaks of 'invasions' anymore", critics of the Indo-Aryan Migration theory continue to present the theory as an "Aryan Invasion Theory",<sup>[1][65][note 11]</sup> presenting it as a racist and colonialist discourse:

The theory of an immigration of IA speaking Arya ("Aryan invasion") is simply seen as a means of British policy to justify their own intrusion into India and their subsequent colonial rule: in both cases, a "white race" was seen as subduing the local darker colored population.<sup>[1]</sup>

## Aryan migration

In the later 20th century, ideas were refined along with data accrual, and migration and acculturation were seen as the methods whereby Indo-Aryans and their language and culture spread into northwest India around 1500 BCE. The term "invasion" is only being used nowadays by opponents of the Indo-Aryan Migration theory.<sup>[1][65]</sup>

Michael Witzel:

...it has been supplanted by much more sophisticated models over the past few decades [...] philologists first, and archaeologists somewhat later, noticed certain inconsistencies in the older theory and tried to find new explanations, a new version of the immigration theories.<sup>[1][note 12]</sup>



An early 20th century depiction of Aryans settling in agricultural villages in India

These changes were thought to be in line with changes in thinking about language transfer in general, such as the migration of the Greeks into Greece (between 2100 and 1600 BCE) and their adoption of a syllabic script, Linear B, from the pre-existing Linear A, with the purpose of writing Mycenaean Greek, or the Indo-Europeanization of Western Europe (in stages between 2200 and 1300 BCE).

## Future directions

Mallory notes that with the development and the growing sophistication of the knowledge on the Indo-European migrations and their purported homeland, new questions arise, and that "it is evident that we still have a very long way to go."<sup>[66]</sup> One of those questions is the origin of the shared agricultural vocabulary, and the earliest dates for agriculturalism in areas settled by the Indo-Europeans.

Those dates seem to be too late to account for the shared vocabulary, and raise the question what their origin is.<sup>[67]</sup> In 2016, publications are expected on DNA-analysis of Harappans, which may answer the question to which non-Indian populations they were related.

## Linguistics: relationships between languages

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Linguistic research traces the connections between the various Indo-European languages, and reconstructs proto-Indo-European. Accumulated linguistic evidence points to the Indo-Aryan languages as intrusive into South Asia, some time in the 2nd millennium BCE.<sup>[68][69][70][71]</sup> The language of the Rigveda, the earliest stratum of Vedic Sanskrit, is assigned to about 1500–1200 BCE.<sup>[42]</sup>

### Comparative method

Connections between languages can be traced because the processes that change languages are not random, but follow strict patterns. Especially sound shifts, the changing of vowels and consonants, are important, although grammar (especially morphology) and the lexicon (vocabulary) may also be significant. Historical-comparative linguistics thus makes it possible to see great similarities between languages which at first sight might seem very different.<sup>[10]</sup>

Linguistics use the **comparative method** to study the development of languages by performing a feature-by-feature comparison of two or more languages with common descent from a shared ancestor, as opposed to the method of internal reconstruction, which analyses the internal development of a single language over time.<sup>[72]</sup> Ordinarily both methods are used together to reconstruct prehistoric phases of languages, to fill in gaps in the historical record of a language, to discover the development of phonological, morphological, and other linguistic systems, and to confirm or refute hypothesized relationships between languages.

The comparative method aims to prove that two or more historically attested languages are descended from a single proto-language by comparing lists of cognate terms. From them, regular sound correspondences between the languages are established, and a sequence of regular sound changes can then be postulated, which allows the proto-language to be reconstructed. Relation is deemed certain only if at least a partial reconstruction of the common ancestor is feasible, and if regular sound correspondences can be established with chance similarities ruled out.

The comparative method was developed over the 19th century. Key contributions were made by the Danish scholars Rasmus Rask and Karl Verner and the German scholar Jacob Grimm. The first linguist to offer reconstructed forms from a proto-language was August Schleicher, in his *Compendium der vergleichenden Grammatik der indogermanischen Sprachen*, originally published in 1861.<sup>[73]</sup>

### Proto-Indo-European

Proto-Indo-European (**PIE**) is the linguistic reconstruction of the common ancestor of the Indo-European languages. PIE was the first proposed proto-language to be widely accepted by linguists. Far more work has gone into reconstructing it than any other proto-language, and it is by far the best understood of all proto-languages of its age. During the 19th century, the vast majority of linguistic work was devoted to reconstruction of Proto-Indo-European or its daughter proto-languages such as Proto-Germanic, and most of the current techniques of linguistic reconstruction in historical linguistics (e.g., the comparative method and the method of internal reconstruction) were developed as a result. These methods supply all of our knowledge concerning PIE, since there is no written record of the language.

Scholars estimate that PIE may have been spoken as a single language (before divergence began) around 3500 BCE, though estimates by different authorities can vary by more than a millennium. A number of hypotheses have been proposed for the origin and spread of the language, the most popular among linguists being the Kurgan hypothesis, which postulates an origin in the Pontic–Caspian steppe of Eastern Europe. Features of the culture of the speakers of PIE, known as Proto-Indo-Europeans, have also been reconstructed based on the shared vocabulary of the early attested Indo-European languages.

The existence of PIE was first postulated in the 18th century by Sir William Jones, who observed the similarities between Sanskrit, Ancient Greek, and Latin. By the early 20th century well-defined descriptions of PIE had been developed that are still accepted today (with some refinements). The largest developments of the 20th century were the discovery of the Anatolian and Tocharian languages and the acceptance of the laryngeal theory. The Anatolian languages have also spurred a major re-evaluation of theories concerning the development of various shared Indo-European language features and the extent to which these features were present in PIE itself. Relationships to other language families, including the Uralic languages, have been proposed but remain controversial.

PIE is thought to have had a complex system of morphology that included inflectional suffixes as well as ablaut (vowel alterations, as preserved in English *sing*, *sang*, *sung*). Nouns and verbs had complex systems of declension and conjugation respectively.

## Arguments against an Indian origin of proto-Indo-European

### Diversity

According to the linguistic center of gravity principle, the most likely point of origin of a language family is in the area of its greatest diversity.<sup>[74][note 13]</sup> By this criterion, Northern India, home to only a single branch of the Indo-European language family (i.e., Indo-Aryan), is an exceedingly unlikely candidate for the Indo-European homeland, compared to Central-Eastern Europe, for example, which is home to the Italic, Venetic, Illyrian, Albanian, Germanic, Baltic, Slavic, Thracian and Greek branches of Indo-European.<sup>[75]</sup>

Both mainstream Urheimat solutions locate the Proto-Indo-European homeland in the vicinity of the Black Sea.<sup>[76]</sup>

### Dialectal variation

It has been recognized since the mid-19th century, beginning with Schmidt and Schuchardt, that a binary tree model cannot capture all linguistic alignments; certain areal features cut across language groups and are better explained through a model treating linguistic change like waves rippling out through a pond. This is true of the Indo-European languages as well. Various features originated and spread while Proto-Indo-European was still a dialect continuum.<sup>[77]</sup> These features sometimes cut across sub-families: for instance, the instrumental, dative and ablative plurals in Germanic and Balto-Slavic feature endings beginning with -m-, rather than the usual -\*bh-, e.g. Old Church Slavonic instrumental plural *synъ-mi* 'with sons',<sup>[78]</sup> despite the fact that the Germanic languages are centum, while Balto-Slavic languages are satem.



Indo-European isoglosses, including the centum and satem languages (blue and red, respectively), augment, PIE \*-tt- > -ss-, \*-tt- > -st-, and m-endings.

The strong correspondence between the dialectal relationships of the Indo-European languages and their actual geographical arrangement in their earliest attested forms makes an Indian origin, as suggested by the Out of India Theory, unlikely.<sup>[79]</sup>

### Substrate influence

Already in 1870s the Neogrammarians realised that the Greek/Latin vocalism couldn't be explained on the basis of the Sanskrit one, and therefore must be more original. The Indo-Iranian and Uralic languages influenced each other, with the Finno-Ugric languages containing Indo-European loan words. A telling example is the Finnish word *vasra*, "hammer", which is related to *vajra*, the weapon of Indra. Since the Finno-Ugric homeland was located in the northern forest zone in northern Europe, the contacts must have taken place, which is in line with the placement of the proto-Indo-European homeland at the Pontic-Caspian steppes, between the Black Sea and the Caspian Sea.<sup>[web 1]</sup>

Dravidian and other South Asian languages share with Indo-Aryan a number of syntactical and morphological features that are alien to other Indo-European languages, including even its closest relative, Old Iranian. Phonologically, there is the introduction of retroflexes, which alternate with dentals in Indo-Aryan; morphologically there are the gerunds; and syntactically there is the use of a quotative marker (*iti*).<sup>[note 14]</sup> These are taken as evidence of substratum influence.

It has been argued that Dravidian influenced Indic through "shift", whereby native Dravidian speakers learned and adopted Indic languages. The presence of Dravidian structural features in Old Indo-Aryan is thus plausibly explained, that the majority of early Old Indo-Aryan speakers had a Dravidian mother tongue which they gradually abandoned.<sup>[80]</sup> Even though the innovative traits in Indic could be explained by multiple internal explanations, early Dravidian influence is the only explanation that can account for all of the innovations at once – it becomes a question of explanatory parsimony; moreover, early Dravidian influence accounts for several of the innovative traits in Indic better than any internal explanation that has been proposed.<sup>[81]</sup>

A pre-Indo-European linguistic substratum in South Asia would be a good reason to exclude India as a potential Indo-European homeland.<sup>[82]</sup> However, several linguists, all of whom accept the external origin of the Aryan languages on other grounds, are still open to considering the evidence as internal developments rather than the result of substrate influences,<sup>[83]</sup> or as adstratum effects.<sup>[84]</sup>

## Archaeology: migrations from the steppe Urheimat

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The Sintashta, Andronovo, Bactria-Margiana and Yaz cultures have been associated with Indo-Iranian migrations in Central Asia. The Gandhara Grave Cemetery H, Copper Hoard and Painted Grey Ware cultures are candidates for subsequent cultures within south India associated with Indo-Aryan movements. The decline of the Indus Valley Civilisation predates the Indo-Aryan migrations, but archeological data show a cultural continuity in the archeological record. Together with the presence of Dravidian loanwords in the Rigveda, this argues in favor of an interaction between post-Harappan and Indo-Aryan cultures.

### Stages of migrations

About 6,000 years ago the Indo-Europeans started to spread out from their proto-Indo-European homeland in Central Eurasia, between the southern Ural Mountains, the North Caucasus, and the Black Sea.<sup>[11]</sup> About 4,000 years ago Indo-European speaking peoples started to migrate out of the Eurasian steppes.<sup>[85][note 15]</sup>

### Diffusion from the "Urheimat"

Most scholars regard the middle Volga, which was the location of the Samara culture (late 6th and early 5th millennium BCE), and the Yamna culture, to be the "Urheimat" of the Indo-Europeans, as described by the Kurgan hypothesis. From this "Urheimat", Indo-European languages spread throughout the Eurasian steppes between ca. 4,500 and 2,500 BCE, forming the Yamna culture.

### Anthony – multiple migrations

David Anthony gives an elaborate overview of the sequence of migrations.

The oldest attested Indo-European language is Hittite, which belongs to the oldest written Indo-European languages, the Anatolian branch.<sup>[86]</sup> Although the Hittites are placed in the 2nd millennium BCE,<sup>[87]</sup> the Anatolian branch seems to predate Proto-Indo-European, and may have developed from an older Pre-Proto-Indo-European ancestor.<sup>[88]</sup> If it separated from Proto-Indo-European, it is likely to have done so between 4500–3500 BCE.<sup>[89]</sup>

A migration of archaic Proto-Indo-European speaking steppe herders took place into the lower Danube valley about 4200–4000 BCE, either causing or taking advantage of the collapse of Old Europe.<sup>[49]</sup>

According to Mallory and Adams, migrations southward founded the Maykop culture (c. 3500–2500 BCE),<sup>[90]</sup> and eastward the Afanasevo culture (c. 3500–2500 BCE),<sup>[91]</sup> which developed into the Tbcharians (c. 3700–3300 BCE).<sup>[92]</sup>

According to Anthony, between 3100–2800/2600 BCE, a real folk migration of Proto-Indo-European speakers from the Yamna-culture took place toward the west, into the Danube Valley.<sup>[93]</sup> These migrations probably split off Pre-Italic, Pre-Celtic and Pre-Germanic from Proto-Indo-European.<sup>[94]</sup> According to Anthony, this was followed by a movement north, which split away Baltic-Slavic c. 2800 BCE.<sup>[95]</sup> Pre-Armenian split off at the same time.<sup>[96]</sup> According to Parpola, this migration is related to the appearance of Indo-European speakers from Europe in Anatolia, and the appearance of Hittite.<sup>[97]</sup>

The Corded Ware culture in Middle Europe (ca. 2900–2450/2350 cal. BCE),<sup>[98]</sup> has been associated with some of the Indo-European family of languages. According to Haak et al. (2015) a massive migration took place from the Eurasian steppes to Central Europe.

This migration is closely associated with the Corded Ware culture.<sup>[99][web 6][web 7]</sup>

The Indo-Iranian language and culture emerged in the Sintashta culture (c. 2100–1800 BCE), where the chariot was invented.<sup>[10]</sup> Allentoft et al. (2015) found close autosomal genetic relationship between peoples of Corded Ware culture and Sintashta culture, which "suggests similar genetic sources of the two", and may imply that "the Sintashta derives directly from an eastward migration of Corded Ware peoples".<sup>[100]</sup>

The Indo-Iranian language and culture was further developed in the Andronovo culture (c. 1800–1400 BCE), and influenced by the Bactria–Margiana Archaeological Complex (c. 2300–1700 BCE). The Indo-Aryans split off around 1800–1600 BCE from the Iranians,<sup>[6]</sup> whereafter Indo-Aryan groups moved to the Levant (Mitanni), northern India (Vedic people, c. 1500 BCE), and China (Wusun).<sup>[12]</sup> Thereafter the Iranians migrated into Iran.<sup>[12]</sup>

## Central Asia: formation of Indo-Iranians

Indo-Iranian peoples are a grouping of ethnic groups consisting of the Indo-Aryan, Iranian, Dardic and Nuristani peoples; that is, speakers of Indo-Iranian languages, a major branch of the Indo-European language family

The Proto-Indo-Iranians are commonly identified with the Andronovo culture,<sup>[5]</sup> that flourished ca. 1800–1400 BCE in an area of the Eurasian Steppe that borders the Ural River on the west, the Tian Shan on the east. The older Sintashta culture (2100–1800), formerly included within the Andronovo culture, is now considered separately, but regarded as its predecessor, and accepted as part of the wider Andronovo horizon.

The Indo-Aryan migration was part of the Indo-Iranian migrations from the Andronovo culture into Anatolia, Iran and South-Asia.<sup>[101]</sup>

### Sintashta-Petrovka culture

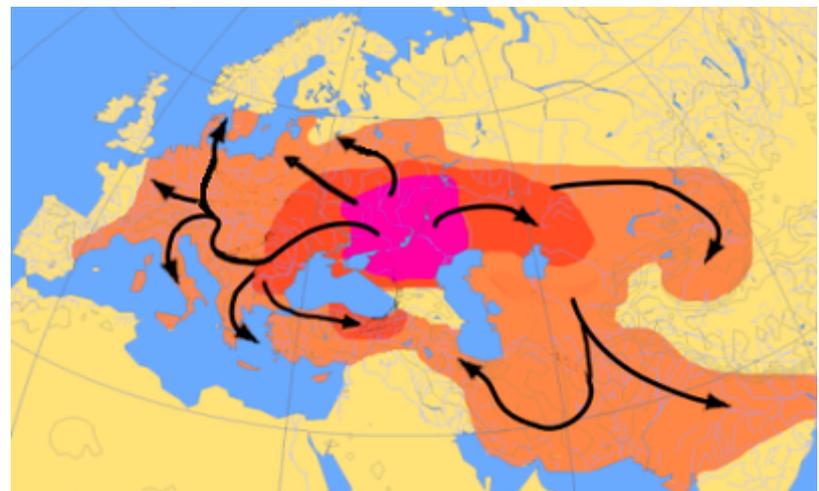
The Sintashta culture, also known as the Sintashta-Petrovka culture<sup>[102]</sup> or Sintashta-Arkaim culture,<sup>[103]</sup> is a Bronze Age archaeological culture of the northern Eurasian Steppe on the borders of Eastern Europe and Central Asia, dated to the period 2100–1800 BCE.<sup>[104]</sup> The Sintashta culture is probably the archaeological manifestation of the Indo-Iranian language group.<sup>[3]</sup>

The Sintashta culture emerged from the interaction of two antecedent cultures. Its immediate predecessor in the Ural-Tobol steppe was the Poltavka culture, an offshoot of the cattle-herding Yamnaya horizon that moved east into the region between 2800 and 2600 BCE.<sup>[105]</sup> Several Sintashta towns were built over older Poltovka settlements or close to Poltovka cemeteries, and Poltovka motifs are common on Sintashta pottery. Sintashta material culture also shows the influence of the late Abashevo culture, a collection of Corded Ware settlements in the forest steppe zone north of the Sintashta region that were also predominantly pastoralist.<sup>[106]</sup> Allentoft et al. (2015) also found close autosomal genetic relationship between peoples of Corded Ware culture and Sintashta culture!<sup>[100]</sup>

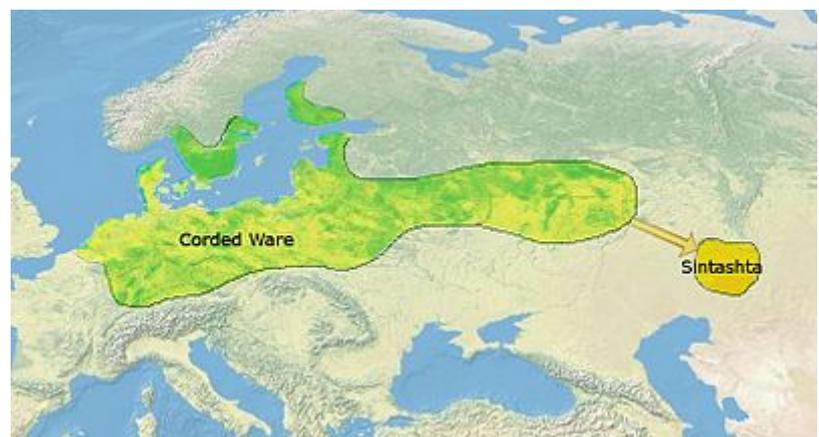
### Indo-European migration



The Yamna culture 3500–2000 BCE.



Scheme of Indo-European migrations from ca. 4000 to 1000 BCE according to the Kurgan hypothesis. The magenta area corresponds to the assumed *Urheimat* (Samara culture, Sredny Stog culture). The red area corresponds to the area which may have been settled by Indo-European-speaking peoples up to ca. 2500 BCE; the orange area to 1000 BCE. (Christopher I. Beckwith (2009) *Empires of the Silk Road*, Oxford University Press, p.30)



According to Allentoft (2015), the Sintashta culture probably derived from the Corded Ware Culture.

The earliest known chariots have been found in Sintashta burials, and the culture is considered a strong candidate for the origin of the technology, which spread throughout the Old World and played an important role in ancient warfare.<sup>[107]</sup> Sintashta settlements are also remarkable for the intensity of copper mining and bronze metallurgy carried out there, which is unusual for a steppe culture.<sup>[108]</sup>

Because of the difficulty of identifying the remains of Sintashta sites beneath those of later settlements, the culture was only recently distinguished from the Andronovo culture.<sup>[103]</sup> It is now recognised as a separate entity forming part of the 'Andronovo horizon'.<sup>[102]</sup>

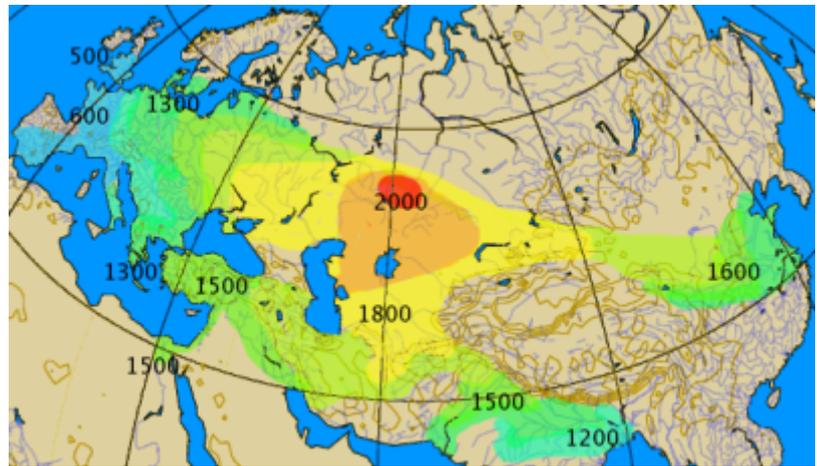
### Andronovo culture

The Andronovo culture is a collection of similar local Bronze Age Indo-Iranian cultures that flourished ca. 1800–1400 BCE in western Siberia and the west Asiatic steppe. It is probably better termed an archaeological complex or archaeological horizon. The name derives from the village of Andronovo (55°53'N 55°42'E), where in 1914, several graves were discovered, with skeletons in crouched positions, buried with richly decorated pottery. The older Sintashta culture (2100–1800), formerly included within the Andronovo culture, is now considered separately, but regarded as its predecessor, and accepted as part of the wider Andronovo horizon.

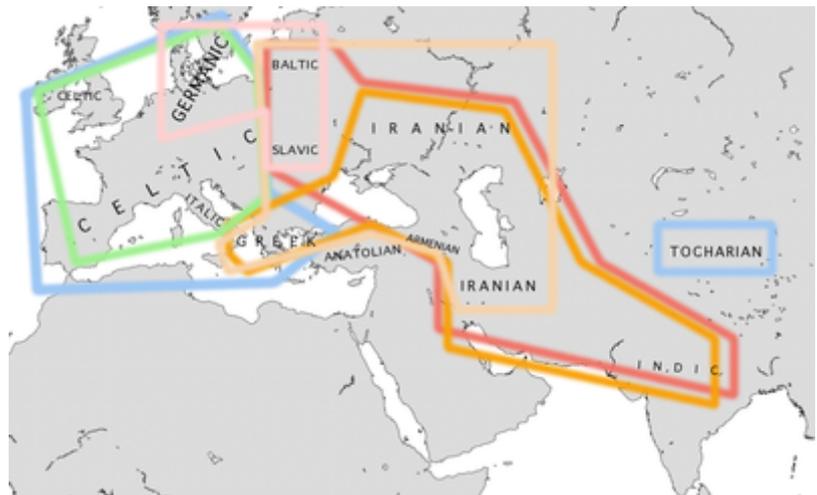
Sub-cultures have been distinguished:

- Alakul (1800–1400 BCE)
- Fedorovo (1700–1300 BCE)
- Alekseyevka (1200–1000 BCE)

The geographical extent of the culture is vast and difficult to delineate exactly. On its western fringes, it overlaps with the approximately contemporaneous, but distinct, Srubna culture in the Volga–Ural interfluvial. To the east, it reaches into the Minusinsk depression, with some sites as far west as the southern Ural Mountains.<sup>[109]</sup> overlapping with the area of the earlier Afanasevo culture.<sup>[110]</sup> Additional sites are scattered as far south as the Kopet Dag



Historical spread of the chariot. Dates given in image are approximate BCE years.



Indo-European isoglosses, including the centum and satem languages (blue and red, respectively), augment, PIE \*-tt- > -ss-, \*-tt- > -st-, and m-endings.

(Turkmenistan), the Pamir (Tajikistan) and the Tian Shan (Kyrgyzstan). The northern boundary vaguely corresponds to the beginning of the Taiga.<sup>[109]</sup> In the Volga basin, interaction with the Srubna culture was the most intense and prolonged, and Federovo style pottery is found as far west as Volgograd.

Towards the middle of the 2nd millennium, the Andronovo cultures begin to move intensively eastwards. They mined deposits of copper ore in the Altai Mountains and lived in villages of as many as ten sunken log cabin houses measuring up to 30m by 60m in size. Burials were made in stone cists or stone enclosures with buried timber chambers.

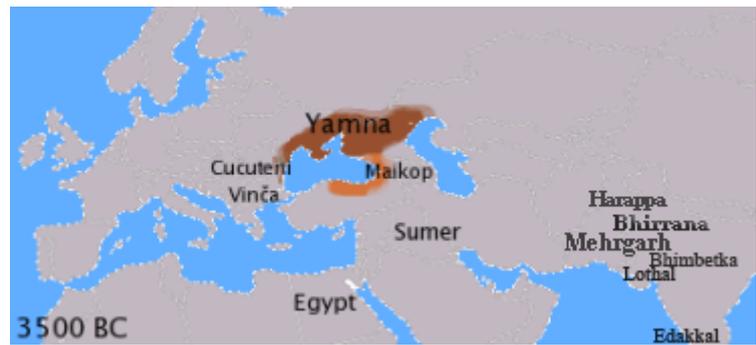
In other respects, the economy was pastoral, based on cattle, horses, sheep, and goats.<sup>[109]</sup> While agricultural use has been posited, no clear evidence has been presented.

Most researchers associate the Andronovo horizon with early Indo-Iranian languages, though it may have overlapped the early Uralic-speaking area at its northern fringe, including the Turkic-speaking area at its northeastern fringe.<sup>[111][112]</sup>

Based on its use by Indo-Aryans in Mitanni and Vedic India, its prior absence in the Near East and Harappan India, and its 19–20th century BCE attestation at the Andronovo site of Sintashta, Kuzmina (1994) argues that the chariot corroborates the identification of Andronovo as Indo-Iranian. Klejn (1974) and Brentjes (1981) find the Andronovo culture much too late for an Indo-Iranian identification since chariot-wielding Aryans appear in Mitanni by the 15th to 16th century BCE. However, Anthony & Vinogradov (1995) dated a chariot burial at Krivoye Lake to about 2000 BCE and a Bactria-Margiana burial that also contains a foal has recently been found, indicating further links with the steppes.<sup>[113]</sup>

Mallory (as cited in Bryant 2001:216) notes the difficulties of making a case for expansions from Andronovo to northern India, and that attempts to link the Indo-Aryans to such sites as the Beshkent and Vakhsh cultures "only gets

## Spread of IE-languages



Indo-European languages ca. 3500 BC



Indo-European languages ca. 2500 BC



Indo-European languages ca. 1500 BC



Indo-European languages ca. 500 BC

the Indo-Iranian to Central Asia, but not as far as the seats of the Medes, Persians or Indo-Aryans". However he has also developed the "kulturkugel" model that has the Indo-Iranians taking over Bactria-Margiana cultural traits but preserving their language and religion while moving into Iran and India.



Indo-European languages ca. 500 AD

### Bactria-Margiana culture

The Bactria-Margiana Culture, also called "Bactria-Margiana Archaeological Complex",

was a non-Indo-European culture which influenced the Indo-Iranians.<sup>[101]</sup> It was centered in what is nowadays northwestern Afghanistan and southern Turkmenistan.<sup>[101]</sup> Proto-Indo-Iranian arose due to this influence.<sup>[101]</sup>

The Indo-Iranians also borrowed their distinctive religious beliefs and practices from this culture.<sup>[101]</sup> According to Anthony, the Old Indic religion probably emerged among Indo-European immigrants in the contact zone between the Zeravshan River (present-day Uzbekistan) and (present-day) Iran.<sup>[114]</sup> It was "a syncretic mixture of old Central Asian and new Indo-European elements",<sup>[114]</sup> which borrowed "distinctive religious beliefs and practices"<sup>[101]</sup> from the Bactria-Margiana Culture.<sup>[101]</sup> At least 383 non-Indo-European words were borrowed from this culture, including the god Indra and the ritual drink Soma.<sup>[115]</sup>

The characteristically Bactria-Margiana (southern Turkmenistan/northern Afghanistan) artifacts found at burials in Mehrgarh and Balochistan are explained by a movement of peoples from Central Asia to the south.<sup>[116]</sup> The Indo-Aryan tribes may have been present in the area of the BMAC from 1700 BCE at the latest (incidentally corresponding with the decline of that culture).

From the BMAC, the Indo-Aryans moved into south Asia. According to Bryant, the Bactria-Margiana material inventory of the Mehrgarh and Baluchistan burials is "evidence of an archaeological intrusion into the subcontinent from Central Asia during the commonly accepted time frame for the arrival of the Indo-Aryans".<sup>[117]</sup><sup>[note 16]</sup>



Yamna culture



According to Allentoft (2015), the Sintashta culture probably derived from the Corded Ware Culture.

## Two waves of Indo-Iranian migration

The Indo-Iranian migrations took place in two waves,<sup>[118]</sup><sup>[119]</sup> belonging to the second and the third stage of Beckwith's description of the Indo-European migrations.<sup>[120]</sup> The first wave consisted of the Indo-Aryan migration into the Levant, founding the Mitanni kingdom in northern Syria<sup>[121]</sup> (ca.1500–1300 BCE), and the migration south-eastward of the Vedic people, over the Hindu Kush into northern India.<sup>[122]</sup> Christopher I. Beckwith suggests that the Wusun, an Indo-European Europoid people of Inner Asia in antiquity, were also of Indo-Aryan origin.<sup>[123]</sup> The second wave is interpreted as the Iranian wave.<sup>[124]</sup>

## First wave – Indo-Aryan migrations

### Mitanni

*Mitanni* (Hittite cuneiform  $KUR^{URU}Mi-ta-an-ni$ ), also *Mittani* (*Mi-it-ta-ni*) or *Hanigalbat* (Assyrian *Hanigalbat*, *Khanigalbat* cuneiform  $\text{Ḫa-ni-gal-bat}$ ) or *Naharin* in ancient Egyptian texts was a Hurrian-speaking state in northern Syria and south-east Anatolia from ca. 1500 BCE–1300 BCE.

Founded by an Indo-Aryan ruling class governing a predominately Hurrian population, Mitanni came to be a regional power after the Hittite destruction of Amorite<sup>[125]</sup> Babylon and a series of ineffectual Assyrian kings created a power vacuum in Mesopotamia. At the beginning of its history Mitanni's major rival was Egypt under the Thutmoseids. However, with the ascent of the Hittite empire, Mitanni and Egypt made an alliance to protect their mutual interests from the threat of Hittite domination.

At the height of its power, during the 14th century BCE, Mitanni had outposts centered on its capital, Washukanni, whose location has been determined by archaeologists to be on the headwaters of the Khabur River. Their sphere of influence is shown in Hurrian place names, personal names and the spread through Syria and the Levant of a distinct pottery type. Eventually, Mitanni succumbed to Hittite and later Assyrian attacks, and was reduced to the status of a province of the Middle Assyrian Empire

The earliest written evidence for an Indo-Aryan language is found not in Northwestern India and Pakistan, but in northern Syria, the location of the Mitanni kingdom.<sup>[126]</sup> The Mitanni kings took Old Indic throne names, and Old Indic technical terms were used for horse-riding and chariot-driving.<sup>[126]</sup> The Old Indic term *r'ta*, meaning "cosmic order and truth", the central concept of the Rigveda, was also employed in the Mitanni kingdom.<sup>[126]</sup> Old Indic gods, including Indra, were also known in the Mitanni kingdom.<sup>[127][128][129]</sup>

## North-India – Vedic culture

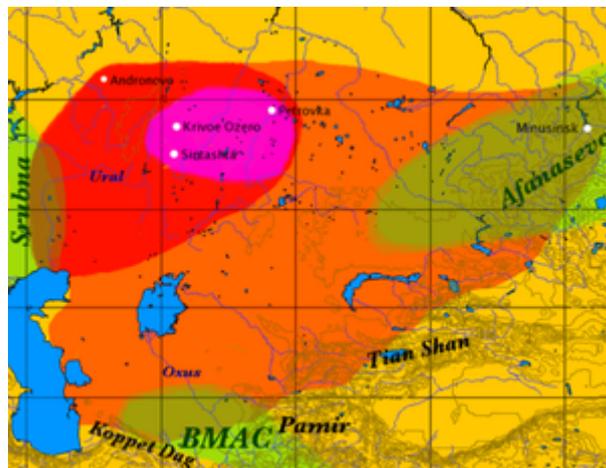
### Migration into northern India

The standard model for the entry of the Indo-European languages into India is that Indo-Aryan migrants went over the Hindu Kush, forming the Gandhara grave culture or Swat culture, in present-day Swat valley, either into the headwaters of the Indus or the Ganges (probably both). The Gandhara grave culture, which emerged c. 1600 BCE, and flourished from c. 1500 BCE to 500 BCE in Gandhara, modern-day Pakistan and Afghanistan, is thus the most likely locus of the earliest bearers of Rigvedic culture.

Based on this Parpola postulates a first wave of immigration from as early as 1900 BCE, corresponding to the Cemetery H culture, and an immigration to the Punjab ca. 1700–1400 BCE.<sup>[130][note 17]</sup>

According to Kochhar there were three waves of Indo-Aryan immigration that occurred after the mature Harappan phase.<sup>[131]</sup>

1. the "Murghamu" (Bactria-Margiana Culture) related people who entered Balochistan at Pirak, Mehrgarh south cemetery, and other places, and later merged with the post-urban Harappans during the late Harappans Jhukar



Map of the approximate maximal extent of the Andronovo culture. The formative Sintashta-Petrovka culture is shown in darker red. The location of the earliest spoke-wheeled chariot finds is indicated in purple. Adjacent and overlapping cultures (Afanasevo, Srubna, Bactria-Margiana Culture) are shown in green.



Archaeological cultures associated with Indo-Iranian migrations and Indo-Aryan migrations (after EIEC). The Andronovo, BMAC and Yaz cultures have often been associated with Indo-Iranian migrations. The GGC, Cemetery H, Copper Hoard and PGW cultures are candidates for cultures associated with Indo-Aryan migrations.

- phase (2000–1800 BCE);
2. the Swat IV that co-founded the Harappan Cemetery H phase in Punjab (2000–1800 BCE);
  3. and the Rigvedic Indo-Aryans of Swat V that later absorbed the Cemetery H people and gave rise to the Painted Grey Ware culture (PGW) (to 1400 BCE).

### Gandhara grave culture

About 1800 BCE, there is a major cultural change in the Swat Valley with the emergence of the Gandhara grave culture. With its introduction of new ceramics, new burial rites, and the horse, the Gandhara grave culture is a major candidate for early Indo-Aryan presence. The two new burial rites—flexed inhumation in a pit and cremation burial in an urn—were, according to early Vedic literature, both practiced in early Indo-Aryan society. Horse-trappings indicate the importance of the horse to the economy of the Gandharan grave culture. Two horse burials indicate the importance of the horse in other respects. Horse burial is a custom that Gandharan grave culture has in common with Andronovo, though not within the distinctive timber-frame graves of the steppe.<sup>[132]</sup>

### Spread of Vedic-Brahmanic culture

During the Early Vedic Period (ca.1500–800 BCE<sup>[web 9]</sup>) the Vedic culture was centered in the northern Punjab, or Sapta Sindhu.<sup>[web 9]</sup> During the Later Vedic Period (ca.800–500 BCE<sup>[web 10]</sup>) the Vedic culture started to extend into the western Ganges Plain,<sup>[web 10]</sup> centering on Kuru and Panchala,<sup>[133]</sup> and had some influence<sup>[134]</sup> at the central Ganges Plain after 500 BCE.<sup>[web 11]</sup> Sixteen Mahajanapada developed at the Ganges Plain, of which the Kuru and Panchala became the most notable developed centers of Vedic culture, at the western Ganges Plain.<sup>[web 10]</sup><sup>[133]</sup>

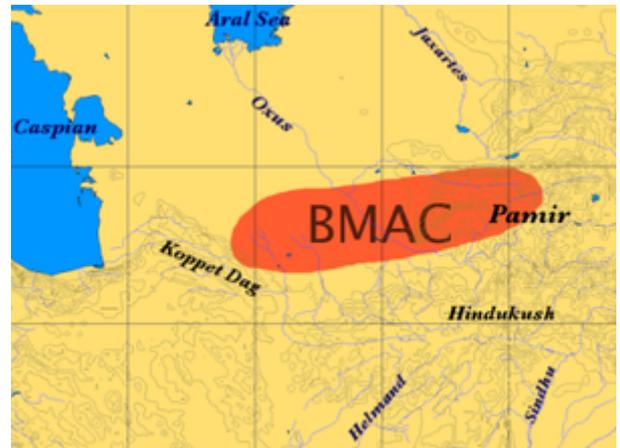
The Central Ganges Plain, were Magadha gained prominence, forming the base of the Mauya Empire, was a distinct cultural area,<sup>[135]</sup> with new states arising after 500 BCE<sup>[web 11]</sup> during the so-called "Second urbanisation".<sup>[136]</sup><sup>[note 18]</sup> It was influenced by the Vedic culture,<sup>[134]</sup> but differed markedly from the Kuru-Panchala region.<sup>[135]</sup> It "was the area of the earliest known cultivation of rice in South Asia and by 1800 BCE was the location of an advanced neolithic population associated with the sites of Chirand and Chechar".<sup>[137]</sup> In this region the Shramanic movements flourished, and Jainism and Buddhism originated.<sup>[133]</sup><sup>[note 19]</sup>

### Indus Valley Civilization

The Indo-Aryan migration into the northern Punjab started shortly after the decline of the Indus Valley Civilisation (IVC). According to the "Aryan Invasion Theory" this decline was caused by "invasions" of barbaric and violent Aryans who conquered the IVC. This "Aryan Invasion Theory" is not supported by the archeological and genetic data, and is not representative of the "Indo-Aryan migration theory".

### Decline of Indus Valley Civilisation

The decline of the IVC from about 1900 BCE started before the onset of the Indo-Aryan migrations. A regional cultural discontinuity occurred during the second millennium BCE and many Indus Valley cities were abandoned during this period, while many new settlements began to appear in Gujarat and East Punjab and other settlements such as in the western Bahawalpur region increased in size.



The extent of the Bactria-Margiana Culture (after EIEC).



Map of the Near East ca. 1400 BCE showing the Kingdom of Mitanni at its greatest extent

Jim G. Shaffer and Lichtenstein contend that in the second millennium BCE considerable "location processes" took place. In the eastern Punjab 79.9% and in Gujarat 96% of sites changed settlement status. According to Shafer & Lichtenstein,

It is evident that a major geographic population shift accompanied this 2nd millennium BCE localisation process. This shift by Harappan and, perhaps, other Indus Valley cultural mosaic groups, is the only archaeologically documented west-to-east movement of human populations in South Asia before the first half of the first millennium B.C.[138]

### Continuity

According to Erdosy, the ancient Harappans were not markedly different from modern populations in Northwestern India and present-day Pakistan. Craniometric data showed similarity with prehistoric peoples of the Iranian plateau and Western Asia,[note 20] although Mohenjo-daro was distinct from the other areas of the Indus Valley.[note 21][note 22]

According to Kennedy, there is no evidence of "demographic disruptions" after the decline of the Harappa culture.[140][note 23] Kenoyer notes that no biological evidence can be found for major new populations in post-Harappan communities.[141][note 24] Hemphill notes that "patterns of phonetic affinity" between Bactria and the Indus Valley Civilisation are best explained by "a pattern of long-standing, but low-level bidirectional mutual exchange"[note 25]

According to Kennedy, the Cemetery H culture "shows clear biological affinities" with the earlier population of Harappa.[142] The archaeologist Kenoyer noted that this culture "may only reflect a change in the focus of settlement organization from that which was the pattern of the earlier Harappan phase and not cultural discontinuity, urban decay, invading aliens, or site abandonment, all of which have been suggested in the past." [143]

### Spread of Vedic culture



Early Vedic Period.



Painted Grey Ware culture (1200–600 BCE)



Kingdoms, tribes and theological schools of the Late Vedic Period.

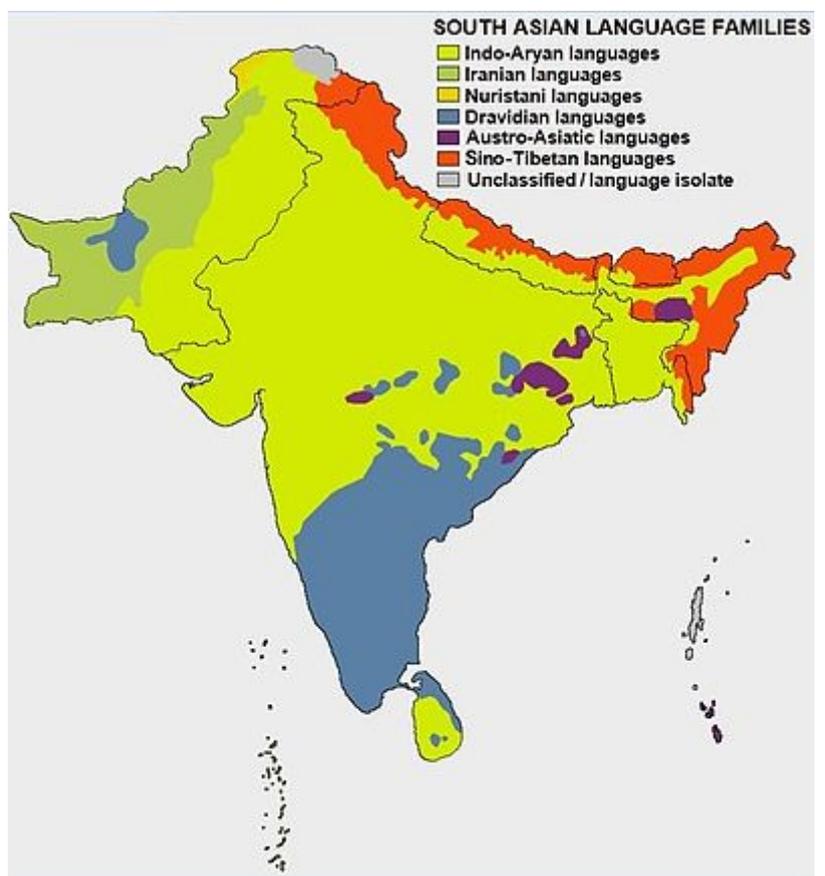


According to Christopher I. Beckwith the Wusun, an Indo-European Caucasian people of Inner Asia in antiquity, were also of Indo-Aryan origin.<sup>[123]</sup> From the Chinese term Wusun, Beckwith reconstructs the Old Chinese \*âswin, which he compares to the Old Indic asvin "the horsemen", the name of the Rigvedic twin equestrian gods.<sup>[123]</sup> Beckwith suggests that the Wusun were an eastern remnant of the Indo-Aryans, who had been suddenly pushed to the extremities of the Eurasian Steppe by the Iranian peoples in the 2nd millennium BCE.<sup>[151]</sup>

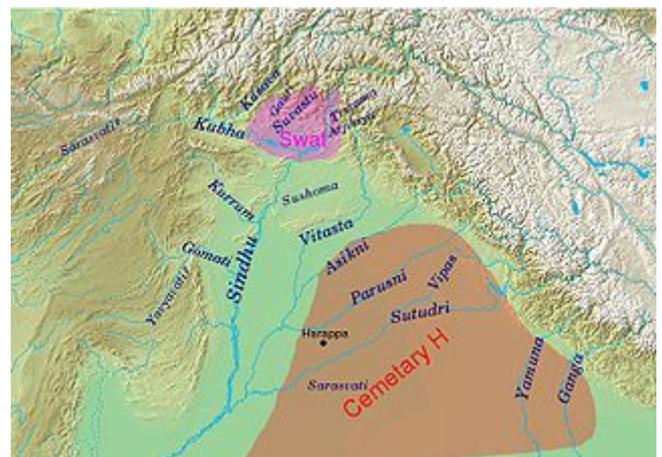
The Wusun are first mentioned by Chinese sources as vassals in the Tarim Basin of the Yuezhi,<sup>[152]</sup> another Indo-European Caucasian people of possible Tocharian stock.<sup>[153][154]</sup> Around 175 BCE, the Yuezhi were utterly defeated by the Xiongnu, also former vassals of the Yuezhi.<sup>[154][155]</sup> The Yuezhi subsequently attacked the Wusun and killed their king (Kunmo Chinese: 昆莫 or Kunmi Chinese: 昆彌) Nandoumi (Chinese: 難兜靡), capturing the Ili Valley from the Saka (Scythians) shortly afterwards.<sup>[155]</sup> In return the Wusun settled in the former territories of the Yuezhi as vassals of the Xiongnu.<sup>[155][156]</sup>

The son of Nandoumi was adopted by the Xiongnu king and made leader of the Wusun.<sup>[156]</sup> Around 130 BCE he attacked and utterly defeated the Yuezhi, settling the Wusun in the Ili Valley.<sup>[156]</sup> After the Yuezhi were defeated by the Xiongnu, in the 2nd century BCE, a small group, known as the Little Yuezhi, fled to the south, while the majority migrated west to the Ili Valley, where they displaced the Sakas (Scythians). Driven from the Ili Valley shortly afterwards by the Wusun, the Yuezhi migrated to Sogdia and then Bactria, where they are often identified with the Tókharoi (Τοχάριοι) and Asii of Classical sources. They then expanded into northern South Asia, where one branch of the Yuezhi founded the Kushan Empire. The Kushan empire stretched from Turpan in the Tarim Basin to Pataliputra on the Indo-Gangetic Plain at its greatest extent, and played an important role in the development of the Silk Road and the transmission of Buddhism to China.

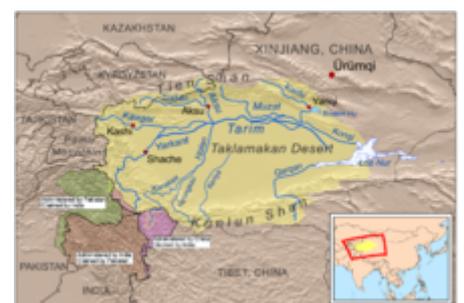
Soon after 130 BCE the Wusun became independent of the Xiongnu, becoming trusted vassals of the Han dynasty and powerful force in the region for centuries.<sup>[156]</sup> With the emerging steppe federations of the Rouran, the Wusun migrated into the Pamir Mountains in the 5th century CE.<sup>[155]</sup> They are last mentioned in 938 when a Wusun chieftain paid tribute to the Liao dynasty.<sup>[155]</sup>



Language families in the Indian subcontinent



Geography of the Rigveda, with river names; the extent of the Swat and Cemetery H cultures are indicated.



The Tarim Basin, 2008

## Second wave – Iranians



## David Anthony: elite recruitment

David Anthony, in his "revised Steppe hypothesis"<sup>[22]</sup> notes that the spread of the Indo-European languages probably did not happen through "chain-type folk migrations", but by the introduction of these languages by ritual and political elites, which are emulated by large groups of people.<sup>[23][note 3][note 28]</sup> Anthony gives the example of the Luo-speaking Acholi in northern Uganda in the 17th and 18th century, whose language spread rapidly in the 19th century.<sup>[20]</sup> Anthony notes that "Indo-European languages probably spread in a similar way among the tribal societies of prehistoric Europe", carried forward by "Indo-European chiefs" and their "ideology of political clientage".<sup>[24]</sup> Anthony notes that "elite recruitment" may be a suitable term for this system.<sup>[24][note 29]</sup>

## Michael Witzel: small groups and acculturation

Michael Witzel refers to Ehret's model<sup>[note 30]</sup> "which stresses the osmosis, or a 'billiard ball', or Mallory's *Kulturkugel*, effect of cultural transmission".<sup>[18]</sup> According to Ehret, ethnicity and language can shift with relatively easy in small societies, due to the cultural, economic and military choices made by the local population in question. The group bringing new traits may initially be small, contributing features that can be fewer in number than those of the already local culture. The emerging combined group may then initiate a recurrent, expansionist process of ethnic and language shift.<sup>[8]</sup>

Witzel notes that "arya/ārya does not mean a particular 'people' or even a particular 'racial' group but all those who had joined the tribes speaking Vedic Sanskrit and adhering to their cultural norms (such as ritual, poetry, etc.)."<sup>[161]</sup> According to Witzel, "there must have been a long period of acculturation between the local population and the 'original' immigrants speaking Indo-Aryan."<sup>[161]</sup> Witzel also notes that the speakers of Indo-Aryan and the local population must have been bilingual, speaking each other's languages and interacting with each other before the Rg Vēda was composed in the Punjab.<sup>[162]</sup>

## Salmons: systematic changes in community structure

Joseph Salmons notes that Anthony presents scarce concrete evidence or arguments.<sup>[163]</sup> Salmons is critical about the notion of "prestige" as a central factor in the shift to Indo-European languages, referring to Milroy who notes that "prestige" is "a cover term for a variety of very distinct notions".<sup>[163]</sup> Instead, Milroy offers "arguments built around network structure", though Salmons also notes that Anthony includes several of those arguments, "including political and technological advantages".<sup>[163]</sup> According to Salmons, the best model is offered by Fishman,<sup>[note 31]</sup> who

... understands shift in terms of geographical, social, and cultural "dislocation" of language communities. Social dislocation, to give the most relevant example, involves "siphoning off the talented, the enterprising, the imaginative and the creative" ([Fishman] 1991: 61), and sounds strikingly like Anthony's 'recruitment' scenario.<sup>[27]</sup>

Salmons himself argues that

... systematic changes in community structure are what drive language shift, incorporating Milroy's network structures as well. The heart of the view is the quintessential element of modernization, namely a shift from local community-internal organization to regional (state or national or international, in modern settings), extra-community organizations. Shift correlates with this move from pre-dominantly "horizontal" community structures to more "vertical" ones.<sup>[27][note 4]</sup>

## Genetics: ancient ancestry and multiple gene flows

India has one of the most genetically diverse populations in the world, and the history of this genetic diversity is the topic of continued research and debate. The Indo-Aryan migrations form part of a complex genetical puzzle on the origin and spread of the various components of the Indian population, including various waves of admixture and language shift. The genetic impact of the Indo-Aryans may have been marginal, but this is not at odds with the cultural and linguistic influence, since language shift is possible without a change in genetics.<sup>[165]</sup>

# Ancestral groups

## Common maternal ancestry

Sahoo et al. (2006) states that "there is general agreement that Indian caste and tribal populations share a common late Pleistocene maternal ancestry in India."

Kivisild et al. (1999) concluded that there is "an extensive deep late Pleistocene genetic link between contemporary Europeans and Indians" via the mitochondrial DNA, that is, DNA which is inherited from the mother. According to them, the two groups split at the time of the peopling of Asia and Eurasia and before modern humans entered Europe.<sup>[28]</sup> Kivisild et al. (2000) note that "the sum of any recent (the last 15,000 years) western mtDNA gene flow to India comprises, in average, less than 10 per cent of the contemporary Indian mtDNA lineages."<sup>[web 4]</sup>

Kivisild et al. (2003) and Sharma (2005) note that north and south Indians share a common maternal ancestry: Kivisild et al. (2003) further note that "these results show that Indian tribal and caste populations derive largely from the same genetic heritage of Pleistocene southern and western Asians and have received limited gene flow from external regions since the Holocene."<sup>[29]</sup>

## "Ancestral North Indians" and "Ancestral South Indians"

Reich et al. (2009), in a collaborative effort between the Harvard Medical School and the Centre for Cellular and Molecular Biology (CCMB), examined the entire genomes worth 560,000 single nucleotide polymorphisms (SNPs), as compared to 420 SNPs in prior work. They also cross-compared them with the genomes of other regions available in the global genome database.<sup>[166]</sup> Through this study, they were able to discern two genetic groups in the majority of populations in India, which they called "Ancestral North Indians" (ANI) and "Ancestral South Indians" (ASI).<sup>[note 32]</sup> They found that the ANI genes are close to those of Middle Easterners, Central Asians and Europeans whereas the ASI genes are dissimilar to all other known populations outside India.<sup>[note 33][note 34]</sup> These two distinct groups, which had split ca. 50,000 years ago, formed the basis for the present population of India.<sup>[web 12]</sup>

The two groups mixed between 1,900 and 4,200 years ago (100 CE-2200 BCE), where-after a shift to endogamy took place and admixture became rare.<sup>[note 35]</sup> Speaking to Fountain Ink, David Reich stated, "Prior to 4,200 years ago, there were unmixed groups in India. Sometime between 1,900 to 4,200 years ago, profound, pervasive convulsive mixture occurred, affecting every Indo-European and Dravidian group in India without exception." Reich pointed out that their work does not show that a substantial migration occurred during this time.<sup>[web 13]</sup>

Metspalu et al. (2011), representing a collaboration between the Estonian Biocenter and CCMB, confirmed that the Indian populations are characterized by two major ancestry components. One of them is spread at comparable frequency and haplotype diversity in populations of South and West Asia and the Caucasus. The second component is more restricted to South Asia and accounts for more than 50% of the ancestry in Indian populations. Haplotype diversity associated with these South Asian ancestry components is significantly higher than that of the components dominating the rest of Eurasian ancestry palette.<sup>[33]</sup>

## Additional components

ArunKumar et al. (2015) discern three major ancestry components, which they call "Southwest Asian", "Southeast Asian" and "Northeast Asian". The Southwest Asian component seems to be a native Indian component, while the Southeast Asian component is related to East Asian populations.<sup>[167]</sup> Brahmin populations "contained 11.4 and 10.6% of Northern Eurasian and Mediterranean components, thereby suggesting a shared ancestry with the Europeans". They note that this fits with earlier studies which "suggested similar shared ancestries with Europeans and Mediterraneans".<sup>[167]</sup> They further note that

Studies based on uni-parental marker have shown diverse Y-chromosomal haplogroups making up the Indian gene pool. Many of these Y-chromosomal markers show a strong correlation to the linguistic affiliation of the population. The genome-wide variation of the Indian samples in the present study correlated with the linguistic affiliation of the sample.<sup>[168]</sup>

They conclude that, while there may have been an ancient settlement in the subcontinent, "male-dominated genetic elements shaped the Indian gene pool", and that these elements "have earlier been correlated to various languages", and further note "the fluidity of female gene pools when in a patriarchal and patrilineal society such as that of India"<sup>[169]</sup>

Basu et al. (2016) extend the study of Reich et al. (2009) by postulating two other populations in addition to the ANI and ASI: "Ancestral Austro-Asiatic" (AAA) and "Ancestral Tibeto-Burman" (ATB), corresponding to the Austroasiatic and Tibeto-Burman language speakers.<sup>[35]</sup> According to them, ancestral populations seem to have occupied geographically separated habitats.<sup>[36]</sup> The ASI and the AAA were early settlers, who possibly arrived via the southern wave out of Africa.<sup>[36]</sup> The ANI are related to Central South Asians and entered India through the northwest, while the ATB are related to East Asians and entered India through northeast corridors.<sup>[36]</sup> They further note that

The asymmetry of admixture, with ANI populations providing genomic inputs to tribal populations (AA, Dravidian tribe, and TB) but not vice versa, is consistent with elite dominance and patriarchy. Males from dominant populations, possibly upper castes, with high ANI component, mated outside of their caste, but their offspring were not allowed to be inducted into the caste. This phenomenon has been previously observed as asymmetry in homogeneity of mtDNA and heterogeneity of Y-chromosomal haplotypes in tribal populations of India as well as the African Americans in United States.<sup>[36]</sup>

### Male-mediated migration

Reich et al. (2009), citing Kivisild et al. (1999), indicate that there has been a low influx of female genetic material since 50,000 years ago, but a "male gene flow from groups with more ANI relatedness into ones with less".<sup>[32][note 36]</sup>

ArunKumar et al. (2015) "suggest that ancient male-mediated migratory events and settlement in various regional niches led to the present day scenario and peopling of India."<sup>[470]</sup>

### North-south cline

According to Metspalu et al. (2011) there is "a general principal component cline stretching from Europe to south India". This northwest component is shared with populations from the Middle East, Europe and Central Asia, and is thought to represent at least one ancient influx of people from the northwest.<sup>[171]</sup> According to Saraswathy et al. (2010), there is "a major genetic contribution from Eurasia to North Indian upper castes" and a "greater genetic inflow among North Indian caste populations than is observed among South Indian caste and tribal populations".<sup>[web 14]</sup> According to Basu et al. (2003) and Saraswathy et al. (2010) certain sample populations of upper caste North Indians show a stronger affinity to Central Asian caucasians, whereas southern Indian Brahmins show a less stronger affinity.<sup>[web 14]</sup>

### Scenarios

While Reich notes that the onset of admixture coincides with the arrival of Indo-European language,<sup>[web 2][note 37]</sup> according to Metspalu (2011), the commonalities of the ANI with European genes cannot be explained by the influx of Indo-Aryans at ca. 3,500 BP alone.<sup>[172]</sup> They state that the split of ASI and ANI predates the Indo-Aryan migration,<sup>[33]</sup> both of these ancestry components being older than 3,500 BP.<sup>[173][web 15]</sup> Moorjani (2013) states that "We have further shown that groups with unmixed ANI and ASI ancestry were plausibly living in India until this time."<sup>[474]</sup> Moorjani (2013) describes three scenarios regarding the bringing together of the two groups:<sup>[37]</sup>

1. "migrations that occurred prior to the development of agriculture [8,000–9,000 years before present (BP)]. Evidence for this comes from mitochondrial DNA studies, which have shown that the mitochondrial haplogroups (hg U2, U7, and W) that are most closely shared between Indians and West Eurasians diverged about 30,000–40,000 years BP
2. "Western Asian peoples migrated to India along with the spread of agriculture [...] Any such agriculture related migrations would probably have begun at least 8,000–9,000 years BP (based on the dates for Mehrgarh) and may have continued into the period of the Indus civilization that began around 4,600 years BP and depended upon West Asian crops."

3. "migrations from Western or Central Asia from 3,000 to 4,000 years BP, a time during which it is likely that Indo-European languages began to be spoken in the subcontinent. A difficulty with this theory however, is that by this time India was a densely populated region with widespread agriculture, so the number of migrants of West Eurasian ancestry must have been extraordinarily large to explain the fact that today about half the ancestry in India derives from the ANI."

### Pre-agricultural migrations

Metspalu et al. (2011) detected a genetic component in India, k5, which "distributed across the Indus Valley, Central Asia, and the Caucasus".<sup>[175]</sup> According to Metspalu et al. (2011), k5 "might represent the genetic vestige of the ANI", though they also note that the geographic cline of this component within India "is very weak, which is unexpected under the ASI-ANI model", explaining that the ASI-ANI model implies an ANI contribution which decreases toward southern India.<sup>[176]</sup> According to Metspalu et al. (2011), "regardless of where this component was from (the Caucasus, Near East, Indus Valley, or Central Asia), its spread to other regions must have occurred well before our detection limits at 12,500 years."<sup>[177]</sup> Speaking to *Fountain Ink*, Metspalu said, "the West Eurasian component in Indians appears to come from a population that diverged genetically from people actually living in Eurasia, and this separation happened at least 12,500 years ago."<sup>[web 13][note 38]</sup> Moorjani et al. (2013) refer to Metspalu (2011)<sup>[note 39]</sup> as "fail[ing] to find any evidence for shared ancestry between the ANI and groups in West Eurasia within the past 12,500 years".<sup>[181]</sup> CCMB researcher Thangaraj believes that "it was much longer ago", and that "the ANI came to India in a second wave of migration"<sup>[note 40]</sup> that happened perhaps 40,000 years ago.<sup>[web 13]</sup>

### Agricultural migrations

#### Near-Eastern migrations

Kivisild et al. (1999) note that "a small fraction of the 'Caucasoid-specific' mtDNA lineages found in Indian populations can be ascribed to a relatively recent admixture."<sup>[178]</sup> at ca. 9,300 ± 3,000 years before present,<sup>[182]</sup> which coincides with "the arrival to India of cereals domesticated in the fertile Crescent" and "lends credence to the suggested linguistic connection between Elamite and Dravidic populations".<sup>[182][note 7]</sup>

According to Gallego Romero et al. (2011), their research on lactose tolerance in India suggests that "the west Eurasian genetic contribution identified by Reich et al. (2009) principally reflects gene flow from Iran and the Middle East."<sup>[38]</sup> Gallego Romero notes that Indians who are lactose-tolerant show a genetic pattern regarding this tolerance which is "characteristic of the common European mutation".<sup>[web 3]</sup> According to Gallego Romero, this suggests that "the most common lactose tolerance mutation made a two-way migration out of the Middle East less than 10,000 years ago. While the mutation spread across Europe, another explorer must have brought the mutation eastward to India – likely traveling along the coast of the Persian Gulf where other pockets of the same mutation have been found."<sup>[web 3]</sup> In contrast, Allentoft et al. (2015) found that lactose-tolerance was absent in the Yamnaya culture, noting that while "the Yamnaya and these other Bronze Age cultures herded cattle, goats, and sheep, they couldn't digest raw milk as adults. Lactose tolerance was still rare among Europeans and Asians at the end of the Bronze Age, just 2000 years ago."<sup>[web 16][100]</sup>

According to Lazaridis et al. (2016), "farmers related to those from Iran spread northward into the Eurasian steppe; and people related to both the early farmers of Iran and to the pastoralists of the Eurasian steppe spread eastward into South Asia."<sup>[39]</sup> They further note that ANI "can be modelled as a mix of ancestry related to both early farmers of western Iran and to people of the Bronze Age Eurasian steppe".<sup>[39][note 41]</sup>

#### Haplogroup R1a and related haplogroups

The distribution and proposed origin of haplogroup R1a, more specifically R1a1a1b, is often being used as an argument pro or contra the Indo-Aryan migrations. It is found in high frequencies in Eastern Europe (Z282) and south Asia (Z93), the areas of the Indo-European migrations. The place of origin of this haplogroup may give an indication of the "homeland" of the Indo-Europeans, and the direction of the first migrations.<sup>[185]</sup>

Cordeaux et al. (2004) based on the spread of a cluster of haplogroups (J2, R1a, R2, and L) in India, with higher rates in northern India,<sup>[186]</sup> argue that agriculture in south India spread with migrating agriculturalists, which also influenced the gene pool in south India!<sup>[187][186]</sup>

Sahoo et al. (2006), in response to Cordeaux et al. (2004), suggest that those haplogroups originated in India, based on the spread of these various haplogroups in India. According to Sahoo et al. (2006), this spread "argue[s] against any major influx, from regions north and west of India, of people associated either with the development of agriculture or the spread of the Indo-Aryan language family".<sup>[186]</sup> They further propose that "the high incidence of R1\* and R1a throughout Central Asian and East European populations (without R2 and R\* in most cases) is more parsimoniously explained by gene flow in the opposite direction",<sup>[188]</sup> which according to Sahoo et al. (2006) explains the "sharing of some Y-chromosomal haplogroups between Indian and Central Asian populations".<sup>[186]</sup>

Sengupta et al. (2006) also comment on Cordeaux et al. (2004), stating that "the influence of Central Asia on the pre-existing gene pool was minor", and arguing for "a peninsular origin of Dravidian speakers than a source with proximity to the Indus and with significant genetic input resulting from demic diffusion associated with agriculture".<sup>[189]</sup>

Sharma et al. (2009) found a high frequency of R1a1 in India. They therefore argue for an Indian origin of R1a1, and dispute "the origin of Indian higher most castes from Central Asian and Eurasian regions, supporting their origin within the Indian subcontinent".<sup>[190]</sup>

Underhill et al. (2014/2015) conclude that R1a1a1, the most frequent subclade of R1a, split into Z282 (Europe) and Z93 (Asia) at circa 5,800 before present.<sup>[191]</sup> According to Underhill et al. (2014/2015), "[t]his suggests the possibility that R1a lineages accompanied demic expansions initiated during the Copper, Bronze, and Iron ages."<sup>[192]</sup> They further note that the diversification of Z93 and the "early urbanization within the Indus Valley also occurred at this time and the geographic distribution of R1a-M780 (Figure 3d) may reflect this".<sup>[192]</sup>

Palanichamy et al. (2015), while responding to Cordeaux et al. (2004), Sahoo et al. (2006) and Sengupta et al. (2006), elaborated on Kivisild et al.'s (1999) suggestion that West Eurasian haplogroups "may have been spread by the early Neolithic migrations of proto-Dravidian farmers spreading from the eastern horn of the Fertile Crescent into India".<sup>[193]</sup> They conclude that "the L1a lineage arrived from western Asia during the Neolithic period and perhaps was associated with the spread of the Dravidian language to India", indicating that "the Dravidian language originated outside India and may have been introduced by pastoralists coming from western Asia (Iran)".<sup>[194]</sup> They further conclude that two subhalogroups originated with the Dravidian speaking peoples, and may have come to South India when the Dravidian language spread.<sup>[195]</sup>

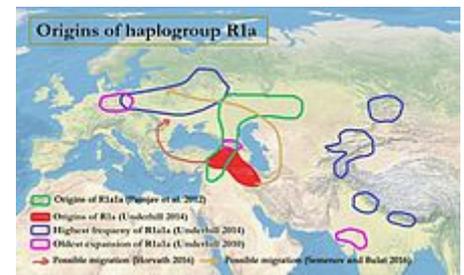
Poznik et al. (2016) note that "striking expansions" occurred within R1a-Z93 at ~4,500–4,000 years ago, which "predates by a few centuries the collapse of the Indus Valley Civilisation".<sup>[196]</sup> Mascarenhas et al. (2015) note that the expansion of Z93 from Transcaucasia into South Asia is compatible with "the archeological records of eastward expansion of West Asian populations in the 4th millennium BCE culminating in the so-called Kura-Araxes migrations in the post-Uruk IV period".<sup>[197]</sup>

## Indo-European migrations

### Genetic impact of Indo-Aryan migrations

The impact, or absence of such an impact, of the Indo-Aryan migrations on the Indian gene pool is a matter of ongoing debate.

Zerjal et al. (2002) argue that "multiple recent events" may have reshaped "this genetic landscape".<sup>[web 17]</sup>



R1a origins (Underhill 2010,<sup>[184]</sup> R1a migration to Eastern Europe; R1a1a diversification (Pamjav 2012); and R1a1a oldest expansion and highest frequency (Underhill 2014)

Bamshad et al. (2001), Wells et al. (2002) and Basu et al. (2003) argue for an influx of Indo-European migrants into the Indian subcontinent, but not necessarily an "invasion of any kind".<sup>[web 18]</sup> Bamshad et al. (2001) notice that the correlation between caste-status and West Eurasian DNA may be explained by subsequent male immigration into the Indian subcontinent. Basu et al. (2003) argue that the Indian subcontinent was subjected to a series of Indo-European migrations about 1500 BCE.

Metspalu et al. (2011) note that "any nonmarginal migration from Central Asia to South Asia should have also introduced readily apparent signals of East Asian ancestry into India" (although this presupposes the unproven assumption that East Asian ancestry was present – to a significant extent – in prehistorical Central Asia), which is not the case, and conclude that if there was a major migration of Eurasians into India, this happened before the rise of the Yamna culture.<sup>[176]</sup> Based on Metspalu (2011), Lalji Singh, a co-author of Metspalu, concludes that "[t]here is no genetic evidence that Indo-Aryans invaded or migrated to India".<sup>[web 19][web 20][web 21][note 42]</sup>

Moorjani et al. (2013) notes that the period of 4,200–1,900 years BP was a time of dramatic changes in northern India, and coincides with the "likely first appearance of Indo-European languages and Vedic religion in the subcontinent".<sup>[181][note 43]</sup> Moorjani further notes that there must have been multiple waves of admixture, which had more impact on higher-caste and northern Indians and took place more recently.<sup>[174][note 44]</sup> This may be explained by "additional gene flow", related to the spread of languages.<sup>[198]</sup>

...at least some of the history of population mixture in India is related to the spread of languages in the subcontinent. One possible explanation for the generally younger dates in northern Indians is that after an original mixture event of ANI and ASI that contributed to all present-day Indians, some northern groups received additional gene flow from groups with high proportions of West Eurasian ancestry bringing down their average mixture date.<sup>[198][note 45]</sup>

Palanichamy et al. (2015), elaborating on Kivisild et al. (1999) conclude that "A large proportion of the west Eurasian mtDNA haplogroups observed among the higher-ranked caste groups, their phylogenetic affinity and age estimate indicate recent Indo-Aryan migration to India from west Asia.<sup>[194]</sup> According to Palanichamy et al. (2015), "the west Eurasian admixture was restricted to caste rank. It is likely that Indo-Aryan migration has influenced the social stratification in the pre-existing populations and helped in building the Hindu caste system, but it should not be inferred that the contemporary Indian caste groups have directly descended from Indo-Aryan immigrants".<sup>[194][note 46]</sup>

Jones et al. (2015) state that CHG<sup>[note 47]</sup> was "a major contributor to the Ancestral North Indian component". According to Jones et al. (2015), it "may be linked with the spread of Indo-European languages", but they also note that "earlier movements associated with other developments such as that of cereal farming and herding are also plausible".<sup>[203]</sup>

Basu et al. (2016) note that the ANI are inseparable from Central-South Asian populations in present-day Pakistan. They hypothesise that "the root of ANI is in Central Asia".<sup>[204]</sup>

According to Lazaridis et al. (2016) ANI "can be modelled as a mix of ancestry related to both early farmers of western Iran and to people of the Bronze Age Eurasian steppe".<sup>[39]</sup>

Silva et al. (2017) state that "the recently refined Y-chromosome tree strongly suggests that R1a is indeed a highly plausible marker for the long-contested Bronze Age spread of Indo-Aryan speakers into South Asia."<sup>[205][note 48]</sup> Silva et al. (2017) further notes "they likely spread from a single Central Asian source pool, there do seem to be at least three and probably more R1a founder clades within the Subcontinent, consistent with multiple waves of arrival."

### Origins of R1a-Z93

Ornella Semino et al. (2000) proposed Ukrainian origins of R1a1, and a postglacial spread of the R1a1 gene during the Late Glacial, subsequently magnified by the expansion of the Kurgan culture into Europe and eastward.<sup>[206]</sup> Spencer Wells proposes central Asian origins, suggesting that the distribution and age of R1a1 points to an ancient migration corresponding to the spread by the Kurgan people in their expansion from the Eurasian Steppe.<sup>[207]</sup> According to Pamjav et al. (2012), "Inner and Central Asia is an overlap

zone for the R1a1-Z280 and R1a1-Z93 lineages [which] implies that an early differentiation zone of R1a1-M198 conceivably occurred somewhere within the Eurasian Steppes or the Middle East and Caucasus region as they lie between South Asia and Eastern Europe."<sup>[208][205]</sup>

## Literary research: similarities, geography, and references to migration

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### Similarities

#### Mitanni

The oldest inscriptions in Old Indic, the language of the Rig Veda, is found not in India, but in northern Syria in Hittite records regarding one of their neighbors, the Hurrian-speaking Mitanni. In a treaty with the Hittites, the king of Mitanni, after swearing by a series of Hurrian gods, swears by the gods Mitrašil, Uruvanaššil, Indara, and Našatianna, who correspond to the Vedic gods Mitra, Varuna, Indra, and Nāsatya (Aśvin). Contemporary equestrian terminology, as recorded in a horse-training manual whose author is identified as "Kikkuli", contains Indo-Aryan loanwords. The personal names and gods of the Mitanni aristocracy also bear significant traces of Indo-Aryan. Because of the association of Indo-Aryan with horsemanship and the Mitanni aristocracy, it is presumed that, after superimposing themselves as rulers on a native Hurrian-speaking population about the 15th–16th centuries BCE, Indo-Aryan charioteers were absorbed into the local population and adopted the Hurrian language<sup>[209]</sup>

Brentjes argues that there is not a single cultural element of central Asian, eastern European, or Caucasian origin in the Mitannian area; he also associates with an Indo-Aryan presence the peacock motif found in the Middle East from before 1600 BCE and quite likely from before 2100 BCE.<sup>[210]</sup>

Most scholars reject the possibility that the Indo-Aryans of Mitanni came from the Indian subcontinent as well as the possibility that the Indo-Aryans of the Indian subcontinent came from the territory of Mitanni, leaving migration from the north the only likely scenario.<sup>[note 49]</sup> The presence of some Bactria-Margiana loan words in Mitanni, Old Iranian and Vedic further strengthens this scenario.<sup>[211]</sup>

#### Iranian Avesta

The religious practices depicted in the *Rigveda* and those depicted in the *Avesta*, the central religious text of Zoroastrianism—the ancient Iranian faith founded by the prophet Zoroaster—have in common the deity Mitra, priests called *hotr* in the *Rigveda* and *zaotar* in the *Avesta*, and the use of a ritual substance that the *Rigveda* calls *soma* and the *Avesta* *haoma*. However, the Indo-Aryan *deva* 'god' is cognate with the Iranian *daēva* 'demon'. Similarly, the Indo-Aryan *asura* 'name of a particular group of gods' (later on, 'demon') is cognate with the Iranian *ahura* 'lord, god,' which 19th and early 20th century authors such as Burrow explained as a reflection of religious rivalry between Indo-Aryans and Iranians.<sup>[212]</sup>

Most linguists such as Burrow argue that the strong similarity between the Avestan of the *Gāthās*—the oldest part of the *Avesta*—and the Vedic Sanskrit of the *Rigveda* pushes the dating of Zarathustra or at least the *Gathas* closer to the conventional *Rigveda* dating of 1500–1200 BCE, i.e. 1100 BCE, possibly earlier. Boyce concurs with a lower date of 1100 BCE and tentatively proposes an upper date of 1500 BCE. Gnoli dates the *Gathas* to around 1000 BCE, as does Mallory (1989), with the caveat of a 400-year leeway on either side, i.e. between 1400 and 600 BCE. Therefore, the date of the *Avesta* could also indicate the date of the *Rigveda*.<sup>[213]</sup>

There is mention in the *Avesta* of *Airyan Vaejah*, one of the '16 the lands of the Aryans'.<sup>[214]</sup> Gnoli's interpretation of geographic references in the *Avesta* situates the *Airyanem Vaejah* in the Hindu Kush. For similar reasons, Boyce excludes places north of the Syr Darya and western Iranian places. With some reservations, Skjaervo concurs that the evidence of the Avestan texts makes it impossible to avoid the conclusion that they were composed somewhere in northeastern Iran. Witzel points to the central Afghan

highlands. Humbach derives Vaējah from cognates of the Vedic root "vij", suggesting the region of fast-flowing rivers. Gnoli considers Choresmia (Xvairizem), the lower Oxus region, south of the Aral Sea to be an outlying area in the Avestan world. However, according to Mallory & Mair (2000) the probable homeland of Avestan is, in fact, the area south of the Aral Sea.<sup>[215]</sup>

## Geographical location of Rigvedic rivers

The geography of the Rigveda seems to be centered on the land of the seven rivers. While the geography of the Rigvedic rivers is unclear in some of the early books of the Rigveda, the Nadistuti sukta is an important source for the geography of late Rigvedic society

The Sarasvati River is one of the chief Rigvedic rivers. The Nadistuti sukta in the Rigveda mentions the Sarasvati between the Yamuna in the east and the Sutlej in the west, and later texts like the Brahmanas and Mahabharata mention that the Sarasvati dried up in a desert.<sup>[216]</sup>

Most scholars agree that at least some of the references to the Sarasvati in the Rigveda refer to the Ghaggar-Hakra River,<sup>[44]</sup> while the Afghan river Haraxvaiti/Harauvati/Helmand is sometimes quoted as the locus of the early Rigvedic river.<sup>[45]</sup> Whether such a transfer of the name has taken place from the Helmand to the Ghaggar-Hakra is a matter of dispute. Identification of the early Rigvedic Sarasvati with the Ghaggar-Hakra before its assumed drying up early in the second millennium would place the Rigveda BCE,<sup>[web 23]</sup> well outside the range commonly assumed by Indo-Aryan migration theory

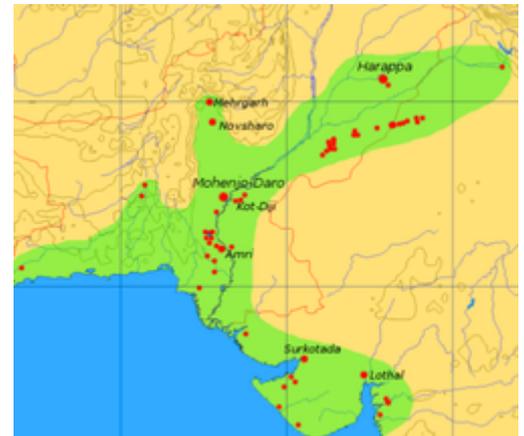
A non-Indo-Aryan substratum in the river-names and place-names of the Rigvedic homeland would support an external origin of the Indo-Aryans. However, most place-names in the Rigveda and the vast majority of the river-names in the north-west of South Asia are Indo-Aryan.<sup>[217]</sup> Non-Indo-Aryan names are, however, frequent in the Ghaggar and Kabul River areas,<sup>[218]</sup> the first being a post-Harappan stronghold of Indus populations.

## Textual references to migrations

### Rigveda

Just as the Avesta does not mention an external homeland of the Zoroastrians, the Rigveda does not explicitly refer to an external homeland<sup>[46]</sup> or to a migration.<sup>[47][note 50]</sup> Later Hindu texts, such as the Brahmanas, Mahabharata, Ramayana, and Puranas, are centered in the Ganges region (rather than Haryana and the Punjab) and mention regions still further to the south and east, suggesting a later movement or expansion of the Vedic religion and culture to the east. There is no clear indication of general movement in either direction in the Rigveda itself; searching for indirect references in the text, or by correlating geographic references with the proposed order of composition of its hymns, has not led to any consensus on the issue.

### Srauta Sutra of Baudhayana



Cluster of Indus Valley Civilization site along the course of the Indus River in Pakistan. See this for a more detailed map.



Probable geographic expansion of late Vedic culture.

According to Romila Thapar, the *Srauta Sutra of Baudhayana* "refers to the Parasus and the arattas who stayed behind and others who moved eastwards to the middle Ganges valley and the places equivalent such as the Kasi, the Videhas and the Kuru Pancalas, and so on. In fact, when one looks for them, there are evidence for migration."<sup>[web 24]</sup>

## Later Vedic and Hindu texts

Texts like the Puranas and Mahabharata belong to a much later period than the Rigveda, making their evidence less than sufficient to be used for or against the Indo-Aryan migration theory

Later Vedic texts show a shift of location from the Punjab to the East. According to the Yajurveda, Yajnavalkya (a Vedic ritualist and philosopher) lived in the eastern region of Mithila.<sup>[219]</sup> Aitareya Brahmana 33.6.1. records that Vishvamitra's sons migrated to the north, and in Shatapatha Brahmana 1:2:4:10 the Asuras were driven to the north.<sup>[220]</sup> In much later texts, Manu was said to be a king from Dravida.<sup>[221]</sup> In the legend of the flood he stranded with his ship in Northwestern India or the Himalayas.<sup>[222]</sup> The Vedic lands (e.g. Aryavarta, Brahmavarta) are located in Northern India or at the Sarasvati and Drishadvati river.<sup>[223]</sup> However, in a post-Vedic text the Mahabharata Udyoga Parva (108), the East is described as the homeland of the Vedic culture, where "the divine Creator of the universe first sang the Vedas".<sup>[224]</sup> The legends of Ikshvaku, Sumati and other Hindu legends may have their origin in Southeast Asia.<sup>[225]</sup>

The Puranas record that Yayati left Prayag (confluence of the Ganges & Yamuna) and conquered the region of Sapta Sindhu.<sup>[226][227]</sup> His five sons Yadu, Druhyus, Puru, Anu and Turvashu correspond to the main tribes of the Rigveda.

The Puranas also record that the Druhyus were driven out of the land of the seven rivers by Mandhatr and that their next king Gandhara settled in a north-western region which became known as Gandhara. The sons of the later Druhyu king Prachetas are supposed by some to have 'migrated' to the region north of Afghanistan though the Puranic texts only speak of an "adjacent" settlement.<sup>[228][229]</sup>

## Ecology

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Climate change and drought may have triggered both the initial dispersal of Indo-European speakers, and the migration of Indo-Europeans from the steppes in south central Asia and India.

Around 4200–4100 BCE a climate change occurred, manifesting in colder winters in Europe.<sup>[48]</sup> Between 4200–3900 BCE many tell settlements in the lower Danube Valley were burned and abandoned,<sup>[48]</sup> while the Cucuteni-Tripolye culture showed an increase in fortifications,<sup>[230]</sup> meanwhile moving eastwards towards the Dniepr.<sup>[231]</sup> Steppe herders, archaic Proto-Indo-European speakers, spread into the lower Danube valley about 4200–4000 BCE, either causing or taking advantage of the collapse Old Europe.<sup>[49]</sup>

The Yamna horizon was an adaptation to a climate change which occurred between 3500 and 3000 BCE, in which the steppes became drier and cooler. Herds needed to be moved frequently to feed them sufficiently, and the use of wagons and horse-back riding made this possible, leading to "a new, more mobile form of pastoralism".<sup>[50]</sup> It was accompanied by new social rules and institutions, to regulate the local migrations in the steppes, creating a new social awareness of a distinct culture, and of "cultural Others" who did not participate in these new institutions.<sup>[232]</sup>

In the second century BCE widespread aridization lead to water shortages and ecological changes in both the Eurasian steppes and south Asia.<sup>[web 1][51]</sup> At the steppes, humidization lead a change of vegetation, triggering "higher mobility and transition to the nomadic cattle breeding".<sup>[51][note 51][note 52]</sup> Water shortage also had a strong impact in south Asia:

This time was one of great upheaval for ecological reasons. Prolonged failure of rains caused acute water shortage in a large area, causing the collapse of sedentary urban cultures in south central Asia, Afghanistan, Iran, and India, and triggering large-scale migrations. Inevitably, the new arrivals came to merge with and dominate the post-urban cultures.<sup>[web 1]</sup>

The Indus Valley Civilisation was localised, that is, urban centers disappeared and were replaced by local cultures, due to a climate change that is also signalled for the neighbouring areas of the Middle East.<sup>[233]</sup> As of 2016 many scholars believe that drought and a decline in trade with Egypt and Mesopotamia caused the collapse of the Indus Civilisation.<sup>[234]</sup> The Ghaggar-Hakra system was rain-fed,<sup>[235][236][237]</sup> and water-supply depended on the monsoons. The Indus valley climate grew significantly cooler and drier from about 1800 BCE, linked to a general weakening of the monsoon at that time.<sup>[235]</sup> The Indian monsoon declined and aridity increased, with the Ghaggar-Hakra retracting its reach towards the foothills of the Himalaya,<sup>[235][238][239]</sup> leading to erratic and less extensive floods that made inundation agriculture less sustainable. Aridification reduced the water supply enough to cause the civilisation's demise, and to scatter its population eastward.<sup>[240][241][242]</sup>

## Controversy

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The debate about the origin of Indo-Aryan peoples is controversial in the Indian subcontinent. It is seen as an oppressive colonial construct, which undermines Indian narratives of the ancientness and indigenous origins of Indian people, language, culture and religion. The theory has been increasingly criticised in India with the growing popularity of Hindutva-politics in the 1990s.

### "Indigenous Aryans"

Opponents of the Indo-Aryan migration theory question it and instead promote the notion of *Indigenous Aryans*, which claims that speakers of Indo-Iranian languages (sometimes called *Aryan languages*) are "indigenous" to the Indian subcontinent.<sup>[243]</sup> Within India, several such alternative ideas of the origins of the Indo-Iranian languages and cultures have been developed that purport to show indigenous origins.<sup>[244]</sup> They are rejected by mainstream scholars, who point out that they neglect linguistic research,<sup>[244]</sup> and are contradicted by a broad range of research on Indo-European migrations.<sup>[10]</sup>

The proposed "Indigenous Aryans" scenario is based on specific interpretations of archaeological, genetic, and linguistic data and on literary interpretations of the Rigveda.<sup>[245]</sup> Standard arguments supporting the "Indigenous Aryans" theory or opposing the mainstream Indo-Aryan migration theory include the following:

- Questioning the Indo-Aryan migration theory:
  - Presenting the Indo-Aryan migration theory as an "Indo-Aryan invasion theory"<sup>[1][note 53]</sup>
  - Questioning the methodology of linguistics,<sup>[246][247]</sup>
  - Reinterpretation of the linguistic data, arguing for the ancient, indigenous origins of Sanskrit,<sup>[248][246]</sup>
  - Pointing to the supposed lack of genetic and archaeological evidence to support such an "invasion" into North West India,<sup>[246][note 54][note 55]</sup>
  - Contesting the possibility that small groups can change culture and languages in a major way,<sup>[255]</sup>
- Redating India's chronology re-establishing the Vedic-Puranic chronology:
  - Dating the Rigveda and the Vedic people to the 3rd millennium BCE or earlier,<sup>[256]</sup>
  - Identifying the Sarasvati River with the Ghaggar-Hakra River, which dried-up at ca. 2000 BCE,<sup>[257]</sup>
  - Identifying the Vedic people with the Harappan Civilisation,<sup>[258]</sup>
  - Equating the Harappan Civilisation, Vedic Culture and the Vedic-Puranic chronology.<sup>[259]</sup>

These ideas have been answered and rejected in mainstream scholarship.<sup>[260][9][261]</sup>

### Hindu nationalism

Nationalistic movements in India oppose the idea that Hinduism has partly endogenous origins.<sup>[244][262][263][note 56]</sup> For the founders of the contemporary Hindutva movement, the Aryan migration theory presented a problem.<sup>[264]</sup> The Hindutva-notion that the Hindu-culture originated in India was threatened by the notion that the Aryans originated outside India.<sup>[264]</sup> Later Indian writers regarded the Aryan migration theory to be a product of colonialism, aimed to denigrate Hindus.<sup>[265]</sup> According to them, Hindus had existed in India from times immemorial, as expressed by M. S. Golwalkar.<sup>[265]</sup>

Undoubtedly ... we Hindus have been in undisputed and undisturbed possession of this land for over 8 or even 10 thousand years before the land was invaded by any foreign race. (Golwakar [1939 1944])<sup>[265][note 57][note 58][note 19]</sup>

## Racism

The debate inflamed issues around racism and the idea of race, as the origin of the theory was intertwined with the desire of many in the Western world to find the origin of a pure Aryan race; the division of castes by racial basis; and the idea of an Indo-Aryan and Dravidian relating to language families rather than race.<sup>[278][279]</sup>

## Dalit response

The Dalit and Self-Respect Movement bases much of its identity on the idea of the indigenous origin of Dalits as opposed to transgressing Indo-Aryans.<sup>[280][281][282][283][284]</sup>

## See also

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- *The Arctic Home in the Vedas* by Bal Gangadhar Tilak
- Ariana
- Tamil nationalism

## Notes

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1. The term "invasion", while it was once commonly used in regard to Indo-Aryan migration, is now usually used only by opponents of the Indo-Aryan migration theory.<sup>[1]</sup> The term "invasion" does not any longer reflect the scholarly understanding of the Indo-Aryan migrations,<sup>[1]</sup> and is now generally regarded as polemical, distracting and unscholarly.
2. Michael Witzel: "Just one 'Afghan' IA tribe that did not return to the highlands but stayed in their Panjab winter quarters in spring was needed to set off a wave of acculturation in the plains, by transmitting its 'status kit' (Ehret) to its neighbors."<sup>[13]</sup>  
Compare Max Muller: "why should not one shepherd, with his servants and flocks, have transferred his peculiar dialect from one part of Asia or Europe to another? This may seem a very humble and modest view of what was formerly represented as the irresistible stream of mighty waves rolling forth from the Aryan centre and gradually overflowing the mountains and valleys of Asia and Europe, but it is, at all events, a possible view; nay should say a view far more in keeping with what we know of recent colonisation."<sup>[14]</sup>
3. David Anthony (1995): "Language shift can be understood best as a social strategy through which individuals and groups compete for positions of prestige, power and domestic security [...] What is important, then, is not just dominance, but vertical social mobility and a linkage between language and access to positions of prestige and power [...] A relatively small immigrant elite population can encourage widespread language shift among numerically dominant indigenes in a non-state or pre-state context if the elite employs a specific combination of encouragements and punishments. Ethnohistorical cases [...] demonstrate that small elite groups have successfully imposed their languages in non-state situations."<sup>[159]</sup>
4. Note the dislocation of the Indus Valley Civilisation prior to the start of the Indo-Aryan migrations into northern India, and the onset of Sanskritisation with the rise of the Kuru Kingdom, as described by Michael Witzel.<sup>[164]</sup> Note also that the "Ancestral North Indians" and "Ancestral South Indians"<sup>[33][32]</sup> mixed between 4,200 to 1,900 years ago (2200 BCE-100 CE), whereafter a shift to endogamy took place.<sup>[34]</sup>
5. Basu et al. (2016) discern four major ancestries in mainland India, namely ANI, ASI, Ancestral Austro-Asiatic tribals (AAA) and Ancestral Tibeto-Burman (ATB).<sup>[35]</sup>
6. See also Fertile Crescent, Western Asia and Near East
7. Both Renfrew and Cavalli-Sforza propose that proto-Dravidian was brought to India by farmers from the Iranian part of the Fertile Crescent.<sup>[183]</sup> The Dravidian language was present in northern India at the time of the arrival of the Indo-Aryans, who borrowed a substantial number of words from the Dravidian language.

8. Demkina et al. (2017): "In the second millennium BC, humidization of the climate led to the divergence of the soil cover with secondary formation of the complexes of chestnut soils and solonchaks. This paleoecological crisis had a significant effect on the economy of the tribes in the Late Catacomb and Post-Catacomb time stipulating their higher mobility and transition to the nomadic cattle breeding!"<sup>[51]</sup>
9. See also Eurogenes Blogspot, *The crisis* (<http://eurogenes.blogspot.nl/2017/07/the-crisis.html>)
10. Esleben: "In later years, especially before his death, he was deeply saddened by the fact that these classifications later came to be expressed in racist terms."<sup>[58]</sup>
11. According to Bryant, keeping up-to-date is problematic for many Indian scholars, since most Indian universities don't have enough funds to keep up with current scholarship, and most Indian scholars are not able to gain access to recent western publications.<sup>[65]</sup> Bryant further notes that "while one would be lucky to find a book by Max Muller even in the antique book markets of London, one can find a plethora of recent-edition publications of his and other nineteenth-century scholars' works in just about any bookstore in India (some of these on their tenth or twelfth edition). Practically speaking, it is small Delhi publishers that are keeping the most crude versions of the Aryan invasion theory alive by their nineteenth-century reprints! These are some of the main sources available to most Indian readers."<sup>[65]</sup>
12. Michael Witzel: "In these views, though often for quite different reasons, any immigration or trickling in – nearly always called "invasion" – of the (Indo-)Aryans into the subcontinent is suspect or simply denied. The Arya of the Rigveda are supposed to be just another tribe or group of tribes that have always been resident in India, next to Dravidians, Mundas, etc. The theory of an immigration of IA speaking Arya ("Aryan invasion") is simply seen as a means of British policy to justify their own intrusion into India and their subsequent colonial rule: in both cases, a "white race" was seen as subduing the local darker colored population. However, present (European, American, Japanese, etc.) Indologists do not maintain anything like this now [...] While the "invasion model" was still prominent in the work of archaeologists such as Wheeler (1966: "Indra stands accused"), it has been supplanted by much more sophisticated models over the past few decades (see Kuiper 1955 sqq.; Thapar 1968; Witzel 1995). This development has not occurred because Indologists were reacting, as is now frequently alleged, to current Indian criticism of the older theory. Rather, philologists first, and archaeologists somewhat later, noticed certain inconsistencies in the older theory and tried to find new explanations, a new version of the immigration theories!"<sup>[1]</sup>
13. Latham, as cited in Mallory 1989, p. 152
14. Krishnamurti states: "Besides, the Rg Veda has used the gerund, not found in Avestan, with the same grammatical function as in Dravidian, as a non-finite verb for 'incomplete' action. Rg Vedic language also attests the use of it as a quotation clause complementary. All these features are not a consequence of simple borrowing but they indicate substratum influence (Kuiper 1991: ch 2)".
15. Steppe herders, archaic Proto-Indo-European speakers, spread into the lower Danube valley as early as 4200–4000 BCE, either causing or taking advantage of the collapse of Old Europe.<sup>[49]</sup>
16. Nevertheless, archaeologists like B.B. Lal have seriously questioned the Bactria-Margiana and Indo-Iranian "connections", and thoroughly disputed all the proclaimed relations.<sup>[web 8]</sup>
17. However, this culture may also represent forerunners of the Indo-Iranians, similar to the Lullubi and Kassite invasion of Mesopotamia early in the second millennium BCE.
18. The "First urbanisation" was the Indus Valley Civilisation.<sup>[133]</sup>
19. Jainism and Buddhism *did not* originate from the historical Vedic religion, but are indigenous to India itself, just like Yoga and Samkhya.<sup>[subnote 6]</sup> Hinduism itself is "a fusion of Aryan and Dravidian cultures".<sup>[269]</sup> Among its roots are the historical Vedic religion of Iron Age India.<sup>[web 26]</sup> but also the religions of the Indus Valley Civilisation,<sup>[270][271][272][273]</sup> the Shramana<sup>[274]</sup> or renouncer traditions<sup>[275]</sup> of north-east India,<sup>[274]</sup> and "popular or local traditions".<sup>[275]</sup> The "Hindu synthesis" emerged around the beginning of the Common Era.<sup>[276][277]</sup>
20. Comparing the Harappan and Gandhara cultures, Kennedy states: "Our multivariate approach does not define the biological identity of an ancient Aryan population, but it does indicate that the Indus Valley and Gandhara peoples shared a number of craniometric, odontometric and discrete traits that point to a high degree of biological affinity." Kennedy in Erdosy 1995, p. 49
21. Kennedy: "Have Aryans been identified in the prehistoric skeletal record from South Asia? Biological anthropology and concepts of ancient races", in Erdosy 1995 at p. 49.
22. Cephalic measures, however, may not be a good indicator as they do not necessarily indicate ethnicity and they might vary in different environments. On the use of which, however, see <sup>[139]</sup>

23. Kennedy: "there is no evidence of demographic disruptions in the north-western sector of the Subcontinent during and immediately after the decline of the Harappan culture. If Vedic Aryans were a biological entity represented by the skeletons from Timargarha, then their biological features of cranial and dental anatomy were not distinct to a marked degree from what we encountered in the ancient Harappans." Kennedy in Erdosy 1995, p. 54
24. Kenoyer: "there was an overlap between Late Harappan and post-Harappan communities...with no biological evidence for major new populations." Kenoyer as quoted in Bryant 2001, p. 231
25. Hemphill: "the data provide no support for any model of massive migration and gene flow between the oases of Bactria and the Indus Valley. Rather, patterns of phonetic affinity best conform to a pattern of long-standing, but low-level bidirectional mutual exchange. "Hemphill 1998 "Biological Affinities and Adaptations of Bronze Age Bactrians: III. An initial craniometric assessment" American Journal of Physical Anthropology 106, 329–348.; Hemphill 1999 "Biological Affinities and Adaptations of Bronze Age Bactrians: III. A Craniometric Investigation of Bactrian Origins", American Journal of Physical Anthropology 108, 173–192
26. Kenoyer: "Although the overall socioeconomic organization changed, continuities technology, subsistence practices, settlement organization, and some regional symbols show that the indigenous population was not displaced by invading hordes of Indo-Aryan speaking people. For many years, the 'invasions' or 'migrations' of these Indo-Aryan-speaking Vedic/Aryan tribes explained the decline of the Indus civilization and the sudden rise of urbanization in the Ganges-Yamuna valley. This was based on simplistic models of culture change and an uncritical reading of Vedic texts..."<sup>[145]</sup>
27. Basu et al. (2003) refer to Renfrew (1992) *Archaeology, genetics and linguistic diversity* stating: "Renfrew (1992) has suggested that the elite dominance model, which envisages the intrusion of a relatively small but well-organized group that takes over an existing system by the use of force, may be appropriate to explain the distribution of the IE languages in north India and Pakistan."<sup>[19]</sup> Anthony explains that small elite groups may effect significant social changes because their social organisation allows for the recruitment of new members via patronage-systems, which may be attractive for outsiders.<sup>[20][21]</sup>
28. Compare the process of Sanskritization in India.
29. Another example Anthony gives of how an open social system can encourage recruitment and language shift, are the Pathans in western Afghanistan. Traditionally status depended on agricultural surpluses and landownership. The neighbouring Baluch, outnumbered by the Pathans, were pastoral herders, and has hierarchical political system. Pathans who lost their land, could take refuge among the Baluch. As Anthony notes, "chronic tribal warfare might generally favor pastoralism over sedentary economics as herds can be defended by moving them, whereas agricultural fields are an immobile target."<sup>[160]</sup>
30. Michael Witzel: Ehret, Ch., 1988. "Language Change and the Material Correlates of Language and Ethnic Shift," *Antiquity*, 62: 564–74; derived from Africa, cf. Diakonoff 1985.<sup>[18]</sup>
31. Joshua Fishman (1991), *Reversing language shift*
32. Reich et al. (2009) excluded the Austro-Asiatic and Tibeto-Burman speakers from their analysis in order to avoid interference.
33. Reich et al. (2009) "We analyze 25 diverse groups to provide strong evidence for two ancient populations, genetically divergent, that are ancestral to most Indians today. One, the "Ancestral North Indians" (ANI), is genetically close to Middle Easterners, Central Asians, and Europeans, while the other, the "Ancestral South Indians" (ASI), is as distinct from ANI and East Asians as they are from each other."
34. Moorjani et al. (2013) "Most Indian groups descend from a mixture of two genetically divergent populations: Ancestral North Indians (ANI) related to Central Asians, Middle Easterners, Caucasians, and Europeans; and Ancestral South Indians (ASI) not closely related to groups outside the subcontinent."
35. Moorjani et al. (2013) "We report genome-wide data from 73 groups from the Indian subcontinent and analyze linkage disequilibrium to estimate ANI-ASI mixture dates ranging from about 1,900 to 4,200 years ago. In a subset of groups, 100% of the mixture is consistent with having occurred during this period. These results show that India experienced a demographic transformation several thousand years ago, from a region in which major population mixture was common to one in which mixture even between closely related groups became rare because of a shift to endogamy."

36. Reich et al.: "The stronger gradient in males, replicating previous reports, could reflect either male gene flow from groups with more ANI relatedness into ones with less, or female gene flow in the reverse direction. However extensive female gene flow in India would be expected to homogenize ANI ancestry on the autosomes just as in mtDNA, which we do not observe. Supporting the view of little female ANI ancestry in India, Kivisild et al. reported that mtDNA 'haplogroup U' splits into two deep clades. 'U2i' accounts for 77% of copies in India but ~0% in Europe, and 'U2e' accounts for 0% of all copies in India but ~10% in Europe. The split is ~50,000 years old, indicating low female gene flow between Europe and India since that time.<sup>[32]</sup>
37. David reich: "This mystery of how Indo-Europeans spread over such a vast region and what the historical underpinnings of it would have been is ongoing and remains a mystery. The fact that these languages are in India has led to the hypothesis that they came in from somewhere else, from the north, from the west, and that perhaps maybe this would be a vector for the movement of these people.

Another reason that people think that is that when you have languages coming in, not always but usually they're brought by large movements of people. Hungarian is an exception. The Hungarians are mostly not descended from the people who brought Hungarian to Hungary. In general, languages typically tend to follow large movements of people.

On the other hand, once agriculture is established, as it has been for 5000 to 8000 years in India, it's very hard for a group to make a dent on it. The British didn't make any demographic dent on India even though they politically ruled it for a couple of hundred years.

It's a mystery how this occurred, and it remains a mystery. What we know is that the likely timing of this event is probably around 3000 to 4000 years ago. The timing of the arrival of Indo-European language corresponds to the timing of the mixture event.<sup>[web 2]</sup>

38. Note that according to Jones et al. (2015), Caucasian Hunter Gatherers and "the ancestors of Neolithic farmers" split circa 25,000 years ago: "Caucasus hunter-gatherers (CHG) belong to a distinct ancient clade that split from western hunter-gatherers ~45 kya, shortly after the expansion of anatomically modern humans into Europe and from the ancestors of Neolithic farmers ~25 kya, around the Last Glacial Maximum. CHG genomes significantly contributed to the Yamnaya steppe herders who migrated into Europe 8,000 BC, supporting a formative Caucasus influence on this important Early Bronze age culture."<sup>[40]</sup>
39. The reference is to a "recent study", and gives Kivisild et al. (1999). Kivisild (1999) does not mention the number 12,500, nor does it explicitly make such a statement. What it does state is that western-Eurasian and Indian mtDNA lineages overlap in haplogroup U,<sup>[178]</sup> that the split between the western-Eurasian and Indian U2 lineages appeared circa 53,000 ± 4,000 years before present,<sup>[178]</sup> and that "despite their equally deep time depth, the Indian U2 has not penetrated western Eurasia, and the European U5 has almost not reached India."<sup>[179]</sup> They further note that western-Eurasian mtDNA lineages did spread in India at the time of the spread of agricultural crops from the fertile Crescent.<sup>[180]</sup> Metspalu et al. (2011) do refer to 12,500 years ago.<sup>[177]</sup> Apparently, the reference to Kivisild (1999) is incorrect, and was not noticed by the authors.
40. After the initial settlement of India by the ASI.
41. See also eurogenes.blogspot, *The genetic structure of the world's first farmers (Lazaridis et al. preprint)* (<http://eurogenes.blogspot.nl/2016/06/the-genetic-structure-of-worlds-first.html>)
42. Metspalu et al (2011): "However any nonmarginal migration from Central Asia to South Asia should have also introduced readily apparent signals of East Asian ancestry into India (see Figure 2B). Because this ancestry component is absent from the region, we have to conclude that if such a dispersal event nevertheless took place, it occurred before the East Asian ancestry component reached Central Asia. The demographic history of Central Asia is, however, complex, and although it has been shown that demic diffusion coupled with influx of Turkic speakers during historical times has shaped the genetic makeup of Uzbeks<sup>75</sup> [...] it is not clear what was the extent of East Asian ancestry in Central Asian populations prior to these events."<sup>[176]</sup> See also Dinesh C. Sharma (2011), *Indians are not descendants of Aryans, says new study* (<http://indiatoday.intoday.in/story/indians-are-not-descendants-of-aryans-study/1/163645.html>), *India Today*

43. Moorjani: "The period of around 1,900–4,200 years BP was a time of profound change in India, characterized by the deurbanization of the Indus civilization, increasing population density in the central and downstream portions of the Gangetic system, 40 shifts in burial practices, and the likely first appearance of Indo-European languages and ~~Indic~~ <sup>Indic</sup> religion in the subcontinent.<sup>[181]</sup> Note that according to Salmons, language shift is driven by "systematic changes in community structure [...] namely a shift from local community-internal organization to regional (state or national or international, in modern settings), extra-community organizations. Shift correlates with this move from predominantly 'horizontal' community structures to more 'vertical' ones."<sup>[27]</sup>
44. Moorjani: "Further evidence for multiple waves of admixture in the history of many traditionally middle- and upper-caste groups (as well as Indo-European and northern groups) comes from the more recent admixture dates we observe in these groups (Table 1) and the fact that a sum of two exponential functions often produces a better fit to the decay of admixture LD than does a single exponential (as noted above for some northern groups; Appendix B). Evidence for multiple components of West Eurasian-related ancestry in northern Indian populations has also been reported by Metspalu et al. based on clustering analysis.<sup>[174]</sup>
45. The "original mixture event of ANI and ASI" may have been the spread of Dravidian languages to the south, followed by the (still ongoing) Sanskritization of India.<sup>[199]</sup> Note that Asko Parpola proposes that the Harappans spoke Proto-Dravidian language<sup>[web 22]</sup> and Mikhail Andronov proposes that the Proto-Dravidian language was introduced by migrations at the beginning of the third millennium BCE.<sup>[200]</sup> See Deneke's blogspot, 560K SNP study reveals dual origin of Indian populations (Reich et al. 2009)(<http://dienekes.blogspot.nl/2009/09/560k-snp-study-reveals-dual-rigin-of.html>) and Razib Khan (8 August 2013), Indo-Aryans, Dravidians, and waves of admixture (migration?)<sup>(<http://blogs.discovermagazine.com/gnxp/2013/08/indo-aryans-dravidians-and-waves-of-admixture-migration/>)</sup> for various proposals and discussions, and this chart (<http://dienekes.blogspot.nl/2012/10/the-tangled-web-of-humanity.html>) for the complexities of the Indian (and European) genepool.
46. According to George Hart, there existed an "Early South Indian Caste System", which ~~der~~ <sup>der</sup>ived from the well-known classic north Indian *varnas*.<sup>[201]</sup>
47. Caucasus Hunter Gatherers, one of the contributors to the Indo-Aryan gene-pool. According to Jones et al. (2015), "Caucasus hunter-gatherers (CHG) belong to a distinct ancient clade that split from western hunter-gatherers ~45 kya, shortly after the expansion of anatomically modern humans into Europe and from the ancestors of Neolithic farmers ~25 kya, around the Last Glacial Maximum."<sup>[202]</sup>
48. See also Eurogenes Blog, "Heavily sex-biased" population dispersals into the Indian Subcontinent<sup>(<http://eurogenes.blogspot.nl/2017/03/heavily-sex-biased-population.html>)</sup>
49. Mallory: "It is highly probable that the Indo-Aryans of Western Asia migrated eastwards, for example with the collapse of the Mitanni, and wandered into India, since there is not a shred of evidence — for example, names of non-Indic deities, personal names, loan words — that the Indo-Aryans of India ever had any contacts with their west Asian neighbours. The reverse possibility that a small group broke off and wandered from India into Western Asia is readily dismissed as an improbably long migration, again without the least bit of evidence."<sup>[43]</sup>
50. According to Cardona, "there is no textual evidence in the early literary traditions unambiguously showing a trace" of an Indo-Aryan migration.<sup>[47]</sup>
51. Demkina et al. (2017): "In the second millennium BC, humidization of the climate led to the divergence of the soil cover with secondary formation of the complexes of chestnut soils and solonchaks. This paleoecological crisis had a significant effect on the economy of the tribes in the Late Catacomb and Post-Catacomb time stipulating their higher mobility and transition to the nomadic cattle breeding."<sup>[51]</sup>
52. See also Eurogenes Blogspot, The crisis (<http://eurogenes.blogspot.nl/2017/07/the-crisis.html>)
53. The term "invasion" is only used nowadays by opponents of the Indo-Aryan migration theory.<sup>[4]</sup> The term "invasion" does not reflect the contemporary scholarly understanding of the Indo-Aryan migrations,<sup>[1]</sup> and is merely used in a polemical and distractive way

#### 54. Archaeological arguments:

- Scholars like Jim G. Shaffer and B.B. Lal note the absence of archaeological remains of an Aryan "conquest" and note the high degree of physical continuity between Harappan and Post-Harappan society<sup>[web 25]</sup> They support the controversial<sup>[web 25]</sup> theory that the Aryan civilization was not introduced by Aryan migrations, but originated in pre-Vedic India.<sup>[web 25]</sup>
- Jim Shaffer has noted several problems with the arguments that the ancient Harappans were Aryans.<sup>[249]</sup> According to Shaffer, archaeological evidence consistent with a mass population movement, or an invasion of South Asia in the pre- or proto- historic periods, has not been found. Instead, Shaffer proposes a series of cultural changes reflecting indigenous cultural developments from prehistoric to historic periods.<sup>[250]</sup><sup>[subnote 1]</sup> Shaffer contends:

There were no invasions from central or western South Asia. Rather there were several internal cultural adjustments reflecting altered ecological, social and economic conditions affecting northwestern and north-central South Asia.<sup>[251]</sup>

- Lal notes that at Kalibangan (at the Ghaggar river) the remains of what some writers claim to be fire altars have been unearthed that are claimed to have been used for Vedic sacrifices although the presence of animal bones does not seem consistent with Vedic rites. In addition, the remains of a bathing place (suggestive of ceremonial bathing) have been found near the altars in Kalibangan.<sup>[252]</sup> S.R. Rao found similar "fire altars" in Lothal which he thinks could have served no other purpose than Vedic ritual.<sup>[253]</sup> The sites in Kalibangan are dated back to pre-Harappan times i.e. 3500 BC, well before any likely date for the Indo-Aryan migrations, so this may suggest that Vedic rites are indigenous to India and not brought in from outside.<sup>[254]</sup>
55. Archaeological evidence of continuity need not be conclusive. A similar case has been Central Europe, where the archaeological evidence shows continuous linear development, with no marked external influences.<sup>[subnote 2]</sup> Archaeological continuity can be supported for every Indo-European-speaking region Eurasia, not just India.<sup>[subnote 3]</sup><sup>[subnote 4]</sup> Several historically documented migrations, such as those of the Helvetii to Switzerland, the Huns into Europe, or Gaelic-speakers into Scotland are not attested in the archaeological record.<sup>[subnote 5]</sup> As Cavalli-Sforza 2000 sums up, "archaeology can verify the occurrence of migration only in exceptional cases".
56. See also S. Kalyanaraman (19 December 2005), Harvard University's international scandal unravels a global Hindu conspiracy ([http://www.ivarta.com/columns/ol\\_051219.htm](http://www.ivarta.com/columns/ol_051219.htm)).
57. See also Savarkar, Essentials of Hindutva ([http://www.savarkar.org/content/pdfs/en/essentials\\_of\\_hindutva.v001.pdf](http://www.savarkar.org/content/pdfs/en/essentials_of_hindutva.v001.pdf)) and Edwin Bryant, The Quest for the Origins of Vedic Culture: The Indo-Aryan Migration Debate
58. Hindutva-theory faces other challenges as well. It includes Jainism and Buddhism into its notions of 'Hinduness', as part of the Indian heritage. A recent strategy exemplified by Rajiv Malhotra is the use of the term dhama as a common denominator, which also includes Jainism and Buddhism.<sup>[266]</sup> Nevertheless, Jainism and Buddhism have distinct origins.<sup>[267]</sup>

#### Subnotes

1. Shaffer: "Current archaeological data do not support the existence of an Indo-Aryan or European invasion into South Asia any time in the pre- or protohistoric periods. Instead, it is possible to document archaeologically a series of cultural changes reflecting indigenous cultural developments from prehistoric to historic periods". Shaffer<sup>[250]</sup> as cited in Bryant 2001, p. 232
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3. Mallory, in Blench & Spriggs 1997
4. Bryant: "India is not the only Indo-European-speaking area that has not revealed any archaeological traces of immigration." As Bryant 2001, p. 235
5. Anthony 1986, Sinor 1990, p. 203, Mallory 1989, p. 166 as cited in Bryant 2001, p. 235
6. Zimmer: "Jainism does not derive from Brahman-Aryan sources, but reflects the cosmology and anthropology of a much older pre-Aryan upper class of northeastern India – being rooted in the same subsoil of archaic metaphysical speculation as Yoga, Sankhya, and Buddhism, the other non-Vedic Indian systems."<sup>[268]</sup>

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