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Article

Massive cranium from Harbin in northeastern China establishes a new Middle Pleistocene human lineage

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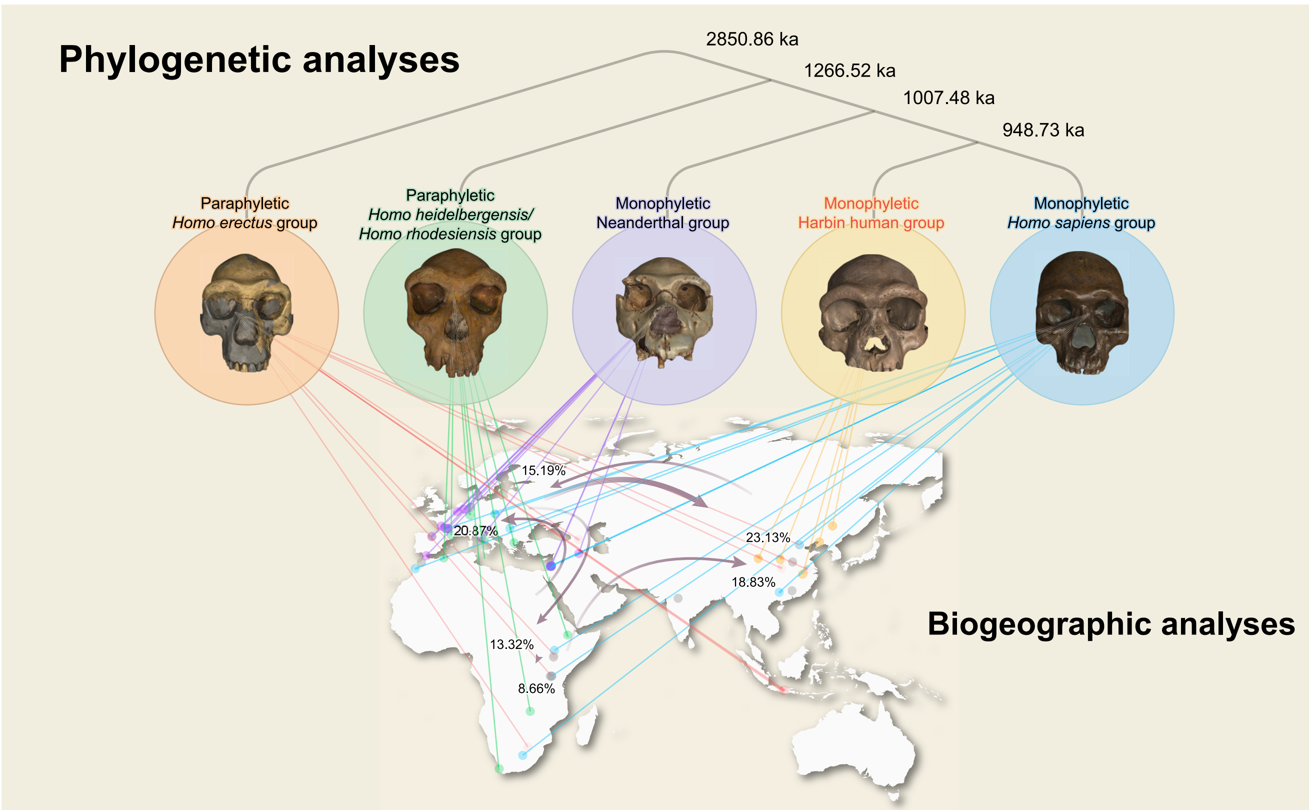
Graphical abstract



Public summary

- More than 100,000 years ago, several human species coexisted in Asia, Europe, and Africa
- A completely preserved fossil human cranium discovered in the Harbin area provides critical evidence for understanding the evolution of humans and the origin of our species
- The Harbin cranium has a large cranial capacity (~1,420 mL) falling in the range of modern humans, but is combined with a mosaic of primitive and derived characters
- Our comprehensive phylogenetic analyses suggest that the Harbin cranium represents a new sister lineage for *Homo sapiens*
- A multi-directional "shuttle dispersal model" is more likely to explain the complex phylogenetic connections among African and Eurasian *Homo* species/populations

Massive cranium from Harbin in northeastern China establishes a new Middle Pleistocene human lineage

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It has recently become clear that several human lineages coexisted with *Homo sapiens* during the late Middle and Late Pleistocene. Here, we report an archaic human fossil that throws new light on debates concerning the diversification of the *Homo* genus and the origin of *H. sapiens*. The fossil was recovered in Harbin city in northeastern China, with a minimum uranium-series age of 146 ka. This cranium is one of the best preserved Middle Pleistocene human fossils. Its massive size, with a large cranial capacity (∼1,420 mL) falling in the range of modern humans, is combined with a mosaic of primitive and derived characters. It differs from all the other named *Homo* species by presenting a combination of features, such as long and low cranial vault, a wide and low face, large and almost square orbits, gently curved but massively developed supraorbital torus, flat and low cheekbones with a shallow canine fossa, and a shallow palate with thick alveolar bone supporting very large molars. The excellent preservation of the Harbin cranium advances our understanding of several less-complete late Middle Pleistocene fossils from China, which have been interpreted as local evolutionary intermediates between the earlier species *Homo erectus* and later *H. sapiens*. Phylogenetic analyses based on parsimony criteria and Bayesian tip-dating suggest that the Harbin cranium and some other Middle Pleistocene human fossils from China, such as those from Dali and Xiahe, form a third East Asian lineage, which is a part of the sister group of the *H. sapiens* lineage. Our analyses of such morphologically distinctive archaic human lineages from Asia, Europe, and Africa suggest that the diversification of the *Homo* genus may have had a much deeper timescale than previously presumed. Sympatric isolation of small populations combined with stochastic long-distance dispersals is the best fitting biogeographical model for interpreting the evolution of the *Homo* genus.

Keywords: **human phylogeny; human cranium fossil; human dispersal; human diversification**

INTRODUCTION

The origin of modern humans (*Homo sapiens*, our own species) has long been a controversial topic. During the late Middle and Late Pleistocene, several human lineages, evidently at species level, coexisted with *H. sapiens* across Africa and Eurasia. These extinct hominins include *H. heidelbergensis*/*H. rhodesiensis*, *Homo naledi*, *Homo floresiensis*, *H. luzonensis*, Denisovans, Neanderthals (*Homo neanderthalensis*), and *Homo erectus*.[1–5] The phylogenetic relationship between these coexisting hominins and *H. sapiens* has long been debated. Before the appearance of undoubted modern humans in Asia, some archaic fossils, such as those from Narmada, Maba, Dali, Jinniushan, Xuchang, and Hualongdong show mosaic combinations of features present in *H. erectus*, *H. heidelbergensis*/*H. rhodesiensis*, Neanderthals, and *H. sapiens*. Therefore, it is widely believed that these Asian hominins are critical for studying the later evolution of the genus *Homo* and the origin of *H. sapiens*. The incomplete preservation of these fossils and the fact that they have largely been described by advocates of regional continuity have made it difficult to integrate them into the wider picture of human evolution. For example, Xuchang, Dali, and Hualongdong have all been described as transitional forms between Chinese *H. erectus* and *H. sapiens*, whose affinities can be understood in the context of a braided stream network model of gene flow.[6–9] Here, we report a fossil human cranium that is characterized by a combination of large cranial capacity, short face, and small check bones as in *H. sapiens*, but also a low vault, strong browridges, large molars, and alveolar prognathism as in most archaic humans. Through phylogenetic and biogeographic analyses, we argue that this fossil is the most complete representative of a distinct Middle Pleistocene lineage, with a separate evolutionary history in East Asia.

The Harbin human fossil is represented by a single cranium (HBSM2018-000018(A), housed in the Geoscience Museum of Hebei GEO University, Shijiazhuang, Hebei Province, China), which was reportedly discovered in 1933 during construction work when a bridge (Dongjiang Bridge) was built over the Songhua River in Harbin city (Figure 1). Because of a long and confused history since the discovery (see the supplemental information), the exact site of the find is uncertain. We tested the concentrations of rare earth elements (REEs) and the Sr isotopic composition of the human fossil and a range of mammalian fossils collected from deposits of the Songhua River near the supposed locality (Dongjiang Bridge), and used non-destructive X-ray fluorescence analyses to examine the element distributions of these human and mammalian fossils. The results of our experiments show that element distributions and REE concentrations of the Harbin cranium and the mammalian fossils found near Dongjiang Bridge have similar distribution patterns.[10] The Sr isotopic composition of the Harbin cranium falls in the range of the local Middle Pleistocene-Early Holocene human and mammalian fossils.[10] We also directly dated the Harbin fossil cranium by the uranium-series disequilibrium (U-series) method. The results suggest a minimum age for the cranium of ∼146 ka.[10] While these results cannot pin the Harbin cranium to an exact site and layer, they are consistent with the conclusion that the cranium is from the late Middle Pleistocene of the Harbin area.[10]

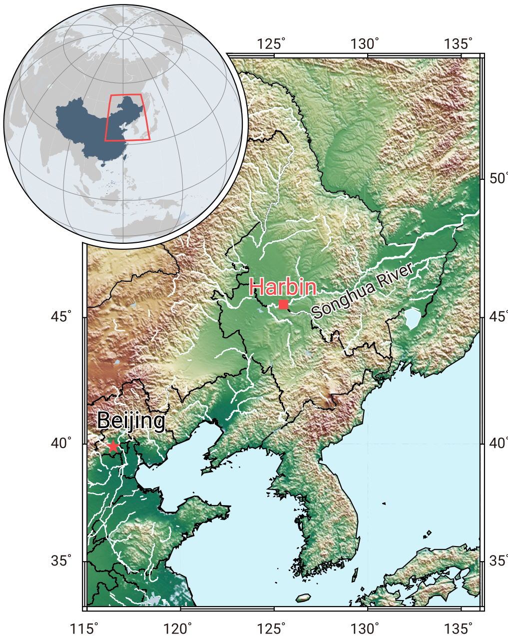

Figure 1. Geographic location of the Harbin cranium The red square indicates the Dongjiang Bridge in Harbin city.

RESULTS AND DISCUSSION

Morphology

The Harbin cranium is undistorted and almost intact, with the main losses being all but one tooth (the left M^2), and slight damage to the left zygomatic arch (Figure 2). It is massive in size, showing the largest values in our comparative fossil database (see the supplemental information) for measurements, such as maximum cranial length, nasio-occipital length, and supraorbital torus breadth, and the second largest values for measurements, such as biauricular breadth, frontal chord, zygomatic breadth, and biorbital breadth. Detailed morphological descriptions and comparisons of the cranium are given in the supplemental information, and are summarized below.

The cranial vault is voluminous (~1,420 mL capacity, measured using high-resolution computed tomography [CT] scanning and three-dimensional reconstruction of the endocranial cast). However, the braincase is clearly archaic, with a very wide supraorbital torus, base and palate, and a long and low shape in lateral view, with a receding frontal and evenly curved parietal contour. Nevertheless, it lacks both the angulated occipital with a strong transverse torus found in *H. erectus* and *H. heidelbergensis*/*H. rhodesiensis* crania, and the protruding occipital region with a central suprainiac fossa typical of Neanderthals. In posterior view the unkeeled cranium is widest in the supramastoid area, below which the well-developed mastoid processes slope inward. The temporals and parietals do not converge strongly as in *H. erectus* fossils, but there is no upper parietal expansion, as found in recent *H. sapiens*, nor the "en bombe" shape typical of Neanderthals. In lateral view the face is relatively low in height and retracted under the cranial vault, lacking the total anterior projection typical of *H. erectus* and *H. heidelbergensis*/*H. rhodesiensis*. The upper face and nasal aperture are very wide, but the zygomaxillary region is transversely flat and faces anteriorly, with a morphology like that of *H. sapiens*.

The combination of an archaic but large-brained cranial vault and a wide but *H. sapiens*-like face is striking, and is also found in the less-complete Middle Pleistocene Chinese fossils from Dali and Jinniushan, although they differ in details of morphology (see the supplemental information and Videos S1–S3). The less-complete Hualongdong cranium resembles Dali more closely in several respects, and some of its differences may be due to its immaturity, while the Xuchang and Maba partial crania appear more distinct (see the supplemental information for more details and comparative data).

Overall, the Harbin cranium shows an individual combination of traits, and probably represents a distinct species of *Homo* from other designated Middle-Late Pleistocene human taxa, such as *H. sapiens*, *H. neanderthalensis*, and *H. heidelbergensis*/*H. rhodesiensis*. Its enormous overall size sets it apart from nearly every other fossil but, in terms of cranial vault proportions, the braincase clearly overlaps in shape with those of other large-sized late archaic *Homo* species. However, the face, despite its enormous breadth dimensions, is relatively low in height and has an *H. sapiens* and *H. antecessor*-like zygomaxillary shape that is also found in the Middle Pleistocene Chinese fossils from Dali and Jinniushan. It is also hafted onto the braincase with reduced prognathism, as in recent humans. In its combination of traits, the Harbin cranium is more like fossils attributed to early *H. sapiens*, such as Jebel Irhoud 1 and Eliye Springs, than to later members of our lineage. Finally, and perhaps significantly, the morphology and large size of the surviving Harbin M^2 (Figure S1, mesiodistal length 13.6 mm and buccolingual width 16.6 mm) are matched most closely in the Late Pleistocene record by the permanent molars from Denisova Cave (Denisovan 4: $M^{2/3}$, mesiodistal length 13.1 mm, and buccolingual width 14.7 mm; Denisovan 8: M^3, mesiodistal length 14.3 mm, and buccolingual width 14.65 mm).[11,12]

Life reconstruction

The overall size, robustness, thick and strong supraorbital tori, large mastoid processes, and salient temporal lines of the Harbin cranium suggest that

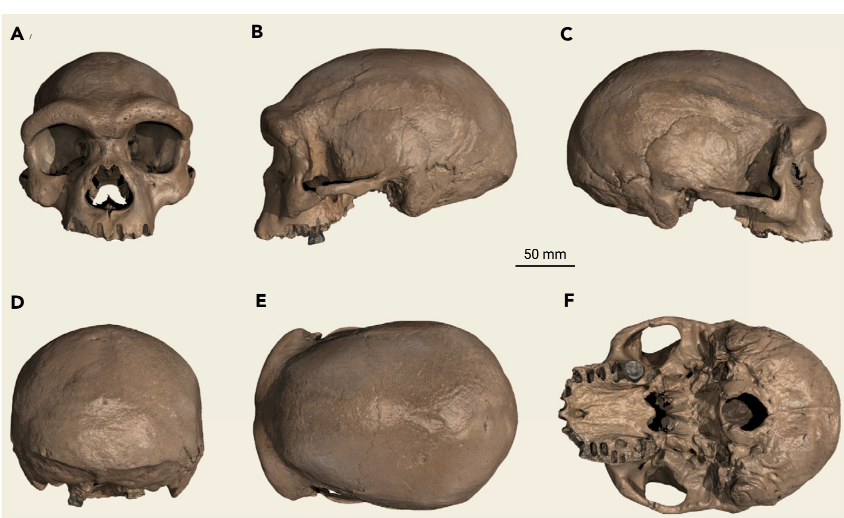

Figure 2. The Harbin cranium in standard views (A) Anterior view.
(B) Lateral view, left side.
(C) Lateral view, right side.
(D) Posterior view.
(E) Superior view.
(F) Inferior view. Scale bar, 50 mm.

it probably represents a male individual. The ectocranial sutures at the midlambdoid, lambdoid, obelion, anterior sagittal, superior sphenotemporal, incisive, anterior and posterior median palatine, and transverse palatine are all completely obliterated. The ectocranial sutures at bregma, midcoronal, pterion, sphenofrontal, and inferior sphenotemporal show significant closure. For the standard of *H. sapiens*, the ectocranial suture composite scores would suggest an old adult around 50 years old.[11,12] However, the tooth wear seems to suggest a younger age. The only preserved M^2 still has much enamel present, and dentine exposure is present on the protocone and paracone. The relatively complete ectocranial suture closure may be related to the robustness of the Harbin cranium. The large square eye sockets with strong supraorbital tori indicate deep eyes. The large and wide piriform aperture indicates a large and bulbous nose. The expanded paranasal region and relatively projecting middle face are matched with flat and short modern human-like cheek regions. Large incisor and canine tooth sockets indicate that the man probably had quite large front teeth and a broad mouth. The mandible of this individual is not known, but the phylogenetic analyses suggest that the Harbin cranium and the Xiahe mandible from Gansu Province of China form a sister group. The M^2 size of the Harbin cranium matches the tooth size of the Xiahe mandible. It is reasonable to deduce that the Harbin cranium probably matches a mandible as robust as the Xiahe mandible and without a chin. It is hard to reconstruct the skin tone and hair color of the Harbin individual without genetic information, but available genetic data suggest that Neanderthals, Denisovans, and early *H. sapiens* generally had relatively dark skin, hair, and eye color. Considering the high latitude of the provenance of the Harbin cranium, we have chosen to give the reconstruction only a medium-dark skin color (Figure 3).

Phylogenetic position of the Harbin cranium

Our extensive phylogenetic analyses based on parsimony criteria[13] and Bayesian inference[14–17] firstly support the monophyly of Neanderthals and the monophyly of *H. sapiens* (Figures 4 and S19–S23). The Irhoud fossils from Morocco form the most basal operational taxonomic unit (OTU) of the *H. sapiens* clade, and the Sima de los Huesos crania from Spain form the most basal OTU of the Neanderthal clade, in line with other current interpretations.[18–20] The Harbin cranium and Xiahe mandible form a sister group, and they, plus the Dali, Hualongdong, Jinniushan specimens, the European *H. antecessor* partial cranium, the African Eliye Springs cranium, and Rabat palate, form a monophyletic group. This clade forms the sister group of the similarly monophyletic *H. sapiens* clade. The specimens traditionally grouped in *H. heidelbergensis*/*H. rhodesiensis* do not constitute a monophyletic group and the Asian and African *H. erectus* specimens similarly form a paraphyletic group. When backbone constraints are used to reflect the results from palaeoproteomic and ancient DNA research by forcing the Xiahe mandible as the sister group of Neanderthals[21] and *H. antecessor* outside of the *H. sapiens*-Neanderthal clade,[22] Chinese late Middle Pleistocene humans, including the Harbin cranium, form a monophyletic clade as the sister group of Neanderthals (Figure S20). Both most parsimonious and backbone partially constrained phylogenetic trees support the monophyly of the group, including Dali, Jinniushan, Hualongdong, Xiahe, and Harbin.

Some researchers have proposed that all Middle Pleistocene hominins belong to a single lineage leading to modern humans, with Asian Middle Pleistocene hominins, such as Dali and Hualongdong, suggested as transitional forms between Asian *H. erectus* and Asian *H. sapiens* specimens.[6,9,24] Some other researchers have recognized these Asian hominins as part of the *H. heidelbergensis*/*H. rhodesiensis* hypodigm.[25–27] A previous analysis based on overall similarity showed differences between Dali-Maba and the *H. heidelbergensis* hypodigm, and the potential connection between Dali-Maba and African early *H. sapiens*.[28] Our analyses suggest that the Harbin cranium, together with Dali, Jinniushan, Hualongdong, and Xiahe, is not a part of the African and European *H. heidelbergensis*/*H. rhodesiensis* clade, but is the sister group of *H. sapiens* (see also the backbone partially constrained parsimony analysis in the supplemental information). The sister relationship between Harbin and Xiahe, as identified by Bayesian inference (but not parsimony analysis, see the supplemental information), is particularly interesting. The Xiahe mandible shows some proteomic features of the Denisovans,[21] who were informally called "*Homo sapiens altaiensis*" or "*Homo altaiensis*,"[12,29] and sediments from Baishiya Cave have yielded Denisovan mtDNA.[30] The Harbin M^2 also matches the known permanent Denisovan molars in size and root morphology, and, ever since the discovery of Denisovans, Asian Middle Pleistocene hominins, such as Dali, Jinniushan, and Xujiayao, have been suspected to represent an East Asian population of the Denisovans.[31] More mandibular specimens for the Harbin population or cranial specimens corresponding to the Xiahe mandible will test how close the Harbin and Xiahe humans are morphologically, while new genetic material will test the relationship of these populations to each other and to the Denisovans.

The results of the Bayesian tip-dating analyses suggest that the Harbin and Xiahe fossils shared a common ancestor ~188 ka (397–155 ka), and the clade, including the Harbin cranium and *H. sapiens* shared a common ancestor at ~949 ka (1,041.41–875.25 ka). The Neanderthal-*H. sapiens* divergence time in our analysis was ~1,007 ka (1,114–919 ka). This estimation falls in the range based on mtDNAs for the split between the basal Neanderthal (Sima de los Huesos) and the *H. sapiens* lineage,[20] but is much older than the estimation based on nuclear DNAs for the splits between the Neanderthal and *H. sapiens* lineages.[32–34] However, it is possible that this younger estimated divergence date is an artifact of statistical averaging between "super-archaic" and "recent gene flow" events.[35] The common ancestor of the *H. sapiens* OTUs included in our analysis is as old as ~770 ka (922–622 ka), suggesting that the *H. sapiens* clade has a much deeper origin time than previously estimated. The Eurasian *H. sapiens* OTUs share a common ancestor ~416 ka (534–305 ka) old. Outside of Africa, however, the earliest known *H. sapiens* fossil is only ~210 ka.[36]

There is a large time gap between the hypothetical common ancestor of Eurasian *H. sapiens* and the actual fossil record, from the Bayesian tip-dating analysis. One plausible hypothesis is that the ancestral population of Eurasian *H. sapiens* may have diversified in Africa for many millennia before they dispersed into Eurasia. Genetic studies on ancient DNA suggest that the initial genetic exchanges between Neanderthals and *H. sapiens* occurred between 468 and 219 ka,[33] or between ~370 and 100 ka,[34] and the introgression may

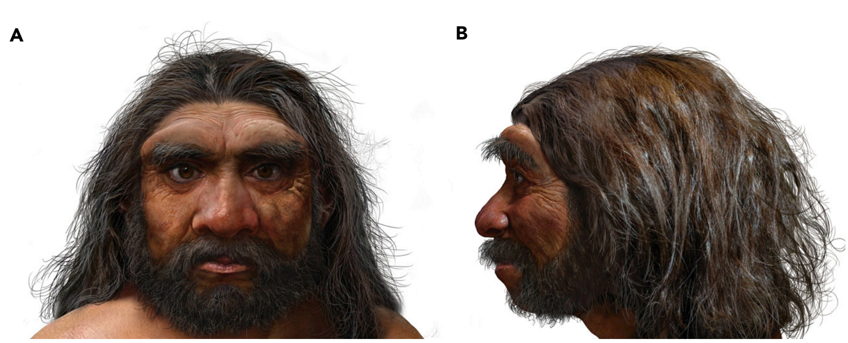

Figure 3. Life reconstruction of the Harbin cranium
(A) Anterior view.
(B) Lateral view, left side.

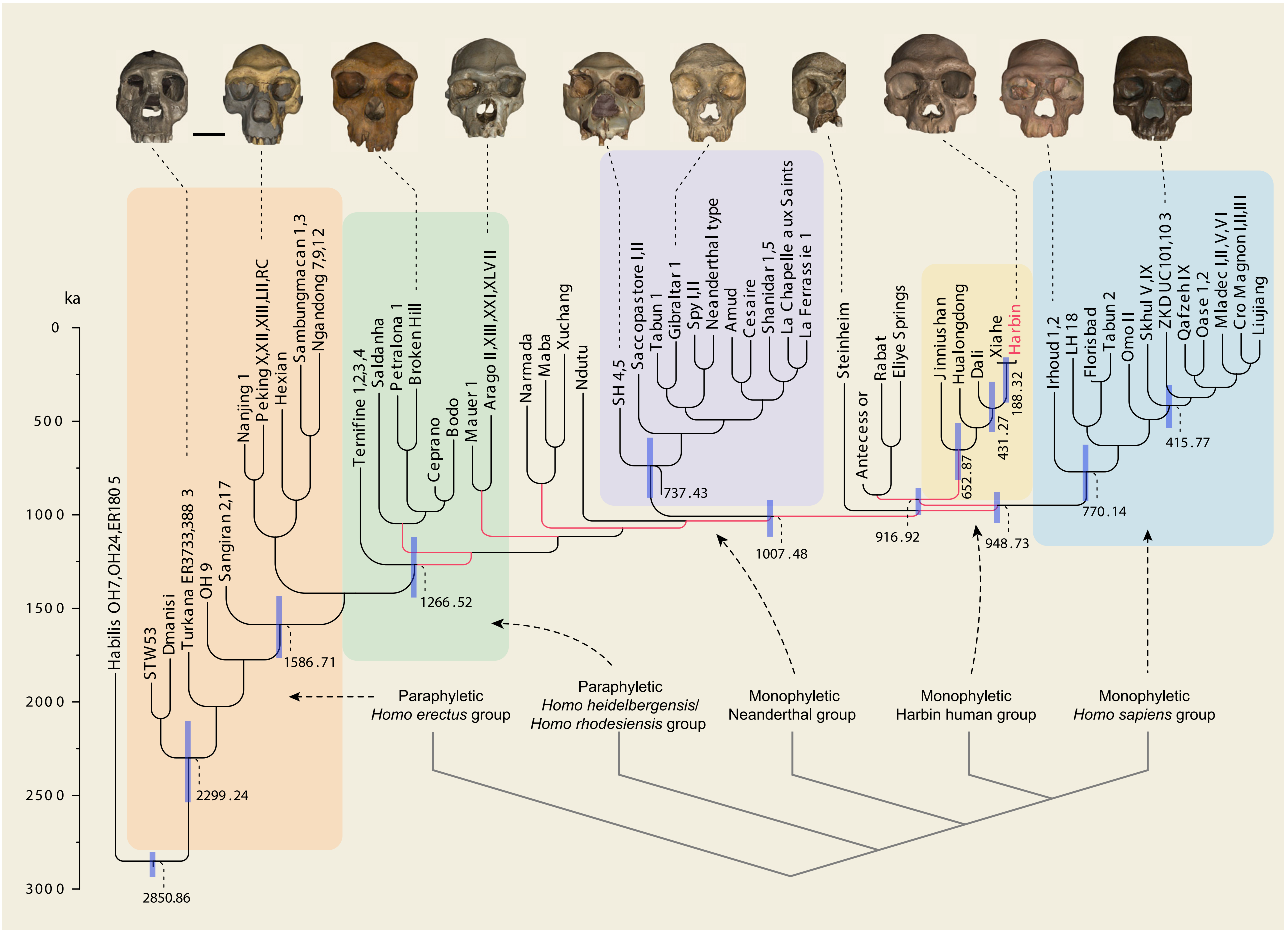

Figure 4. Phylogeny of the 55 selected fossils from the genus *Homo* The topology of the tree was inferred from a Bayesian tip-dating analysis in MrBayes 3.2[23] and summarized as the all-compatible tree. To reduce the polytomy at some clades, the strict consensus of the most parsimonious trees from the parsimony analysis in TNT[13] was used as a reference. The branches in red indicate the backbone constraints based on the most parsimonious trees. Branch lengths are proportional to the division age in thousands of years. Numbers at the internal nodes are the median ages, and the blue bars indicate the 95% highest posterior density interval of the node ages. Color shadows indicate the monophyletic *H. sapiens* group, Neanderthal group and Harbin human group, and the paraphyletic *H. heidelbergensis/H. rhodesiensis* group and *H. erectus* group. A simplified phylogenetic relationship of the five groups is shown on the lower right. Human crania images are aligned to the Frankfurt horizontal plane. Scale bar, 50 mm (between the Turkana and Peking crania).

have originated through gene flow from an African source.[19,33] Interestingly, not only does the estimated time of the introgression event between Neanderthals and *H. sapiens* roughly overlap our prediction for the age of the common ancestor of Eurasian *H. sapiens*, but the African origin of the introgression is also consistent with our African ancestral population hypothesis.

Biogeography of the *Homo* species/populations

We conducted maximum likelihood analysis under 18 different biogeographical models and estimated the number and type of biogeographical events using biogeographical stochastic mapping (BSM). The Akaike information criterion (AIC) model selection strongly supported dispersal-extinction cladogenesis[37,38] with the founder-event dispersal ("jump dispersal")[39,40] model (DEC + *j*) as the best fit and the most probable biogeographical model (Tables S12–S14). Under this best fitting model (Figure 5), the ancestral distribution range of the Harbin, Dali, Jinniushan, Xiahe and Hualongdong group is most probably in Asia. The ancestral area for the Harbin-*H. sapiens* clade is most probably from Africa, supporting the idea that Africa is the center of origin of the *H. sapiens* clade. The ancestral distribution of the group bracketing Neanderthal, *H. sapiens*, and Harbin is from Africa or Europe.

Our simulation of the biogeographical history of *Homo* species/populations identified sympatry diversification (~57%) and founder-event dispersal (~42%) as the common types of biogeographical modes across the phylogenetic tree of *Homo* (Table S15). Because all the OTUs are at the population level from a single locality, it is reasonable to find that no range expansion or range contraction event is detected from the BSM simulations. Founder-event dispersal usually involves a small number of individuals that dispersed to a new locality through a long dispersal distance and established a new isolated founder population.[42–44] The changes in distribution range occurred at a lineage-splitting node, resulting in one daughter lineage dispersal into a new range, and the other daughter lineage remaining in the ancestral range. Sympatric diversification and founder-event dispersal being the most dominant biogeographical modes reflects the fact that multi-lineages of *Homo* coexisted in Africa, Europe, and Asia during the Middle and Late Pleistocene. These *Homo* lineages probably had a strong capability of dispersing for long distances, but remained in relatively small and isolated populations.

BSMs indicate that the directionality of the dispersals between Africa, Asia, and Europe is asymmetric (Figure 5; Table S15). Asia is a sink of *Homo* species/populations that receives more dispersals from Africa and Europe than it gives dispersals to Africa and Europe. In total, Asia receives ~42% of the total dispersal events and only provides ~24% dispersals to other continents (Figure 5; Table S16). Africa is the major source of *Homo* dispersals. In total, ~40% of all the dispersals are from Africa, while Africa also receives ~22% dispersals from Asia and Europe. Instead of a unidirectional "out of Africa" model, a multi-directional "shuttle dispersal model" is more likely to explain the complex phylogenetic connections among African and Eurasian *Homo* species/populations.

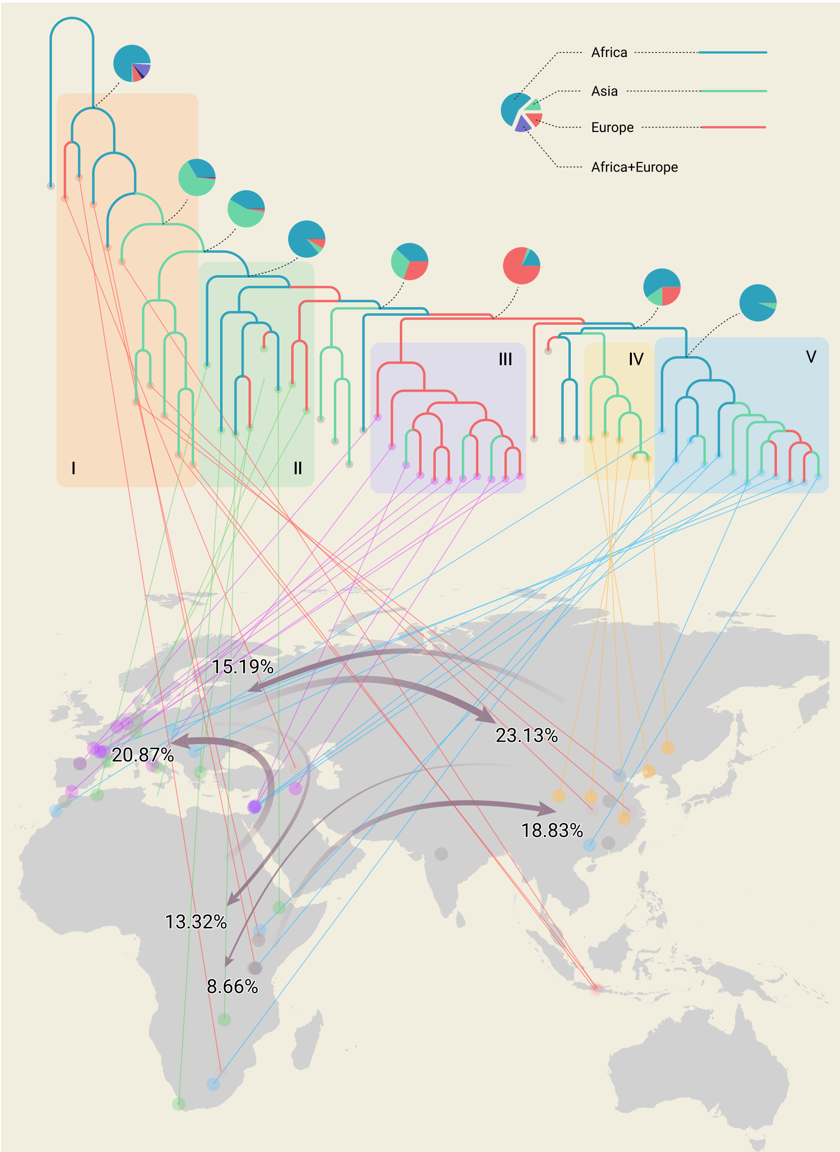

Figure 5. Maximum likelihood ancestral range estimations and dispersal events for the Pleistocene *Homo* species/populations R[41] package BioGeoBEARS[39,40] was used to estimate ancestral range probabilities and the number of dispersals. Topology of the phylogenetic tree is the same as that in Figure 4. The branch colors (red, blue, and green) indicate the geographical occurrences of the *Homo* fossils and the maximum likelihood ancestral range estimations for *Homo* under the best DEC + *j* model (dispersal-extinction cladogenesis[38] with the founder-event dispersal[39,40] model). The pie diagrams at the nodes show the relative probability of all possible ancestral distribution (areas or combinations of areas). Color shadows behind the phylogenetic tree indicate: I, *H. erectus* group; II, *H. heidelbergensis/H. rhodesiensis* group; III, Neanderthal group; IV, Harbin human group; V, *H. sapiens* group. Terminal taxa are linked with their geographical distributions. Grey arrows indicate the dispersal events between Africa, Asia, and Europe. Numbers near the arrowheads show the percentages of the means for the count of dispersal events between each pair of regions. The means are calculated from the event counts in each of 100 biogeographical stochastic maps. The common ancestor of the *H. sapiens* group and the common ancestor of the *H. sapiens* group, Harbin human group, and Neanderthal group are from Africa. However, the monophyletic clade embraced between the *H. sapiens* group and Asian *H. erectus* has an ancestral distribution in Asia. Asia received more dispersals from the other two continents. Africa received fewer dispersal from the other two continents.

Conclusions

The Harbin cranium is one of the best preserved of all archaic human fossils and its estimated late Middle Pleistocene age places it as an Asian contemporary of the evolving *H. sapiens*, *H. neanderthalensis*, and Denisovan lineages. It is huge in size, and its distinctive combination of traits in the cranial vault and face differentiate it from *H. sapiens* and *H. neanderthalensis*, as well as from the earlier species *H. heidelbergensis*/*H. rhodesiensis*. Instead it shows the greatest resemblances to Middle Pleistocene Chinese fossils, such as Hualongdong, Dali, and Jinniushan. This is confirmed by phylogenetic analyses using parsimony and Bayesian methods, which place these Chinese fossils with Harbin as a part of the sister group to *H. sapiens*, based on synapomorphies, such as a moderate post-toral sulcus, gently arched zygomaticoalveolar crest, presence of inferior orbital torus, strong malar tubercle, and thick mastoid processes. Our analyses also suggest a potential link between the Harbin cranium and the Xiahe mandible, a fossil attributed to the Denisovan lineage. The northerly location of the Harbin site also has implications for Middle Pleistocene human adaptive capabilities, since, even in the present interglacial, this region has winter temperatures averaging more than 16°C below zero. The very large size of the Harbin individual (as judged from the size of the cranium) may indicate physical adaptation to such conditions.[45] The coexistence of several human lineages during the late Middle and Late Pleistocene of Asia is probably related to its diverse palaeoenvironments (ranging from the Gobi Desert to rainforest, and from coastal plains to the Qinghai-Tibet Plateau), which produced a varied biogeographic sink for human evolution.

MATERIAL AND METHODS

Morphological studies

We scored and measured morphological characters from 95 cranial, mandibular, or dental specimens of the *Homo* genus (Table S1). All the specimens and replicas used in this research are under the oversight of the institutional review board of the Hebei GEO University, the Institute of Vertebrate Paleontology or the Natural History Museum, London. We used the high-resolution CT facilities and the surface scanner at the Key Laboratory of Vertebrate Evolution and Human Origins of the Chinese Academy of Sciences and the Natural History Museum, London, to CT scan or surface scan all the *Homo* fossils and casts included in this study. We used VG Studio Max 3.2 to build three-dimensional models. All measurements were taken from the digital three-dimensional models.

Phylogenetic analyses

Although it is debatable how phenomic features are correlated to each other and whether some characters are more important than others for phylogeny reconstruction, phylogenetic analysis based on phenomic characters has long been practiced to generate phylogenetic frameworks for hominins (e.g., Wood and other workers[25,46–49]). We built a phenomic character data matrix (232 discrete characters and 400 continuous characters) using MorphoBank.[50] Most of the 234 discrete characters are widely used and discussed in paleoanthropological research (see the supplemental information). The continuous characters include 184 linear measurements, 22 angles, and 194 ratios. The linear and angular measurements were taken following the standards defined by Martin and Saller[51] and Howells.[52] In total, 1,379 annotated images and 9,618 labels were used in MorphoBank (MorphoBank: Project 3385) to illustrate the phenomic homologies. To remove the effect of body size, the linear measurements of the crania and the upper dentitions of a scored specimen were divided by the 1/3 power of the cranial capacity of this specimen. The linear measurements of the mandibles and lower dentitions of a scored specimen were divided by the biramus breadth at the alveolar margin of this specimen. We consciously avoided redundant and potentially correlated discrete characters. All the continuous characters were normalized to have a range between 0 and 1. Normalization of the continuous characters can significantly reduce the potential correlations among different characters.

For most of the species/populations of *Homo*, palaeoproteomic or ancient DNA data are unknown. Thus, phenomic data form the base of evidence for setting taxonomic boundaries and/or phylogenetic relationships. It has been shown that hybridization does not cause significant taxonomic problems in most analyses,[53,54] and we assume that any interbreeding between the OTUs did not affect the distribution or expression of characters for parsimony or Bayesian tip-dating analyses.

To reflect intra- and inter-species morphological variation, specimens that were from the same locality and generally accepted as the same species/population were grouped into one OTU. After combination, 55 OTUs were used as terminal taxa for the phylogenetic and biogeographic analyses. The OTUs cover most of the major clades or groups of the *Homo* genus. For each terminal taxon, we use the most recently published dating results (Table S1). The Hualongdong skull, *H. antecessor* ATD6-69, and the Turkana KNM-WT 15000 fossil are adolescent individuals. The main effects of their young ages will be in the final stages of cranial growth and the full development of face and mandible size, and cranial superstructures. When scoring these young specimens, we chose characters and character states that are little affected by their immaturity.

Parsimony analysis of the data matrix, including discrete and continuous characters was undertaken by using TNT, Tree analysis using New Technology, a parsimony analysis program subsidized by the Willi Hennig Society.[13] We used the parallel version of TNT on 100 CPU cores. In total, one million replications were performed (10,000 replications on each core). The 234 discrete characters were all equally weighted. Forty-six multi-state characters were set as "ordered." The merged cells with multiple states were set to polymorphism. To separately reflect recent results from palaeoproteomic and ancient DNA research,[5,21,22,32] partial backbone constraints were used to force the Xiahe mandible as the sister group of Neanderthals and to force *H. antecessor* outside of the Neanderthal-Xiahe-*H. sapiens* clade (see the supplemental information). We used Bremer supports[55] calculated in TNT to describe the stability of the phylogenetic results.

Estimating the split time of ancestral species/populations of *Homo* should be treated with caution, because all estimations must be based on particular models. The divergence times between Neanderthal, Denisovan, and fossil *H. sapiens* populations, as reflected by ancient DNA sequences and favored by one of the present authors (C.S. in Bergström et al.[35]), rely on a fixed human DNA sequence mutation rate.[19,20,32,33,56] However, in our Bayesian tip-dating analysis we included fossil ages for all the OTUs to inform the divergence times of all the *Homo* clades, and co-estimated the clock rate together with the divergence times (instead of using a fixed mutation rate, see the supplemental information). We used the Bayesian tip-dating approach[14–17] implemented in MrBayes 3.2.7[23] to infer the timetree and evolutionary rates. This method integrates both the fossil ages and the morphological data while accounting for their uncertainties in a coherent analysis. Since MrBayes 3.2.7 cannot handle continuous characters directly and can only deal with ordered characters up to six states, all the continuous characters were discretized into six states. We executed four independent runs and eight chains per run (one cold and seven hot chains with temperature 0.05) in the Markov chain Monte Carlo simulation. Each run was executed with 100 million iterations, and sampled every 2,000 iterations.

To test whether different age estimates for the Harbin cranium would change its phylogenetic position in the Bayesian tip-dating analyses, we also used 296 ± 8 and 59–304 ka (the maximum U-series age and the maximum U-series age range, see the supplemental information) as the tip ages for the Harbin cranium. Different tip age estimates have very minor influence on the topology and the divergence age estimation of the whole tree (Figures S22 and S23).

Biogeographical analyses

We used the R[41] package BioGeoBEARS[39,40] to compare biogeographical models and estimate ancestral range probabilities of *Homo* species/populations. The same R package was also used to estimate the number of dispersal, vicariance, and sympatry events with BSM[40] using the same R package. The Bayesian tip-dating all-compatible consensus tree was used for biogeographical analyses. We tested 18 biogeographical models, including 3 hypotheses of dispersal routes from Africa to Asia. AIC was used to select the best fitting model.[37] We ran 1,000 BSMs under the best fitting biogeographical model, and calculated the means and standard deviations of biogeographical events across the 100 mapping processes.

Data availability

The phenomic data matrix, including scoring, metrical measurements, illustrations, and labels will be released on MorphoBank (project 3385) after publication. Full description of the methods and the scripts for computational analyses are given in the supplemental information. Other data will be available by request to X.N. and Q.J.

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AUTHOR CONTRIBUTIONS

Q.J. obtained the Harbin cranium, organized the project, and edited the manuscript. Q.S. performed U-series dating, REE and Sr isotopic analyses, analyzed the U-series dating data, and edited the manuscript. J.G. analyzed the REE and Sr isotopic data, and edited the manuscript. J.L. performed XRF analyses, and edited the manuscript. C.Z. performed the Bayesian tip-dating analysis, and edited the manuscript. R.G. analyzed the U-series dating data, and edited the manuscript. Q.L. collected the mammalian fossils, revised the phylogenetic data matrix, and edited the manuscript. W.W., Y.J., Z.G., and L.L. collected data, drilled the core, and measured sections. C.S. described and compared the fossils, revised the phylogenetic data matrix, and wrote the manuscript. X.N. organized the project, developed the phylogenetic data matrix, described and compared the fossils, performed phylogenetic and biogeographical analyses, and wrote the manuscript.

DECLARATION OF INTERESTS

The authors declare no competing interests.

SUPPLEMENTAL INFORMATION

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The Innovation, Volume *2*

Supplemental Information

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Title:

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Story of the discovery

The Harbin cranium reported in this paper was allegedly discovered in 1933. A man (kept anonymous by his family), who worked for the Japanese occupiers as a labour contractor, discovered the cranium when his team of workers were constructing a bridge for the Japanese near Harbin City in northeastern China. The bridge was later named as Dongjiang Bridge. The man was shrewd and realized the potential value of the discovery, probably because the discovery of the first Peking Man cranium in 1929 had attracted huge interest in China. Instead of passing the cranium to his Japanese boss, he buried it in an abandoned well, a traditional Chinese method of concealing treasures. After the establishment of the modern Chinese republic, the man returned to farming and did his best to hide his experience as a labour contractor working for the Japanese invaders. With his difficult life experience, the man never had a chance to re-excavate his secret treasure. The cranium thus remained unknown to the public and science for decades, but it survived the Japanese invasion, the civil war, the communist movement, the cultural revolution, and rampant fossil dealing in recent years. The third generation of the man's family learnt of his secret discovery before his death and recovered the fossil in 2018. The corresponding author (Qiang Ji) learnt of the cranium, and successfully persuaded the family to donate the specimen to the Geoscience Museum of Hebei GEO University.

Taxonomic scope

We scored and measured morphological characters from 95 cranial, mandibular or dental specimens of the *Homo* genus (S-Table 1). Specimens from the same locality and generally accepted as the same species/population were grouped into one operational taxonomic unit (OTU). After combination, 55 OTUs were used as terminal taxa for the phylogenetic and biogeographic analyses. The OTUs cover most of the major clades or forms of the *Homo* genus, including *H. habilis*, "*H. ergaster*", *H. erectus*, *H. heidelbergensis*/*H. rhodesiensis*, *H. neanderthalensis* and *H. sapiens* (S-Table 1). For each terminal taxon/specimen, we use the most recently published dating results. For the combined terminal taxon, dates for all the specimens were used as an age range. The two crania from Yunxian China were not included because they are severely deformed. Although one of the two Yunxian crania (Yunxian II) was reconstructed based on CT scanning data[1], the results still show obvious deformation and cracking. *Homo floresiensis*[2], *Homo luzonensis*[3], and *H. naledi* were also not included. These three species show strong plesiomorphic and apomorphic features that are rare or absent elsewhere in the genus *Homo*[3] and some researchers have noted similarities between these species and *Australopithecus*[3-9].

S-Table 1. Specimens used for comparison and phylogenetic analysis

OTUs*	Specimens	Specimen source**	Assigned Age (ka)	Cranial capacity (ml)	Age Reference	Cranial Capacity Reference
Antecessor	*H. antecessor* ATD6-15 ATD6-69 ATD6-96	NHM replicas; IVPP AN2245	900000-800000	1000	Ref.[10]	Ref.[11]
	H. antecessor Dental		900000-800000		Ref.[10]	
Narmada	*Homo* sp. Narmada	NHM replica; IVPP AN1631	780000-236000	1155-1421	Ref.[12]	Ref.[13]
Eliye Springs	*Homo* sp. Eliye Springs	NHM replica	300000-200000	1170-1245	Ref.[14]	Ref.[15]

Ndutu	*Homo* sp. Ndutu	NHM replica	350000	1100	Ref.[16, 17]	Ref.[16, 17]
Irhoud 1,2	*H. sapiens* Irhoud1	NHM replica	349000-281000	1369-1381	Ref.[18]	Ref.[19]
	H. sapiens Irhoud2	NHM replica	349000-281000	1467-1473	Ref.[18]	Ref.[19]
Florisbad	*H. sapiens* Florisbad	NHM replica	294000-224000	1280	Ref.[20]	Ref.[17, 21]
Omo II	*H. sapiens* Omo II	NHM replicas	195000	1487-1495	Ref.[19]	Ref.[19]
LH 18	*H. sapiens* LH18	NHM replicas	150000-120000	1232-1242	Ref.[19]	Ref.[19]
Skhul V,IX	*H. sapiens* Skhul V	NHM replicas	115000	1362-1364	Ref.[19]	Ref.[19]
	H. sapiens Skhul IX	NHM replicas	115000	1400-1587.33	Ref.[19]	Ref.[17, 22]
Qafzeh IX	*H. sapiens* Qafzeh IX	NHM replicas	115000	1492-1502	Ref.[19]	Ref.[19]
Mladec I,II,V,VI	*H. sapiens* Mladec I	IVPP AN1961, AN1628	3500	1606	Ref.[19]	Ref.[22]
	H. sapiens Mladec II	NHM replica	35000	1390	Ref.[19]	Ref.[22]
	H. sapiens Mladec V	NHM replica	35000	1500-1650	Ref.[19]	Ref.[17, 22]
	H. sapiens Mladec VI	NHM replica	35000		Ref.[19]	
Cro-Magnon I,II,III	*H. sapiens* Cro-Magnon I	NHM replicas	31000	1573-1575	Ref.[19]	Ref.[19]
	H. sapiens Cro-Magnon II		31000		Ref.[19]	
	H. sapiens Cro-Magnon III	NHM replica	31000	1781-1845	Ref.[19]	Ref.[19]
Oase 1,2	*H. sapiens* Oase1	IVPP AN2250-2	41470-39410		Ref.[23]	
	H. sapiens Oase2	IVPP AN2250-1	41470-39410	1400-1500	Ref.[23]	This research
ZKD UC101,103	*H. sapiens* Upper Cave 101	IVPP AN59, AN62	27000	1500	Ref.[24]	Ref.[24]
	H. sapiens Upper Cave 103	IVPP AN61	27000	1290-1300	Ref.[24]	Ref.; Ref.[22]
Liujiang	*H. sapiens* Liujiang	IVPP PA89	67000	1567	Ref.[24]	Ref.[24]
SH 4,5	*H. neanderthalensis* SH4		430000	1360	Ref.[25]	Ref.[26]
	H. neanderthalensis SH5	NHM replica; IVPP AN2183-1, AN2183-2	430000	1092	Ref.[25]	Ref.[26]
Tabun 1	*H. neanderthalensis* Tabun C1	NHM original	122000-100000	1270.5-1271	Ref.[17]	Ref.[17, 22]
Tabun 2	*H. sapiens* Tabun C2	NHM replica	122000-		Ref.[17]	

			100000			
Spy I,II	*H. neanderthalensis* spy ii	NHM replicas	40000	1278-1296	Ref.[19]	Ref.[19]
	H. neanderthalensis Spy II		40000	1524-1538	Ref.[19]	Ref.[19]
Gibraltar 1	*H. neanderthalensis* Gibraltar1 (=Forbes' Quarry 1)	NHM original	75000	1209-1217	Ref.[19]	Ref.[19]
Amud	*H. neanderthalensis* Amud	NHM replicas	53000	1731-1763	Ref.[19]	Ref.[19]
La Chapelle aux Saints	*H. neanderthalensis* La Chapelle aux Saints	IVPP AN2301-1, AN2301-2	52000	1487-1493	Ref.[19]	Ref.[19]
La Ferrassie 1	*H. neanderthalensis* La Ferrassie1	NHM replica	70000	1638-1648	Ref.[19]	Ref.[19]
Shanidar 1,5	*H. neanderthalensis* Shanidar1	NHM replica	50000	1650	Ref.[16, 17]	Ref.[16, 17]
	H. neanderthalensis Shanidar5	NHM replica	50000	1550	Ref.[16, 17]	Ref.[16, 17]
St Césaire	*H. neanderthalensis* St Césaire	NHM replicas	41950-40660		Hublin et al., 2012[27]	
Saccopastore I,II	*H. neanderthalensis* Saccopastore I	NHM replica	250000	1234.3	Ref.[16, 17]	Ref.[16, 17]
	H. neanderthalensis Saccopastore II	NHM replica	250000	1295	Ref.[16, 17]	Ref.[16, 17]
Neanderthal type	Neanderthal 1	NHM replica	42000	1337.8	Ref.[16, 17]	Ref.[16, 17]
Xiahe	*Homo* sp. Xiahe	IVPP replica	155000-164500		Chen et al., 2019[28]	
Dali	*Homo* sp. Dali	IVPP AN1369	267700-258300	1120	Sun et al., 2017[29]	Wu and Athreya, 2013[30]
Hualongdong	*Homo* sp. Hualongdong	IVPP Hualongdong	331000-275000	1150	Ref.[31]	Ref.[31]
Harbin	*Homo* sp. Harbin	HBSM2018-000018(A)	225000-221000	1400	This research	This research
Jinniushan	*Homo* sp. Jinniushan	IVPP AN2118	310000-200000	1390	Ref.[24]	Ref.[24]
Maba	*Homo* sp. Maba	IVPP AN629	278000-230000	1300	Ref.[32]	Ref.[33]
Xuchang	*Homo* sp. Xuchang	IVPP replica	125000-105000	1800	Ref.[34]	Ref.[34]
Mauer 1	*H. heidelbergensis/H. rhodesiensis* Mauer 1	NHM replica	649000-569000		Ref.[35]	

Arago II,XIII,XXI,XLVII	*H. heidelbergensis/H. rhodesiensis* Arago XXI XLVII	NHM replicas	469000-407000	1138.667-1166	Ref.[36]	Ref.[17, 22]
	H. heidelbergensis/H. rhodesiensis Arago XIII	NHM replicas	469000-407000		Ref.[36]	
	H. heidelbergensis/H. rhodesiensis Arago II	NHM replicas	469000-407000		Ref.[36]	
Broken Hill	*H. heidelbergensis/H. rhodesiensis* Broken Hill	NHM E 686	324000-274000	1249	Ref.[37]	Ref.[19]
Petralona 1	*H. heidelbergensis/H. rhodesiensis* Petralona1	NHM replica	400000-150000	1160-1164	Ref.[19]	Ref.[19]
Ceprano	*H. heidelbergensis/H. rhodesiensis* Ceprano	NHM replica	850000-400000	1185	Ref.[16, 17]	Ref.[16, 17]
Steinheim	*H. heidelbergensis/H. rhodesiensis* Steinheim S11	NHM replica	300000	1111.192	Ref.[16, 17]	Ref.[16, 17]
Saldanha	*H. heidelbergensis/H. rhodesiensis* Saldanha (=Elandsfontein)	NHM replicas	500000-350000	1216.667	Ref.[16, 17]	Ref.[16, 17]
Bodo	*H. heidelbergensis/H. rhodesiensis* Bodo	NHM replica	600000	1200-1325	Ref.[16, 17]	Ref.[38]
Ternifine 1,2,3,4	*H. heidelbergensis/H. rhodesiensis* Ternifine1	NHM replica	750000		Ref.[21]	
	H. heidelbergensis/H. rhodesiensis Ternifine2	NHM replica	750000		Ref.[21]	
	H. heidelbergensis/H. rhodesiensis Ternifine3	NHM replica	750000		Ref.[21]	
	H. heidelbergensis/H. rhodesiensis Ternifine4	NHM replica	750000	1300	Ref.[21]	Ref.[16, 17, 21]
Peking X,XII,XIII,LII,RC	*H. erectus* Peking X	IVPP AN1	580000-280000	1225	Ref.[24, 39]	Ref.[24]
	H. erectus Peking XII	IVPP AN3	580000-280000	1030	Ref.[24, 39]	Ref.[24]
	H. erectus Peking XIII	IVPP AN55	580000-		Ref.[24, 39]	

			280000			
	H. erectus Peking LII	IVPP AN22	580000-280000		Ref.[24, 39]	
	H. erectus Peking RC1996	IVPP AN742-1, AN742-2	580000-280000	1030	Ref.[24, 39]	Ref.[24]
Nanjing 1	*H. erectus* Nanjing1	IVPP AN1353	620000-580000	876	Ref.[24]	Ref.[24]
Hexian	*H. erectus* Hexian	IVPP AN1368	437000-387000	1025	Cui and Wu, 2015[40]	Ref.[24]
Sambungmacan 1,3	*H. erectus* Sambungmacan1	NHM replica	200000		Ref.[19]	
	H. erectus Sambungmacan3	NHM replica	200000	898-906	Ref.[19]	Ref.[19]
Sangiran 2,17	*H. erectus* Sangiran2	NHM replica	1500000-1300000	789-797	Ref.[19]	Ref.[19]
	H. erectus Sangiran17	NHM replica	1500000-1300000	1020	Ref.[19]	Ref.[16, 17]
Ngandong 7,9,12	*H. erectus* Ngandong 7	IVPP AN166	117000-108000	1013	Ref.[41]	Ref.[22]
	H. erectus Ngandong 9	IVPP AN345	117000-108000		Ref.[41]	
	H. erectus Ngandong 12	IVPP AN170	117000-108000	1127	Ref.[41]	Ref.[22]
Dmanisi	*H. erectus* Dmanisi 211 2282	NHM replicas	1770000	650	Ref.[42]	Ref.[42]
	H. erectus Dmanisi 2280	IVPP AN2181	1770000	730	Ref.[42]	Ref.[42]
	H. erectus Dmanisi 2700 2735	NHM replicas	1770000	601	Ref.[42]	Ref.[42]
	H. erectus Dmanisi 4500 2600	NHM replicas	1770000	546	Ref.[42]	Ref.[42]
Rabat	*Homo* sp. Rabat	IVPP AN1288	300000		Ref.[43, 44]	
STW53	*Homo* sp. STW53	NHM replica	1900000	570	Ref.[16, 17]	Ref.[16, 17]
OH 9	*H. erectus* OH9	NHM replica; IVPP AN748	1470000	1009-1017	Ref.[19]	Ref.[19]
Turkana ER3733,3883	*H. erectus* Turkana	NHM replicas	1535000	846-854	Ref.[19]	Ref.[19]
	H. erectus ER 3733	NHM replica	1780000	876-880	Ref.[19]	Ref.[19]
	H. erectus ER 3883	NHM replica	1570000	837-839	Ref.[19]	Ref.[19]
Habilis OH7,OH24,ER1805	*H. habilis* OH24	NHM replica; IVPP AN2179	1800000	597	Ref.[16, 17]	Ref.[16, 17]
	H. habilis OH7	NHM replica;	1780000		Ref.[16, 17]	Ref.[16, 17]

	H. habilis ER1805	IVPP AN2292 NHM replicas	1850000	616	Ref.[16, 17]	Ref.[16, 17]

* OTUs: operational taxonomy units. ** NHM: Natural History Museum, London; IVPP: Institute of Vertebrate Paleontology and Paleoanthropology; HBSM: Hebei Science Museum.

Three dimensional model building

The Harbin, Hexian, and Liujiang crania were CT scanned using the High Resolution CT facilities at the Key Laboratory of Vertebrate Evolution and Human Origins of the Chinese Academy of Sciences. The resolution ranges from 60 micrometers to 160 micrometers. X-ray CT images were exported to VG Studio Max 3.2 to build three dimensional models. Other casts and fossils compared and scored in this research were surface scanned by using the Arctec Space Spider surface scanner with a 3D point accuracy up to 50 micrometers.

Morphological data collection

Character state scoring and linear and angular measurements were taken at the specimen level. Most of the 234 discrete characters are widely used and discussed in palaeoanthropological researches (e.g. in the resources of ref.[26, 42, 45-50]). We revised and re-defined the characters, and presented illustrations for those not in outright or unmistakable definition. The continuous characters include 184 linear measurements, 22 angles and 194 ratios. The ratios are derived from the linear measurements. The linear and angular measurements were taken following the standards defined by Martin[51] and Howells[52]. X-ray CT images and the surface models were exported to VG Studio Max 3.2, and all the measurements were taken from the digital 3D models in VG Studio Max 3.2. It has long been recognized that dental traits are not simply discrete. Most of the gross morphology of hominid dentitions shows extensive variation. The wide range of variation should be scored on a ranked scale. Here, the morphological traits of the permanent upper and lower dentitions of *Homo* fossils were scored by using the standard of the Arizona State University Dental Anthropology System[53]. This ranking system is widely accepted as a standard[54, 55], and it has been used to infer the phylogenetic relationships of hominids[56].

Discrete character definitions, linear and angle measurement standards, original scoring and measurements are stored in MorphoBank, which is a publicly available web application and database widely used for large-scale, online morphological character standardization and data collection[57]. To standardize the characters, scoring and measurements, we used the labeling tools of MorphoBank (Morphobank Project 3385) to illustrate the anatomical features and homology. By following the methods of scoring in ref.[58], we loaded and labelled medial to document the exemplars of the characters and measurements, and recorded how the states of discrete characters looked in each specimen. Two hundred and thirty-four discrete characters and 321 continuous characters were defined and scored or measured for the 95 *Homo* specimens. In total, 1379 media, 9618 labels and 22042 cell scorings were input in MorphoBank Project 3385.

Morphology of the Harbin cranium

The Harbin cranium is undistorted and almost intact, with the main losses being all but one tooth (the left M^2), and slight damage to the left zygomatic arch (Fig. 2). It is massive in size, showing the largest values in our comparative fossil database (S-Table 2) for measurements such as maximum cranial length, nasio-occipital length and supraorbital torus breadth, and the second largest values for measurements like biauricular breadth, frontal chord, zygomatic breadth and biorbital breadth. We have presented only limited data from the internal morphology of the

Harbin cranium, as these will be presented in additional studies.

The cranial vault is voluminous (~1420 ml capacity, measured using high-resolution CT scanning and 3D reconstruction of the endocranial cast) and is relatively long and low in lateral view, with a receding frontal and evenly curved parietal contour. There are very small angular tori inferiorly on the parietals, and a relatively rounded occipital profile, lacking both the flexed form typical of *H. erectus*, and the protruding chignon found in many Neanderthals. However, the occipital surfaces are slightly raised compared with the parietals along their common sutures. The upper scale of the occipital bone is slightly longer than the lower, and they meet at a minimally developed occipital torus. The temporal line parallels the upper border of the high temporal squama, and the zygomatic arches are long and relatively slender. There are prominent mastoid processes, which incline slightly forwards and inwards. The external auditory meatus is high and narrow. The anteroinferior tympanic plate is flat and moderately thick. In lateral view the face is relatively low in height and lacks the total anterior projection typical of *H. erectus* and *H. heidelbergensis* /*H. rhodesiensis,* and there is a deep nasal root beneath a strong supraorbital torus. The zygomaxillary region is flat and faces anteriorly, but there is alveolar prognathism below.

In facial view (Fig. 2B,C), the frontal bone has an evenly curved superior profile, without obvious keeling or parasagittal flattening. The supraorbital torus is very wide and massively developed, but with a slight lateral reduction in thickness. There is a horizontal shelf of bone above and behind the prominent glabella, where a small vertical furrow partly separates the right and left components of the browridge, and the torus curves downwards from about the midpoint of the orbits. The inferior borders of the torus are near horizontal until midorbit, where they also start to curve downwards more strongly laterally. The upper face is extremely wide, with large and almost square-looking orbits, separated by a wide interorbital area with a rather flat nasal saddle, recessed below glabella. The lateral portions of the cheekbones are flat and quite low, with shallow canine fossae. There are inferior prominences at the zygomaxillary suture, and small notches mesially before the anterior surface meets the alveolar portion. The infraorbital foramina are placed quite high and mesial with only a small associated furrow extending below. The lower nasal region and maxillae lie well forward of the cheekbones, but there is none of the maxillary inflation found in Neanderthals and some *H. heidelbergensis*/*H. rhodesiensis* crania. The nasal aperture is very wide inferiorly, and almost triangular, but nasal and facial height are relatively low compared with the upper facial breadth. The anterior nasal spine is broken but bifid. A blunt spinal crest passes laterally and produces two branches. One branch merges with the sharp edge of the aperture, while the other trends posterolaterally, where it merges with the nasal wall. The nasal margin descends externally to a shallow, crescent-shaped sill, reaching to the damaged incisor sockets. The internal nasal floor is depressed and smooth, curving upwards centrally to the preserved parts of the bony nasal septum but almost horizontal proceeding internally. The internal nasal volume is very large.

In superior view (Fig. 2E), the cranium is widest in the supramastoid area, and the frontal bone narrows behind the wide supraorbital torus, but post-orbital constriction is not as marked as in *H. erectus* and *H. heidelbergensis*/*H. rhodesiensis* fossils. The torus recedes in an even curve laterally. In posterior view the cranium is also widest in the supramastoid area, below which the well-developed mastoid processes slope inwards. The temporals and parietals do not converge strongly as in *H. erectus* fossils, but there is no upper parietal expansion, as found in recent *H. sapiens*, nor the 'en bombe' shape typical of Neanderthals. There is no keeling near bregma, but there are slight depressions in the surface of the left parietal near bregma, perhaps indicative of healed trauma. The occipital bone has no central protuberance or suprainiac depression, and the occipital torus is a weak and low ridge of bone which becomes slightly more salient towards the mastoid region.

The inferior view (Fig. 2F) illustrates the extreme breadth of the cranial base and palate, which is U-shaped and shallow, with thick alveolar bone. The incisor sockets are angled, suggesting there was alveolar prognathism. The incisive fossa is situated just behind the incisor roots, and a channel leading into the posteriorly directed incisive canal is formed behind the septum that separated the central incisors. The premolar sockets suggest only single-rooted teeth, while the M^1 sockets show one very large and splayed lingual root socket and two smaller buccals. The preserved M^2 is exceptionally large (mesiodistal length 13.6, buccolingual breadth 16.6), bigger than all the other comparative specimens except the $M^{2/3}$ from Denisova Cave [59, 60]. This tooth (and its antimere, to judge from the preserved sockets) has three roots, with the lingual one much larger. The Xiahe lower molars cannot be compared directly, but their large size matches the Harbin upper molar quite well. In occlusal view, the tooth has a nearly oval shape. The crown is deeply worn, generating a flat crown surface (S-Fig. 1). A small dentine facet is exposed on the protocone, and a large dentine facet on the paracone. The mesial side of the tooth has a flat contact facet for the M^1. The distal side is round and smooth, without any trace of a contact facet. Given the quite deep wear stage and the lack of a distal contact facet, the M^3 was either very small or absent. The protocone (mesiolingual cusp, cusp 1) of the tooth is massive, occupying nearly half of the tooth. The mesiolingual side of the protocone is round and smooth. There is no trace of a Carabelli's cusp. The paracone (mesiolabial cusp, cusp 2) is slightly smaller than the protocone. Its labial side is round and smooth. The metacone (distolabial cusp, cusp 3) is very reduced, presenting as a ridge-like cusp without a free apex. The labial side of the metacone is small. The groove separating the paracone and metacone is distally positioned. A faint mesostyle (sometime called a parastyle) is present at the base of this groove. The hypocone (distolingual cusp, cusp 4) was probably moderately developed. Because of wear, no groove is present to show the boundary between the protocone and hypocone.

S-Figure 1. Left upper M^2 of the Harbin cranium. White bar indicates 10 mm.

The zygomaticoalveolar root emerges from the region of the P^4-M^1, and recedes slightly as it progresses laterally. The pterygoid processes are sloping and elongated, with relatively thickened bone. The supramastoid crest is moundlike and stronger on the right side, and extends forward to overhang the auditory opening. Here is contributes to form a shelf above the recessed auditory meatus, from which the wide root of the zygomatic process emerges, distal to the mandibular fossa. The mandibular fossae are wide and quite deep, but the tympanic plates and petrous bones are not robustly built, and only slightly angled in relation to each other. A forwardly inclined sphenoid spine is preserved on the left side and fused to the tympanic, but broken off on the right. There is a well-marked, long and straight digastric fossa mesial to the mastoid processes, but this region lacks the prominent occipitomastoid crest found in Neanderthals. The foramen magnum is oval and broad, and the occipital condyles are long, while the nuchal plane is extensive and relatively flat, traversed by an external occipital crest, and bordered posteriorly by the modest occipital torus.

Comparative morphology of the Harbin cranium

The Harbin cranium clearly represents an archaic human. The cranial vault lacks the globularity of the modern human braincase, with a low frontal and parietal bone. The frontal, parietal, occipital and nasion-bregma angles, as the metrical proxies of globularity, fall in the range of archaic humans, including the *H. erectus* group (S-Fig. 2-4). The supraorbital torus is massive and continuous. As in archaic humans, the thickness of the supraorbital torus is proportionally greater than that of later *H. sapiens* (S-Fig. 5-7). The base and upper face are extremely broad, and there is no upper parietal expansion in posterior view. Relative to the maximum cranial length, the frontomalare, biorbital and zygomatic breadths are all well above the averages for the genus *Homo* (S-Fig. 8-10). However, in contrast, the face height is very low and the basion angle-nasion angle plot indicates that the Harbin cranium is much closer to *H. sapiens* than to *H. erectus* and *H. heidelbergensis/H. rhodesiensis* (S-Fig. 11-12). The single molar tooth is enormous, approached but not matched in size by those of some early *H. sapiens* fossils.

The large endocranial volume differentiates the Harbin cranium from primitive *Homo* species such as *H. erectus*, *H. naledi* and *H. floresiensis*, and this is reflected in almost parallel-sided temporals and parietals in posterior view, and only moderate postorbital constriction. The postorbital constriction index of the Harbin cranium is lower than those of Neanderthals and *H. sapiens*, but higher than in most members of the *H. erectus* group (S-Fig. 10, 11). The fossil lacks an angular cranial vault with buttressing and keeling, the occipital torus is only minimally developed, and the tympanic bone lacks the robusticity typical of *H. erectus*. The face does not show the total prognathism found in archaic *Homo* species. Together with the Dali and Jinniushan crania, the range of the prosthion angle and nasion angle of these three humans overlaps that of *H. sapiens* (S-Fig. 12-14).

Compared with Neanderthals, the Harbin cranium has a similarly massive supraorbital torus, with strong lateral thickness. Relative to the maximum cranial length, the supraorbital torus of Harbin has a similar central and lateral thickness to Neanderthals (S-Fig.3-4), but its medial thickness is even larger (S-Fig. 2). In lateral view the occipital profile of the Harbin cranium is more arched, with a much smaller occipital angle (S-Fig. 3-4). In posterior view the cranium lacks the 'en bombe' shape, as well as a centrally developed suprainiac fossa. These two features are typically present in the Neanderthals. The midface projection is strong, but lacks the maxillary inflation found in Neanderthals. In contrast, the cheekbones are low, transversely flattened, and with an incurved inframalar region. The zygomaxillary angle is slightly larger than in Neanderthals and approaches that of *H. sapiens.* Relative to their maximum cranial lengths, the Harbin, Dali, Jinniushan and most *H. sapiens* crania show larger zygomaxillary angles (S-Fig. 15), corresponding to their flatter faces compared with the Neanderthals. The single molar tooth is huge by Neanderthal standards.

Comparisons with *H. antecessor* are limited by the incompleteness of the Spanish fossils, and despite similarities in zygomaxillary shape, the massive supraorbital development, large endocranial volume, high upper face width and huge M^2 set Harbin apart. Compared to *H. heidelbergensis/H. rhodesiensis*, the Harbin cranium lacks the strong transverse torus and angulation of the occipital. The cheekbones do not show the inflation typically seen in Neanderthals and some large specimens of *H. heidelbergensis/H. rhodesiensis*. The midface projection is moderate, weaker than those in the Broken Hill, Arago and Steinheim fossils (S-Fig. 11, 12).

The Harbin cranium shows resemblances to Dali, Hualongdong, Jinniushan and other Middle Pleistocene Asian archaic humans, particularly illustrated using conventional metrics and cranial angles (S-Table 2, S-Fig. 2-18). Differing from the Dali cranium [30, 61], the Harbin cranium lacks sagittal keeling, presents relatively larger orbits, thinner and smoother supraorbital tori, weaker superciliary arch and weaker lateral thinning. Compared with the more gracile Jinniushan cranium, the anterior maxillary region of the Harbin cranium is proportionally broader. The orbits are much larger and more squared, the supraorbital tori are thicker, and the single preserved molar is much larger than in Jinniushan. The adolescent Hualongdong [31] is more similar to the Dali cranium than to the Harbin cranium. The Hualongdong cranium has strong frontal sagittal keeling. The supraorbital tori of Hualongdong are thicker and show significant lateral thinning. The superciliary arch is very strong. Compared with the Xuchang cranium[34], the Harbin cranium has a much smaller cranial capacity, but with a more elevated frontal squama. The bones of the braincase of Harbin are much thicker. Overall the Xuchang cranium is more gracile. Its supraorbital tori are much thinner, and its mastoid processes are much smaller. The Maba partial cranium is as gracile, with thinner frontal and parietal, as the Xuchang and Jinniushan fossils. The preserved supraorbital torus of Maba is very Neanderthal-like [33, 62]. It is thinner and more curved. The nasal bone of Maba is more projecting, another feature of Maba similar to the Neanderthals.

Overall, the Harbin cranium shows a distinctive combination of traits, and probably represents a distinct species of *Homo* from other designated Middle-Late Pleistocene human taxa such as *H. sapiens*, *H. neanderthalensis* and *H. heidelbergensis/rhodesiensis*. Its enormous overall size sets it apart from nearly every other fossil, with the highest values recorded for dimensions like maximum cranial length, nasio-occipital length and supraorbital torus breadth, and it is matched or exceeded only by fossils such as Xuchang (biauricular breadth), Ceprano (bizygomatic breadth), Cro-Magnon 3 (frontal chord), Saccopastore 2 (biorbital breadth) and Denisova (molar size). In terms of cranial vault proportions, the braincase clearly overlaps in shape with those of other large-sized late archaic *Homo* species, although the relatively and absolutely long frontal chord seems more *H. sapiens*-like. However the face, despite its enormous breadth dimensions, is relatively low in height and has a *H. sapiens* and *H. antecessor*-like zygomaxillary shape. It is also hafted onto the braincase with reduced prognathism, as in recent humans. In its combination of traits Harbin is more like fossils attributed to early *H. sapiens*, such as Jebel Irhoud 1 and Eliye Springs, than like later members of our lineage.

S-Table 2. Measurements of the Harbin cranium and comparisons with other Middle-Late Pleistocene *Homo* cranial fossils. Linear measurements in millimetres, angles in degrees, ratios ranged from 0 to 100.

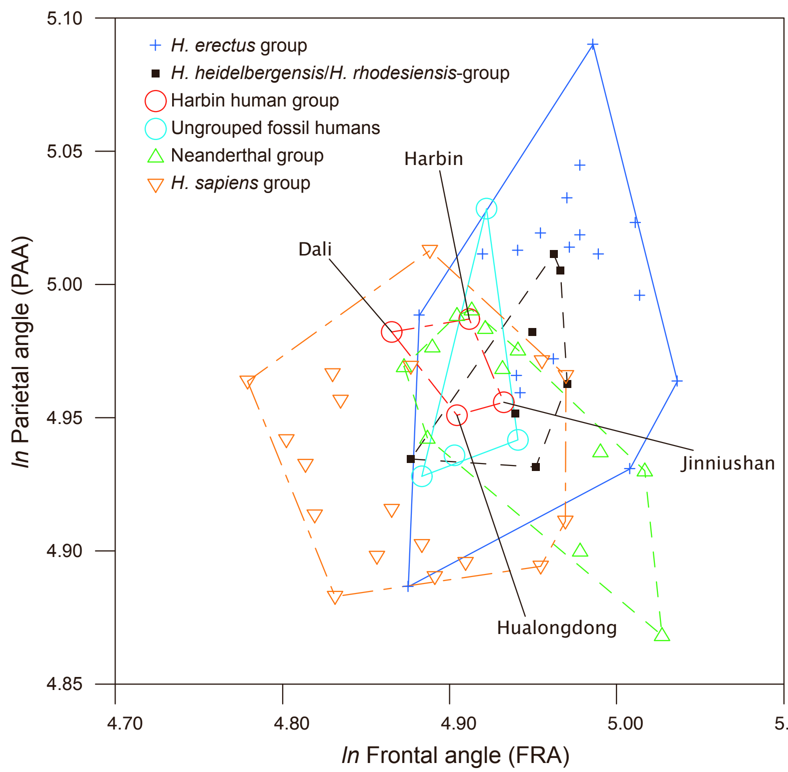
Measurements	Harbin	Dali	Jinniushan	Maba	Xuchang	Narmada	Broken Hill	Irhoud 1
M1. GOL. g-op. Maximum cranial length	221.3	212.2	203.6	196.5	217	207.5	206.3	198.9
M1d. NOL. n-op. Nasio-occipital length	212.9	202.2	195.4	188.5	212	198.5	197.6	192.6
M2. Glabella-inion length	218.3	203.5	191.6	?	217	204	208	198.9
Glabella-sphenobasion length	107.6	96	87.9	?	?	?	97.9	?
Glabella-bregma chord	122.2	114.4	112.4	104.1	103	109.8	118.2	104.4
g-b/g-op. Glabella-bregma chord index	55.2	53.9	55.2	53	47.45	52.9	57.3	52.5

Length of basal temporal	116.1	97	104	?	112	?	101.8	?
BTL/g-op. Basal temporal length index	52.5	45.7	51.1	?	51.65	?	49.3	?
Entire temporal bone length	104.8	97.5	97.8	?	103.8	89.6	97.6	102
ETL/g-op. Entire temporal bone length index	47.4	45.9	48	?	47.85	43.2	47.3	51.3
M5. BNL. Basion-nasion length	117.5	108.2	97.9	?	?	108.5	109.8	?
M5(1). Nasion-opisthion length	152.2	147.4	147.7	?	?	147.5	148.5	?
M6. ba-sphba. Basilar length	23.7	25.7	22.6	?	?	?	24.6	?
M7. FOL. Foramen magnum length (ba-o)	38	41.1	52.6	?	?	?	41.4	?
M8. XCB. Maximum cranial breadth	164.1	156.4	144.1	?	177	166.7	146.9	151.5
M8c. Squama suture breadth	154.6	139	140.9	?	167	158.5	142.8	141.6
Maximum cranial breadth at supramastoid crest. Cranial vault	164.1	156.7	144.1	?	177	166.7	146.9	148.9
Maximum biparietal breadth (Rightmire et al., 2006). Cranial vault	157.4	155.1	143.8	146	170.7	158.5	144.4	148.9
Ratio. Maximum biparietal breadth / maximum bimastoid breadth	95.9	99	99.8	?	96.4	97.9	98.3	100.4
M9. ft-ft. Least frontal breadth. Frontal	116.1	105.7	109	98.1	122.8	107.8	97.6	108.5
Postorbital constriction index. M9/M44	88.7	90.4	88.8	91.3	?	93.3	78.1	94.9
M10. XFB. Maximum frontal breadth. Frontal	128.1	122.7	127.1	116.6	138.8	120.8	118.3	135.1
M10b. STB. Bistephanic breadth (st-st)	121.9	110	115.3	112.7	138.8	107.6	111.2	120.6
M11. AUB. Biauricular breadth	159.1	145.8	139.2	?	173.62	151.9	135.9	143.1
M11b. Biradicular breadth	158.8	144.3	132.8	?	165.1	146	133.7	143
M12. ASB. Biasterion breadth (ast-ast). Temporal	134.4	121.4	126.4	?	136.7	147.5	120.4	123.2
M14. WCB. Minimum cranial breadth	76.7	80.6	80.9	?	?	77.3	72	87.6
M16. Foramen magnum breadth	30.6	31.5	35.4	?	?	?	34.1	?
M17. BBH. Basion-Bregma height	132.6	116.4	110.7	?	?	129	128.8	?
M13a. MDB. Mastoid width. Temporal	21.3	18.4	17.65	?	13.9	11.8	16.1	13.3
Maximum mastoid width	25.4	24.65	20.9	?	20.95	18.8	20.7	20.2
M19a. MDH. Mastoid height. Temporal	30.65	26.55	20.5	?	19.15	25.9	30.9	28.3
Minimum distance between the mastoid and supramastoid crests	14.25	15.2	14.8	?	14.1	17.1	8.5	11.8
Maximum bimastoid breadth	147.5	140.6	128	?	166.1	161.9	143.3	148.3
M20. Porion-bregmatic project height	113.9	102.9	99.7	?	114.6	118.2	107.1	112.4
AVH. Auriculare-vertex projective height	109.5	101.6	97.1	?	103.9	112.8	103.3	110.6
Biporion breadth. Cranial vault	147.9	135.3	128.7	?	158.5	143	125.5	133.5
Porion-basion height	18.8	13.6	12.9	?	?	13.1	22.1	?
M29. FRC. n-b. Frontal sagittal chord	125.1	114.9	113.5	107.9	104.9	114.9	120	107.7
FRF. Nasion-subtense fraction. Frontal	58.6	47.7	57.3	53.6	51.8	54.8	59.7	39.7
FRF/M29. Nasion-subtense fraction relative to the frontal sagittal chord	46.8	41.5	50.5	49.7	49.4	47.9	49.8	36.9
Metopion subtense. Frontal	25.3	25.4	21.4	22.6	20.8	21	21.6	22.1

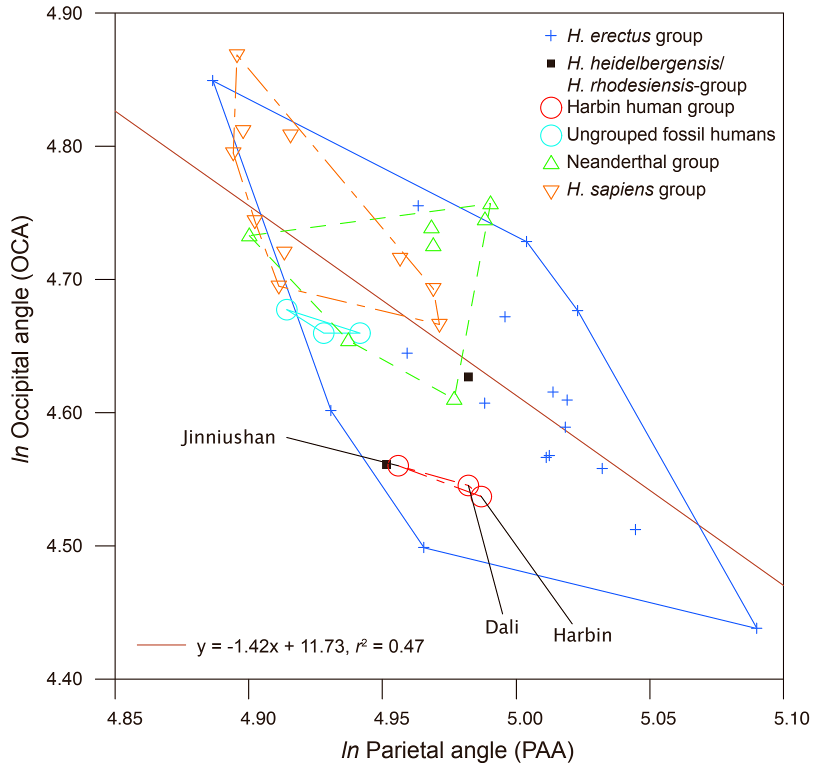
Metopion subtense/M29. Metopion subtense relative to the nation-bregma chord	20.2	22.1	18.9	20.9	19.8	18.3	18	20.5
Lower frontal inclination angle (m-g-i)	64	68.3	59.8	69	64.5	68.4	60.5	73.1
M30. PAC. Parietal sagittal chord	106.1	109.3	104.7	112.1	109.2	128.3	110.8	122.7
M30(2). Bregma-sphenion chord (b-sphn)	93.9	91.4	95.7	89	100.5	96.15	89.5	96.2
M30(3). Lambda-asterion chord (l-ast)	105.8	91.8	79.9	?	99.3	99.9	90	91.6
ASI. Asterion-inion chord	81.7	76	72.6	?	80.4	88.3	75.2	76.8
M30c. Bregma-asterion chord (b-ast). Parietal	146	131.9	121.7	?	146.4	148.3	139.3	144.3
Parietal chord index. M30/M1	47.9	51.5	51.4	57.05	50.35	61.8	53.7	61.7
M31. OCC. l-o. Occipital sagittal chord	103.1	90.3	72.7	?	?	87.8	91.1	?
M31(1). LIC. Lambda-inion chord (l-i)	79.8	69.2	53.2	52	84.2	56.1	55.7	47.3
Lambda-opisthocranion chord	56.7	49.5	39.6	52	82.3	44.2	43.4	47.3
M31(2). Inion-opisthion chord (i-o)	62.2	39	39.2	?	?	53.8	63.6	?
Ratio. M31(1)/M31(2). Length of occipital (lambda-inion) plane compared to nuchal (inion- opisthion) plane. X100	128.3	177.4	135.7	?	?	104.3	87.6	?
Opisthocranion-opisthion chord	77.9	64.5	58.4	?	?	65.2	67.7	?
Sphenobasion-opisthion length	58.2	63.9	70.6	?	?	?	63.6	?
M32(1). Frontal inclination angle (b-n-i). Frontal	50.9	51.8	48.6	51.5	51.4	58.6	49.4	52.9
M32(2). Bregma angle (b-g-i). Frontal	46.9	47.2	45	48.5	47.2	54	45.9	49.7
M32(5). FRA. Frontal angle (b-m-n, degree)	135.9	129.7	138.7	134.7	137.3	139.9	141.1	132.7
M33d. OCA. Occipital angle (degree)	93.4	94.2	95.6	?	?	105.6	102.2	?
M33e. PAA. Parietal angle (degree)	146.5	145.8	142	139.2	152.7	140	145.8	150.3
M33(4). Lambda-inion-opisthion angle (l-i-o)	93.3	98.4	102.8	?	?	106.9	100.5	?
Temporal squama length (Martínez and Arsuaga, 1997)	71.4	70.9	68.5	?	70.8	69.9	69.3	79.3
Temporal squama height (Martínez and Arsuaga, 1997)	52.9	46.5	41.2	?	39.8	52	51.7	38.3
Temporal squama angle (Martínez and Arsuaga, 1997)	52.8	46.8	50.2	?	38.7	56.8	52	32
Temporal muscle attachment height	83.3	89.9	87.6	?	76.1	90	91.4	75.8
Temporal muscle attachment length	143.4	131.4	141.9	140	140	127.2	143.7	135.2
Temporal muscle attachment length index	64.8	61.9	69.7	71.25	64.55	61.3	69.7	68
Transverse tympanic width	22.5	25.6	20.7	?	?	25.5	26	?
Tympanic axis angle	94.8	101.2	100.4	?	?	91.6	105.8	?
Tympanic axis length	23.1	23.2	21.4	?	?	23	26.5	?
Petrous axis angle	128.4	136.9	131.7	?	?	124	122	?
Petrous axis length	14.5	12.9	13	?	?	15.9	11.6	?
Tympanic angle	38.6	34.9	30.4	?	?	31.2	16.8	?
Postglenoid-ectoglenoid length	17.4	18.3	14.5	?	19.4	14.5	18.1	24.2
Postglenoid-entoglenoid length	24.8	21.3	15.4	?	?	24.2	23.8	17.8

Ectoglenoid-entoglenoid length	29.9	29.5	23.4	?	?	25	30.2	30.2
Chord length of the parietomastoid suture. Incisura parietalis - asterion	33.4	26.7	29.3	?	33	19.7	28.3	22.7
Occipital height (l-sphba)	130.7	123.8	117	?	?	?	125.3	?
Occipital subtense	47.7	41.7	33.8	?	?	31.8	37.1	?
Occipital plane index	42.2	40.8	31.3	?	60.2	38	36	38.4
Inion-endinion	25.1	26.4	?	?	?	?	35.3	37.9
M40. BPL. Basion-prosthion length. Cranial vault	125.1	107.8	101.6	?	?	?	117.1	?
M43. FMT. Bi-frontomalare temporale breadth (fmt-fmt). Frontal	140.2	124.4	129	117.2	140	123.8	134.4	127.2
M43a. FMB. Bifrontal breadth. Frontal	130.9	116.9	122.7	107.4	120	113.9	124.9	113
M43b. NAS. Nasio-frontal subtense	27.1	20.4	21.4	18.8	13.1	13.8	26.4	19
M43b/M43a. Nasion-frontal subtense relative to the bifrontal breadth	20.7	17.5	17.4	17.5	10.9	12.1	21.1	16.8
Frontal. Supraorbital torus breadth	145.7	129	135.5	119	140.7	125.5	139.4	128.3
M44. EKB. Biorbital breadth (ek-ek)	130.9	116.9	122.7	107.4	?	115.6	124.9	114.3
Supraorbital torus thickness central. Frontal	15	18	10.8	12.4	13.8	14	20	13.1
Supraorbital torus thickness lateral. Frontal	15.5	13	13.4	9.5	12.7	18.2	17.2	17.2
Supraorbital torus thickness medial. Frontal	21.4	19.2	15.8	16.8	?	13.5	20	18.8
M45. ZYB. Bizygomatic breadth (zy-zy)	162.4	143.8	148.5	?	?	?	143.4	?
M45(1). JUB. Bijugal breadth	138.6	126.5	130.9	114.2	?	122.4	134.1	127.9
M46b. ZMB. Bimaxillary breadth	113.8	111.4	116.9	?	?	?	110.6	108.1
Facial proportion. M46b/M43	81.2	89.5	90.6	?	?	?	82.3	85
Temporal gutter angle	54.8	59.4	58.5	48.2	?	49.5	51	40.4
M48. NPH. Upper facial height. Nasion-prosthion height (n-pr)	76.4	64.1	72.5	?	?	?	90.9	83.5
M48(1). Nasospinale-prosthion distance (ns-pr)	16.2	16.8	19.7	?	?	?	26.9	23
M74. Upper facial angle. Nasion-prosthion relative to the FH	78	82.1	82.9	?	?	?	82.2	75.9
M74(1). Clivus-alveolar plane angle	57.9	55.1	74.1	?	?	?	65	64.8
Nasiospinale-alveolare length	19.5	?	23	?	?	?	31.5	?
Nasiospinale-alveolare angle	81.5	?	86.7	?	?	?	84.9	?
M48d. WMH. Cheek height	28.3	22.6	27.6	?	?	?	26.5	23.45
M49a. DKB. Interorbital breadth (d-d)	24.7	20.6	26.2	19.9	?	?	25.3	27.3
M50. IOW. Anterior interorbital breadth (mf-mf)	31.4	23.5	33.6	22.4	?	?	28.1	26.6
M51. Orbital breadth (mf-ek)	52.4	50.5	46.4	47	?	51.5	52.7	45.1
M51a. OBB. Orbital breadth	57.3	51	50.7	45.5	?	51	49.5	44.9
M52. OBH. Orbital height	41.6	34.2	36	38	?	39	39.2	33.3
M54. NBL. Nasal breadth	36.2	34.9	31.8	?	?	?	31.5	36
M57(2). Upper nasal breadth of nasal bones	17.9	8.5	13	13.4	?	?	17.7	15.9
M55. NH. Nasal height	61	48.4	52.1	?	?	?	63.9	56.5

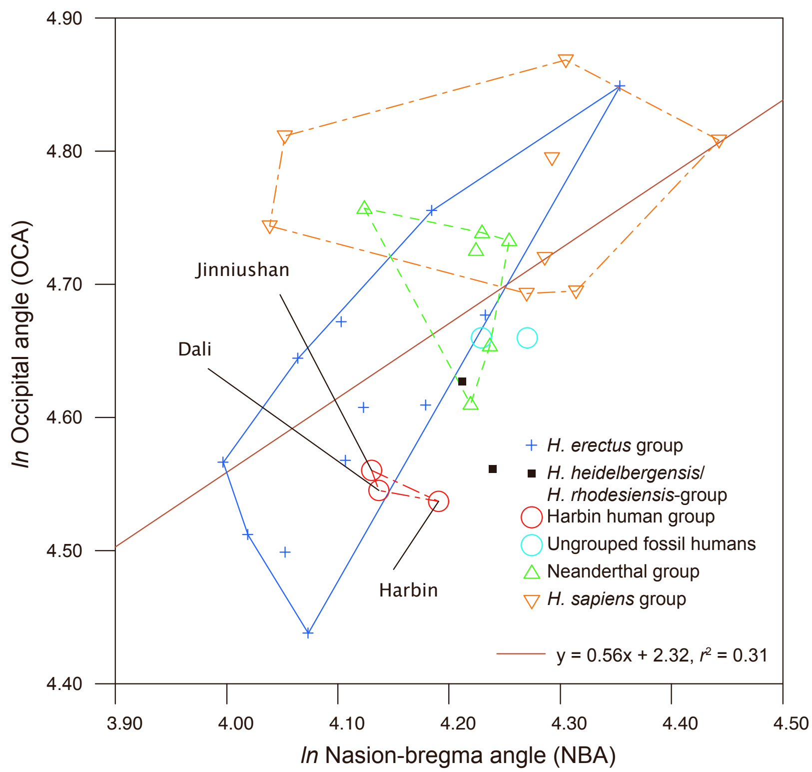
M61. MAB. Maxilloalveolar breadth	79.2	73.9	65.5	?	?	?	84.8	73.5
Maxilloalveolar length	74	69.1	65.1	?	?	?	67.2	63.1
Maxillary palate length	45.8	49.8	39.5	?	?	?	42.4	45
M63. Internal palatal breadth	39	40.3	34.8	?	?	?	47.4	40.6
External alveolar breadth at canine level	68.8	51.3	46.4	?	?	?	52.4	50.8
External alveolar breadth at P3 level	73.1	62	54.7	?	?	?	62.1	56.6
Exteranal alveolar breadth at P4 level	74.6	66.2	60.5	?	?	?	67.7	65.1
External alveolar breadth at M1/M2 level	74.5	67.2	64.8	?	?	?	78.7	73.5
M61 relative to the external palatal breadth at the canine level	115.1	144.1	141.2	?	?	?	161.8	144.7
M61 relative to the external palatal breadth at the P3 level	108.3	119.2	119.7	?	?	?	129.1	129.9
M76a. SSA. Zygomaxillary angle (degree)	112.3	122.6	119.5	?	?	?	107.3	116.8
Subspinale subtense	38.2	30.5	33.9	?	?	?	40.8	33.5
M77a. NFA. Nasio-frontal angle (fm:a-n-fm:a)	135.2	141.8	142.7	143	?	152.9	136	145.3
Width of nasal bridge. Rightmire 1998	29.9	24.7	31	20.1	?	?	27.4	27.8
Nasal bridge height. Rightmire 1998	16.2	12.1	11.6	12.4	?	?	16.8	20.5
Nasal bridge index. Rightmire 1998	54.2	49	37.4	61.7	?	?	61.3	73.7
Nasal bridge angle. Rightmire 1998	85.8	91.4	103.4	75.7	?	?	77.3	67.4
M41c. XML. Maximum malar length	52.7	54	52	?	?	?	56.6	?
Maximum malar height (Rightmire et al., 2006)	52.1	43.1	41.6	?	?	?	54.1	48.7
Zygomaxillare anterior-zygoorbitale (zm:a-zo)	33.9	32.9	35.4	?	?	?	33.4	32.9
M41d. MLS. Malar subtense	11.5	10.8	10.4	?	?	?	12.3	?
IZM height. Inferior zygomatic margin height	18.9	16.9	21.2	?	?	?	26.5	22.9
Malar angle. Posterior-inferior angle between the Frankfurt horizontal and the chord connecting the most inferior-lateral point of the orbit and the most inferior point on the malaria-maxillary suture	67.9	50.3	58.8	?	?	?	73.8	66.7
bimandibular fossa breadth	116.2	104.7	97.7	?	?	118.7	107.8	113.6
Mandibular fossa depth	11.8	6.5	9.3	?	8	9.2	10.1	?
Midfacial prognathism	15.8	5.6	9.1	?	?	?	12.3	16.7
Dental. Upper M2. Mesiodistal length	13.6	?	11.1	?	?	?	12.4	?
Dental. Upper M2. Buccolingual width	16.6	?	12.3	?	?	?	13.4	?
Dental. Upper M2. Width/length	122.1	?	110.8	?	?	?	108.1	?



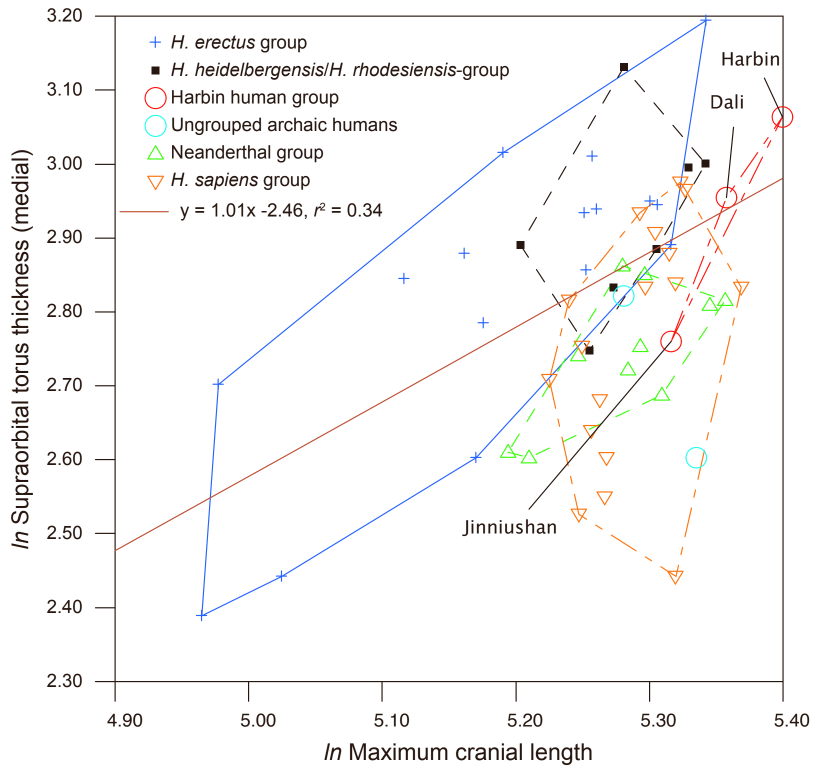
S-Figure 2. Frontal angle and parietal angle of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-degrees. The *Homo erectus* group tends to have flat frontal and parietal bones (with larger frontal angles and parietal angles). The *Homo sapiens* group tends to have more arched frontal and parietal bones (with smaller frontal angles and parietal angles). Harbin and comparable Chinese fossils lie centrally in this figure.



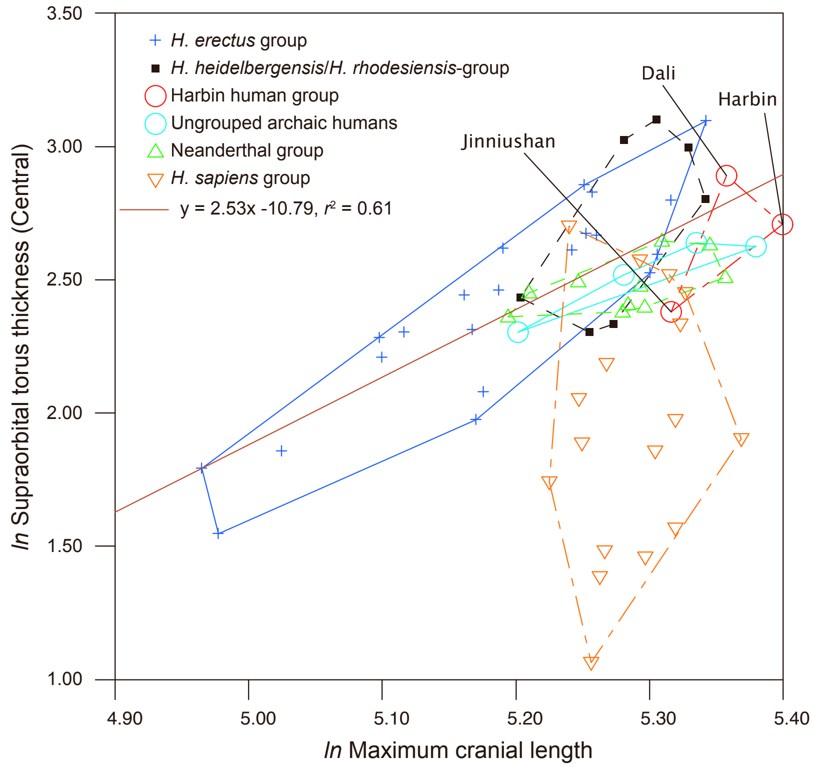
S-Figure 3. Parietal angle and occipital angle of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-degrees. The *Homo erectus* group tends to have flat parietal bones (with larger parietal angles) and more angulated occipital bones (with smaller occipital angles). The *Homo sapiens* group tends to have more arched parietal bones (with smaller parietal angles) and flat occipital bones (with larger occipital angles). The Harbin, Dali, and Jinniushan crania fall in the range of the *Homo erectus* group.



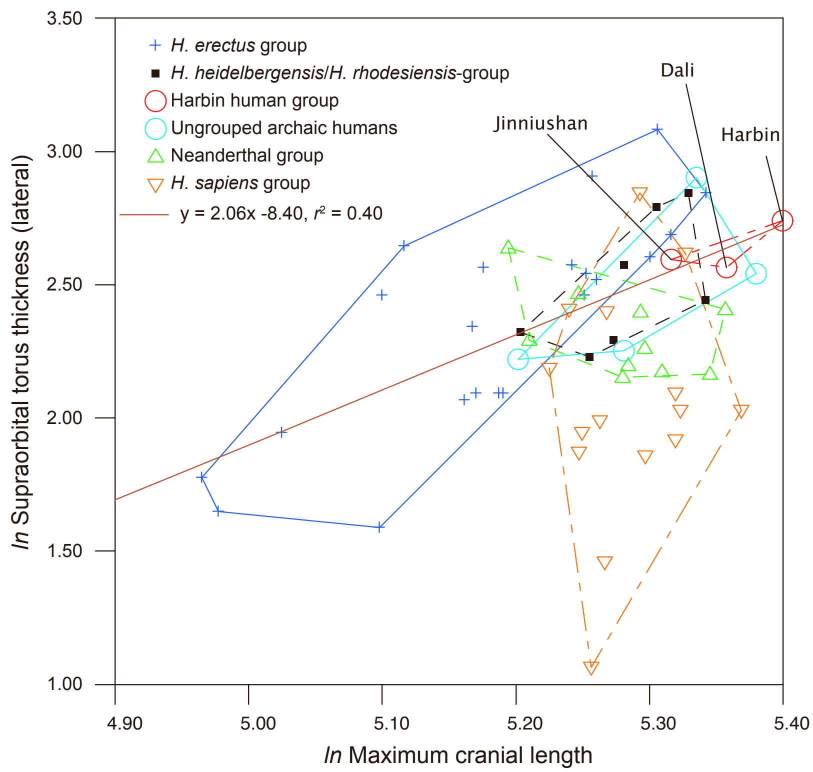
S-Figure 4. Nasion-bregma angle and occipital angle of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-degrees. The *Homo erectus* group tends to have smaller nasion-bregma angles and more arched occipital bones (with smaller occipital angles) than *Homo sapiens*. The *H. sapiens* group tends to have less angulated occipital bones (with larger occipital angles) and larger nasion-bregma angles. The Harbin, Dali, and Jinniushan crania fall in the range of the *H. erectus* group.



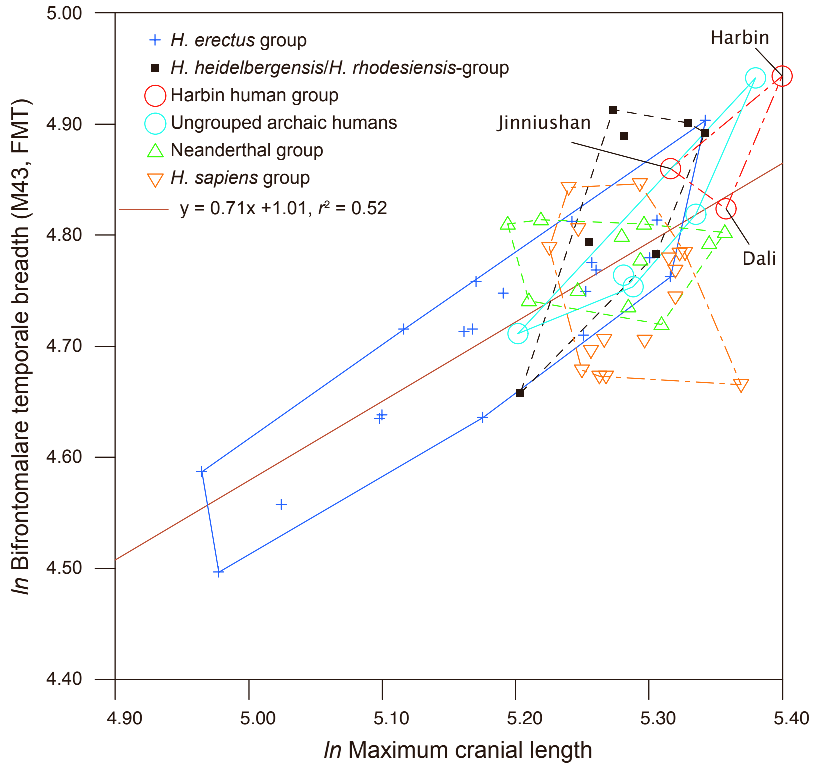
S-Figure 5. Medial supraorbital torus thickness of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression line fits on the data excluding *Homo sapiens*. The linear relationship between the maximum cranial length and the medial supraorbital torus thickness fits quite well within the archaic humans and excluding *H. sapiens*. The medial supraorbital torus thickness of *H. sapiens* is not correlated with the maximum cranial length, which can be used as a proxy of body size. The Harbin, Dali, and Jinniushan crania fall in the range of archaic humans, excluding *H. sapiens*, but have a small overlap with *H. sapiens*.



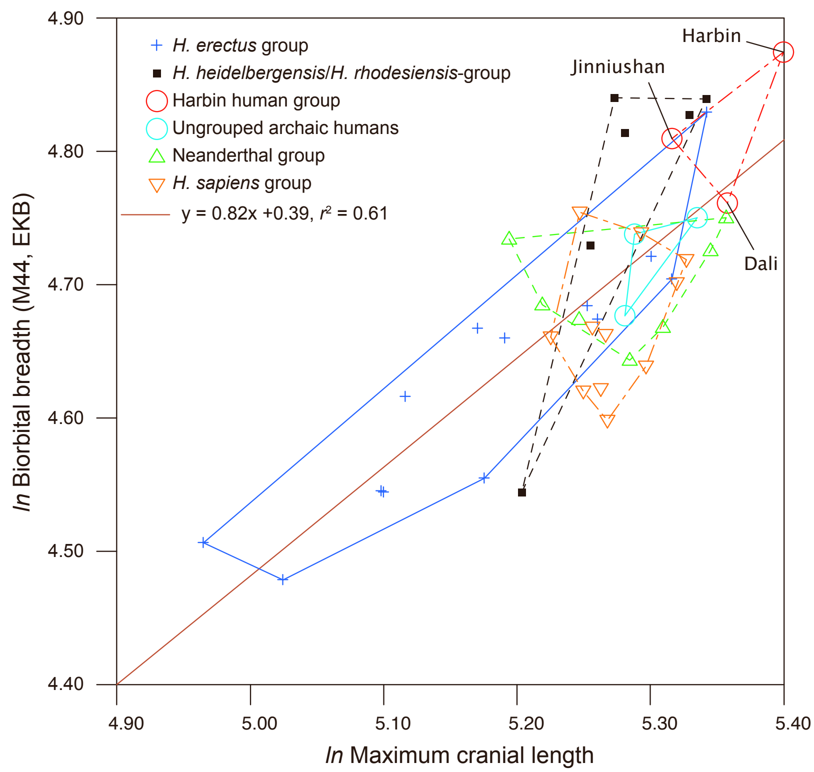
S-Figure 6. Central supraorbital torus thickness of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression line fits on the data excluding *Homo sapiens*. The linear relationship between the maximum cranial length and the central supraorbital torus thickness fits quite well within the archaic humans, excluding *H. sapiens*. The central supraorbital torus thickness of *H. sapiens* is not correlated with the maximum cranial length, which can be used as a proxy of body size. The Harbin, Dali, and Jinniushan crania fall in the range of archaic humans, excluding *H. sapiens*, but have a small overlap with *H. sapiens*.



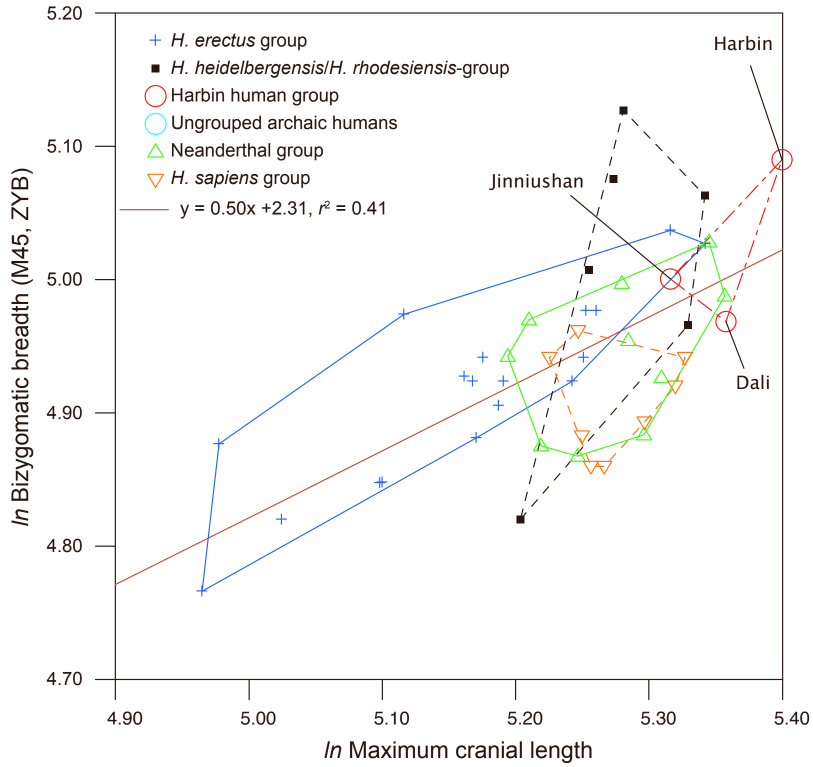
S-Figure 7. Lateral supraorbital torus thickness of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression line fits on the data excluding *Homo sapiens*. The linear relationship between the maximum cranial length and the lateral supraorbital torus thickness fits quite well within the archaic humans, excluding *H. sapiens*. The lateral supraorbital torus thickness of *H. sapiens* is not correlated with the maximum cranial length, which can be used as a proxy of body size. The Harbin, Dali, and Jinniushan crania fall in the range of archaic humans, excluding *H. sapiens*, but have a small overlap with *H. sapiens*.



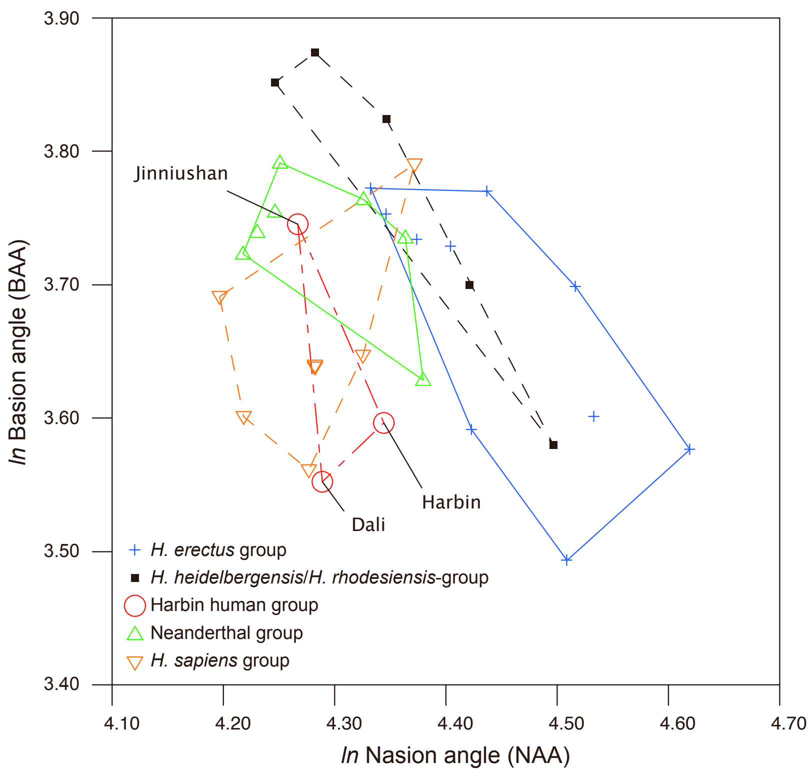
S-Figure 8. Bifrontomalare temporale breadth of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression analysis indicates that all the humans examined here follow the same linear relationship between the bifrontomalare temporale breadth and the maximum cranial length. The Harbin cranium is well above the regression line, suggesting that it has a broader face relative to its cranial length.



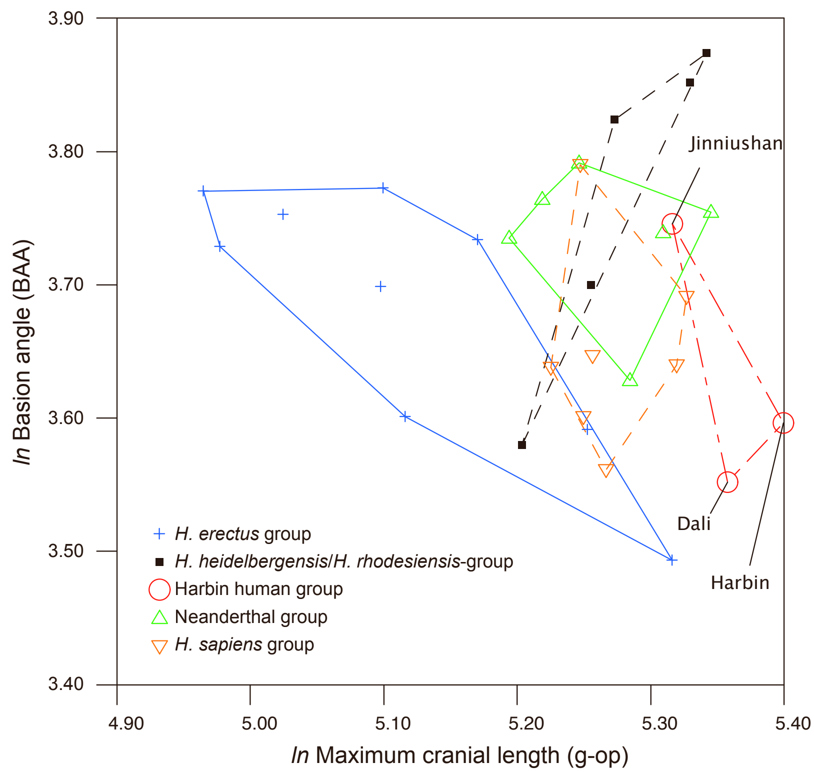
S-Figure 9. Biorbital breadth of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression analysis indicates that all the humans examined here follow the same linear relationship between the biorbital breadth and the maximum cranial length. The Harbin cranium lies well above the regression line, suggesting that it has a broader face relative to its cranial length.



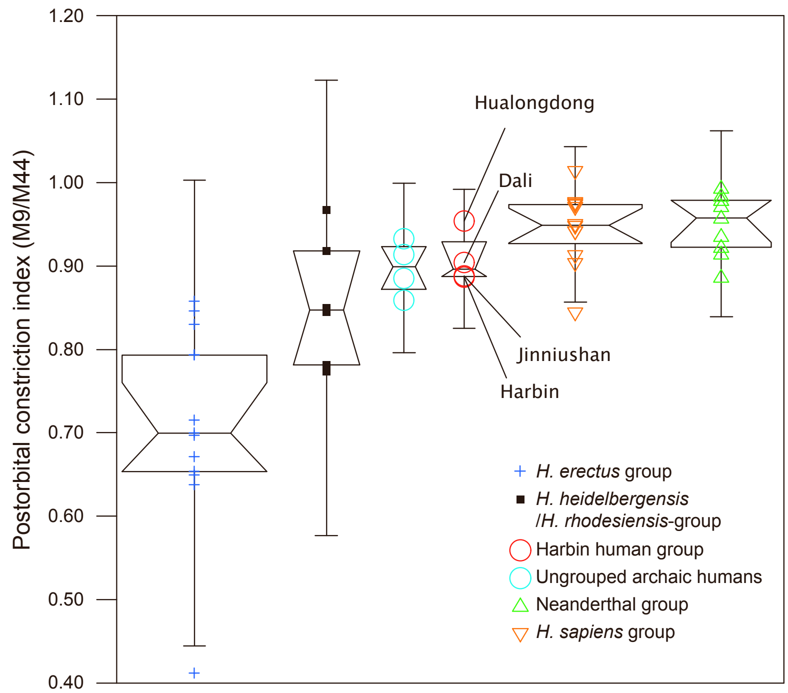
S-Figure 10. Bizygomatic breadth of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-millimeters. The regression analysis indicates that all the humans examined here follow the same linear relationship between the bizygomatic breadth and the maximum cranial length. The Harbin cranium lies well above the regression line, suggesting that it has a broader face relative to its cranial length.



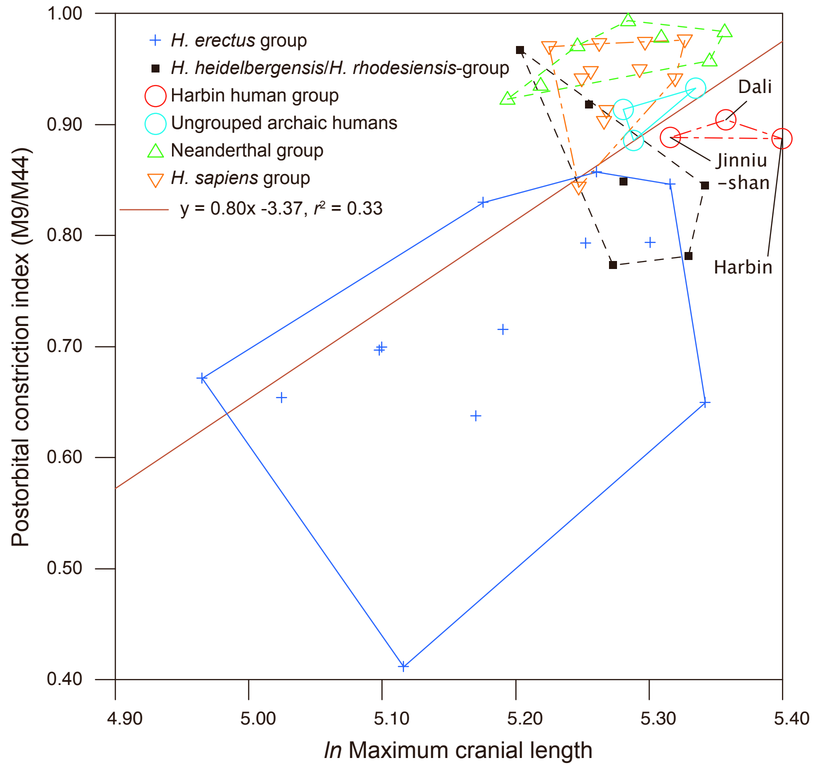
S-Figure 11. The basion angle and nasion angle of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-degrees. The two angles do not show a significant linear relationship when all the data are grouped together. *Homo sapiens* tend to have smaller nasion and basion angles, corresponding to a low and retracted face. The Harbin, Dali and Jinniushan crania largely overlap the range of *H. sapiens*.



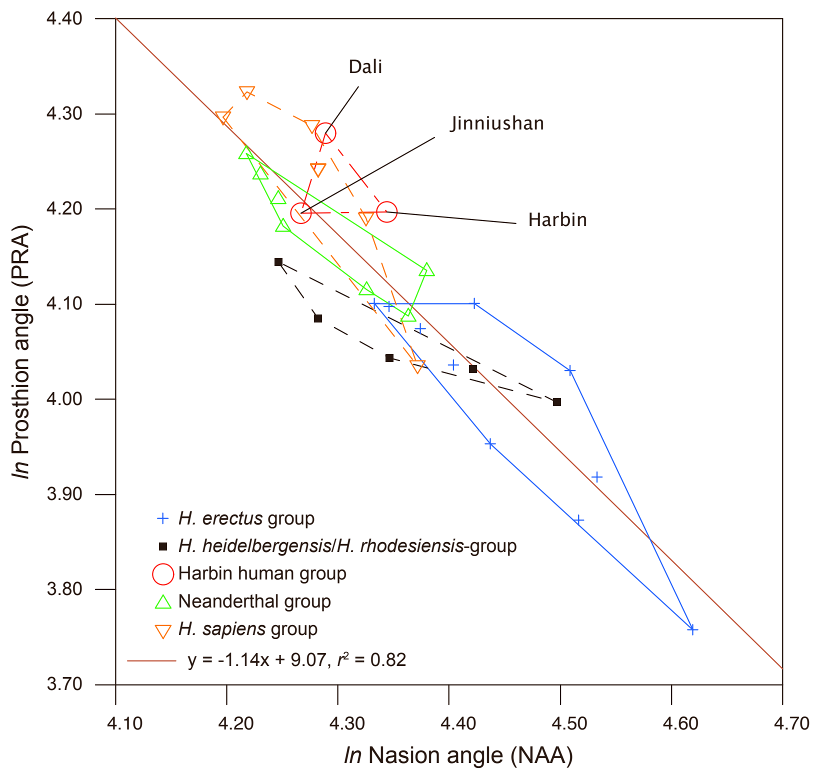
S-Figure 12. The basion angles of the Harbin cranium and other Middle-Late Pleistocene *Homo* cranial fossils relative to the maximum cranial lengths. Scales in *ln*-degrees and *ln* millimeters. The basion angles do not show a significant linear relationship against the maximum cranial lengths. *Homo sapiens* tend to have smaller nasion and basion angles, corresponding to their low and retracted faces. The Harbin and Dali also have small basion and nasion angles.



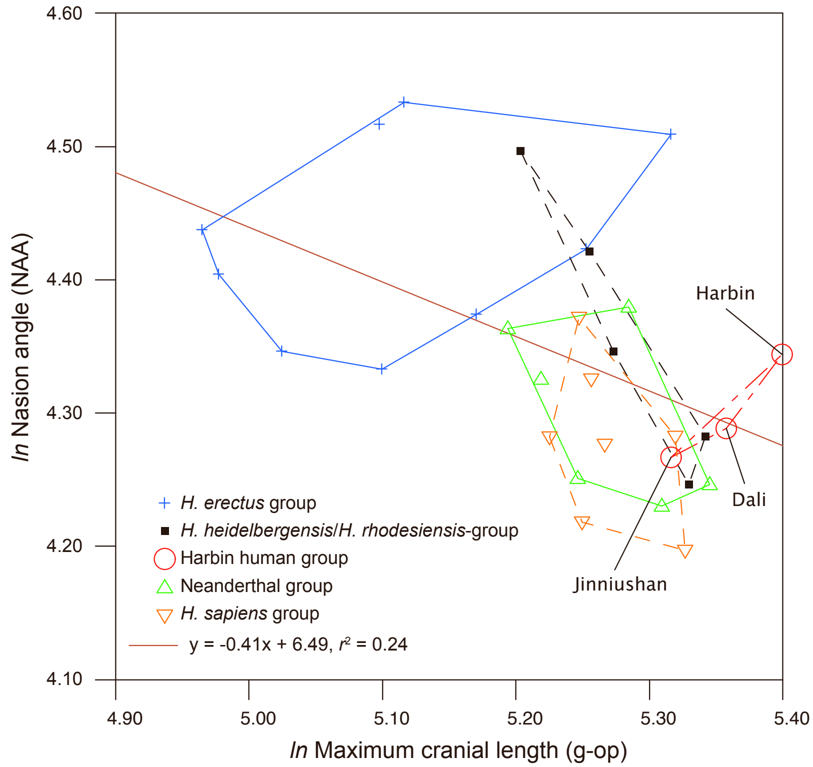
S-Figure 13. Postorbital constriction index of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. The postorbital constriction index is calculated as the quotient of least frontal breadth (M9) over biorbital breadth (M44). Notched boxes indicate the first quartiles (Q1s) and the third quartiles (Q3s). Whiskers indicate 1.5 times the interquartile range (IQR, IQR = Q3 – Q1). The notches indicate the medians. The widths of the boxes are proportional to the sample sizes. The postorbital constriction variation range of *Homo sapiens* largely overlaps that of the Neanderthals. The Harbin cranium has a moderate postorbital constriction, well above the variation range of *Homo erectus*, but below the variation range of *H. sapiens* and the Neanderthals. It overlaps with those of the *Homo heidelbergensis*/*Homo rhodesiensis* group and the ungrouped archaic humans.



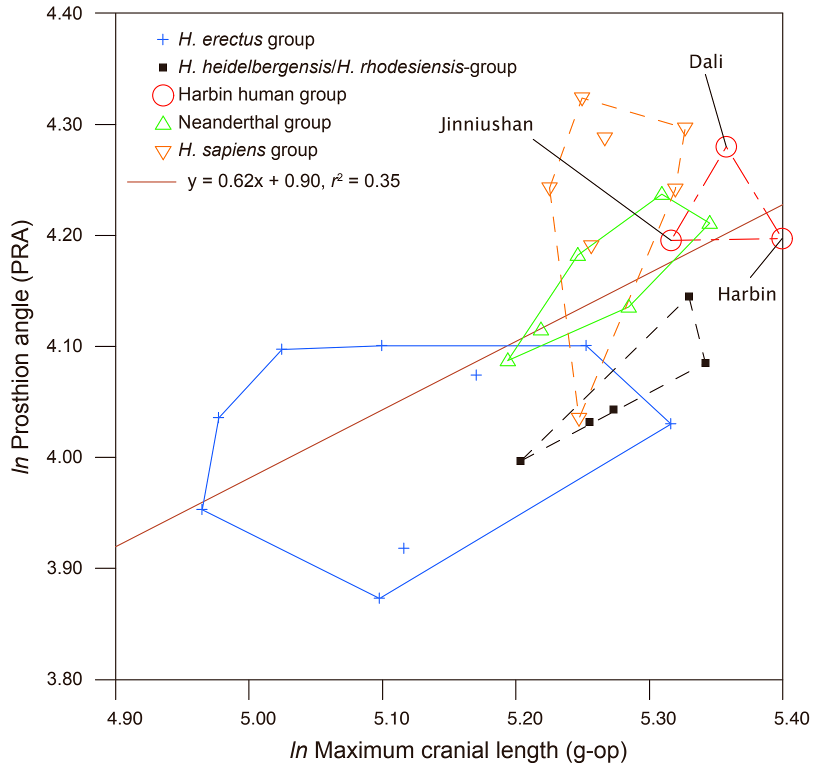
S-Figure 14. Postorbital constriction indices of the Harbin cranium and other Middle-Late Pleistocene *Homo* cranial fossils, relative to the maximum cranium lengths. Maximum cranial length is scaled in *ln* millimeters. Postorbital constriction index is calculated as the quotient of least frontal breadth (M9) over biorbital breadth (M44). Larger cranial lengths tend to have larger postorbital constriction indices. The postorbital constriction variation range of *Homo sapiens* largely overlaps that of the Neanderthals. The Harbin cranium has a relatively lower postorbital constriction index compared with the Neanderthal and *H. sapiens* groups.



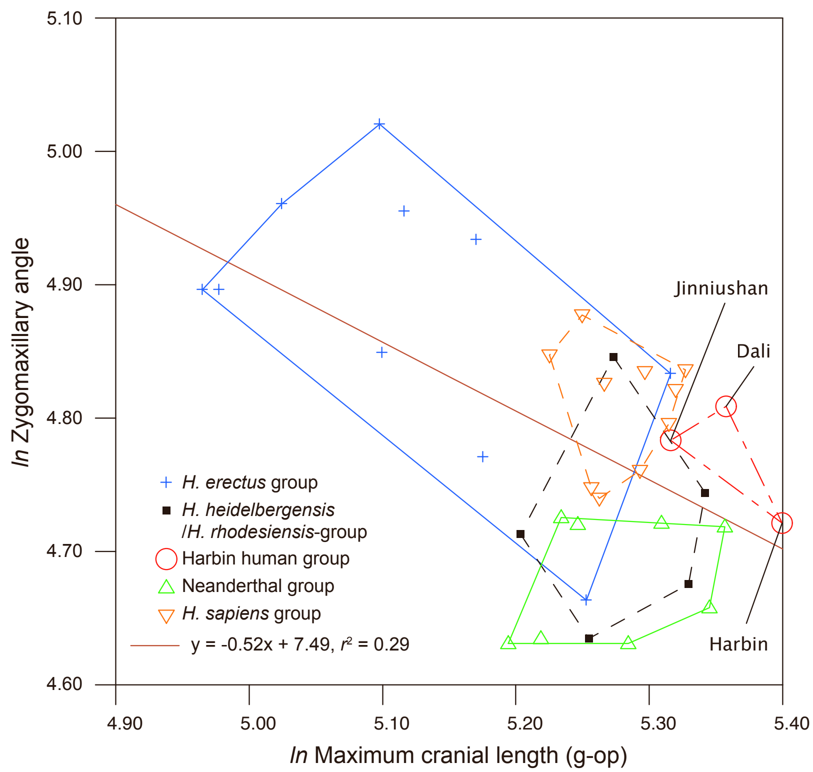
S-Figure 15. The prosthion angle and nasion angle of the Harbin cranium compared with other Middle-Late Pleistocene *Homo* cranial fossils. Scales in *ln*-degrees. The two angles show a significant linear relationship. *Homo sapiens* have smaller nasion angles and larger prosthion angles, corresponding to lower prognathism. *Homo erectus* have larger nasion angles and smaller prosthion angles, corresponding to higher prognathism. The Harbin, Dali and Jinniushan crania fall in the range of *H. sapiens*.



S-Figure 16. The nasion angles of the Harbin cranium and other Middle-Late Pleistocene *Homo* cranial fossils relative to the maximum cranial lengths. Scales in *ln*-degrees and *ln* millimeters. The nasion angles show a weak linear relationship against the maximum cranial lengths. If *Homo erectus* and other humans are considered separately, the linear relationship does not show. *Homo sapiens* and Neanderthals show large overlaps. The Jinniushan and Dali crania are close to the ranges of *H. sapiens* and Neanderthals, while Harbin lies outside the range because of its huge size.



S-Figure 17. The prosthion angles of the Harbin cranium and other Middle-Late Pleistocene *Homo* cranial fossils relative to the maximum cranial lengths. Scales in *ln*-degrees and *ln* millimeters. The prosthion angles show a linear relationship against the maximum cranial lengths. If *Homo erectus* and other humans are considered separately, the linear relationship does not show. *Homo sapiens* and Neanderthals show large overlaps. The Jinniushan and Dali crania are close to the ranges of *H. sapiens* and Neanderthals, while Harbin lies outside the range because of its huge size.



S-Figure 18. The zygomaxillary angles of the Harbin cranium and other Middle-Late Pleistocene *Homo* cranial fossils relative to the maximum cranial lengths. Scales in *ln*-degrees and *ln* millimeters. The zygomaxillary angles show a linear relationship against the maximum cranial lengths. If *Homo erectus* and other humans are considered separately, the linear relationship does not show. Given the same maximum cranial length, *Homo sapiens* have larger zygomaxillary angles than Neanderthals. The Harbin, Jinniushan and Dali crania are closer to the range of *H. sapiens*.

Characters for phylogenetic analysis

The 234 discrete characters were all equally weighted. Forty-six multi-state characters were set as "ordered". When the scored specimens were merged into a terminal taxon, their character states were also merged. The merged cells with multiple states were set to polymorphism.

To remove the effect of body size, the linear measurements of the crania and the upper dentitions of a scored specimen were divided by the 1/3rd power of the cranial capacity of this specimen. The linear measurements of the mandibles and lower dentitions of a scored specimen were divided by the bi-ramus breadth at the alveolar margin of this specimen. Ratios were calculated as one linear measurement over another linear measurement and multiplied by 100. After the removal of the effect of body size, the linear measurement, ratio, or angle variables were normalized. Given a variable, a value of this variable minus the minimum of the variable, then the result was divided by the difference between the maximum and minimum of this variable among all the scored specimens. After transformation and normalization, all the continuous characters have a range between 0 and 1.

In total 400 normalized continuous characters and 234 discrete characters were used for phylogenetic analysis.

The names of the characters were listed in Appendix 1 and Appendix 2.

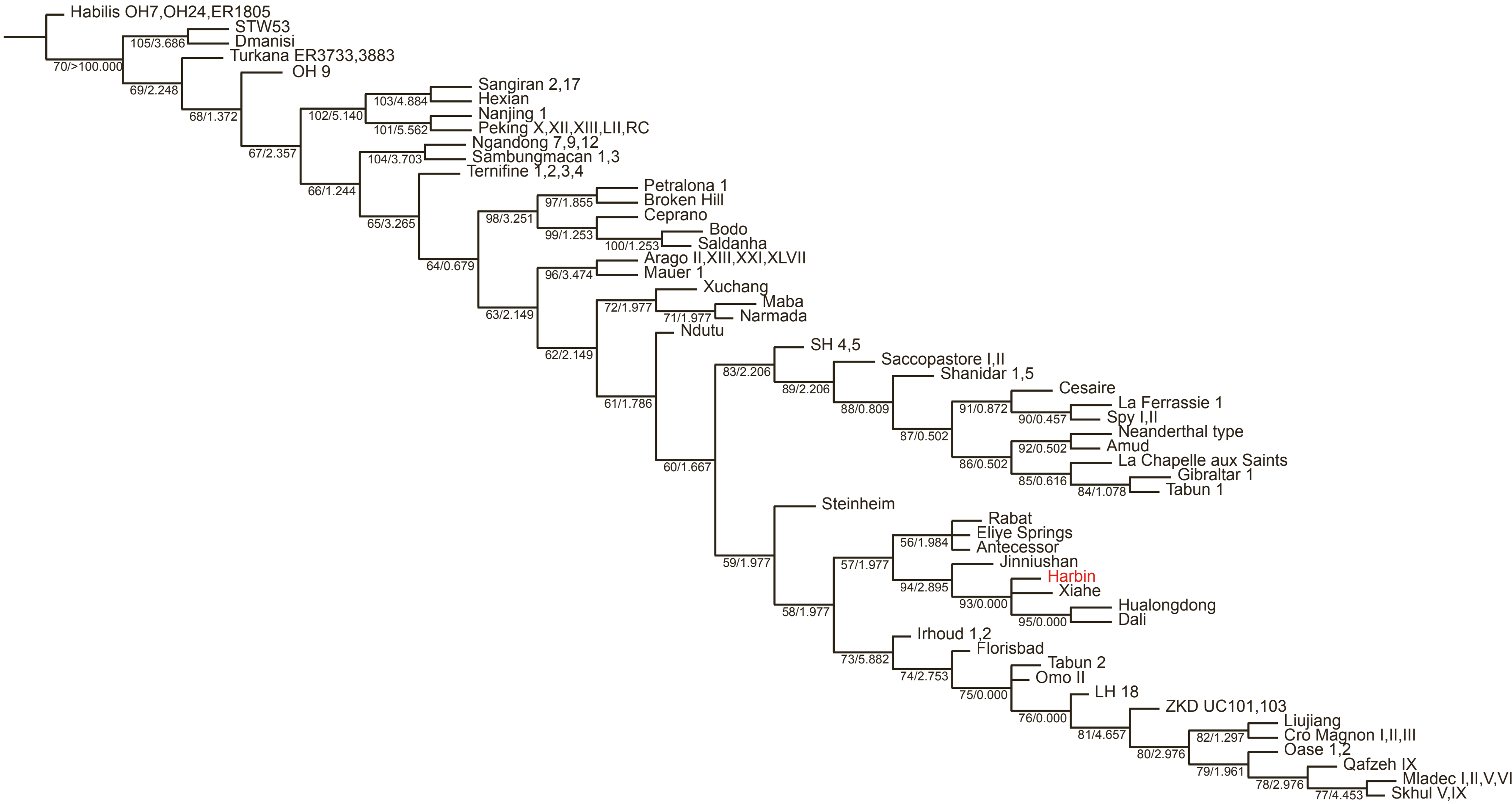
Parsimony analysis

Parsimony analysis of the dataset (discrete and continuous, Appendix 3) was undertaken by using TNT, Tree analysis using New Technology, a parsimony analysis program subsidized by the Willi Hennig Society[63]. We used the parallel version of TNT on one hundred CPU cores. We ran multiple replications, using sectorial searches, drifting, ratchet and fusing combined (Appendix 4). Random sectorial search, constraint sectorial search and exclusive sectorial search were set with default settings. On each core, ten cycles of tree drifting, 10 cycles of ratchet and 10 cycles of tree fusing were performed in the search. The search level was set as 10 for 55 taxa. Optimal scores were hit 10 times independently, each hit with 1000 initial replications. In total 1 million replications were performed (10000 replications on each core). Some characters are set as ordered (Appendix 4, 5). All characters have equal weight. No constraint was used for the parsimony analysis. About 31 hours were required to finish the non-constraint parsimony search on our computing cluster. More than 3247 billion rearrangements were examined. Twenty-five trees with a best score of 2812.678 were retained.

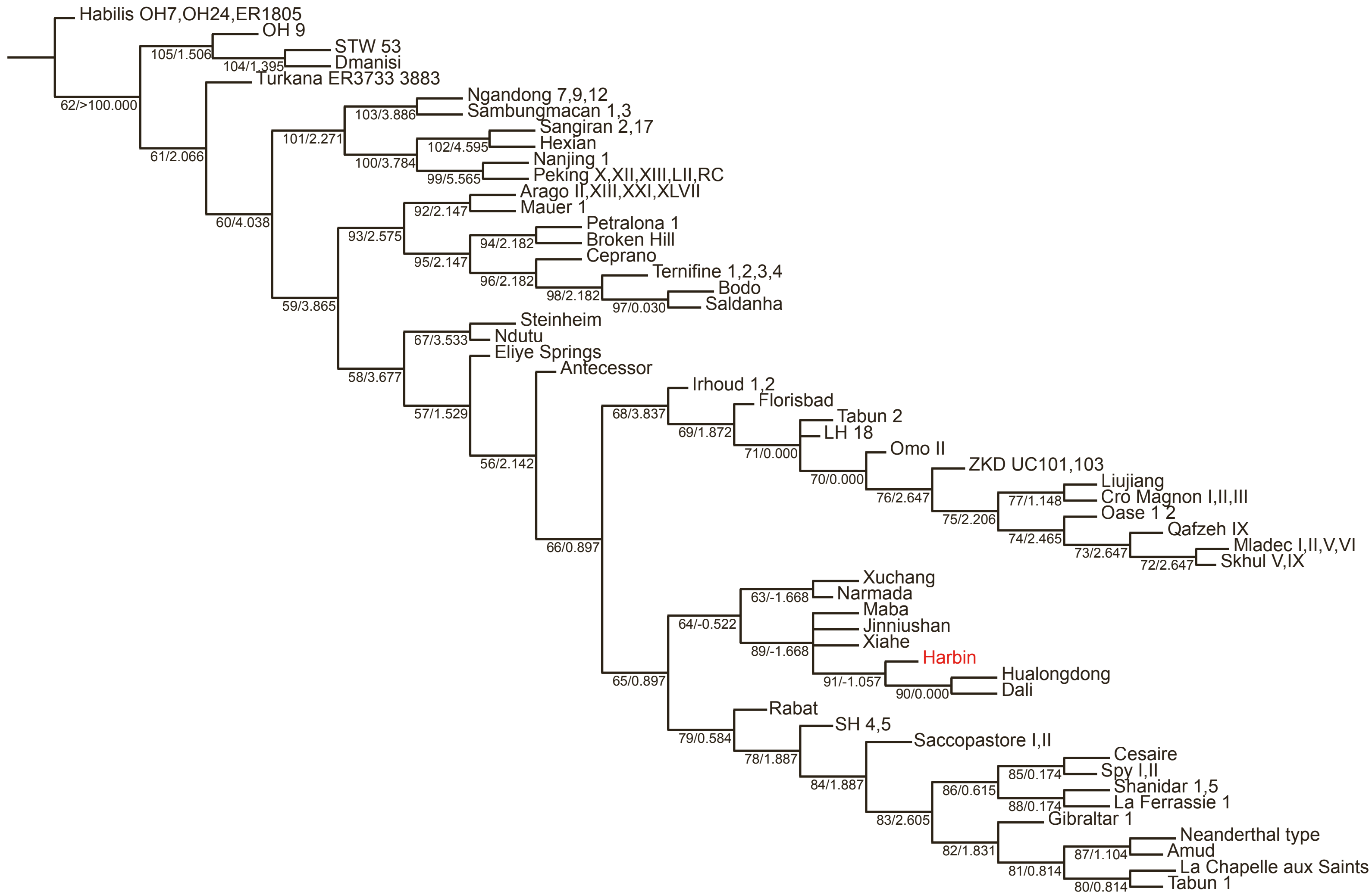
To reflect the recent results from palaeoproteomic and ancient DNA researches[28, 64-66], partial backbone constraints were used to force the Xiahe mandible as the sister group of Neanderthals and to force *H. antecessor* outside of the Neanderthal-Xiahe-*H. sapiens* clade. The same searching strategy was used as in the non-constraint parsimony analysis. Script for the backbone constrained parsimony searches is given in Appendix 5. About 31 hours were required to finish the backbone constrained parsimony search. More than 3207 billion rearrangements were examined. Fifty-five trees with a best score of 2818.897 were retained.

We used Bremer supports[67] calculated in TNT (Appendix 6) to describe the stability of the phylogenetic results (S-Fig. 19, 20). The results of backbone-constrained and non-constraint searches were compared in S-Table 3. The most parsimonious trees (S-Fig. 19) are preferred because they require fewer assumptions than the backbone-constrained trees. The majority consensus of the most parsimonious trees was described in TNT. The synapomorphies were listed in S-Table 4 to S-Table 7 and Appendix 7.

When parsimony criteria are used for mapping the characters on the most parsimonious tree, the Harbin human group (Harbin, Dali, Jinniushan, Hualongdong, Xiahe) shares 31 synapomorphies of continuous characters and 10 synapomorphies of discrete characters (S-Table 4). Most of these continuous characters are related to an increase in overall size and robustness, such as nasion-opisthion length, biasterionic breadth, and supraorbital torus breadth. A few angles, such as the frontal inclination angle, bregma angle, occipital angle etc., are related to the low cranial vaults of the Harbin group. The upper facial angle and nasiospinale-alveolare angle are enlarged, while the nasio-frontal angle and midfacial prognathism are reduced. These four characters are related to the reduction of prognathism in the Harbin human group. The discrete synapomorphic characters mainly lie in the anterior maxillary and temporal regions. Synapomorphies supporting the Harbin-*H. sapiens* clade include 20 continuous characters and 9 discrete characters (S-Table 7). Most of the continuous characters are related to the increase in cranial breadth and reduction of palatine length. The synapomorphic discrete characters include a moderate post-toral sulcus, gently arched zygomaticoalveolar crest, presence of inferior orbital torus, strong malar tubercle, and thick mastoid processes.



S-Figure 19. Majority-rule consensus tree of 25 most parsimonious trees. Number in front of a slash indicates the node number, while the number behind a slash indicates the Bremer support.



S-Figure 20. Majority-rule consensus trees of 55 most parsimonious trees. Backbone constraints were used to force Xiahe as the sister group of Neanderthals and *H. antecessor* outside of the Neanderthal-*H. sapiens* clade. Number in front of a slash indicates the node number, while the number behind a slash indicates the Bremer support.

S-Table 3. Comparison between the most parsimonious phylogenetic tree and the backbone constrained phylogenetic tree

	Most parsimonious tree	Backbone constrained tree
Replications	1 million	1 million
Most parsimonious tree number	25	55
Searching time	30:45:48	30:46:24
Rearrangements examined	3,247,009,993,272	3,207,084,736,601
Tree length	2812.68	2818.90
Consistency Index	0.26	0.26
Retention Index	0.46	0.46
Homo sapiens	Monophyletic	Monophyletic
Neanderthals	Monophyletic	Monophyletic
H. sapiens-Harbin monophyly	Supported	Not supported
H. sapiens-Xiahe monophyly	Supported	Not supported
Neanderthal-Harbin monophyly	Not supported	Supported
Neanderthal-Xiahe monophyly	Not supported	Supported
Harbin-Xiahe-Dali-Jinniushan-Hualongdong monophyly	Supported	Supported
Harbin-Maba-Narmada-Xuchang monophyly	Not supported	Supported
Homo heidelbergensis/*H. rhodesiensis*	Paraphyletic	Paraphyletic
Homo heidelbergensis/*H. rhodesiensis*-Harbin monophyly	Not supported	Not supported
Homo heidelbergensis/*H. rhodesiensis*-Maba monophyly	Not supported	Not supported
Homo erectus	Paraphyletic	Paraphyletic

S-Table 4. Synapomorphies shared by the Harbin human clade.

Characters	Plesiomorphic states	Synapomorphic states
Char. 12, M5(1). Nasion-opisthion length	0.325-0.351	0.391
Char. 26, M12. ASB. Biasterion breadth (ast-ast).	0.457	0.536
Char. 48, ASI. Asterion-inion chord	0.524	0.537
Char. 50, Parietal chord index. M30/M1	0.632-0.736	0.544-0.547
Char. 58, M32(1). Frontal inclination angle (b-n-i)	0.606-0.698	0.566-0.602
Char. 59, M32(2). Bregma angle (b-g-i). Frontal	0.536-0.706	0.516-0.528
Char. 61, M33d. OCA. Occipital angle (degree)	0.461	0.241
Char. 63, M33(4). Lambda-inion-opisthion angle (l-i-o)	0.518-0.540	0.400
Char. 68, Temporal muscle attachment length	0.344	0.519-0.531
Char. 85, M43. FMT. Bi-frontomalare temporale breadth (fmt-fmt)	0.462	0.522
Char. 87, M43b. NAS. Nasio-frontal subtense	0.502-0.566	0.596
Char. 89, Frontal. Supraorbital torus breadth. XSOT	0.461	0.637

Char. 92, Supraorbital torus thickness lateral	0.427-0.429	0.514
Char. 94, M45. ZYB. Bizygomatic breadth (zy-zy)	0.108-0.196	0.316
Char. 95, M45(1). JUB. Bijugal breadth	0.339	0.381
Char. 96, M46b. ZMB. Bimaxillary breadth	0.266-0.280	0.352-0.409
Char. 101, M74. Upper facial angle. Nasion-prosthion relative to the FH	0.558-0.592	0.632-0.711
Char. 104, Nasiospinale-alveolare angle	0.618-0.718	0.759-0.835
Char. 107, M50. IOW. Anterior interorbital breadth (mf-mf)	0.388-0.408	0.512-0.867
Char. 109, M51a. OBB. Orbital breadth	0.517-0.654	0.679
Char. 110, M52. OBH. Orbital height	0.408-0.492	0.552
Char. 126, M77a. NFA. Nasio-frontal angle (fm_a-n-fm_a)	0.451-0.571	0.440
Char. 139, Midfacial prognathism	0.384-0.440	0.208-0.361
Char. 216, Dental. Upper P3. Width/length	0.406-0.466	0.318
Char. 240, Dental. Upper M2. Hypocone size. ASUDAS grades. UM2HC	0.583	0.500
Char. 332, Ratio, Auriculare-vertex projection height/Maximum cranial breadth	0.423	0.417
Char. 334, Ratio, Frontal sagittal chord/Parietal sagittal chord	0.139-0.172	0.212-0.243
Char. 339, Ratio, Occipital angle/Parietal angle	0.526	0.336
Char. 354, Cheek height/Supraorbital breadth	0.292	0.230
Char. 355, Ratio, Interorbital breadth (d-d)/Supraorbital breadth	0.276-0.300	0.240
Char. 358, Ratio, Maxilloalveolar breadth/Maxilloalveolar length	0.376	0.269-0.270
Char. 406, Frontal. Anterior view. Supraorbital sulcus	Shallow	Absent
Char. 409, Frontal. Anterior view, superior view. Supraorbital trigon surface topography	Posteriorly concave	Flat
Char. 430, Frontal. Double temporal line on the frontal	Absent	Present
Char. 452, Maxillary. Anterior view. Anterior nasal sill crest	Absent or very weak	Present
Char. 453, Maxillary. Anterior view. Anterior nasal sill central spine	Small	Large
Char. 467, Parietal. Thickness at parietal eminence (or the centre)	Intermediate	Thick
Char. 484, Occipital. Ventral view. opisthionic recess (narrowing) at the rear of the foramen magnum	Absent	Present
Char. 493, Temporal. Posterior view. Mastoid foramen position	Lateral to the temporal-occipital suture	At the temporal-occipital suture
Char. 502, Temporal. Ventral view. Glenoid fossa anterior-posterior width	Relatively broad	Very broad
Char. 511, Temporal. Ventral view. Tympanic plate orientation	More coronally orientated	More sagittally orientated

S-Table 5. Synapomorphies shared by the *H. sapiens* clade.

Characters	Plesiomorphic states	Synapomorphic states
Char. 13, M6. ba-sphba. Basilar length	0.347-0.352	0.479
Char. 19, Ratio, Maximum biparietal breadth / maximum bimastoid breadth	0.492	0.514-0.618
Char. 62, M33e. PAA. Parietal angle (degree)	0.287-0.368	0.411-0.436

Char. 64, Temporal squama length	0.246-0.277	0.360-0.396
Char. 65, Temporal squama height	0.524-0.619	0.297
Char. 66, Temporal squama angle	0.338-0.581	0.278
Char. 76, Postglenoid-ectoglenoid length	0.376-0.420	0.456-0.475
Char. 105, M48d. WMH. Cheek height	0.282-0.315	0.228-0.271
Char. 115, Maxilloalveolar length	0.370	0.327
Char. 136, Malar angle. Posterior-inferior angle between the Frankfurt horizontal and the chord connecting the most inferior-lateral point of the orbit and the most inferior point on the malaria-maxillary suture	0.243	0.269
Char. 143, Gonion condylar height	0.479-0.560	0.696
Char. 147, Condylar neck length	0.589	0.638
Char. 158, Mandibular corpus height at p3	0.557-0.594	0.698-0.732
Char. 159, Mandibular corpus height at p4	0.582-0.616	0.726-0.825
Char. 188, Symphysis height (id-gn)	0.339-0.414	0.573-0.702
Char. 229, Dental. Upper M1. Metacone size. ASUDAS grades. UM1MC	0.333-0.444	0.666
Char. 239, Dental. Upper M2. Metacone size. ASUDAS grades. UM2MC	0.300-0.400	0.500
Char. 248, Dental. Upper M3. Area relative to M1	0.163-0.281	0.301
Char. 293, Dental. Lower m2. Anterior Fovea. ASUDAS grades	0.500	0.250
Char. 298, Dental. Lower m3. Mesiodistal length	0.236-0.363	0.392
Char. 300, Dental. Lower m3. Width/length	0.589-0.655	0.420
Char. 302, Dental. Lower m3. Anterior Fovea. ASUDAS grades. As LM1AF	0.500-0.833	0.250
Char. 328, Ratio, Basion-Bregma height/Maximum cranial breadth	0.221-0.317	0.445
Char. 329, Ratio, Basion-Bregma height/Maximum cranial length	0.316-0.433	0.567
Char. 334, Ratio, Frontal sagittal chord/Parietal sagittal chord	0.139-0.172	0.112-0.129
Char. 335, Ratio, b-sphn bregma-sphenion chord/l-ast lambda-asterion chord	0.210	0.305-0.326
Char. 340, Ratio, Temporal squama height/Temporal squama length	0.583-0.596	0.304
Char. 342, Ratio, Postglenoid-ectoglenoid length/Postglenoid-entoglenoid length	0.437	0.473-0.560
Char. 358, Ratio, Maxilloalveolar breadth/Maxilloalveolar length	0.376-0.380	0.388-0.442
Char. 364, Ratio, External alveolar breadth at M1-M2/External alveolar breadth at canine	0.359-0.388	0.417
Char. 385, Ratio, External breadth at i2/canine along the alveolar margin/External breadth at canine along the alveolar margin	0.338-0.437	0.486-0.588
Char. 408, Frontal. Anterior view. Supraorbital lateral tubercle	Very large	Large
Char. 422, Frontal 4. Anterior view. Glabellar inflexion	Deep	Shallow
Char. 437, Maxillary. Anterior view. Lateral view. Paranasal inflation. Maxilla superior lateral inflation of the bone surrounding the nasal aperture	Present	Absent
Char. 439, Maxillary. Anterior view. Dorsal-ventral position of the root of the zygomaticoalveolar crest	Intermedia	High
Char. 496, Temporal. Ventral view. Preglenoid planum	Small	Large
Char. 512, Temporal. Lateral view. Tympanic plate thickness	Moderate	Thin
Char. 529, Mandible 4. Anterior view. Mental tubercle	Absent	Strong
Char. 531, Mandible 6. Anterior view. Mental fossa	Absent	Shallow

Char. 563, Mandible. Anterior view. Canine pillar	Low	Moderate
Char. 582, Mandible 52. Superior view, medial view. Symphysis planum alveolare (simian shelf)	Preset	Absent
	small/large	
Char. 614, Lower p3. Occlusal view. Crown shape	Asymmetrical	Symmetrical

S-Table 6. Synapomorphies shared by the Neanderthal clade.

Characters	Plesiomorphic states	Synapomorphic states
Char. 1, M1. GOL. g-op. Maximum cranial length	0.263-0.270	0.185
Char. 19, Ratio, Maximum biparietal breadth / maximum bimastoid breadth	0.492	0.564-0.708
Char. 31, Maximum mastoid width	0.214-0.294	0.212
Char. 52, M31(1). LIC. Lambda-inion chord (l-i)	0.562	0.417-0.435
Char. 53, Lambda-opisthocranion chord	0.445-0.586	0.419-0.433
Char. 65, Temporal squama height	0.524	0.455-0.477
Char. 68, Temporal muscle attachment length	0.276-0.327	0.117-0.183
Char. 69, Temporal muscle attachment length index	0.243-0.253	0.144-0.224
Char. 71, Tympanic axis angle	0.495-0.502	0.540
Char. 82, Occipital plane index	0.649-0.699	0.450-0.506
Char. 111, M54. NBL. Nasal breadth	0.305-0.329	0.471-0.513
Char. 112, M57(2). Upper nasal breadth of nasal bones	0.467	0.476-0.755
Char. 129, Nasal bridge index	0.315-0.337	0.236
Char. 130, Nasal bridge angle	0.446	0.620-0.630
Char. 138, Mandibular fossa depth	0.333-0.468	0.245-0.297
Char. 193, Dental. Upper I1. Area relative to M1	0.411-0.417	0.472
Char. 226, Dental. Upper M1. Mesiodistal length	0.542-0.561	0.392-0.463
Char. 228, Dental. Upper M1. Width/length	0.265-0.330	0.367-0.459
Char. 235, Dental. Upper M2. Mesiodistal length	0.271	0.101-0.149
Char. 236, Dental. Upper M2. Buccolingual width	0.212	0.049-0.133
Char. 237, Dental. Upper M2. Width/length	0.533-0.618	0.749
Char. 238, Dental. Upper M2. Area relative to M1	0.227-0.274	0.081-0.154
Char. 271, Dental. Lower p3. Mesiodistal length	0.176-0.248	0.064
Char. 272, Dental. Lower p3. Buccolingual width	0.295-0.358	0.173-0.286
Char. 276, Dental. Lower p4. Mesiodistal length	0.309-0.336	0.063-0.064
Char. 277, Dental. Lower p4. Buccolingual width	0.231-0.232	0.080-0.129
Char. 279, Dental. Lower p4. Area relative to m1	0.528-0.621	0.419
Char. 281, Dental. Lower m1. Mesiodistal length	0.323-0.365	0.058-0.061
Char. 282, Dental. Lower m1. Buccolingual width	0.231-0.292	0.116-0.190
Char. 283, Dental. Lower m1. Width/length	0.489-0.523	0.716-0.746
Char. 289, Dental. Lower m2. Mesiodistal length	0.212-0.238	0.044-0.063

Char. 290, Dental. Lower m2. Buccolingual width	0.245-0.326	0.174-0.201
Char. 301, Dental. Lower m3. Area relative to m1	0.627-0.722	0.773-0.787
Char. 333, Ratio, n-b frontal sagittal chord/Glabella-bregma chord	0.417-0.474	0.593-0.645
Char. 342, Ratio, Postglenoid-ectoglenoid length/Postglenoid-entoglenoid length	0.437	0.499
Char. 355, Ratio, Interorbital breadth (d-d)/Supraorbital breadth	0.276-0.300	0.389-0.577
Char. 356, Ratio, Orbital height OBH/Orbital breadth OBB	0.410-0.441	0.501
Char. 358, Ratio, Maxilloalveolar breadth/Maxilloalveolar length	0.376-0.380	0.440-0.529
Char. 366, Ratio, Maximum malar length/Bimaxillary breadth	0.354	0.410-0.585
Char. 378, Ratio, Mandibular corpus height at canine/Infradentale to the posterior edge of the last molar at the aveolar level	0.256-0.433	0.608-0.627
Char. 384, Ratio, Condyle articular facet breadth/Infradentale to the posterior edge	0.378-0.385	0.468
Char. 403, Frontal. Anterior view. Supraorbital torus parallel-bordered	Absent	Present
Char. 410, Frontal. Anterior view, superior view. Supraorbital trigon orientation	Posterior-lateral	Mainly lateral, slightly posterior
Char. 412, Frontal 6. Superior view. Supraorbital torus arching in superior view	Gently arching	Strongly arching
Char. 414, Frontal. Superior view. Glabella concavity relative to the supraorbital tori	Shallow	Absent
Char. 423, Frontal. Mid-sagittal supraglabellary tubercle	Absent	Present
Char. 433, Maxillary. Medial view. Lack of an ossified roof over the lacrimal groove	No	Yes
Char. 435, Maxillary. Anterior view, medial view. Inferior concha covering the lacrimal groove	Present	Absent
Char. 441, Maxillary. Ventral view. Anterior-posterior position of the root of the zygomaticoalveolar crest	M1-M2	M2-M3
Char. 464, Parietal. Lateral view. Posterior view	Position of the superior temporal line. Intermediate	Low
Char. 471, Occipital. Posterior inferior view. Superior nuchal line	Moderately developed	Highly elevated
Char. 493, Temporal. Posterior view. Mastoid foramen position	Lateral to the temporal-occipital suture	At the temporal-occipital suture
Char. 511, Temporal. Ventral view. Tympanic plate orientation	More coronally orientated	More sagittally orientated
Char. 521, Nasal. Lateral view. Nasal root projecting	Deeply concave	At the same sagittal level as the glabella.
Char. 532, Mandible 7. Anterior view. Inferior marginal thickening	Present, thick	Absent
Char. 549, Mandible 22. Lateral view. Retromolar space shielded by the ramus	Completely shielded, shielding part of the last molar	No shielding, large space visible

S-Table 7. Synapomorphies shared by Harbin-*H. sapiens* clade

Characters	Plesimorphic states	Synapomorphic states
Char. 22, M10. XFB. Maximum frontal breadth. Frontal	0.585-0.588	0.689-0.720
Char. 27, M14. WCB. Minimum cranial breadth	0.340-0.388	0.463-0.501
Char. 35, M20. Porion-bregmatic projective height	0.351-0.466	0.575-0.595
Char. 46, M30(2). Bregma-sphenion chord (b-sphn)	0.445-0.521	0.658-0.665
Char. 49, M30c. Bregma-asterion chord (b-ast)	0.431-0.567	0.746
Char. 77, Postglenoid-entoglenoid length	0.309	0.333-0.395
Char. 84, M40. BPL. Basion-prosthion length	0.257-0.322	0.129-0.250
Char. 86, M43a. FMB. Bifrontal breadth. Frontal	0.385-0.462	0.512
Char. 88, M43b/M43a. Nasion-frontal subtense relative to the bifrontal breadth	0.338-0.582	0.619-0.624
Char. 116, Maxillary palate length	0.494	0.333-0.380
Char. 124, M76a. SSA. Zygomaxillary angle (degree)	0.185	0.268-0.294
Char. 133, Zygomaxillare anterior-zygoorbitale (zm:a-zo)	0.342	0.303-0.338
Char. 223, Dental. Upper P4. Area relative to M1	0.220-0.228	0.242-0.324
Char. 335, Ratio, b-sphn bregma-sphenion chord/l-ast lambda-asterion chord	0.189	0.210
Char. 344, Ratio, Basion-prosthion length/Maximum cranial length	0.411-0.462	0.150-0.184
Char. 346, Ratio, Bi-frontomalare temporale breadth/Maximum frontal breadth	0.498	0.480
Char. 354, Ratio, Cheek height/Supraorbital breadth	0.405-0.481	0.292-0.315
Char. 356, Ratio, Orbital height OBH/Orbital breadth OBB	0.389	0.309-0.356
Char. 368, Ratio, Inferior zygomatic margin height/Bimaxillary breadth	0.550-0.607	0.490
Char. 421, Frontal. Lateral view. Posttoral sulcus. Concavity of the region between supraorbital torus and frontal squama	Deep	Moderate
Char. 438, Maxillary. Anterior view. Zygomaticoalveolar crest	Oblique	Gently arched
Char. 440, Zygomatic, Maxillary. Anterior view. Zygomaticoalveolar crest (Inferior zygomaticomaxillary margin) extends to the zygion	Present	Absent
Char. 442, Zygomatic, Maxillary. Anterior view. Inferior orbital torus	Absent	Present
Char. 443, Zygomatic, Maxillary. Anterior view, lateral view. Malar tubercle	Absent or weak	Strong
Char. 486, Temporal. Posterior view. Mastoid process thickness	Thin	Thick
Char. 488, Temporal-occipital. Posterior view. Juxtamastoid process (or eminence)	Absent	Small
Char. 489, Temporal. Posterior view. Ventral view. Sulcus for occipital artery	Absent	Present
Char. 504, Temporal. Ventral view. Glenoid fossa overhang	Equal or greater than 50 percent	Less than 50 percent

Bayesian inference and tip-dating analyses

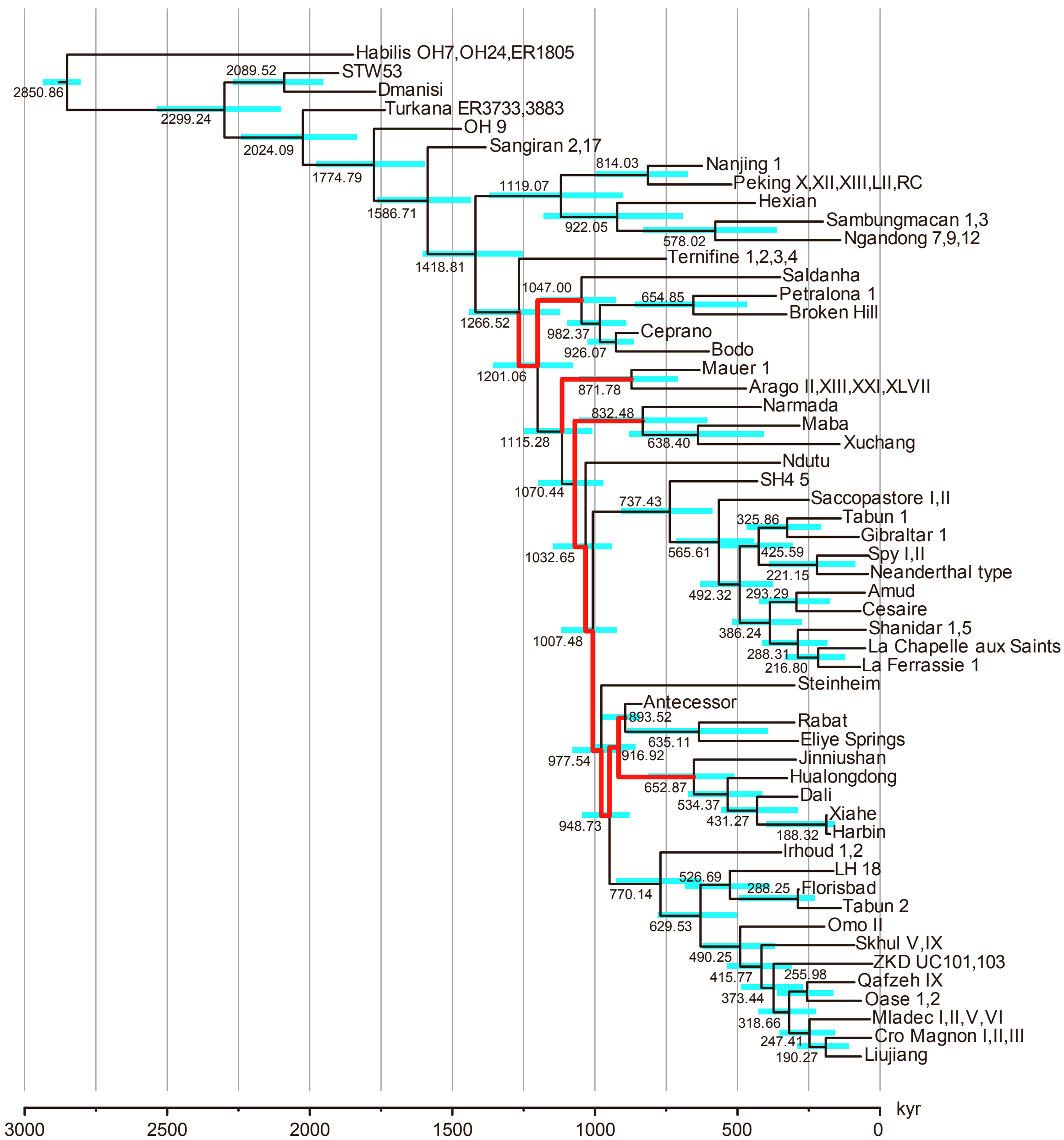
We used the Bayesian tip-dating approach[68-71] implemented in MrBayes 3.2.7[72] to infer the timetree and evolutionary rates. The method integrates both fossil ages and morphological data in a coherent analysis, while accounting for their uncertainties in a coherent analysis. The morphological data (both discrete and continuous characters) are treated as two data partitions. For the discrete data, the Lewis Mk model with variable ascertainment bias correction[73] and gamma rate variation across characters[74] (Mkv+Γ) was used for the likelihood calculation. 46 characters were defined as ordered and the rest of them (188 characters) were unordered (See the Characters for phylogenetic analysis section). Since MrBayes 3.2.7 cannot handle continuous characters directly and can deal with ordered characters only up to six states, all the continuous characters (400 characters) were discretised into six states. This is done by first dividing the range of 0 and 1 into six equal-length intervals (numbered as 0 to 5) and then converting each trait value into a state according to its interval assignment (Appendix 8). The discretised continuous characters were all defined as ordered to fit the nature of gradual change and modelled under Mkv+Γ. We note that RevBayes[75, 76] can handle continuous characters directly without discretisation. However, the software is still under development and the functionalities related to tip-dating using both discrete and continuous characters were not working when we were planning this study (see https://github.com/revbayes/revbayes/issues). Thus, we used MrBayes 3.2.7 for dating purpose, which is more established and produced more reliable results.

We now describe the prior usages in the Bayesian inference. The Mkv+Γ model has only one free parameter, the gamma shape[74], which was assigned an exponential(1.0) prior by default. The gamma shape models rate variation within each partition, while the evolutionary rate variation among the two data partitions were accounted for using a uniform Dirichlet prior[70]. The prior for the timetree was modelled by the fossilized birth-death (FBD) process[70, 77-79]. The process is conditioned on the time of the most recent common ancestor (root age) and has hyperparameters of speciation rate, extinction rate, fossil-sampling rate and extant-sampling probability. It has long been hypothesized that the origin of the genus *Homo* was related to the climatic and environmental shifts around 3.0-2.6 Ma in the Late Pliocene[80, 81]. The root age was assigned an offset-exponential prior with a mean age of 3600 kyr and minimum age of 2800 kyr, referring to the potentially oldest fossil of *Homo habilis*[82, 83] and the beginning of the Late Pliocene epoch. The ages of the fossil tips were either fixed or given uniform distributions based on the corresponding stratigraphic ranges. The speciation, extinction and fossil-sampling rates were reparametrized for convenience[70, 78]. The net diversification rate (speciation rate minus extinction rate) was assigned an exponential(200) prior with mean 0.005 which ranges from zero to infinity and puts less weight on higher rate. The turn-over rate (extinction rate over speciation rate, which is between 0 and 1) and relative fossil-sampling rate (fossil-sampling rate over the sum of extinction rate and fossil-sampling rate, which is also between 0 and 1) were both assigned a uniform(0,1) prior. The extant-sampling probability was fixed to 1.0 by default.

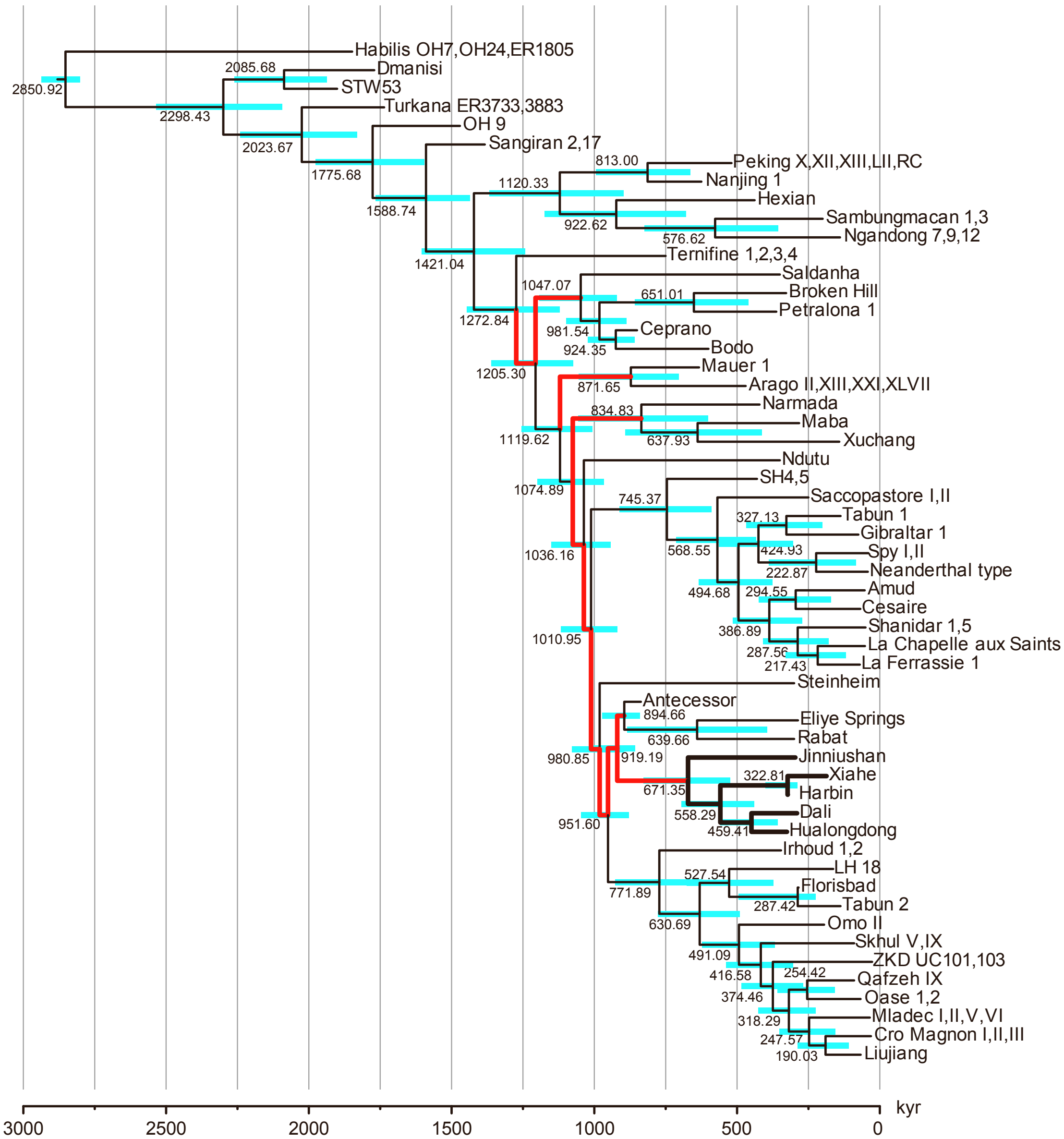
Apart from the timetree, the other key component in the Bayesian tip-dating analysis is the relaxed clock model, which models the evolutionary rate variation along the branches in the tree. We used the white noise (WN)[84] model, in which the branch rates follow independent gamma distributions. The mean clock rate was assigned an exponential (300) prior (about 3 changes per 1000 characters per thousand years) and the variance parameter of the clock rate was exponential(2). As the discrete and continuous characters probably have distinct patterns of change through time, we unlinked the clock variance in these two partitions so that the evolutionary rate varies independently between partitions.

We executed four independent runs and 8 chains per run (1 cold and 7 hot chains with temperature 0.05) in the Markov chain Monte Carlo (MCMC) simulation. Each run was executed with 100 million iterations and sampled every 2000 iterations. The first 30% of samples were discarded as burn-in and the rest from two runs were combined. Good convergence and mixing were diagnosed by an effective sample size (ESS)[85] larger than 200 for all parameters and the average standard deviation of split frequencies (ASDSF)[72] smaller than 0.02. The posterior trees were summarized to both 50% majority-rule consensus tree and all-compatible consensus tree. The MrBayes commands are provided in Appendix 9. The analysis took about 83 hours using the parallel version of MrBayes on our computing cluster.

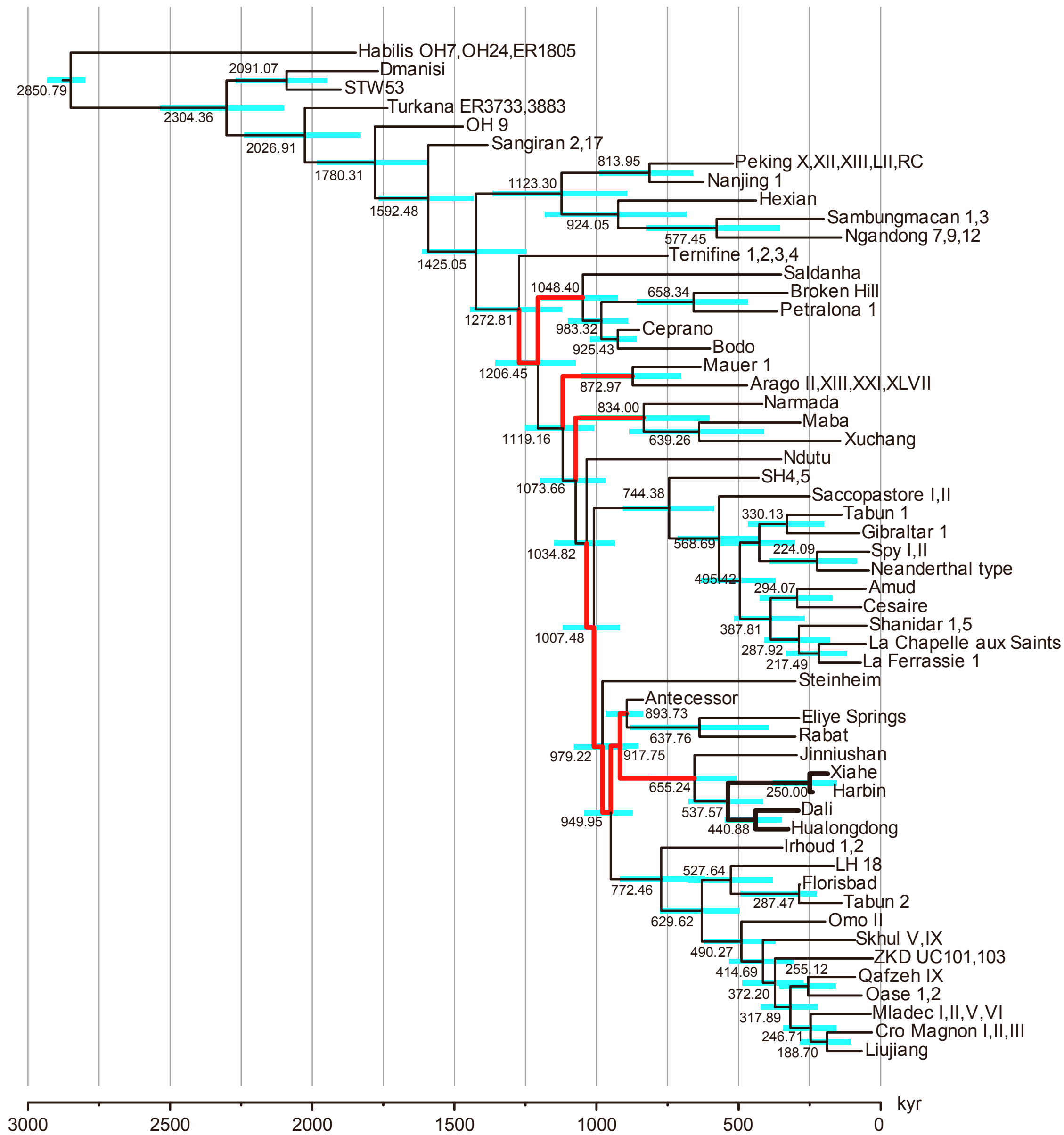
The initial run with no topological constraint was not able to resolve the phylogenetic relationship in the clade containing *H. heidelbergensis/H. rhodesiensis*, Harbin, Maba, Neanderthals and *H. sapiens* in the majority-rule consensus tree. The all-compatible consensus tree is more resolved but we note that the posterior probabilities are very low for many clades, and those with probabilities smaller than 0.5 were collapsed into polytomies in the majority-rule consensus tree. On one hand, the consensus tree summarized all the trees in the posterior credibility region instead of just taking one most probable tree (e.g., the maximum a posteriori (MAP) tree or most parsimonious tree), and thus represents more uncertainty from the posterior region. On the other hand, discretising the continuous characters reduced the amount of information contained in the original data thus would also increase the uncertainty in the consensus tree. We further enforced a few backbone constraints based on the parsimony analysis, which handled the continuous characters directly without discretization (S-Fig. 19). The preferred Bayesian tip-dating phylogenetic tree is shown in S-Fig. 21.



S-Figure 21. Phylogeny of the 55 selected OTUs from the genus *Homo*. This timetree was inferred from the Bayesian tip-dating analysis using MrBayes 3.2.7 and summarized as the all-compatible tree. The tip-date for the Harbin cranium is set as 148±2 ka. To reduce the polytomy at some clades, the strict consensus of the most parsimonious trees from the parsimony analysis (S-Fig. 19) was used as a reference. The branches in red indicate the backbone constraints based on the most parsimonious trees. Branch lengths are proportional to the division age in thousand years. Numbers at the internal nodes are the median ages, and the blue bars indicate the 95% highest posterior density interval of the node ages.



S-Figure 22. Phylogeny of the 55 selected OTUs from the genus *Homo*. This timetree was inferred from the Bayesian tip-dating analysis using MrBayes 3.2.7 and summarized as the all-compatible tree. The tip-date for the Harbin cranium is set as 296±8 ka. To reduce the polytomy at some clades, the strict consensus of the most parsimonious trees from the parsimony analysis (S-Fig. 19) was used as a reference. The branches in red indicate the backbone constraints based on the most parsimonious trees. The branches in bold lines indicate the significant differences compared with the preferred phylogeny in S-Fig. 21. Branch lengths are proportional to the division age in thousand years. Numbers at the internal nodes are the median ages, and the blue bars indicate the 95% highest posterior density interval of the node ages.



S-Figure 23. Phylogeny of the 55 selected OTUs from the genus *Homo*. This timetree was inferred from the Bayesian tip-dating analysis using MrBayes 3.2.7 and summarized as the all-compatible tree. The tip-date for the Harbin cranium is set as 59-304 ka. To reduce the polytomy at some clades, the strict consensus of the most parsimonious trees from the parsimony analysis (S-Fig. 19) was used as a reference. The branches in red indicate the backbone constraints based on the most parsimonious trees. The branches in bold lines indicate the significant differences compared with the preferred phylogeny in S-Fig. 21. Branch lengths are proportional to the division age in thousand years. Numbers at the internal nodes are the median ages, and the blue bars indicate the 95% highest posterior density interval of the node ages.

The U-series dating on the Harbin cranium shows a large variation range. As discussed above, the most reliable minimum date of the cranium is 146 ka. To test whether different age estimates for the Harbin cranium will change its phylogenetic position in the Bayesian tip-dating analyses, we also used 296±8 ka (the maximum U-series age) and 59 - 304 ka (the maximum U-series age range) as the tip ages for the Harbin cranium. All the other parameters and dates are unchanged. The results suggest that different tip age estimates for the Harbin cranium have only very minor influences on the topology and the divergence age estimation of the whole tree (S-Fig. 22, 23). Only the divergence times between Harbin, Xiahe, Dali and Hualongdong are significantly altered.

In both the parsimony and Bayesian analyses, the morphological characters (both discrete and continuous) were treated as independent data points, and thus no correlations among characters were considered. This follows the most common practice in morphological data analyses, and indeed, most characters can be assumed to be independent. However, some characters are likely to be correlated due to their anatomical structure or synergy in function. Here we discuss the potential biases that could be introduced and the further work that needs to be done. When we built the data matrix, we consciously avoided redundant and potentially correlated discrete characters. Normalisation of the continuous characters can significantly reduce the potential correlations. As parsimony has no explicit model assumption, the consequence of ignoring character correlation is hard to predict. One obvious consequence would be overestimating the number of changes (parsimony length) in the tree and would probably aggravate long-branch attraction. In Bayesian tip-dating analysis, the overestimation of character changes is reflected in the branch lengths, each of which is a product of divergence time and evolutionary rate. With sufficient fossils and relatively accurate ages, the divergence time estimates would be less affected while resulting in accelerated evolutionary rates. The ignorance of character correlation would also include erroneous or overconfident topological inference[86], although simulation studies showed that the estimate is relatively robust[87]. Some studies also show that when the correlation is low, treating the characters as independent still can produce reliable estimates of topology and times[87, 88]. Further efforts are still needed in model developments for morphological characters.

Some recent analyses based on ancient DNA have produced relatively younger estimates of Neanderthal-*H. sapiens* divergence dates[89]. The approach is also tip dating -- using ancient DNA sequences as data and their ages as tip dates. Although there were abundant molecular sequences in their analyses, it does not necessarily mean that their estimates are more reliable than ours. Theoretical studies have shown that even with infinitely long molecular sequences (or infinitely many morphological characters analogously) so that the branch lengths (distances measured by expected number of substitutions per site) can be inferred without error, the divergence times and evolutionary rates are confounded and rely on the information of fossil ages (or calibration priors) and clock models to get resolved[90, 91]. They only included Neanderthals, Denisovans and *H. sapiens* with the oldest being the Sima de los Huesos early Neanderthal (~ 430 kyr), and lack information to inform the divergences near the root of the *Homo* genus. We included most of the major clades of the *Homo* genus, and thus we have more information from fossil ages to inform the divergence times of all the *Homo* clades. They also fixed the mutation rate[89] and thus put apparent certainty in the clock model, which might also bias the age estimates, while in our study, the clock rate was co-estimated with the divergence times from the tip-dating analysis. The FBD model that we used explicitly models the speciation, extinction and sampling processes and is more suitable for our data than the coalescent model[92] used by Posth et al.[89], which is better suited for a single population without population structure.

Biogeographical analyses

Biogeography is the study of geographic distribution pattern of any forms of life and the factors responsible for forming and changing the distribution pattern. It is a very old discipline, even dating back to the pre-Darwin era[93]. The evolutionary processes occurring over long temporal large spatial scale are the historical perspectives of biogeography, and the relevant study is primarily concerned with the evolutionary history of the geographic distribution of organisms[93-96]. Such a discipline is also called historical biogeography, and is generally regarded as a discipline of comparative biology[93, 95]. It is generally accepted that taxa sharing similar geographic distribution patterns and close position in the phylogenetic tree must have shared a common evolutionary history of biogeography[93, 97]. The idea that phylogenetic relationships reflects the evolutionary process of the geographic distribution can be traced back to Darwin and Wallace[97]. Since the cladistic methodology was applied in reconstructing the ancestral distribution areas across a phylogenetic tree, many quantitative methods and models for biogeographic analyses have been developed and widely used outside of palaeoanthropology[96, 98, 99]. These methods include cladistic biogeography, event-based biogeography and probabilistic biogeography[93]. The probabilistic biogeography is a parametric approach. The development of parametric modeling of geographic range evolution makes biogeographic problems accessible to statistical model-based methodologies (such as maximum-likelihood and Bayesian inference)[93, 96, 98, 99].

The objectives of the biogeographic analyses in this research lie in two aspects: a) to statistically compare the models concerning the biogeographical origin and evolutionary history of the members of the *Homo* genus; b) to statistically estimate the historical biogeographical processes that have resulted in the geographical range evolution of *Homo*.

All biogeographical analyses were based on the Bayesian tip-dating all-compatible consensus tree (as in S-Fig. 21), which is more resolved than the majority-rule consensus tree, for biogeographical analyses. No pruning was needed for the downstream analyses. The geographic coordinates of the terminal OTUs are given in S-Table 8.

S-Table 8. The geographic coordinates of the terminal OTUs.

OTUs	Latitude	Longitude
Habilis OH7,OH24,ER1805	-2.98	35.4
Antecessor	42.35	-3.52
Narmada	22.3	76.5
Eliye Springs	3.24	36.02
Ndutu	-3	35
Irhoud 1,2	31.9	-8.9
Florisbad	-28.7	26
Omo II	5.4	36.3
LH 18	-2.99	35.4
Skhul V,IX	32.9	35.2
Qafzeh IX	32.7	35.3
Mladec I,II,V,VI	49.7	17
Cro Magnon I,II,III	44.94	1.02
Oase 1,2	45.02	21.82
ZKD UC101,103	39.69	115.93
Liujiang	24.25	109.33
SH 4,5	42.35	-3.52
Tabun 1	32.67	35
Tabun 2	32.67	35
Spy I,II	50.48	4.67
Gibraltar 1	36.13	-5.34
Amud	32.95	35.3
La Chapelle aux Saints	45	1.73
La Ferrassie 1	44.95	0.94
Shanidar 1,5	36.83	44.22
Cesaire	45.75	-0.51
Saccopastore I,II	41.93	12.53
Neanderthal type	51.23	6.94
Xiahe	35.2	102.52

Dali	34.87	109.67
Hualongdong	30.11	116.95
Harbin	45.82	126.69
Jinniushan	40.58	122.45
Maba	24.75	113.5
Xuchang	34.07	113.68
Mauer 1	49.34	8.8
Arago II,XIII,XXI,XLVII	42.84	2.75
Broken Hill	-14.43	28.45
Petralona 1	40.38	23.17
Ceprano	41.53	13.51
Steinheim	51.87	9.09
Saldanha	-33.06	18.35
Bodo	10.4	40.6
Ternifine 1,2,3,4	35.42	0.33
Peking X,XII,XIII,LII,RC	39.69	115.93
Nanjing1	32.05	110.05
Hexian	31.75	118.33
Sambungmacan 1,3	-7.41	111.1
Sangiran 2,17	-7.63	110.89
Ngandong 7,9,12	-7.78	110.55
Dmanisi	41.33	44.21
Rabat	34	-6.9
STW53	-26.02	27.73
OH 9	-2.98	35.4
Turkana ER3733,3883	3.95	36.19

We used R[100] package BioGeoBEARS[99, 101] to compare biogeographical models and estimated ancestral range probabilities of *Homo* species or populations (Appendix 10). Using the same package, we also estimated the number of dispersal, vicariance and sympatry events with biogeographical stochastic mapping (BSM)[102]. Dispersal-Extinction-Cladogenesis[98] (DEC), Dispersal-Vicariance-Analysis[103] like (DIVALIKE) and Bayesian-Inference-of-Historical-Biogeography-for-Discrete-Areas[96] like (BAYAREALIKE) were used as the basic models. DEC model assigns probabilities to various biogeographic events[98]. Given the observed geographic distribution data of the OUTs of a phylogenetic tree and these probabilities of the biogeographic events, maximum likelihood is used as the criterion for estimating the parameters and ancestral states. Dispersal-vicariance analysis (DIVA)[103] method assigns the biogeographic events or processes of dispersal, extinction, duplication and vicariance determinist costs according to their likelihood of occurrence. All the event-based methods (also cladistic biogeographic methods) must rely on the principle of parsimony for biogeographic inference. Bayesian-Inference-of-Historical-Biogeography-for-Discrete-Areas (BAYAREA), as its name indicates, is a method based on Bayesian technique[96]. The three models (DEC, DIVA and BAYAREA) were widely applied in various biogeographical researches[99]. Matzke[99, 101] developed the likelihood interpretations (DEC, DIVALIKE, and BAYARALIKE) of the three models in the BioGeoBEARS package. This package can be used not only for probabilistic inference of the evolution of the geographic ranges on a phylogenetic tree as in the three models, but also for comparison of different models of range evolution. The available model that best fits the given geographical and phylogenetic data can be determined through the model comparison.

The DEC models “dispersal” and “extinction” as an anagenetic range-expansion process and an anagenetic range-contraction process. DEC assumes equal per-event weights for the sympatry, subset sympatry and vicariance during the cladogenesis[98]. DIVALIKE assumes the same anagentic processes as the DEC model, but disallows subset sympatry and permits vicariance in the distribution of the descendants. BAYAREALIKE assumes no geographical range change during cladogenesis. The descendants inherit the ancestral distribution ranges. The three models cover all the generally recognized biogeographical processes, including sympatric speciation, vicariance, range expansion and range contraction.

When the founder-event speciation is considered and the *j* parameter is added to the three basic models, it creates three additional models: DEC+*j*, DIVALIKE+*j* and BAYAREALIKE+*j*. The free parameter *j* represents the relative per-event weight of the founder-event speciation/diversification during cladogenesis.

For the founder-event speciation/diversification, it describes a jump dispersal event that founds a new species or lineage, which occupies a new distribution area while its sister group remains in the ancestral distribution area[104-106]. This founder-event speciation, or jump dispersal speciation, is sometimes called speciation through long distance dispersal or allopatric mode II speciation[104, 107-110]. It usually involves a small number of individuals that dispersed to a new locality through a long dispersal distance and established a new isolated founder population. Here in our analysis, the founder-event is more relevant to diversification instead of speciation, because most of the terminal OTUs in our analyses are populations, not an isolated species. Before a species is actually evolved through the founder-event speciation mode, a founder isolated population must be established. In our analyses, all the terminal OTUs show distinct features and the tip-dating results suggest that they have a deeper division time.

To test the possibility of different dispersal routes, each of these six models was modified by adding the free parameter *w* and the dispersal probability (the dispersal rate for parameter *d*, and the dispersal weight for parameter *j*) is multiplied by a manual dispersal multiplier matrix. Three manual dispersal multipliers matrix are used. The first manual dispersal multiplier matrix divides the distribution range of *Homo* into 3 areas: Africa, Asia, and Europe.

The rates among the 3 areas are set to be equal (S-Table 9). By using this manual dispersal multiplier, we assume that the dispersal probabilities among African, Asia and Europe are equal. No route is specifically more preferred by humans when they dispersed from one area to another area. The second and the third manual dispersal multiplier matrix divide the distribution range of *Homo* into 5 areas: Africa, Europe, West Asia, East Asia, South-Southeast Asia. The rates from West Asia to East Asia and South-Southeast Asia are set to values lower than 1 (S-Table 10, 11). For a southern dispersal route from Africa to Asia, the rates from Africa to West Asia, to South-Southeast Asia then to East Asia are gradually reduced from 0.8 to 0.4 (S-Table 10). Alternatively for a northern dispersal route from Africa to Asia, the rates from Africa to West Asia, to East Asia, then to South-Southeast Asia are gradually reduced from 0.8 to 0.4 (S-Table 11).

S-Table 9. Manual dispersal multipliers matrix assuming 3 distribution areas with equal dispersal rates among Africa, Europe and Asia

	Africa	Asia	Europe
Africa	1	0.8	0.8
Asia	0.8	1	0.8
Europe	0.8	0.8	1

S-Table 10. Manual dispersal multipliers matrix assuming 5 distribution areas with a southern dispersal route from Africa to Asia

	Africa	E Asia	Europe	S-SE Asia	W Asia
Africa	1	0.4	0.6	0.6	0.8
E Asia	0.4	1	0.6	0.8	0.6
Europe	0.6	0.4	1	0.6	0.8
S-SE Asia	0.6	0.8	0.6	1	0.8
W Asia	0.8	0.6	0.8	0.8	1

S-Table 11. Manual dispersal multipliers matrix assuming 5 distribution areas with a northern dispersal route from Africa to Asia

	Africa	E Asia	Europe	S-SE Asia	W Asia
Africa	1	0.6	0.6	0.4	0.8
E Asia	0.6	1	0.6	0.8	0.8
Europe	0.6	0.6	1	0.4	0.6
S-SE Asia	0.4	0.8	0.4	1	0.6
W Asia	0.8	0.8	0.8	0.6	1

For each dispersal route hypothesis, we tested 6 models (DEC, DEC+*j*, DIVALIKE, DIVALIKE+*j*, BAYAREALIKE, BATAREALIKE+*j*) and estimated 3 free parameters (*d* for the rate of range expansion, *e* for the rate of range contraction, and *j* for the per-event weight of founder-event speciation at cladogenesis). We used the Akaike information criterion (AIC)[111] to select the best fitting model. We also used the likelihood ratio test (LRT) to compare pairs of nested models, that is, DEC vs. DEC+*j*, DIVALIKE vs. DIVALIKE+*j*, BAYAREALIKE vs. BATAREALIKE+*j*. All the models with the *j* parameter show much lower AICs than others without the *j* parameter (S-Table 11-13). The results suggest that range expansion alone cannot sufficiently interpret the increase of distribution areas. Model DEC+*j* of each dispersal route hypothesis has the lowest AIC value compared with other models. The three basic models (without *j* parameter) all have much higher AIC than the best model (DEC+*j*). Although the three basic models have AICs different to each other, the models with *j* parameters perform similarly well in terms of the AIC values and the ΔAIC values among them are less than 1 (S-Table 12-14).

The model DEC+*j* of the first dispersal route hypothesis (3 distribution areas, equal dispersal rates among different areas) has the lowest AIC value (115.19) among the 18 models and is the best fitting biogeographical model (S-Table 12). The models DEC+*j* of the southern dispersal route and northern dispersal route have similar AIC values (S-Table 13, 14), with that of the southern dispersal route hypothesis being slightly better.

S-Table 12. Comparison of different biogeographical models under the equal dispersal rate hypothesis

Models	log-likelihoods	Number of parameters	d	e	j	AIC	ΔAIC
DEC	-93.92043	2	3.250324e-04	1.000000e-12	0.0000000	191.8409	76.6484
DEC+J	-54.59623	3	1.000000e-12	1.000000e-12	0.2113595	115.1925	0
DIVALIKE	-92.69438	2	4.760872e-04	1.000000e-12	0.0000000	189.3888	74.1963
DIVALIKE+J	-54.66967	3	1.000000e-12	1.000000e-12	0.2057641	115.3393	0.1468
BAYAREALIKE	-109.58300	2	1.687909e-04	1.489092e-03	0.0000000	223.1660	107.9735
BAYAREALIKE+J	-54.82272	3	1.000000e-07	1.000000e-07	0.1838015	115.6454	0.4529

S-Table 13. Comparison of different biogeographical models under the south route dispersal hypothesis

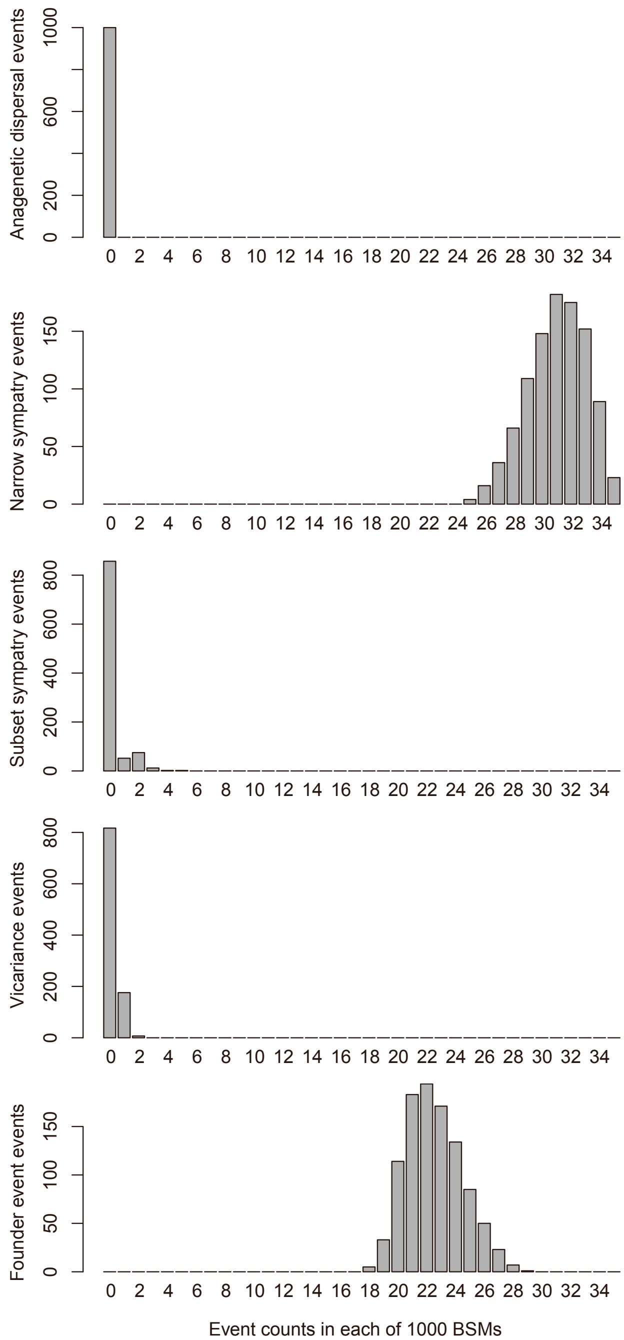
Models	log-likelihoods	Number of parameters	d	e	j	AIC	ΔAIC
DEC	-120.83285	2	2.583563e-04	5.651608e-05	0.0000000	245.6657	89.749
DEC+J	-74.95835	3	1.000000e-12	1.000000e-12	0.1671559	155.9167	0
DIVALIKE	-117.27715	2	3.480991e-04	1.000000e-12	0.0000000	238.5543	82.6376
DIVALIKE+J	-75.17725	3	1.000000e-12	1.000000e-12	0.1626270	156.3545	0.4378
BAYAREALIKE	-230.98269	2	1.000000e-02	1.000000e-02	0.0000000	465.9654	310.0487
BAYAREALIKE+J	-230.98553	3	1.000000e-02	1.000000e-02	0.0001000	467.9711	312.0544

S-Table 14. Comparison of different biogeographical models under the north route dispersal hypothesis

Models	log-likelihoods	Number of parameters	d	e	j	AIC	ΔAIC
DEC	-121.06451	2	2.548388e-04	5.002505e-05	0.0000000	246.1290	89.4804
DEC+J	-75.32429	3	1.000000e-12	1.000000e-12	0.1637598	156.6486	0
DIVALIKE	-117.48584	2	3.434934e-04	1.000000e-12	0.0000000	238.9717	82.3231
DIVALIKE+J	-75.55497	3	1.000000e-12	1.000000e-12	0.1593124	157.1099	0.4613
BAYAREALIKE	-231.43713	2	1.000000e-02	1.000000e-02	0.0000000	466.8743	310.2257
BAYAREALIKE+J	-231.44003	3	1.000000e-02	1.000000e-02	0.0001000	468.8801	312.2315

BSM generates simulated biogeographical histories, including the times, ancestral ranges, and the geographical distribution of all the biogeographic events along the phylogenetic branches. We ran 1000 BSMs under the DEC+*j* 3 areas equal dispersal rate biogeographical model, and calculated the means and standard deviations of biogeographical events across the 1000 mapping processes. The ancestral range estimation in BioGeoBEARS shows the single most probable range and a pie chart of all the possible ranges at each internal node (Fig. 5).

Each of the 1000 BSMs has a certain number of narrow sympatry, subset sympatry, vicariance and founder-events (S-Fig. 24). Anagenetic dispersal events are totally absent. Subset sympatry and vicariance are also quite rare events. Narrow sympatry and founder-event are the most common events. Narrow sympatry shows 28-34 events per BSM realized history, and the founder-event shows 20-26 events per BSM realized history. Sympatric events account for 57.46% of the total biogeographical events, and the founder-events occupy 41.72% of the total biogeographical events (S-Table 15).



S-Figure 24. Distribution of event counts across 1000 biogeographical stochastic mappings (BSMs) generated under the DEC+*j* model. The maximum of the vertical axis is the 1000 BSMs.

S-Table 15. Summary of biogeographical stochastic mapping (BSM) counts for the *Homo* species using the DEC+*j* model under 3 distribution areas with equal dispersal rate hypothesis. Means, standard deviations and summation are calculated from 1000 BSMs.

Mode	Type	Means	SD	Percentage
Sympatric diversifications	Narrow sympatry	31.03	2.06	57.46%
	Subset Sympatry	0.26	0.69	0.48%
Dispersal events	Founder-event (cladogentic dispersal)	22.53	1.97	41.72%
	Range-switching dispersal	0	0	0.00
	Range-expansion dispersal	0	0	0.00
	Range-contraction	0	0	0.00
Vicariances	Vicariance	0.19	0.41	0.35%
All dispersals (anagenetic and cladogentic dispersal)		22.53	1.97	42.20%
Anagenetic dispersals (range-switching or expansion)		0	0	0.00
All anagenetic events		0	0	0.00
All cladogenetic events		54	0	100.00%
Total biogeographic events		54	0	100.00%

Because all the OTUs are at the population level from a single locality, it is reasonable to see that no range expansion or range contraction event is detected from the BSM simulations. For the founder-events, or the jump dispersal events, we found that the dispersal movements between areas are asymmetrical (S-Table 16). Africa is the source of dispersal, which represents the ancestral state. In total, 39.70% of all the dispersals are from Africa, much greater than the dispersals to Africa (21.98%). Europe keeps a kind of balance. The continent originates 36.46% dispersal events, and receives 36.06% dispersals from other continents. Asia is obviously a sink for the evolution of *Homo*. Totally 41.96% dispersal events are from other continents to Asia, and only 23.85% dispersals are from Asia to other continents.

S-Table 16. Mean (SD) of the number of the founder-events (jump dispersal events) in the evolutionary history of the genus *Homo*, estimated with biogeographical stochastic mappings (BSMs). Counts of dispersal events were averaged across the 1000 BSMs. The ancestral state is referred to the place where a lineage dispersed from (the rows), and the descendant state is referred to the place where a lineage dispersed to (the columns).

	To Africa	To Asia	To Europe	Total	Percentage
From Africa	0	4.24 (1.13)	4.70 (1.37)	8.94	39.70%
From Asia	1.95 (1.58)	0	3.42 (1.67)	5.37	23.85%
From Europe	3.00 (1.82)	5.21 (1.47)	0	8.21	36.46%
Total	4.95	9.45	8.12	22.52	
Percentage	21.98%	41.96%	36.06%		

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Appendix

Appendix 1. Continuous phenomic characters used for phylogenetic analysis

0. Cranial capacity. [In cm^3, cc, ml]
1. M1. GOL. g-op. Maximum cranial length.
2. M1d. NOL. n-op. Nasio-occipital length.
3. M2. Glabella-inion length.
4. Glabella-sphenobasion length.
5. Glabella-bregma chord. g-b chord.
6. g-b/g-op. Glabella-bregma chord index. [Glabella-bregma/glabella-opisthocranion]
7. Length of basal temporal.
8. BTL/g-op. Basal temporal length index.
9. Entire temporal bone length. [Sum of the temporal squama length and parietal notch length]
10. ETL/g-op. Entire temporal bone length index.
11. M5. BNL. Basion-nasion length.
12. M5(1). Nasion-opisthion length.
13. M6. ba-sphba. Basilar length. [Straight distance of the basion (ba) from the sphenobasion (sphba)]
14. M7. FOL. Foramen magnum length (ba-o).
15. M8. XCB. Maximum cranial breadth.
16. M8c. Squama suture breadth.
17. Maximum cranial breadth at supramastoid crest. Cranial vault.
18. Maximum biparietal breadth (Rightmire et al., 2006). Cranial vault. BPB. [Taken as a chord. -- Rightmire et al., 2006]
19. Ratio. Maximum biparietal breadth / maximum bimastoid breadth. [Taken inferior to the supramatoid crest]
20. M9. ft-ft. Least frontal breadth. Frontal.
21. Postorbital constriction index. M9/M44.
22. M10. XFB. Maximum frontal breadth. Frontal.
23. M10b. STB. Bistephanic breadth (st-st).
24. M11. AUB. Biauricular breadth.
25. M11b. Biradicular breadth.
26. M12. ASB. Biasterion breadth (ast-ast). Temporal.
27. M14. WCB. Minimum cranial breadth.
28. M16. Foramen magnum breadth.
29. M17. BBH. Basion-Bregma height.
30. M13a. MDB. Mastoid width. Temporal. [Width of the mastoid process at its base, through its transverse axis. Measure from the incisura mastoidea, or digastric groove, to a corresponding level on the external surface of the process, transversely with reference to the process itself, not with reference to the cranium]
31. Maximum mastoid width. [Width of the mastoid process at its base, at the level of mastoid tip, through its transverse axis. Measure from the incisura mastoidea, or digastric groove, to a corresponding level on most lateral point of the mastoid. Perpendicular to the sagittal section]
32. M19a. MDH. Mastoid height. Temporal. [The length of the mastoid process below, and perpendicular to, the eye-ear plane, in the vertical plane. Below the porion]
33. Minimum distance between the mastoid and supramastoid crests.
34. Maximum bimastoid breadth.
35. M20. Porion-bregmatic projective height.
36. AVH. Auriculare-vertex projective height.
37. Biporion breadth. Cranial vault.
38. Porion-basion projective height.
39. M29. FRC. n-b. Frontal sagittal chord.
40. FRF. Nasion-subtense fraction. Frontal. [The distance along the nasion-bregma chord, recorded from nasion, at which the nasion-bregma subtense falls]
41. FRF/M29. Nasion-subtense fraction relative to the frontal sagittal chord. [As a measurement for the position of the metopion]
42. Metopion subtense. Frontal. [Maximum distance from the metopion to the nation-bregma chord]
43. Metopion subtense/M29. Metopion subtense relative to the nation-bregma chord. [A measurement for the elevation of the frontal bossing (anterior-posterior convexity)]

44. Lower frontal inclination angle (m-g-i).
45. M30. PAC. Parietal sagittal chord. [The external chord, or direct distance from bregma to lambda, taken in the midplane and at the external surface]
46. M30(2). Bregma-sphenion chord (b-sphn).
47. M30(3). Lambda-asterion chord (l-ast).
48. ASI. Asterion-inion chord.
49. M30c. Bregma-asterion chord (b-ast).
50. Parietal chord index. M30/M1.
51. M31. OCC. l-o. Occipital sagittal chord. [Lambda-opisthion chord (Occipital chord). The external occipital chord, or direct distance from lambda to opisthion taken in the midplane and at the external surface]
52. M31(1). LIC. Lambda-inion chord (l-i).
53. Lambda-opisthocranion chord.
54. M31(2). Inion-opisthion chord (i-o).
55. Ratio. M31(1)/M31(2). Length of occipital (lambda-inion) plane compared to nuchal (inion- opisthion) plane. X100. [Weidenreich, 1943; Santa Luca, 1980. M31(1)/M31(2)]
56. Opisthocranion-opisthion chord.
57. Sphenobasion-opisthion length.
58. M32(1). Frontal inclination angle (b-n-i). Frontal.
59. M32(2). Bregma angle (b-g-i). Frontal.
60. M32(5). FRA. Frontal angle (b-m-n, degree).
61. M33d. OCA. Occipital angle (degree). [In the sagittal plane, the angle underlying the curvature of the occipital bone at its maximum height above the occipital chord]
62. M33e. PAA. Parietal angle (degree). [In the sagittal plane, the angle underlying the curvature of the parietal bones along the sagittal suture, at its maximum height above the parietal chord]
63. M33(4). Lambda-inion-opisthion angle (l-i-o).
64. Temporal squama length (Martínez and Arsuaga, 1997). [Distance from the incisura parietalis to the most anterior point of the temporal bone, taken parallel to the major axis of the zygomatic root. -- Martínez, I., Arsuaga, J. L. (1997): The temporal bones from Sima de los Huesos Middle Pleistocene site (Sierra de Atapuerca, Spain). A phylogenetic approach. Journal of Human Evolution, 33(2): 283-318]
65. Temporal squama height (Martínez and Arsuaga, 1997). [Maximum height of the squama from porion, perpendicular to the squama length. -- Martínez, I., Arsuaga, J. L. (1997): The temporal bones from Sima de los Huesos Middle Pleistocene site (Sierra de Atapuerca, Spain). A phylogenetic approach. Journal of Human Evolution, 33(2): 283-318]
66. Temporal squama angle (Martínez and Arsuaga, 1997). [Distance from incisura parietalis to the highest point of the temporal squama projected on the squama length -- Martínez, I., Arsuaga, J. L. (1997): The temporal bones from Sima de los Huesos Middle Pleistocene site (Sierra de Atapuerca, Spain). A phylogenetic approach. Journal of Human Evolution, 33(2): 283-318]
67. Temporal muscle attachment height.
68. Temporal muscle attachment length. [A raised and thickened ridge at the back of the posterior temporalis muscle attachment, where the line marking the furthest backward extent of its fan-shaped fibres angles downward and forward]
69. Temporal muscle attachment length index.
70. Transverse tympanic width. [The medial edge is defined as the lateral margin of the internal carotid canal]
71. Tympanic axis angle. [The tympanic axis is defined as the line connecting the most lateroposterior point of the carotid foramen and the point Crossing point between the inferior edge of the tympanic plate and the auditory meatus inferior border (Martínez, I., & Arsuaga, J. L., 1997). The angle is this axis relative to the sagittal plane on the Frankfurt horizontal plane. anterior angle]

72. Tympanic axis length. [The distance between the most lateroposterior point of the carotid foramen and the point Crossing point between the inferior edge of the tympanic plate and the auditory meatus inferior border.]
73. Petrous axis angle. [The petrous axis is defined as the line connecting the most lateroposterior point of the carotid foramen and the most medioanterior point of the stylomastoid foramen (Martínez, I., & Arsuaga, J. L., 1997). The anterior angle is this axis relative to the sagittal plane on the Frankfurt horizontal plane]
74. Petrous axis length. [The distance between the most lateroposterior point of the carotid foramen and the most medioanterior point of the stylomastoid foramen]
75. Tympanic angle. [The tympanic axis is defined as the line connecting the most lateroposterior point of the carotid foramen and the crossing point between the inferior edge of the tympanic plate and the auditory meatus inferior border. The petrous axis is defined as the line connecting the most lateroposterior point of the carotid foramen and the most medioanterior point of the stylomastoid foramen (Martínez, I., & Arsuaga, J. L., 1997). The tympanic angle is defined by these two axes. Projected on the Frankfurt plane]
76. Postglenoid-ectoglenoid length.
77. Postglenoid-entoglenoid length.
78. Ectoglenoid-entoglenoid length.
79. Chord length of the parietomastoid suture. Incisura parietalis - asterion.
80. Occipital height (l-sphba). [Xinzhi Wu and Sheela Athreya. 2013.]
81. Occipital subtense.
82. Occipital plane index.
83. Inion-endinion. [Xinzhi Wu and Sheela Athreya. 2013. In general, a lesser endinion-inion distance seems directly associated with rounding of the occipital as a whole]
84. M40. BPL. Basion-prosthion length.
85. M43. FMT. Bi-frontomalare temporale breadth (fmt-fmt). Frontal. [fmt, Frontomalare temporale, most lateral point on frontozygomatic suture]
86. M43a. FMB. Bifrontal breadth. Frontal. [The breadth across the frontal bone between frontomalare anterior on each side, i.e., the most anterior point on the fronto-malar suture]
87. M43b. NAS. Nasio-frontal subtense. [The subtense from nasion to the bifrontal breadth]
88. M43b/M43a. Nasion-frontal subtense relative to the bifrontal breadth.
89. Frontal. Supraorbital torus breadth. XSOT. [Greatest breadth across the supraorbital tori. This corresponds to the superior facial breadth (M43) when the tip of zygomatic process of the frontal bone flares inferolaterally as in most modern humans. but not necessary as in *Homo erectus* (Kaifu et al., 2008)]
90. M44. EKB. Biorbital breadth (ek-ek). [The breadth across the orbits from ectoconchion to ectoconchion. Ectoconchion is here defined as lying on the most anterior surface of the orbital border]
91. Supraorbital torus thickness central. Frontal. [Thickness perpendicular to the central line of the supraorbital torus]
92. Supraorbital torus thickness lateral. Frontal. [Thickness perpendicular to the central line of the supraorbital torus]
93. Supraorbital torus thickness medial. Frontal. [Thickness perpendicular to the central line of the supraorbital torus]
94. M45. ZYB. Bizygomatic breadth (zy-zy).
95. M45(1). JUB. Bijugal breadth. [The external breadth across the malars at the jugale and jugale. At the deepest points in the curvature between the frontal and temporal process of the malars. Jugale, the jugal point is the point at which lines following the margin of the frontal

and temporal processes of the zygomatic bone are joined]

96. M46b. ZMB. Bimaxillary breadth.
97. Facial proportion. M46b/M43.
98. Temporal gutter angle.
99. M48. NPH. Upper facial height. Nasion-prosthion height (n-pr).
100. M48(1). Nasospinale-prosthion distance (ns-pr). [Height of the intermediate jaw. Straight-line distance of nasospinal (ns) from the prosthion (pr)]
101. M74. Upper facial angle. Nasion-prosthion relative to the FH.
102. M74(1). Clivus-alveolar plane angle. [The angle that the alveolar-condylar plane (ACE) forms with a nasospinal (ns) and prosthion (pr) connecting straight line. ACE is also called Broca's plane, which is laid by the prosthion and the two lowest points of the occipital condyles]
103. Nasiospinale-alveolare length.
104. Nasiospinale-alveolare angle.
105. M48d. WMH. Cheek height. [The minimum distance, in any direction, from the lower border of the orbit to the lower margin of the maxilla, mesial to the masseter attachment, on the left side]
106. M49a. DKB. Interorbital breadth (d-d).
107. M50. IOW. Anterior interorbital breadth (mf-mf).
108. M51. Orbital breadth (mf-ek). [Measured from Ectoconchion to maxillofrontale]
109. M51a. OBB. Orbital breadth. [Breadth from ectoconchion to dacryon, as defined, approximating the longitudinal axis which bisects the orbit into equal upper and lower parts. The point of junction of the maxillary bone, lacrimal bone, and frontal bone is named the dacryon]
110. M52. OBH. Orbital height. [The height between the upper and lower borders of the orbit, perpendicular to the long axis of the orbit and bisecting it]
111. M54. NBL. Nasal breadth.
112. M57(2). Upper nasal breadth of nasal bones. [Straight distance of the two points where the Suturae nasofrontalis and nasomaxillaris meet]
113. M55. NH. Nasal height. n-ns.
114. M61. MAB. Maxilloalveolar breadth. [The greatest breadth across the alveolar border. Wherever it is found, perpendicular to the medial plane]
115. Maxilloalveolar length. [The greatest length of the alveolar process of maxilla]
116. Maxillary palate length.
117. M63. Internal palatal breadth. [Endomolar endomolare (enm - enm). Straight distance of the middle edges of the alveoli of the second molars from each other.]
118. External alveolar breadth at canine level.
119. External alveolar breadth at P3 level.
120. External alveolar breadth at P4 level.
121. External alveolar breadth at M1/M2 level.
122. M61 relative to the external palatal breadth at the canine level.
123. M61 relative to the external palatal breadth at the P3 level. [In frontal view, the lateral protrusion of the alveolar torus of the maxilla is sometimes also visible posterior to P3 (lateral alveolar prognathism, Pope, 1991)]
124. M76a. SSA. Zygomaxillary angle (degree). [The angle at subspinale whose two sides reach from this point to zygomaxillare anterior left and right]
125. Subspinale subtense. [Distance from subspinale to bi-zygomaxillary chord]
126. M77a. NFA. Nasio-frontal angle (fm:a-n-fm:a). [The angle at nasion whose two sides reach from this point to frontomalare, left and right. This measures the facial flatness at nasion relative to the most anterior points on the external angular processes of the frontal, the

higher the angle the less the forward protrusion of the supranasal point of the frontal relative to its external angles. It is entirely a measure of the frontal bones, it is thus more an index of transverse frontal flatness than of facial flatness. -- Howells, 1973. Also called nasion angle, can be calculated from the nasion subtense and one half the biorbital chord in Rightmire (1998).]

127. Width of nasal bridge. Rightmire 1998. [Measured at the anterior lacrimal crests, following Weidenreich (1943). The nasal bones and the bridge portions of the frontal process of the maxilla forming a continuous, curved line. The bridge itself is formed by the two nasal bones and the two bridge portions of the maxilla which are bound by the nasomaxillary margin, on one side, and the crista lacrimalis anterior, on the other.]
128. Nasal bridge height. Rightmire 1998. [Taken as a subtense to nasion, from the chord defined as the width of nasal bridge]
129. Nasal bridge index. Rightmire 1998. [The ratio of height to width, as used by Weidenreich (1943)]
130. Nasal bridge angle. Rightmire 1998. [Projection of nasion relative to the anterior lacrimal crests, calculated from the nasal bridge subtense and one half the nasal bridge width]
131. M41c. XML. Maximum malar length. [Total direct length of the malar in a diagonal direction, from the lower end of the zygo-temporal suture on the lateral face of the bone, to zygoorbitale the junction of the zygo-maxillary suture with the lower border of the orbit, on the left side]
132. Maximum malar height (Rightmire et al., 2006). [Caliper. Taken approximately vertically, from the inferior margin of the malar surface to the tip of the frontal process]
133. Zygomaxillare anterior-zygoorbitale (zm:a-zo). [Zygoorbitale is the point at which zygomaxillary suture contacts lower border of the eye. Zygomaxillare anterior is the limit of the attachment of the masseter muscle on the zygomaxillary suture (Hanihara, 2000) corresponding to lowest point on the zygomaxillary suture (Iscan and Steyn, 2013)]
134. M41d. MLS. Malar subtense. [The maximum subtense from the convexity of the malaria to the maximum length of the bone, at the level of the zygomaticofacial foramen, on the left side]
135. IZM height. Inferior zygomatic margin height. [A point on the inferior zygomatic margin at the level of the lateral wall of the orbit (fmo) to the horizontal plane containing prosthion (Pope, 1991)]
136. Malar angle. Posterior-inferior angle between the Frankfurt horizontal and the chord connecting the most inferior-lateral point of the orbit and the most inferior point on the malaria-maxillary suture.
137. Bimandibular fossa breadth.
138. Mandibular fossa depth.
139. Midfacial prognathism.
140. M66. Bigonial breadth. go-go. Mandible.
141. M71a. Minimum ramus width.
142. Gonion coronoid height.
143. Gonion condylar height.
144. Gonion-notch height.
145. Notch width.
146. Notch depth.
147. Condylar neck length.
148. Coronoid length.
149. Coronoid width.
150. M79. Ramus angle. Angulus mandibularis. [Projected to the sagittal plane]
151. M79(1b). Angle of chin to alveolar plane (degree).
152. Pogonion-gonion length.
153. Infradentale-gonion length.
154. Infradentale to the posterior edge of the last molar at the alveolar level.

155. Infradentale to the coronoid tip.
156. Pogonion to the posterior edge of the last molar at the alveolar level.
157. Mandibular corpus height at canine.
158. Mandibular corpus height at p3.
159. Mandibular corpus height at p4.
160. Mandibular corpus height at m1.
161. Mandibular corpus height at m2.
162. Bimental breadth. [If there are more than one mental foramen, select the largest one]
163. Bicoronoid breadth.
164. Binotch breadth.
165. Biramus breadth at the alveolar margin.
166. Biramus breadth at the lateral prominence.
167. Condyle articular facet breadth.
168. External breadth at i2/canine along the alveolar margin.
169. External breadth at canine along the alveolar margin.
170. External breadth at p3 along the alveolar margin.
171. External breadth at p4 along the alveolar margin.
172. External breadth at m1 along the alveolar margin.
173. External breadth at m2 along the alveolar margin.
174. External breadth at m3 along the alveolar margin.
175. Internal breadth at canine along the alveolar margin.
176. Internal breadth at p3 along the alveolar margin.
177. Internal breadth at p4 along the alveolar margin.
178. Internal breadth at m1 along the alveolar margin.
179. Internal breadth at m2 along the alveolar margin.
180. Maximum thickness of the mandibular corpus at the canine level.
181. Maximum thickness of the mandibular corpus at the p3 level.
182. Maximum thickness of the mandibular corpus at the p4 level.
183. Maximum thickness of the mandibular corpus at the m1 level.
184. Maximum thickness of the mandibular corpus at the m2 level.
185. Alveolar length of incisor region along the alveolar margin.
186. Alveolar length of canine-premolar region along the alveolar margin.
187. Alveolar length of molar region along the alveolar margin.
188. Symphysis height (id-gn).
189. Symphysis width. [When pogonion is not present, take a point which makes the connection between this point and the genion perpendicular to the long axis of the symphysis]
190. Dental. Upper I1. Mesiodistal length.
191. Dental. Upper I1. Buccolingual width.
192. Dental. Upper I1. Width/length.
193. Dental. Upper I1. Area relative to M1. LxW of I1 / LxW of M1.
194. Dental. Upper I1. Labial convexity. ASUDAS grades. UI1LC.
195. Dental. Upper I1. Lingual shovelling. ASUDAS grades. UI1SS.
196. Dental. Upper I1. Labial shovelling. ASUDAS grades. UI1DS. [Named as double-shovelling]
197. Dental. Upper I1. Tuberculum Dentale. ASUDAS grades. UI1TD.
198. Dental. Upper I2. Mesiodistal length.
199. Dental. Upper I2. Buccolingual width.
200. Dental. Upper I2. Width/length.
201. Dental. Upper I2. Area relative to I1. LxW of I2 / LxW of I1.
202. Dental. Upper I2. Labial convexity. ASUDAS grades as UI1LC.
203. Dental. Upper I2. Lingual shovelling. ASUDAS grades. UI2SS.
204. Dental. Upper I2. Labial shovelling. ASUDAS grades. UI2DS.

205. Dental. Upper I2. Tuberculum Dentale. ASUDAS grades. UI2TD.
206. Dental. Upper canine. Mesiodistal length.
207. Dental. Upper canine. Buccolingual width.
208. Dental. Upper canine. Width/length.
209. Dental. Upper canine. Area relative to M1. LxW of C1 / LxW of M1.
210. Dental. Upper canine. Tuberculum Dentale. ASUDAS grades. UCTD.
211. Dental. Upper canine. Mesial marginal ridge. ASUDAS grades. UCMR.
212. Dental. Upper canine. Distal marginal ridge. ASUDAS grades. As UCMR.
213. Dental. Upper canine. Distal accessory ridges. ASUDAS grades. UCDR.
214. Dental. Upper P3. Mesiodistal length.
215. Dental. Upper P3. Buccolingual width.
216. Dental. Upper P3. Width/length.
217. Dental. Upper P3. Area relative to M1. LxW of P3 / LxW of M1.
218. Dental. Upper P3. Mesial accessory ridges. ASUDAS grades. UP3M MXPAR.
219. Dental. Upper P3. Distal accessory ridges. ASUDAS grades. UP3D MXPAR.
220. Dental. Upper P4. Mesiodistal length.
221. Dental. Upper P4. Buccolingual width.
222. Dental. Upper P4. Width/length.
223. Dental. Upper P4. Area relative to M1. LxW of P4 / LxW of M1.
224. Dental. Upper P4. Mesial accessory ridges. ASUDAS grades. UP4M MXPAR.
225. Dental. Upper P4. Distal accessory ridges. ASUDAS grades. UP4D MXPAR.
226. Dental. Upper M1. Mesiodistal length.
227. Dental. Upper M1. Buccolingual width.
228. Dental. Upper M1. Width/length.
229. Dental. Upper M1. Metacone size. ASUDAS grades. UM1MC.
230. Dental. Upper M1. Hypocone size. ASUDAS grades. UM1HC.
231. Dental. Upper M1. Cusp 5 size. ASUDAS grades. UM1C5. [It is a cusp developed on the distal cingulum, buccal to the hypocone. Some researchers call it metaconule, but it is not the true metaconule.]
232. Dental. Upper M1. Carabelli's cusp. ASUDAS grades. UM1CB. [Carabelli's trait is referred to a cusp on the lingual surface of the protocone. It is equivalent to the pericone]
233. Dental. Upper M1. Mesostyle size. ASUDAS grades. UM1PS. [In the "Dental Morphology Manual", this small cusp is called parastyle. It is a small cusp on the distobuccal side of the paracone. The true parastyle is a small cusp mesial to the paracone]
234. Dental. Upper M1. Enamel Extension. ASUDAS grades. UMEE. ["This trait is an apical extension of the enamel from a straight line that is the usual cemento-enamel junction on the buccal surface, usually in line with the buccal groove. It is more common on maxillary than mandibular molars. Enamel in the buccal groove but not attached to the tooth crown is not considered an enamel extension, but may be an enamel pearl."]
235. Dental. Upper M2. Mesiodistal length.
236. Dental. Upper M2. Buccolingual width.
237. Dental. Upper M2. Width/length.
238. Dental. Upper M2. Area relative to M1. LxW of M2 / LxW of M1.
239. Dental. Upper M2. Metacone size. ASUDAS grades. UM2MC.
240. Dental. Upper M2. Hypocone size. ASUDAS grades. UM2HC.
241. Dental. Upper M2. Cusp 5 size. ASUDAS grades. UM2C5. [It was called metaconule by some authors, but it is not the true metaconule]
242. Dental. Upper M2. Carabelli's cusp. ASUDAS grades. UM2CB. [Carabelli's trait is referred to a cusp on the lingual surface of the protocone. It is equivalent to the pericone]
243. Dental. Upper M2. Mesostyle size. ASUDAS

grades. UM2PS. [In the "Dental Morphology Manual", this small cusp is called parastyle. It is a small cusp on the distobuccal side of the paracone. The true parastyle is a small cusp mesial to the paracone]

244. Dental. Upper M2. Enamel Extension. ASUDAS grades. UMEE. ["This trait is an apical extension of the enamel from a straight line that is the usual cemento-enamel junction on the buccal surface, usually in line with the buccal groove. It is more common on maxillary than mandibular molars. Enamel in the buccal groove but not attached to the tooth crown is not considered an enamel extension, but may be an enamel pearl."]
245. Dental. Upper M3. Mesiodistal length.
246. Dental. Upper M3. Buccolingual width.
247. Dental. Upper M3. Width/length.
248. Dental. Upper M3. Area relative to M1. LxW of M3 / LxW of M1.
249. Dental. Upper M3. Metacone size. ASUDAS grades. As UM2MC.
250. Dental. Upper M3. Hypocone size. ASUDAS grades. As UM2HC.
251. Dental. Upper M3. Cusp 5 size. ASUDAS grades. As UM2C5. [It was called metaconule by some authors, but it is not the true metaconule]
252. Dental. Upper M3. Carabelli's cusp. ASUDAS grades. As UM2CB. [Carabelli's trait is referred to a cusp on the lingual surface of the protocone. It is equivalent to the pericone]
253. Dental. Upper M3. Mesostyle size. ASUDAS grades. As UM2PS. [In the "Dental Morphology Manual", this small cusp is called parastyle. It is a small cusp on the distobuccal side of the paracone. The true parastyle is a small cusp mesial to the paracone]
254. Dental. Upper M3. Enamel Extension. ASUDAS grades. UMEE. ["This trait is an apical extension of the enamel from a straight line that is the usual cemento-enamel junction on the buccal surface, usually in line with the buccal groove. It is more common on maxillary than mandibular molars. Enamel in the buccal groove but not attached to the tooth crown is not considered an enamel extension, but may be an enamel pearl."]
255. Dental. Lower i1. Mesiodistal length.
256. Dental. Lower i1. Buccolingual width.
257. Dental. Lower i1. Width/length.
258. Dental. Lower i1. Area relative to m1. LxW of i1 / LxW of m1.
259. Dental.Lower i1. Lingual shovelling. ASUDAS grades. LI1SS.
260. Dental. Lower i2. Mesiodistal length.
261. Dental. Lower i2. Buccolingual width.
262. Dental. Lower i2. Width/length.
263. Dental. Lower i2. Area relative to i1. LxW of i2 / LxW of i1.
264. Dental. Lower i2. Area relative to m1. LxW of i2 / LxW of m1.
265. Dental. Lower i2. Lingual shovelling. ASUDAS grades. LI2SS.
266. Dental. Lower canine. Mesiodistal length.
267. Dental. Lower canine. Buccolingual width.
268. Dental. Lower canine. Width/length.
269. Dental. Lower canine. Area relative to m1. LxW of c1 / LxW of m1.
270. Dental. Lower canine. Distal accessory ridge. ASUDAS grades. LCDR.
271. Dental. Lower p3. Mesiodistal length.
272. Dental. Lower p3. Buccolingual width.
273. Dental. Lower p3. Width/length.
274. Dental. Lower p3. Area relative to m1. LxW of p3 / LxW of m1.
275. Dental. Lower p3. Lingual cusp complexity. ASUDAS grades. LP3LC.
276. Dental. Lower p4. Mesiodistal length.
277. Dental. Lower p4. Buccolingual width.
278. Dental. Lower p4. Width/length.
279. Dental. Lower p4. Area relative to m1. LxW of

p4 / LxW of m1.

280. Dental. Lower p4. Lingual cusp complexity. ASUDAS grades. LP4LC.
281. Dental. Lower m1. Mesiodistal length.
282. Dental. Lower m1. Buccolingual width.
283. Dental. Lower m1. Width/length.
284. Dental. Lower m1. Anterior Fovea. ASUDAS grades. LM1AF.
285. Dental. Lower m1. Deflecting wrinkle on the hypometacristid (a ridge on the buccal side of the metaconid). ASUDAS grades. LM1DW.
286. Dental. Lower m1. Protostylid. ASUDAS grades. LM1PS. [A small cusp on the distobuccal side of the protoconid]
287. Dental. Lower m1. Metastylid. LM1C7. [A cusp occurs on the distolingual side of the metaconid, between the metaconid and entoconid. Usually called cusp 7.]
288. Dental. Lower m1. Enamel Extension. ASUDAS grades. LMEE.
289. Dental. Lower m2. Mesiodistal length.
290. Dental. Lower m2. Buccolingual width.
291. Dental. Lower m2. Width/length.
292. Dental. Lower m2. Area relative to m1. LxW of m2 / LxW of m1.
293. Dental. Lower m2. Anterior Fovea. ASUDAS grades. As LM1AF.
294. Dental. Lower m2. Deflecting wrinkle on the hypometacristid (a ridge on the buccal side of the metaconid). ASUDAS grades. As LM1DW.
295. Dental. Lower m2. Protostylid. ASUDAS grades. LM2PS.
296. Dental. Lower m2. Metastylid. LM2C7.
297. Dental. Lower m2. Enamel Extension. ASUDAS grades. LMEE.
298. Dental. Lower m3. Mesiodistal length.
299. Dental. Lower m3. Buccolingual width.
300. Dental. Lower m3. Width/length.
301. Dental. Lower m3. Area relative to m1. LxW of m3 / LxW of m1.
302. Dental. Lower m3. Anterior Fovea. ASUDAS grades. As LM1AF.
303. Dental. Lower m3. Deflecting wrinkle on the hypometacristid (a ridge on the buccal side of the metaconid). ASUDAS grades. As LM1DW.
304. Dental. Lower m3. Protostylid. ASUDAS grades. As LM1PS.
305. Dental. Lower m3. Metastylid. As LM1C7.
306. Dental. Lower m3. Enamel Extension. ASUDAS grades. LMEE.
307. Dental. BPh I. Relative wear areas of buccal phase I. [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764.]
308. Dental. LPh I. Relative wear areas of lingual phase I. [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]
309. Dental. Ph II. Relative wear areas of phase II. [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]
310. Dental. Ve. Volume of enamel cap (mm^3). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X,

Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

311. Dental. Vc. Total crown volume (mm^3). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

312. Dental. Vcdp. Volume of the crown dentine and pulp (mm^3). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

313. Dental. Vcdp/Vc. Relative size of dental and pulp. [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

314. Dental. SEDG. Surface area of the enamel-dentine junction (mm^2). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

315. Dental. 3D AET. Three dimensional average enamel thickness (mm). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

316. Dental. 3D RET. Three-dimensional relative average enamel thickness (mm). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

317. Dental. LEA. Lateral enamel surface area (mm^2). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764.]

318. Dental. RA. Root surface area (mm^2). [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

319. Dental. CRR. Crown-root ratio. [Zanolli C, Kullmer O, Kelley J, Bacon A-M, Demeter F, Dumoncel J, Fiorenza L, Grine FE, Hublin J-J, Nguyen AT, Nguyen TMH, Pan L, Schillinger B, Schrenk F, Skinner MM, Ji X, Macchiarelli

R. 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. Nature Ecology & Evolution 3: 755-764]

320. Ratio: Maximum cranial breadth/Maximum cranial length.
321. Ratio: Least frontal breadth/Maximum frontal breadth.
322. Ratio: Bistephanic breadth/Maximum frontal breadth.
323. Ratio: Glabella-bregma chord/Maximumfrontal breadth.
324. Ratio: Biasterion breadth/Maximum cranial breadth at supramastoid crest.
325. Ratio: Minimum cranial breadth/Maximum cranial breadth.
326. Ratio: Minimum cranial breadth/Maximum frontal breadth.
327. Ratio: Foramen magnum breadth/Foramen magnum length.
328. Ratio: Basion-Bregma height/Maximum cranial breadth.
329. Ratio: Basion-Bregma height/Maximum cranial length.
330. Ratio: Mastoid width/Maximum mastoid width.
331. Ratio: Mastoid height/Maximum mastoid width.
332. Ratio: Auriculare-vertex projection height/Maximum cranial breadth.
333. Ratio: n-b frontal sagittal chord/Glabella-bregma chord.
334. Ratio: Frontal sagittal chord/Parietal sagittal chord.
335. Ratio: b-sphn bregma-sphenion chord/l-ast lambda-asterion chord.
336. Ratio: Occipital sagittal chord/Parietal sagittal chord.
337. Ratio: Lambda-inion chord/Parietal sagittal chord.
338. Ratio: Frontal angle/Parietal angle.
339. Ratio: Occipital angle/Parietal angle.
340. Ratio: Temporal squama height/Temporal squama length.
341. Ratio: Temporal muscle attachment height/Auriculare-vertex projection height.
342. Ratio: Postglenoid-ectoglenoid length/Postglenoid-entoglenoid length.
343. Ratio: Ectoglenoid-entoglenoid length/Postglenoid-entoglenoid length.
344. Ratio: Basion-prosthion length/Maximum cranial length.
345. Ratio: Bi-frontomalare temporale breadth/Maximum cranial length.
346. Ratio: Bi-frontomalare temporale breadth/Maximum frontal breadth.
347. Ratio: Supraorbital torus thickness medial/Supraorbital torus thickness central.
348. Ratio: Supraorbital torus thickness lateral/Supraorbital torus thickness central.
349. Ratio: Bijugal breadth/Supraorbital torus breadth.
350. Ratio: Nasion-prosthion height/Maximum cranial length.
351. Ratio: Nasion-prosthion height/Supraorbital torus breadth.
352. Ratio: Nasiospinale-alveolare length/Nasion-prosthion height.
353. Ratio: Cheek height/Maximum cranial length.
354. Ratio: Cheek height/Supraorbital breadth.
355. Ratio: Interorbital breadth (d-d)/Supraorbital breadth.
356. Ratio: Orbital height OBH/Orbital breadth OBB.
357. Ratio: Nasal breadth NBL/Nasal height NH.
358. Ratio: Maxilloalveolar breadth/Maxilloalveolar length.
359. Ratio: Maxilloalveolar breadth/Supraorbital torus breadth.
360. Ratio: Maxilloalveolar breadth/Maximum cranial length.
361. Ratio: Internal palatal breadth/Maxilloalveolar breadth.

362. Ratio: External alveolar breadth at P3/External alveolar breadth at canine.
363. Ratio: External alveolar breadth at P4/External alveolar breadth at canine.
364. Ratio: External alveolar breadth at M1-M2/External alveolar breadth at canine.
365. Ratio: Width of nasal bridge/Bimaxillary breadth.
366. Ratio: Maximum malar length/Bimaxillary breadth.
367. Ratio: Maximum malar height/Bimaxillary breadth.
368. Ratio: Inferior zygomatic margin height/Bimaxillary breadth.
369. Ratio: Bimandibular fossa breadth/Maximum cranial length.
370. Ratio: Bimandibular fossa breadth/Maximum cranial breadth.
371. Ratio: Midfacial prognathism/Maximum cranial length.
372. Ratio: Midfacial prognathism/Upper facial height.
373. Ratio: Minimum ramus width/Gonion-notch height.
374. Ratio: Gonion-notch height/Bigonial breadth go-go.
375. Ratio: Notch width/Minimum ramus width.
376. Ratio: Notch depth/Gonion-notch height.
377. Ratio: Pogonion-gonion length/Bigonial breadth go-go.
378. Ratio: Mandibular corpus height at canine/Infradentale to the posterior edge of the last molar at the alveolar level.
379. Ratio: Mandibular corpus height at p3/Mandibular corpus height at canine.
380. Ratio: Mandibular corpus height at p4/Mandibular corpus height at canine.
381. Ratio: Mandibular corpus height at m1/Mandibular corpus height at canine.
382. Ratio: Mandibular corpus height at m2/Mandibular corpus height at canine.
383. Ratio: Bimental breadth/Bigonial breadth go-go.
384. Ratio: Condyle articular facet breadth/Infradentale to the posterior edge of the last molar at the alveolar level.
385. Ratio: External breadth at i2/canine along the alveolar margin/External breadth at canine along the alveolar margin.
386. Ratio: External breadth at p3 along the alveolar margin/External breadth at canine along the alveolar margin.
387. Ratio: External breadth at p4 along the alveolar margin/External breadth at canine along the alveolar margin.
388. Ratio: External breadth at m1 along the alveolar margin/External breadth at canine along the alveolar margin.
389. Ratio: External breadth at m2 along the alveolar margin/External breadth at canine along the alveolar margin.
390. Ratio: External breadth at m3 along the alveolar margin/External breadth at canine along the alveolar margin.
391. Ratio: Internal breadth at m1 along the alveolar margin/External breadth at m1 along the alveolar margin.
392. Ratio: External breadth at m1 along the alveolar margin/Infradentale to the posterior edge of the last molar at the alveolar level.
393. Ratio: Maximum thickness of the mandibular corpus at the p3 level/Maximum thickness of the mandibular corpus at the canine level.
394. Ratio: Maximum thickness of the mandibular corpus at the p4 level/Maximum thickness of the mandibular corpus at the canine level.
395. Ratio: Maximum thickness of the mandibular corpus at the m1 level/Maximum thickness of the mandibular corpus at the canine level.
396. Ratio: Maximum thickness of the mandibular corpus at the m2 level/Maximum thickness of the mandibular corpus at the canine level.

397. Ratio: Alveolar length of incisor region along the alveolar margin/Alveolar length of molar region along the alveolar margin.
398. Ratio: Alveolar length of canine-premolar region along the alveolar margin/Alveolar length of molar region along the alveolar margin.
399. Ratio: Symphysis width/Symphysis height (id-gn).

Appendix 2. Discrete phenomic characters used for phylogenetic analysis

400. Frontal. Anterior view. Supraorbital tori arching in anterior view. [Related character: double-arched torus. It's two rather parallel-bordered arches, one above each orbit.]
-- straight (0)
-- gently arching (1)
-- strongly arching (2)

401. Frontal. Anterior view. Supraorbital torus divided into distinct medial and lateral portions.
-- absent (0)
-- present (1)

402. Frontal. Anterior view. Supraorbital torus lateral thinning.
-- absent (0)
-- present (1)

403. Frontal. Anterior view. Supraorbital torus parallel-bordered. [Superior and inferior borders of the supraorbital torus are rather parallel.]
-- Present. (0)
-- Absent in young individual. (1)
-- Absent. (2)

404. Frontal. Anterior view. Superciliary arch. [Referred to a ridge or crest on the media part of the supraorbital torus only.]
-- Absent (0)
-- Present, weak (1)
-- Present, strong (2)

405. Frontal. Anterior view. Fusion of superciliary arcs (arcus superciliaris) at the glabellar level (Zeitoun, V., 2000). [Zeitoun, V. Reappraisal of the species *Homo erectus* (Dubois, 1893). Use of morphologic and metric data in cladistic investigation of the case of *Homo erectus*. Bull. Mem. Soc. Anthrop. Paris Nouvelle S"]
-- Unmerged. (0)
-- Merged. (1)

406. Frontal. Anterior view. Supraorbital sulcus.
-- Absent (0)
-- Shallow (1)
-- Deep (2)
-- Foramen (3)

407. Frontal. Anterior view. Supraorbital arch.
-- Thick (0)
-- Thin (1)

408. Frontal. Anterior view. Supraorbital lateral tubercle.
-- Small (0)
-- Large (1)
-- Very large (2)

409. Frontal. Anterior view, superior view. Supraorbital trigon surface topography.
-- Posteriorly concave (0)
-- Flat (1)

410. Frontal. Anterior view, superior view. Supraorbital trigon orientation.
-- Posterior-lateral (0)
-- Mainly lateral, slightly posterior (1)
-- Anterior-lateral (2)

411. Frontal. Anterior view. Zygomatic process of the frontal bone flaring inferolaterally. [As in most of modern humans, but not necessarily so in *H. erectus*]
-- absent (0)
-- present (1)

412. Frontal. Superior view. Supraorbital torus arching in superior view.
-- straight (0)
-- gently arching (1)
-- strongly arching (2)

413. Frontal. Superior view. Supraorbital torus orientation relative to the glabella.
-- in the same as plane (0)
-- the glabellar and orbital segments on different planes (1)

414. Frontal. Superior view. Glabella concavity relative to the supraorbital tori.
-- deep (0)
-- shallow (1)
-- absent (2)

415. Frontal. Lateral view. Supraorbital torus

smoothly rolled. [Related character: double-arched torus. Evenly curved profile (rolled) in lateral view]
-- absent (0)
-- present (1)

416. Frontal. Anterior view. Frontal Keeling.
-- absent (0)
-- weak (1)
-- strong (2)

417. Frontal. Lateral view. Bregmatic eminence. [Present in *Homo erectus*.]
-- absent (0)
-- present (1)

418. Frontal. Lateral view. Cranial vault thickness at bregma. [Modified from Gilbert 2008.]
-- thin, thinner than 7.5 mm (0)
-- thick, between 7.5-9.5 mm (1)
-- very thick, larger than 9.5 mm (2)

419. Frontal. Lateral view. Forehead elevation. [Convexity along the sagittal profile of the frontal bone between the supratoral sulcus and the bregma. When the frontal presented even curvature, it was scored as 0, such in Sangiran 17. Some have slightly convexity, such as the Zhoukoudian specimens. Modern human are scored as pronounced convexity. Modified from Gilbert, 2008.]
-- Flat. (0)
-- Slightly convex. (1)
-- Strongly convex. (2)

420. Frontal. Lateral view. Position of the most prominent aspect of midsagittal profile. [Wu X, Athreya S. 2013. A description of the geological context, discrete traits, and linear morphometrics of the middle Pleistocene hominin from Dali, Shaanxi Province, China. American Journal of Physical Anthropology 150: 141-157.]
-- Low (0)
-- High (1)

421. Frontal. Lateral view. Posttoral sulcus. Concavity of the region between supraorbital torus and frontal squama.
-- deep (0)
-- moderate (1)
-- absent or very shallow (2)

422. Frontal 4. Anterior view. Glabellar inflexion. [Transverse concavity at the glabella. It is the concavity separating the supraorbital tori. Modified from Gilbert, 2008.]
-- Flat or slightly concave. (0)
-- Shallow. (1)
-- Deep. (2)

423. Frontal. Mid-sagittal supraglabellary tubercle (Zeitoun, 2000). [A tubercle at the junction of the postorbital sulcus and the frontal squama. Always present in the Neanderthals, Zeitoun, V. Reappraisal of the species *Homo erectus* (Dubois, 1893). Use of morphologic and metric data in cladistic investigation of the case of Homo erectus. Bull. Mem. Soc. Anthrop. Paris Nouvelle S"]
-- Absent. (0)
-- Present. (1)

424. Frontal 7. Superior view. Postorbital constriction. [It was measured as an index of chord between two temporal lines at the point of maximum constriction divided by maximum cranial breadth. Because in many fossils, the cranium was incomplete, it is very hard to estimate the chord and the breadth. Here it is scored as very deep like in some *H. erectus*, moderate as in Neanderthals, and shallow as in *H. sapiens*.]
-- Very deep. (0)
-- Deep. (1)
-- Moderate. (2)
-- Shallow. (3)

425. Frontal. Lateral. Frontal bossing. [Frontal bossing is not present in the Sima de los Huesos crania, but it is present in Neanderthals. Boss is a smooth, round, broad eminence. Female *Homo*

sapiens skulls tend to show more bossing of the frontal bone than those of males.]
-- Absent. (0)
-- Present. (1)

426. Frontal. Internal. Frontal sinus. [Weidenreich, 1943, 1951. Rightmire, 2004, 2007, 2008]
-- Absent. (0)
-- Present. (1)

427. Frontal. Internal. Frontal sinus lateral extension.
-- small, not reaching midorbit laterally. (0)
-- large, reaching midorbit laterally. (1)

428. Frontal. Internal. Frontal sinus posterior extension.
-- No posterior extension. (0)
-- Invading the frontal squama. (1)

429. Frontal. Development of the temporal line on the frontal. [When present double temporal line, score the strongest one.]
-- Strong, elevated, extends to the frontal-parietal suture. (0)
-- Moderate, low, extends to the frontal-parietal suture. (1)
-- Weak, elevated crest present at the posterior side of the orbit only. (2)

430. Frontal. Double temporal line on the frontal.
-- Absent. (0)
-- Present. (1)

431. Maxillary. Anterior view. Internal nasal margin medial projection. [Development of an internal nasal margin bearing a well-developed and vertically oriented medial projection. An apomorphine form Neanderthals. Schwartz, J. H., Tattersall, I., 1996. Called "internal nasal rim" in Ref.. It was described as absent for the Sima de los Huesos crania.]
-- Absent. (0)
-- Present. (1)

432. Maxillary. Anterior view. Swelling of the lateral nasal cavity wall into the capacious posterior nasal cavity. [An apomorphine feature of Neanderthals. Schwartz, J. H., Tattersall, I., 1996.]
-- Absent. (0)
-- Present. (1)

433. Maxillary. Medial view. Lack of an ossified roof over the lacrimal groove. [An apomorphine feature of Neanderthals. Schwartz, J. H., Tattersall, I., 1996]
-- Yes. (0)
-- No. (1)

434. Maxillary. Anterior view, medial view. Conchal crest extends to the nasal margin. [Inferior nasal concha anteriorly continues the conchal crest. A *Homo sapiens* character.]
-- Absent. (0)
-- Present. (1)

435. Maxillary. Anterior view, medial view. Inferior concha covering the lacrimal groove. [Present in *Homo sapiens*.]
-- Absent. (0)
-- Present. (1)

436. Maxillary. Anterior view. Lateral view. Inflation of the maxillary below the orbit. [A Neanderthal feature, also present in Petralona 1.]
-- Absent. (0)
-- Present. (1)

437. Maxillary. Anterior view. Lateral view. Paranasal inflation. Maxilla superior lateral inflation of the bone surrounding the nasal aperture [As in Sangiran 17, Dali, and Jinniushan. Pope, 1992.]
-- Absent (0)
-- Present (1)

438. Maxillary. Anterior view. Zygomaticoalveolar crest. [Zygomaticoalveolar crest is the inferior zygomaticomaxillary margin (Pope, 1991). State 2 "deeply arched" is equivalent to a prominently developed malar notch (incisura malaris).]
-- Oblique (0)
-- gently arched (1)
-- deeply arched (2)

439. Maxillary. Anterior view. Dorsal-ventral

position of the root of the zygomaticoalveolar crest. [Low as in Neanderthals. Intermedia as in the Sima de los Huesos crania. High as in modern human.]
-- Low. (0)
-- Intermedia. (1)
-- High. (2)

440. Zygomatic, Maxillary. Anterior view. Zygomaticoalveolar crest (Inferior zygomaticomaxillary margin) extends to the zygion. [Zygion is the most lateral point the zygomatic bone.]
-- Absent. (0)
-- Present. (1)

441. Maxillary. Ventral view. Anterior-posterior position of the root of the zygomaticoalveolar crest.
-- M2-M3 (0)
-- M1-M2 (1)
-- P4-M1 (2)
-- P3-4 (3)

442. Zygomatic, Maxillary. Anterior view. Inferior orbital torus.
-- Absent. (0)
-- Present. (1)

443. Zygomatic, Maxillary. Anterior view, lateral view. Malar tubercle. [Lateral prominence used by Weidenreich 1943. It is not necessarily associated with the zygomaticomaxillary suture. Here, the malar tubercle refers to an inferiorly projecting tubercle which, in anatomically modern humans, marks the anterior origin of the masseter muscle (Pope, 1991).]
-- Absent or weak (0)
-- Strong (1)

444. Zygomatic, Maxillary. Anterior view. Malar tubercle position. [The placement of the tubercle relative to a vertical line marking the lateral wall of the orbit (a vertical line intersecting fmo (frontomalare orbitale) and parallel to the medial sagittal plane) (Pope, 1991)]
-- Completely lateral to the lateral wall of the orbit (0)
-- Slightly lateral to the lateral wall of the orbit (1)
-- Below the lateral wall of the orbit (2)
-- Slightly medial to the lateral wall of the orbit (3)
-- Completely medial to the lateral wall of the orbit (4)

445. Maxillary. Ventral view. Anterior-posterior position of the incisive foramen.
-- P4. (0)
-- P3. (1)
-- Canine. (2)

446. Maxillary. Anterior view. Lateral view. Canine fossa. [Canine fossa is coincident with the infraorbital depression sensu Maureille (1994), which produces a horizontal incurvation as well as an incurvation of the zygomaticoalveolar crest. It refers to an extended infraorbital depression that affects most, if not the entire zygomatic process of the maxilla.]
-- Absent (0)
-- Present, shallow (1)
-- Present, deep (2)

447. Maxillary. Anterior view. Sulcus maxillaries. [A vertical groove inferior to the infraorbital foramen, a furrow-like sulcus, which would lie lateral to the canine jugum.]
-- Absent (0)
-- Present (1)

448. Maxillary. Superior view. Anterior view. Maxillary flexion [A zone of flexion along the junction of the two maxillary surfaces: the infraorbital plate and the more sagittal one of the lateral nasal wall. This flexure can be easily noticed in a transverse (horizontal) cross-section. Neanderthals have a uniplanar facial surface (sometimes may even be slightly convex), which lacks both a canine fossa and maxillary flexion.]

-- present (0)
-- absent (1)

449. Maxillary. Anterior view. Lateral view. Infraorbital plate orientation. [Diagonally orientated in Neanderthals.]
-- diagonally (0)
-- coronally (1)

450. Maxillary. Lateral view. Maxillary torus.
-- present (0)
-- absent (1)

451. Maxillary. Anterior view. Lateral view. Subnasal clivus shape. [overall curvature in sagittal and transverse directions]
-- Convex (0)
-- Flat (1)
-- Concave (2)

452. Maxillary. Anterior view. Anterior nasal sill crest. [The nasal sill is the floor of the nasal opening.]
-- absent or very weak (0)
-- present (1)

453. Maxillary. Anterior view. Anterior nasal sill central spine
-- Absent. (0)
-- Small. (1)
-- Large. (2)

454. Maxillary. Anterior view. Philtrum crest.
-- Absent. (0)
-- Present. (1)

455. Maxillary. Anterior view. Anterior nasal sill crest continuous with the lateral nasal margin
-- Absent. (0)
-- Present. (1)

456. Maxillary. Palatine. Ventral view. Elevated ridges along both sides of the inter maxillary suture. [Mainly on the maxillary. It is not considered as the palatine torus.]
-- absent (0)
-- present (1)

457. Palatine. Maxillary. Ventral view. Palatine torus. [Palatine torus is a bony exostosis that is expressed on both side of the midline on the hard palate (Scott and Irish, 2017).]
-- Absent (0)
-- Small, elevated for about 1-5 mm, limited to the palatine bones. (1)
-- Large, elevated for about 5-10 mm, extends onto the maxillary. (2)
-- Very large, elevated greater than 10 mm long, extends to the maxillary. (3)

458. Palatine. Ventral view. Surface. [Rightmire 1998.]
-- Rugose (0)
-- Smooth (1)

459. Parietal. Posterior view. Parietal keeling.
-- Absent. (0)
-- Weak. (1)
-- Strong. (2)

460. Parietal. Superior view. Obelion depression [Depression along the sagittal suture]
-- Absent. (0)
-- Present. (1)

461. Parietal. Parasagittal hollowing on both sides of the parietal suture.
-- Absent. (0)
-- Present. (1)

462. Parietal. Lateral view. Superior view. Temporal line.
-- Absent. (0)
-- Present, low. (1)
-- Present, strong ridge. (2)

463. Parietal. Lateral view. Temporal double line band. [Modified from Mounier, A. & Caparros, M. Le statut phylogénétique d'*Homo heidelbergensis* - étude cladistique des homininés du Pléistocène moyen. BMSAP 27, 110-134, doi:10.1007/s13219-015-0127-4 (2015).]
-- Absent. (0)
-- Present, single line. (1)
-- Present, double lines, the band narrow. <20 mm. (2)

-- Present, double lines, the band wide. >=20 mm. (3)

464. Parietal. Lateral view. Posterior view. Position of the superior temporal line. [Mounier, A. & Caparros, M. Le statut phylogénétique d'*Homo heidelbergensis* - étude cladistique des homininés du Pléistocène moyen. BMSAP 27, 110-134, doi:10.1007/s13219-015-0127-4 (2015).]
-- High. (0)
-- Intermediate. (1)
-- Low. (2)

465. Parietal. Lateral view. Torus angulari. [Angular torus is a raised and thickened ridge at the back of the posterior temporalis muscle attachment, where the line marking the furthest backward extent of its fan-shaped fibers angles downward and forward. The torus angular on parietal was first described by Weidenreich (1943) as a round bulge at the angle of the lambdoid suture and parietomastoid suture.]
-- Absent. (0)
-- Present, small, ridge like. (1)
-- Present, large, rounded bulge. (2)

466. Parietal. Posterior view. Parietal eminence. [Parietal tuber.]
-- Absent. (0)
-- Present. (1)

467. Parietal. Thickness at parietal eminence (or the center). [Cranial vault thickness at the parietal tuber. If the parietal eminence is absent, take the middle point of the parietal.]
-- thick (0)
-- intermediate (1)
-- thin (2)

468. Parietal. Lateral view. Lambdoidal flattening.
-- Absent (0)
-- Present (1)

469. Occipital. Posterior inferior view. Supreme nuchal line.
-- Absent (0)
-- Weak (1)
-- Moderately developed (2)
-- Highly elevated (3)

470. Occipital. Posterior inferior view. Extension of the supreme nuchal line.
-- Limited in the middle region. (0)
-- Continuous from asterion to asterion. (1)

471. Occipital. Posterior inferior view. Superior nuchal line.
-- Absent. (0)
-- Weak. (1)
-- Moderately developed. (2)
-- Highly elevated. (3)

472. Occipital. Posterior inferior view. Extension of the superior nuchal line.
-- Limited in the middle region. (0)
-- Continuous from asterion to asterion. (1)

473. Occipital. Posterior inferior view. Inferior nuchal line.
-- Absent. (0)
-- Weak. (1)
-- Moderately developed. (2)
-- Highly elevated. (3)

474. Occipital. Posterior inferior view. Occipital crest. [An external bony ridge that separates left and right halves of the nuchal plane of the occipital bone.]
-- Weak. (0)
-- Moderately developed. (1)
-- High ridge. (2)

475. Occipital. Posterior view. Occipital torus thickness at the middle line. [Transverse bony thickening along the border of the nuchal and occipital planes. The occipital torus is formed between the superior and supreme nuchal lines.]
-- Absent (0)
-- superoinferiorly thin (1)
-- moderate (2)
-- thick (3)

476. Occipital. Posterior view. Occipital torus transverse extension. [Variable in *Homo erectus*.

Modified from Gilbert, 2008.]
-- long, continuous from asterion to asterion. (0)
-- narrow, present near the middle line. (1)

477. Occipital. Posterior view. Occipital torus central depression.
-- absent, torus straight in the middle (0)
-- present, depression in the middle (1)

478. Occipital. Posterior view. Occipital supratoral sulcus.
-- present (0)
-- absent (1)

479. Occipital. Posterior view. Ventral view. Suprainiac fossa. [The cratered area is present in the Sima de los Huesos and Swanscombe. The Neanderthal suprainiac fossa is smaller, clearly sunken, and more inferiorly oriented. Also called suprainiac depression, "Santa Luca, A. P., 1978, A re-examination of presumed Neandertal-like fossils: Journal of Human Evolution, v. 7, no. 7, p. 619-636."]
-- absent (0)
-- present, small pit (1)
-- present, large, oval "cratered" area (2)
-- present, large, oval or triangle depression (3)

480. Occipital. Lateral view. Opisthocranion position. [In *Homo sapiens* and Sima de los Huesos, the opisthocranion lies on the occipital plane, In contrast, in early *Homo* and Asian H. erectus, the opisthocranion always lies on the occipital torus.]
-- On the occipital torus. (0)
-- On the occipital plane. (1)

481. Occipital. Lateral view. Inion separate from opisthocranion.
-- No or very close (0)
-- Yes (1)

482. Occipital. Lateral view. Occipital bun.
-- absent, occipital plane exhibits small curvature (0)
-- present, small, occipital plane exhibits large curvature (1)
-- present, large, occipital plane exhibits very large curvature (2)

483. Occipital. Ventral view. Postcondyloid tuberosities
-- present (0)
-- absent (1)

484. Occipital. Ventral view. opisthionic recess (narrowing) at the rear of the foramen magnum
-- Present (0)
-- Absent (1)

485. Occipital. Endocranial. Cerebellar fossa area relative to the cerebral fossa. [Moderns have a cerebellar fossa to cerebral fossa ratio of about 2:1, or a 100% larger area devoted to the cerebellar fossa. In "-'Sinanthropus", the ratio is reversed, with the cerebellar fossa only 50% as large as the cerebral fossa (Weidenreich, 1943).]
-- Cerebral fossa larger (0)
-- Cerebellar fossa larger (1)

486. Temporal. Posterior view. Mastoid process thickness
-- thin (0)
-- thick (1)

487. Temporal. Ventral view. Digastric fossa depth. [Also known as mastoid notch. It is the medial notch on the inferior surface of the mastoid process. It gives origin to the posterior belly of the digastric muscle.]
-- deep (0)
-- shallow (1)

488. Temporal-occipital. Posterior view. Juxtamastoid process (or eminence)
-- absent (0)
-- small (1)
-- large (2)

489. Temporal. Posterior view. Ventral view. Sulcus for occipital artery
-- absent (0)
-- present (1)

490. Temporal-occipital. Posterior view. Ventral view. Occipitomastoid crest [The

occipitomastoid suture is usually flat in modern humans, but is usually elevated in the Neanderthal crania. The elevated occipitomastoid suture is referred as occipitomastoid crest.]
-- absent (0)
-- low (1)
-- high (2)

491. Temporal. Posterior inferior view. Mastoid process ventral projection relative to the temporal-occipital suture.
-- At the same level. (0)
-- Below the suture. (1)
-- Markedly below. (2)
-- Higher than the suture. (3)

492. Temporal. Ventral view. Position of the tip of the mastoid process relative to the external meatus
-- More medially positioned (0)
-- Mediolaterally at the same level or slightly lateral (1)

493. Temporal. Posterior view. Mastoid foramen position.
-- at the temporal-occipital suture (0)
-- media to the temporal-occipital suture (1)
-- lateral to the temporal-occipital suture (2)

494. Temporal. Posterior view. Mastoid foramen number.
-- absent (0)
-- one (1)
-- more than one (2)

495. Temporal. Ventral view. Articular eminence.
-- flat (0)
-- raised, projected (1)

496. Temporal. Ventral view. Preglenoid planum. [Large in modern humans (Pope G G. 1992. Craniofacial evidence for the origin of modern humans in China. American Journal of Physical Anthropology, 35: 243-298).]
-- Absent (0)
-- Small (1)
-- Large (2)

497. Temporal. Ventral view. Postglenoid process.
-- absent (0)
-- small (1)
-- large (2)

498. Temporal. Ventral view. Entoglenoid process.
-- absent (0)
-- small (1)
-- large (2)

499. Temporal. Ventral view. Medial recess. [The entoglenoid process is separated from the tympanic bone by a deep gap or medial recess.]
-- broad (0)
-- narrow (1)

500. Temporal. Ventral view. Contribution of the sphenoid bone to the medial wall of the glenoid fossa. [Modified from Martínez, I., & Arsuaga, J. L. (1997). The temporal bones from Sima de los Huesos Middle Pleistocene site (Sierra de Atapuerca, Spain). A phylogenetic approach. Journal of Human Evolution, 33(2), 283-318. doi:https://doi.org/10.1006/jhev.1997.0155]
-- absent (0)
-- small (1)
-- large (2)

501. Temporal. Ventral view. Glenoid fossa depth.
-- shallow (0)
-- deep (1)

502. Temporal. Ventral view. Glenoid fossa anterior-posterior width [Preglenoid eminence is excluded.]
-- Anterior-posteriorly very narrow. (0)
-- Narrow. (1)
-- Relatively broad. (2)
-- Very broad. (3)

503. Temporal. Ventral view. Glenoid fossa shape.
-- Oval fossa. (0)
-- Transverse trough. (1)

504. Temporal. Ventral view. Glenoid fossa overhang. [Proportion of the fossa that overhangs the external cranial vault.

Lordkipanidze, D. Better seen from the anterior-ventral view.]
-- Equal or greater than 50 percent (0)
-- Less than 50 percent (1)

505. Temporal. Ventral view. Mediolateral course of the squamotympanic fissure coincides with the deepest portion of the glenoid fossa
-- Present (0)
-- Positioned more posteriorly (1)

506. Temporal. Lateral view. Deepest point of the glenoid fossa dorsal-ventral position relative to the external acoustic meatus.
-- Close to the dorsal edge of the meatus. (0)
-- Close to the ventral edge of the meatus. (1)

507. Temporal. Ventral view. Styloid process fused to the basicranium [In Homo erectus, the styloid process probably is not fused to the basicranium. It was regarded as absent by some researchers (Pope G G. 1992. Craniofacial evidence for the origin of modern humans in China. American Journal of Physical Anthropology, 35: 243-298).]
-- absent (0)
-- present (1)

508. Temporal. Ventral view. Vaginal process. [In contrast to hominoids and *Homo erectus*, the styloid process is partially surrounded by a flange of bone in modern humans and Neanderthals. This flange of bone is the vaginal process. (as it was figured in: Pope G G. 1992. Craniofacial evidence for the origin of modern humans in China. American Journal of Physical Anthropology, 35: 243-298).]
-- absent (0)
-- present (1)

509. Temporal. Ventral view. Process supratubalis. [In Homo erectus, there is neither a styloid process nor vaginal process, but there is a process supratubalis (Pope G G. 1992. Craniofacial evidence for the origin of modern humans in China. American Journal of Physical Anthropology, 35: 243-298).]
-- Present (0)
-- Absent (1)

510. Temporal. Ventral view. Stylomastoid foramen position relative to the line of digastric groove
-- More medially positioned (0)
-- Aligned with the styloid process and the digastric groove (1)
-- More laterally positioned (2)

511. Temporal. Ventral view. Tympanic plate orientation. [In *Homo erectus* (Sangiran 17), the tympanic plate is more sagittally orientated. In *Homo sapiens*, the tympanic plate is more coronally orientated.]
-- More coronally orientated (0)
-- More sagittally orientated (1)

512. Temporal. Lateral view. Tympanic plate thickness. [Weidenreich, 1951. Martínez and Arsuaga, 1997. Tympanic plate is a curved platelike bone that is part of the temporal bone and forms the floor and anterior wall of the external auditory canal.]
-- Thick (0)
-- moderate (1)
-- thin (2)

513. Temporal. Ventral view. Shape of the anteroinferior surface of the tympanic.
-- Rounded (0)
-- Flat (1)

514. Temporal. Ventral view. Tympanomastoid fissure
-- Wide, known as mastoid groove (0)
-- Narrow (1)

515. Temporal. Lateral view. Superior edge shape of the temporal squama.
-- convex, with an arched or subtriangular superior border (0)
-- flat (1)

516. Temporal. Lateral view. Supramastoid crest.
-- absent or very weak (0)
-- moderate (1)

-- marked (2)

517. Temporal. Lateral view. Anterior mastoid tubercle on the mastoid process [Called mastoid crest or tuberosity in "Santa Luca, A. P., 1978, A re-examination of presumed Neandertal-like fossils: Journal of Human Evolution, v. 7, no. 7, p. 619-636."]
-- absent or weak (0)
-- strong (1)

518. Temporal-parietal. Posterior view. Cranium form. Pentagonal-globular form. [Klein, R. G., 2009, The human career. Human biology and cultural origins. Third edition., Chicago and London, The University of Chicago, 989 p.]
-- Low pentagonal. (0)
-- Intermediate pentagonal. (1)
-- High pentagonal. (2)
-- Globular. (3)

519. Temporal-parietal. Posterior view. Maximum cranial breadth position.
-- at the supramastoid crest. (0)
-- slightly above the supramastoid crest. (1)
-- above the supramastoid crest. (2)

520. Temporal-Parietal. Posterior view. Lateral cranial walls. [Convergent superiorly, as in early *Homo* and Asian *H. erectus*. Parallel or slightly convergent superiorly as in Sima de los Huesos crania and other European MPHs (Swanscombe, Steinheim, Reilingen, Petralona). Circular outline as in Neanderthals. Divergent lateral walls with marked parietal bosses as in *Homo sapiens*.]
-- Convergent superiorly (0)
-- parallel or slightly convergent superiorly (1)
-- circular outline (2)
-- divergent lateral walls with marked parietal bosses (3)

521. Nasal. Lateral view. Nasal root projecting
-- At the same sagittal level as the glabella. (0)
-- Deeply concave. (1)

522. Nasal. Lateral view. Inferior end projecting.
-- absent (0)
-- present (1)

523. Nasal. Anterior view. Internasal keeling. [Rightmire, 1998.]
-- Absent (0)
-- Present (1)

524. Sphenoid. Lateral view. Basicranial flexion, flexion between the pre-sellar sphenoid and the sphenoid-occipital clivus. [In Dmanisi crania, the basicranial flexion is strong. In *Australopithecus* it is moderate. In chimpanzees, it is weak.]
-- Weak (0)
-- Moderate (1)
-- Strong (2)

525. Sphenoid. Ventral view. Sphenoid spine extends inferiorly without contributing directly to medial wall of mandibular fossa [Stringer, 1984]
-- absent (0)
-- present, small (1)
-- present, large (2)

526. Mandible 1. Lateral view. Incurvatio mandibulae. [Below the alveolar margin, the bone may be curved inward, presenting a shallow depression that has been referred to as the "incurvatio mandibularis" (Hublin & Tillier, 1981), the "incurvatio mandibulae" (Rosas, 1995), or the "impressio subincisiva externa" (Inke, 1967). Schwartz and Tattersall, 2000.]
-- absent (0)
-- shallow (1)
-- deep (2)

527. Mandible 2. Lateral view. Symphyseal profile. Relative to the lower dental border.
-- Receding (0)
-- Vertical (1)
-- Convex (2)

528. Mandible 3. Anterior view. Central part of the mental protuberance. [The "mental protuberance" (Johnston & Willis, 1954), the "mental eminence" (Lieberman, 1995), the

"mental osseum" (Brauer, 1984. Rosas, 1995), or the "tuber symphyseos" (Hublin & Tillier, 1981. Inke, 1967). Schwartz and Tattersall, 2000.]
-- absent (0)
-- weak (1)
-- strong (2)

529. Mandible 4. Anterior view. Mental tubercle. [The mental protuberance may continue laterally on each side to some extent as a thickening of the inferior margin of the corpus. In some individuals, each lateral extremity of the mental protuberance may bear a blunt "corner", which has been referred to as a "mental tubercle" (Johnston & Willis, 1954. Ran, 1998) or "tubercula lateralia" (Hublin and Tillier, 1981. Inke, 1967). Schwartz and Tattersall, 2000.]
-- absent (0)
-- weak (1)
-- strong (2)

530. Mandible 5. Anterior view. Mental trigon central keel. [The mental protuberance and lateral extremities were collectively called "mental trigon" (Rak, 1998). In the center of the mental trigon, it usually bears a vertical keel.]
-- absent (0)
-- weak (1)
-- strong, crest-like (2)

531. Mandible 6. Anterior view. Mental fossa. [Above each lateral extremity and to each side of the mental protuberance, there is a depression.]
-- absent (0)
-- shallow (1)
-- deep (2)

532. Mandible 7. Anterior view. Inferior marginal thickening
-- absent (0)
-- present, thick (1)
-- present, very thick (2)

533. Mandible 8. Anterior view. Cleft indentation at the inferior margin of the symphysis. [Corresponding to the incompletely fused symphysis. (Schwartz and Tattersall, 2000). Also called incisura submentalis, referred to a semilunar space beneath the inferior rim of the symphysis (Mounier et al., 2009).]
-- absent (0)
-- small (1)
-- large (2)

534. Mandible. Anterior view. Central tubercle at the inferior margin.
-- Absent (0)
-- Present (1)

535. Mandible 9. Lateral view. Inferior marginal tubercle. [Usually lies under the large mental foramen. This tubercle is separate from the mental protuberance, and it is not a terminus or corner of the mental protuberance. It is not the mental tubercle. Tuberculus marginalis anterior in Mounier et al., 2009.]
-- absent (0)
-- small (1)
-- large (2)

536. Mandible. Lateral view. Inferior marginal tubercle position. [Also called anterior marginal tubercle (illustrated in Antonio Rosas, 2001).]
-- p3-p4 (0)
-- p4-m1 (1)
-- m1 (2)

537. Mandible 10. Ventral view, posterior view. Fossae digastrica.
-- shallow (0)
-- deep (1)

538. Mandible 11. Ventral view, posterior view. Fossae digastrica medial crest. [Ridge between the fossae.]
-- absent (0)
-- weak (1)
-- strong (2)

539. Mandible 12. Ventral view, posterior view.

Fossae digastrica orientation.
-- Downward (0)
-- Downward-backward (1)
-- Backward (2)

540. Mandible 13. Lateral view. Depth at the symphysis vs. the depth at the posterior margin of m2.
-- symphysis deeper (0)
-- sub equal (1)
-- symphysis shallower (2)

541. Mandible 14. Lateral view. Foramen mentale number.
-- Single (0)
-- multiple (1)

542. Mandible 15. Lateral view. Foramen mentale position.
-- p3-p4 (0)
-- p4-m1 (1)
-- m1 (2)

543. Mandible 16. Lateral view. Superoinferior position of the mental foramen
-- Inferior (0)
-- middle (1)
-- superior (2)

544. Mandible 17. Lateral view. Sulcus intertoralis [The hollowed area posterior to the mental foramen surrounded by the marginal tori. Mounier et al. (2009).]
-- Flat surface (0)
-- Weak, mainly defined by one torus (1)
-- well defined, by two marginal tori (2)

545. Mandible 18. Lateral view. Torus marginalis superis relief.
-- absent or weak (0)
-- swelling, clearly visible (1)

546. Mandible 19. Lateral view. Torus marginalis inferius relief.
-- absent or weak (0)
-- swelling, clearly visible (1)

547. Mandible 20. Lateral view. Prominentia lateralis relief.
-- absent, flat surface (0)
-- weak swelling (1)
-- strong swelling (2)

548. Mandible 21. Lateral view. Prominentia lateralis position relative to the tooth loci. [Lateral prominence.]
-- m1-m2 (0)
-- m2-m3 (1)
-- m3 (2)

549. Mandible 22. Lateral view. Retromolar space shielded by the ramus.
-- completely shielded, shielding part of the last molar (0)
-- completely shielded, to the posterior margin of the last molar (1)
-- no shielding, large space visible (2)

550. Mandible 23. Superior view. Retromolar space.
-- Absent or very small (0)
-- smaller than half of the m1 (1)
-- large, larger than half of the m1 (2)
-- large, larger than m1 (3)

551. Mandible 24. Superior view. Retromolar space orientation.
-- horizontal (0)
-- inclined (1)
-- deeply inclined, near vertical (2)

552. Mandible 25. Superior view. Extramolar sulcus.
-- absent (0)
-- narrow gutter (1)
-- large gutter (2)

553. Mandible 26. Lateral view. Crista ectocondyloidea. [A ridge extending inferiorly from the lateral side of the condyle.]
-- Absent or very weak (0)
-- Present, short (1)
-- Present, long (2)

554. Mandible 27. Lateral view. Fossa subcondylea.
-- absent, flat (0)
-- present, shallow (1)
-- present, deep (2)

555. Mandible 28. Lateral view. Masseter fossa.

[Insertion area of the masseter muscle.]
-- absent, flat (0)
-- present, shallow (1)
-- present, deep (2)

556. Mandible 29. Lateral view. Masseter tuberosity.
-- weak (0)
-- strong (1)

557. Mandible 30. Lateral view. Gonion shape.
-- broad curved (0)
-- acute curved (1)

558. Mandible 31. Lateral view. Mandibular notch (sigmoid notch) depth.
-- very shallow (0)
-- shallow (1)
-- deep (2)

559. Mandible 32. Lateral view. Mandibular notch (sigmoid notch) length.
-- very short (0)
-- short (1)
-- long (2)

560. Mandibular 33. Lateral view. Mandibular notch (sigmoid notch) shape. [In chimps, the lowest point is closer to the coronoid process. In modern humans, it is symmetric. In Neanderthals, it is closer to the condyle process.]
-- Asymmetric, the lowest point is more anteriorly positioned, closer to the coronoid process (0)
-- symmetric, the lowest point is in the middle between coronoid process and the condyle process (1)
-- asymmetric, the lowest point is more posteriorly positioned, closer to the condyle process (2)

561. Mandibular 34. Lateral view. Coronoid process orientation. [In modern humans, it is near vertical. In early modern *Homo sapiens*, it is anteriorly projecting. In chimps and Neanderthals, it is posteriorly projecting.]
-- posteriorly projecting (0)
-- anteriorly projecting (1)
-- vertically projecting (2)

562. Mandible 34. Lateral view. Condyle height relative to the coronoid.
-- lower (0)
-- subequal (1)
-- higher (2)

563. Mandible. Anterior view. Canine pillar. [Absent in *Homo*, strong in *Pongo* and *Sivapithecus*. Moderate in *Gigantopithecus* and *Lufengpithecus*. Low in *Khoratpithecus*.]
-- absent (0)
-- low (1)
-- moderate (2)
-- strong (3)

564. Mandible. Anterior view, lateral view. Canine alveolar size relative to the canine tooth root size. [In *Homo* and *Lufengpithecus*, the canine socket is much smaller than the canine tooth root.]
-- Similar (0)
-- Smaller (1)
-- Canine socket very small (2)

565. Mandible 35. Superior view. Position of the junction between the mandibular notch and the condyle articular surface. [Medial-lateral position of intersection between mandibular notch and condyle. In medially positioned intersection, the condyle is laterally expanded (Antonio Rosas, 2001).]
-- Lateral (0)
-- Medial (1)

566. Mandible 36. Medial view. Internal coronoid pillar.
-- weak (0)
-- strong (1)

567. Mandible 37. Medial view. Internal coronoid pillar orientation.
-- near vertical (0)
-- oblique (1)

568. Mandible 38. Medial view. Pterygoid fovea. [Pit

on the front of the neck of the mandible for the attachment of the lateral pterygoid muscle.]
-- small (0)
-- large (1)

569. Mandible 39. Medial view. Crista endocondyloidea. [A ridge extends inferiorly from the condyle tip.]
-- absent or very weak (0)
-- strong ridge (1)

570. Mandible 40. Medial view. Crista endocondyloidea orientation.
-- inclined (0)
-- strongly inclined (1)

571. Mandible 41. Medial view. Planum triangulare size. [The concave space between the internal coronoid pillar and the crest endocondyloidea.]
-- weakly developed (0)
-- intermediate (1)
-- strongly developed (2)

572. Mandible 42. Medial view. Planum triangulare depth.
-- flat (0)
-- shallow (1)
-- deep (2)

573. Mandible 43. Posterior view. Mandibular foramen shape. [Opening on the inner aspect of the mandibular ramus, leading to the mandibular canal.]
-- oval (0)
-- round (1)

574. Mandible 44. Medial view. Lingula of the mandible [Bony projection medial to the mandibular foramen. Attachment site of the sphenomandibular ligament.]
-- small projection (0)
-- large projection (1)

575. Mandible 45. Medial view. Mylohyoid groove. [The groove extends forward and downward from the mandibular foramen and housing the mylohyoid never and the mylohyoid branch of the inferior alveolar artery.]
-- present (0)
-- absent (1)

576. Mandible 46. Medial view. Mylohyoid groove bony bridge.
-- absent (0)
-- present (1)

577. Mandible 47. Medial view. Pterygoid fossa.
-- shallow (0)
-- deep (1)

578. Mandible 48. Medial view. Pterypoid tuberosity. [Roughened area present on the internal surface near the angle of the mandible. Attachment site of the medial pterygoid muscle.]
-- absent or weak (0)
-- strong (1)

579. Mandible 49. Medial view. Mylohyoid line. [Oblique ridge extending from the posterosuperior to anteroinferior aspect of the body of the mandible. Origin of the mylohypoid muscle. Its posterior end is the origin place of the mylopharyngeal part of the superior pharynx constrictor.]
-- weak (0)
-- strong (1)

580. Mandible 50. Medial view. Mylohyoid line orientation. [Relatively to the alveolus line.]
-- Near parallel (0)
-- Inclined (1)
-- Very inclined (2)

581. Mandible 51. Medial view. Mylohyoid line position at the m3 level.
-- low (0)
-- intermediate (1)
-- high (2)

582. Mandible 52. Superior view, medial view. Symphysis planum alveolare (simian shelf).
-- absent (0)
-- present, small (1)
-- present, large (2)

583. Mandible 53. Medial view. Fossae genioglossus. [Excavated area delineated by the transverse

tori.]
-- flat surface (0)
-- weak, mainly defined by one torus (1)
-- well defined by two tori (2)

584. Mandible 54. Medial view. Fossae genioglossus. Torus transversus superius.
-- weak or absent (0)
-- swelling clearly visible (1)

585. Mandible 55. Medial view. Fossae genioglossus. Torus transversus inferius.
-- weak or absent (0)
-- swelling clearly visible (1)

586. Mandible 56. Medial view. Sublingual fovea. [Depression for the sublingual gland on the anterior part of the mandible above the mylohyoid line.]
-- shallow (0)
-- deep (1)

587. Mandible 57. Medial view. Submandibular fovea. [Depression for the submandibular gland on the posterior half of the mandible body below the mylohyoid line.]
-- shallow (0)
-- deep (1)

588. Mandible 58. Medial view. Medial pterygoid tubercle. [Present in chimps. A tubercle between the condyle and angular process. Weak in modern humans.]
-- Absent or very weak (0)
-- Small (1)
-- Large (2)

589. Mandible. Ventral view. Corpus ventral edge below m2-3 [In modern Homo, the ventral edge of the mandible is thin.]
-- rounded and thick (0)
-- thin, v-shaped in cross section (1)

590. Upper incisor. I1. Labial side dentine wrinkles. [In relation to the labial dentine wrinkles, particularly to the state of strong, the labial enamel surface usually has several vertical grooves (as in the Hexian fossil).]
-- absent (0)
-- present, weak (1)
-- present, strong (2)

591. Upper incisor. I1. Lingual side dentine wrinkles.
-- absent (0)
-- present, weak (1)
-- present, strong (2)

592. Upper incisor. I1. Interruption groove on mesiolingual marginal ridge.
-- absent (0)
-- present, one (1)
-- present, more than one (2)

593. Upper incisor. I1. Interruption groove on distolingual marginal ridge
-- absent (0)
-- present, one (1)
-- present, more than one (2)

594. Upper incisor. I1. Interruption groove on medial aspect of basal cingulum.
-- absent (0)
-- present, limited to the tooth crown (1)
-- present, long and deep, extends to the root (2)

595. Upper incisor. I2. Interruption groove on mesiolingual marginal ridge
-- absent (0)
-- present, one (1)
-- present, more than one (2)

596. Upper incisor. I2. Interruption groove on distolingual marginal ridge.
-- absent (0)
-- present, one (1)
-- present, more than one (2)

597. Upper incisor. I2. Interruption groove on medial aspect of the basal cingulum.
-- absent (0)
-- present, limited to the tooth crown (1)
-- present, long and deep, extends to the root (2)

598. Upper incisor. I2. Shape
-- Classic shovel shape. (0)
-- Triangular shovel shape. (1)

599. Upper canine. Lingual central ridge.

-- absent (0)
-- present, weak (1)
-- present, strong (2)

600. Upper canine. Form.
-- flared, "talonid"-like marginal ridges (0)
-- incisor-like (1)

601. Upper P3. Mesial accessory cuspule. UP3AC [A small cusp on the mesial marginal ridge, between protocone and paracone.]
-- absent (0)
-- present, small (1)
-- present, large (2)

602. Upper P3. Distal accessory cuspule. UP3AC
-- absent (0)
-- present, small (1)
-- present, large (2)

603. Upper P3. Buccal tooth crown dorsal expansion.
-- absent, tooth neck on lingual and buccal sides are similar high (0)
-- buccal side dorsally expanded (1)
-- buccal side dorsally expanded in large amount (2)

604. Upper P3. Buccal vertical ridge on paracone. [A central ridge delimited by mesial and distal depressions.]
-- absent (0)
-- present, weak (1)
-- present, strong (2)

605. Upper P3. Tooth root number.
-- Three. (0)
-- Two. (1)
-- Two, partially fused. (2)
-- One. (3)

606. Upper P4. Mesial accessory cuspule. UP4AC
-- absent (0)
-- present, small (1)
-- present, large (2)

607. Upper P4. Distal accessory cuspule. UP4AC
-- absent (0)
-- present, small (1)
-- present, large (2)

608. Upper P4. Buccal vertical ridge on paracone.
-- absent (0)
-- present, weak (1)
-- present, strong (2)

609. Upper P4. Tooth root number.
-- Three. (0)
-- Two. (1)
-- Two, partially fused. (2)
-- One. (3)

610. Upper M1. Crista obliqua. [A crest between the tip of the protocone and the tip of the metacone. Wood, B. A. & Engleman, C. A. Analysis of the dental morphology of Plio-Pleistocene hominids. V. Maxillary postcanine tooth morphology. J. Anat. 161, 1-35 (1988).]
-- Complete, high (0)
-- Complete, low (1)
-- Incomplete (2)
-- Absent (3)

611. Upper M2. Crista obliqua. [A crest between the tip of the protocone and the tip of the metacone. Wood, B. A. & Engleman, C. A. Analysis of the dental morphology of Plio-Pleistocene hominids. V. Maxillary postcanine tooth morphology. J. Anat. 161, 1-35 (1988).]
-- Complete, high (0)
-- Complete, low (1)
-- Incomplete (2)
-- Absent (3)

612. Upper M3. Crista obliqua. [A crest between the tip of the protocone and the tip of the metacone. Wood, B. A. & Engleman, C. A. Analysis of the dental morphology of Plio-Pleistocene hominids. V. Maxillary postcanine tooth morphology. J. Anat. 161, 1-35 (1988).]
-- Complete, high (0)
-- Complete, low (1)
-- Incomplete (2)
-- Absent (3)

613. Upper M3. Reduction
-- M3 as large as M2, or slightly smaller, or

slightly larger (0)
-- M3 present, larger than half of M2. (1)
-- M3 present, but much smaller than M2, or absent in one side. (2)
-- M3 absent. (3)

614. Lower p3. Occlusal view. Crown shape.
-- Asymmetrical (0)
-- Symmetrical (1)

615. Lower p3. Occlusal view. Distolingual talonid.
-- Large (0)
-- Small (1)
-- Absent (2)

616. Lower p3. Occlusal view. Transverse crest between protoconid and metaconid.
-- Absent (0)
-- Present, incomplete (1)
-- Present, complete (2)

617. Lower p3. Root number.
-- Two (0)
-- Two, partially fused (1)
-- One (2)

618. Lower p3. Grooves on the mesial and distal sides of the root.
-- Absent (0)
-- Shallow (1)
-- Deep (2)

619. Lower p4. Occlusal view. Crown shape.
-- Asymmetrical (0)
-- Symmetrical (1)

620. Lower p4. Occlusal view. Distalingual talonid.
-- Large (0)
-- Small (1)
-- Absent (2)

621. Lower p4. Occlusal view. Transverse crest between Protoconid and metaconid.
-- Absent (0)
-- Present, incomplete (1)
-- Present, complete (2)

622. Lower p4. Root number.
-- Two (0)
-- Two, partially fused (1)
-- One (2)

623. Lower p4. Grooves on the mesial and distal sides of the root.
-- Absent (0)
-- Shallow (1)
-- Deep (2)

624. Lower m1. Groove pattern. LM1GP [Referring the relationship between the four main tooth cusps as indicated by the grooves that separate them.]
-- Y groove. The metaconid and hypoconid meet at a groove, and the protoconid and entoconid do not meet. (0)
-- + groove. Protoconid, metaconid, hypoconid and entoconid touch at the center of the tooth so that the primary grooves form a plus sign. (1)
-- X groove. The protoconid and the entoconid meet at a groove, and the metaconid and hypoconid do not meet. (2)

625. Lower m1. Trigonid crest. LM1TC [There is a ridge that interrupts the groove separating the protoconid and metaconid.]
-- absent. (0)
-- present. (1)

626. Lower m1. Hypoconulid.
-- absent. (0)
-- present one. (1)
-- present two. (2)
-- present three or more. (3)

627. Lower m2. Groove pattern. LM2GP
-- Y groove. The metaconid and hypoconid meet at a groove, and the protoconid and entoconid do not meet. (0)
-- + groove. Protoconid, metaconid, hypoconid and entoconid touch at the center of the tooth so that the primary grooves form a plus sign. (1)
-- X groove. The protoconid and the entoconid meet at a groove, and the metaconid and hypoconid do not meet. (2)

628. Lower m2. Trigonid crest. LM2TC
-- absent. (0)

-- present. (1)

629. Lower m2. Hypoconulid.
-- absent. (0)
-- present one. (1)
-- present two. (2)
-- present three or more. (3)

630. Lower m3. Reduction
-- m3 present, in normal size. (0)
-- m3 present, but much smaller than m2, or absent in one side. (1)
-- m3 absent. (2)

631. Lower m3. Groove pattern. LM3GP
-- Y groove. The metaconid and hypoconid meet at a groove, and the protoconid and entoconid do not meet. (0)
-- + groove. Protoconid, metaconid, hypoconid and entoconid touch at the center of the tooth so that the primary grooves form a plus sign. (1)
-- X groove. The protoconid and the entoconid meet at a groove, and the metaconid and hypoconid do not meet. (2)

632. Lower m3. Trigonid crest. LM3TC
-- absent. (0)
-- present. (1)

633. Lower m3. Hypoconulid.
-- absent. (0)
-- present one. (1)
-- present two. (2)
-- present three or more. (3)

Appendix 3. Data matrix in TNT format for phylogenetic analysis

nstates num 32;
xread
634 55

&[cont]
Habilis_OH7_OH24_ER1805 0.0478 0.1400 0.1748 0.1963 0.1195 0.8091 1.0000 0.4404 0.4447 0.3726 0.2813 0.0000 0.0000 0.2774 0.2826 0.4601 0.5498 0.3870 0.4207 0.4550 0.3444 ? 0.9071 0.5119 0.4016 0.3626 0.6787 0.4792 0.4864 0.2371 0.5212 0.6100 0.6383 0.3125 0.5759 0.2198 0.3589 0.4846 0.6035 0.7360 0.7812 0.5978 0.5072 0.3902 0.1093 0.2747 0.8628 0.7485 0.7657 0.4398 0.0812 0.7842 0.4370 0.5133 0.8273 0.3057 0.9067 0.2433 0.0945 0.1160 0.6154 0.2571 0.5402 0.2615 0.3201 0.4480 0.1412 0.4964 0.4827 0.5944 0.8384 0.5906 0.7700 0.1422 0.7888 0.1076 0.3860 0.7310 0.7208 0.3973 0.8960 0.7121 0.4928 ? 0.2858 0.5463 0.5976 0.1967 0.1905 0.5306 0.5499 0.2358 0.2429 0.2364 0.4174 0.2777 0.4145 0.3243 0.3596 0.6168 0.2898 0.1463 0.2571 0.2887 0.1474 0.4508 0.5525 0.4539 0.6166 0.5184 0.7373 0.6231 0.5092 0.6396 0.6801 0.7027 0.3408 0.4910 0.6227 0.7166 0.8645 0.5771 0.4659 0.8272 0.6402 0.0662 0.8768 0.3301 0.5628 0.4881 0.3483 0.3099 0.8084 0.6658 ? 0.5142 0.2040 0.4543 0.6999 0.9068 ? ? ? ? ? ? ? ? ? ? ? 0.2032 ? ? 0.7281 ? 1.0000 0.8415 ? ? 0.5666 0.4248 0.9073 ? ? 0.2078 0.8687 ? 1.0000 0.6152 0.8416 0.6512 0.5902 0.7369 0.3755 0.6524 0.2718 0.0314 0.2027 0.2891 0.9894 0.5905 0.9358 0.8295 0.8520 1.0000 0.6537 0.9491 0.5472 1.0000 0.4930 0.6265 0.5582 0.0931 0.0000 0.4000 0.0000 0.5000 0.5058 0.0501 0.0343 0.1907 0.5000 0.0000 0.0000 0.0000 0.0000 0.6605 0.9359 0.0437 0.0000 0.2000 0.4000 ? 0.8072 0.6646 0.5234 0.4074 0.4000 0.6000 0.7992 0.7414 0.5224 0.3816 0.2500 0.7500 0.9261 0.7070 0.1192 0.8333 0.7857 0.5000 0.0000 0.6667 0.5000 0.8336 0.7244 0.4734 0.4286 0.7000 0.6667 1.0000 0.0000 1.0000 0.5000 0.6349 0.6418 0.1077 0.4656 0.6500 0.7500 0.8333 0.4000 0.0000 0.5000 1.0000 0.4816 0.0000 0.1216 1.0000 1.0000 1.0000 0.2832 0.9390 0.3081 0.8000 1.0000 1.0000 0.5075 0.4675 0.6000 1.0000 1.0000 0.4229 0.6169 0.0000 1.0000 1.0000 0.1233 0.9899 0.3333 0.8109 0.7076 0.2854 0.5000 1.0000 0.2500 0.8333 0.6000 0.7073 0.7612 0.3916 0.6357 1.0000 0.6667 0.4444 0.6000 0.3333 0.8964

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Narmada 0.5856 0.6056 0.5532 0.6497 ? 0.5269 0.3215 ? ? 0.2819 0.1473 0.4145 0.4601 ? ? 0.7780 0.8722 0.7835 0.8508 0.4209 0.8277 0.6667 0.6407 0.7537 0.5928 0.5241 0.9239 0.4667 ? 0.6898 0.1840 0.2948 0.3843 0.6344 0.8684 0.9323 0.9150 0.6005 0.2220 0.6005 0.5290 0.3073 0.4846 0.4146 0.4744 1.0000 0.7760 0.8965 1.0000 1.0000 0.8216 0.5754 0.3943 0.5374 0.6348 0.2240 0.3878 ? 0.8701 0.8000 0.6154 0.4615 0.3065 0.4901 0.3460 0.8654 0.7859 0.4347 0.3277 0.1124 0.3223 0.4745 0.2654 0.2898 0.6481 0.3222 0.1703 0.6229 0.2719 0.2015 ? 0.3838 0.5986 ? ? 0.4816 0.5285 0.3145 0.3386 0.5023 0.5141 0.5307 0.7708 0.2003 ? 0.2917 ? ? 0.6096 ? ? ? ? ? ? ? ? ? 0.7280 0.7595 0.7814 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6825 ? ? ? ? ? ? ? ? ? ? 0.7562 0.3710 ? 0.6496 0.8516 0.7950 0.5848 0.8255 0.1984 0.3801 ? 0.2264 0.4210 0.3877 0.4760 0.4250 0.5530 0.0685 0.1291 0.0676 0.1054 0.4924 0.5161 0.7839 0.2878 0.0851 0.0256 ? 0.5023 0.5024 0.0386 0.6038 0.1969 ? ? ? ? ? ? 0.4101 ? ? ? ? ? ? ? ? ? ? ? ? 0.6689 0.5026 ?

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0.6589 0.7028 0.4628 0.7607 0.7364 0.7168 0.5891 0.3890 0.3723 0.5913 0.7710 0.2565 0.8307 0.7600 0.4011
0.4615 0.2477 0.6330 0.2466 0.7362 0.5906 0.4278 0.3447 0.1928 0.3238 0.7084 0.3497 0.3777 0.7243 0.2500
0.3143 0.4995 0.1169 0.5493 0.7698 0.4743 0.8897 ? ? 0.3712 ? ? ? ? 0.5405 ? ? ? ? ? ? ? 0.2575 ? ? ? ? ? ? ? 0.5566
0.4084 0.7992 0.6548 ? 0.6102 0.6423 ? 0.1708 ? ? ? ? ? ? ? ? ? ? ? ? 0.6458 0.4611 0.2370 0.5974 ? ? ? ? ? ? 0.2740
0.6428 ?
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? 0.5067 0.7504 0.6908
0.7055 0.4663 0.2803 0.3158 1.0000 0.2164 0.3164 0.3104 0.2376 0.4234 0.1087 0.1397 0.2100 0.1732 0.2574
0.3669 0.5391 0.7835 0.3850 0.2370 0.0000 ? 0.4492 0.3735 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.1124 ? ? ? ? ? ? ? ? 0.2038
0.0000 ?
Ndutu 0.4373 0.2701 0.2981 0.3577 0.5946 0.1915 0.2389 ? ? 0.5336 0.6116 0.5151 0.4551 0.3528 0.3484
0.3888 0.4843 0.4330 0.3905 0.3669 0.6371 ? 0.4811 0.7447 0.3623 0.3446 0.4568 0.3881 0.5156 0.4798 0.1697
0.2142 0.4627 0.6945 0.3997 0.2551 0.4198 0.2265 0.6339 0.2397 ? ? ? ? ? 0.5368 0.5213 0.3435 0.3470 0.4317
0.9148 0.6937 0.6073 0.7051 0.4012 0.5817 0.1722 0.3929 0.5079 0.5360 ? 0.5033 0.1889 0.5187 0.3711 0.5241
0.2988 0.2412 0.3801 0.3815 0.0944 0.2339 0.0000 0.3777 0.2169 0.6044 ? 0.0000 ? 0.5985 0.7568 0.4501 0.7740
0.4813 0.0563 0.3436 0.3500 0.0408 0.0476 0.3158 ? 0.3673 0.3463 ? ? ? ? ? 0.4136 0.5352 ? 0.7706 ? ? ? ? 0.3260
0.3696 ? ? 0.5773 0.2551 0.4679 0.6822 0.0000 0.0603 ? 0.4010 0.0000 0.0000 0.0000 0.1804 0.6856 0.9615 ? ?
0.9834 0.3986 0.6779 0.5155 0.2556 ? ? ? ? ? ? 0.4551 0.8360
0.0000 ?
? ?
? 0.4801 0.7061 0.8758 0.4139
0.6011 0.3487 0.3920 0.6617 0.3178 0.4339 0.4713 0.6339 0.3951 0.4743 0.2051 0.4471 0.3523 0.4328 ? 0.5935
0.4929 0.3077 ? ? 0.0636 0.5799 0.4984 ? 0.3170 ? 0.6358 0.6673 ? ? ? 0.2765 ? 0.1506 0.3803 0.0139 0.0000
0.2971 0.3418 0.5483 1.0000 ? ? ? ? 0.5222 0.4480 0.0000 0.0000 ?
Irhoud_1_2 0.6918 0.1896 0.1886 0.3562 0.1802 0.3038 0.4248 ? ? 0.3974 0.4933 0.1663 0.3080 0.4798 0.5047
0.3004 0.3454 0.3445 0.3995 0.6691 0.8450 0.7333 0.8388 0.9465 0.3559 0.3828 0.4171 0.5170 0.1972 0.4644
0.2438 0.2329 0.4531 0.3082 0.3704 0.5756 0.5042 0.3566 0.3695 0.3084 0.3658 0.1746 0.5618 0.6128 0.6256
0.8434 0.6665 0.4773 0.5590 0.7466 0.8535 0.0596 0.1126 0.4452 0.3733 0.0860 0.1368 0.5684 0.6988 0.7060
0.3970 0.5407 0.5263 0.5407 0.3965 0.2975 0.2788 0.0788 0.2104 0.2329 ? ? ? ? ? ? 0.8143 0.3955 0.4898 0.3248
0.1703 0.1491 0.6031 0.8702 ? 0.4627 0.5127 0.5667 0.6376 0.4601 0.4223 0.5089 0.5474 0.4283 ? 0.3391 0.2662
0.1554 0.6395 0.5500 0.3260 0.5927 0.5142 ? ? 0.1487 0.5355 0.5966 0.2592 0.4001 0.4051 0.5037 0.5917 0.5498
0.3876 0.3271 0.3801 0.5740 0.4718 0.4304 0.5498 0.3815 0.3737 0.8551 0.2947 0.1596 0.4514 0.6424 0.7902
0.4218 0.3364 ? 0.5896 0.2516 ? 0.3072 0.2691 0.5072 ? 0.3848 1.0000 0.1287 ? 0.8152 0.6349 ? ? 0.6380 ? ?
0.2453 0.0858 0.6744 0.8507 0.6834 ? 0.5918 0.5494 0.7326 0.8257 0.8226 0.6745 0.0000 ? 0.6838 0.8480 0.9693
0.3050 0.7974 0.5729 0.6508 0.6215 0.5995 0.6335 0.5558 0.7029 0.8734 0.7526 0.5967 0.7295 0.2968 0.1441
0.1650 0.3129 0.4800 0.5843 0.8721 0.5418 0.7029 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6487 0.2707 ? ? ? ? ? ?
0.4667 0.4986 ? ? ? ? 0.3989 0.3910 ? ? ? ? 0.2705 0.6667 0.5714 0.9000 0.0000 0.0000 0.0000 ? ? 0.4512 0.2745
0.5000 0.7500 0.9000 0.0833 0.0000 0.0000 ? ? 0.6543 0.3018 ? ? ? ? ? ? 0.2371 0.2104 0.5579 0.1892 1.0000
0.5718 0.1844 0.0394 0.7679 0.2965 0.6000 0.5778 0.2412 0.4101 0.4318 0.9000 0.3488 0.3583 0.4381 0.4527
0.1111 0.4257 0.3469 0.1514 0.6717 0.3333 0.3973 0.3429 0.4592 0.0000 0.0000 0.1667 0.6667 0.4000 0.3437

0.3260 0.2360 0.3886 0.0000 0.0000 0.3333 0.0000 0.6667 0.4027 0.2673 0.4204 0.5052 0.0000 0.0000 0.1429
0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4413 0.7665 0.8922 0.1915 0.6305 0.5657 0.3165 0.2740 0.4452 0.5671
0.6268 0.6204 0.4922 0.3465 0.0601 0.4091 0.0000 0.0153 0.1930 0.5262 0.3044 0.0869 0.7852 0.6258 ? 0.7950
0.3532 0.1152 0.3992 0.2596 0.6167 0.5343 ? 0.1937 0.0612 0.3796 0.3567 0.4926 0.4428 0.4133 0.4760 0.2567
0.1795 0.4494 0.4170 0.8497 ? 0.7569 0.4908 0.6284 0.6252 0.4037 0.4141 0.1285 0.1886 ? ? 0.0000 0.2069
0.9765 0.9327 0.9148 0.6242 0.0000 0.0974 1.0000 ? 0.4641 0.4504 0.5044 0.2600 0.5050 0.1813 0.6066 0.2755
0.7310 1.0000 0.3182 0.4854 ?
Florisbad 0.5793 ? ? ? ? 0.5188 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 1.0000 1.0000 0.8269 0.9015 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ?
0.4960 0.4684 0.2542 0.4465 0.4085 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6044 ?
0.6591 0.6363 0.7804 0.8307 0.6425 0.5933 0.2908 0.4275 0.4436 ? 0.4937 ? ? ? ? ? ? ? ? ? ? 0.4397 0.3880 0.7667
0.7139 0.4923 0.1256 0.5463 0.7388 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.2299 0.5076 0.5208 0.3378 0.4464 ? 0.5446 0.3426 ? ?
0.3509 ? ?
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? 0.9464 0.8503
0.3966 ? ? ? ? ? ? ? ? ? ? 0.2831 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5199 0.2806 0.5809 0.3060 ? ? ? ? ? 0.2113 0.2137
0.0000 ?
Omo_II 0.7459 0.5406 0.5328 0.3451 ? 0.5158 0.3569 ? ? 0.5062 0.7143 ? 0.5014 ? ? 0.2299 0.4297 0.3102
0.1879 0.5144 0.7560 ? 0.6666 0.7883 0.2119 0.2062 0.4086 0.4632 0.5573 ? 0.4129 0.3560 0.4528 0.5628 0.3251
0.5956 0.7013 0.2600 ? 0.4446 0.5043 0.3296 0.3720 0.3415 0.5233 0.7783 0.8294 0.6852 0.3549 0.9072 0.6591
1.0000 0.7440 0.6801 0.2526 0.8694 0.5345 ? 0.8465 0.8400 0.6703 0.4769 0.4365 0.4769 0.4700 0.2184 0.1741
0.5947 0.8979 0.7631 0.2169 0.4432 0.2246 0.2857 0.1144 0.3557 0.4560 0.3308 0.2605 0.3987 ? 0.5741 0.7685
0.2132 ? 0.0073 0.0801 0.2501 0.3915 0.0674 ? 0.1710 0.2236 0.3666 ? ? ? ?
0.9618 ? 0.6493 ? ? ? ? ? ? ? ? ? ? ? 0.3345
0.4687 ?
? ?
? 0.0621 0.7509 0.8181
0.5477 0.6523 0.5575 0.3609 ? ? ? 0.7350 0.4798 0.6525 0.1472 0.1296 0.3057 0.2946 0.3724 0.4476 0.4782
0.1926 0.5527 0.4734 0.3225 ? 0.0000 0.0773 0.4228 0.4787 ? 0.2496
0.4250 ?
LH_18 0.5454 0.5755 0.6698 0.5563 0.7487 0.5290 0.3451 0.3837 0.3394 0.3815 0.0313 ? ? ? ? 0.2040 0.3238
0.2558 0.2815 0.6187 0.7379 ? 0.5710 0.6021 0.2330 0.2230 0.3827 0.2161 ? ? 0.0361 0.1476 0.3079 0.2273
0.3185 0.7813 0.7058 0.2454 ? 0.6103 0.5142 0.2765 0.3663 0.2866 0.4163 0.9072 0.6004 0.5207 0.4297 0.7461
0.7550 ? 0.4874 0.3783 ? ? ? ? 0.6378 0.6680 0.7280 ? 0.4118 ? 0.3602 0.1338 0.2376 0.3123 0.3463 0.1486 0.2971
0.5025 0.3271 0.3269 0.4778 0.3466 0.7317 0.3334 0.3319 0.3522 0.8900 ? 0.4304 ? ? 0.4149 ? ? ? 0.4025 ?
0.4631 ? 0.4811 ? ? 0.3310 0.3497 0.5797 0.3086 ? 0.8528 0.4621 0.2677 0.4516 0.2711 0.3977 0.3731 ? ? 0.8421
0.3051 0.4299 0.4507 0.2503 0.2549 0.3155 0.4297 0.2945 0.3478 0.3965 0.1347 0.4735 0.8385 0.3801
0.1116 ? ? ? ? ? ? ? 0.2105 ? 0.3582 ? 0.3059 0.5033
0.0477 ?
? ? ? ? ? ? ? ? ? ? ? 0.1760 0.0392 0.3027 0.1311 ? ? ? ? ? ? ? ? 0.4006 0.2230 0.6615 0.6667 0.8571 0.0000 0.0000
0.0000 0.0000 0.2529 ? ? ? ? ? ? ? 0.0000 0.0000 0.2069 0.2780 0.4014 0.4244 ? ? ? ? 0.0000

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? ? 0.0056 0.7818 0.6667 0.6603 0.6709 0.2639 0.1463 ? ? ? 0.2630 0.5587 0.6739 0.5744 0.1122 0.3261 ? 0.1830
0.5068 ? 0.1960 0.2528 0.6690 0.3927 ? 0.4466 0.4950 0.1537 ? ? 0.2264 0.3573 0.4262 0.4138 0.3155 0.3002 ?
0.3819 0.3884 0.3135 0.1739 0.2204 0.4696 0.5763 0.4379 ? ? ? 0.5265 0.2030 0.4062 0.0473
0.0590 ?
Skhul_V_IX 0.6964 0.1481 0.0172 0.2764 0.1405 0.3572 0.5103 0.3265 0.4700 0.5655 0.7143 0.0197 0.1804
0.6084 0.4408 0.3206 0.2745 0.2499 0.4423 0.9209 0.5992 0.4354 0.7432 0.7907 0.2128 0.2397 0.4273 0.2349
0.4150 0.5324 0.4205 0.3312 0.4140 0.6040 0.1834 0.6978 0.8748 0.2915 0.1699 0.3166 0.3780 0.1899 0.7605
0.8354 0.7186 0.7041 0.5793 0.4692 0.4919 0.5672 0.7390 0.8099 0.5221 0.3991 0.5585 0.3779 0.7550 0.6405
0.9094 0.8140 0.2212 0.6659 0.2709 0.6659 0.0814 0.7490 1.0000 0.4258 0.4637 0.5502 0.2649 0.5091 0.2291
0.2541 0.5947 0.2835 0.2890 0.3720 0.2778 0.2611 0.6167 0.3330 0.4430 ? 0.2054 0.2112 0.2656 0.2409 0.3201
0.2133 0.2367 0.2504 0.2828 0.1420 0.2498 0.3624 0.3336 0.3716 0.6645 0.4455 ? 0.5373 ? ? ? 0.2695 0.2776
0.2541 0.3784 0.4630 0.5890 ? 0.3499 0.6002 0.2390 0.3177 0.4055 0.6794 0.2402 0.2971 0.3524 0.1836 0.5467
0.8651 ? ? 0.8152 0.0000 0.6088 1.0000 0.0000 0.0000 0.5741 ? 0.0109 0.3656 0.1996 0.2915 0.4315 0.5176
0.2627 0.1336 0.7159 0.9762 0.8009 0.2595 0.7832 0.6196 0.3651 0.4451 0.3358 0.5801 0.3653 0.4126 0.3920
0.6013 0.5752 0.8594 0.7430 0.8346 0.9030 0.9074 0.6840 0.8638 0.5152 0.4662 0.0000 0.8306 0.6803 0.4783
0.5148 0.5363 0.4513 0.6917 0.2779 0.8929 0.9102 0.9765 0.7573 0.8068 0.1563 0.0344 0.0455 0.0036 0.0731
0.5509 0.3781 0.0000 0.6614 0.0559 0.3499 0.3900 0.0000 0.3015 0.2857 0.0000 0.0000 0.0000 0.2486 0.0868
0.2522 0.3919 0.7500 0.1250 0.0000 0.0000 0.3464 0.0000 0.3897 0.1878 0.0000 0.2000 0.4000 0.0000 0.3599
0.0400 0.0000 0.3248 0.0000 0.0000 0.2183 0.0756 0.2683 0.1543 0.0000 0.0000 0.0000 0.1109 0.2000 0.4444
0.2857 0.0000 0.0000 0.0000 0.0000 0.3001 0.0412 0.2129 0.1958 0.3000 0.4167 0.0000 0.0000 0.0000 0.0000
0.1023 0.1966 0.5602 0.2368 0.3000 0.5000 0.0000 0.0000 0.1250 0.5000 0.4342 0.0801 0.1889 0.3423 0.0000
0.4451 0.0000 0.0000 0.2649 0.1744 0.0000 0.0000 0.0000 0.0000 0.4221 0.0000 0.2873 0.2813 0.4159 0.3930
0.2222 0.3134 0.1707 0.0989 0.2828 0.3333 0.3146 0.3128 0.5708 0.0000 0.0000 0.1667 0.0000 0.4000 0.2533
0.3348 0.4301 0.4200 0.1250 0.0000 0.2222 0.0000 0.6667 0.4726 0.3361 0.4041 0.0000 0.0000 0.0000 0.1429
0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? 0.5068 0.5305 0.7801 0.3265 0.7535 0.2423 0.1208 0.4951 0.4342 0.5482
0.7900 0.4691 0.7200 0.2215 0.1319 0.3808 0.2529 0.2897 0.2200 0.7358 1.0000 0.2962 0.3165 0.2848 0.3444
0.5059 0.2099 0.1840 0.4035 0.4582 0.5847 0.5307 ? 0.3630 0.3403 0.2875 0.4694 ? 0.2824 0.3363 0.3772 0.3710
0.4940 0.6283 0.5574 ? 0.0000 0.6897 0.5357 0.3880 0.3115 0.5669 0.5901 0.0000 1.0000 0.4625 0.6187 0.4618
0.7427 0.7326 0.3748 0.7548 0.5361 0.6211 0.6127 0.9761 ? 0.5316 0.4420 0.6027 0.2104 0.7276 0.4253 0.6507
0.2389 0.0679 0.3254 1.0000 1.0000 0.0000
Qafzeh_IX 0.7506 0.0829 0.1316 0.1545 0.0000 0.3697 0.5811 0.0679 0.1816 0.1022 0.1830 ? 0.2470 ? ?
0.0915 0.0523 0.0000 0.1262 0.7698 0.6653 0.7250 0.2433 0.6778 0.0378 0.0463 0.2345 0.1932 0.0202 ? 0.3358
0.1706 0.3356 0.6110 0.0295 0.6563 0.7216 0.0863 ? 0.3781 0.4134 0.2207 0.5383 0.5549 0.8093 0.9477 0.4698
0.6206 0.5146 0.5583 1.0000 0.6559 0.1928 0.0000 0.5795 0.0860 1.0000 0.7317 0.8386 0.9040 0.4973 1.0000
0.1115 1.0000 0.1973 0.4977 0.4071 0.0780 0.0001 0.0562 ? 0.5470 ? 0.2390 ? 0.2036 0.1006 0.3482 0.1178 0.1156
0.8938 0.0000 0.0000 ? ? 0.0702 0.2785 0.5651 0.7354 0.0665 0.1653 0.0000 0.0000 0.1889 0.0000 0.2079 0.2761
0.7331 0.5963 0.2497 0.1279 0.6023 0.3223 0.1573 0.5337 0.1839 ? ? 0.2352 0.3909 0.3656 0.3533 ? 0.4967
0.2285 0.1485 0.1636 0.5801 0.1727 0.3039 0.3326 0.1045 0.6515 0.8551 0.2642 0.1925 0.2891 0.5163 0.2924
0.1901 0.7060 0.1636 0.5380 0.2245 0.3214 0.1998 0.2220 0.2458 0.3641 0.3091 0.3816 0.0378 0.3081 0.6939
0.4703 0.4434 0.6067 0.6699 0.2248 0.1436 0.5774 0.6591 0.2384 0.1897 0.4071 0.4006 0.7683 0.6457 0.6590

0.6142 0.6216 0.5091 0.8597 0.6068 0.0100 0.5338 0.9773 0.4567 0.5947 0.6402 0.6018 0.5161 0.5630 0.0000
0.4519 0.6815 0.6826 0.7129 0.7771 0.8125 0.3125 0.3714 0.3204 0.3268 0.3355 0.5624 0.4008 0.6720 0.4823
0.2136 0.4824 0.0000 0.4579 0.4176 0.4286 0.3000 0.0000 0.5000 0.5905 0.6102 0.4132 0.5946 0.0000 0.3750
0.0000 0.3750 0.5307 0.2076 0.3385 0.5983 0.1000 0.4000 0.4000 0.7500 0.3830 0.1429 0.1784 0.3476 0.0000
0.0000 0.1641 0.1084 0.4490 0.0000 0.1250 0.1250 0.5349 0.1874 0.1949 0.3333 0.8571 0.3000 1.0000 0.0000
0.0000 0.3144 0.0837 0.2705 0.1156 0.5000 0.5833 0.1000 0.4167 0.0000 0.0000 0.2454 0.2068 0.0703 0.3090
0.3000 1.0000 0.2500 1.0000 0.3750 0.0000 0.3955 0.4792 0.5882 0.2523 1.0000 0.7416 0.3816 0.0394 0.7366
0.3401 0.4000 0.6129 0.4830 0.6231 0.4026 0.8000 0.2886 0.4096 0.6121 0.0000 0.3333 0.3484 0.3699 0.2861
0.1061 0.6667 0.4862 0.5689 0.7039 0.5000 0.3333 0.4167 0.5000 0.4000 0.2671 0.4557 0.6713 0.0200 1.0000
0.3333 0.6667 0.6000 0.6667 0.6619 0.5883 0.4694 0.6517 0.7500 0.5000 0.8571 0.5000 1.0000 0.1593 0.5860
0.8314 ? ? ? ? ? ? ? ? ? ? 0.2669 0.8898 0.9475 0.8786 0.7325 0.3149 0.3160 ? ? ? 0.9280 0.5597 0.7692 0.3619
0.0333 0.1790 0.1110 0.0249 0.5362 1.0000 0.6306 0.0000 0.2039 0.1534 ? 0.3754 0.4244 0.9823 0.3774 0.6425
0.3868 0.5565 0.2747 0.2544 0.4287 ? 0.3281 0.3900 0.5378 0.6778 0.4129 0.3167 0.7646 0.7712 0.5885 0.6469
0.2180 0.6806 0.3240 0.3791 0.4312 0.3460 0.3963 0.2288 0.4951 0.7403 0.6270 0.2730 0.5092 0.8012 0.3977
0.6628 0.3401 0.6944 0.3780 0.4868 ? 0.2469 0.3032 0.0000 0.1317 0.6613 0.5413 0.9627 0.6933 0.7283 0.6282
0.2240 0.1549 0.2646
Mladec_I_II_V_VI 0.7716 0.2121 0.1833 0.1968 0.3369 0.2820 0.5280 0.2993 0.4388 0.3506 0.5179 0.1139
0.1835 0.3613 0.2781 0.1581 0.2355 0.1553 0.2182 0.5558 0.6423 0.8375 0.5578 0.7266 0.1390 0.1530 0.2776
0.1554 0.2235 0.6347 0.4250 0.3353 0.3555 0.2023 0.2347 0.6641 0.6703 0.2085 0.4295 0.3187 0.3406 0.2214
0.8010 0.8232 0.9062 0.6980 0.4652 0.4997 0.1859 0.6443 0.7319 0.9008 0.6468 0.4968 0.3393 0.7155 0.6726
0.3713 0.9081 0.9053 0.2479 0.5956 0.2067 0.7011 0.3455 0.2684 0.2439 0.3654 0.4967 0.5361 0.2075 0.5832
0.1702 0.3411 0.7006 0.3140 0.3397 0.3282 0.3001 0.3220 0.5285 0.4308 0.6486 ? 0.0717 0.1284 0.2128 0.3218
0.4427 0.1163 0.0378 0.1302 0.1347 0.3642 0.0179 0.0000 0.1434 0.5338 0.6179 0.1474 0.0610 0.6845 0.6706
0.0940 0.9677 0.0000 0.2656 0.1781 0.0703 0.1787 0.1180 0.0358 0.1740 0.4087 0.1312 0.2410 0.1339 0.4962
0.0737 0.2206 0.1986 0.0144 0.7159 0.8598 0.4776 0.1043 0.6102 0.1783 0.4067 0.4987 0.3033 0.2529 0.0000
0.0795 0.2028 0.3880 0.0000 0.3538 0.4550
0.2429 ?
? 0.3831 0.0457 0.3667 0.5556 0.1429 0.2000 0.0000 0.0000 0.0000 0.1591
0.0205 0.4634 0.2071 0.7000 0.0000 0.0000 0.0000 0.0000
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0.5265 0.5712 0.3829 ? ? ? ? ? ? ? ? ? ? 0.3477 0.6722 0.8122 0.4858 0.6051 0.2605 0.0621 0.4839 0.6431 0.6569
0.7525 0.4390 0.6882 0.4135 0.1453 0.2731 0.3018 0.3132 0.2787 0.5864 0.3074 0.3254 0.3958 0.3679 0.1503
0.3616 0.2521 0.6345 0.4678 0.3801 0.2276 0.4759 0.2252 0.0782 0.1279 0.3379 0.2590 0.1279 0.2622 0.5749
0.2405 0.3042 0.8780 0.7795 0.6688 0.2109 0.4361 0.0000 0.7013 0.3636 0.5386 0.2673
0.3331 ?
Cro_Magnon_I_II_III 0.9057 0.1719 0.1422 0.1486 0.1424 0.6021 0.7148 0.3530 0.4544 0.4857 0.5580 0.0860
0.2375 0.5912 0.4434 0.2465 0.2127 0.1033 0.3401 0.7386 0.6169 0.7646 0.6164 0.6275 0.0605 0.0749 0.2366
0.2965 0.2875 0.6371 0.6171 0.4184 0.3939 0.4559 0.1636 0.8775 0.9365 0.1163 0.3657 0.6155 0.4538 0.1732
0.9661 0.9187 0.9640 0.7559 0.7871 0.3663 0.2383 0.6792 0.8038 0.8054 0.5006 0.4226 0.5362 0.3418 0.4059
0.6319 0.8642 0.8900 0.1813 0.6066 0.2890 0.7648 0.5124 0.3235 0.2859 0.4982 0.4336 0.4739 0.0781 0.6269
0.1727 0.3558 0.7609 0.2784 0.7017 0.3241 0.1632 0.2924 0.8516 0.3485 0.5461 ? 0.0376 0.1154 0.1637 0.3461

0.4638 0.1106 0.2064 0.1274 0.2014 0.1772 0.0781 0.2340 0.0485 0.2821 0.7907 0.1466 0.0727 0.6816 0.4917 0.0946 0.7031 0.2303 0.3390 0.1526 0.3378 0.3873 0.0000 0.0000 0.1347 0.4155 0.1062 0.0896 0.2904 0.4620 0.3407 0.2773 0.2375 0.0898 0.3270 0.8033 0.3445 0.0803 0.5095 0.2991 0.3412 0.2339 0.6834 0.6260 0.4600 0.5656 0.5141 0.1450 0.2141 0.1234 0.7091 0.0903 0.4206 0.3394 ? ? 0.2495 ? ? ? ? ? 1.0000 1.0000 0.3446 0.0000 0.0000 ? 0.4658 0.6827 0.0000 0.6809 0.7240 0.9199 0.6380 ? 0.3184 0.8750 0.8356 ? 0.0483 0.0000 0.0000 0.0000 0.0000 0.7148 0.3692 0.0000 0.3520 0.3491 0.6161 0.9504 0.1204 0.1172 0.1330 0.2167 0.2740 0.0000 0.0000 0.4680 0.4272 0.7384 ? 0.4205 0.3333 0.5714 ? 0.0000 0.0000 0.0000 ? ? 0.9180 0.1011 0.5000 0.5833 0.0000 0.0000 0.0000
0.0000 ? 0.3413 0.6300 0.7791 0.6585 0.5986 0.3180 0.1446 0.3922 0.4940 0.5816 0.8507 0.4548 0.8252 0.4429 0.1725 0.4848 0.2476 0.2528 0.1726 0.6712 0.2431 0.2507 0.6593 0.2301 0.0389 0.3428 0.1880 0.5204 0.7212 0.4603 0.1644 0.3577 0.1159 0.4159 0.4937 0.4557 0.1539 0.1608 0.5490 0.4456 0.2048 0.2861 0.3225 0.3222 0.3739 0.5704 1.0000 0.6992 0.3089 0.1425 0.0192 0.2152 0.2787 0.7172 0.2261 ? ? 0.2883 0.9792 0.0000 0.4383 0.7261 0.7352 0.5161 ? 0.7050 ? 0.8434 0.8391 1.0000 1.0000 1.0000 0.4871 0.8970 0.6586 1.0000 0.9867 0.0000 0.0846 0.8674
Oase_1_2 0.7135 0.1616 0.2388 0.1957 0.2223 0.4632 0.6106 0.3517 0.5051 0.4188 0.5357 ? 0.2099 ? ? 0.0000 0.1015 0.0232 0.0000 0.5935 0.6094 0.5417 0.2844 0.6672 0.0547 0.0866 0.2446 0.2645 ? ? 0.2334 0.0723 0.3058 0.0814 0.1655 0.7508 0.8001 0.1694 ? 0.5395 0.4463 0.2039 0.4001 0.3415 0.6791 0.8343 0.7267 0.3521 0.2654 0.5104 0.8562 0.8488 0.3792 0.3618 0.6493 0.2028 0.6998 0.3119 0.7717 0.8560 0.6676 0.7978 0.1053 0.8264 0.3711 0.3380 0.2918 0.2828 0.3238 0.3896 0.0630 0.5750 0.1214 0.4203 0.3965 0.3776 0.4614 0.2597 0.0000 0.4002 0.7381 0.2191 0.4521 ? ? 0.1157 0.2479 0.5545 0.7354 0.1108 0.1776 0.0695 0.0686 0.1263 0.0188 0.1597 0.1343 0.4054 0.6661 0.1499 0.0732 0.7228 0.6730 0.1346 0.7874 0.1946 0.3197 0.2696 0.2619 0.3169 0.3433 0.1016 0.1780 0.3851 0.2924 0.2122 0.1850 0.6419 0.1765 0.3777 0.4502 0.2634 0.7247 0.8405 0.4553 0.0950 0.2938 0.2766 0.2604 0.2900 0.4636 0.3661 0.4739 0.3035 0.2461 0.2746 0.3184 0.3188 0.4307 0.1494 0.6608 0.8004 0.6095 0.7014 0.5164 0.6723 1.0000 1.0000 0.6116 0.4368 0.0000 0.6591 0.8415 0.6802 0.3584 0.4581 0.5546 0.4807 0.6050 0.5575 0.6751 0.5670 0.7842 0.7864 0.4407 0.4561 0.8914 0.8126 0.0803 0.3303 0.1857 0.1508 0.3530 0.7615 0.5676 0.5168 0.5467 0.5124 0.7188 0.9966 0.0000 0.0000 0.0180 0.0000 0.0000 0.2592 0.0903 0.6622 0.3640 0.1971 ? 0.5457 0.3382 0.4231 0.7778 0.5714 0.3000 0.0000 0.0000 0.0000 0.5609 0.2972 0.2373 0.5377 0.5000 0.5833 0.5000 0.0000 0.0000 0.0000 0.3687 0.3324 0.0544 0.4482 0.4000 0.5833 0.9167 0.0000 1.0000
0.0000 ? 0.3349 0.3364 0.5751 0.3750 0.0000 0.1667 0.0000 0.4000 0.2463 0.3532 0.4895 0.3686 0.5000 0.0000 0.2222 0.0000 0.6667 0.7671 0.5295 0.2082 1.0000 0.6250 0.5000 0.5714 0.5000 1.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.0792 0.7862 0.9072 0.9292 0.7216 0.4836 0.3760 ? ? ? 0.9121 0.6607 0.8934 0.5607 0.1281 0.5547 0.2193 0.1560 0.6770 0.8508 0.3480 0.1822 0.5600 0.1361 ? 0.3757 0.4363 0.5137 0.3602 0.4997 0.2241 0.3982 0.3003 0.4067 0.4104 0.4032 0.3655 0.2199 0.5101 0.7282 0.4534 0.3278 1.0000 1.0000 0.7329 0.3800 0.5794 0.6916 0.5248 0.4231 0.6721 0.1638 0.2046 0.6533 0.3071 0.4219 1.0000 0.3019 0.3796 0.8790 0.6173 0.8344 0.5827 0.5245 0.6330 0.0337 ? 0.3436 0.5950 0.7580 0.5740 0.7735 0.3538 0.9404 0.6365 0.5680 0.5195 0.0652 0.0169 0.3396
ZKD_UC_101_103 0.6721 0.2530 0.2224 0.3420 0.4209 0.2918 0.3540 0.2056 0.2790 0.2706 0.3058 0.3299 0.3512 0.5255 0.4117 0.1135 0.1295 0.1842 0.2040 0.6151 0.7632 0.8333 0.7284 0.8103 0.1977 0.2240 0.3806 0.2433 0.4788 0.8607 0.2974 0.2431 0.4316 0.4372 0.2202 0.8045 0.8425 0.1692 0.4071 0.4171 0.4409 0.2458

0.6346 0.6463 0.7907 0.8694 0.6441 0.5503 0.4947 0.8020 0.8509 0.7424 0.4504 0.5590 0.4952 0.3646 0.3323
0.5144 0.9035 0.8920 0.5302 0.6890 0.1858 0.7242 0.3371 0.7546 0.3929 0.5216 0.6112 0.6586 0.1389 0.4934
0.1798 0.3997 0.5825 0.4207 0.4754 0.3539 0.3193 0.1433 0.7582 0.2836 0.6429 ? 0.1296 0.3347 0.3432 0.4098
0.5079 0.3234 0.2796 0.2643 0.4090 0.3985 0.1965 0.3292 0.2807 0.3682 0.9311 0.2925 0.0341 0.7218 0.6872
0.0471 0.7911 0.2288 0.2024 0.1300 0.3538 0.3818 0.3372 0.2451 0.3552 0.5694 0.2406 0.2090 0.2649 0.5965
0.2429 0.3027 0.3531 0.1709 0.5455 0.8628 0.4959 0.1018 0.5261 0.2573 0.4213 0.4350 0.3318 0.7185 0.5484
0.3967 0.6519 0.2160 0.3425 0.3493 0.3655 0.1791 0.6332 0.4154 0.3389 0.3179 0.2663 0.6692 0.5684 0.4179
0.8563 0.7043 0.6566 0.9436 0.7432 0.4244 0.0779 0.3637 0.4269 0.6259 0.6980 0.7264 0.7569 0.7689 0.8207
0.7723 0.4288 0.5709 0.9269 0.8490 0.0000 0.1939 0.1350 0.1597 0.4138 0.7598 0.2264 0.5289 0.4780 0.3351
0.6248 0.9014 0.0942 0.1354 0.1206 0.0810 0.2044 0.2182 0.0622 0.4768 0.5738 0.3776 0.0000 0.4279 0.6436
0.4115 1.0000 ? 0.0000 0.0000 0.3596 0.0000 0.0000 0.0024 1.0000 ? 0.0000 0.0000 0.3253 0.1679 0.8031 0.5543 ?
0.2000 0.4000 0.0000 0.0603 0.0626 0.7055 0.3011 ? ? 0.0123 0.0843 0.7550 0.2424 ? ? 0.3553 0.1596 0.4906
0.6667 0.5714 0.1000 0.0000 0.0000 0.0000 0.1302 0.1312 0.7663 0.2745 0.5000 0.5833 0.0000 0.0000 0.0000
0.0000 0.0109 0.1868 1.0000 0.2868 0.5000 0.2500 0.0833 0.0000 0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? 0.3974 0.2092
0.7452 0.4805 ? 0.0234 0.1887 0.7336 0.1095 ? 0.1454 0.1367 0.3272 0.1869 ? 0.1733 0.2313 0.7554 ? ? ? ? 0.0000
0.1208 0.2452 0.5420 0.3429 0.1250 ? 0.2222 0.0000 0.0000 0.2824 0.2412 0.6245 0.6586 0.1250 0.0000 0.2857
0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.1472 0.7267 0.8080 0.2739 0.7356 0.3656 0.0940 0.5839 0.8084 0.7984
0.6901 0.5716 0.8290 0.7178 0.0781 0.3372 0.1713 0.1793 0.5099 0.7319 0.7151 0.4112 0.4641 0.3532 0.1842
0.5861 0.3179 0.3287 0.6575 0.4638 0.3537 0.3995 0.0567 0.3021 0.3077 0.1414 0.3094 0.2186 0.4525 0.3854
0.3310 0.3213 0.5037 0.6234 0.5434 0.2450 0.8223 0.6920 0.3478 0.4092 0.5851 0.1963 0.2295 0.7469 0.0928
0.6696 0.7194 0.2827 0.8157 0.8645 0.6147 0.7953 0.6397 0.5577 0.9562 0.1233 0.3836 0.6201 0.9649 0.8631
0.5557 0.6538 0.9436 1.0000 0.7020 0.5602 0.8685 0.1345 0.1126 0.3617

Liujiang 0.8058 0.0000 0.0140 0.0000 0.3261 0.5348 0.8407 0.1488 0.3297 0.2250 0.3884 0.1497 0.1227 0.0902
0.1079 0.1407 0.1398 0.1050 0.1942 1.0000 0.5759 0.7000 0.5841 0.8514 0.0619 0.0863 0.2287 0.1586 0.1998
0.6413 0.3318 0.2342 0.3201 0.0000 0.0277 0.6853 0.7239 0.0646 0.0527 0.4921 0.4264 0.1927 0.7808 0.7744
0.8070 0.7282 0.6653 0.3131 0.3260 0.3900 0.0000 0.5745 0.3365 0.2541 0.2999 0.4055 0.6248 0.0000 0.8228
0.8640 0.3049 0.8418 0.1207 0.9297 0.2031 0.6025 0.4847 0.4285 0.3929 0.5944 0.3985 0.4646 0.2019 0.2418
0.6326 0.2951 0.4937 0.1570 0.1199 0.3191 0.1579 0.1149 0.3219 ? 0.0000 0.0000 0.0895 0.3245 0.4921 0.0000
0.0137 0.1616 0.1896 0.2749 0.0137 0.1094 0.0000 0.3209 0.9385 0.0416 0.0265 0.7992 0.5521 0.0785 0.8109
0.0462 0.4643 0.1371 0.0502 0.0000 0.1203 0.1057 0.1624 0.3064 0.0943 0.0400 0.0000 0.0000 0.2124 0.2695
0.2848 0.0066 0.4154 0.8073 0.5894 0.0306 0.5332 0.4606 0.4841 0.3404 0.4252 0.2916 0.4066 0.1562 0.3319
0.0860 0.2377 0.2851 0.3783

0.0838 ? 0.1121 0.5279 0.6740
0.4893 0.5714 1.0000 0.0000 1.0000 0.2087 0.2361 0.4210 0.4354 0.7500 1.0000 0.0000 0.5000 0.2922 0.1150
0.8000 0.4585 0.2000 0.0000 0.2000 ? 0.1980 0.1368 0.4919 0.5356 0.0000 0.0000 0.2107 0.1134 0.3649 0.4229
0.0000 0.0000 0.3013 0.2001 1.0000 0.7778 0.2857 0.0000 0.0000 0.6667 1.0000 0.0982 0.1788 1.0000 0.3194
0.6000 0.6667 0.1000 0.0000 0.0000

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? ? ? ? ? ? ? ? ? ? ? ? ? 0.4097 0.5753 0.9333 0.6521 0.6144 0.2339 0.0761 0.6347 0.6123 0.7693 0.7864 0.4753
0.7318 0.2290 0.1699 0.5609 0.1942 0.1754 0.3762 0.8763 0.7160 0.3666 0.7374 0.4422 0.1187 0.3454 0.1201
0.3841 0.4231 0.5846 0.1637 0.3564 0.2682 0.0000 0.2272 0.6639 0.4197 0.2964 0.5556 0.5292 0.2731 0.0000

0.5016 0.5675 0.4370 0.8231 0.6385 0.6934 0.2924 0.4744 0.4421 0.0959
0.1239 ?
SH4_5 0.5367 0.1837 0.3529 0.4008 0.4086 0.3467 0.4159 0.2816 0.3718 0.3430 0.3929 0.3912 0.2972 0.3774
0.1682 0.4688 0.7106 0.5217 0.5778 0.7086 0.8708 0.6250 0.5889 0.8705 0.4653 0.4634 0.4783 0.3331 0.0000
0.5819 0.2000 0.1439 0.7156 1.0000 0.4545 0.3467 0.4519 0.4047 0.4116 0.4141 0.4726 0.2793 0.2413 0.1951
0.3860 0.6366 0.3903 0.5547 0.5825 0.5674 0.6591 0.6981 0.4171 0.4192 0.9256 0.0913 0.7430 0.2941 0.5394
0.6120 0.8104 0.4484 0.2879 0.4484 0.2073 0.4551 0.3388 0.2094 0.1173 0.0924 0.5498 0.5404 0.5229 0.4492
0.9953 0.3428 0.4206 0.2838 0.4510 0.5166 0.8040 0.5510 0.4503 ? 0.3846 0.6039 0.4629 0.5274 0.5820 0.6191
0.6272 0.3985 0.6007 0.2540 0.3629 0.3989 0.3700 0.2095 0.4352 0.5555 0.3161 0.4990 0.5545 0.4043 0.5777
0.5713 0.9454 0.8225 0.4228 0.3214 0.4904 0.6383 1.0000 0.6564 0.4924 0.3842 0.6315 0.7333 0.8376 0.7287
0.8283 0.4505 0.1237 0.7654 0.1098 0.3411 0.6043 0.8167 0.5820 0.2361 0.6358 0.6986 0.6821 0.5962 0.4509
0.3177 0.3430 0.4997 0.2451 0.6743 0.2349 0.7231 0.4190 0.4793 0.4293 0.2519 0.7941 0.7188 0.2370 0.1145
0.3623 0.2731 0.5678 0.5485 0.0770 0.5515 0.1082 0.6730 0.7340 0.8194 0.8217 1.0000 0.9533 0.5827 0.0000
0.5878 0.7666 0.3963 0.2037 0.4918 0.7181 0.5752 0.4513 0.7577 0.3408 0.8379 0.8749 0.6860 0.4679 0.5138
0.4468 0.4576 0.3210 0.2560 0.2204 0.1810 0.2527 0.5778 0.5326 0.0532 0.0291 0.6313 0.8448 0.4722 0.8571 ?
0.0000 ? 0.3925 0.1279 0.5000 0.3333 0.2857 ? 0.0000 0.0000
0.0000 0.0660 0.0403 0.7539 0.0000 0.3000 0.5000 ? 0.0000 0.0000 0.0000 0.1917 0.2210 0.2857 0.4143 0.4000
0.0000 ? 0.0000 0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.0346 0.0000 0.3598 0.7164 0.5556 0.0309 0.0800
0.4764 0.4192 0.2222 0.0000 0.0259 0.7468 0.2500 ? ? ? 0.0000 0.0208 0.1743 0.6294 0.7029 ? ? 0.2222 ? 0.6667
0.1658 0.1706 0.7633 0.8659 ? ? 0.0000 ? 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6642 0.8772 0.8949 0.3662 0.5514
0.2206 0.2111 0.5628 0.3367 0.5844 0.6635 1.0000 0.3554 0.6454 0.1990 0.1895 0.2863 0.2518 0.6546 0.5138
0.5835 0.2559 0.4993 0.6006 0.5651 0.9184 0.5744 0.1165 0.6194 0.3832 0.7091 0.5149 0.4385 ? 0.6135 0.7003
0.5019 0.5214 0.5292 0.5081 0.7117 0.2912 0.0361 0.2173 0.1225 1.0000 0.6968 0.7977 0.4405 0.5859 0.4156
0.7232 0.7014 0.7194 0.6008 0.1018 0.8532 0.6037 0.8727 0.8671 0.6744 0.8169 0.8309 0.8509 0.6468 0.0000 ?
0.5515 0.4188 0.6474 0.2311 0.5069 1.0000 0.8605 0.3768 0.1914 0.1355 0.0595 0.1438 0.0682
Tabun_1 0.5720 0.1142 0.1451 0.2549 0.1899 0.0745 0.2330 0.0874 0.1913 0.1174 0.1875 ? ? ? ? 0.3320 0.4369
0.3641 0.4336 0.5000 0.7255 ? 0.7653 0.9390 0.3859 0.3839 0.4676 0.8919 ? ? 0.0464 0.0000 0.2925 0.3746
0.3897 0.3786 0.4077 0.4157 ? 0.1201 0.5670 0.5950 0.4793 0.5976 0.4628 0.6385 0.3619 0.4900 0.5174 0.4308
0.6911 ? 0.4171 0.3356 ? ? ? ? 0.5906 0.6120 0.4121 ? 0.3096 ? 0.1404 0.0724 0.5576 0.1095 0.1692 0.2369 0.0197
1.0000 0.1268 0.8228 0.6887 0.4072 ? 0.2523 ? 0.2279 0.9947 ? 0.3599 0.0000 ? 0.2978 0.3601 0.3290 0.4021
0.3088 ? 0.4199 0.3587 0.2040 0.3146 ? ? ? 0.3621 0.4021 0.2002 0.7094 0.6848 0.2466 0.7478 ? 1.0000 ? ? ?
0.4972 0.6253 0.7662 0.6015 0.3929 0.1030 0.1973 0.7159 0.3443 0.3879 0.4756 0.3417 0.5568 0.8837 ? ? 0.6066
1.0000 0.6809 0.2219 0.6305 ? ? ? ? ? ? 0.7644 0.2958 0.1727 0.3435 0.1199 0.0557 0.0000 0.0000 0.7501 0.3497
0.3892 0.8065 0.5707 0.5132 0.1783 0.3963 0.4360 0.3159 0.3141 0.0842 0.0909 0.3964 0.1235 0.2882 0.2305
0.8408 0.7048 0.5187 0.6385 0.7792 ? 0.4313 0.4686 0.3839 0.4410 0.5030 0.7470 0.4515 0.7970 0.7658 0.6983
0.6798 0.8229 0.2528 0.1854 0.1831 0.1248 0.1457 0.5564 0.0174 0.4257 0.2055 0.0135 0.2739 0.5753 0.6239
0.0000 0.8571 0.6000 0.0000 1.0000 0.5023 0.5601 0.4446 0.5781 0.7500 0.1250 0.0000 1.0000 0.3214 0.1507
0.7846 0.2707 0.7000 1.0000 0.8000 ? 0.2528 0.1384 0.3892 0.3818 0.0000 0.0000 0.1266 0.1465 0.6208 0.1596
0.0000 0.0000 0.4620 0.1196 0.2718 0.1111 0.7143 0.2000 0.0000 0.0000 0.0000 0.2535 0.1070 0.4412 0.2472
0.2000 0.5000 0.4000 0.0000 0.0000 0.0000 0.1027 0.1252 0.3130 0.1910 0.2000 0.0000 0.0000 0.0000 0.0000
0.0000 0.2591 0.2618 0.5758 0.8063 0.5000 0.5324 0.4378 0.3387 0.9211 1.0000 0.8000 0.4781 0.1231 0.4518

0.9123 0.0000 0.2149 0.1375 0.2991 1.0000 0.3333 0.0000 0.1378 1.0000 0.3232 0.6667 0.0857 0.0000 0.4206
0.5000 0.0000 0.1667 0.0000 0.4000 0.1144 0.1651 0.3566 0.7800 0.2500 0.0000 0.2222 0.0000 0.6667 0.1693
0.1185 0.6490 0.7581 0.2500 0.5000 0.0000 0.3333 1.0000 0.0929 0.8360 0.3829 ? ? ? ? ? ? ? ? ? ? 0.5539 0.6638
0.9220 0.0383 0.6757 1.0000 0.7492 ? ? ? 0.5546 0.7705 0.4226 0.4626 0.1066 0.2268 ? 0.2615 0.3352 ? 0.3031
0.1620 ? ? ? 0.6441 0.2629 0.0873 0.2668 ? 0.5605 0.5275 0.3292 ? ? 1.0000 ? 0.5619 0.8511 0.6386 0.6217 0.3314
0.4299 0.6012 0.5452 ? ? ? ? 0.9847 0.9992 0.1917 0.2018 1.0000 0.0148 1.0000 0.6390 0.3900 0.0000 1.0000
0.6694 0.7762 0.6766 0.7000 ? 0.4974 0.6065 0.4407 0.5192 0.6531 0.3222 0.6314 0.6168 0.7541 0.4381 0.2423
0.3067 0.3906 0.1239 0.2594
Tabun_2
? ?
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0.3052 0.1981 0.3744 0.2098 0.9064 0.8616 0.9714 1.0000 0.9389 0.9137 0.6358 0.2070 0.6419 0.9135 0.3819
0.3729 0.3656 0.3308 0.3975 0.3437 0.6939 0.2281 0.6509 0.5375 0.2816 0.4463 0.5692 0.3361 0.3660 0.3272
0.2570 0.3522 0.4005 0.2510 0.4837 0.7740
0.8243 ?
? ? 0.4436 0.6233 0.6506 1.0000 0.0000 0.4459 0.6124 0.6470 0.4018 0.7703 0.0000 0.4918 0.3834 0.7559 0.8799
0.0000 0.1763 0.2951 0.6238 0.7313 0.1111 0.2426 0.2321 0.2846 0.7273 0.4444 0.2054 0.1262 0.4163 ? ? ? ?
0.0000 0.0902 0.1885 0.4755 0.2686 0.2500 ? 0.1111 0.0000 0.6667 0.3923 0.1938 0.3102 0.7719 0.2500 0.5000
0.0000 0.0000
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? ? ? 0.4985 0.7086 0.9206 0.7793 0.5061 1.0000 0.8247 0.4955 0.7998 0.5211 0.8844 0.5150 0.5887 0.4463 0.5758
0.5159 0.6753 0.3168 0.5653 0.6118 0.9090 0.6505 0.4488 0.6144 0.2454 0.2098 0.6186
Spy_I_II 0.6811 0.2906 0.3573 0.4221 0.3381 0.3392 0.3717 0.3743 0.4651 0.2874 0.3036 ? ? ? ? 0.3325 0.4084
0.3714 0.4588 0.5126 0.7443 ? 0.6115 0.8337 0.3002 0.2799 0.4322 ? ? ? 0.1173 0.2577 0.2378 0.2924 0.3607
0.6257 0.6144 0.2976 ? 0.3556 0.4191 0.2542 0.3226 0.3018 0.3651 0.6470 0.5994 0.4872 0.4769 0.6085 0.6325
0.9231 0.2523 0.4462 ? ? ? ? 0.4390 0.4840 0.6978 0.6681 0.3854 0.6681 0.2080 0.2371 0.5906 0.2816 0.3923
0.3795 0.2191 0.3657 0.2454 0.0185 0.2542 0.1811 0.7204 0.1472 0.3463 0.4194 0.6168 0.3325 0.4964 0.3168 ?
0.3734 0.4597 0.7431 0.8704 0.3712 ? 0.3699 0.3032 0.4116 0.1960 ? ? ? 0.3862 ? ? ? ? ? ? ? ? ? ? ? ? ?
0.5118 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.1955 ? ? ? ? ? ? ? ? ? ? 0.3855 0.2368 ? 0.3096 ? ? ? 0.2937 ? ? ? ? 0.1813 ? 0.3454
0.0414 0.1618 0.2286 ? 0.1207 0.5846 0.6437 0.6250 0.6120 0.4808 1.0000 ? 0.3008 0.7027 0.9234 ? 0.3111 0.2181
0.1601 0.2423 0.3102 0.7036 0.3088 0.6671 0.5691 0.5352 0.7613 0.7987 0.0684 0.0426 0.1727 0.1258 0.1450
0.2760 0.0747 0.4327 0.5551 0.1198 ? 0.2000 ? ? ? 0.0378 0.1876 1.0000 0.3105 ?
0.0000 0.1905 0.0960 0.3667 0.3085 0.0000 0.0000 0.3890 0.1007 0.4590 0.3333 0.7143 0.2000 0.0000 0.0000
1.0000 0.1323 0.1121 0.7428 0.2231 0.2000 0.5833 0.2000 0.0000 0.0000 1.0000 0.2417 0.2962 0.3334 0.5688
0.5000 0.4167 0.0000 0.0000 0.0000 0.0000 ? 0.2155 ? ? ? ? 0.1714 ? ? ? ? 0.4540 0.0641 0.4240 0.5325 ? 0.0209
0.1248 0.6192 0.1493 0.1111 0.1305 0.0150 0.1811 0.0707 0.1111 0.1355 0.1722 0.7167 0.2500 0.0000 0.4167
1.0000 0.4000 0.1319 0.2237 0.4580 0.5029 0.2500 0.0000 0.2222 0.0000 0.6667 0.2096 0.3446 1.0000 0.7526
0.2500 0.0000 0.2857 0.0000 1.0000 0.1195 1.0000 0.0000 0.0927 0.1963 0.2850 0.7031 0.2284 0.0714 0.3214 ? ? ?
0.3889 0.7656 0.8966 0.4262 0.6267 ? ? ? ? ? 0.2961 0.3797 0.5364 0.3895 0.1753 0.3522 0.3599 0.1624 0.5090
0.5816 0.3875 0.2621 0.9617 0.7612 ? 0.6009 0.4295 0.1930 0.2525 ? 0.4279

0.3921 ? ? ? 0.3688 ? ? 0.2425 0.6082 0.8342 0.5273 0.6965 0.3704 0.8398 ? 0.7889 ? 0.6770 0.7707 0.7911 0.5737 0.8420 0.5119 0.8599 1.0000 0.8424 0.7712 0.1992 0.1513 0.1210

Gibraltar_1 0.5264 0.3187 0.3674 0.3829 0.6455 0.1219 0.1422 0.0000 0.0000 0.3809 0.4107 0.8220 0.4087 0.5269 ? 0.3683 0.4701 0.3241 0.5082 0.8022 0.8044 0.8250 0.8391 1.0000 0.1311 0.3155 0.5664 0.3808 ? 0.5562 0.0000 0.3250 0.1856 0.2943 0.2787 0.6882 0.8291 0.2498 0.1981 0.3207 0.5940 0.5279 0.5727 0.6220 0.5256 0.6292 0.4454 0.7070 0.4978 0.7779 0.6059 0.6600 0.6403 0.5595 0.5338 0.5017 0.5181 0.1352 0.7402 0.7320 0.4231 0.3495 0.4613 0.3516 0.2827 0.3183 0.5459 0.1772 0.3150 0.2851 0.2322 0.5585 0.2754 0.3489 0.3599 0.3273 0.3340 0.1806 0.3401 0.1638 0.2986 0.5392 0.5732 0.3349 0.2507 0.3589 0.4318 0.6928 0.8201 0.3770 0.3596 0.4525 0.4632 0.3433 0.1423 0.2426 0.3668 0.4797 0.5814 0.4337 0.3879 0.7457 0.6469 0.1254 0.8270 0.1491 0.4482 0.3391 0.4957 0.4280 0.9832 0.5741 0.2086 0.5586 0.3827 0.3873 0.3082 0.7239 0.2260 0.3752 0.4708 0.2755 0.7449 0.8870 0.2012 0.1702 0.2062 0.4695 0.2757 0.1989 0.6715 0.2317 0.4363 0.0000 0.3508 0.4492 0.3307 0.4410 0.0873

0.1874 ? 0.4110 0.7176 0.9434 0.0225 0.8364 0.3539 0.1806 ? 0.3839 0.4733 0.0000 0.2815 0.6264 0.9522 0.1743 0.1044 0.2790 0.3963 0.2495 0.3808 0.4002 0.0630 0.5599 0.6741 0.3252 0.5621 0.2677 0.1160 0.3586 0.2736 0.4892 0.5083 0.1184 0.1285 0.1381 0.3676 0.8492 0.5538 0.3504 0.5425 0.4803 0.3395 0.7975 0.8966 0.6621 0.5046 0.2209 0.4917 0.6350 0.4792 0.4475 0.1975 0.2150 ?

Amud 0.9479 0.2725 0.2780 0.2026 0.4188 0.3669 0.4159 0.1772 0.2323 0.0646 0.0446 ? ? ? ? 0.2031 0.2497 0.1777 0.2803 0.6295 0.7579 0.8792 0.5546 0.7562 0.1400 0.1604 0.4611 ? ? ? 0.2392 0.2904 0.5361 0.6151 0.0838 0.6201 0.7886 0.1793 ? 0.3717 0.3942 0.1927 0.4598 0.4695 0.4628 0.6045 0.5469 0.5921 0.4983 0.4064 0.6005 ? 0.5408 0.4663 ? ? ? ? 0.5945 0.5960 0.5412 ? 0.4923 ? 0.1494 0.1316 0.1694 0.2493 0.2170 0.1928 0.0549 0.3311 0.0744 0.1992 0.0000 0.3724 0.3509 0.4171 0.4159 0.1231 0.8231 ? 0.5063 ? ? 0.1934 0.2984 0.6838 0.8783 0.2493 0.2418 0.3943 0.3629 0.2984 0.1396 0.2152 0.3473 0.6723 ? 0.4790 0.1929 0.9312 0.6161 0.2235 0.7199 0.1983 0.5841 0.6177 0.2162 0.2793 0.4810 0.3290 0.5355 0.6796 0.3326 0.0000 0.1901 0.7505 0.1233 0.2710 0.3144 0.1075 0.8838 0.9336 0.1972 0.2061 0.1754 0.6227 0.3640 0.1910 0.7152 0.2497 0.4889 0.1711 0.1026 0.5290 0.1457 0.3893 0.2120 0.0617 0.4282 0.0606 0.4148 0.4554 0.5007 0.0000 0.3927 0.0000 0.4984 0.4585 0.5509 0.6591 0.3170 0.2717 0.0164 0.5847 0.1995 0.5070 0.5926 0.4501 0.6472 0.5807 0.9887 0.8265 0.4863 0.8378 0.7925 0.8015 0.1873 0.1071 0.1627 0.1377 0.2899 0.7282 0.3642 0.6160 0.5415 0.4809 0.6734 0.9217 0.1902 0.0683 0.0000 0.1012 0.1609 0.2505 0.0217 0.4251 0.4374 0.2526 0.0161 0.4665 0.6716 0.4893 0.5714 0.4000 0.0000 0.5000 0.3703 0.5387 0.5407 0.8408 0.7500 0.7500 0.0000 0.8750 0.2496 0.0675 0.8385 0.5546 0.8000 0.8000 0.8000 0.0000 0.1222 0.0504 0.4378 0.4843 0.0000 0.0000 0.0740 0.0125 0.4168 0.2713 0.0000 0.0000 0.3124 0.0074 0.5308 0.4444 0.8571 0.2000 0.9231 0.0000 0.0000 0.1019 0.0000 0.5565 0.2632 0.2000 0.9167 0.2000 1.0000 0.0000 0.0000 0.0000 0.0000 0.2812 0.1409 0.0000 0.2500 0.0000 1.0000 0.0000 0.0000 0.0921 0.0000 0.5615 0.3559 0.0000 0.1391 0.2139 0.7581 0.5536 0.3401 0.4000 0.5608 0.1755 0.3597 1.0000 0.4000 0.0000 0.2474 0.8949 0.5672 0.3333 0.1300 0.0671 0.2557 0.3889 0.6667 0.0614 0.1163 0.7983 0.2500 0.0000 0.1667 0.0000 0.4000 0.0235 0.0978 0.4161 0.2057 0.2500 0.0000 0.2222 0.0000 0.6667 0.2538 0.1467 0.5102 0.7733 0.2500 0.5000 0.2857 0.6667 1.0000 0.2788 0.6478 0.5429 ? ? ? ? ? ? ? ? ? 0.2446 0.8161 0.8456 0.5158 0.8522 ? ? ? ? ? 0.5029 0.6138 0.7216 0.3513 0.2052 0.2398 ? 0.3519 0.3175 ? 0.3495 0.1524 0.3208 0.3600 ? 0.3932 0.3103 0.1347 0.3037 0.3939 0.5673 0.6624 0.2483 ? 0.3072 0.6000 0.5272 0.2198 1.0000 0.6153

0.4413 0.3734 0.8492 0.8790 0.6743 0.7455 0.2548 0.5706 0.7629 0.4450 0.5458 0.0658 0.0690 0.2125 0.4833
0.2325 0.3899 0.2679 0.7429 0.8389 0.3795 0.7869 0.5675 0.7632 1.0000 0.7735 ? 0.7820 1.0000 0.9091 0.7938
0.7881 0.8896 0.6529 0.0000 0.3305 0.4817 0.1873 0.1268 0.3399
La_Chapelle_aux_Saints 0.7451 0.1960 0.1116 0.2509 0.4552 0.2241 0.3274 0.0606 0.1193 0.0000 0.0000 0.2331
0.4073 0.2232 0.8081 0.2905 0.1724 0.2398 0.4009 0.6511 0.6974 0.9167 0.7844 0.8107 0.1971 0.1680 0.2949
0.1784 0.3013 0.3116 0.1105 0.2598 0.2589 0.1910 0.2021 0.2796 0.1896 0.2395 0.3423 0.1630 0.2702 0.0754
0.5544 0.6707 0.4651 0.6476 0.3087 0.5903 0.5401 0.3007 0.6671 0.0744 0.2310 0.3356 0.0000 0.5839 0.1456
0.6250 0.5709 0.4880 0.3626 0.6198 0.4272 0.7055 0.0000 0.0761 0.4776 0.1616 0.3969 0.4498 0.2390 0.5618
0.0880 0.2555 0.4820 0.2564 0.4697 0.1181 0.1331 0.2370 0.2900 0.1092 0.4051 ? 0.2448 0.1614 0.2384 0.4407
0.5926 0.0737 0.1087 0.3689 0.2903 0.2608 0.1774 0.1682 0.2056 0.4696 0.9236 0.2674 0.1198 0.5660 0.7109
0.2039 0.8534 0.1653 0.2857 0.2299 0.1608 0.2442 0.5082 0.4850 0.2684 0.5016 0.2094 0.2288 0.2843 0.7071
0.2600 ? ? ? 0.4785 ? 0.0061 0.2399 0.4147 0.3468 0.3711 0.3307 0.4583 0.2205 0.5137 0.1609 0.0151 0.2713
0.3621 0.3655 0.3186 0.3993 0.0093 0.7939 0.0163 0.5229 0.4277 0.7316 0.0000 0.4846 0.4266 0.3647 0.1509
0.2731 0.6744 0.5328 0.6366 0.5914 0.7174 0.5661 ? ? ? ? 0.9279 0.7188 0.5543 0.3682 ?
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0.4231 0.6221 0.7795 0.1618 0.5728 0.1592 0.0000 0.1450 0.2628 0.3239 0.2834 0.3949 0.3283 0.1389 0.1149
0.1209 0.0789 0.1498 0.2251 0.5816 0.4359 0.3320 0.7843 0.5384 0.3870 0.4083 0.1385 0.1375 0.2346 0.5677
0.3515 0.5716 0.3448 0.1643 0.3886 0.3898 0.5854 0.5204 0.3782 0.6346 0.3200 0.4003 ? ? ? 0.4393 0.3407
0.6964 0.4733 0.4592 0.4099 0.4341 0.5062 0.7679 0.8930 0.4760 0.0000 1.0000 0.2540 ? ? ? ? 1.0000
0.2125 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.1504
La_Ferrassie_1 0.8658 0.3088 0.3247 0.3234 0.5845 0.4669 0.4926 0.4114 0.5012 0.4512 0.4911 0.4904 0.4930
0.3431 0.4020 0.3825 0.2885 0.4257 0.5278 0.5000 0.7149 0.7667 0.5081 0.7125 0.3335 0.3135 0.3250 0.3321
0.3515 0.6277 0.0998 0.2871 0.3846 0.3976 0.3725 0.5548 0.5782 0.3597 0.5155 0.5319 0.4959 0.2821 0.4997
0.4512 0.4070 0.5889 0.5513 0.4417 0.1200 0.6141 0.5739 0.6594 0.4792 0.4862 0.2983 0.5510 0.4183 0.4494
0.5630 0.5520 0.5797 0.6527 0.4241 0.7890 0.2971 0.3488 0.3341 0.2264 0.2560 0.2129 0.2874 0.7694 0.2490
0.4835 0.6234 0.2680 0.3822 0.2579 0.3155 0.5680 0.5315 0.2320 0.5769 ? 0.2371 0.2179 0.3028 0.7287 0.9312
0.2349 0.2315 0.4748 0.2627 0.3119 0.2594 0.2143 0.3226 0.5946 0.5449 0.3621 0.0548 0.7457 0.5829 0.3500
0.7185 0.4488 0.2337 0.2801 0.1326 0.2479 0.6032 0.3896 0.5621 0.7087 0.4904 0.2120 0.2462 0.7766 0.1646
0.2926 0.3076 0.1247 1.0000 1.0000 0.0630 0.2547 0.1161 0.4689 0.5135 0.3546 0.4265 0.4226 0.5458 0.4767
0.2725 0.5368 0.1570 0.3950 0.0000
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? 0.2572 0.0000 0.7333 ? ? ? ? ? ? 0.0830 0.0492 0.7273 0.4382 ? ? ? ? ? ?
0.1145 0.1704 0.4195 0.4936 0.0000 0.4167 0.0000 0.0000 0.0000
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? ? 0.4373 0.7893 0.8235 0.6664 0.4492 0.2862 0.3117 0.4782 0.4238 0.5440 0.2300 0.4834 0.4832 0.5284 0.2662
0.3701 0.3048 0.3238 0.3883 0.6058 0.4136 0.2168 0.4999 0.4954 0.3107 0.3974 0.3645 0.0948 0.0950 0.4115
0.4095 0.5430 0.5250 ? 0.7444 0.2248 0.6736 0.2541 0.7619 0.8895 0.6282 0.3289 0.7579 0.7431 0.6210 0.5372
0.4591 0.6600 0.7924 0.4319 0.3609 0.1721 0.1948 ?

Shanidar_1_5 0.8319 0.1611 0.2331 0.1965 0.3953 0.3437 0.4395 0.0811 0.1115 0.0805 0.0625 0.3089 0.3236 0.2368 0.3741 0.3294 0.4466 0.4193 0.4801 0.4640 0.6575 0.6646 0.5158 0.7743 0.2578 0.2797 0.4470 0.3401 0.1001 0.5226 0.0496 0.1209 0.3160 0.4673 0.3534 0.4122 0.6318 0.3118 0.4234 0.4319 0.4567 0.2626 0.3938 0.3689 0.4698 0.6482 0.4986 0.6350 0.3463 0.3420 0.7017 0.6801 0.4069 0.4335 0.4505 0.3556 0.5079 0.3461 0.5984 0.6760 0.8613 0.6374 0.0650 0.7099 0.1547 0.3182 0.3059 0.1987 0.1838 0.2249 0.2191 0.7002 0.2054 0.4485 0.6134 0.3061 0.2238 0.1858 0.2267 0.1424 0.7259 0.2845 0.6727 ? 0.1309 0.1355 0.2905 0.4686 0.6111 0.1480 0.1953 0.3892 0.2640 0.2636 0.1923 0.1863 0.2646 0.6081 0.7558 0.4468 0.2934 0.6358 0.5545 0.2917 0.6100 0.3090 0.2411 0.2233 0.1434 0.2255 0.5657 0.4719 0.3882 0.5826 0.3243 0.2173 0.2687 0.6414 0.1541 0.1260 0.1647 0.0064 0.8093 0.9648 0.1931 0.1899 0.4147 0.4844 0.1757 0.1357 0.7576 0.3374 0.5880 0.4174 0.2108 0.4425 0.2203 0.5542 0.1800 0.0781 0.4538 0.4020 0.4849 0.3459 0.3134 0.3463 0.7141 0.2957 0.9330 0.5685 0.7434 0.6072 0.7330 0.5511 0.2361 0.6452 0.4503 0.6087 0.5947 0.5823 0.7948 0.8152 0.9310 0.9574 0.9289 0.7264 0.9064 0.3648 0.5076 0.4386 0.4135 0.4987 0.4208 0.7487 0.4632 0.6962 0.5856 0.4270 0.5084 0.7625 0.4163 0.4441 0.3676 0.3635 0.3654 0.6583 0.1816 0.4342 0.3927
0.7756 ? 0.0000 0.0000 0.5838 0.2194 ? ? 0.0000 0.0000 0.5635 0.1543 ? ? 0.2959 0.0333 0.6513 0.3333 0.7143 ? 0.0000 0.0000 0.0000 0.0232 0.0109 0.8071 0.1541 0.2000 0.6667 0.4000 0.0000 0.0000 0.0000 0.0790 0.1779 0.5998 0.3489 0.2000 0.5000 0.3333 0.0000 0.0000 0.0000 ? ? ? ? ? 0.2829 0.2805 0.5556 ? 0.4709 0.4000 0.5326 0.2634 0.5203 0.9578 0.4000 0.0645 0.2860 0.8248 0.6617 0.5556 0.0634 0.1297 0.4810 0.2273 0.5556 0.0588 0.1904 1.0000 0.3750 0.0000 0.1667 0.0000 0.4000 0.0446 0.2014 0.6364 0.3714 0.5000 0.3333 0.2222 0.0000 0.6667 0.3138 0.1780 0.4408 0.7871 0.5000 0.0000 0.2857 0.3333 1.0000 0.0000 0.6828 0.8286 ? ? ? ? ? ? ? ? ? ? 0.4236 0.7127 0.8887 0.5329 0.5981 0.3761 0.3219 0.2981 0.4303 0.5427 0.3389 0.6202 0.5480 0.5936 0.1981 0.1963 0.2613 0.2412 0.8664 0.7187 0.5130 0.1667 0.4589 0.5243 0.2338 0.2939 0.2846 0.1403 0.1923 0.4860 0.5472 0.7179 0.3725 0.5007 0.5844 0.2917 0.6630 0.4317 0.5428 0.7279 0.3064 0.3151 0.5529 0.7241 0.6727 0.6094 0.4103 0.7666 0.6842 0.4115 0.6616 0.0856 0.0907 0.6660 0.2664 0.3671 0.8551 0.4423 0.6275 0.7541 0.4126 0.8419 0.7097 0.7092 0.4687 0.7134 ? 0.5595 0.4757 0.6733 0.3659 0.5589 0.6481 0.8907 0.5647 0.5586 0.4819 0.4507 0.2105 0.9483
Cesaire ? 0.5647 ? 0.5875 ? 0.3827 ? 0.2927 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.9368 ? ? ? ? ? 0.4494 ? 0.7831 ? ? ? ? ? ? ? ? 0.5068 0.4900 ? ? 0.7132 0.5711 ? 0.6657 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5884 0.8983 0.0000 ? 0.2441 ? ? 0.3227 0.4715 ? ? ? ? ? 0.2309 ? ? ? 0.4051 0.0000 ? 0.4499 ? ? ? ? ? ? 0.6642 0.2889 0.2483 0.2311 0.1686 ? 0.1566 0.4429 0.4891 0.4078 0.5697 0.3260 0.8681 ? 0.1290 0.8176 0.9311 ? 0.3121 0.2021 0.0730 0.1120 0.2620 0.6282 0.2686 0.5498 0.5537 0.2898 0.4619 0.6154 0.2262 0.1922 0.0984 0.1105 0.0225 0.2183 0.0875 0.4039 0.4144 0.0669 ? ? 0.5582 0.4740 0.5714 0.4000 0.0000 0.5000 ? ? 0.3935 0.5601 1.0000 0.6250 0.0000 0.2500 ? ? 0.7179 0.3275 0.7000 1.0000 0.8000 0.0000 ? ? 0.2541 0.4530 0.0000 0.0000 ? ? 0.3488 0.3218 0.0000 0.0000 ? ? 0.3000 0.4444 1.0000 0.4000 0.3077 0.0000 0.0000 ? ? 0.8293 0.2424 0.6000 0.5000 0.1000 0.3333 0.0000 0.0000 ? ? 0.5443 0.4058 0.5000 0.5000 0.2500 0.8000 0.0000 0.0000 0.0000 0.2311 1.0000 0.4775 0.0000 0.1863 0.1063 0.5179 0.4405 0.3779 0.4000 0.3569 0.0634 0.6381 0.6201 1.0000 0.0951 0.1738 0.5631 0.8010 0.3333 0.0647 0.0000 0.2801 0.2222 0.3333 0.0575 0.0360 0.5966 0.5000 0.0000 0.1667 0.0000 0.4000 0.0633 0.0000 0.0559 0.2086 0.5000 0.3333 0.2222 0.0000 0.6667 0.2361 0.1406 0.5388 0.8328 0.5000 0.0000 0.2857 0.0000
1.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.8188 0.9585 0.8481 ? ? ? ? ? ? ? ? 0.6908 0.3124 ? ? ? ? ? ? 0.6648 0.1585 ? ? ? ? 0.4714 0.2678 0.4694 0.4490 ? 0.7317 0.2570 0.0915 0.2573 0.4683 0.5370 0.0066 0.6925 0.7243 ? 0.3000 0.4262

0.3391 0.3992 0.7292 0.2585 0.5623 1.0000 ? 0.5690 ? 0.1889 ? ? ? ? 0.2558 0.5072 0.7617 0.4296 0.7640 0.3425 0.6885 ? 0.8303 ? 0.5406 0.7407 0.7335 0.5713 0.6387 0.5522 0.8170 0.2374 0.2635 0.0517 0.1797 0.1810 0.1583
Saccopastore_I_II 0.5672 0.1854 0.2590 0.2574 0.4933 0.2895 0.4100 0.1472 0.1641 0.1867 0.2054 0.2823 0.3251 0.3778 0.2687 0.3427 0.2971 0.2860 0.4743 0.7122 0.7584 0.6750 0.6928 0.8110 0.2545 0.2905 0.3429 0.4491 0.6862 0.2743 0.1975 0.2126 0.4484 0.2301 0.2469 0.4887 0.4721 0.2861 0.0060 0.5115 0.5336 0.3464 0.5610 0.5244 0.4326 0.5797 0.4454 0.5956 0.4899 0.4185 0.6085 0.6492 0.4352 0.4066 0.4243 0.4013 0.5576 0.4239 0.5118 0.5360 0.5110 0.6989 0.5232 0.6923 0.0638 0.4773 0.4471 0.1962 0.0949 0.1446 0.2308 0.5486 0.2336 0.3551 0.3404 0.3415 0.7218 0.2249 0.5375 0.4651 0.3834 0.2564 0.4485 ? 0.2570 0.6252 0.6148 0.8376 0.8995 0.7869 0.6435 0.4494 0.4702 0.3901 0.2923 0.3984 0.3859 0.0743 0.6952 0.6081 0.2307 0.7476 0.9040 0.2872 0.9208 0.3655 0.7697 0.7237 0.3860 0.4013 0.7513 0.5132 0.7552 0.8050 0.3738 0.3174 0.5663 0.5924 0.3562 0.3699 0.4338 0.2955 0.5189 0.8874 0.1047 0.2450 0.1813 0.6247 0.3896 0.2118 0.6205 0.4034 0.7927 0.4725 0.4291 0.6485 0.2433 0.4130 0.2970
0.1963 ?
1.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3156 0.0967 0.6846 0.0087 ? ? ? ? 0.2098 0.1746 0.5568 0.2707 ? ? 0.1709 0.2308 0.7120 0.2207 ? ? 0.4634 0.1732 0.3679 0.5000 0.4286 0.4000 0.0000 0.0000 0.0000 0.1490 0.1338 0.7494 0.0811 0.3500 0.5000 0.8000 0.0000 0.0000 0.0000 0.1450 0.1873 0.3526 0.2564 0.1500 0.1667 0.0000 0.0000 0.0000 0.0000 ? 0.2566 0.5753 0.7257 ? ? ? ? ? ? ? ? ? ? 0.5012 0.7398 0.8281 0.3049 0.5942 0.4544 0.1566 0.8894 0.2034 0.2955 0.5360 0.6247 0.4503 1.0000 0.2658 0.1858 0.3075 0.3025 0.2768 0.5992 0.7758 0.2315 0.9558 1.0000 0.4119 0.8499 0.4860 0.1327 0.3712 0.0421 0.6667 0.4778 0.2783 1.0000 0.4810 0.5778 0.6709 0.2935 0.4405 0.2139 0.4637 0.2718 0.3375 0.5013 0.4927 0.9357 0.5857 0.9332 0.6096 0.4371 0.4304 0.3306
0.2104 ?
Neanderthalensis_type 0.6249 0.3763 0.4014 0.4910 ? 0.5388 0.5103 ? ? ? ? ? ? ? ? ? 0.0678 ? 0.4292 ? 0.7820 ? 0.6043 0.7498 ? ? 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5819 0.5224 0.2989 0.4813 0.4146 0.3000 0.6143 0.8729 0.0668 0.0000 0.5699 0.5739 ? 0.2598 0.4578 ? ? ? ? 0.4094 0.4160 0.6154 ? 0.4551 ? ? ? ? ? 0.5278 0.4739 ? ? ? ? ? ? ? ? ? 0.1801 ? ? 0.6854 ? ? 0.3457 0.4090 0.5879 0.7037 0.3431 ? 0.4245 0.4045 0.3241 ? ? ? ? ? ? ? ? ? ? ? ? 0.4470 0.4274 ? ? ? ? 0.4762 ? ? ? ? ? ? ? ? ? ? ? ? ?
0.4455 ? 0.8170 0.8107 0.6344 ? ? ? ? ? ? ? ? ? 0.4682 0.2655 1.0000 ? 0.1810 0.3951 ? ? ? ? ? ? 0.5041 0.4102 0.1253 0.3203 ? ? ? ? ? ? 0.3877 ?
Xiahe
? 0.2735 ? ? ? ? ? ? ? ? ? ? 0.1016 0.1448 0.1792 0.2467 ? 0.1686 0.4416 0.5578 0.5278 0.5326 0.3574 0.9343 ? ? 0.6588 0.8305 ? 0.7293 0.8670 0.6817 0.5798 0.6519 0.7922 ? 0.9614 0.7065 0.7014 0.4708 0.5665 0.5822 0.5472 0.4275 0.5379 0.5681 0.7112 0.4426 0.3695 0.3228
0.1806 ? 0.7196 0.4987 0.0987 1.0000 0.0000 0.0000 0.6667 0.4000 0.4785 0.6501 0.6014 0.5000 1.0000 0.0000 0.1111 1.0000

0.6667 ?
? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3331 0.4335 0.8540 0.6462 0.7291 0.3814 0.8113 ? 0.3389 ? 0.0000 0.0744 0.4773 ?
0.3819 0.9392 0.7837 0.3688 0.6285 0.5758 0.5502 0.4234 0.3561

Dali 0.4530 0.9145 0.8628 0.8106 0.6151 0.8267 0.3805 0.3631 0.1738 0.5238 0.2679 0.5347 0.5952 0.6002 0.5563 0.7220 0.6102 0.7387 0.9593 0.4604 0.8681 0.5458 0.8393 0.8640 0.6064 0.6049 0.5995 0.6263 0.4613 0.5319 0.5256 0.6042 0.4483 0.5579 0.5899 0.6238 0.7065 0.5810 0.2641 0.7567 0.4477 0.1285 0.7670 0.6463 0.4721 0.7891 0.7608 0.8021 0.7710 0.7545 0.5473 0.8069 0.7854 0.6428 0.1828 1.0000 0.4539 0.6344 0.6024 0.5280 0.3352 0.2110 0.4861 0.3033 0.4426 0.7394 0.5506 0.5080 0.5191 0.1365 0.3657 0.6326 0.3014 0.4670 0.5043 0.3698 0.4982 0.5313 0.5548 0.4771 0.8887 0.7926 0.6492 0.5777 0.2507 0.6184 0.7154 0.6173 0.6243 0.6992 0.6817 0.7600 0.5422 0.6093 0.4007 0.4670 0.4581 0.3074 0.7741 0.2172 0.1727 0.7113 0.2844 ? ? 0.1796 0.2393 0.5123 0.8176 0.8832 0.5956 0.5590 0.0174 0.4236 0.5270 0.5706 0.6342 0.6425 0.5888 0.6788 0.7100 0.3352 0.3662 0.7841 0.4126 0.1508 0.4194 0.5858 0.3604 0.2034 0.6543 0.4506 0.5375 0.3387 0.2445 0.1491 0.0852 0.5860 0.1352

0.1382 ? 0.3352 0.7897 0.8058 0.6669 0.5164 0.4003 0.4296 0.4347 0.1594 0.1350 0.5890 0.3106 0.3557 0.1854 0.2127 0.1862 0.2312 0.3889 0.1703 0.2768 0.5969 0.4586 0.3245 0.3439 0.0349 0.4510 0.4784 0.0636 0.1677 0.2124 0.0000 0.0870 ? 0.0758 0.0000 0.0000 0.1919 0.6823 0.2690 0.4133 0.3388 0.2492 0.5074 0.4698 0.2601 0.6025 0.3739 0.5676 0.1690 0.3407 0.3185 0.1269 0.1809 ?

Hualongdong 0.4767 ? ? ? ? 0.2102 ? ? ? ? ? ? ? ? ? 0.4403 ? ? 0.4383 ? 0.8305 ? 0.6242 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6214 ? ? 0.2324 ? ? 0.4469 0.5122 ? 0.5545 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4780 ? 0.3467 ? ? 0.6632 ? 0.5267 0.4555 0.6787 0.4584 0.3448 ? ? 0.4419 ? ? 0.5959 0.1679 0.8815 ? ? 0.9282 0.2760 ? ? ? 0.4369 0.9669 0.3359 ? 0.8441 0.5125 ? ? 0.7945 ? ? ? ? ? ? ? ? 0.7133 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.0000 0.0913 ? ? ? ? ? ? ? ? ? 0.3273 ? ? ? ? ? 0.0509 ? ? 0.1442 0.0664 ? ? 0.1270 0.8074 0.7543 ? 0.6298 0.6106 0.7314 0.7497 0.9718 0.8488 ? 0.9185 1.0000 1.0000 1.0000 1.0000 0.2045 0.1224 ? 0.1807 0.1897 0.4555 0.3084 0.1703 0.0000 0.0342 ? ? ? ? ? ? ? ? 0.0000 0.3425 0.7390 ? 0.7500 0.5000 0.0000 0.0000 ? ? ? ? ? ? ? ? 0.3511 0.1745 0.3189 0.2137 1.0000 1.0000 ? ? ? ? ? ? 0.5612 0.3077 0.3308 0.3333 0.7143 0.7000 0.0769 0.0000 0.0000 0.3905 0.2963 0.5333 0.3210 0.4000 0.5000 0.5000 0.1667 0.0000 0.0000 0.0395 0.0804 0.4264 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.2185 0.1000 1.0000 0.0000 0.0000 ? ? ? ? ? 0.3850 0.2310 0.0731 0.7626 0.1111 0.3236 0.1773 0.2489 0.8750 0.0000 0.0000 0.6667 0.4000 0.2125 0.1916 0.1853 0.2529 0.8750 0.0000 0.1111 0.8000 0.6667 0.0000 0.0000 0.8367 0.2357 1.0000 0.0000 0.2857 0.6667 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.8646 ? 0.2921 ? ? ? ? ? ? ? ? 0.4706 0.3942 0.1914 ? ? ? 0.3615 ? ? ? ? ? ? ? ? 0.0288 0.1487 ? ? 0.5629 ? 0.2274 0.2399 ? 0.8262 0.1201 ? 0.5689 ? 0.3304 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6392 0.4927 ? ? 0.6071 ? 0.5387 0.7959 0.6474 ? 0.5527 ? 0.7291 ? 0.5700 0.5229 0.5905 0.5915 0.5025

Harbin 0.6740 0.7668 0.7520 0.7951 0.7008 0.7967 0.4572 0.5490 0.4388 0.5195 0.3348 0.5575 0.4704 0.4001 0.2270 0.6382 0.7065 0.6577 0.7037 0.3489 0.8980 0.4750 0.7378 0.9118 0.6380 0.6558 0.6558 0.4063 0.2188 0.6890 0.5914 0.5548 0.5149 0.4235 0.5165 0.7120 0.7083 0.6137 0.4119 0.7935 0.5659 0.2765 0.6661 0.5305 0.3721 0.6159 0.5887 0.9726 0.7667 0.8470 0.4514 0.9996 0.9074 0.6880 0.8687 0.4788 0.6816 0.2709 0.5669 0.5160 0.5055 0.1934 0.5077 0.1912 0.3359 0.8443 0.6918 0.2774 0.5521 0.2530 0.2037 0.5272 0.2507 0.3503 0.5397 0.4175 0.3403 0.6190 0.4674 0.6273 0.7829 0.8856 0.6745 0.4322 0.3695 0.7445 0.8209 0.8166 0.7937

0.8330 0.7997 0.5585 0.6148 0.6525 0.5051 0.5062 0.3523 0.0270 0.6977 0.3808 0.1150 0.6329 0.3507 0.1556
0.7595 0.3419 0.3803 0.8671 0.6939 1.0000 0.8670 0.5031 0.7516 0.6615 0.5170 0.5609 0.3961 0.5248 0.9701
0.8380 0.8005 0.3981 0.0000 0.7116 0.2033 0.2064 0.2630 0.7228 0.5397 0.2493 0.5801 0.2975 0.6525 0.2814
0.2370 0.1719 0.2825 0.6487 0.5956
0.3619 ?
? 0.5263 0.5654 0.7428 ? 0.0000 0.5000 0.1000 0.0000 0.0000
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? ? ? ? ? ? ? ? ? ? ? ? 0.3565 0.8795 0.9092 0.7426 0.6407 0.2128 0.2602 0.5287 0.3039 0.3330 0.7452 0.3820
0.4009 0.3546 0.3311 0.0000 0.3990 0.5611 0.2820 0.2579 0.7774 0.2149 0.1794 0.1817 0.2569 0.6845 0.6546
0.1515 0.4025 0.1271 0.2261 0.1668 0.1942 0.5919 0.1537 0.0703 0.3204 0.3937 0.2705 0.2780 0.4009 0.1929
0.0000 0.0000 0.0000 0.8886 0.3012 0.7786 0.2459 0.4729 0.4855 0.3433
0.4282 ?
Jinniushan 0.6661 0.4178 0.3676 0.3490 0.3021 0.5204 0.4572 0.3592 0.3843 0.3927 0.3616 0.0916 0.3917
0.3476 1.0000 0.2620 0.4420 0.3188 0.3535 0.4892 0.8067 0.4792 0.7204 0.8231 0.3347 0.2662 0.5362 0.5018
0.5743 0.2175 0.4310 0.3642 0.1866 0.4606 0.1603 0.3089 0.3201 0.3262 0.2028 0.4795 0.5469 0.3799 0.4777
0.4512 0.2744 0.5988 0.6654 0.3383 0.5376 0.2799 0.5446 0.0000 0.2933 0.4605 0.0905 0.5573 0.1580 0.7005
0.4764 0.4400 0.5824 0.2418 0.3684 0.4000 0.2773 0.4112 0.6306 0.3542 0.5314 0.4498 0.1479 0.6194 0.2064
0.3956 0.4536 0.3119 0.1448 0.1764 0.1672 0.4968 0.2488 0.4234 0.4774 ? 0.0617 0.5228 0.6532 0.5969 0.6190
0.6370 0.6122 0.3668 0.5144 0.3180 0.3164 0.3819 0.4099 0.3446 0.7591 0.2979 0.2228 0.7266 0.7346 0.2593
0.8358 0.3159 0.4680 1.0000 0.3296 0.6796 0.5525 0.3296 0.3428 0.4259 0.1837 0.3665 0.2078 0.4151 0.3424
0.3771 0.4164 0.1139 0.3295 0.7874 0.3496 0.1625 0.4408 0.7717 0.2808 0.1008 0.8132 0.2814 0.4417 0.3403
0.1767 0.2488 0.1805 0.3131 0.3578
0.2089 ? 0.4159 0.6231 0.5928
0.5252 0.2857 0.4000 0.0000 0.0000 0.5582 0.4851 0.3405 0.0000 0.5000 0.3750 0.0000 0.0000 0.4093 0.1842
0.5949 0.3450 0.2000 1.0000 0.8000 0.0000 0.3507 0.1802 0.3081 0.4245 0.0000 0.6000 0.3107 0.2026 0.3649
0.3245 0.0000 0.3750 0.4846 0.2131 0.3769 0.0000 0.5714 0.3000 0.1538 0.6667 0.0000 0.2719 0.1509 0.4922
0.1974 0.2000 0.5000 0.8000 0.0000 0.0000 1.0000 0.0689 0.0878 0.3220 0.0874 0.1000 0.2500 0.3333 0.0000
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? ? 0.1965 0.7820 0.8259 0.4986 0.8040 0.5804 0.3702 0.2086 0.2137 0.1161 0.7552 0.2577 0.4177 0.2327 0.2431
0.5344 0.0792 0.2080 0.4262 0.3369 0.4815 0.4926 0.4003 0.4656 0.0000 0.6848 0.4808 0.1604 0.5590 0.1700
0.2830 0.1979 0.4194 0.7073 0.2300 0.2407 0.2834 0.4320 0.1536 0.0000 0.1677 0.2342 0.4043 0.5004 0.3593
0.9056 0.2399 0.4753 0.3276 0.2842 0.3555 0.2149 0.2599 ?
Maba 0.5951 0.3637 0.3077 ? ? 0.3474 0.3274 ? ? ? ? ? ? ? ? ? ? ? 0.4990 ? 0.6904 0.5833 0.5239
0.8223 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3916 0.5060 0.3575 0.5616 0.5732 0.4884 0.7469 0.4878 ? ? ? 0.6951 ? 0.2927
0.6425 ? ? ? ? 0.5906 0.5800 0.4725 ? 0.2817 ? ? ? ? ? 0.5539 0.5120 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3359 0.3795
0.5121 0.6243 0.3621 0.3061 0.4533 0.3351 0.4011 ? 0.1437 ? ? 0.5880 ? ? ? ? ? ? ? 0.1386 0.3751 0.4326 0.4727
0.7159 ? 0.4019 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4479 0.3360 0.3421 0.3156
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0.9373 0.5282 ? ? ? ? ? ? ? ? ? 0.4662 0.1305 ? ? 0.1440 0.3996 ? ? ? ? ? ? 0.5014 0.4594 0.1340 0.2009
0.1515 ? ? ? ? ? 0.0539 0.5734 ?
Xuchang 0.9897 0.3261 0.3472 0.4765 ? 0.0000 0.0000 0.3392 0.4057 0.3444 0.3549 ? ? ? ? 0.6129 0.6863 0.6349
0.6927 0.3669 0.8557 ? 0.7265 0.9925 0.6468 0.5501 0.5209 ? ? ? 0.2129 0.2921 0.0912 0.3423 0.6140 0.4663
0.2632 0.5812 ? 0.0000 0.3863 0.3492 0.3640 0.5061 0.3837 0.5315 0.5330 0.6153 0.5675 0.5786 0.5166 ? 0.8525
0.9421 ? ? ? ? 0.5866 0.5280 0.5440 ? 0.6997 ? 0.2011 0.2359 0.3600 0.0508 0.2915 0.2430 ? ? ? ? ? ? 0.3704 ? ?
0.5285 ? ? 1.0000 ? ? 0.5114 0.3853 0.2312 0.2751 0.5093 ? 0.4525
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? 0.7078 0.8363 1.0000
0.0000 0.5097 ? ? ? ? ? 0.4484 0.2209 0.1952 0.3084 0.1288 0.2146 ? 0.5885 0.1984 ? 0.3981 0.1594 ? ? ? 0.7419
0.4670 ? 0.3172 ?
Mauer_1
? ?
? ?
? ? ? ? ? ? ? ? ? 0.3414 0.7635 0.3067 0.5603 0.5484 1.0000 0.1700 0.3640 1.0000 0.9066 0.8038 0.2460 0.1955
0.3208 0.1929 0.3141 0.0000 0.2409 0.4560 0.4668 0.6185 0.6329 0.9507 0.6751 0.3467 0.9155 0.8617 0.1399
0.1315 0.0681 0.1988 0.1459 0.1334 0.6080 0.0000 0.5866 0.2834 0.2962 0.3284 0.4368 0.5743 0.4711 0.3898
0.3335 0.3326 0.3580 0.1558 0.6835 0.1867
0.1964 ?
? ? 0.1340 0.3175 0.8342 0.5991 0.0000 0.0154 0.1701 1.0000 0.0000 0.1919 0.0000 0.3399 0.0917 0.7216 0.5130
0.1000 0.2053 0.2109 0.4322 0.9353 0.1111 0.1894 0.1094 0.2116 0.6212 0.1111 0.0657 0.1217 0.7983 0.2500
0.3333 0.1667 0.0000 0.4000 0.1720 0.2738 0.4825 1.0000 0.2500 0.3333 0.1111 0.0000 1.0000 0.2281 0.1989
0.6755 0.7802 1.0000 0.5000 0.2857 0.0000
0.0000 ?
? ? ? 0.5913 0.6207 0.7246 0.1485 0.2903 0.2567 0.9157 1.0000 1.0000 1.0000 0.7835 0.3628 0.7365 ? 0.8861
0.8693 0.8242 0.6000 0.6284 0.3320 0.6945 0.2970 0.1455 0.1662 0.1086 0.0361 0.5070
Arago_II_XIII_XXI_XLVII 0.4786 0.4230 0.4143 ? 0.4533 0.3938 0.3274 0.4156 0.4486 0.5352 0.5357 ? ? ? ?
0.3443 0.5251 ? 0.4751 ? 0.8281 0.6042 0.4040 0.7315 ? ? 0.4576 0.2816 ? ? ? ? ? ? ? 0.3964 0.3467 ? ? 0.4049
0.4310 0.2346 0.2947 0.2683 0.3256 0.5932 0.6653 0.9765 ? 0.7329 0.5393 ? 0.7642 0.6218 ? ? ? ? 0.5906 0.5800
0.6978 ? 0.6192 ? 0.3493 0.1442 0.2494 0.0220 0.2790 0.1687 ? ? ? ? ? ? ? ? ? 0.6480 1.0000 ? 0.6808 ? 0.4438
0.5123 0.6065 0.4142 0.4339 0.5969 0.5599 0.3597 0.3441 0.3666 0.4650 0.3968 0.4678 0.4459 0.4601 0.5875
0.2291 0.3652 0.6896 0.2373 0.7757 0.3103 0.3594 0.7970 0.6670 0.5673 0.3536 0.3051 0.6553 0.7741 0.5164
0.5407 0.5411 0.6315 0.5140 0.5498 0.4917 0.4038 0.4470 0.8452 0.0142 0.3062 0.5664 0.5221 0.4078 0.2591
0.5563 0.2739 0.5460 0.4889 0.1666 0.4752 0.1816 0.7546 0.5077 0.7772 0.2958 0.3091 0.3393 0.4217 0.4511
0.2348 0.3649 0.3897 0.2234 0.4761 0.5358 0.4007 0.6358 0.6019 0.4452 0.9265 0.4010 0.3412 0.4827 0.4011
0.5965 0.4932 0.9471 0.9906 0.7134 0.7044 0.9444 0.4305 0.4829 0.5879 0.5659 0.6862 0.6221 0.8122 0.4318
0.8923 0.7851 0.8823 0.7512 0.8023 0.6523 0.6113 0.4955 0.4195 0.4215 0.5170 0.2608 0.6033 0.3289
0.2401 ? 0.3230 0.2295 0.4649 0.3362 0.0000 0.0000 ? ? ? ? ? ? 0.5425
0.2405 0.2654 0.4444 0.2857 0.4000 0.0000 0.0000 0.0000 0.4445 0.2643 0.3803 0.4510 0.3000 0.5000 0.5000

0.0000 0.0000 0.0000 0.1940 0.1900 0.1837 0.2216 0.2000 0.3333 0.5000 0.0000 0.0000
0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5718 0.6598 0.5397 0.7164 0.3333 0.3094 0.3963 0.4102 0.5101 0.1111 0.3653
0.3518 0.5236 1.0000 0.0000 0.1667 0.0000 0.2000 0.3507 0.3883 0.3409 0.5586 1.0000 0.0000 0.2222 0.0000
0.3333 0.3639 0.3442 0.6367 0.5363 0.8750 0.2500 0.2857 0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.2921 1.0000
0.9075 0.7084 ? 0.2505 0.3181 ? ? ? ? ? 0.3822 0.3710 0.2229 0.0307 ? 0.4916 0.3536 ? 0.2111 0.0872 ? ? 0.5452
0.6685 0.7165 0.1841 0.3245 0.2316 0.6142 0.5039 0.2125 ? 0.2465 0.1582 0.1939 0.1361 0.2941 0.5003 0.5916
0.2468 0.3818 0.2748 0.3861 0.5066 0.1905 0.5724 0.6074 0.7724 0.9685 0.7985 0.8199 0.4230 0.5683 0.2147
0.3803 0.5621 0.1796 0.8481 0.6417 0.8796 0.6767 0.8107 0.3850 0.4379 1.0000 0.5445 0.4973 0.6530 0.2087
0.6124 0.5857 0.7816 0.4050 0.2009 0.2165 0.2406 0.1273 0.4168
Broken_Hill 0.5549 0.6249 0.5796 0.7571 0.5800 0.8136 0.5811 0.3832 0.3141 0.4555 0.3304 0.4747 0.5094
0.4932 0.4897 0.4180 0.5825 0.4593 0.5082 0.4353 0.7015 0.0333 0.6079 0.8222 0.3601 0.3537 0.5109 0.3649
0.5697 0.7151 0.3880 0.3879 0.5620 0.0803 0.5417 0.6355 0.6383 0.3469 0.5599 0.7811 0.6218 0.3603 0.5260
0.3963 0.2907 0.7498 0.5536 0.6689 0.6747 0.8163 0.6059 0.7196 0.3985 0.5326 1.0000 0.0467 0.4767 0.5397
0.5079 0.4760 0.6484 0.3868 0.4861 0.3495 0.3485 0.8743 0.6729 0.4756 0.6565 0.4498 0.3475 0.7084 0.3695
0.2624 0.3961 0.1366 0.4360 0.6154 0.5359 0.4977 0.7613 0.5792 0.5624 0.9364 0.3238 0.7325 0.7964 0.8292
0.8148 0.8152 0.7722 0.8236 0.7297 0.6149 0.3178 0.5180 0.3709 0.0642 0.6346 0.7820 0.4721 0.7132 0.5190
0.5412 0.8094 0.3102 0.4690 0.7382 0.8388 0.7092 0.8168 0.3635 0.7925 0.8058 0.7358 0.4677 0.3429 0.7978
0.5655 0.6213 0.6828 0.6140 0.5896 0.8498 0.1016 0.2498 0.2820 0.6630 0.6106 0.3121 0.4675 0.4681 0.7356
0.3110 0.3085 0.4542 0.3487 0.5712 0.4701
0.2926 ? 0.1016 0.8290 1.0000
0.2912 ? ? ? ? 0.1136 0.7061 0.9588 0.3303 0.7500 ? ? ? 0.6252 0.4496 0.5385 0.6376 ? ? ? ? 0.2427 0.2422 0.6432
0.0000 ? ? ? ? ? ? ? ? 0.6418 0.3851 0.2538 0.3333 0.2857 0.3000 0.0000 0.0000 0.0000 0.4524 0.3052 0.4324
0.2151 0.4000 0.5000 0.7000 0.0000 0.0000 0.0000 0.1592 0.2979 0.6486 0.1587 0.2000 0.1667 0.0000 0.0000
0.0000
1.0000 ?
? ? 0.2169 0.7168 0.8874 0.9010 0.6424 0.3017 0.2890 0.5733 0.4596 0.4313 0.6421 0.5394 0.4930 0.2803 0.2421
0.1842 0.2266 0.2002 0.3998 0.3982 0.7883 0.4585 0.2337 0.2390 0.2659 0.7731 0.7455 0.0473 0.2717 0.1582
0.7258 0.5380 0.5258 0.4145 0.1203 0.1559 0.4732 0.1665 0.6198 0.5770 0.7437 0.2637 0.4259 0.4733 0.4800
0.7839 0.4645 0.8719 0.6394 0.4623 0.5966 0.2867 0.2802 ?
Petralona_1 0.4862 0.7868 0.6780 0.8412 0.6808 0.5517 0.2212 0.6255 0.5129 0.6473 0.4777 0.4237 0.5726
0.2894 0.7458 0.8273 0.6709 0.8280 0.7312 0.1763 0.8652 0.3000 0.5844 0.6346 0.6823 0.6778 0.4623 0.6588
0.8106 0.6261 0.4723 0.5288 ? 0.4240 0.7709 0.7322 0.8507 0.6479 0.2994 0.5202 0.5926 0.4302 0.4642 0.4207
0.2209 0.6870 0.6914 0.7618 0.4996 0.9423 0.5047 0.8134 0.6533 0.8107 0.9101 0.2696 0.3763 0.5948 0.5669
0.4400 0.6099 0.2440 0.3498 0.2462 0.2356 0.7444 0.3012 0.4534 0.3162 0.0000 0.3346 0.4827 0.3789 ? ? ?
0.0752 0.6086 0.4525 1.0000 0.6842 0.7778 0.8879 ? 0.3630 0.7758 0.8972 0.6607 0.6085 0.7965 0.8851 0.6759
0.4564 0.6518 0.5864 0.6485 0.6599 0.4257 0.1777 0.8332 0.3472 0.6941 0.5735 0.4807 0.9208 0.6039 0.8875
0.9595 0.6778 0.7185 0.5517 0.6943 0.5888 0.9663 0.8227 0.5291 0.5659 0.8581 0.5818 0.7575 0.8911 0.8792
0.6490 0.8631 0.2561 0.2539 0.4242 0.9177 0.7130 0.2626 0.5510 0.5827 0.7828 0.7972 0.4750 0.6049 0.2814
0.6546 0.8724
0.3266 ?
? ? ? 0.6185 0.3020 0.3128 0.2052 0.0000 0.2000 0.4000 0.0000 0.5088 0.4818 0.6396 0.4644 0.0000 0.0000

0.3388 0.5239 0.9535 0.2287 0.0000 0.5000 0.6424 0.5061 0.4385 0.3333 0.4286 0.4000 0.0000 1.0000 0.0000 0.3642 0.4208 0.8226 0.1332 0.4000 0.5000 0.6000 0.0000 0.0000 0.0000 0.2769 0.4071 0.5193 0.2810 0.4000 0.3333 0.0000 0.0000 0.1250

0.0000 ? 0.5515 0.9308 0.6956 0.6685 0.3092 0.3702 0.6259 0.5375 0.1623 0.2718 0.5969 ? 0.3696 0.2617 0.2017 0.1824 0.2922 0.3712 0.4592 0.3447 0.8027 0.3345 0.0396 0.1798 0.2385 0.7047 0.8028 0.1006 0.1487 0.3331 0.6970 0.5969 0.4180 0.9698 0.5321 0.5346 0.2577 0.3320 0.6208 0.7087 0.7508 0.2671 0.7236 0.7556 0.6473 0.8855 0.3479 0.7372 0.6615 0.4691 0.3197 0.3085 0.3052 ?

Ceprano 0.5043 0.4917 0.5208 0.6082 0.4352 0.3095 0.1917 0.3658 0.3570 0.5069 0.4554 ? ? ? ? 0.8137 0.6721 0.8157 1.0000 0.3993 0.8242 0.3167 0.5856 0.8686 0.7151 0.7213 0.6848 1.0000 ? ? 0.6337 0.6871 0.5495 0.2040 0.6926 0.6435 0.8034 0.6587 ? 0.3470 0.6433 0.5922 0.2453 0.2317 0.2698 0.6810 0.5638 0.7957 0.7183 0.9017 0.5925 ? 0.5203 0.7583 ? ? ? ? 0.5236 0.5200 0.7143 ? 0.5913 ? 0.2580 0.3533 0.5506 0.3297 0.6395 0.5181 ? ? ? ? ? ? 0.4515 0.5011 0.3598 0.7200 0.1882 ? 0.7342 ? ? 0.7484 0.8092 0.6137 0.5873 0.7234 0.7841 0.8696 0.5346 0.8214 0.7243 0.6200 ? ? 0.0000 ? ? ? ? ? ? ? 0.5248 0.7313 0.5326

0.6496 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4171 ? ? ? ? ? ? ? ? ? ?

1.0000 ? 0.7951 0.8797 0.9512 0.4272 0.5493 0.7326 1.0000 ? ? ? 0.6477 0.3305 0.3545 0.4452 0.1528 0.0996 ? 0.2994 0.3823 ? 0.4499 0.2289 0.3189 0.2101 ? 0.8933 0.7776 0.0746 0.1026 0.3759 ? ? ? ? ? 0.2494 ? ? ? ? ? ? ? ? ? ? ? ? ? 1.0000

0.8001 ?

Steinheim 0.4461 0.2633 0.1738 0.3540 0.4439 0.2630 0.3156 0.1772 0.2362 0.2618 0.2857 0.1472 ? 0.0398 ? 0.0027 0.0000 0.0853 0.0009 0.4928 0.6601 0.8083 0.1644 0.6759 0.0000 0.0000 0.2525 0.0000 ? 0.0000 0.4368 0.5031 0.3682 0.2940 0.0000 0.3516 0.5676 0.0000 0.0000 0.1910 0.3986 0.2765 0.5538 0.6585 0.4070 0.5639 0.4321 0.6833 0.5243 0.3858 0.5659 ? 0.5620 0.5869 ? ? ? ? 0.6063 0.5040 0.3764 ? 0.2755 ? 0.1991 0.6193 0.5812 0.1887 0.2760 0.2651 0.2956 0.4959 0.3119 0.3008 0.1708 0.4510 0.3764 0.3096 0.5135 0.3921 0.0000 ? 0.7306 ? 0.3220 0.2078 0.2919 0.2373 0.3069 0.1642 0.1056 0.4351 0.3971 0.5347 0.1083 0.1513 0.0270 0.0946 0.8339 0.2693 0.2135 0.5430 0.4431 ? ? 0.3152 0.0000 0.0944 0.1183 0.2654 0.3239 0.2987 0.2824 0.4273 0.1494 0.3733 0.4943 0.3346 0.3070 0.2418 0.2039 0.0000 0.3396 0.8551 0.1850 0.1461 0.6919 0.2922 0.4174 0.4050 0.3868 0.0921 0.5444 0.3421 0.1978 0.2920 0.2433 0.0000 0.3339

0.4403 ? 0.2328 0.1740 0.4526 0.1543 0.0000 0.5000 0.5686 0.1328 0.0205 0.3333 0.8571 0.1000 0.0000 0.6667 0.0000 0.2717 0.2122 0.6186 0.2279 0.4000 0.5833 0.2000 0.0000 0.0000 0.0000 0.1247 0.1524 0.3175 0.1630 0.2000 0.1667 0.0000 0.0000 0.0000

0.0000 ? 0.0000 0.9374 1.0000 0.8608 0.6670 0.1177 0.1238 ? 0.2210 0.0000 0.5724 0.3124 0.7483 0.1109 0.1720 0.1146 ? 0.3882 0.3297 ? 0.7351 0.1802 0.4378 0.6219 0.4629 0.4175 0.6301 0.1887 0.2979 0.4114 0.3212 0.4954 ? ? 0.5785 0.0028 0.3893 0.3973 0.1064 0.4174 0.2024 0.1964 0.1062 0.1940 0.3070 0.4955 0.3543 0.8855 0.6325 0.0000 0.0963 0.4706 0.5576 ?

Saldanha 0.5293 0.5589 0.4878 0.5542 ? 0.6808 0.5044 0.1665 0.0959 ? ? ? ? ? ? 0.3955 0.4091 ? 0.5458 ? 0.7694 ? 0.6191 0.5363 ? ? 0.3863 ? ? ? ? ? ? ? ? ? ? ? ? 0.6372 0.5913 0.3771 0.4638 0.3780 0.3558 0.7476 0.6913

0.6219 0.4341 0.7646 0.6272 ? 0.4759 0.6514 ? ? ? ? 0.6693 0.6200 0.6566 ? 0.2632 ? ? ? ? ? 0.6090
0.4418 ? ? ? ? ? ? ? ? ? 0.6384 ? ? 0.7450 0.2289 ? 0.4375 0.3250 0.4147 0.5238 0.4495 ? 0.9379 0.6915
0.4935 ?
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0.7932 0.5713 0.7581 ? ? ? ? ? ? ? ? ? 0.2402 0.2015 0.2884 ? 0.2431 0.5538 ? ? ? ? ? ? 0.4837 0.4797 0.0000
0.1768 ?
Bodo 0.5655 0.3722 0.2453 ? 0.5747 0.3567 0.3304 ? ? ? ? 0.2059 ? 0.0000 ? 0.4789 0.5905 ? 0.6362 ? 0.6994
0.0000 0.5814 0.7452 0.5544 0.5644 ? 0.5997 ? 0.6708 ? ? ? ? 0.5644 0.7137 0.8109 0.5588 0.4870 0.3843 0.6284
0.5503 0.2941 0.2744 0.2907 0.7159 0.6955 ? ? ? 0.6631 ? 0.4009 0.7049 ? ? ? ? 0.5906 0.5600 0.7308 ? 0.3994 ?
0.1588 0.3957 0.6329 0.5580 0.4795 0.4217 ? ? ? ? ? ? ? 0.4155 ? ? 0.7922 ? ? ? 0.3139 0.7561 0.8019 0.5154
0.4868 0.7207 0.8005 0.3593 0.3598 0.4237 0.5498 0.7587 0.7980 0.6419 0.2973 0.6662 0.3022 0.5067 0.1635
0.3718 0.6188 0.4759 0.6614 0.9373 0.6987 0.7052 0.7731 0.7865 0.2133 0.8078 0.7077 0.5012 0.4920 1.0000
0.4696 0.5945 0.7272 0.6454 0.6982 0.9023 0.5061 0.1719 0.5166 0.7535 0.3667 0.1494 0.7338 0.3869 0.7379
0.5410 0.4800 0.4340 0.1749 0.8815 ?
0.6472 ?
? ?
? 0.4999 0.7286 0.8183
0.4782 ? 0.5338 0.5629 ? 0.3895 0.5427 ? ? 0.5453 0.4176 0.1448 ? ? 0.2162 0.5171 ? 0.5793 0.4593 ? ? 0.3874
1.0000 0.7879 0.2062 0.3480 0.5498 0.7332 0.4945 0.3627 ? 0.4054 0.3748 0.4414 0.5241 0.5419 0.6349 0.8708
0.3645 0.6284 0.7416 0.6184 0.5831 0.0875 0.6136 0.3863 0.9460 1.0000 0.6732
0.6557 ?
Ternifine_1_2_3_4 0.5951 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.2439 0.2209 ? 0.2770 ? ? ? ? ? ? ?
0.4373 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3702 0.1859 0.3424 ? 0.4200 ? ? ? ? ? ? ? ? ? ? ? ?
0.5418 ?
? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.3596 0.5643 0.6888 0.8456 0.8463 0.3415 0.4701 0.2987 0.5315 0.5642 0.3623 0.3762
0.1639 0.2727 0.4365 0.5779 0.5081 0.5484 0.5278 0.6162 0.7154 0.6581 0.7951 0.8440 0.4791 0.7016 0.8709
0.7836 0.3373 0.4924 0.4864 0.5212 0.5254 0.7941 0.6137 0.6017 0.4677 0.4758 0.5830 0.8464 0.4467 0.3629
0.2911 0.2703 0.3421 0.3417 0.2769 0.6293 0.3396
0.3071 ?
? ? ? ? ? ? ? 0.0746 0.0298 0.6559 ? 0.0247 0.0000 0.3990 0.2800 0.8394 0.6104 0.0000 0.2481 0.4191 0.6916
0.4859 0.2222 0.3368 0.3214 0.2511 0.5286 0.2593 0.3846 0.2929 0.3648 0.7917 0.0000 0.1667 0.2222 0.0667
0.2380 0.3687 0.5793 0.3571 1.0000 0.1667 0.2222 0.1333 0.0000 0.4038 0.3927 0.6558 0.6273 0.8333 0.0000
0.3810 0.0000 0.0000 ? ? ? 1.0000 1.0000 1.0000 0.3646 1.0000 1.0000 0.5179 0.5129 0.7072
0.3333 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.2576 ? 0.1887
0.9275 0.2638 0.3338 0.2559 0.3997 0.7288 0.5933 0.8248 0.6184 0.6520 0.7092 0.2649 0.2533 0.4891 0.5022
0.6758 0.3855 0.5420 0.4512 0.7249 0.3109 0.2477 0.3958 0.1311 0.1294 0.4848
Peking_X_XII_XIII_LII_RC 0.4333 0.5692 0.6527 0.6465 0.3578 0.5717 0.3717 0.4719 0.4421 0.5844 0.5030 ?
0.6248 ? ? 0.5840 0.5902 0.6177 0.5352 0.2554 0.6380 ? 0.4825 0.5553 0.6188 0.6381 0.4886 0.6075 0.0637 ?
0.4921 0.5239 0.1992 0.4200 0.6246 0.6525 0.6678 0.5919 ? 0.7450 0.5815 0.3184 0.3979 0.2785 0.2977 0.6134

0.4324 0.6446 0.5860 0.7729 0.5100 0.5646 0.5288 0.7137 0.6503 0.3854 0.2255 0.9320 0.4606 0.4907 0.7299
0.1901 0.6450 0.1912 0.5422 0.5590 0.2376 0.3390 0.5738 0.3963 0.4425 0.3328 0.3458 0.1030 0.5581 0.2818
0.3171 0.4495 0.2304 0.4278 0.7392 0.7036 0.7667 0.5504 ? 0.4875 0.5608 0.5554 0.6085 0.4654 0.5088 0.5597
0.5407 0.5719 0.4803 0.4751 0.3838 0.3378 0.3588 0.5418 ? 0.6807 ? ? ? 0.3987 0.5105 0.3442 0.5634 0.4780
0.7435 0.4862 0.7554 0.8379 0.3971 0.4771 0.3173 0.6103 0.3709 0.4331 0.4668 0.3105 0.3819 0.8256 0.0752
0.2641 0.4348 0.5250 0.5507 0.3466 0.4318 0.2021 0.6810 0.4377 0.0333 0.1189 0.1906 0.6945 0.6007 0.3095
0.6363 0.9011 1.0000 1.0000 1.0000 0.4077 0.6136 0.3775 0.6592 0.5763 0.1208 0.0000 0.5759 1.0000 1.0000
1.0000 0.8603 0.7432 0.8327 0.8414 0.9206 0.9895 0.8172 1.0000 0.9467 0.1250 0.9470 1.0000 0.5697 0.7089
0.8955 0.9913 1.0000 1.0000 1.0000 0.7608 0.9203 0.6548 0.8613 0.8831 0.5662 0.6154 0.4882 0.5016 0.4168
0.7351 0.6705 0.8501 0.8486 ? 0.4940 0.4630 0.4173 0.2553 0.2857 0.5000 0.0000 0.5000 0.7914 0.4647 0.5819
0.6637 0.6250 0.8750 0.0000 0.0000 0.5668 0.0541 0.0000 0.0000 0.2000 0.2000 0.6000 1.0000 0.3469 0.2274
0.3829 0.5897 0.0000 0.0000 0.5978 0.2405 0.6172 0.3449 0.0000 0.0000 0.5956 0.3486 0.4581 0.9259 0.5714
0.2667 0.0000 0.0000 0.0000 0.5517 0.3411 0.6763 0.3173 0.6667 0.6111 0.2667 0.0278 0.0000 0.0000 0.3509
0.4257 0.3485 0.4055 0.7667 0.6389 0.9444 0.0000 0.0000 0.0000 0.7588 1.0000 0.5704 0.4910 1.0000 0.6940
0.5609 0.2509 0.1057 0.1890 0.8000 0.8973 0.8120 0.4839 0.6266 0.8000 0.5051 0.9267 1.0000 0.4826 0.1111
0.6459 0.8481 0.3744 0.8384 0.0000 0.6378 0.8538 0.9099 0.5000 ? 0.0000 ? 0.0000 0.4361 0.8034 1.0000 0.3057
0.5000 0.0000 0.0000 0.2000 0.0000 0.8770 1.0000 0.7020 0.7222 0.3750 0.2500 0.1429 0.0000 0.0000 1.0000
0.0000 0.9886 ? ? ? ? ? ? ? 0.0000 0.0000 1.0000 0.4548 0.7059 0.6594 0.8029 0.4866 0.4749 0.6486 ? ? ? 0.6327
0.1864 0.4115 0.8284 0.3201 0.1402 0.2963 0.3454 0.3632 0.1851 0.3948 0.2983 0.2755 0.1450 ? 0.5338 0.6283
0.1320 0.3313 0.4486 0.4872 0.5410 ? 0.6574 0.4571 0.3774 0.5611 0.2491 0.1956 0.4483 0.3573 0.2525 0.3284
0.4583 0.3887 0.5726 0.1776 0.7930 0.1568 0.6224 0.6049 0.3070 0.3346 0.2327 0.7785 0.1480 0.4004 0.2079
0.1792 0.9219 0.5802 0.8489 0.7385 0.5543 0.2509 0.3209 ? 0.6274 0.6572 0.7020 0.3470 0.4469 0.2102 0.8963
0.5387 0.5745 0.3296 0.2181 0.1677 ?
Nanjing1 0.2605 0.4734 0.5937 0.6000 ? 0.1384 0.0383 ? ? ? ? ? 0.7858 ? ? ? 0.7521 ? 0.6751 ? 0.5795 ? 0.3221
0.3020 ? ? 0.5477 0.4418 ? ? ? ? ? ? ? ? ? ? ? 0.2945 0.3587 0.1676 0.2690 0.2744 0.2907 0.5681 0.2658 0.2314
0.6143 0.6074 0.5007 0.3352 0.1873 0.5817 0.7455 0.0000 0.1590 ? 0.1496 0.1720 0.7363 0.3604 0.6316
0.3604 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6892 ? 0.3969 0.6040 ? ? 0.3442 0.4029 0.3674 0.4392 0.3708 0.3322 0.2992
0.6002 0.5046 0.5230 0.4246 0.3735 0.5068 0.4452 ? ? ? ? ? ? 0.3943 0.2669 0.2021 0.4033 0.4443 0.5949 0.6502
0.6230 0.5932 0.4669 ? ? ? ? ? ? ? ? ? 0.3191 1.0000 0.5853 0.4274 0.5360 0.3961 0.3974 0.3572 0.7672 0.4033
0.3394 0.0584
0.8722 ?
? ?
? 0.7226 0.4449
0.5289 ? ? 0.5641 ? ? ? ? ? ? 0.8145 0.2031 0.4117 0.2089 0.1584 0.3735 0.3321 ? ? ? ? ? 0.4341 0.6270 0.2977
0.8491 0.5376 ? ? ? 0.7496 0.5363 0.1830 0.4907 0.5940 ? 0.6789 0.4990 ? ? ? ? 0.4383 0.3466 0.9102
0.0750 ?
Hexian 0.3781 0.5721 0.6397 0.6376 0.3835 0.2550 0.0855 0.4843 0.4564 0.5807 0.4955 ? 0.5614 ? ? 0.8400
1.0000 0.8394 0.9246 0.3129 0.7804 ? 0.6754 0.5401 0.6846 0.5931 1.0000 0.3068 0.3496 ? 0.7197 0.9780 0.1679
0.1325 0.9460 0.5147 0.5918 0.6137 ? 0.3276 0.4239 0.2570 0.3944 0.4085 0.3302 0.7162 0.4240 0.7356 0.9480
0.7529 0.5952 0.6171 0.3844 0.6034 0.8513 0.1019 0.4742 0.7846 0.4252 0.4160 0.8819 0.3297 0.2601 0.3407
0.5940 0.7375 0.6541 0.5385 0.6498 0.4739 0.4204 0.2669 0.3841 0.2569 0.5092 0.4652 ? 0.5796 ? 0.3433 0.6593

0.5705 0.4937 0.4021 ? 0.3975 0.3132 0.0000 0.0000 0.3481 ? 0.7562 0.4925 0.6199 0.4066 ? ? ?
0.6595 ? 1.0000 ? ? ? ? ? ? ? ? ? ? 0.6318
0.4747 ? 0.9751 0.8758
0.5463 0.6208 1.0000 0.4000 0.0000 0.7500 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.6787 0.6115 0.5982 0.7593 0.0000
0.0000 ? ? ? ? ? ? 0.6625 0.5436 0.4462 0.6667 0.2857 0.0000 0.0000 0.0000 1.0000 0.5255 0.5426 0.7040 0.3957
0.3000 0.5833 0.3000 1.0000 0.0000
1.0000 ? 0.7343 ? 0.7500 0.3333
0.4444 0.0000 0.3333 ? ? 0.9633 ? 0.7500 0.5000 0.0000 0.0000 1.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.7518 0.7753
0.5493 0.2878 0.8581 0.0000 0.1887 ? ? ? 0.4858 0.0294 0.2441 0.5499 0.1279 0.0745 0.2139 0.2069 0.7298
0.4384 0.4778 0.5509 ? ? ? 0.4289 0.4057 0.0670 0.1301 ? 0.5541
0.2782 ?
Sambungmacan_1_30.3419 0.4456 ? 0.4848 0.3559 0.6932 0.6047 0.6485 0.7126 0.7182 0.7254 ? ? ? ? 0.6060
0.6578 0.6277 0.6225 0.3183 0.8934 ? 0.8827 0.8561 0.5992 0.5161 0.5501 0.6316 0.4186 ? 0.4900 0.5550 0.3032
0.3317 0.6115 0.6270 0.6000 0.5262 ? ? ? ? ? ? 0.3988 0.6218 0.8512 0.3634 0.4732 0.6751 0.5579 ? 0.4699
0.6702 ? ? ? ? ? 0.5260 ? ? 0.3731 ? 0.5087 0.6308 0.4212 0.2579 0.5871 0.4920 0.4091 0.3583 0.2638 0.4883
0.1949 0.6211 0.0000 0.5538 ? 0.7096 0.4071 ? 0.6998 0.4484 ? 0.5808 0.6254 ? ? 0.5774 ? 0.4812 0.5039 ?
0.4036 ? ? ? 0.5316 ? 0.4359
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? 0.5899 0.7972 0.7814
0.5069 0.5459 0.4429 0.4790 ? ? ? 0.5934 0.2399 0.3654 ? ? 0.6129 ? 0.3038 ? ? 0.4587 0.2421 0.0000 ? ? 0.7321
0.4204 ? 0.3747 ? 0.4069 0.2102 ?
Sangiran_2_17 0.2845 0.7669 0.9031 0.8283 0.6128 0.7506 0.4174 0.5669 0.4573 0.6702 0.4978 0.6209 0.7518
0.6778 0.6474 0.7944 0.8571 0.7983 0.8522 0.3040 0.6387 ? 0.7593 0.5345 0.6670 0.6087 0.7710 0.6383 0.5880
0.4149 0.3706 0.6209 0.2009 0.2358 0.8271 0.6386 0.6002 0.6264 0.0748 0.7760 0.5290 0.2346 0.3416 0.2134
0.1616 0.5041 0.7607 0.8873 0.9286 0.7538 0.3628 0.8242 0.6856 0.7978 0.7603 0.6242 0.2429 0.8418 0.4646
0.3140 0.7912 0.0000 0.8762 0.0000 0.7358 0.6089 0.2247 0.5672 0.9184 0.6265 0.5184 0.2792 0.3772 0.1902
0.4715 0.3976 0.6798 0.7193 0.4386 0.2817 0.5526 1.0000 0.7360 0.6657 0.6348 0.5374 0.5198 0.8043 0.8519
0.4768 0.6050 0.6128 0.4965 0.5685 0.5713 0.6294 0.6517 0.6959 0.4568 0.4366 0.1225 0.4111 0.5498 ? ? 0.8403
0.8155 0.5720 0.7248 0.6614 0.8015 0.5310 0.5177 0.6916 0.7040 0.4575 0.2440 0.7591 0.6444 0.7013 0.7691
0.5722 0.4621 0.8439 0.4736 0.1593 0.2062 0.8058 0.9125 0.4014 0.4159 1.0000 1.0000 1.0000 1.0000 0.0698
0.8700 0.6575 0.6088
0.6694 ?
? ? ? 0.5834 0.2548 0.3077 0.5284 0.0000 0.2000 0.4000 0.0000 0.2571 0.1964 0.5117 0.1225 0.0000
0.0000 ? ? ? ? ? ? 0.5338 0.3541 0.4821 0.3333 0.4286 0.1000 0.0000 0.0000 0.5000 0.4534 0.2809 0.3858 0.3804
0.2000 0.5000 0.1000 0.0000 0.0000 0.5000 0.1926 0.4046 0.8346 0.3362 0.2000 0.3333 0.0000 0.0000 0.0000
0.5000 ? 0.5575 0.7124
0.0457 0.4218 0.3259 0.2440 0.0000 0.3248 0.7143 1.0000 1.0000 1.0000 0.7692 0.5317 0.5646 0.5066 0.6778
0.6527 0.3700 0.4913 0.4564 0.0297 0.0643 0.3622 0.1580 0.2695 0.4457 0.4205 0.1280 0.4343 0.5059 0.2034
0.0000 0.3029 0.5783 0.2995 0.0724 0.5520 0.3939 0.4314 0.0711 0.2221 0.4977 0.2444 0.3384 ? ? 1.0000 0.5737

0.4960 0.3948 0.6010 0.7314 0.5667 0.2548 0.4169 0.4539 0.3677 0.7496 0.7345 0.9847 0.0000 0.4796 0.3504 0.6212 0.7669 ?

Ngandong7_9_12 0.4136 0.6450 0.7582 0.6961 0.5521 0.6374 0.3963 0.5600 0.5060 0.7017 0.5938 0.7272 0.8054 0.7579 0.8141 0.6198 0.7264 0.6411 0.6478 0.3561 0.8671 ? 0.7982 0.9112 0.5777 0.5356 0.6155 0.3191 0.5101 0.7423 0.8286 0.8942 0.5831 0.4492 0.7004 0.7602 0.7523 0.4053 0.4612 0.7742 0.6001 0.3324 0.4253 0.2957 0.2705 0.5619 0.6257 0.7614 0.5993 0.8565 0.4079 0.7599 0.7564 0.8480 0.4831 0.6476 0.1165 0.9295 0.4803 0.4453 0.7143 0.3253 0.7307 0.3319 0.5509 0.5141 0.2196 0.2696 0.7814 0.6399 0.3700 0.5082 0.3172 0.9032 0.8058 0.8711 0.4220 0.8154 0.4566 0.6175 0.7117 0.6347 0.8053 ? ? 0.5809 0.5224 0.6271 0.7063 0.6420 ? 0.6326 0.9260 0.6596 ? ? ? ? 0.7126 ? ? ? ? ? ? ? 0.9511 0.8353 ? ? ? ? 0.7638 ? ? ? ? ? ? ? ? ? ? ? ? ?

0.3400 ? ? ? ? ? ? ? ? ? ? 0.5522

0.8094 ? 0.4337 0.7746 0.8148 0.6189 0.6610 0.1275 0.1396 0.2925 0.3485 0.4432 0.6738 0.3020 0.4327 0.7264 0.3652 0.1844 0.3582 0.5083 0.3440 0.3014 0.3532 0.1879 0.2171 0.1627 ? 0.5876 0.4768 0.1229 0.6452 ? ? ? ? ? ? 0.6673 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4323 0.3644 ?

Dmanisi 0.0677 0.6283 0.6609 0.7054 0.6183 0.5717 0.3481 0.6781 0.6473 0.8783 0.8025 0.7584 0.7739 0.5471 0.6638 0.6844 0.6766 0.7151 0.6503 0.2464 0.3352 ? 0.4853 0.2569 0.7039 0.6999 0.4548 0.4452 0.6730 0.5788 0.8519 0.8020 0.5217 0.4397 0.8113 0.3778 0.3193 0.7012 0.6255 0.5840 0.5066 0.2723 0.2775 0.1982 0.1215 0.6506 0.4790 0.2996 0.4367 0.5612 0.5260 0.5808 0.3651 0.6211 0.5191 0.3832 0.1183 0.7274 0.3022 0.2880 0.8070 0.4725 0.5565 0.4799 0.8265 0.5709 0.2276 0.5212 0.6532 0.4408 0.6658 0.5096 0.3380 0.3787 0.6074 0.3935 0.8198 0.7048 0.8284 0.5175 0.6878 0.4172 0.6903 ? 0.7192 0.6921 0.7053 0.6155 0.6270 0.6595 0.6741 0.4335 0.4051 0.5864 0.6747 0.6888 0.7607 0.6745 0.4635 0.8148 0.5810 0.4366 0.0893 0.6803 0.4086 0.7360 0.6759 0.4766 0.6644 0.5727 0.8529 0.7217 0.1499 0.8478 0.7714 0.7798 0.7237 0.7342 0.8148 0.8781 0.8778 0.7610 0.3485 0.7898 0.8753 0.0341 0.4206 0.3839 0.5136 0.4474 0.3649 0.8224 0.7588 0.6711 0.6198 0.7909 0.9043 0.7871 0.7029 0.8093 0.6850 0.6331 0.0761 0.0324 0.1998 0.3106 0.4322 0.3650 0.3527 0.6723 0.7472 0.3717 0.7017 0.6622 0.7049 0.7045 0.7817 0.5881 0.6597 0.5305 0.1804 0.3716 0.8031 0.3601 0.3046 0.4358 0.8761 0.5413 0.4538 0.4130 0.6790 0.7607 0.6399 0.7773 0.3386 0.7522 0.6420 0.4855 0.5705 0.5894 0.7470 0.7360 0.5414 0.5534 0.5745 0.6387 0.6670 0.6973 0.6107 0.3675 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 1.0000 1.0000 0.5897 1.0000 ? ? ? ? 1.0000 1.0000 0.7423 0.9117 ? ? 0.8461 0.7717 0.4857 0.5093 1.0000 0.7500 0.8616 0.7695 0.3205 0.9259 0.4762 0.2000 0.3077 0.0000 0.3333 0.6270 0.6568 0.2624 0.4864 0.7667 0.9167 0.5000 0.1667 0.0000 0.1667 1.0000 1.0000 0.0499 1.0000 1.0000 0.8333 1.0000 0.0000 0.0000 0.0000 0.5162 0.2753 0.1872 0.0000 1.0000 0.5664 0.4213 0.0860 0.4732 0.0000 0.8000 0.8019 0.3537 0.1745 0.4594 0.0000 0.6873 0.4559 0.1371 0.6252 0.1481 0.4488 0.3828 0.1598 0.1566 0.1111 0.6072 0.4921 0.2904 1.0000 0.6667 0.6667 0.5833 0.5000 0.4330 0.4416 0.2832 0.2295 1.0000 0.3333 0.7222 0.6000 0.3333 0.7405 0.5809 0.3694 0.6510 1.0000 0.3750 0.7857 0.5000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5228 0.3270 0.3276 0.8018 0.3905 0.2102 0.4428 0.5322 0.1417 0.3245 0.8103 0.2656 0.1951 0.3894 0.2440 0.4833 0.2275 0.2243 0.4707 0.4404 0.2306 0.7004 0.4137 0.3872 0.7854 0.7214 0.8122 0.2154 0.3190 0.5500 0.7651 0.6952 0.6790 0.5697 0.8258 0.3957 0.5495 0.4466 0.2677 0.8059 0.7915 0.2275 0.4246 0.3334 0.3419 0.1287 0.4905 0.6623 0.8226 0.6901 0.6384 0.7881 0.7521 0.7419 0.0000 0.2264 0.2674 0.2231 0.2305 0.8451 0.3624 0.3431 0.2218 0.5785 0.2261 0.6536 0.6055 0.9124 0.7904 0.7156 0.3266 0.4617 0.1983 0.8068 0.3353 0.3503 0.3590 0.2548 0.2663 0.3438

Rabat

? 0.4384 ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4646 0.8020 ? 0.9439 0.2895 0.5714 0.4000 0.0000 1.0000 ? ? 0.9588 1.0000 0.1250 0.2500 0.0000 0.7500 ? ? 0.9385 0.7380 1.0000 1.0000 0.8000 0.7500 ? ? 0.5225 0.6781 0.4000 0.8000 ? ? 0.8140 0.2261 1.0000 0.2500 ? ? 0.3667 0.7778 0.4286 1.0000 0.3077 0.6667 0.0000 ? ? 0.4479 0.0979 0.2000 0.5833 0.5000 0.3333 1.0000 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.5000 ? ? ? ? ? 0.6000 ? ? ? ? 0.0000 ? ? ? ? 0.3333 ? ? ? ? 1.0000 ? ? ? 1.0000 0.3333 0.0000 0.6667 0.0000 ? ? ? ? ? ? ? ? ? ? ? ? ? 1.0000 0.5000 0.2857 0.6667 0.0000 ? 1.0000 0.6368 0.4877 0.3744 ? 0.5235 0.4973 ? ? ? ?

STW53 0.0189 0.2493 0.0883 0.4029 0.5697 0.1876 0.2507 0.7878 1.0000 0.7199 0.8527 0.5157 0.4037 0.7955 0.2649 0.7848 0.5841 0.7897 0.4664 0.0072 0.0000 ? 0.0000 ? 0.6272 0.6415 0.4334 ? 0.4073 0.8102 0.2624 0.4753 0.4462 0.2175 0.9441 0.6645 0.6714 0.5744 0.7466 0.2019 0.4657 0.3827 0.5967 0.7012 0.4419 0.9163 ? 0.0999 0.4809 0.5280 0.8935 0.4546 0.1330 0.2525 0.4836 0.0849 0.3956 0.5229 0.7598 0.6320 0.3709 0.9451 0.0743 0.9451 0.6015 ? ? 1.0000 0.9052 1.0000 0.6782 0.5848 0.4093 0.3132 0.8366 0.2693 0.5432 0.6394 0.5264 0.5768 0.4676 0.0213 0.2749 ? 0.5567 0.3541 0.5371 0.1772 0.1799 0.4397 ? 0.1609 0.2029 0.5745 0.7088 0.8258 0.6825 1.0000 ? 0.7645 0.6029 0.4570 0.1114 0.5628 0.5909 0.4816 0.3570 0.2951 ? ? 0.9261 0.4581 ? 0.6937 0.7362 0.8384 0.6481 0.6901 0.5524 0.7808 0.9531 0.7509 0.6086 0.8186 0.6402 0.1011 0.8460 0.2310 0.4628 0.4960 0.2781 0.6730 0.7588 0.2751 0.5603 0.5600 ? 0.8019 0.4602 0.7262 ? 0.6732 0.7753 0.8847 0.7066 ? ? 0.9488 0.8818 0.5134 1.0000 0.0000 0.0000 0.6948 0.7330 0.6462 0.8889 0.7143 ? ? 0.0000 1.0000 0.9178 0.8530 0.5277 1.0000 0.8000 0.6667 0.4000 0.0000 0.0000 1.0000 0.6940 0.8872 0.4309 0.8786 0.6000 0.9167 1.0000 0.4000 0.0000 1.0000 ? 1.0000 0.0580 ? 1.0000 0.3042 ? ? 0.6543 0.2956 0.7496 0.3243 0.3849 0.3074 0.3686 0.0000 ? 0.0694 0.0045 0.4612 0.9778 ? 1.0000 0.2769 0.2085 0.8224 0.6088 0.9481 0.5775 0.4576 1.0000 0.9231 0.8047 0.5651 ? 0.6189 0.2376 ? 0.3271 0.1765 1.0000 0.9950 0.2148 0.8685 0.9131 0.5924 0.0030 0.4132 0.6976 0.5934 0.9362 0.5587 0.7788 0.7011 ?

OH_9 0.3686 1.0000 1.0000 1.0000 0.8649 1.0000 0.4749 0.5271 0.3122 0.7077 0.4196 1.0000 1.0000 1.0000 0.6296 0.7060 0.7133 0.6649 0.6388 0.2878 0.5555 ? 0.9542 0.5032 0.5977 0.5702 0.5146 0.3710 ? 0.5011 0.5234 0.5952 ? 0.4240 0.8882 0.3886 0.5553 0.6226 0.4881 1.0000 1.0000 0.7626 0.6163 0.4146 0.0349 0.6532 0.5761 0.4509 0.7511 0.5478 0.3542 0.2017 0.2785 0.4838 0.5000 0.2059 0.2769 1.0000 0.2008 0.1360 0.5357 0.2549 0.6192 0.3121 0.9664 0.2791 0.3341 0.4465 0.8801 0.4418 0.5200 0.5535 0.3033 0.4299 0.6626 0.4021 1.0000 0.6841 0.7453 0.0000 0.6438 0.4228 0.5099 0.7801 ? 0.9449 1.0000 0.7157 0.6296 0.9500 1.0000 1.0000 0.7924 1.0000 0.6092 ? ? ? 0.8439 ? ? ? ? ? ? ? 0.9198 0.7444 0.7736 0.7167 ? ? 0.8760 ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4265 ? ? ? ? ? ? ? ? ? ? 0.6893 0.9704 ? 0.2549 0.3890 0.3966 0.7099 0.4798 0.1364 0.1149 ? 0.1487 0.0724 0.5960 ? 0.2915 0.3732 0.3694 0.3751 0.1170 0.1747 0.2382 0.2653

0.0000 0.4695 0.4855 0.3306 ? 0.7387 0.6599 0.0727 0.2100 ? ? ? ? ? ? 0.4762 ? ? ? ? ? ? ? ? ? ? ? ? ? ? 0.4041 0.4777 ?

Turkana_ER3733_3883 0.2441 0.4188 0.4112 0.5283 0.5475 0.3112 0.2448 0.4002 0.4356 0.5793 0.5811 0.5698 0.5789 0.5750 0.4139 0.4959 0.6271 0.5416 0.5519 0.3657 0.4449 ? 0.6422 0.4451 0.4848 0.4435 0.5621 0.4429 0.5275 0.3384 0.5165 0.6575 0.4783 0.4023 0.6713 0.4339 0.3417 0.4548 0.2090 0.3468 0.5801 0.4963 0.2853 0.2703 0.1736 0.5135 0.2980 0.5137 0.6822 0.5110 0.4718 0.5453 0.4547 0.6348 0.5989 0.3001 0.2594 0.6351 0.4042 0.3813 0.6694 0.3846 0.4427 0.4088 0.5750 0.7202 0.2369 0.5033 0.6408 0.5683 0.4694 0.3070 0.3286 0.2724 0.6164 0.4515 0.4966 0.5810 0.5531 0.3707 0.2594 0.4750 0.6498 ? 0.4837 0.5702 0.5841 0.4509 0.4921 0.5376 0.5470 0.4118 0.3946 0.5676 0.4146 0.5038 0.3855 0.3193 0.5233 0.7498 0.4771 0.6310 0.1126 0.4564 0.5528 0.5462 0.5763 0.4628 0.3893 0.4387 0.8999 0.7390 0.1608 0.8172 0.3921 0.4631 0.3588 0.5939 0.7113 0.7230 0.6515 0.2802 0.1168 0.7106 0.6291 0.0677 0.4953 0.5113 0.6089 0.3660 0.4457 0.2369 0.7985 0.4066 0.2477 0.3987 0.3033 0.5345 0.4273 0.4048 0.4323 0.5594 0.3875 0.4659 0.4329 0.6138 0.5942 0.7743 0.2738 0.4611 0.7057 0.3273 0.5699 0.6002 0.5157 0.6823 0.4565 0.4619 0.5022 0.1854 0.2414 0.0699 0.8886 0.6716 0.4464 0.2973 0.9087 0.0232 0.5682 0.6892 0.6873 0.8991 0.8682 0.8778 ? 0.8903 0.7784 0.4200 0.4096 0.6312 0.7657 0.7637 0.5894 0.6059 0.6308 0.8225 0.9355 0.6350 0.4452 0.2056 1.0000 0.9178 0.5666 1.0000 0.0000 0.4000 0.0000 1.0000 0.9380 1.0000 0.4426 0.2718 0.2500 0.5000 0.0000 0.0000 ? ? ? ? ? ? ? ? 0.5600 0.4134 0.4315 0.7564 0.4000 0.7000 0.5279 0.3600 0.3050 0.5266 0.3750 0.8750 0.3438 0.2539 0.1077 0.8889 0.4286 0.8000 0.0769 0.6667 1.0000 0.4743 0.2477 0.2905 0.3355 0.6000 0.7083 0.4000 0.0000 0.0000 0.0000 ? ? ? ? ? ? ? ? ? ? 0.4795 0.5835 0.5686 0.3153 1.0000 0.6804 0.9329 0.6057 1.0000 0.5407 0.8000 0.7951 0.6751 0.5096 0.7143 0.0000 0.7212 0.5418 0.2056 0.7662 0.1111 0.7177 0.5314 0.0000 1.0000 0.1111 0.5713 0.5553 0.4893 1.0000 1.0000 0.3333 0.6667 0.4000 0.4213 0.5668 0.5559 0.3886 1.0000 1.0000 0.4444 0.6000 0.6667 ? 0.4841 0.3928 0.4640 0.3784 0.6306 0.3417 0.3591 0.6125 0.1585 0.2282 0.4891 0.2532 0.2941 0.4498 0.2577 0.1831 0.3213 0.3578 0.4450 0.4122 0.4870 0.6555 0.3056 0.2996 0.6643 0.7391 0.5795 0.2139 0.3779 0.4379 0.8605 0.7637 0.4347 ? 0.6832 0.4117 0.7668 0.4978 0.2608 0.4545 0.4905 0.2657 0.3042 0.1746 0.1155 0.5587 0.2098 0.9397 0.5509 0.5803 0.4639 0.4258 0.3939 0.6079 0.4087 0.5176 0.6361 0.3857 0.2394 0.7621 0.0000 0.4339 0.0213 0.6898 0.0490 0.3516 ? 0.5656 0.5510 0.6247 ? 0.2207 0.7383 0.8111 0.3952 0.4222 0.4032 0.3894 0.4318 0.2839

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Antecessor

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Narmada

20000?00202021?1212101??2010000????????????????????????????20020110000?213?11000111??10100011

2111220013011110110111121100l??22??
???

Eliye_Springs 1?02??[1
2]02000????00210120201110000111011l?20???1?10??????000001210111l0?2122101111111110212202111211 01
21110111201100271011?120??
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Ndutu
10020?3020001??0??1100??00???000011111?0?10??2?0101?????0?1000110111121210010010111101000021
12212221010101000020111021101l?120???
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Irhoud_1_2 1[0 1]0[0 2][0 2]0101010111[0 1][0 1]01[1 2]01[0 1]0[2
3]110000001110012011142100100010?011000[1 2]21[0 1][0 1]100?21001[0 1]01011011110[0 1][0
1]1210112211012[0 1]110???102?1[0 1]201[1 2][1 2 3][0
1]?021111211121221110010000110112221112????211??010220010011120000110 0???0????????????????12?11122
?0012?0010020102

Florisbad
1112213011210110001102103010000001110022011 1?21001?001010?1010????011?????????????????????????
???????????????????????????1??1?1??
????????????????????????????????????

Omo_II
1112212111210??01112121030111 00?????????????????????????????20110101101030113101011011110 11221
21122110120110111102110202 11???2??
???

LH_18
111220201121011100110210301??11001110012?10??2100110010?01100022101110?20110??11111??101002
310112111012011011110211011 2231??21???
??????????0?2???211?1????????????????????

Skhul_V_IX 1112[1 2]?[1 2][0 1][1 2]121[0 1]12[0
1]0012010031100110011100121 1103?21011?????110000???01[1 2][0 1][0
2]0211011010110101100012121122110120110111202110112231?0212222222001112100011012121010000122111
21011111221001111020101110000000000000100002000310301202011120?0?1010001

Qafzeh_IX
11122?11012101200012121031 10?110011100120011221001121101011000120001010102 00??101101011011
12101122112120110111102110202 21???22222121 1000?0210001101111021000002211222010111111000001120 21
101001100001002111013110311101112011120001101 0101

Mladec_I_II_V_VI [1 2]11220[1 2 3]101210120[0 1]002[0 1]2[0 1]03110?110011100120110321101021211100[0
1][0 1]01[2 3]001[1 2][0 1]10[1 3]0[1 2][0 2][0 1]1[0 1]1011[1 2]1111[0 1][0 1 2][0 1]221[0 2][1 2]12211[0
1]1201101111021102[0 1]2[0 1 2][1
3]1?122???3???303?0?????????
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Cro_Magnon_I_II_III 11122[0 1][1 2]101210120001202[0 1]0311??1100111002201114211101[0 1][0 2]0[0 1]0103[0 1][0 1][0 1]01[2 3]0[0 1]11[0 1][0 1 2]12[0 1]210?01011[1 2]11111111212[1 2]12211012011011110211021223101222222202000?121000210111002 1?2110????22?1?????101001112000001 00???????????????[2 3]???311?1???2????2???????0???

Oase_1_2

111220110121 0120?0121200301??100011100120111222001110 10?01100000?01110?10000??1011111100111 0121122111120110111102110112230?12022222221010121100221121012121111221011201110022000001101000 10000???????????????2???21120???2????2?0012020202

ZKD_UC_101_103 111220[2 3]111210120001212[0 1]031???[0 1]10011110220111221001100 10?0210001200111[2 3][0 1]2121[1 3]11101111111011 1212[1 2]12211012011011110 2110[1 2]122[1 3]101222222222001202110001012110222[1 2]2102211121011100220101011210101000000000000 0?1??00[2 3]??03113111?2012120???2010202

Liujiang

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SH4_5 20000?10201021211011 0011201??00[0 1][0 1]01011011000?2111010020002010010211100?3121100121101111021021010222100010100101111111112301121 0010110101112110202111223012211022000011100002200000110010000010 0???0??????????1???0???002211122 21??????0???

Tabun_1 20000?00201021010011002120100201100011???????20?1000120?0?100010200110?[2 3]11010013111??10000230[0 2]21122101201110112111012132 21?020100000000[0 1]212111[0 1]0000122300221012211201001010210000011121211001001000100001011120113003112221122211011010201

Tabun_2

?? ????????????2?????????????222211111110100[0 1]2021122220212110221112101101012000101112000011 00?????????????????????????12?2112?21???00?0101

Spy_I_II 20[0 1]0[0 1]?[0 2]02??021210[0 1]1[1 2]002120100101100011????????????0????????0001??[0 1]0110?311[1 2]10013112??1000023[0 1]0111021[0 1]0200111112111012132 20??2010000000111121011021112 2201?110122?2?12?11???22001?10112021111?0?????? ???0102013111300201112011120001 1010101

Gibraltar_1

20000?0020102121001100212010010110001 1001000?1011010120110 0?001??10111?312010013112??10000 2302211221002111101121110121322010 20?? ?????????1????3??03???[0 1]????????????????????

Amud

200011002??021210011002120 1??10???????????00?1??100012010?000012210110?312010013112??1100022 1[0 2]2112210120011011201101213221??2?211000000121111[0 1]2021112220122211112201110011 22001?0112202111110010000010010111201131131012201022021121 10211

La_Chapelle_aux_Saints

20000?002??021210012002120 1??201100011001?00?10010101 2010?000010?00110?2131100131121 1100002

01[0
2]2001200020011011211101113221?1210100000000?001?1201101????1220??22012?1101011110001 1010?110101
00???

La_Ferrassie_1

20120?0020102111001100212 01??10110001100 1000?10010021?0103000012200110?2121100131121110000
2310100221002001111211101213220??21??
???0???0?1????????????0????????????????????

Shanidar_1_5 2000[0 2]0[0 1]020102[0 1]210[0 1]1[1 2]0021201??1011000110 01000?2[0 1]010121[1
2]010?10101[1 2]200110?21101001311211100002[0 3]10111221[0 1]120[0 1]1[0 1]11[0 1]21110121322[0
1]?0210100000000?12111101111222121110021010110101112200010111210000000?????????1??0??????11[0
1]1122111121012012 0011

Cesaire

201021002010212100120021201??1011000110 01000?110101011010?1?????????????????????????????????
????????????????????????????????110000000111210110000122212111002????21110100220001101221211110102
000001011000130003002012121111211010110011

Saccopastore_I_II 20000?00201021?100120021201001011000110 01[0 1]00?10010[0
1]0010?01101012200100?31321001311111100002110111121 0120[0
1]111112111012132201021???01??11
200131[0 1][1 2]1????????????????????

Neanderthalensis_type

20001100201021010121012120 10010???????????????????????????0101110010?31??10013002??????????
?????????????????????1??3221?1???
???????????????????????????????????

Xiahe

???
??????????????????????????000000111210110110211102301?2000?????31?11???2210010010222110100?????????
??????????????????21???212021012???

Dali 211221002100111020210120 20[0
1]??01001110111021142200110120000110012111000?2111100101101011010201?2112210131110000111110211 01
11121??2???3???2????????????
?????????

Hualongdong

211221002100111020110120 20???0100111010102114221011012000001001211000???????????????????????
????2???13111????????02?1??1??2?111100110??0?10000???11230122200?????10?11???22000100100010000100?
????0010??22003???31[1 2]?[2 3]???2110121[1 2]01101[1 2]101

Harbin 20020?002100111100210110 2010[0
1]0100111011102014211011012000000001211000 0?211210010110101111111102122210131110111111100110111
021??3???3?2?3?????????????
???????

Jinniushan

20020?0021001110002101202 01??11001110111021142100101120000100012101000?21121001000 01011011

21101112210131110000111110201011012 1??0
2111000011210032203 1122????????????????????

Maba

20020?0020001111002101202010011????????????????????????????000111?010??????????????????????????
??????????????????????1??111??
????????????????????????????????

Xuchang

1000??1020001??0001101??2010001???????????????????????????00012210100?21211011111011101 00201
21122100130111????1111100100???2???
???????????????????????????????????????

Mauer_1

???
?????????????????????????0000001212100121102112212121211102212110110102200000110222110000???????
????????????????012121012100200101 01

Arago_II_XIII_XXI_XLVII

11122010200011001011012020100??0011111 0011?02201100111010001002??1010????????????????????????
?????????????????????????1011012?[0 1]10[0 1]001[0 1 2]02[1 2]0002[0 1][1 2]02112[1 2][0
1]212121112110211[0 1]10010220000011[0 1]222110000???????????00002???311310121210121201002 0102

Broken_Hill

111221002000210010100120101110000111110111003200100112001301102111011113 11220?100020011000
201211121101210101111111011101101 21??
?????????1??002???21131??????????????????

Petralona_1

201221002000111110100120101111001111100110032001001120013010012100010?312120010001001 1????
??2111211011101 0111?111102?10110121??
??????211000200021131???????????????????

Ceprano

101220002000110100110020101 1100???????????????????????????00021111002131122000000 0??1110021?
211121101110101111???1010101???21???
???????????????????????????????????????

Steinheim

200211002000111110110020101110000111010111003211010???0?011200221010010112010010110??101001
1122112201111010111201000001211012 1???
?????????????300021231???????????????????

Saldanha

11122??020002100001000201011111?????????????????????????????00020?000021311?20000000??1????????
????????????????????????112???2???
???????????????????????????????????

Bodo

10022030200001200021002?10111??001111100 12?01200101112000012 0?1???00????????????110??????????

??122210121110????0???11?32211021???
???????????????????????????????????????
Ternifine_1_2_3_4
??????????????????1??0002111000??????????????????????????????
????????????????1??100?????001[1 2]1[0 1]1[1 2][0 1]21[0 1][0 2]11[0 1]012111101022221121200111000[0 1]01110011101121010000????????????????????????0122111[1 2][1 2][1 2]0[0 1]10[0 1]10[0 1][0 1]1
Peking_X_XII_XIII_LII_RC 0000[1 2]010200000[1 2]021210020101001100111002101?14220010?1??1??0[1 2]0010?20002?31213010000[1 2]1001000200[0 2]11112001211100002000012000000?120000??????101?1110100011011012211212200101001022010001012l???0 0100211000002112012112211[2 3]00122010220001001020l
Nanjing1
0000101020000020112000001010011001110121 0?012?1001???????????0010?200021213230010000??0??????
??????????????????????????0??
?????????????????????????????????????
Hexian
111221102000110011200120101000 0????????????????????????????1012102100313110301000110101100200
011102001010000001000012000001?020???????????????????????0201??20??????????????????????1122???01??22
110??????0[0 1]101?????????????????????0010[0 2]02
Sambungmacan_1_30000[0 1]?[0 1]021101100[1 2]12101001010?00????????????????????????????[0 1]00212200031311[1 2]30[0 1]000000?00011[1 2][0 1]0[0 2][1 2]1101111[0 1]100000010000121000l??21??
???????????????????????????????
Sangiran_2_17 000021102000110011[1 2]00110001??0000111111001011200011001000 31[0 1]0121021000?211[0 2]3001000000000002[0 1]0?01112001210100002101112000011120??
????????1100002???21110????????????????????
Ngandong7_9_12 00020?202120010021[1 2][0 1]0100[0 1]01[0 1]000????????????????????????????[0 2]0[0 1]211[1 2][0 1]0[0 1]0?[2 3]1[2 3][0 2]30[0 1][0 1]00010001[0 1]21220[0 1 2][1 2]120[1 2]1012100000000001120[0 1]000?02[0 1]???
?????
Dmanisi 0[0 1][0 1][0 1]10[1 2]0[1 2]00001201120000000??0000010100011[1 2]01[0 1][0 1][0 1]001100100021[0 2]00210[0 1]00[0 1]0?[1 3][0 1][0 1][0 1 2][0 3]00[0 1]000[0 1]0101120020[0 2][1 2][0 1]1[1 2]111[0 1]1101000021011121000[0 1][0 1][0 1]21001[1 2][0 1]0000110[1 2]0[0 1][0 1]0[0 1]2111[0 1]0[0 1]11021012210[0 2]310111112200[0 1][0 1]00[0 1]0220000[0 1]000?000000??1??00[0 2]11[0 1][1 2]00000021111111[0 1]121120112
Rabat
??0100001??
???????????????????????????1110001000????101000011?????????????????????????????????1???0??00100000002
1100?3011302??0102100121012???0012

STW53

01101?10100001201021010000??000001010000120100000110010001100021000000?21111001011000011001 00?0011000021010001210001110001112 1??
????????????000??20?000????????????????????

OH_9

000020202000010000?21001000??000?????????????????????????????0021020000?2122100100000??01120010
2111111010101000011011101000 1?121??
??

Turkana_ER3733_3883 10[0 1]20?2010001110[0 1]12[0 1][0 1]01000??00000101000012003[0 1]100111010?0010002101001 0?21221001000100001120[0 1][0 1]0211111001110100001 10011[1 2][0 1]00011[0 1]2[0 1]001111100100201101211100??10[0 1]10022100110101102200000110222110100120 00???0??[0 1]10[0 1]20[0 1]0200?[0 3]022211222101101[1 2]????
;

ccode - 0.3 5 7 9.15 17.18 20 23 25.28 30.44 47.58 60.61 63 66 68 70 72 76.81 83.87 89.95 99.101 103.117 119.123 127.204 206.208 214 217.219 223.225 227.228 231.232 234.554 + 4 6 8 16 19 21.22 24 29 45.46 59 62 64.65 67 69 71 73.75 82 88 96.98 102 118 124.126 205 209.213 215.216 220.222 226 229.230 233;
;

Appendix 4. TNT script for running multiple replications, using sectorial searches, drifting, ratchet and fusing combined

```
log run.log ;
cost < ;
mxram 2000 ;
p data.tnt ;
taxname = ;
tsave *run.tre ;
ptnt commtime 1 ;
    hold 100000 ;
    coll tbr ;
    report +/1 ;
ptnt begin ajob 100 +.-myself /ram 200 =
    hold 100000 ;
    coll tbr ;
    keep 0 ;
    ratchet: iter 10 upfactor 4 downfact 4 autoconst
    0 num 30 give 99 equa ;
    dri: it 10 fit 1.00 rfi 0.20 aut 0 num 60 give 99xfa
    3.00 equa ;
    sect: mins 45 maxs 98 self 84 incr 75 minf 10 god
    75 drift 6 glob 3 dglob 10 rou 3 xss 10-14 +2
    noxev noeq slack 200 ;
    tf:rou 5 minf 3 best ke nochoo swap ;
    xm:lev 10 55 rep 1000 fuse 10 dri 10 rss css xss
    hit 10 rat 10 xmix ;
    xm ;
    tchoose 1.;
  return trees ;
ptnt wait ajob ;
keep 0 ;
ptnt get ajob ;
collapse 3 ;
unique * ;
save ;
export - run_nexus.tre ;
tsave/;
keep 0 ;
p run.tre;
nelsen *;
tsave *strict_consensus.tre;
save /;
tsave/;
keep 0;
p strict_consensus.tre;
export - strict_consensus_nexus.tre;
keep 0;
p run.tre;
majority =50 *;
tsave *majority_consensus.tre;
save /;
tsave/;
keep 0;
p run.tre;
ttag=;
majority =50;
keep 0;
p majority_consensus.tre;
tsave *majority_consensus_tagged.tre;
save *;
export - majority_consensus_tagged_nexus.tre;
tsave/;
log/;
proc/;
zzz;
```

Appendix 5. TNT script for running multiple replications, using sectorial searches, drifting, ratchet and fusing combined, with backbone constraints

```
log run.log ;
cost < ;
mxram 2000 ;
p data.tnt ;
taxname = ;
tsave *run.tre ;
ptnt commtime 1 ;
    hold 100000 ;
    coll tbr ;
    report +/1 ;
ptnt begin ajob 100 +.-myself /ram 200 =
    hold 100000 ;
    force / (Habilis_OH7_OH24_ER1805
    (Antecessor ((Irhoud_1_2 Florisbad Omo_II
    LH_18 Skhul_V_IX Qafzeh_IX
    Mladec_I_II_V_VI Cro_Magnon_I_II_III
    Oase_1_2 ZKD_UC_101_103 Liujiang
    Tabun_2 ) (SH4_5 Tabun_1 Spy_I_II Gibraltar_1
    Amud La_Chapelle_aux_Saints La_Ferrassie_1
    Shanidar_1_5 Cesaire Saccopastore_I_II
    Neanderthalensis_type Xiahe ))));
    constrain = ;
    coll tbr ;
    keep 0 ;
    ratchet: iter 10 upfactor 4 downfact 4 autoconst
    0 num 30 give 99 equa ;
    dri: it 10 fit 1.00 rfi 0.20 aut 0 num 60 give 99xfa
    3.00 equa ;
    sect: mins 45 maxs 98 self 84 incr 75 minf 10 god
    75 drift 6 glob 3 dglob 10 rou 3 xss 10-14 +2
    noxev noeq slack 200 ;
    tf:rou 5 minf 3 best ke nochoo swap ;
    xm:lev 10 55 rep 1000 fuse 10 dri 10 rss css xss
    hit 10 rat 10 xmix ;
    xm ;
    tchoose 1.;
  return trees ;
ptnt wait ajob ;
keep 0 ;
ptnt get ajob ;
collapse 3 ;
unique * ;
save ;
export - run_nexus.tre ;
tsave/;
keep 0 ;
p run.tre;
nelsen *;
tsave *strict_consensus.tre;
save /;
tsave/;
keep 0;
p strict_consensus.tre;
export - strict_consensus_nexus.tre;
keep 0;
p run.tre;
majority =50 *;
tsave *majority_consensus.tre;
save /;
tsave/;
keep 0;
p run.tre;
ttag=;
majority =50;
keep 0;
p majority_consensus.tre;
tsave *majority_consensus_tagged.tre;
save *;
export - majority_consensus_tagged_nexus.tre;
tsave/;
log/;
proc/;
zzz;
```

Appendix 6. TNT script for calculating the Bremer Supports and Relative Bremer Supports

```
log run_Bremer.log;
```

```
mxram 4000;
p data.tnt;
hold 100000;
p majority_consensus.tre ;
ttags = ;
naked -;
tplot 0;
sub 100x0.90 ;
bsupp !!+0 0. ;
ttags;
ttags & run_Bremer.svg;
log/;
zzz;
```

Appendix 7. Synapomorphies mapping on the most-parsimonious phylogenetic tree. Characters are listed in Appendix 1 and Appendix 2. Node number are indicated in S-Figure 27.

Antecessor :

Char. 0: 0.522 --> 0.358
Char. 5: 0.343-0.520 --> 0.140
Char. 21: 0.479-0.733 --> 0.841
Char. 22: 0.689 --> 0.612
Char. 27: 0.463-0.501 --> 0.672
Char. 39: 0.391-0.479 --> 0.039
Char. 40: 0.468-0.504 --> 0.000
Char. 60: 0.401 --> 0.000
Char. 90: 0.540-0.612 --> 0.706
Char. 106: 0.556 --> 0.563
Char. 107: 0.388-0.408 --> 0.308
Char. 112: 0.342-0.467 --> 0.000
Char. 114: 0.250-0.373 --> 0.384
Char. 122: 0.329-0.373 --> 0.253
Char. 123: 0.787-0.802 --> 0.000
Char. 195: 0.400 --> 0.500
Char. 200: 0.413-0.444 --> 0.385
Char. 203: 0.500-0.625 --> 0.875
Char. 205: 0.750 --> 0.812
Char. 208: 0.938 --> 0.994
Char. 223: 0.242-0.324 --> 0.380
Char. 228: 0.270-0.330 --> 0.230
Char. 230: 0.571 --> 0.714
Char. 231: 0.300-0.400 --> 0.000
Char. 238: 0.227-0.274 --> 0.383
Char. 239: 0.200-0.400 --> 0.500
Char. 240: 0.583 --> 0.666
Char. 241: 0.500 --> 0.100
Char. 259: 0.500 --> 1.000
Char. 265: 0.600 --> 1.000
Char. 275: 0.333 --> 1.000
Char. 285: 0.333 --> 0.500
Char. 305: 0.666 --> 1.000
Char. 321: 0.782-0.836 --> 0.839
Char. 323: 0.413-0.498 --> 0.234
Char. 326: 0.316-0.370 --> 0.621
Char. 333: 0.108 --> 0.000
Char. 346: 0.480 --> 0.487
Char. 362: 0.337-0.404 --> 0.224
Char. 363: 0.458-0.469 --> 0.246
Char. 364: 0.359-0.374 --> 0.231
Char. 394: 0.523 --> 0.685
Char. 395: 0.560-0.570 --> 0.945
Char. 402: 0 --> 1
Char. 410: 0 --> 1
Char. 429: 0 --> 1
Char. 431: 0 --> 1
Char. 432: 0 --> 1
Char. 434: 1 --> 0
Char. 435: 1 --> 0
Char. 437: 1 --> 0
Char. 446: 1 --> 2
Char. 542: 1 --> 0
Char. 543: 0 --> 1
Char. 590: 0 --> 1
Char. 595: 0 --> 1
Char. 606: 0 --> 1
Char. 609: 3 --> 2
Char. 617: 2 --> 1
Char. 618: 1 --> 2
Char. 620: 0 --> 1
Char. 621: 1 --> 2
Char. 622: 2 --> 1
Char. 623: 1 --> 2

Narmada :

Char. 1: 0.363 --> 0.605
Char. 2: 0.347 --> 0.553
Char. 5: 0.347 --> 0.526
Char. 18: 0.499-0.692 --> 0.850
Char. 39: 0.391-0.404 --> 0.600
Char. 40: 0.506 --> 0.529
Char. 45: 0.746 --> 1.000
Char. 46: 0.533 --> 0.776
Char. 50: 0.695 --> 0.821
Char. 53: 0.642 --> 0.537
Char. 58: 0.590 --> 0.870
Char. 59: 0.580 --> 0.800

Char. 69: 0.243-0.253 --> 0.112
Char. 86: 0.385-0.462 --> 0.528
Char. 91: 0.453 --> 0.530
Char. 92: 0.427-0.429 --> 0.770
Char. 93: 0.366-0.401 --> 0.200
Char. 98: 0.588 --> 0.609
Char. 108: 0.432-0.667 --> 0.728
Char. 109: 0.472-0.567 --> 0.759
Char. 110: 0.715 --> 0.781
Char. 126: 0.566-0.604 --> 0.682
Char. 321: 0.793-0.836 --> 0.851
Char. 322: 0.888-0.937 --> 0.795
Char. 323: 0.528 --> 0.584
Char. 333: 0.466 --> 0.553
Char. 334: 0.128-0.130 --> 0.068
Char. 337: 0.144 --> 0.105
Char. 338: 0.399 --> 0.492
Char. 346: 0.467-0.498 --> 0.502
Char. 347: 0.132-0.134 --> 0.038
Char. 348: 0.317-0.324 --> 0.603
Char. 410: 0 --> 2
Char. 412: 1 --> 2
Char. 416: 0 --> 2
Char. 417: 0 --> 1
Char. 459: 0 --> 2
Char. 462: 1 --> 2
Char. 463: 1 --> 0
Char. 467: 1 --> 0

Eliye_Springs :

Char. 5: 0.343-0.520 --> 0.704
Char. 20: 0.804 --> 0.765
Char. 21: 0.479-0.733 --> 0.466
Char. 23: 0.771 --> 0.679
Char. 27: 0.463-0.501 --> 0.433
Char. 39: 0.391-0.479 --> 0.610
Char. 85: 0.441 --> 0.371
Char. 98: 0.651 --> 0.257
Char. 108: 0.359 --> 0.799
Char. 111: 0.307-0.329 --> 0.610
Char. 112: 0.342-0.467 --> 0.642
Char. 114: 0.250-0.373 --> 0.170
Char. 321: 0.782-0.836 --> 0.750
Char. 322: 0.825-0.829 --> 0.690
Char. 323: 0.413-0.498 --> 0.705
Char. 326: 0.316-0.370 --> 0.315
Char. 346: 0.480 --> 0.373
Char. 442: 1 --> 0
Char. 448: 0 --> 1
Char. 449: 1 --> 0
Char. 458: 1 --> 0

Ndutu :

Char. 0: 0.504-0.536 --> 0.437
Char. 4: 0.453-0.547 --> 0.594
Char. 5: 0.343-0.346 --> 0.191
Char. 6: 0.321-0.327 --> 0.238
Char. 10: 0.354-0.503 --> 0.611
Char. 11: 0.414-0.423 --> 0.515
Char. 18: 0.399-0.474 --> 0.390
Char. 20: 0.758-0.806 --> 0.637
Char. 22: 0.585-0.588 --> 0.481
Char. 23: 0.745-0.811 --> 0.744
Char. 29: 0.496-0.522 --> 0.479
Char. 30: 0.200-0.212 --> 0.169
Char. 33: 0.402-0.437 --> 0.694
Char. 35: 0.351-0.466 --> 0.255
Char. 37: 0.297-0.356 --> 0.226
Char. 38: 0.411-0.461 --> 0.633
Char. 39: 0.391-0.404 --> 0.239
Char. 45: 0.593 --> 0.536
Char. 47: 0.595-0.668 --> 0.343
Char. 48: 0.524 --> 0.347
Char. 50: 0.632-0.659 --> 0.914
Char. 53: 0.642-0.670 --> 0.705
Char. 55: 0.364-0.401 --> 0.581
Char. 56: 0.376-0.387 --> 0.172
Char. 57: 0.423-0.514 --> 0.392
Char. 58: 0.539-0.586 --> 0.507
Char. 62: 0.287-0.368 --> 0.188
Char. 64: 0.346-0.349 --> 0.371
Char. 68: 0.291-0.327 --> 0.380
Char. 69: 0.243-0.253 --> 0.381
Char. 70: 0.230-0.295 --> 0.094

Char. 71: 0.474-0.482 --> 0.233
Char. 72: 0.250-0.265 --> 0.000
Char. 73: 0.326-0.355 --> 0.377
Char. 74: 0.477-0.482 --> 0.216
Char. 75: 0.342-0.346 --> 0.604
Char. 77: 0.283-0.309 --> 0.000
Char. 82: 0.680-0.699 --> 0.774
Char. 84: 0.257-0.322 --> 0.056
Char. 85: 0.462-0.511 --> 0.343
Char. 86: 0.385-0.462 --> 0.350
Char. 87: 0.314-0.414 --> 0.040
Char. 88: 0.338-0.433 --> 0.047
Char. 89: 0.460-0.509 --> 0.315
Char. 91: 0.398-0.409 --> 0.367
Char. 92: 0.427-0.429 --> 0.346
Char. 98: 0.460-0.588 --> 0.413
Char. 101: 0.543-0.592 --> 0.770
Char. 107: 0.375-0.408 --> 0.369
Char. 111: 0.305-0.329 --> 0.255
Char. 114: 0.250-0.373 --> 0.000
Char. 115: 0.370-0.373 --> 0.060
Char. 117: 0.543-0.631 --> 0.401
Char. 118: 0.356-0.471 --> 0.000
Char. 119: 0.369-0.430 --> 0.000
Char. 120: 0.433-0.491 --> 0.000
Char. 121: 0.268-0.295 --> 0.180
Char. 122: 0.447-0.462 --> 0.685
Char. 123: 0.845-0.855 --> 0.961
Char. 126: 0.566-0.604 --> 0.983
Char. 128: 0.417-0.461 --> 0.677
Char. 129: 0.315-0.337 --> 0.515
Char. 130: 0.446 --> 0.255
Char. 138: 0.371-0.507 --> 0.836
Char. 139: 0.384-0.440 --> 0.000
Char. 321: 0.782-0.836 --> 0.706
Char. 322: 0.888-0.894 --> 0.875
Char. 326: 0.380 --> 0.392
Char. 327: 0.537-0.562 --> 0.661
Char. 331: 0.330-0.624 --> 0.633
Char. 335: 0.189 --> 0.447
Char. 336: 0.286-0.292 --> 0.352
Char. 339: 0.526 --> 0.593
Char. 341: 0.252-0.287 --> 0.307
Char. 344: 0.411-0.462 --> 0.063
Char. 351: 0.514-0.538 --> 0.667
Char. 359: 0.417-0.500 --> 0.013
Char. 360: 0.202-0.463 --> 0.000
Char. 361: 0.254-0.291 --> 0.297
Char. 363: 0.458-0.469 --> 0.548
Char. 364: 0.386-0.388 --> 1.000
Char. 371: 0.330-0.470 --> 0.000
Char. 372: 0.414-0.557 --> 0.000
Char. 406: 1 --> 3
Char. 424: 2 --> 0
Char. 464: 1 --> 0
Char. 468: 0 --> 1
Char. 469: 0 --> 2
Char. 473: 2 --> 0
Char. 482: 0 --> 1
Char. 494: 1 --> 2
Char. 496: 1 --> 2
Char. 502: 2 --> 0
Char. 507: 1 --> 0
Char. 509: 1 --> 0
Char. 525: 1 --> 0

Irhoud_1_2 :

Char. 0: 0.579-0.672 --> 0.691
Char. 1: 0.263-0.497 --> 0.189
Char. 2: 0.298-0.461 --> 0.188
Char. 3: 0.349-0.354 --> 0.356
Char. 4: 0.302-0.420 --> 0.180
Char. 5: 0.343-0.515 --> 0.303
Char. 12: 0.325-0.351 --> 0.308
Char. 14: 0.411 --> 0.504
Char. 19: 0.514-0.618 --> 0.669
Char. 22: 0.689-0.826 --> 0.838
Char. 23: 0.788-0.901 --> 0.946
Char. 27: 0.463-0.501 --> 0.517
Char. 28: 0.478-0.515 --> 0.197
Char. 29: 0.496 --> 0.464
Char. 30: 0.297-0.412 --> 0.243
Char. 31: 0.234-0.356 --> 0.232

Char. 33: 0.402-0.437 --> 0.308
Char. 36: 0.567-0.683 --> 0.504
Char. 39: 0.391-0.479 --> 0.308
Char. 40: 0.468-0.472 --> 0.365
Char. 41: 0.254-0.276 --> 0.174
Char. 44: 0.523 --> 0.625
Char. 47: 0.520-0.683 --> 0.477
Char. 48: 0.524 --> 0.559
Char. 50: 0.659-0.755 --> 0.853
Char. 51: 0.693-0.716 --> 0.059
Char. 52: 0.487-0.562 --> 0.112
Char. 55: 0.364-0.401 --> 0.086
Char. 56: 0.453-0.534 --> 0.136
Char. 57: 0.514 --> 0.568
Char. 60: 0.401-0.505 --> 0.397
Char. 62: 0.411-0.436 --> 0.526
Char. 67: 0.209-0.354 --> 0.078
Char. 68: 0.276-0.344 --> 0.210
Char. 69: 0.243-0.253 --> 0.232
Char. 76: 0.456-0.475 --> 0.814
Char. 78: 0.319-0.451 --> 0.489
Char. 79: 0.352-0.398 --> 0.324
Char. 80: 0.756-0.758 --> 0.170
Char. 81: 0.283-0.450 --> 0.149
Char. 83: 0.432-0.481 --> 0.870
Char. 91: 0.409 --> 0.508
Char. 92: 0.427-0.429 --> 0.547
Char. 98: 0.651-0.759 --> 0.639
Char. 99: 0.297-0.308 --> 0.550
Char. 100: 0.200-0.213 --> 0.326
Char. 105: 0.228-0.271 --> 0.148
Char. 106: 0.439-0.468 --> 0.535
Char. 107: 0.388-0.408 --> 0.596
Char. 108: 0.353-0.359 --> 0.259
Char. 110: 0.408-0.492 --> 0.405
Char. 111: 0.305-0.329 --> 0.503
Char. 112: 0.429-0.546 --> 0.591
Char. 114: 0.250-0.373 --> 0.387
Char. 120: 0.433-0.539 --> 0.549
Char. 121: 0.268 --> 0.381
Char. 128: 0.421-0.520 --> 0.790
Char. 129: 0.337 --> 0.421
Char. 130: 0.446 --> 0.336
Char. 132: 0.544 --> 0.589
Char. 133: 0.303-0.338 --> 0.251
Char. 137: 0.313-0.334 --> 0.507
Char. 140: 0.341-0.420 --> 1.000
Char. 143: 0.696 --> 0.815
Char. 144: 0.423-0.429 --> 0.634
Char. 150: 0.535-0.656 --> 0.245
Char. 151: 0.327 --> 0.085
Char. 152: 0.365-0.567 --> 0.674
Char. 153: 0.412-0.548 --> 0.850
Char. 154: 0.228-0.246 --> 0.683
Char. 156: 0.218-0.426 --> 0.591
Char. 162: 0.820-0.913 --> 0.000
Char. 164: 0.428-0.479 --> 0.683
Char. 165: 0.704-0.807 --> 0.848
Char. 166: 0.913 --> 0.969
Char. 168: 0.337-0.372 --> 0.797
Char. 169: 0.491-0.492 --> 0.572
Char. 170: 0.486-0.565 --> 0.650
Char. 171: 0.521-0.575 --> 0.621
Char. 172: 0.451-0.525 --> 0.599
Char. 173: 0.693-0.714 --> 0.633
Char. 174: 0.228-0.364 --> 0.555
Char. 176: 0.585-0.706 --> 0.873
Char. 177: 0.475-0.480 --> 0.752
Char. 183: 0.256-0.257 --> 0.312
Char. 184: 0.241-0.352 --> 0.480
Char. 185: 0.358-0.400 --> 0.584
Char. 186: 0.252-0.260 --> 0.872
Char. 209: 0.327-0.345 --> 0.270
Char. 217: 0.336-0.424 --> 0.498
Char. 223: 0.242-0.324 --> 0.391
Char. 231: 0.300-0.400 --> 0.900
Char. 237: 0.533-0.618 --> 0.451
Char. 240: 0.583 --> 0.750
Char. 241: 0.500 --> 0.900
Char. 242: 0.000 --> 0.083
Char. 247: 0.401 --> 0.654
Char. 256: 0.231-0.317 --> 0.210

Char. 257: 0.575-0.588 --> 0.557
Char. 258: 0.342-0.477 --> 0.189
Char. 259: 0.000-0.500 --> 1.000
Char. 260: 0.445 --> 0.571
Char. 263: 0.401-0.440 --> 0.767
Char. 264: 0.340-0.377 --> 0.296
Char. 266: 0.399-0.491 --> 0.577
Char. 268: 0.721-0.745 --> 0.410
Char. 269: 0.480-0.610 --> 0.431
Char. 270: 0.000-0.100 --> 0.900
Char. 271: 0.176-0.248 --> 0.348
Char. 273: 0.619-0.623 --> 0.438
Char. 276: 0.309-0.385 --> 0.425
Char. 277: 0.231-0.232 --> 0.346
Char. 278: 0.251-0.284 --> 0.151
Char. 281: 0.323-0.365 --> 0.397
Char. 282: 0.231-0.292 --> 0.342
Char. 284: 0.375 --> 0.000
Char. 288: 0.066-0.200 --> 0.400
Char. 289: 0.212-0.238 --> 0.343
Char. 293: 0.250 --> 0.000
Char. 295: 0.222 --> 0.333
Char. 298: 0.392 --> 0.402
Char. 299: 0.193-0.241 --> 0.267
Char. 302: 0.250 --> 0.000
Char. 323: 0.396-0.498 --> 0.191
Char. 325: 0.318-0.557 --> 0.565
Char. 327: 0.495-0.562 --> 0.274
Char. 331: 0.479-0.558 --> 0.620
Char. 333: 0.283 --> 0.346
Char. 334: 0.112-0.129 --> 0.060
Char. 335: 0.305-0.326 --> 0.409
Char. 336: 0.173-0.219 --> 0.000
Char. 337: 0.183-0.257 --> 0.015
Char. 338: 0.363-0.366 --> 0.193
Char. 341: 0.252-0.255 --> 0.086
Char. 342: 0.473-0.560 --> 0.785
Char. 343: 0.353-0.600 --> 0.625
Char. 345: 0.449-0.668 --> 0.795
Char. 347: 0.132-0.151 --> 0.115
Char. 350: 0.283-0.321 --> 0.616
Char. 351: 0.398-0.495 --> 0.534
Char. 353: 0.302-0.413 --> 0.193
Char. 354: 0.292-0.315 --> 0.061
Char. 355: 0.276-0.300 --> 0.379
Char. 357: 0.397-0.432 --> 0.492
Char. 360: 0.202-0.331 --> 0.476
Char. 362: 0.337-0.404 --> 0.179
Char. 363: 0.458-0.469 --> 0.449
Char. 369: 0.249-0.284 --> 0.628
Char. 370: 0.425 --> 0.625
Char. 373: 0.498-0.666 --> 0.128
Char. 374: 0.226-0.600 --> 0.188
Char. 377: 0.288-0.333 --> 0.000
Char. 378: 0.256-0.433 --> 0.206
Char. 379: 0.845-0.848 --> 0.976
Char. 380: 0.633-0.641 --> 0.932
Char. 381: 0.816-0.824 --> 0.914
Char. 383: 0.557-0.783 --> 0.000
Char. 384: 0.378-0.385 --> 0.097
Char. 385: 0.486-0.588 --> 1.000
Char. 387: 0.551-0.559 --> 0.464
Char. 388: 0.502-0.515 --> 0.450
Char. 389: 0.673-0.675 --> 0.504
Char. 390: 0.316-0.365 --> 0.260
Char. 392: 0.611 --> 0.181
Char. 393: 0.783-0.860 --> 0.606
Char. 394: 0.376-0.395 --> 0.275
Char. 395: 0.560-0.570 --> 0.731
Char. 396: 0.614-0.868 --> 1.000
Char. 397: 0.245-0.294 --> 0.318
Char. 398: 0.209-0.304 --> 0.485
Char. 425: 0 --> 1
Char. 450: 1 --> 0
Char. 490: 2 --> 1
Char. 493: 2 --> 0
Char. 523: 1 --> 0
Char. 533: 01 --> 2
Char. 536: 1 --> 2
Char. 544: 2 --> 0
Char. 546: 1 --> 0
Char. 550: 2 --> 1

Char. 557: 0 --> 1
Char. 565: 0 --> 1
Char. 575: 0 --> 1
Char. 619: 1 --> 0
Char. 629: 1 --> 2

Florisbad :

Char. 5: 0.515 --> 0.518
Char. 20: 0.804-0.845 --> 1.000
Char. 21: 0.733-0.833 --> 1.000
Char. 39: 0.444-0.492 --> 0.496
Char. 85: 0.462 --> 0.659
Char. 86: 0.512 --> 0.636
Char. 87: 0.502-0.566 --> 0.780
Char. 88: 0.619-0.637 --> 0.830
Char. 89: 0.460-0.461 --> 0.642
Char. 90: 0.422-0.559 --> 0.593
Char. 93: 0.398-0.428 --> 0.443
Char. 95: 0.339 --> 0.493
Char. 108: 0.353-0.359 --> 0.766
Char. 109: 0.400 --> 0.713
Char. 111: 0.245-0.305 --> 0.125
Char. 113: 0.450-0.549 --> 0.738
Char. 126: 0.451-0.526 --> 0.229
Char. 133: 0.303-0.338 --> 0.342
Char. 136: 0.269-0.342 --> 0.350
Char. 321: 0.766-0.836 --> 0.946
Char. 346: 0.353-0.480 --> 0.519
Char. 348: 0.478 --> 0.580
Char. 355: 0.276-0.300 --> 0.211
Char. 356: 0.309-0.328 --> 0.213
Char. 357: 0.219-0.381 --> 0.000
Char. 438: 1 --> 2
Char. 460: 0 --> 1
Char. 466: 1 --> 0

Omo_II :

Char. 0: 0.579-0.672 --> 0.745
Char. 9: 0.396-0.397 --> 0.506
Char. 10: 0.334-0.493 --> 0.714
Char. 12: 0.325-0.351 --> 0.501
Char. 18: 0.204-0.281 --> 0.187
Char. 25: 0.223 --> 0.206
Char. 28: 0.478-0.515 --> 0.557
Char. 33: 0.402-0.437 --> 0.562
Char. 41: 0.254-0.276 --> 0.329
Char. 46: 0.658-0.666 --> 0.829
Char. 47: 0.520-0.683 --> 0.685
Char. 48: 0.429 --> 0.354
Char. 49: 0.746 --> 0.907
Char. 51: 0.742-0.805 --> 1.000
Char. 52: 0.487-0.562 --> 0.744
Char. 53: 0.445-0.460 --> 0.680
Char. 54: 0.373 --> 0.252
Char. 55: 0.364-0.401 --> 0.869
Char. 58: 0.698-0.838 --> 0.846
Char. 63: 0.518-0.540 --> 0.476
Char. 64: 0.360-0.396 --> 0.470
Char. 66: 0.237-0.278 --> 0.174
Char. 67: 0.312-0.428 --> 0.594
Char. 68: 0.346-0.392 --> 0.897
Char. 69: 0.243-0.473 --> 0.763
Char. 71: 0.495-0.502 --> 0.443
Char. 73: 0.326-0.355 --> 0.285
Char. 74: 0.477-0.482 --> 0.114
Char. 75: 0.346 --> 0.355
Char. 77: 0.333 --> 0.330
Char. 78: 0.319-0.331 --> 0.260
Char. 81: 0.283-0.450 --> 0.574
Char. 82: 0.603-0.699 --> 0.768
Char. 85: 0.334-0.414 --> 0.007
Char. 86: 0.247-0.343 --> 0.080
Char. 87: 0.409 --> 0.250
Char. 88: 0.507 --> 0.391
Char. 89: 0.323-0.402 --> 0.067
Char. 91: 0.264-0.290 --> 0.171
Char. 93: 0.398-0.428 --> 0.366
Char. 98: 0.651-0.790 --> 0.961
Char. 126: 0.509-0.526 --> 0.649
Char. 326: 0.316 --> 0.360
Char. 330: 0.626-0.690 --> 0.735
Char. 333: 0.283 --> 0.147
Char. 336: 0.173-0.219 --> 0.294
Char. 337: 0.183-0.257 --> 0.372

Char. 339: 0.526 --> 0.478
Char. 340: 0.196-0.304 --> 0.192
Char. 341: 0.252-0.255 --> 0.552
Char. 343: 0.353-0.392 --> 0.322
Char. 345: 0.446 --> 0.000
Char. 346: 0.317-0.480 --> 0.077
Char. 347: 0.280-0.328 --> 0.422
Char. 416: 0 --> 1
Char. 417: 0 --> 1
Char. 427: 0 --> 1
Char. 428: 0 --> 1
Char. 459: 0 --> 2
Char. 461: 0 --> 1
Char. 463: 2 --> 0
Char. 469: 0 --> 1
Char. 471: 2 --> 3
Char. 519: 2 --> 1

LH_18 :

Char. 0: 0.579-0.672 --> 0.545
Char. 1: 0.263-0.540 --> 0.575
Char. 2: 0.298-0.532 --> 0.669
Char. 3: 0.345-0.354 --> 0.556
Char. 4: 0.302-0.420 --> 0.748
Char. 5: 0.515 --> 0.529
Char. 6: 0.354-0.356 --> 0.345
Char. 7: 0.299-0.359 --> 0.383
Char. 10: 0.305-0.493 --> 0.031
Char. 22: 0.584-0.666 --> 0.571
Char. 23: 0.677-0.788 --> 0.602
Char. 27: 0.243 --> 0.216
Char. 30: 0.297-0.331 --> 0.036
Char. 31: 0.234-0.243 --> 0.147
Char. 32: 0.335-0.431 --> 0.307
Char. 33: 0.402-0.437 --> 0.227
Char. 39: 0.444-0.492 --> 0.610
Char. 40: 0.468-0.504 --> 0.514
Char. 42: 0.372-0.446 --> 0.366
Char. 43: 0.341-0.408 --> 0.286
Char. 44: 0.523 --> 0.416
Char. 45: 0.834-0.869 --> 0.907
Char. 46: 0.644-0.665 --> 0.600
Char. 58: 0.698-0.838 --> 0.637
Char. 59: 0.706-0.840 --> 0.668
Char. 60: 0.604-0.670 --> 0.728
Char. 65: 0.218-0.297 --> 0.133
Char. 69: 0.243-0.473 --> 0.148
Char. 70: 0.216-0.295 --> 0.297
Char. 72: 0.224-0.265 --> 0.327
Char. 76: 0.475 --> 0.731
Char. 80: 0.756-0.758 --> 0.890
Char. 82: 0.452-0.642 --> 0.430
Char. 91: 0.264-0.290 --> 0.463
Char. 93: 0.398-0.428 --> 0.481
Char. 96: 0.266-0.280 --> 0.331
Char. 98: 0.651-0.790 --> 0.579
Char. 101: 0.721 --> 0.852
Char. 104: 0.618-0.718 --> 0.451
Char. 110: 0.408-0.492 --> 0.842
Char. 117: 0.543-0.574 --> 0.429
Char. 123: 0.840-0.855 --> 0.838
Char. 133: 0.303-0.338 --> 0.210
Char. 135: 0.292-0.307 --> 0.358
Char. 138: 0.430-0.468 --> 0.503
Char. 139: 0.129-0.149 --> 0.047
Char. 215: 0.062-0.136 --> 0.039
Char. 216: 0.466 --> 0.302
Char. 217: 0.301-0.347 --> 0.131
Char. 228: 0.423-0.490 --> 0.661
Char. 230: 0.571 --> 0.857
Char. 231: 0.100 --> 0.000
Char. 246: 0.186-0.206 --> 0.278
Char. 248: 0.301-0.309 --> 0.424
Char. 320: 0.062-0.147 --> 0.005
Char. 322: 0.808-0.818 --> 0.666
Char. 323: 0.547-0.658 --> 0.660
Char. 325: 0.318-0.365 --> 0.263
Char. 330: 0.626-0.690 --> 0.263
Char. 342: 0.473-0.560 --> 0.669
Char. 346: 0.317-0.480 --> 0.495
Char. 347: 0.280-0.328 --> 0.153
Char. 351: 0.398-0.399 --> 0.357
Char. 352: 0.350 --> 0.426

Char. 359: 0.385-0.413 --> 0.313
Char. 360: 0.202-0.331 --> 0.173
Char. 361: 0.241-0.256 --> 0.220
Char. 368: 0.490 --> 0.526
Char. 369: 0.249-0.284 --> 0.203
Char. 370: 0.425 --> 0.406
Char. 371: 0.196 --> 0.047
Char. 372: 0.229 --> 0.059
Char. 415: 0 --> 1
Char. 442: 1 --> 0
Char. 462: 1 --> 2
Char. 479: 0 --> 1
Char. 486: 1 --> 0
Char. 487: 0 --> 1
Char. 488: 1 --> 0
Char. 489: 1 --> 0
Char. 491: 2 --> 3
Char. 493: 2 --> 0
Char. 497: 2 --> 1
Char. 516: 2 --> 1
Char. 609: 3 --> 2

Skhul_V_IX :

Char. 0: 0.713-0.750 --> 0.696
Char. 2: 0.131-0.183 --> 0.017
Char. 3: 0.196 --> 0.276
Char. 6: 0.528 --> 0.510
Char. 8: 0.438 --> 0.470
Char. 9: 0.350-0.381 --> 0.565
Char. 10: 0.517 --> 0.714
Char. 11: 0.113 --> 0.019
Char. 12: 0.183 --> 0.180
Char. 13: 0.479-0.525 --> 0.608
Char. 14: 0.411 --> 0.440
Char. 15: 0.158 --> 0.320
Char. 16: 0.235 --> 0.274
Char. 17: 0.155 --> 0.249
Char. 18: 0.218 --> 0.442
Char. 19: 0.615-0.769 --> 0.920
Char. 20: 0.616-0.642 --> 0.599
Char. 21: 0.725 --> 0.435
Char. 22: 0.557 --> 0.743
Char. 23: 0.726 --> 0.790
Char. 24: 0.139 --> 0.212
Char. 25: 0.153 --> 0.239
Char. 26: 0.277 --> 0.427
Char. 28: 0.223-0.287 --> 0.415
Char. 29: 0.634 --> 0.532
Char. 32: 0.355 --> 0.414
Char. 36: 0.721-0.800 --> 0.874
Char. 37: 0.208 --> 0.291
Char. 38: 0.365-0.369 --> 0.169
Char. 39: 0.318 --> 0.316
Char. 41: 0.203-0.220 --> 0.189
Char. 43: 0.823 --> 0.835
Char. 44: 0.790-0.809 --> 0.718
Char. 58: 0.908 --> 0.909
Char. 59: 0.864-0.904 --> 0.814
Char. 60: 0.247 --> 0.221
Char. 62: 0.206 --> 0.270
Char. 63: 0.701 --> 0.665
Char. 64: 0.197-0.345 --> 0.081
Char. 65: 0.338-0.497 --> 0.749
Char. 66: 0.291-0.407 --> 1.000
Char. 67: 0.365 --> 0.425
Char. 69: 0.536 --> 0.550
Char. 70: 0.207 --> 0.264
Char. 71: 0.547 --> 0.509
Char. 72: 0.170-0.179 --> 0.229
Char. 77: 0.328-0.348 --> 0.372
Char. 84: 0.071-0.129 --> 0.205
Char. 85: 0.128 --> 0.211
Char. 87: 0.321 --> 0.240
Char. 88: 0.442 --> 0.320
Char. 89: 0.116 --> 0.213
Char. 90: 0.165-0.177 --> 0.236
Char. 91: 0.130 --> 0.250
Char. 92: 0.134 --> 0.282
Char. 93: 0.188 --> 0.142
Char. 94: 0.017-0.018 --> 0.249
Char. 95: 0.207 --> 0.362
Char. 96: 0.143-0.276 --> 0.333
Char. 97: 0.405-0.533 --> 0.371

Char. 99: 0.149-0.249 --> 0.445
Char. 101: 0.602-0.684 --> 0.537
Char. 105: 0.183-0.194 --> 0.269
Char. 108: 0.235-0.261 --> 0.378
Char. 109: 0.381-0.390 --> 0.463
Char. 110: 0.343-0.365 --> 0.589
Char. 112: 0.178 --> 0.349
Char. 113: 0.415-0.496 --> 0.600
Char. 115: 0.241 --> 0.317
Char. 116: 0.163-0.185 --> 0.405
Char. 117: 0.580 --> 0.679
Char. 118: 0.172-0.176 --> 0.240
Char. 121: 0.104-0.170 --> 0.183
Char. 122: 0.651 --> 0.546
Char. 123: 0.859 --> 0.865
Char. 126: 0.610 --> 0.815
Char. 127: 0.178 --> 0.000
Char. 128: 0.406 --> 0.608
Char. 129: 0.498 --> 1.000
Char. 130: 0.303 --> 0.000
Char. 131: 0.163-0.252 --> 0.000
Char. 132: 0.473-0.538 --> 0.574
Char. 134: 0.202 --> 0.010
Char. 139: 0.242-0.309 --> 0.517
Char. 226: 0.383 --> 0.000
Char. 231: 0.200 --> 0.000
Char. 237: 0.270 --> 0.212
Char. 239: 0.500 --> 0.300
Char. 320: 0.347 --> 0.506
Char. 321: 0.672 --> 0.530
Char. 322: 0.812 --> 0.780
Char. 323: 0.485 --> 0.326
Char. 324: 0.721-0.732 --> 0.753
Char. 325: 0.260 --> 0.242
Char. 328: 0.494-0.612 --> 0.434
Char. 329: 0.581-0.656 --> 0.548
Char. 333: 0.361-0.413 --> 0.221
Char. 338: 0.278 --> 0.220
Char. 340: 0.348-0.630 --> 1.000
Char. 344: 0.150-0.184 --> 0.344
Char. 345: 0.375 --> 0.505
Char. 346: 0.252 --> 0.209
Char. 347: 0.513-0.634 --> 0.184
Char. 350: 0.227-0.386 --> 0.584
Char. 355: 0.337 --> 0.287
Char. 356: 0.328 --> 0.469
Char. 359: 0.574 --> 0.336
Char. 361: 0.316 --> 0.371
Char. 362: 0.764 --> 0.494
Char. 363: 0.771 --> 0.628
Char. 364: 0.588 --> 0.557
Char. 366: 0.218-0.436 --> 0.000
Char. 370: 0.431-0.442 --> 0.311
Char. 371: 0.267-0.346 --> 0.566
Char. 372: 0.333-0.396 --> 0.590
Char. 408: 0 --> 12
Char. 421: 2 --> 1
Char. 440: 0 --> 1
Char. 446: 1 --> 2
Char. 471: 1 --> 2
Char. 472: 0 --> 1
Char. 510: 1 --> 2
Char. 516: 2 --> 1
Char. 523: 1 --> 0
Char. 525: 2 --> 1

Qafzeh_IX :

Char. 1: 0.148-0.161 --> 0.082
Char. 3: 0.195 --> 0.154
Char. 4: 0.140-0.222 --> 0.000
Char. 7: 0.299-0.326 --> 0.067
Char. 8: 0.339-0.438 --> 0.181
Char. 9: 0.350-0.381 --> 0.102
Char. 10: 0.388-0.517 --> 0.183
Char. 12: 0.209-0.237 --> 0.247
Char. 16: 0.101-0.139 --> 0.052
Char. 17: 0.023-0.105 --> 0.000
Char. 20: 0.616-0.642 --> 0.665
Char. 22: 0.284-0.557 --> 0.243
Char. 24: 0.054-0.061 --> 0.037
Char. 25: 0.086 --> 0.046
Char. 26: 0.244 --> 0.234
Char. 28: 0.223-0.287 --> 0.020

Char. 33: 0.402-0.604 --> 0.611
Char. 34: 0.165 --> 0.029
Char. 35: 0.664-0.697 --> 0.656
Char. 37: 0.169 --> 0.086
Char. 45: 0.834 --> 0.947
Char. 47: 0.469-0.499 --> 0.620
Char. 48: 0.326-0.491 --> 0.514
Char. 50: 0.803-0.856 --> 1.000
Char. 51: 0.742-0.809 --> 0.655
Char. 52: 0.379-0.450 --> 0.192
Char. 53: 0.361-0.399 --> 0.000
Char. 55: 0.202-0.364 --> 0.086
Char. 56: 0.699-0.755 --> 1.000
Char. 57: 0.514-0.640 --> 0.731
Char. 61: 0.689-0.797 --> 1.000
Char. 63: 0.764-0.826 --> 1.000
Char. 67: 0.282-0.365 --> 0.078
Char. 68: 0.323-0.392 --> 0.000
Char. 69: 0.389-0.473 --> 0.056
Char. 73: 0.254-0.341 --> 0.239
Char. 75: 0.283-0.314 --> 0.203
Char. 76: 0.289-0.339 --> 0.100
Char. 79: 0.261-0.319 --> 0.115
Char. 80: 0.738-0.758 --> 0.893
Char. 81: 0.219-0.283 --> 0.000
Char. 82: 0.443-0.452 --> 0.000
Char. 85: 0.115 --> 0.070
Char. 86: 0.247-0.265 --> 0.278
Char. 87: 0.409-0.554 --> 0.565
Char. 89: 0.110 --> 0.066
Char. 91: 0.069-0.130 --> 0.000
Char. 92: 0.068-0.134 --> 0.000
Char. 94: 0.017-0.018 --> 0.000
Char. 97: 0.405-0.533 --> 0.733
Char. 98: 0.617-0.664 --> 0.596
Char. 100: 0.072-0.073 --> 0.127
Char. 102: 0.552-0.670 --> 0.322
Char. 103: 0.094-0.134 --> 0.157
Char. 104: 0.787 --> 0.533
Char. 111: 0.101-0.105 --> 0.353
Char. 115: 0.209-0.212 --> 0.148
Char. 124: 0.455 --> 0.264
Char. 125: 0.104 --> 0.192
Char. 126: 0.293-0.526 --> 0.289
Char. 127: 0.276-0.299 --> 0.516
Char. 129: 0.290-0.337 --> 0.190
Char. 130: 0.446-0.463 --> 0.706
Char. 135: 0.216-0.274 --> 0.199
Char. 137: 0.291-0.318 --> 0.245
Char. 138: 0.430 --> 0.364
Char. 141: 0.133 --> 0.037
Char. 142: 0.382-0.609 --> 0.308
Char. 143: 0.696-0.701 --> 0.693
Char. 148: 0.365 --> 0.224
Char. 149: 0.436-0.445 --> 0.143
Char. 152: 0.365 --> 0.238
Char. 153: 0.412 --> 0.189
Char. 154: 0.392 --> 0.407
Char. 156: 0.575 --> 0.768
Char. 160: 0.675-0.724 --> 0.621
Char. 161: 0.567-0.768 --> 0.509
Char. 162: 0.784 --> 0.859
Char. 163: 0.772-0.786 --> 0.606
Char. 164: 0.428-0.440 --> 0.010
Char. 166: 0.891 --> 0.977
Char. 167: 0.812 --> 0.456
Char. 169: 0.478 --> 0.640
Char. 170: 0.514 --> 0.601
Char. 172: 0.451 --> 0.563
Char. 173: 0.691 --> 0.000
Char. 178: 0.757 --> 0.777
Char. 180: 0.156 --> 0.312
Char. 181: 0.034-0.117 --> 0.371
Char. 182: 0.045-0.133 --> 0.320
Char. 183: 0.003-0.216 --> 0.326
Char. 184: 0.073-0.274 --> 0.335
Char. 185: 0.550 --> 0.562
Char. 186: 0.378 --> 0.400
Char. 187: 0.476-0.662 --> 0.672
Char. 190: 0.349 --> 0.482
Char. 191: 0.390 --> 0.000
Char. 198: 0.248-0.359 --> 0.590

Char. 199: 0.236 --> 0.610
Char. 201: 0.391-0.435 --> 0.594
Char. 202: 0.750 --> 0.000
Char. 206: 0.346 --> 0.530
Char. 207: 0.115-0.167 --> 0.207
Char. 208: 0.389 --> 0.338
Char. 209: 0.458 --> 0.598
Char. 211: 0.200 --> 0.400
Char. 213: 0.000 --> 0.750
Char. 214: 0.359 --> 0.383
Char. 215: 0.062-0.136 --> 0.142
Char. 220: 0.210 --> 0.164
Char. 223: 0.154 --> 0.000
Char. 224: 0.000 --> 0.125
Char. 228: 0.200-0.366 --> 0.194
Char. 229: 0.444-0.555 --> 0.333
Char. 230: 0.571 --> 0.857
Char. 232: 0.000 --> 1.000
Char. 238: 0.195-0.207 --> 0.115
Char. 242: 0.000 --> 0.416
Char. 250: 0.500-0.583 --> 1.000
Char. 252: 0.000 --> 1.000
Char. 258: 0.342 --> 0.252
Char. 259: 0.000-0.500 --> 1.000
Char. 260: 0.445 --> 0.741
Char. 263: 0.401-0.440 --> 0.736
Char. 266: 0.397-0.491 --> 0.612
Char. 267: 0.209-0.241 --> 0.483
Char. 269: 0.422 --> 0.402
Char. 270: 0.000-0.100 --> 0.800
Char. 271: 0.287 --> 0.288
Char. 272: 0.281-0.295 --> 0.409
Char. 274: 0.109-0.393 --> 0.000
Char. 275: 0.222 --> 0.333
Char. 276: 0.313 --> 0.348
Char. 277: 0.170-0.232 --> 0.369
Char. 279: 0.186-0.282 --> 0.106
Char. 280: 0.333-0.444 --> 0.666
Char. 281: 0.314-0.334 --> 0.486
Char. 282: 0.312-0.336 --> 0.568
Char. 283: 0.575 --> 0.703
Char. 284: 0.375 --> 0.500
Char. 285: 0.000 --> 0.333
Char. 286: 0.166 --> 0.416
Char. 289: 0.253 --> 0.267
Char. 290: 0.334-0.353 --> 0.455
Char. 291: 0.489 --> 0.671
Char. 292: 0.342-0.368 --> 0.020
Char. 293: 0.250-0.500 --> 1.000
Char. 294: 0.000 --> 0.333
Char. 295: 0.222 --> 0.666
Char. 296: 0.000 --> 0.600
Char. 299: 0.336-0.529 --> 0.588
Char. 300: 0.404-0.420 --> 0.469
Char. 302: 0.250-0.625 --> 0.750
Char. 304: 0.285-0.571 --> 0.857
Char. 307: 0.256-0.526 --> 0.159
Char. 309: 0.725 --> 0.831
Char. 321: 0.726-0.786 --> 0.889
Char. 322: 0.812-0.907 --> 0.947
Char. 330: 0.790-0.912 --> 0.928
Char. 334: 0.128 --> 0.033
Char. 335: 0.273-0.380 --> 0.179
Char. 336: 0.194-0.219 --> 0.111
Char. 337: 0.156-0.179 --> 0.024
Char. 339: 0.735-0.850 --> 1.000
Char. 341: 0.182-0.255 --> 0.000
Char. 342: 0.316-0.395 --> 0.203
Char. 347: 0.513-0.634 --> 0.982
Char. 349: 0.463-0.499 --> 0.642
Char. 351: 0.475-0.530 --> 0.556
Char. 354: 0.340-0.410 --> 0.428
Char. 357: 0.219 --> 0.390
Char. 358: 0.510 --> 0.537
Char. 365: 0.380-0.570 --> 0.646
Char. 368: 0.347-0.524 --> 0.324
Char. 375: 0.462-0.669 --> 0.740
Char. 377: 0.288-0.301 --> 0.273
Char. 381: 0.754 --> 0.662
Char. 382: 0.536 --> 0.340
Char. 383: 0.621 --> 0.694
Char. 384: 0.612 --> 0.378

Char. 387: 0.343-0.531 --> 0.246
Char. 388: 0.442 --> 0.303
Char. 389: 0.602 --> 0.000
Char. 390: 0.210 --> 0.131
Char. 391: 0.727 --> 0.661
Char. 392: 0.425-0.487 --> 0.541
Char. 393: 0.909-0.940 --> 0.962
Char. 394: 0.636-0.658 --> 0.693
Char. 395: 0.568 --> 0.728
Char. 422: 0 --> 1
Char. 441: 1 --> 0
Char. 466: 1 --> 0
Char. 493: 2 --> 0
Char. 500: 0 --> 2
Char. 517: 1 --> 0
Char. 520: 3 --> 1
Char. 529: 2 --> 1
Char. 531: 2 --> 1
Char. 532: 2 --> 1
Char. 535: 1 --> 0
Char. 537: 1 --> 0
Char. 547: 2 --> 1
Char. 562: 1 --> 2
Char. 567: 1 --> 0
Char. 571: 2 --> 1
Char. 572: 2 --> 1
Char. 578: 1 --> 0
Char. 584: 0 --> 1
Char. 590: 0 --> 1
Char. 591: 0 --> 1
Char. 596: 0 --> 1
Char. 601: 0 --> 1
Char. 602: 0 --> 1
Char. 604: 0 --> 1
Char. 606: 0 --> 1
Char. 607: 0 --> 1
Char. 612: 3 --> 1

Mladec_I_II_V_VI :

Char. 0: 0.713-0.750 --> 0.771
Char. 1: 0.148-0.161 --> 0.212
Char. 4: 0.140-0.222 --> 0.336
Char. 5: 0.357 --> 0.282
Char. 13: 0.479-0.525 --> 0.361
Char. 14: 0.411 --> 0.278
Char. 19: 0.615-0.769 --> 0.555
Char. 21: 0.725 --> 0.837
Char. 27: 0.193-0.234 --> 0.155
Char. 30: 0.420 --> 0.425
Char. 31: 0.331 --> 0.335
Char. 33: 0.402-0.604 --> 0.202
Char. 34: 0.183 --> 0.234
Char. 36: 0.721-0.800 --> 0.670
Char. 38: 0.365-0.369 --> 0.429
Char. 40: 0.378 --> 0.340
Char. 41: 0.203-0.220 --> 0.221
Char. 42: 0.760 --> 0.801
Char. 44: 0.790-0.809 --> 0.906
Char. 45: 0.704 --> 0.698
Char. 46: 0.469-0.579 --> 0.465
Char. 48: 0.326-0.491 --> 0.185
Char. 49: 0.567 --> 0.644
Char. 50: 0.739 --> 0.731
Char. 51: 0.809 --> 0.900
Char. 52: 0.522 --> 0.646
Char. 53: 0.399 --> 0.496
Char. 54: 0.558 --> 0.339
Char. 55: 0.377 --> 0.715
Char. 56: 0.699-0.755 --> 0.672
Char. 57: 0.514-0.640 --> 0.371
Char. 59: 0.864-0.904 --> 0.905
Char. 61: 0.665 --> 0.595
Char. 65: 0.338-0.497 --> 0.268
Char. 66: 0.291-0.407 --> 0.243
Char. 68: 0.463 --> 0.496
Char. 71: 0.547 --> 0.583
Char. 74: 0.594 --> 0.700
Char. 78: 0.277 --> 0.300
Char. 79: 0.261-0.319 --> 0.322
Char. 80: 0.616 --> 0.528
Char. 81: 0.333 --> 0.430
Char. 82: 0.443-0.452 --> 0.648
Char. 86: 0.247-0.265 --> 0.212

Char. 90: 0.165-0.177 --> 0.037
Char. 93: 0.188 --> 0.364
Char. 95: 0.207 --> 0.000
Char. 99: 0.149-0.249 --> 0.147
Char. 105: 0.183-0.194 --> 0.000
Char. 106: 0.277 --> 0.265
Char. 108: 0.235-0.261 --> 0.070
Char. 109: 0.381-0.390 --> 0.178
Char. 110: 0.343-0.365 --> 0.118
Char. 112: 0.178 --> 0.174
Char. 113: 0.415-0.496 --> 0.408
Char. 114: 0.228-0.239 --> 0.131
Char. 116: 0.163-0.185 --> 0.133
Char. 117: 0.580 --> 0.496
Char. 118: 0.172-0.176 --> 0.073
Char. 119: 0.297 --> 0.220
Char. 120: 0.332-0.352 --> 0.198
Char. 121: 0.104-0.170 --> 0.014
Char. 122: 0.651 --> 0.715
Char. 132: 0.473-0.538 --> 0.000
Char. 135: 0.365 --> 0.388
Char. 136: 0.199 --> 0.000
Char. 137: 0.291-0.318 --> 0.353
Char. 138: 0.431 --> 0.455
Char. 227: 0.110 --> 0.045
Char. 230: 0.285 --> 0.142
Char. 235: 0.300 --> 0.159
Char. 236: 0.041 --> 0.020
Char. 237: 0.270 --> 0.463
Char. 239: 0.500 --> 0.700
Char. 240: 0.416 --> 0.000
Char. 324: 0.721-0.732 --> 0.605
Char. 326: 0.120 --> 0.062
Char. 327: 0.495 --> 0.483
Char. 328: 0.494-0.612 --> 0.643
Char. 330: 0.790 --> 0.752
Char. 331: 0.469 --> 0.439
Char. 332: 0.720 --> 0.688
Char. 334: 0.131 --> 0.145
Char. 336: 0.252 --> 0.301
Char. 337: 0.289 --> 0.313
Char. 339: 0.735 --> 0.586
Char. 340: 0.348-0.630 --> 0.307
Char. 341: 0.296 --> 0.325
Char. 343: 0.284 --> 0.367
Char. 345: 0.375 --> 0.361
Char. 348: 0.403 --> 0.467
Char. 349: 0.458 --> 0.380
Char. 353: 0.254-0.363 --> 0.078
Char. 354: 0.340 --> 0.127
Char. 356: 0.328 --> 0.259
Char. 358: 0.282 --> 0.262
Char. 360: 0.377 --> 0.240
Char. 361: 0.316 --> 0.304
Char. 362: 0.764 --> 0.878
Char. 363: 0.771 --> 0.779
Char. 364: 0.588 --> 0.668
Char. 367: 0.680-0.689 --> 0.000
Char. 368: 0.535 --> 0.701
Char. 369: 0.379-0.388 --> 0.363
Char. 370: 0.431-0.442 --> 0.538
Char. 418: 1 --> 0
Char. 450: 1 --> 0
Char. 457: 1 --> 0
Char. 490: 1 --> 2
Char. 610: 1 --> 0

Cro_Magnon_I_II_III :

Char. 0: 0.805 --> 0.905
Char. 4: 0.222-0.326 --> 0.142
Char. 5: 0.534 --> 0.602
Char. 7: 0.299-0.351 --> 0.353
Char. 8: 0.339-0.438 --> 0.454
Char. 9: 0.350-0.381 --> 0.485
Char. 10: 0.388-0.517 --> 0.558
Char. 11: 0.113-0.149 --> 0.086
Char. 13: 0.479-0.525 --> 0.591
Char. 14: 0.411 --> 0.443
Char. 15: 0.140 --> 0.246
Char. 16: 0.139 --> 0.212
Char. 18: 0.194-0.204 --> 0.340
Char. 23: 0.677-0.788 --> 0.627
Char. 25: 0.086 --> 0.074

Char. 27: 0.243 --> 0.296
Char. 30: 0.331 --> 0.617
Char. 31: 0.234-0.243 --> 0.418
Char. 33: 0.402-0.437 --> 0.455
Char. 35: 0.750-0.781 --> 0.877
Char. 36: 0.723-0.800 --> 0.936
Char. 39: 0.492 --> 0.615
Char. 40: 0.440-0.446 --> 0.453
Char. 41: 0.192 --> 0.173
Char. 42: 0.780 --> 0.966
Char. 43: 0.774 --> 0.918
Char. 44: 0.807 --> 0.964
Char. 46: 0.665 --> 0.787
Char. 48: 0.326 --> 0.238
Char. 52: 0.379-0.450 --> 0.500
Char. 56: 0.453-0.624 --> 0.405
Char. 57: 0.514 --> 0.631
Char. 58: 0.822-0.838 --> 0.864
Char. 60: 0.304 --> 0.181
Char. 61: 0.689-0.797 --> 0.606
Char. 62: 0.120-0.185 --> 0.289
Char. 64: 0.337-0.360 --> 0.512
Char. 65: 0.338-0.497 --> 0.323
Char. 66: 0.291-0.392 --> 0.285
Char. 67: 0.428 --> 0.498
Char. 68: 0.392 --> 0.433
Char. 70: 0.138-0.207 --> 0.078
Char. 71: 0.495-0.547 --> 0.626
Char. 74: 0.632 --> 0.760
Char. 75: 0.295 --> 0.278
Char. 76: 0.493 --> 0.701
Char. 80: 0.738-0.758 --> 0.851
Char. 81: 0.219-0.283 --> 0.348
Char. 88: 0.492 --> 0.463
Char. 93: 0.188-0.274 --> 0.177
Char. 97: 0.320 --> 0.282
Char. 101: 0.721 --> 0.681
Char. 102: 0.552 --> 0.491
Char. 104: 0.787 --> 0.703
Char. 105: 0.194-0.228 --> 0.230
Char. 110: 0.120 --> 0.000
Char. 111: 0.101-0.105 --> 0.000
Char. 112: 0.162 --> 0.134
Char. 116: 0.185-0.264 --> 0.290
Char. 118: 0.212-0.242 --> 0.340
Char. 120: 0.284 --> 0.237
Char. 122: 0.415 --> 0.327
Char. 123: 0.807 --> 0.803
Char. 124: 0.455 --> 0.344
Char. 129: 0.290-0.337 --> 0.233
Char. 130: 0.446-0.463 --> 0.683
Char. 131: 0.291-0.366 --> 0.626
Char. 133: 0.303-0.338 --> 0.565
Char. 134: 0.331 --> 0.514
Char. 136: 0.237 --> 0.214
Char. 137: 0.285 --> 0.123
Char. 138: 0.430 --> 0.709
Char. 228: 0.423-0.490 --> 0.420
Char. 229: 0.666 --> 0.333
Char. 238: 0.274 --> 0.101
Char. 241: 0.100 --> 0.000
Char. 322: 0.808-0.907 --> 0.779
Char. 324: 0.614 --> 0.598
Char. 327: 0.495-0.562 --> 0.392
Char. 331: 0.475 --> 0.454
Char. 334: 0.169 --> 0.172
Char. 336: 0.194-0.219 --> 0.247
Char. 337: 0.175-0.179 --> 0.252
Char. 338: 0.376 --> 0.172
Char. 339: 0.731-0.850 --> 0.671
Char. 340: 0.348-0.630 --> 0.243
Char. 344: 0.118 --> 0.038
Char. 345: 0.345 --> 0.342
Char. 347: 0.384-0.513 --> 0.520
Char. 348: 0.423-0.478 --> 0.721
Char. 349: 0.463-0.499 --> 0.460
Char. 352: 0.268 --> 0.115
Char. 353: 0.302-0.406 --> 0.415
Char. 354: 0.307-0.410 --> 0.493
Char. 356: 0.309-0.328 --> 0.153
Char. 357: 0.219 --> 0.160
Char. 360: 0.273 --> 0.204

Char. 362: 0.501 --> 0.322
Char. 363: 0.567 --> 0.322
Char. 364: 0.437 --> 0.373
Char. 366: 0.638 --> 1.000
Char. 367: 0.693 --> 0.699
Char. 369: 0.379-0.409 --> 0.142
Char. 370: 0.431-0.442 --> 0.019
Char. 371: 0.196 --> 0.215
Char. 372: 0.229 --> 0.278
Char. 420: 1 --> 0
Char. 438: 1 --> 2
Char. 444: 2 --> 4
Char. 447: 0 --> 1

Oase_1_2 :

Char. 2: 0.142-0.222 --> 0.238
Char. 8: 0.339-0.438 --> 0.505
Char. 9: 0.350-0.381 --> 0.418
Char. 10: 0.388-0.517 --> 0.535
Char. 15: 0.091-0.140 --> 0.000
Char. 18: 0.126-0.204 --> 0.000
Char. 19: 0.615-0.738 --> 0.593
Char. 20: 0.616-0.642 --> 0.609
Char. 21: 0.725 --> 0.541
Char. 23: 0.677-0.726 --> 0.667
Char. 27: 0.243 --> 0.264
Char. 30: 0.297-0.331 --> 0.233
Char. 31: 0.170-0.243 --> 0.072
Char. 32: 0.335-0.355 --> 0.305
Char. 33: 0.402-0.437 --> 0.081
Char. 39: 0.444-0.492 --> 0.539
Char. 42: 0.538-0.634 --> 0.400
Char. 43: 0.554-0.646 --> 0.341
Char. 44: 0.790-0.807 --> 0.679
Char. 46: 0.644-0.665 --> 0.726
Char. 47: 0.366-0.499 --> 0.352
Char. 48: 0.326-0.429 --> 0.265
Char. 49: 0.558-0.567 --> 0.510
Char. 51: 0.742-0.809 --> 0.848
Char. 54: 0.558-0.579 --> 0.649
Char. 57: 0.514 --> 0.311
Char. 58: 0.822-0.838 --> 0.771
Char. 59: 0.864-0.890 --> 0.856
Char. 60: 0.497-0.530 --> 0.667
Char. 62: 0.111-0.185 --> 0.105
Char. 64: 0.337-0.360 --> 0.371
Char. 70: 0.138-0.207 --> 0.063
Char. 71: 0.547 --> 0.575
Char. 72: 0.170-0.179 --> 0.121
Char. 73: 0.326-0.355 --> 0.420
Char. 74: 0.582-0.594 --> 0.396
Char. 75: 0.295-0.346 --> 0.377
Char. 77: 0.324-0.333 --> 0.259
Char. 78: 0.117-0.163 --> 0.000
Char. 79: 0.292-0.319 --> 0.400
Char. 93: 0.188 --> 0.126
Char. 95: 0.207 --> 0.159
Char. 101: 0.721 --> 0.722
Char. 102: 0.552-0.670 --> 0.673
Char. 107: 0.178-0.254 --> 0.269
Char. 109: 0.381-0.387 --> 0.316
Char. 113: 0.415-0.496 --> 0.385
Char. 114: 0.228-0.240 --> 0.292
Char. 117: 0.580 --> 0.641
Char. 119: 0.302-0.303 --> 0.377
Char. 120: 0.332-0.353 --> 0.450
Char. 121: 0.104-0.170 --> 0.263
Char. 122: 0.651 --> 0.724
Char. 128: 0.292-0.406 --> 0.260
Char. 140: 0.420 --> 0.660
Char. 141: 0.339-0.374 --> 0.800
Char. 145: 0.669 --> 0.672
Char. 146: 0.606-0.783 --> 1.000
Char. 147: 0.638-0.669 --> 1.000
Char. 150: 0.335-0.577 --> 0.000
Char. 152: 0.365-0.567 --> 0.841
Char. 153: 0.412-0.424 --> 0.680
Char. 157: 0.625-0.645 --> 0.480
Char. 159: 0.614-0.680 --> 0.557
Char. 165: 0.466-0.533 --> 0.456
Char. 173: 0.714 --> 0.761
Char. 174: 0.369-0.451 --> 0.567
Char. 179: 0.901-0.950 --> 0.996

Char. 180: 0.120 --> 0.000
Char. 181: 0.034-0.117 --> 0.000
Char. 182: 0.045-0.133 --> 0.018
Char. 183: 0.003-0.216 --> 0.000
Char. 184: 0.073-0.274 --> 0.000
Char. 188: 0.427-0.482 --> 0.364
Char. 226: 0.383-0.534 --> 0.545
Char. 227: 0.200 --> 0.338
Char. 229: 0.666 --> 0.777
Char. 235: 0.300-0.314 --> 0.560
Char. 236: 0.178 --> 0.297
Char. 237: 0.270 --> 0.237
Char. 238: 0.274 --> 0.537
Char. 241: 0.100 --> 0.500
Char. 245: 0.124-0.245 --> 0.368
Char. 246: 0.196-0.206 --> 0.332
Char. 247: 0.070-0.401 --> 0.054
Char. 248: 0.301-0.309 --> 0.448
Char. 251: 0.083-0.250 --> 0.916
Char. 253: 0.125-0.375 --> 1.000
Char. 298: 0.472-0.661 --> 0.767
Char. 300: 0.404-0.420 --> 0.208
Char. 301: 0.658 --> 1.000
Char. 320: 0.147-0.266 --> 0.079
Char. 323: 0.652-0.878 --> 0.929
Char. 325: 0.318-0.365 --> 0.483
Char. 326: 0.144-0.316 --> 0.376
Char. 331: 0.558-0.559 --> 0.660
Char. 332: 0.769-0.825 --> 0.893
Char. 335: 0.337-0.484 --> 0.554
Char. 338: 0.506-0.536 --> 0.677
Char. 343: 0.153-0.284 --> 0.136
Char. 346: 0.317-0.424 --> 0.436
Char. 348: 0.377-0.403 --> 0.360
Char. 352: 0.268-0.274 --> 0.300
Char. 356: 0.328 --> 0.365
Char. 359: 0.574-0.677 --> 0.728
Char. 360: 0.377-0.412 --> 0.453
Char. 361: 0.316 --> 0.327
Char. 362: 0.764 --> 1.000
Char. 363: 0.771 --> 1.000
Char. 364: 0.588 --> 0.732
Char. 369: 0.379-0.409 --> 0.423
Char. 370: 0.431-0.442 --> 0.672
Char. 371: 0.196 --> 0.163
Char. 372: 0.229 --> 0.204
Char. 375: 0.462-0.669 --> 0.421
Char. 376: 0.719-0.779 --> 1.000
Char. 378: 0.509-0.742 --> 0.379
Char. 379: 0.801-0.848 --> 0.879
Char. 380: 0.438-0.614 --> 0.617
Char. 381: 0.754-0.795 --> 0.834
Char. 385: 0.486-0.588 --> 0.033
Char. 392: 0.425-0.487 --> 0.353
Char. 398: 0.084-0.112 --> 0.016
Char. 425: 1 --> 0
Char. 430: 1 --> 0
Char. 446: 1 --> 2
Char. 462: 1 --> 0
Char. 463: 2 --> 0
Char. 473: 2 --> 0
Char. 486: 1 --> 0
Char. 491: 2 --> 0
Char. 500: 0 --> 1
Char. 516: 2 --> 1
Char. 521: 1 --> 0
Char. 525: 2 --> 0
Char. 533: 0 --> 1
Char. 536: 1 --> 0
Char. 540: 0 --> 1
Char. 544: 1 --> 2
Char. 545: 0 --> 1
Char. 561: 1 --> 0
Char. 563: 2 --> 1
Char. 581: 2 --> 1
Char. 587: 1 --> 0
Char. 609: 3 --> 2
Char. 612: 3 --> 2
Char. 629: 1 --> 2

ZKD_UC_101_103 :

Char. 5: 0.463-0.515 --> 0.291
Char. 7: 0.299-0.351 --> 0.205

Char. 8: 0.339-0.371 --> 0.279
Char. 9: 0.350-0.381 --> 0.270
Char. 11: 0.147-0.166 --> 0.329
Char. 20: 0.737-0.756 --> 0.763
Char. 22: 0.584-0.666 --> 0.728
Char. 23: 0.677-0.788 --> 0.810
Char. 25: 0.223 --> 0.224
Char. 29: 0.634-0.637 --> 0.860
Char. 35: 0.750-0.781 --> 0.804
Char. 36: 0.723-0.800 --> 0.842
Char. 38: 0.365-0.369 --> 0.407
Char. 39: 0.444-0.492 --> 0.417
Char. 48: 0.429 --> 0.494
Char. 49: 0.746 --> 0.802
Char. 53: 0.378-0.460 --> 0.559
Char. 56: 0.453-0.534 --> 0.332
Char. 58: 0.822-0.838 --> 0.903
Char. 59: 0.864-0.890 --> 0.892
Char. 65: 0.338-0.497 --> 0.754
Char. 67: 0.312-0.428 --> 0.521
Char. 68: 0.346-0.392 --> 0.611
Char. 69: 0.389-0.473 --> 0.658
Char. 71: 0.495-0.502 --> 0.493
Char. 73: 0.326-0.355 --> 0.399
Char. 75: 0.346 --> 0.420
Char. 77: 0.333 --> 0.353
Char. 79: 0.292-0.319 --> 0.143
Char. 98: 0.666-0.790 --> 0.931
Char. 100: 0.072-0.073 --> 0.034
Char. 102: 0.552-0.670 --> 0.687
Char. 103: 0.094-0.134 --> 0.047
Char. 104: 0.787 --> 0.791
Char. 106: 0.319-0.339 --> 0.202
Char. 107: 0.152-0.254 --> 0.130
Char. 113: 0.450-0.549 --> 0.569
Char. 117: 0.543-0.580 --> 0.596
Char. 123: 0.840-0.855 --> 0.862
Char. 124: 0.455 --> 0.495
Char. 127: 0.276-0.299 --> 0.257
Char. 129: 0.337 --> 0.435
Char. 130: 0.446 --> 0.331
Char. 131: 0.291-0.366 --> 0.718
Char. 132: 0.544 --> 0.548
Char. 133: 0.303-0.338 --> 0.396
Char. 134: 0.246-0.331 --> 0.651
Char. 137: 0.305-0.334 --> 0.349
Char. 138: 0.430 --> 0.365
Char. 139: 0.129-0.149 --> 0.179
Char. 140: 0.420 --> 0.633
Char. 141: 0.339-0.374 --> 0.415
Char. 142: 0.382 --> 0.338
Char. 143: 0.696 --> 0.317
Char. 147: 0.638-0.669 --> 0.417
Char. 148: 0.611-0.691 --> 0.856
Char. 149: 0.458-0.596 --> 0.704
Char. 152: 0.365-0.567 --> 0.743
Char. 155: 0.374 --> 0.363
Char. 166: 0.913 --> 0.926
Char. 167: 0.812 --> 0.849
Char. 168: 0.048-0.080 --> 0.000
Char. 173: 0.714 --> 0.759
Char. 174: 0.228-0.364 --> 0.226
Char. 180: 0.120 --> 0.094
Char. 190: 0.101-0.112 --> 0.000
Char. 194: 0.428-0.571 --> 1.000
Char. 197: 0.250-0.500 --> 0.000
Char. 199: 0.236 --> 0.000
Char. 200: 0.413-0.421 --> 0.000
Char. 201: 0.330-0.435 --> 0.002
Char. 202: 0.750 --> 1.000
Char. 208: 0.648-0.800 --> 0.803
Char. 209: 0.458 --> 0.554
Char. 214: 0.176-0.198 --> 0.060
Char. 216: 0.466-0.491 --> 0.705
Char. 220: 0.210 --> 0.012
Char. 221: 0.108-0.113 --> 0.084
Char. 222: 0.398-0.452 --> 0.755
Char. 227: 0.200 --> 0.159
Char. 236: 0.178 --> 0.131
Char. 241: 0.100 --> 0.000
Char. 245: 0.124-0.206 --> 0.010
Char. 247: 0.401 --> 1.000

Char. 248: 0.301-0.309 --> 0.286
Char. 249: 0.300-0.400 --> 0.500
Char. 271: 0.176-0.248 --> 0.023
Char. 272: 0.281-0.295 --> 0.188
Char. 273: 0.619-0.623 --> 0.733
Char. 276: 0.242-0.313 --> 0.145
Char. 277: 0.170-0.232 --> 0.136
Char. 278: 0.284-0.286 --> 0.327
Char. 281: 0.205-0.334 --> 0.173
Char. 283: 0.575 --> 0.755
Char. 291: 0.489 --> 0.542
Char. 293: 0.250 --> 0.125
Char. 297: 0.666 --> 0.000
Char. 298: 0.392 --> 0.282
Char. 300: 0.404-0.420 --> 0.624
Char. 302: 0.250 --> 0.125
Char. 323: 0.547-0.658 --> 0.273
Char. 324: 0.670-0.721 --> 0.735
Char. 326: 0.144-0.146 --> 0.094
Char. 327: 0.495-0.562 --> 0.583
Char. 328: 0.494-0.612 --> 0.808
Char. 329: 0.581-0.656 --> 0.798
Char. 331: 0.558-0.559 --> 0.571
Char. 332: 0.769-0.825 --> 0.829
Char. 333: 0.442-0.574 --> 0.717
Char. 334: 0.112-0.128 --> 0.078
Char. 336: 0.173-0.219 --> 0.171
Char. 340: 0.348-0.630 --> 0.715
Char. 341: 0.252-0.255 --> 0.411
Char. 342: 0.473-0.560 --> 0.464
Char. 345: 0.446 --> 0.586
Char. 348: 0.478 --> 0.657
Char. 350: 0.226-0.321 --> 0.353
Char. 352: 0.268-0.274 --> 0.056
Char. 355: 0.276-0.300 --> 0.141
Char. 357: 0.219 --> 0.218
Char. 361: 0.286-0.316 --> 0.321
Char. 365: 0.380-0.570 --> 0.245
Char. 366: 0.579-0.638 --> 0.822
Char. 370: 0.431-0.442 --> 0.585
Char. 373: 0.653-0.717 --> 0.746
Char. 374: 0.226-0.307 --> 0.092
Char. 377: 0.288-0.301 --> 0.282
Char. 379: 0.824-0.848 --> 0.864
Char. 384: 0.612-0.633 --> 0.956
Char. 385: 0.486-0.588 --> 0.123
Char. 388: 0.595-0.839 --> 0.964
Char. 392: 0.611 --> 0.943
Char. 393: 0.909-0.940 --> 1.000
Char. 394: 0.650-0.658 --> 0.702
Char. 436: 0 --> 1
Char. 438: 1 --> 2
Char. 469: 0 --> 23
Char. 472: 0 --> 1
Char. 477: 0 --> 1
Char. 536: 1 --> 2
Char. 540: 0 --> 1
Char. 549: 0 --> 1
Char. 555: 1 --> 2
Char. 574: 0 --> 1
Char. 580: 1 --> 2
Char. 581: 2 --> 1
Char. 583: 0 --> 1
Char. 587: 1 --> 0

Liujiang :

Char. 1: 0.161-0.171 --> 0.000
Char. 2: 0.142 --> 0.014
Char. 3: 0.148 --> 0.000
Char. 6: 0.714 --> 0.840
Char. 7: 0.299-0.351 --> 0.148
Char. 8: 0.339-0.438 --> 0.329
Char. 9: 0.350-0.381 --> 0.225
Char. 12: 0.209-0.237 --> 0.122
Char. 13: 0.479-0.525 --> 0.090
Char. 14: 0.411 --> 0.107
Char. 19: 0.738 --> 1.000
Char. 20: 0.616 --> 0.575
Char. 21: 0.725-0.764 --> 0.700
Char. 23: 0.677-0.788 --> 0.851
Char. 26: 0.236 --> 0.228
Char. 27: 0.243 --> 0.158
Char. 28: 0.223-0.287 --> 0.199

Char. 29: 0.637 --> 0.641
Char. 32: 0.335-0.393 --> 0.320
Char. 33: 0.402-0.437 --> 0.000
Char. 34: 0.163 --> 0.027
Char. 35: 0.750-0.781 --> 0.685
Char. 37: 0.116 --> 0.064
Char. 38: 0.365 --> 0.052
Char. 40: 0.440-0.446 --> 0.426
Char. 45: 0.755 --> 0.728
Char. 47: 0.366 --> 0.313
Char. 49: 0.558-0.679 --> 0.390
Char. 50: 0.803 --> 0.000
Char. 51: 0.742-0.805 --> 0.574
Char. 52: 0.379-0.450 --> 0.336
Char. 53: 0.361-0.422 --> 0.254
Char. 54: 0.495-0.536 --> 0.299
Char. 55: 0.341-0.364 --> 0.405
Char. 57: 0.514 --> 0.000
Char. 61: 0.689-0.797 --> 0.841
Char. 63: 0.764-0.826 --> 0.929
Char. 64: 0.337-0.360 --> 0.203
Char. 65: 0.338-0.497 --> 0.602
Char. 66: 0.291-0.392 --> 0.484
Char. 69: 0.473 --> 0.594
Char. 70: 0.138-0.207 --> 0.398
Char. 71: 0.495-0.547 --> 0.464
Char. 72: 0.172-0.179 --> 0.201
Char. 73: 0.326-0.355 --> 0.241
Char. 77: 0.324 --> 0.157
Char. 80: 0.738-0.758 --> 0.157
Char. 81: 0.219-0.283 --> 0.114
Char. 82: 0.452-0.546 --> 0.321
Char. 84: 0.037 --> 0.000
Char. 85: 0.115 --> 0.000
Char. 86: 0.163 --> 0.089
Char. 87: 0.346 --> 0.324
Char. 89: 0.110 --> 0.000
Char. 90: 0.177-0.206 --> 0.013
Char. 94: 0.018-0.078 --> 0.013
Char. 95: 0.207-0.234 --> 0.109
Char. 96: 0.048 --> 0.000
Char. 98: 0.790 --> 0.938
Char. 99: 0.146 --> 0.041
Char. 100: 0.072 --> 0.026
Char. 101: 0.721 --> 0.799
Char. 103: 0.094 --> 0.078
Char. 104: 0.787 --> 0.810
Char. 105: 0.194-0.228 --> 0.046
Char. 106: 0.339 --> 0.464
Char. 107: 0.152 --> 0.137
Char. 108: 0.261-0.337 --> 0.050
Char. 109: 0.381-0.387 --> 0.000
Char. 113: 0.415 --> 0.306
Char. 114: 0.106 --> 0.094
Char. 115: 0.089 --> 0.040
Char. 116: 0.185-0.264 --> 0.000
Char. 117: 0.462 --> 0.000
Char. 119: 0.277 --> 0.269
Char. 121: 0.089 --> 0.006
Char. 124: 0.455 --> 0.589
Char. 125: 0.080 --> 0.030
Char. 126: 0.509-0.526 --> 0.533
Char. 127: 0.299 --> 0.460
Char. 128: 0.341-0.421 --> 0.484
Char. 129: 0.290-0.337 --> 0.340
Char. 130: 0.446-0.463 --> 0.425
Char. 132: 0.460 --> 0.406
Char. 133: 0.303-0.338 --> 0.156
Char. 135: 0.145 --> 0.086
Char. 138: 0.430 --> 0.378
Char. 139: 0.090 --> 0.083
Char. 228: 0.423-0.490 --> 1.000
Char. 229: 0.666 --> 0.777
Char. 230: 0.571 --> 0.285
Char. 233: 0.000 --> 0.666
Char. 234: 0.000 --> 1.000
Char. 237: 0.918 --> 1.000
Char. 238: 0.274 --> 0.319
Char. 239: 0.500 --> 0.600
Char. 240: 0.583 --> 0.666
Char. 320: 0.341 --> 0.409
Char. 321: 0.630 --> 0.575

Char. 322: 0.808-0.907 --> 0.933
Char. 325: 0.318 --> 0.233
Char. 326: 0.144 --> 0.076
Char. 327: 0.495-0.562 --> 0.634
Char. 329: 0.581-0.656 --> 0.769
Char. 332: 0.769-0.825 --> 0.731
Char. 333: 0.442 --> 0.229
Char. 335: 0.484 --> 0.560
Char. 339: 0.731-0.850 --> 0.876
Char. 340: 0.348-0.630 --> 0.716
Char. 341: 0.250-0.255 --> 0.366
Char. 342: 0.659 --> 0.737
Char. 343: 0.230-0.353 --> 0.442
Char. 346: 0.188 --> 0.120
Char. 349: 0.463-0.499 --> 0.584
Char. 350: 0.164 --> 0.163
Char. 351: 0.357 --> 0.356
Char. 353: 0.302-0.406 --> 0.000
Char. 354: 0.307-0.410 --> 0.227
Char. 355: 0.455 --> 0.663
Char. 356: 0.309-0.328 --> 0.419
Char. 357: 0.219 --> 0.296
Char. 358: 0.549 --> 0.555
Char. 361: 0.286 --> 0.000
Char. 365: 0.570 --> 0.823
Char. 368: 0.308 --> 0.292
Char. 369: 0.379-0.409 --> 0.474
Char. 371: 0.196 --> 0.095
Char. 372: 0.229 --> 0.123
Char. 406: 12 --> 3
Char. 426: 1 --> 0
Char. 429: 1 --> 2
Char. 436: 0 --> 1
Char. 497: 2 --> 1
Char. 613: 1 --> 3

SH4_5 :

Char. 1: 0.185 --> 0.183
Char. 2: 0.298-0.347 --> 0.352
Char. 3: 0.354-0.357 --> 0.400
Char. 4: 0.418-0.443 --> 0.408
Char. 12: 0.325 --> 0.297
Char. 14: 0.268-0.374 --> 0.168
Char. 15: 0.342-0.388 --> 0.468
Char. 16: 0.345-0.484 --> 0.710
Char. 17: 0.371-0.433 --> 0.521
Char. 18: 0.474 --> 0.577
Char. 20: 0.758-0.806 --> 0.870
Char. 23: 0.774-0.811 --> 0.870
Char. 24: 0.355-0.362 --> 0.465
Char. 25: 0.344-0.382 --> 0.463
Char. 26: 0.432-0.456 --> 0.478
Char. 27: 0.340-0.388 --> 0.333
Char. 28: 0.301-0.515 --> 0.000
Char. 29: 0.496-0.522 --> 0.581
Char. 31: 0.212 --> 0.143
Char. 32: 0.452-0.462 --> 0.715
Char. 33: 0.402-0.437 --> 1.000
Char. 34: 0.370-0.399 --> 0.454
Char. 35: 0.351-0.466 --> 0.346
Char. 37: 0.297-0.356 --> 0.404
Char. 42: 0.425-0.481 --> 0.241
Char. 43: 0.368-0.506 --> 0.195
Char. 46: 0.445-0.498 --> 0.390
Char. 47: 0.595 --> 0.554
Char. 48: 0.524 --> 0.582
Char. 54: 0.424 --> 0.925
Char. 55: 0.364-0.401 --> 0.091
Char. 56: 0.507-0.557 --> 0.743
Char. 57: 0.423 --> 0.294
Char. 59: 0.536-0.552 --> 0.612
Char. 60: 0.544-0.697 --> 0.810
Char. 61: 0.461-0.503 --> 0.448
Char. 63: 0.518-0.540 --> 0.448
Char. 69: 0.144-0.224 --> 0.092
Char. 70: 0.230-0.295 --> 0.549
Char. 72: 0.250-0.265 --> 0.522
Char. 73: 0.355 --> 0.449
Char. 74: 0.477-0.482 --> 0.995
Char. 80: 0.756 --> 0.804
Char. 81: 0.450 --> 0.551
Char. 84: 0.257-0.322 --> 0.384
Char. 92: 0.427-0.470 --> 0.600

Char. 93: 0.298-0.390 --> 0.254
Char. 98: 0.460-0.695 --> 0.435
Char. 100: 0.230 --> 0.316
Char. 101: 0.543-0.592 --> 0.499
Char. 103: 0.287-0.291 --> 0.404
Char. 104: 0.618-0.718 --> 0.577
Char. 105: 0.315-0.365 --> 0.571
Char. 106: 0.326-0.769 --> 0.945
Char. 107: 0.375-0.723 --> 0.822
Char. 111: 0.471-0.513 --> 0.638
Char. 112: 0.476-0.755 --> 1.000
Char. 114: 0.332-0.373 --> 0.492
Char. 115: 0.370-0.373 --> 0.384
Char. 116: 0.494-0.566 --> 0.631
Char. 117: 0.592-0.641 --> 0.733
Char. 118: 0.356-0.471 --> 0.837
Char. 119: 0.369-0.430 --> 0.728
Char. 120: 0.433-0.491 --> 0.828
Char. 121: 0.268-0.295 --> 0.450
Char. 122: 0.339-0.462 --> 0.123
Char. 123: 0.845-0.855 --> 0.765
Char. 125: 0.206-0.245 --> 0.341
Char. 127: 0.484-0.624 --> 0.816
Char. 128: 0.417-0.461 --> 0.582
Char. 130: 0.620-0.630 --> 0.635
Char. 131: 0.337-0.403 --> 0.698
Char. 133: 0.472-0.488 --> 0.596
Char. 134: 0.210-0.429 --> 0.450
Char. 136: 0.243 --> 0.343
Char. 137: 0.413-0.455 --> 0.499
Char. 139: 0.384-0.440 --> 0.674
Char. 140: 0.341-0.359 --> 0.234
Char. 141: 0.402-0.564 --> 0.723
Char. 145: 0.341-0.346 --> 0.251
Char. 146: 0.545-0.714 --> 0.794
Char. 147: 0.377-0.589 --> 0.718
Char. 148: 0.498-0.531 --> 0.237
Char. 149: 0.458-0.564 --> 0.114
Char. 150: 0.535-0.656 --> 0.362
Char. 151: 0.327 --> 0.273
Char. 154: 0.228-0.236 --> 0.077
Char. 156: 0.199-0.401 --> 0.108
Char. 157: 0.548-0.608 --> 0.673
Char. 158: 0.592-0.594 --> 0.734
Char. 159: 0.582-0.616 --> 0.819
Char. 160: 0.715-0.794 --> 0.821
Char. 161: 0.658-0.815 --> 1.000
Char. 162: 0.931 --> 0.953
Char. 163: 0.699-0.826 --> 0.582
Char. 164: 0.428-0.479 --> 0.000
Char. 165: 0.704-0.726 --> 0.587
Char. 166: 0.906 --> 0.766
Char. 168: 0.312-0.372 --> 0.203
Char. 170: 0.486-0.565 --> 0.718
Char. 175: 0.696-0.702 --> 0.837
Char. 176: 0.585-0.706 --> 0.874
Char. 177: 0.475-0.480 --> 0.686
Char. 178: 0.508-0.583 --> 0.467
Char. 179: 0.729-0.762 --> 0.513
Char. 185: 0.276-0.400 --> 0.181
Char. 188: 0.392-0.414 --> 0.532
Char. 189: 0.119-0.240 --> 0.053
Char. 192: 0.643 --> 0.844
Char. 194: 0.571 --> 0.857
Char. 228: 0.367-0.459 --> 0.500
Char. 230: 0.428 --> 0.285
Char. 235: 0.101-0.149 --> 0.066
Char. 236: 0.049-0.133 --> 0.040
Char. 237: 0.749 --> 0.753
Char. 238: 0.081-0.154 --> 0.000
Char. 246: 0.187-0.190 --> 0.221
Char. 247: 0.317-0.348 --> 0.285
Char. 248: 0.256-0.348 --> 0.414
Char. 249: 0.200 --> 0.400
Char. 250: 0.166-0.250 --> 0.000
Char. 271: 0.064 --> 0.034
Char. 272: 0.173-0.286 --> 0.000
Char. 273: 0.619-0.623 --> 0.359
Char. 276: 0.063-0.064 --> 0.030
Char. 281: 0.058-0.061 --> 0.000
Char. 282: 0.116-0.190 --> 0.025
Char. 284: 0.375 --> 0.250

Char. 288: 0.066-0.200 --> 0.000
Char. 289: 0.044-0.063 --> 0.020
Char. 292: 0.388-0.491 --> 0.702
Char. 298: 0.236-0.313 --> 0.165
Char. 300: 0.589-0.655 --> 0.763
Char. 301: 0.773-0.787 --> 0.865
Char. 304: 0.285 --> 0.000
Char. 320: 0.480-0.501 --> 0.664
Char. 321: 0.782-0.836 --> 0.877
Char. 324: 0.594-0.598 --> 0.551
Char. 325: 0.250-0.348 --> 0.220
Char. 329: 0.431-0.542 --> 0.584
Char. 330: 0.536-0.572 --> 0.663
Char. 331: 0.620-0.624 --> 1.000
Char. 332: 0.395-0.450 --> 0.355
Char. 338: 0.363-0.388 --> 0.654
Char. 339: 0.526 --> 0.513
Char. 344: 0.411-0.462 --> 0.565
Char. 345: 0.579-0.849 --> 0.918
Char. 346: 0.498 --> 0.574
Char. 347: 0.132-0.134 --> 0.116
Char. 348: 0.317-0.371 --> 0.619
Char. 350: 0.635-0.666 --> 0.709
Char. 352: 0.350 --> 0.438
Char. 354: 0.481 --> 0.613
Char. 355: 0.389-0.577 --> 0.700
Char. 357: 0.293-0.397 --> 0.521
Char. 360: 0.441-0.463 --> 0.711
Char. 362: 0.337-0.341 --> 0.036
Char. 363: 0.458-0.469 --> 0.217
Char. 364: 0.359-0.388 --> 0.122
Char. 365: 0.609-0.935 --> 1.000
Char. 366: 0.410-0.585 --> 0.696
Char. 368: 0.550-0.607 --> 0.440
Char. 369: 0.437-0.522 --> 0.585
Char. 371: 0.330-0.470 --> 0.723
Char. 372: 0.414-0.557 --> 0.701
Char. 373: 0.666 --> 0.719
Char. 375: 0.263-0.362 --> 0.101
Char. 377: 0.290-0.442 --> 0.603
Char. 378: 0.608-0.627 --> 0.872
Char. 379: 0.845-0.848 --> 0.867
Char. 380: 0.633-0.641 --> 0.674
Char. 382: 0.624-0.709 --> 0.830
Char. 383: 0.763-0.783 --> 0.850
Char. 384: 0.468 --> 0.646
Char. 385: 0.338-0.437 --> 0.000
Char. 388: 0.475-0.515 --> 0.418
Char. 389: 0.673-0.675 --> 0.647
Char. 390: 0.347-0.365 --> 0.231
Char. 392: 0.616-0.648 --> 1.000
Char. 395: 0.247-0.330 --> 0.191
Char. 396: 0.395-0.481 --> 0.135
Char. 397: 0.199-0.218 --> 0.059
Char. 399: 0.259-0.416 --> 0.068
Char. 422: 2 --> 1
Char. 447: 0 --> 1
Char. 453: 1 --> 2
Char. 457: 01 --> 2
Char. 458: 1 --> 0
Char. 459: 0 --> 1
Char. 463: 2 --> 0
Char. 474: 0 --> 1
Char. 486: 0 --> 1
Char. 488: 0 --> 2
Char. 489: 0 --> 1
Char. 490: 2 --> 0
Char. 491: 1 --> 2
Char. 495: 1 --> 0
Char. 496: 1 --> 2
Char. 501: 1 --> 0
Char. 502: 2 --> 0
Char. 507: 1 --> 0
Char. 509: 1 --> 0
Char. 516: 2 --> 1
Char. 531: 0 --> 1
Char. 542: 1 --> 2
Char. 550: 2 --> 3
Char. 563: 1 --> 0
Char. 569: 1 --> 0
Char. 580: 1 --> 0
Char. 581: 2 --> 0

Char. 588: 0 --> 1
Char. 605: 2 --> 1
Char. 609: 3 --> 0
Char. 613: 1 --> 0
Char. 615: 1 --> 2
Char. 617: 2 --> 1
Char. 621: 1 --> 2

Tabun_1 :

Char. 1: 0.196-0.272 --> 0.114
Char. 4: 0.418-0.455 --> 0.189
Char. 5: 0.121 --> 0.074
Char. 17: 0.324 --> 0.364
Char. 19: 0.629-0.651 --> 0.500
Char. 24: 0.197 --> 0.385
Char. 25: 0.315 --> 0.383
Char. 27: 0.380 --> 0.891
Char. 31: 0.259 --> 0.000
Char. 34: 0.278 --> 0.389
Char. 37: 0.249 --> 0.415
Char. 39: 0.163-0.320 --> 0.120
Char. 41: 0.527 --> 0.595
Char. 47: 0.590 --> 0.490
Char. 50: 0.632-0.667 --> 0.691
Char. 62: 0.427 --> 0.309
Char. 65: 0.076-0.131 --> 0.072
Char. 66: 0.545 --> 0.557
Char. 67: 0.161-0.177 --> 0.109
Char. 68: 0.256-0.315 --> 0.169
Char. 70: 0.219-0.232 --> 0.019
Char. 71: 0.558-0.561 --> 1.000
Char. 73: 0.348 --> 0.822
Char. 74: 0.477-0.482 --> 0.688
Char. 75: 0.327 --> 0.407
Char. 77: 0.180-0.224 --> 0.252
Char. 80: 0.298-0.725 --> 0.994
Char. 82: 0.405-0.506 --> 0.359
Char. 83: 0.316-0.334 --> 0.000
Char. 87: 0.440-0.587 --> 0.329
Char. 88: 0.592-0.703 --> 0.402
Char. 93: 0.260-0.311 --> 0.204
Char. 94: 0.177 --> 0.314
Char. 98: 0.581 --> 0.362
Char. 103: 0.203-0.223 --> 0.246
Char. 106: 0.448 --> 1.000
Char. 110: 0.508 --> 0.497
Char. 111: 0.574 --> 0.625
Char. 112: 0.268-0.511 --> 0.766
Char. 114: 0.382 --> 0.392
Char. 115: 0.212-0.228 --> 0.103
Char. 116: 0.246-0.284 --> 0.197
Char. 118: 0.226-0.260 --> 0.344
Char. 119: 0.375 --> 0.387
Char. 120: 0.470 --> 0.475
Char. 121: 0.275 --> 0.341
Char. 123: 0.887 --> 0.883
Char. 126: 0.414 --> 0.606
Char. 127: 0.469-0.484 --> 1.000
Char. 128: 0.371 --> 0.680
Char. 137: 0.441 --> 0.764
Char. 320: 0.423 --> 0.553
Char. 325: 0.353 --> 1.000
Char. 326: 0.180-0.311 --> 0.749
Char. 330: 0.283-0.338 --> 0.554
Char. 331: 0.394-0.613 --> 0.770
Char. 334: 0.114-0.174 --> 0.106
Char. 340: 0.400 --> 0.303
Char. 345: 0.562 --> 0.644
Char. 347: 0.116 --> 0.087
Char. 350: 0.489-0.547 --> 0.560
Char. 355: 0.389 --> 1.000
Char. 357: 0.553 --> 0.561
Char. 358: 0.378-0.692 --> 0.851
Char. 359: 0.634 --> 0.638
Char. 360: 0.480 --> 0.621
Char. 361: 0.339 --> 0.331
Char. 362: 0.552-0.797 --> 0.429
Char. 363: 0.724-0.879 --> 0.601
Char. 364: 0.621-0.662 --> 0.545
Char. 369: 0.479 --> 0.984
Char. 370: 0.447-0.545 --> 0.999
Char. 414: 2 --> 0
Char. 445: 1 --> 2

Char. 450: 1 --> 0
Char. 458: 0 --> 1
Char. 473: 2 --> 1
Char. 482: 2 --> 1

Tabun_2 :

Char. 140: 0.341-0.420 --> 0.138
Char. 145: 0.669 --> 0.894
Char. 147: 0.638-0.669 --> 0.822
Char. 150: 0.656 --> 0.852
Char. 152: 0.365-0.567 --> 0.176
Char. 153: 0.412-0.424 --> 0.305
Char. 156: 0.218-0.426 --> 0.209
Char. 157: 0.625-0.645 --> 0.906
Char. 158: 0.698-0.732 --> 0.861
Char. 159: 0.726-0.825 --> 0.971
Char. 160: 0.756-0.822 --> 1.000
Char. 161: 0.768 --> 0.938
Char. 163: 0.699-0.772 --> 0.635
Char. 164: 0.428 --> 0.207
Char. 172: 0.353-0.413 --> 0.343
Char. 177: 0.335-0.349 --> 0.281
Char. 178: 0.508-0.596 --> 0.446
Char. 179: 0.729 --> 0.569
Char. 180: 0.296 --> 0.336
Char. 181: 0.144-0.166 --> 0.366
Char. 182: 0.165-0.321 --> 0.327
Char. 188: 0.573-0.702 --> 0.774
Char. 189: 0.377 --> 0.824
Char. 255: 0.395-0.434 --> 0.443
Char. 256: 0.231-0.479 --> 0.623
Char. 257: 0.575-0.588 --> 0.650
Char. 258: 0.342-0.477 --> 1.000
Char. 261: 0.184-0.381 --> 0.612
Char. 262: 0.039-0.140 --> 0.647
Char. 264: 0.340-0.377 --> 0.770
Char. 267: 0.209-0.241 --> 0.383
Char. 268: 0.721-0.745 --> 0.755
Char. 269: 0.480-0.610 --> 0.879
Char. 274: 0.452-0.716 --> 0.731
Char. 279: 0.631-0.671 --> 0.727
Char. 282: 0.231-0.292 --> 0.126
Char. 283: 0.459-0.523 --> 0.416
Char. 289: 0.120-0.238 --> 0.090
Char. 290: 0.245-0.326 --> 0.188
Char. 292: 0.342-0.368 --> 0.268
Char. 295: 0.222 --> 0.111
Char. 300: 0.404-0.420 --> 0.310
Char. 301: 0.658 --> 0.771
Char. 304: 0.142-0.285 --> 0.000
Char. 374: 0.226-0.600 --> 0.708
Char. 375: 0.462-0.669 --> 0.920
Char. 377: 0.288-0.333 --> 0.506
Char. 378: 0.815 --> 1.000
Char. 382: 0.624-0.639 --> 0.521
Char. 383: 0.557-0.783 --> 0.884
Char. 395: 0.560-0.568 --> 0.448
Char. 399: 0.361-0.416 --> 0.618
Char. 539: 1 --> 0
Char. 548: 1 --> 2
Char. 549: 0 --> 2
Char. 553: 2 --> 1
Char. 571: 2 --> 1
Char. 615: 1 --> 2

Spy_I_II :

Char. 2: 0.324 --> 0.357
Char. 3: 0.323 --> 0.422
Char. 4: 0.418-0.443 --> 0.338
Char. 5: 0.343 --> 0.339
Char. 6: 0.410-0.415 --> 0.371
Char. 22: 0.588-0.604 --> 0.611
Char. 23: 0.774-0.810 --> 0.833
Char. 32: 0.316-0.384 --> 0.237
Char. 33: 0.397 --> 0.292
Char. 35: 0.554 --> 0.625
Char. 39: 0.371-0.431 --> 0.355
Char. 40: 0.456-0.472 --> 0.419
Char. 41: 0.279-0.282 --> 0.254
Char. 42: 0.425-0.481 --> 0.322
Char. 44: 0.407 --> 0.365
Char. 45: 0.614-0.638 --> 0.647
Char. 46: 0.551 --> 0.599
Char. 51: 0.660-0.680 --> 0.923

Char. 52: 0.406-0.417 --> 0.252
Char. 58: 0.563 --> 0.439
Char. 59: 0.536-0.552 --> 0.484
Char. 61: 0.652 --> 0.668
Char. 63: 0.692-0.705 --> 0.668
Char. 66: 0.338-0.449 --> 0.590
Char. 67: 0.226 --> 0.281
Char. 68: 0.256-0.315 --> 0.392
Char. 69: 0.224-0.285 --> 0.379
Char. 71: 0.548-0.561 --> 0.365
Char. 73: 0.255-0.355 --> 0.018
Char. 74: 0.477-0.482 --> 0.254
Char. 75: 0.268 --> 0.181
Char. 76: 0.382 --> 0.720
Char. 77: 0.185-0.224 --> 0.147
Char. 81: 0.284 --> 0.332
Char. 85: 0.217-0.297 --> 0.373
Char. 86: 0.302-0.360 --> 0.459
Char. 87: 0.728 --> 0.743
Char. 89: 0.249-0.308 --> 0.371
Char. 91: 0.394-0.409 --> 0.369
Char. 93: 0.311 --> 0.411
Char. 98: 0.490-0.544 --> 0.386
Char. 137: 0.389-0.395 --> 0.385
Char. 236: 0.049-0.107 --> 0.112
Char. 238: 0.242 --> 0.223
Char. 245: 0.114 --> 0.241
Char. 246: 0.170-0.177 --> 0.296
Char. 247: 0.352-0.419 --> 0.333
Char. 248: 0.493 --> 0.568
Char. 320: 0.423 --> 0.388
Char. 323: 0.515-0.666 --> 0.426
Char. 331: 0.483 --> 0.379
Char. 334: 0.198-0.199 --> 0.175
Char. 336: 0.304 --> 0.359
Char. 337: 0.241-0.261 --> 0.162
Char. 338: 0.388 --> 0.509
Char. 340: 0.413 --> 0.387
Char. 341: 0.216 --> 0.262
Char. 342: 0.499 --> 0.961
Char. 343: 0.524-0.538 --> 0.761
Char. 345: 0.408-0.504 --> 0.600
Char. 369: 0.431 --> 0.427
Char. 473: 2 --> 1
Char. 497: 2 --> 0
Char. 525: 1 --> 0

Gibraltar_1 :

Char. 0: 0.572 --> 0.526
Char. 1: 0.196-0.272 --> 0.318
Char. 2: 0.145-0.278 --> 0.367
Char. 3: 0.254-0.257 --> 0.382
Char. 4: 0.418-0.455 --> 0.645
Char. 6: 0.233 --> 0.142
Char. 7: 0.060-0.087 --> 0.000
Char. 8: 0.119-0.191 --> 0.000
Char. 9: 0.117 --> 0.380
Char. 10: 0.187 --> 0.410
Char. 15: 0.332 --> 0.368
Char. 16: 0.436 --> 0.470
Char. 18: 0.433 --> 0.508
Char. 19: 0.629-0.651 --> 0.802
Char. 20: 0.725-0.744 --> 0.804
Char. 22: 0.765-0.784 --> 0.839
Char. 23: 0.939 --> 1.000
Char. 24: 0.197 --> 0.131
Char. 26: 0.467 --> 0.566
Char. 30: 0.046 --> 0.000
Char. 31: 0.259 --> 0.325
Char. 32: 0.258-0.292 --> 0.185
Char. 35: 0.378-0.554 --> 0.688
Char. 36: 0.407-0.614 --> 0.829
Char. 40: 0.567 --> 0.594
Char. 42: 0.479-0.554 --> 0.572
Char. 44: 0.462-0.465 --> 0.525
Char. 47: 0.590 --> 0.707
Char. 49: 0.430 --> 0.777
Char. 50: 0.632-0.667 --> 0.605
Char. 52: 0.417 --> 0.640
Char. 53: 0.335-0.446 --> 0.559
Char. 58: 0.590 --> 0.740
Char. 59: 0.612 --> 0.732
Char. 62: 0.427 --> 0.461

Char. 64: 0.140-0.149 --> 0.282
Char. 65: 0.076-0.131 --> 0.318
Char. 72: 0.126 --> 0.275
Char. 74: 0.477-0.482 --> 0.359
Char. 79: 0.227 --> 0.163
Char. 82: 0.405-0.506 --> 0.573
Char. 85: 0.297 --> 0.358
Char. 86: 0.360 --> 0.431
Char. 87: 0.440-0.587 --> 0.692
Char. 88: 0.592-0.703 --> 0.820
Char. 89: 0.308 --> 0.377
Char. 91: 0.419 --> 0.452
Char. 92: 0.358 --> 0.463
Char. 93: 0.260-0.311 --> 0.343
Char. 94: 0.177 --> 0.142
Char. 100: 0.200 --> 0.387
Char. 101: 0.709-0.713 --> 0.745
Char. 103: 0.203-0.223 --> 0.125
Char. 110: 0.508 --> 0.983
Char. 112: 0.268-0.511 --> 0.208
Char. 115: 0.212-0.228 --> 0.387
Char. 116: 0.246-0.284 --> 0.308
Char. 126: 0.414 --> 0.206
Char. 128: 0.371 --> 0.275
Char. 129: 0.211-0.221 --> 0.198
Char. 130: 0.630 --> 0.671
Char. 138: 0.212-0.295 --> 0.087
Char. 320: 0.423 --> 0.411
Char. 322: 0.922 --> 0.943
Char. 323: 0.038 --> 0.022
Char. 324: 0.675 --> 0.836
Char. 330: 0.283-0.338 --> 0.000
Char. 331: 0.394-0.613 --> 0.281
Char. 332: 0.422-0.548 --> 0.626
Char. 333: 0.462 --> 0.952
Char. 335: 0.120-0.226 --> 0.104
Char. 337: 0.261 --> 0.396
Char. 341: 0.162 --> 0.063
Char. 348: 0.266-0.303 --> 0.358
Char. 351: 0.527 --> 0.508
Char. 352: 0.329 --> 0.118
Char. 355: 0.389 --> 0.367
Char. 358: 0.378-0.692 --> 0.350
Char. 359: 0.634 --> 0.542
Char. 363: 0.724-0.879 --> 0.896
Char. 456: 0 --> 1
Char. 465: 0 --> 1
Char. 469: 0 --> 1
Char. 503: 0 --> 1
Char. 521: 1 --> 0
Char. 605: 2 --> 3
Char. 608: 1 --> 0

Amud :

Char. 0: 0.681-0.745 --> 0.947
Char. 3: 0.254-0.257 --> 0.202
Char. 18: 0.429 --> 0.280
Char. 22: 0.588-0.604 --> 0.554
Char. 26: 0.432-0.447 --> 0.461
Char. 40: 0.456-0.472 --> 0.394
Char. 41: 0.279-0.282 --> 0.192
Char. 45: 0.614 --> 0.604
Char. 47: 0.590 --> 0.592
Char. 49: 0.418-0.430 --> 0.406
Char. 52: 0.406-0.417 --> 0.540
Char. 53: 0.457 --> 0.466
Char. 58: 0.563-0.570 --> 0.594
Char. 59: 0.536-0.552 --> 0.596
Char. 62: 0.455 --> 0.492
Char. 68: 0.256-0.315 --> 0.217
Char. 69: 0.224-0.285 --> 0.192
Char. 79: 0.180 --> 0.123
Char. 85: 0.217-0.297 --> 0.193
Char. 86: 0.302-0.360 --> 0.298
Char. 87: 0.587 --> 0.683
Char. 88: 0.703 --> 0.878
Char. 106: 0.447 --> 0.584
Char. 107: 0.427 --> 0.617
Char. 112: 0.476-0.511 --> 0.535
Char. 126: 0.414 --> 0.175
Char. 333: 0.389-0.462 --> 0.351
Char. 337: 0.241-0.261 --> 0.351
Char. 345: 0.408-0.504 --> 0.393

Char. 355: 0.389 --> 0.600
Char. 465: 0 --> 1
La_Chapelle_aux_Saints :
Char. 2: 0.145-0.278 --> 0.111
Char. 3: 0.254-0.257 --> 0.250
Char. 9: 0.064-0.117 --> 0.000
Char. 10: 0.044-0.187 --> 0.000
Char. 11: 0.308-0.490 --> 0.233
Char. 13: 0.343 --> 0.223
Char. 16: 0.249-0.408 --> 0.172
Char. 18: 0.429-0.433 --> 0.400
Char. 20: 0.725-0.744 --> 0.697
Char. 21: 0.825-0.879 --> 0.916
Char. 26: 0.432-0.447 --> 0.294
Char. 27: 0.332-0.340 --> 0.178
Char. 29: 0.522-0.556 --> 0.311
Char. 33: 0.294-0.374 --> 0.191
Char. 35: 0.378-0.554 --> 0.279
Char. 36: 0.407-0.614 --> 0.189
Char. 40: 0.456-0.472 --> 0.270
Char. 41: 0.279-0.282 --> 0.075
Char. 43: 0.597-0.622 --> 0.670
Char. 45: 0.629-0.638 --> 0.647
Char. 46: 0.361-0.445 --> 0.308
Char. 48: 0.497-0.517 --> 0.540
Char. 49: 0.418-0.430 --> 0.300
Char. 51: 0.660 --> 0.074
Char. 52: 0.406-0.417 --> 0.231
Char. 54: 0.298-0.424 --> 0.000
Char. 55: 0.501-0.551 --> 0.583
Char. 56: 0.418-0.507 --> 0.145
Char. 57: 0.423-0.449 --> 0.625
Char. 59: 0.536-0.552 --> 0.488
Char. 60: 0.412-0.423 --> 0.362
Char. 64: 0.140-0.149 --> 0.000
Char. 68: 0.256-0.315 --> 0.396
Char. 69: 0.236-0.285 --> 0.449
Char. 70: 0.219-0.232 --> 0.239
Char. 75: 0.306-0.327 --> 0.256
Char. 76: 0.350-0.382 --> 0.469
Char. 77: 0.180-0.224 --> 0.118
Char. 78: 0.340 --> 0.133
Char. 80: 0.298-0.725 --> 0.290
Char. 81: 0.284 --> 0.109
Char. 85: 0.217-0.297 --> 0.161
Char. 86: 0.302-0.360 --> 0.238
Char. 89: 0.249-0.308 --> 0.073
Char. 90: 0.231-0.241 --> 0.108
Char. 91: 0.394-0.409 --> 0.368
Char. 92: 0.303-0.358 --> 0.290
Char. 95: 0.214-0.215 --> 0.168
Char. 96: 0.322-0.347 --> 0.205
Char. 97: 0.479 --> 0.469
Char. 98: 0.581-0.695 --> 0.923
Char. 99: 0.402-0.433 --> 0.267
Char. 100: 0.192 --> 0.119
Char. 101: 0.709-0.713 --> 0.566
Char. 102: 0.646-0.684 --> 0.710
Char. 104: 0.747-0.827 --> 0.853
Char. 107: 0.280-0.339 --> 0.229
Char. 109: 0.247-0.279 --> 0.244
Char. 113: 0.558-0.601 --> 0.501
Char. 114: 0.332-0.373 --> 0.209
Char. 117: 0.715-0.723 --> 0.707
Char. 122: 0.556-0.744 --> 0.478
Char. 124: 0.109-0.197 --> 0.006
Char. 127: 0.469-0.484 --> 0.346
Char. 129: 0.211-0.221 --> 0.330
Char. 130: 0.620-0.630 --> 0.458
Char. 131: 0.231 --> 0.220
Char. 134: 0.102-0.272 --> 0.015
Char. 135: 0.449 --> 0.271
Char. 136: 0.330 --> 0.362
Char. 137: 0.389-0.395 --> 0.365
Char. 138: 0.212-0.295 --> 0.318
Char. 139: 0.172-0.187 --> 0.399
Char. 140: 0.343 --> 0.009
Char. 141: 0.119 --> 0.793
Char. 142: 0.055 --> 0.016
Char. 143: 0.449-0.455 --> 0.522
Char. 146: 0.349 --> 0.000
Char. 147: 0.389 --> 0.484

Char. 148: 0.498-0.531 --> 0.426
Char. 149: 0.458 --> 0.364
Char. 150: 0.513 --> 0.150
Char. 152: 0.396 --> 0.674
Char. 153: 0.436 --> 0.532
Char. 154: 0.315 --> 0.636
Char. 155: 0.584 --> 0.591
Char. 156: 0.199 --> 0.717
Char. 164: 0.518 --> 0.554
Char. 165: 0.638 --> 0.368
Char. 189: 0.013 --> 0.000
Char. 321: 0.663-0.717 --> 0.622
Char. 322: 0.845-0.888 --> 0.779
Char. 324: 0.598-0.675 --> 0.572
Char. 325: 0.286-0.353 --> 0.159
Char. 326: 0.180-0.311 --> 0.000
Char. 328: 0.383 --> 0.262
Char. 329: 0.473 --> 0.323
Char. 332: 0.422-0.548 --> 0.328
Char. 333: 0.389-0.462 --> 0.138
Char. 336: 0.279 --> 0.078
Char. 337: 0.241-0.261 --> 0.149
Char. 338: 0.249-0.335 --> 0.225
Char. 341: 0.162-0.166 --> 0.332
Char. 342: 0.559 --> 0.784
Char. 344: 0.325 --> 0.387
Char. 346: 0.262-0.267 --> 0.138
Char. 348: 0.266-0.303 --> 0.234
Char. 349: 0.393-0.411 --> 0.567
Char. 350: 0.489-0.547 --> 0.351
Char. 360: 0.441-0.463 --> 0.320
Char. 361: 0.339-0.373 --> 0.400
Char. 365: 0.504 --> 0.439
Char. 367: 0.570-0.660 --> 0.696
Char. 368: 0.635 --> 0.473
Char. 370: 0.447-0.545 --> 0.409
Char. 371: 0.191-0.197 --> 0.434
Char. 372: 0.201-0.215 --> 0.506
Char. 374: 0.368-0.483 --> 0.893
Char. 376: 0.389-0.639 --> 0.000
Char. 377: 0.390 --> 1.000
Char. 383: 0.763 --> 1.000
Char. 399: 0.259 --> 0.150
Char. 419: 1 --> 2
Char. 471: 3 --> 2
Char. 473: 2 --> 3
Char. 474: 0 --> 1
Char. 491: 3 --> 0
Char. 495: 1 --> 0
Char. 496: 1 --> 0
Char. 497: 2 --> 1
Char. 499: 1 --> 0
Char. 516: 2 --> 1
Char. 537: 1 --> 0
Char. 538: 2 --> 0
Char. 555: 1 --> 0
Char. 571: 2 --> 1
Char. 577: 0 --> 1
Char. 578: 1 --> 0
Char. 580: 1 --> 0
Char. 583: 2 --> 1
Char. 584: 1 --> 0

La_Ferrassie_1 :

Char. 0: 0.681-0.745 --> 0.865
Char. 1: 0.290 --> 0.308
Char. 4: 0.418-0.443 --> 0.584
Char. 5: 0.343 --> 0.466
Char. 6: 0.410-0.415 --> 0.492
Char. 7: 0.374 --> 0.411
Char. 8: 0.465 --> 0.501
Char. 9: 0.287 --> 0.451
Char. 10: 0.303 --> 0.491
Char. 15: 0.332 --> 0.382
Char. 17: 0.371-0.419 --> 0.425
Char. 18: 0.458-0.474 --> 0.527
Char. 19: 0.512 --> 0.500
Char. 20: 0.725-0.744 --> 0.714
Char. 22: 0.588-0.604 --> 0.508
Char. 23: 0.774-0.810 --> 0.712
Char. 24: 0.300 --> 0.333
Char. 25: 0.279 --> 0.313
Char. 26: 0.432 --> 0.325

Char. 30: 0.110-0.117 --> 0.099
Char. 31: 0.257-0.259 --> 0.287
Char. 34: 0.360 --> 0.372
Char. 37: 0.297-0.311 --> 0.359
Char. 39: 0.371-0.431 --> 0.531
Char. 40: 0.456-0.472 --> 0.495
Char. 42: 0.425-0.481 --> 0.499
Char. 45: 0.614-0.638 --> 0.588
Char. 47: 0.487 --> 0.441
Char. 48: 0.476 --> 0.120
Char. 49: 0.608 --> 0.614
Char. 50: 0.632 --> 0.573
Char. 51: 0.660-0.680 --> 0.659
Char. 52: 0.406-0.417 --> 0.479
Char. 53: 0.446 --> 0.486
Char. 63: 0.692-0.705 --> 0.789
Char. 64: 0.208 --> 0.297
Char. 65: 0.237-0.318 --> 0.348
Char. 66: 0.338-0.449 --> 0.334
Char. 69: 0.224-0.285 --> 0.212
Char. 70: 0.219-0.230 --> 0.287
Char. 71: 0.548-0.561 --> 0.769
Char. 72: 0.245 --> 0.249
Char. 73: 0.255-0.355 --> 0.483
Char. 74: 0.477-0.482 --> 0.623
Char. 77: 0.185-0.224 --> 0.257
Char. 78: 0.340-0.346 --> 0.315
Char. 79: 0.419 --> 0.568
Char. 80: 0.616 --> 0.531
Char. 81: 0.284 --> 0.232
Char. 82: 0.496-0.506 --> 0.576
Char. 88: 0.870 --> 0.931
Char. 89: 0.249-0.308 --> 0.234
Char. 91: 0.394-0.409 --> 0.474
Char. 92: 0.303 --> 0.262
Char. 94: 0.196 --> 0.259
Char. 112: 0.511 --> 0.562
Char. 126: 0.195 --> 0.116
Char. 138: 0.212-0.236 --> 0.000
Char. 226: 0.312-0.389 --> 0.257
Char. 227: 0.033-0.100 --> 0.000
Char. 228: 0.459 --> 0.733
Char. 235: 0.101-0.132 --> 0.083
Char. 237: 0.742 --> 0.727
Char. 238: 0.242 --> 0.438
Char. 249: 0.200-0.500 --> 0.000
Char. 320: 0.423 --> 0.437
Char. 322: 0.888-0.896 --> 0.823
Char. 324: 0.598-0.626 --> 0.449
Char. 330: 0.296 --> 0.230
Char. 332: 0.536 --> 0.483
Char. 333: 0.389-0.462 --> 0.528
Char. 334: 0.198-0.199 --> 0.266
Char. 335: 0.352 --> 0.370
Char. 337: 0.241-0.261 --> 0.323
Char. 339: 0.581-0.599 --> 0.605
Char. 343: 0.524-0.538 --> 0.495
Char. 345: 0.408-0.504 --> 0.397
Char. 347: 0.134-0.193 --> 0.094
Char. 348: 0.252 --> 0.095
Char. 370: 0.392 --> 0.360
Char. 403: 0 --> 2
Char. 414: 2 --> 1
Char. 471: 3 --> 2
Char. 495: 1 --> 0
Char. 496: 1 --> 0

Shanidar_1_5 :

Char. 0: 0.681-0.745 --> 0.831
Char. 1: 0.185 --> 0.161
Char. 2: 0.259-0.278 --> 0.233
Char. 3: 0.254-0.257 --> 0.196
Char. 4: 0.418-0.443 --> 0.395
Char. 6: 0.410-0.415 --> 0.439
Char. 7: 0.147-0.177 --> 0.081
Char. 8: 0.164-0.232 --> 0.111
Char. 12: 0.325 --> 0.323
Char. 13: 0.343 --> 0.236
Char. 18: 0.474 --> 0.480
Char. 19: 0.564-0.629 --> 0.464
Char. 20: 0.725-0.744 --> 0.657
Char. 22: 0.588-0.604 --> 0.515
Char. 28: 0.301-0.351 --> 0.100

Char. 30: 0.110-0.117 --> 0.049
Char. 31: 0.212 --> 0.120
Char. 33: 0.397-0.437 --> 0.467
Char. 36: 0.578-0.614 --> 0.631
Char. 41: 0.279-0.282 --> 0.262
Char. 42: 0.425-0.481 --> 0.393
Char. 44: 0.432-0.462 --> 0.469
Char. 45: 0.614-0.638 --> 0.648
Char. 47: 0.595 --> 0.635
Char. 48: 0.476-0.489 --> 0.346
Char. 49: 0.418-0.430 --> 0.342
Char. 50: 0.632-0.659 --> 0.701
Char. 54: 0.424 --> 0.450
Char. 55: 0.364-0.401 --> 0.355
Char. 57: 0.423 --> 0.346
Char. 58: 0.563-0.570 --> 0.598
Char. 59: 0.536-0.552 --> 0.676
Char. 60: 0.544-0.697 --> 0.861
Char. 62: 0.287-0.424 --> 0.065
Char. 63: 0.692-0.705 --> 0.709
Char. 66: 0.338-0.447 --> 0.305
Char. 71: 0.548-0.561 --> 0.700
Char. 73: 0.355 --> 0.448
Char. 74: 0.477-0.482 --> 0.613
Char. 76: 0.350-0.382 --> 0.223
Char. 78: 0.340-0.346 --> 0.226
Char. 79: 0.227-0.419 --> 0.142
Char. 82: 0.496-0.506 --> 0.672
Char. 84: 0.237-0.244 --> 0.130
Char. 85: 0.217-0.297 --> 0.135
Char. 86: 0.302-0.360 --> 0.290
Char. 87: 0.527-0.587 --> 0.468
Char. 89: 0.249-0.308 --> 0.148
Char. 90: 0.231-0.241 --> 0.195
Char. 91: 0.394-0.409 --> 0.389
Char. 92: 0.303-0.358 --> 0.264
Char. 93: 0.298-0.311 --> 0.263
Char. 95: 0.214-0.215 --> 0.186
Char. 96: 0.322-0.347 --> 0.264
Char. 97: 0.506-0.594 --> 0.608
Char. 98: 0.581-0.695 --> 0.755
Char. 100: 0.230 --> 0.293
Char. 104: 0.618-0.718 --> 0.610
Char. 107: 0.280-0.339 --> 0.223
Char. 109: 0.247-0.279 --> 0.225
Char. 112: 0.476-0.511 --> 0.388
Char. 113: 0.656-0.679 --> 0.582
Char. 114: 0.332-0.373 --> 0.324
Char. 118: 0.164 --> 0.154
Char. 119: 0.292 --> 0.126
Char. 120: 0.307-0.314 --> 0.164
Char. 121: 0.124 --> 0.006
Char. 123: 0.898-0.933 --> 0.964
Char. 125: 0.206-0.245 --> 0.189
Char. 128: 0.371-0.389 --> 0.175
Char. 129: 0.211-0.221 --> 0.135
Char. 130: 0.620-0.630 --> 0.757
Char. 137: 0.413-0.455 --> 0.554
Char. 138: 0.212-0.236 --> 0.180
Char. 139: 0.162 --> 0.078
Char. 140: 0.343-0.405 --> 0.453
Char. 142: 0.414-0.419 --> 0.484
Char. 143: 0.449-0.455 --> 0.345
Char. 148: 0.498-0.531 --> 0.933
Char. 149: 0.458-0.564 --> 0.568
Char. 150: 0.550-0.664 --> 0.743
Char. 151: 0.327-0.345 --> 0.607
Char. 152: 0.365-0.567 --> 0.733
Char. 153: 0.412-0.548 --> 0.551
Char. 155: 0.584 --> 0.645
Char. 156: 0.199-0.401 --> 0.450
Char. 163: 0.718-0.826 --> 0.957
Char. 164: 0.428-0.486 --> 0.928
Char. 167: 0.396 --> 0.364
Char. 168: 0.312-0.372 --> 0.507
Char. 174: 0.340-0.364 --> 0.463
Char. 177: 0.475-0.480 --> 0.427
Char. 182: 0.321 --> 0.367
Char. 183: 0.256-0.257 --> 0.363
Char. 184: 0.220-0.342 --> 0.365
Char. 185: 0.276-0.400 --> 0.658
Char. 189: 0.119-0.240 --> 0.775

Char. 214: 0.037-0.122 --> 0.000
Char. 215: 0.138-0.174 --> 0.000
Char. 216: 0.466-0.556 --> 0.583
Char. 217: 0.270-0.381 --> 0.219
Char. 220: 0.126-0.170 --> 0.000
Char. 221: 0.096 --> 0.000
Char. 223: 0.220-0.228 --> 0.154
Char. 226: 0.312-0.389 --> 0.295
Char. 228: 0.367-0.459 --> 0.651
Char. 235: 0.101-0.132 --> 0.023
Char. 236: 0.049-0.107 --> 0.010
Char. 237: 0.749 --> 0.807
Char. 240: 0.500-0.583 --> 0.666
Char. 245: 0.102-0.114 --> 0.079
Char. 247: 0.352-0.419 --> 0.599
Char. 250: 0.250-0.416 --> 0.500
Char. 251: 0.000-0.083 --> 0.333
Char. 261: 0.184-0.213 --> 0.280
Char. 264: 0.377 --> 0.470
Char. 266: 0.454-0.478 --> 0.532
Char. 267: 0.123-0.241 --> 0.263
Char. 269: 0.620-0.912 --> 0.957
Char. 273: 0.619-0.623 --> 0.824
Char. 278: 0.280-0.476 --> 0.481
Char. 283: 0.716-0.746 --> 1.000
Char. 291: 0.482-0.629 --> 0.636
Char. 294: 0.000-0.166 --> 0.333
Char. 300: 0.538-0.649 --> 0.440
Char. 307: 0.119 --> 0.000
Char. 309: 0.725 --> 0.828
Char. 321: 0.739-0.789 --> 0.712
Char. 326: 0.211-0.311 --> 0.321
Char. 328: 0.383-0.423 --> 0.430
Char. 336: 0.279-0.286 --> 0.261
Char. 338: 0.363-0.388 --> 0.866
Char. 339: 0.581-0.599 --> 0.718
Char. 342: 0.499 --> 0.458
Char. 344: 0.310-0.325 --> 0.233
Char. 345: 0.408-0.504 --> 0.293
Char. 346: 0.310-0.429 --> 0.284
Char. 348: 0.266-0.303 --> 0.192
Char. 349: 0.393-0.411 --> 0.486
Char. 351: 0.571-0.662 --> 0.717
Char. 352: 0.329-0.350 --> 0.372
Char. 354: 0.481 --> 0.584
Char. 355: 0.389 --> 0.291
Char. 357: 0.293-0.397 --> 0.431
Char. 359: 0.634-0.724 --> 0.727
Char. 360: 0.441-0.463 --> 0.306
Char. 364: 0.621-0.662 --> 0.672
Char. 369: 0.431-0.437 --> 0.411
Char. 370: 0.447-0.545 --> 0.661
Char. 371: 0.172 --> 0.085
Char. 372: 0.188-0.194 --> 0.090
Char. 374: 0.368-0.483 --> 0.266
Char. 376: 0.779-0.853 --> 0.855
Char. 379: 0.834-0.838 --> 0.754
Char. 380: 0.429-0.527 --> 0.412
Char. 381: 0.816-0.824 --> 0.841
Char. 383: 0.763 --> 0.709
Char. 393: 0.817-0.860 --> 0.890
Char. 394: 0.376-0.438 --> 0.564
Char. 395: 0.263-0.330 --> 0.558
Char. 397: 0.199-0.218 --> 0.450
Char. 398: 0.143-0.151 --> 0.210
Char. 399: 0.259-0.416 --> 0.948
Char. 451: 0 --> 2
Char. 471: 3 --> 2
Char. 473: 2 --> 1
Char. 535: 1 --> 0
Char. 544: 2 --> 1
Char. 559: 2 --> 1
Char. 625: 0 --> 1
Char. 626: 1 --> 2
Char. 629: 1 --> 2

Cesaire :

Char. 21: 0.664-0.766 --> 0.587
Char. 41: 0.279-0.282 --> 0.382
Char. 43: 0.301-0.451 --> 0.292
Char. 60: 0.579-0.697 --> 0.936
Char. 124: 0.063 --> 0.000
Char. 151: 0.327-0.345 --> 0.288

Char. 154: 0.228 --> 0.168
Char. 157: 0.507-0.584 --> 0.442
Char. 158: 0.592-0.594 --> 0.489
Char. 159: 0.450-0.582 --> 0.407
Char. 160: 0.612 --> 0.569
Char. 161: 0.480 --> 0.326
Char. 162: 0.931 --> 0.868
Char. 164: 0.300 --> 0.129
Char. 165: 0.704-0.726 --> 0.817
Char. 166: 0.923 --> 0.931
Char. 169: 0.218 --> 0.202
Char. 170: 0.160 --> 0.073
Char. 171: 0.242 --> 0.112
Char. 172: 0.310 --> 0.262
Char. 173: 0.703 --> 0.628
Char. 174: 0.308 --> 0.268
Char. 175: 0.667 --> 0.549
Char. 176: 0.569 --> 0.553
Char. 177: 0.475-0.480 --> 0.289
Char. 178: 0.508-0.673 --> 0.461
Char. 179: 0.762-0.798 --> 0.615
Char. 182: 0.172 --> 0.098
Char. 183: 0.124-0.125 --> 0.110
Char. 184: 0.145 --> 0.022
Char. 185: 0.276 --> 0.218
Char. 187: 0.425-0.432 --> 0.403
Char. 189: 0.119 --> 0.066
Char. 216: 0.437-0.556 --> 0.254
Char. 217: 0.310-0.381 --> 0.453
Char. 222: 0.366 --> 0.348
Char. 223: 0.308 --> 0.321
Char. 228: 0.367-0.459 --> 0.300
Char. 230: 0.714 --> 1.000
Char. 232: 0.000 --> 0.307
Char. 237: 0.742-0.749 --> 0.829
Char. 239: 0.200 --> 0.600
Char. 241: 0.200 --> 0.100
Char. 242: 0.000 --> 0.333
Char. 247: 0.352-0.419 --> 0.544
Char. 250: 0.416 --> 0.500
Char. 251: 0.000-0.083 --> 0.250
Char. 252: 0.000 --> 0.800
Char. 261: 0.171 --> 0.106
Char. 266: 0.454 --> 0.356
Char. 267: 0.064 --> 0.063
Char. 268: 0.451-0.520 --> 0.638
Char. 271: 0.064 --> 0.095
Char. 273: 0.619 --> 0.563
Char. 274: 0.661-0.716 --> 0.801
Char. 277: 0.015 --> 0.000
Char. 281: 0.058-0.061 --> 0.057
Char. 282: 0.116-0.172 --> 0.036
Char. 283: 0.716 --> 0.596
Char. 284: 0.375 --> 0.500
Char. 290: 0.165-0.201 --> 0.000
Char. 291: 0.416-0.458 --> 0.055
Char. 292: 0.371-0.491 --> 0.208
Char. 294: 0.000-0.166 --> 0.333
Char. 299: 0.146-0.178 --> 0.140
Char. 301: 0.773-0.787 --> 0.832
Char. 321: 0.765-0.789 --> 0.818
Char. 322: 0.888-0.896 --> 0.958
Char. 323: 0.515-0.666 --> 0.848
Char. 332: 0.536-0.548 --> 0.690
Char. 333: 0.389-0.462 --> 0.312
Char. 340: 0.413-0.513 --> 0.664
Char. 341: 0.162-0.166 --> 0.158
Char. 346: 0.364-0.429 --> 0.471
Char. 347: 0.134-0.193 --> 0.267
Char. 348: 0.266-0.303 --> 0.469
Char. 349: 0.411 --> 0.449
Char. 351: 0.571-0.662 --> 0.731
Char. 352: 0.329-0.350 --> 0.257
Char. 354: 0.307-0.481 --> 0.257
Char. 355: 0.389 --> 0.468
Char. 356: 0.585-0.663 --> 0.537
Char. 357: 0.254 --> 0.006
Char. 361: 0.315-0.328 --> 0.300
Char. 362: 0.552-0.757 --> 0.426
Char. 363: 0.724-0.743 --> 0.339
Char. 364: 0.621 --> 0.399
Char. 367: 0.570-0.660 --> 0.562

Char. 368: 0.792 --> 1.000
Char. 370: 0.447-0.545 --> 0.569
Char. 378: 0.608 --> 0.507
Char. 379: 0.834 --> 0.761
Char. 382: 0.370 --> 0.342
Char. 383: 0.763 --> 0.688
Char. 385: 0.788 --> 0.830
Char. 387: 0.551-0.559 --> 0.540
Char. 394: 0.376-0.438 --> 0.237
Char. 396: 0.395-0.481 --> 0.051
Char. 397: 0.199 --> 0.179
Char. 398: 0.151 --> 0.181
Char. 404: 0 --> 2
Char. 419: 1 --> 2
Char. 446: 0 --> 1
Char. 544: 2 --> 0
Char. 545: 1 --> 0
Char. 546: 1 --> 0
Char. 563: 1 --> 2
Char. 580: 1 --> 2
Char. 589: 0 --> 1
Char. 599: 0 --> 1
Char. 608: 1 --> 0
Char. 615: 1 --> 2

Saccopastore_I_II :

Char. 4: 0.418-0.443 --> 0.493
Char. 5: 0.343 --> 0.289
Char. 11: 0.308-0.391 --> 0.282
Char. 17: 0.371-0.419 --> 0.286
Char. 19: 0.564-0.708 --> 0.712
Char. 22: 0.588-0.604 --> 0.692
Char. 24: 0.257 --> 0.254
Char. 26: 0.432-0.447 --> 0.342
Char. 27: 0.340-0.388 --> 0.449
Char. 28: 0.301-0.515 --> 0.686
Char. 29: 0.496-0.522 --> 0.274
Char. 33: 0.397-0.437 --> 0.230
Char. 34: 0.353 --> 0.246
Char. 37: 0.297-0.311 --> 0.286
Char. 38: 0.411 --> 0.006
Char. 39: 0.414-0.431 --> 0.511
Char. 40: 0.468-0.472 --> 0.533
Char. 41: 0.279-0.282 --> 0.346
Char. 42: 0.425-0.481 --> 0.561
Char. 43: 0.368-0.506 --> 0.524
Char. 45: 0.593-0.636 --> 0.579
Char. 50: 0.632-0.659 --> 0.608
Char. 51: 0.660-0.680 --> 0.649
Char. 53: 0.419-0.433 --> 0.406
Char. 58: 0.539-0.570 --> 0.511
Char. 60: 0.544-0.697 --> 0.511
Char. 61: 0.637 --> 0.698
Char. 62: 0.287-0.424 --> 0.523
Char. 64: 0.154 --> 0.063
Char. 67: 0.198-0.209 --> 0.196
Char. 68: 0.117-0.183 --> 0.094
Char. 74: 0.477-0.482 --> 0.340
Char. 76: 0.376-0.420 --> 0.721
Char. 78: 0.451 --> 0.537
Char. 80: 0.616-0.725 --> 0.383
Char. 81: 0.284 --> 0.256
Char. 82: 0.450-0.506 --> 0.448
Char. 85: 0.462-0.603 --> 0.625
Char. 86: 0.385-0.462 --> 0.614
Char. 87: 0.527-0.587 --> 0.837
Char. 88: 0.611-0.703 --> 0.899
Char. 89: 0.460-0.619 --> 0.786
Char. 90: 0.514-0.627 --> 0.643
Char. 91: 0.398-0.409 --> 0.449
Char. 96: 0.370 --> 0.385
Char. 97: 0.209 --> 0.074
Char. 99: 0.535-0.555 --> 0.608
Char. 101: 0.635-0.713 --> 0.747
Char. 102: 0.554-0.582 --> 0.904
Char. 104: 0.618-0.718 --> 0.920
Char. 109: 0.321-0.400 --> 0.401
Char. 110: 0.565 --> 0.751
Char. 113: 0.656-0.679 --> 0.805
Char. 124: 0.109-0.185 --> 0.104
Char. 126: 0.414 --> 0.181
Char. 132: 0.588-0.682 --> 0.792
Char. 135: 0.442-0.529 --> 0.648

Char. 191: 0.631 --> 1.000
Char. 209: 0.327 --> 0.008
Char. 222: 0.563-0.617 --> 0.712
Char. 229: 0.333-0.444 --> 0.500
Char. 241: 0.500 --> 0.800
Char. 249: 0.200 --> 0.150
Char. 322: 0.888 --> 0.828
Char. 323: 0.366-0.498 --> 0.304
Char. 325: 0.286-0.376 --> 0.454
Char. 326: 0.211-0.311 --> 0.156
Char. 327: 0.537-0.562 --> 0.889
Char. 328: 0.317-0.336 --> 0.203
Char. 329: 0.431-0.542 --> 0.295
Char. 333: 0.593-0.645 --> 1.000
Char. 334: 0.199 --> 0.265
Char. 335: 0.189 --> 0.185
Char. 336: 0.286 --> 0.307
Char. 338: 0.363-0.388 --> 0.276
Char. 340: 0.583 --> 0.775
Char. 342: 0.499 --> 0.955
Char. 343: 0.524-0.600 --> 1.000
Char. 349: 0.259-0.383 --> 0.042
Char. 351: 0.514 --> 0.477
Char. 352: 0.329-0.350 --> 0.278
Char. 353: 0.500-0.569 --> 1.000
Char. 356: 0.585-0.663 --> 0.670
Char. 359: 0.417-0.508 --> 0.213
Char. 367: 0.766-0.797 --> 0.933
Char. 419: 1 --> 2
Char. 473: 2 --> 3
Char. 474: 0 --> 2
Char. 497: 2 --> 1
Char. 603: 0 --> 1

Neanderthalensis_type :

Char. 0: 0.681-0.745 --> 0.624
Char. 1: 0.272 --> 0.376
Char. 2: 0.278 --> 0.401
Char. 3: 0.254-0.257 --> 0.491
Char. 5: 0.366 --> 0.538
Char. 6: 0.415 --> 0.510
Char. 16: 0.249 --> 0.067
Char. 20: 0.757 --> 0.782
Char. 23: 0.756 --> 0.749
Char. 26: 0.432-0.447 --> 0.000
Char. 39: 0.371-0.431 --> 0.581
Char. 40: 0.456-0.472 --> 0.522
Char. 41: 0.279-0.282 --> 0.298
Char. 44: 0.432-0.462 --> 0.300
Char. 46: 0.546 --> 0.872
Char. 47: 0.590 --> 0.066
Char. 48: 0.476-0.498 --> 0.000
Char. 49: 0.418-0.430 --> 0.569
Char. 50: 0.600 --> 0.573
Char. 52: 0.406-0.417 --> 0.259
Char. 58: 0.563-0.570 --> 0.409
Char. 59: 0.536-0.552 --> 0.416
Char. 68: 0.256-0.315 --> 0.527
Char. 69: 0.224-0.285 --> 0.473
Char. 82: 0.506 --> 0.685
Char. 85: 0.217-0.297 --> 0.345
Char. 86: 0.302-0.360 --> 0.409
Char. 89: 0.249-0.308 --> 0.343
Char. 91: 0.394-0.409 --> 0.424
Char. 92: 0.362 --> 0.404
Char. 93: 0.298-0.311 --> 0.324
Char. 126: 0.414 --> 0.445
Char. 321: 0.816 --> 0.817
Char. 322: 0.845 --> 0.810
Char. 323: 0.515-0.532 --> 0.634
Char. 333: 0.389-0.462 --> 0.468
Char. 334: 0.205 --> 0.265
Char. 335: 0.239 --> 1.000
Char. 337: 0.241-0.261 --> 0.181
Char. 338: 0.317-0.388 --> 0.395
Char. 347: 0.134 --> 0.125
Char. 348: 0.303 --> 0.320
Char. 355: 0.389 --> 0.387
Char. 414: 2 --> 0
Char. 417: 0 --> 1
Char. 418: 1 --> 2
Char. 421: 0 --> 1
Char. 460: 0 --> 1

Char. 463: 2 --> 1
Char. 464: 2 --> 1
Char. 467: 1 --> 0
Char. 480: 1 --> 0
Char. 481: 1 --> 0

Xiahe :

Char. 151: 0.327 --> 0.101
Char. 165: 0.704-0.807 --> 0.658
Char. 168: 0.629 --> 0.729
Char. 169: 0.610 --> 0.867
Char. 175: 0.918 --> 0.961
Char. 179: 0.578-0.729 --> 0.566
Char. 180: 0.204-0.296 --> 0.582
Char. 181: 0.166 --> 0.547
Char. 183: 0.220-0.257 --> 0.537
Char. 184: 0.241-0.342 --> 0.568
Char. 185: 0.455 --> 0.711
Char. 186: 0.308 --> 0.442
Char. 281: 0.323-0.365 --> 0.719
Char. 282: 0.231-0.292 --> 0.498
Char. 283: 0.248 --> 0.098
Char. 284: 0.875 --> 1.000
Char. 289: 0.212-0.238 --> 0.478
Char. 290: 0.245-0.326 --> 0.650
Char. 291: 0.236-0.475 --> 0.601
Char. 292: 0.388-0.491 --> 0.500
Char. 293: 0.875 --> 1.000
Char. 296: 0.800 --> 1.000
Char. 382: 0.492 --> 0.381
Char. 387: 0.538 --> 0.000
Char. 388: 0.502-0.651 --> 0.074
Char. 389: 0.647 --> 0.477
Char. 391: 0.482-0.542 --> 0.381
Char. 395: 0.570 --> 0.628
Char. 399: 0.361-0.416 --> 0.356
Char. 526: 1 --> 0
Char. 527: 1 --> 0
Char. 528: 1 --> 0
Char. 534: 0 --> 1
Char. 548: 1 --> 0
Char. 563: 1 --> 3
Char. 573: 0 --> 1
Char. 583: 0 --> 2
Char. 584: 0 --> 1
Char. 585: 0 --> 1
Char. 626: 1 --> 2

Dali :

Char. 0: 0.476 --> 0.453
Char. 5: 0.520-0.796 --> 0.826
Char. 15: 0.440-0.638 --> 0.722
Char. 18: 0.438-0.703 --> 0.959
Char. 22: 0.720-0.737 --> 0.839
Char. 42: 0.553-0.666 --> 0.767
Char. 43: 0.530 --> 0.646
Char. 45: 0.615 --> 0.789
Char. 60: 0.478 --> 0.335
Char. 91: 0.678 --> 0.760
Char. 96: 0.441 --> 0.458
Char. 99: 0.297-0.380 --> 0.217
Char. 105: 0.276 --> 0.179
Char. 111: 0.335-0.503 --> 0.559
Char. 113: 0.425-0.661 --> 0.423
Char. 114: 0.512-0.517 --> 0.527
Char. 332: 0.400-0.417 --> 0.355
Char. 333: 0.232-0.354 --> 0.185
Char. 338: 0.282-0.361 --> 0.170
Char. 351: 0.166-0.197 --> 0.087
Char. 353: 0.227 --> 0.075
Char. 354: 0.153-0.230 --> 0.000
Char. 356: 0.283-0.320 --> 0.191
Char. 357: 0.393-0.432 --> 0.682
Char. 605: 3 --> 2

Hualongdong :

Char. 5: 0.520-0.796 --> 0.210
Char. 22: 0.720-0.737 --> 0.624
Char. 39: 0.479-0.756 --> 0.232
Char. 42: 0.553-0.666 --> 0.446
Char. 43: 0.530 --> 0.512
Char. 45: 0.615 --> 0.554
Char. 62: 0.368-0.486 --> 0.346
Char. 89: 0.637-0.699 --> 0.526
Char. 90: 0.612-0.681 --> 0.455

- Char. 92: 0.514-0.542 --> 0.458
- Char. 99: 0.297-0.380 --> 0.595
- Char. 101: 0.711 --> 0.881
- Char. 109: 0.679-0.883 --> 0.436
- Char. 110: 0.595-0.867 --> 0.966
- Char. 113: 0.425-0.661 --> 0.844
- Char. 117: 0.642 --> 0.794
- Char. 126: 0.419-0.440 --> 0.713
- Char. 323: 0.498-0.666 --> 0.292
- Char. 332: 0.400-0.417 --> 0.470
- Char. 333: 0.232-0.354 --> 0.394
- Char. 334: 0.212 --> 0.191
- Char. 347: 0.063 --> 0.028
- Char. 348: 0.167 --> 0.148
- Char. 351: 0.166-0.197 --> 0.562
- Char. 354: 0.153-0.230 --> 0.239
- Char. 356: 0.283-0.320 --> 0.826
- Char. 357: 0.393-0.432 --> 0.120
- Char. 359: 0.413 --> 0.568
- Char. 361: 0.249 --> 0.330
- Char. 418: 2 --> 1
- Char. 438: 1 --> 0

Harbin :

- Char. 0: 0.522-0.666 --> 0.674
- Char. 4: 0.615 --> 0.700
- Char. 7: 0.363 --> 0.549
- Char. 8: 0.339-0.384 --> 0.438
- Char. 11: 0.534 --> 0.557
- Char. 14: 0.348-0.556 --> 0.227
- Char. 16: 0.610 --> 0.706
- Char. 19: 0.460 --> 0.348
- Char. 20: 0.830-0.868 --> 0.898
- Char. 21: 0.479-0.545 --> 0.475
- Char. 23: 0.864 --> 0.911
- Char. 24: 0.606 --> 0.638
- Char. 25: 0.604 --> 0.655
- Char. 26: 0.599 --> 0.655
- Char. 27: 0.463-0.501 --> 0.406
- Char. 28: 0.461 --> 0.218
- Char. 29: 0.531 --> 0.689
- Char. 30: 0.525 --> 0.591
- Char. 32: 0.448-0.453 --> 0.514
- Char. 35: 0.623 --> 0.712
- Char. 36: 0.621-0.706 --> 0.708
- Char. 37: 0.581 --> 0.613
- Char. 38: 0.264 --> 0.411
- Char. 39: 0.479-0.756 --> 0.793
- Char. 40: 0.468-0.546 --> 0.565
- Char. 46: 0.658-0.665 --> 0.588
- Char. 47: 0.802 --> 0.972
- Char. 49: 0.754 --> 0.847
- Char. 50: 0.544-0.547 --> 0.451
- Char. 51: 0.806 --> 0.999
- Char. 52: 0.785 --> 0.907
- Char. 53: 0.642 --> 0.688
- Char. 54: 0.182-0.372 --> 0.868
- Char. 55: 0.557 --> 0.478
- Char. 56: 0.453-0.534 --> 0.681
- Char. 57: 0.423-0.634 --> 0.270
- Char. 61: 0.211 --> 0.193
- Char. 62: 0.368-0.486 --> 0.507
- Char. 63: 0.303 --> 0.191
- Char. 65: 0.663-0.739 --> 0.844
- Char. 66: 0.590-0.630 --> 0.691
- Char. 67: 0.354 --> 0.277
- Char. 68: 0.519-0.531 --> 0.552
- Char. 71: 0.619 --> 0.527
- Char. 73: 0.377-0.395 --> 0.350
- Char. 74: 0.504 --> 0.539
- Char. 75: 0.369 --> 0.417
- Char. 77: 0.531 --> 0.619
- Char. 79: 0.496 --> 0.627
- Char. 81: 0.792 --> 0.885
- Char. 84: 0.250 --> 0.369
- Char. 85: 0.618 --> 0.744
- Char. 86: 0.715 --> 0.820
- Char. 87: 0.617 --> 0.816
- Char. 88: 0.624 --> 0.793
- Char. 89: 0.637-0.699 --> 0.833
- Char. 90: 0.612-0.681 --> 0.799
- Char. 92: 0.514-0.542 --> 0.614
- Char. 93: 0.344-0.609 --> 0.652

Char. 94: 0.400 --> 0.505
Char. 95: 0.467 --> 0.506
Char. 97: 0.155-0.307 --> 0.027
Char. 100: 0.167-0.172 --> 0.115
Char. 105: 0.282-0.315 --> 0.341
Char. 109: 0.679-0.883 --> 1.000
Char. 112: 0.342-0.467 --> 0.751
Char. 118: 0.588 --> 0.970
Char. 119: 0.678 --> 0.838
Char. 120: 0.710 --> 0.800
Char. 121: 0.335 --> 0.398
Char. 122: 0.329-0.366 --> 0.000
Char. 123: 0.784 --> 0.711
Char. 124: 0.268-0.349 --> 0.203
Char. 125: 0.162 --> 0.206
Char. 126: 0.419-0.440 --> 0.263
Char. 128: 0.360-0.461 --> 0.539
Char. 129: 0.203-0.237 --> 0.249
Char. 130: 0.597-0.654 --> 0.580
Char. 132: 0.537 --> 0.652
Char. 133: 0.303-0.338 --> 0.281
Char. 136: 0.180 --> 0.282
Char. 137: 0.586 --> 0.648
Char. 138: 0.357-0.468 --> 0.595
Char. 235: 0.390 --> 0.526
Char. 236: 0.296 --> 0.565
Char. 237: 0.533-0.545 --> 0.742
Char. 239: 0.200-0.400 --> 0.000
Char. 241: 0.500 --> 0.100
Char. 321: 0.789-0.864 --> 0.879
Char. 322: 0.825-0.829 --> 0.909
Char. 323: 0.498-0.666 --> 0.742
Char. 325: 0.280-0.400 --> 0.212
Char. 326: 0.316-0.370 --> 0.260
Char. 328: 0.213-0.216 --> 0.303
Char. 329: 0.135-0.316 --> 0.333
Char. 331: 0.310 --> 0.382
Char. 334: 0.212-0.243 --> 0.331
Char. 335: 0.186 --> 0.000
Char. 336: 0.231 --> 0.399
Char. 337: 0.388 --> 0.561
Char. 339: 0.276 --> 0.257
Char. 340: 0.596 --> 0.777
Char. 341: 0.385-0.458 --> 0.214
Char. 342: 0.324 --> 0.179
Char. 343: 0.343 --> 0.181
Char. 344: 0.034-0.184 --> 0.256
Char. 346: 0.480 --> 0.654
Char. 349: 0.170 --> 0.127
Char. 360: 0.338 --> 0.400
Char. 361: 0.234-0.249 --> 0.192
Char. 362: 0.337-0.404 --> 0.000
Char. 363: 0.458-0.469 --> 0.000
Char. 364: 0.260 --> 0.000
Char. 367: 0.567-0.722 --> 0.778
Char. 369: 0.340 --> 0.472
Char. 370: 0.355 --> 0.485
Char. 415: 0 --> 1
Char. 422: 2 --> 1
Char. 442: 1 --> 0
Char. 487: 0 --> 1
Char. 490: 2 --> 1
Char. 496: 1 --> 2
Char. 516: 2 --> 0
Char. 523: 1 --> 0
Char. 613: 2 --> 3

Jinniushan :

Char. 9: 0.396 --> 0.392
Char. 14: 0.348-0.556 --> 1.000
Char. 15: 0.300-0.575 --> 0.262
Char. 17: 0.344-0.599 --> 0.318
Char. 18: 0.399-0.703 --> 0.353
Char. 24: 0.355-0.389 --> 0.334
Char. 25: 0.344-0.398 --> 0.266
Char. 29: 0.496 --> 0.217
Char. 32: 0.448-0.453 --> 0.186
Char. 34: 0.370-0.516 --> 0.160
Char. 35: 0.575-0.605 --> 0.308
Char. 36: 0.567-0.683 --> 0.320
Char. 38: 0.239-0.264 --> 0.202
Char. 41: 0.262-0.276 --> 0.379
Char. 42: 0.553-0.666 --> 0.477

Char. 43: 0.530 --> 0.451
Char. 44: 0.372-0.472 --> 0.274
Char. 45: 0.615 --> 0.598
Char. 47: 0.595-0.702 --> 0.338
Char. 49: 0.746-0.754 --> 0.279
Char. 51: 0.693-0.716 --> 0.000
Char. 52: 0.562-0.589 --> 0.293
Char. 54: 0.182-0.372 --> 0.090
Char. 56: 0.453-0.534 --> 0.158
Char. 57: 0.423-0.634 --> 0.700
Char. 58: 0.566-0.602 --> 0.476
Char. 59: 0.516-0.528 --> 0.440
Char. 60: 0.478-0.505 --> 0.582
Char. 65: 0.524-0.736 --> 0.411
Char. 69: 0.243-0.253 --> 0.449
Char. 70: 0.203-0.295 --> 0.147
Char. 72: 0.250-0.265 --> 0.206
Char. 74: 0.477-0.504 --> 0.453
Char. 76: 0.314-0.340 --> 0.144
Char. 77: 0.333-0.499 --> 0.176
Char. 80: 0.756-0.769 --> 0.248
Char. 81: 0.450-0.474 --> 0.423
Char. 82: 0.649-0.674 --> 0.477
Char. 84: 0.129-0.250 --> 0.061
Char. 91: 0.409 --> 0.366
Char. 97: 0.155-0.307 --> 0.344
Char. 100: 0.200-0.213 --> 0.222
Char. 101: 0.632-0.711 --> 0.726
Char. 102: 0.459-0.514 --> 0.734
Char. 107: 0.512-0.867 --> 1.000
Char. 108: 0.353-0.359 --> 0.329
Char. 114: 0.250-0.373 --> 0.183
Char. 115: 0.370 --> 0.366
Char. 116: 0.333-0.380 --> 0.207
Char. 117: 0.524-0.543 --> 0.415
Char. 118: 0.356-0.570 --> 0.342
Char. 120: 0.433-0.539 --> 0.416
Char. 121: 0.268 --> 0.113
Char. 127: 0.645-0.722 --> 0.771
Char. 128: 0.360-0.461 --> 0.280
Char. 129: 0.203-0.237 --> 0.100
Char. 130: 0.597-0.654 --> 0.813
Char. 132: 0.492-0.537 --> 0.441
Char. 133: 0.303-0.338 --> 0.340
Char. 200: 0.413-0.444 --> 0.340
Char. 202: 0.750 --> 0.500
Char. 203: 0.500 --> 0.375
Char. 216: 0.318 --> 0.308
Char. 226: 0.542-0.561 --> 0.484
Char. 228: 0.330 --> 0.376
Char. 229: 0.333 --> 0.000
Char. 233: 0.000 --> 0.666
Char. 236: 0.212-0.296 --> 0.150
Char. 237: 0.533-0.545 --> 0.492
Char. 238: 0.227-0.274 --> 0.197
Char. 241: 0.500 --> 0.800
Char. 320: 0.335-0.356 --> 0.196
Char. 324: 0.630-0.640 --> 0.804
Char. 325: 0.280-0.400 --> 0.580
Char. 327: 0.434-0.528 --> 0.208
Char. 329: 0.135-0.316 --> 0.116
Char. 330: 0.589-0.745 --> 0.755
Char. 335: 0.210 --> 0.534
Char. 336: 0.173-0.219 --> 0.079
Char. 337: 0.257 --> 0.208
Char. 338: 0.363-0.366 --> 0.426
Char. 340: 0.583-0.596 --> 0.481
Char. 341: 0.385-0.458 --> 0.492
Char. 344: 0.034-0.184 --> 0.000
Char. 347: 0.132-0.151 --> 0.160
Char. 348: 0.317-0.402 --> 0.559
Char. 352: 0.350 --> 0.419
Char. 353: 0.302-0.591 --> 0.707
Char. 358: 0.269-0.270 --> 0.153
Char. 359: 0.278-0.413 --> 0.000
Char. 363: 0.458-0.469 --> 0.500
Char. 365: 0.602-0.888 --> 0.905
Char. 366: 0.301-0.313 --> 0.239
Char. 367: 0.567-0.722 --> 0.475
Char. 429: 0 --> 1
Char. 450: 1 --> 0
Char. 451: 0 --> 1

Char. 480: 1 --> 0
Char. 481: 1 --> 0
Char. 611: 2 --> 1

Maba :

Char. 2: 0.347 --> 0.307
Char. 20: 0.824-0.827 --> 0.690
Char. 21: 0.604-0.666 --> 0.583
Char. 22: 0.585-0.640 --> 0.523
Char. 41: 0.307-0.349 --> 0.357
Char. 42: 0.484 --> 0.561
Char. 43: 0.414-0.506 --> 0.573
Char. 44: 0.474 --> 0.488
Char. 46: 0.533 --> 0.487
Char. 52: 0.394 --> 0.292
Char. 60: 0.544-0.615 --> 0.472
Char. 62: 0.306 --> 0.281
Char. 68: 0.327 --> 0.553
Char. 69: 0.243-0.253 --> 0.512
Char. 85: 0.481 --> 0.335
Char. 86: 0.385-0.462 --> 0.379
Char. 87: 0.314-0.414 --> 0.512
Char. 88: 0.338-0.433 --> 0.624
Char. 89: 0.502 --> 0.362
Char. 90: 0.514 --> 0.306
Char. 92: 0.427-0.429 --> 0.335
Char. 95: 0.291 --> 0.143
Char. 126: 0.566-0.604 --> 0.447
Char. 321: 0.793-0.836 --> 0.749
Char. 345: 0.502 --> 0.501
Char. 346: 0.467-0.498 --> 0.459
Char. 348: 0.317-0.324 --> 0.200
Char. 349: 0.196 --> 0.151
Char. 356: 0.410-0.441 --> 0.573
Char. 429: 0 --> 1

Xuchang :

Char. 0: 0.585-0.595 --> 0.989
Char. 5: 0.343-0.347 --> 0.000
Char. 6: 0.321-0.327 --> 0.000
Char. 20: 0.824-0.827 --> 0.855
Char. 22: 0.585-0.640 --> 0.726
Char. 23: 0.753-0.822 --> 0.992
Char. 24: 0.592-0.597 --> 0.646
Char. 32: 0.384 --> 0.091
Char. 33: 0.402-0.437 --> 0.342
Char. 36: 0.419-0.472 --> 0.263
Char. 39: 0.391-0.404 --> 0.000
Char. 40: 0.468-0.472 --> 0.386
Char. 42: 0.425-0.481 --> 0.364
Char. 45: 0.593 --> 0.531
Char. 50: 0.539-0.659 --> 0.516
Char. 52: 0.562-0.607 --> 0.852
Char. 53: 0.642-0.670 --> 0.942
Char. 59: 0.536-0.552 --> 0.528
Char. 62: 0.306-0.541 --> 0.699
Char. 64: 0.346 --> 0.201
Char. 65: 0.524 --> 0.235
Char. 67: 0.209-0.241 --> 0.050
Char. 82: 0.680-0.699 --> 1.000
Char. 87: 0.314-0.414 --> 0.231
Char. 88: 0.338-0.433 --> 0.275
Char. 138: 0.371 --> 0.169
Char. 320: 0.649 --> 0.707
Char. 322: 0.888-0.937 --> 1.000
Char. 323: 0.413-0.528 --> 0.000
Char. 324: 0.549-0.601 --> 0.509
Char. 331: 0.330-0.476 --> 0.220
Char. 332: 0.382-0.395 --> 0.195
Char. 333: 0.417-0.466 --> 0.308
Char. 335: 0.184-0.189 --> 0.214
Char. 337: 0.303-0.432 --> 0.588
Char. 338: 0.363-0.366 --> 0.198
Char. 341: 0.252-0.287 --> 0.159
Char. 345: 0.579-0.668 --> 0.741
Char. 463: 1 --> 2
Char. 464: 1 --> 2
Char. 477: 0 --> 1
Char. 479: 0 --> 1
Char. 491: 1 --> 0
Char. 496: 1 --> 2
Char. 511: 0 --> 1
Char. 516: 2 --> 0
Char. 517: 1 --> 0

Mauer_1 :

Char. 141: 0.402-0.564 --> 0.763
Char. 142: 0.339 --> 0.306
Char. 145: 0.341-0.346 --> 1.000
Char. 146: 0.364 --> 0.170
Char. 147: 0.377-0.389 --> 0.364
Char. 148: 0.498-0.531 --> 1.000
Char. 149: 0.476-0.564 --> 0.906
Char. 150: 0.535-0.656 --> 0.803
Char. 151: 0.327 --> 0.246
Char. 152: 0.365-0.567 --> 0.195
Char. 153: 0.412-0.548 --> 0.320
Char. 154: 0.228-0.436 --> 0.192
Char. 155: 0.551-0.577 --> 0.314
Char. 156: 0.218-0.401 --> 0.000
Char. 157: 0.341 --> 0.240
Char. 158: 0.482 --> 0.456
Char. 162: 0.947 --> 0.950
Char. 163: 0.699-0.844 --> 0.675
Char. 164: 0.428-0.479 --> 0.346
Char. 165: 0.704-0.726 --> 0.915
Char. 166: 0.906-0.908 --> 0.861
Char. 167: 0.396-0.430 --> 0.139
Char. 168: 0.337-0.372 --> 0.131
Char. 169: 0.491-0.492 --> 0.068
Char. 170: 0.486-0.565 --> 0.198
Char. 171: 0.521-0.575 --> 0.145
Char. 172: 0.451-0.525 --> 0.133
Char. 173: 0.748-0.794 --> 0.608
Char. 174: 0.340-0.431 --> 0.000
Char. 175: 0.696-0.702 --> 0.586
Char. 176: 0.585-0.706 --> 0.283
Char. 177: 0.475-0.480 --> 0.296
Char. 178: 0.508-0.583 --> 0.328
Char. 179: 0.729-0.802 --> 0.436
Char. 186: 0.252-0.260 --> 0.155
Char. 187: 0.603-0.629 --> 0.683
Char. 188: 0.328 --> 0.186
Char. 272: 0.295-0.419 --> 0.210
Char. 273: 0.539 --> 0.432
Char. 274: 0.716 --> 0.935
Char. 275: 0.222-0.333 --> 0.111
Char. 276: 0.309 --> 0.189
Char. 277: 0.231-0.321 --> 0.109
Char. 278: 0.251-0.284 --> 0.211
Char. 281: 0.323-0.365 --> 0.065
Char. 282: 0.231-0.292 --> 0.121
Char. 283: 0.523 --> 0.798
Char. 284: 0.375-0.791 --> 0.250
Char. 285: 0.000 --> 0.333
Char. 288: 0.200 --> 0.400
Char. 289: 0.212-0.238 --> 0.172
Char. 292: 0.558 --> 1.000
Char. 293: 0.500-1.000 --> 0.250
Char. 294: 0.000-0.166 --> 0.333
Char. 295: 0.222 --> 0.111
Char. 297: 0.333-0.666 --> 1.000
Char. 298: 0.236-0.363 --> 0.228
Char. 300: 0.636-0.655 --> 0.675
Char. 301: 0.627-0.722 --> 0.780
Char. 302: 0.875 --> 1.000
Char. 303: 0.250 --> 0.500
Char. 375: 0.263-0.362 --> 0.724
Char. 376: 0.380 --> 0.148
Char. 379: 0.848 --> 0.915
Char. 380: 0.641 --> 1.000
Char. 381: 0.879 --> 1.000
Char. 382: 0.676 --> 1.000
Char. 384: 0.378-0.385 --> 0.362
Char. 385: 0.437 --> 0.736
Char. 387: 0.551-0.559 --> 0.886
Char. 388: 0.502-0.515 --> 0.869
Char. 389: 0.673-0.675 --> 0.824
Char. 390: 0.347-0.365 --> 0.600
Char. 391: 0.612 --> 0.628
Char. 392: 0.451-0.585 --> 0.332
Char. 393: 0.781 --> 0.694
Char. 394: 0.376-0.395 --> 0.297
Char. 395: 0.200 --> 0.145
Char. 396: 0.216 --> 0.166
Char. 397: 0.199-0.218 --> 0.108
Char. 398: 0.127 --> 0.036

Char. 399: 0.416 --> 0.507
Char. 534: 0 --> 1
Char. 558: 2 --> 0
Char. 561: 0 --> 1
Char. 567: 0 --> 1
Char. 626: 1 --> 2

Arago_II_XIII_XXI_XLVII :

Char. 140: 0.341 --> 0.295
Char. 141: 0.402-0.564 --> 0.309
Char. 143: 0.479-0.560 --> 0.421
Char. 145: 0.341-0.346 --> 0.234
Char. 148: 0.498-0.531 --> 0.223
Char. 151: 0.327 --> 0.400
Char. 152: 0.365-0.567 --> 0.635
Char. 153: 0.412-0.548 --> 0.601
Char. 154: 0.228-0.436 --> 0.445
Char. 155: 0.551-0.577 --> 0.926
Char. 159: 0.466 --> 0.401
Char. 160: 0.618 --> 0.596
Char. 161: 0.632 --> 0.493
Char. 163: 0.699-0.844 --> 0.990
Char. 164: 0.428-0.479 --> 0.713
Char. 166: 0.906-0.908 --> 0.944
Char. 168: 0.337-0.372 --> 0.482
Char. 169: 0.491-0.492 --> 0.587
Char. 171: 0.521-0.575 --> 0.686
Char. 172: 0.451-0.525 --> 0.622
Char. 173: 0.748-0.794 --> 0.812
Char. 175: 0.696-0.702 --> 0.892
Char. 176: 0.585-0.706 --> 0.785
Char. 177: 0.475-0.480 --> 0.882
Char. 178: 0.508-0.583 --> 0.751
Char. 180: 0.574 --> 0.652
Char. 181: 0.471 --> 0.611
Char. 182: 0.389 --> 0.495
Char. 183: 0.333 --> 0.419
Char. 184: 0.332-0.342 --> 0.421
Char. 185: 0.358-0.400 --> 0.517
Char. 271: 0.205-0.248 --> 0.571
Char. 272: 0.295-0.419 --> 0.659
Char. 277: 0.231-0.321 --> 0.396
Char. 278: 0.251-0.284 --> 0.410
Char. 279: 0.528-0.621 --> 0.510
Char. 282: 0.231-0.292 --> 0.351
Char. 284: 0.375-0.791 --> 1.000
Char. 289: 0.212-0.238 --> 0.350
Char. 290: 0.273-0.368 --> 0.388
Char. 291: 0.482 --> 0.340
Char. 301: 0.627-0.722 --> 0.536
Char. 375: 0.263-0.362 --> 0.214
Char. 377: 0.290-0.333 --> 0.562
Char. 378: 0.256 --> 0.179
Char. 383: 0.783 --> 0.810
Char. 387: 0.551-0.559 --> 0.544
Char. 388: 0.502-0.515 --> 0.497
Char. 389: 0.673-0.675 --> 0.653
Char. 390: 0.347-0.365 --> 0.208
Char. 394: 0.376-0.395 --> 0.405
Char. 397: 0.199-0.218 --> 0.240
Char. 539: 1 --> 0
Char. 624: 0 --> 2
Char. 629: 1 --> 2
Char. 633: 1 --> 2

Broken_Hill :

Char. 0: 0.504-0.529 --> 0.554
Char. 5: 0.551 --> 0.813
Char. 6: 0.327-0.330 --> 0.581
Char. 8: 0.357-0.442 --> 0.314
Char. 9: 0.506-0.535 --> 0.455
Char. 10: 0.455-0.477 --> 0.330
Char. 11: 0.423 --> 0.474
Char. 13: 0.289-0.352 --> 0.493
Char. 17: 0.634-0.815 --> 0.459
Char. 19: 0.366-0.399 --> 0.435
Char. 20: 0.824-0.827 --> 0.701
Char. 21: 0.300 --> 0.033
Char. 22: 0.585-0.588 --> 0.607
Char. 23: 0.745-0.811 --> 0.822
Char. 24: 0.592-0.597 --> 0.360
Char. 25: 0.535-0.564 --> 0.353
Char. 26: 0.462 --> 0.510
Char. 27: 0.441-0.599 --> 0.364

Char. 29: 0.670 --> 0.715
Char. 30: 0.472 --> 0.388
Char. 31: 0.528 --> 0.387
Char. 33: 0.204-0.420 --> 0.080
Char. 34: 0.614-0.671 --> 0.541
Char. 37: 0.558-0.581 --> 0.346
Char. 38: 0.461-0.487 --> 0.559
Char. 39: 0.520 --> 0.781
Char. 42: 0.464 --> 0.526
Char. 45: 0.687 --> 0.749
Char. 48: 0.567-0.599 --> 0.674
Char. 50: 0.539-0.592 --> 0.605
Char. 52: 0.475-0.520 --> 0.398
Char. 53: 0.642-0.704 --> 0.532
Char. 54: 0.910 --> 1.000
Char. 55: 0.269 --> 0.046
Char. 56: 0.376-0.387 --> 0.476
Char. 58: 0.523-0.566 --> 0.507
Char. 65: 0.744 --> 0.874
Char. 66: 0.301-0.550 --> 0.672
Char. 67: 0.453 --> 0.475
Char. 68: 0.609-0.639 --> 0.656
Char. 71: 0.482 --> 0.708
Char. 77: 0.608 --> 0.615
Char. 78: 0.452 --> 0.535
Char. 79: 0.617-0.638 --> 0.497
Char. 80: 0.684-0.756 --> 0.761
Char. 82: 0.680-0.734 --> 0.562
Char. 87: 0.660 --> 0.829
Char. 88: 0.608 --> 0.814
Char. 89: 0.796 --> 0.815
Char. 92: 0.503-0.534 --> 0.729
Char. 94: 0.465-0.549 --> 0.317
Char. 96: 0.414-0.659 --> 0.370
Char. 97: 0.425 --> 0.064
Char. 98: 0.297-0.523 --> 0.634
Char. 100: 0.347 --> 0.472
Char. 101: 0.694 --> 0.713
Char. 103: 0.480 --> 0.541
Char. 105: 0.475 --> 0.310
Char. 106: 0.524-0.661 --> 0.469
Char. 108: 0.677 --> 0.838
Char. 110: 0.773 --> 0.816
Char. 111: 0.531-0.694 --> 0.363
Char. 112: 0.588-0.623 --> 0.792
Char. 115: 0.477-0.501 --> 0.467
Char. 116: 0.492 --> 0.342
Char. 124: 0.256 --> 0.101
Char. 126: 0.424 --> 0.282
Char. 132: 0.737 --> 0.735
Char. 133: 0.488-0.541 --> 0.311
Char. 134: 0.339-0.475 --> 0.308
Char. 136: 0.281 --> 0.348
Char. 137: 0.654 --> 0.571
Char. 138: 0.507-0.600 --> 0.470
Char. 139: 0.326 --> 0.292
Char. 206: 0.618 --> 0.625
Char. 207: 0.302 --> 0.449
Char. 209: 0.327-0.345 --> 0.637
Char. 214: 0.323-0.346 --> 0.242
Char. 216: 0.639 --> 0.643
Char. 217: 0.336-0.464 --> 0.000
Char. 228: 0.265-0.330 --> 0.253
Char. 230: 0.428 --> 0.285
Char. 237: 0.473-0.618 --> 0.432
Char. 241: 0.600 --> 0.700
Char. 245: 0.194-0.276 --> 0.159
Char. 247: 0.519 --> 0.648
Char. 248: 0.221-0.281 --> 0.158
Char. 250: 0.333 --> 0.166
Char. 254: 0.000-0.500 --> 1.000
Char. 320: 0.480-0.499 --> 0.216
Char. 321: 0.793-0.836 --> 0.716
Char. 323: 0.668 --> 0.901
Char. 324: 0.549-0.601 --> 0.642
Char. 325: 0.341-0.370 --> 0.301
Char. 326: 0.380-0.562 --> 0.289
Char. 327: 0.537-0.562 --> 0.573
Char. 328: 0.317-0.389 --> 0.459
Char. 332: 0.369-0.382 --> 0.493
Char. 334: 0.201-0.222 --> 0.242
Char. 336: 0.286-0.292 --> 0.226

Char. 337: 0.299-0.345 --> 0.200
Char. 341: 0.334 --> 0.458
Char. 343: 0.179-0.210 --> 0.239
Char. 347: 0.074-0.100 --> 0.047
Char. 349: 0.333 --> 0.158
Char. 352: 0.418 --> 0.525
Char. 353: 0.500-0.569 --> 0.414
Char. 354: 0.405-0.481 --> 0.120
Char. 355: 0.249-0.374 --> 0.155
Char. 356: 0.441 --> 0.473
Char. 357: 0.332 --> 0.166
Char. 359: 0.634 --> 0.577
Char. 366: 0.347 --> 0.464
Char. 367: 0.737-0.797 --> 0.871
Char. 369: 0.469 --> 0.462
Char. 371: 0.308 --> 0.286
Char. 372: 0.305 --> 0.280
Char. 401: 0 --> 1
Char. 412: 1 --> 2
Char. 439: 0 --> 1
Char. 460: 0 --> 1
Char. 467: 0 --> 1
Char. 469: 0 --> 1

Petralona_1 :

Char. 0: 0.504-0.529 --> 0.486
Char. 1: 0.624 --> 0.786
Char. 2: 0.579 --> 0.678
Char. 3: 0.757 --> 0.841
Char. 4: 0.580 --> 0.680
Char. 6: 0.327-0.330 --> 0.221
Char. 7: 0.383-0.415 --> 0.625
Char. 8: 0.357-0.442 --> 0.512
Char. 9: 0.506-0.535 --> 0.647
Char. 14: 0.489-0.647 --> 0.745
Char. 15: 0.418-0.478 --> 0.827
Char. 16: 0.582-0.590 --> 0.670
Char. 17: 0.634-0.815 --> 0.828
Char. 18: 0.508-0.636 --> 0.731
Char. 19: 0.366-0.399 --> 0.176
Char. 20: 0.824-0.827 --> 0.865
Char. 22: 0.585-0.588 --> 0.584
Char. 23: 0.745-0.811 --> 0.634
Char. 24: 0.592-0.597 --> 0.682
Char. 25: 0.535-0.564 --> 0.677
Char. 27: 0.441-0.599 --> 0.658
Char. 28: 0.569 --> 0.810
Char. 29: 0.670 --> 0.626
Char. 33: 0.204-0.420 --> 0.424
Char. 34: 0.614-0.671 --> 0.770
Char. 35: 0.635-0.643 --> 0.732
Char. 36: 0.638-0.803 --> 0.850
Char. 37: 0.558-0.581 --> 0.647
Char. 38: 0.461-0.487 --> 0.299
Char. 43: 0.396 --> 0.420
Char. 44: 0.290 --> 0.220
Char. 46: 0.553-0.563 --> 0.691
Char. 47: 0.668 --> 0.761
Char. 48: 0.567-0.599 --> 0.499
Char. 49: 0.816 --> 0.942
Char. 50: 0.539-0.592 --> 0.504
Char. 51: 0.719 --> 0.813
Char. 52: 0.475-0.520 --> 0.653
Char. 53: 0.642-0.704 --> 0.810
Char. 59: 0.476 --> 0.440
Char. 60: 0.648 --> 0.609
Char. 61: 0.325-0.386 --> 0.244
Char. 62: 0.486 --> 0.349
Char. 63: 0.331-0.349 --> 0.246
Char. 64: 0.258-0.348 --> 0.235
Char. 68: 0.609-0.639 --> 0.316
Char. 69: 0.441-0.449 --> 0.000
Char. 72: 0.369 --> 0.378
Char. 76: 0.422-0.436 --> 0.075
Char. 79: 0.617-0.638 --> 1.000
Char. 81: 0.579 --> 0.777
Char. 82: 0.680-0.734 --> 0.887
Char. 85: 0.732-0.748 --> 0.775
Char. 86: 0.796-0.801 --> 0.897
Char. 90: 0.772-0.784 --> 0.885
Char. 92: 0.503-0.534 --> 0.456
Char. 93: 0.614 --> 0.651
Char. 94: 0.465-0.549 --> 0.586

Char. 95: 0.518-0.620 --> 0.648
Char. 98: 0.297-0.523 --> 0.177
Char. 99: 0.782 --> 0.833
Char. 102: 0.519-0.549 --> 0.573
Char. 104: 0.809 --> 0.920
Char. 105: 0.475 --> 0.603
Char. 106: 0.524-0.661 --> 0.887
Char. 107: 0.738-0.797 --> 0.959
Char. 109: 0.709 --> 0.718
Char. 110: 0.773 --> 0.551
Char. 113: 0.805-0.807 --> 0.966
Char. 114: 0.735 --> 0.822
Char. 115: 0.477-0.501 --> 0.529
Char. 116: 0.492 --> 0.565
Char. 118: 0.565 --> 0.581
Char. 119: 0.621 --> 0.757
Char. 120: 0.682-0.727 --> 0.891
Char. 121: 0.614-0.645 --> 0.879
Char. 125: 0.249 --> 0.253
Char. 127: 0.663-0.753 --> 0.917
Char. 128: 0.610 --> 0.713
Char. 131: 0.468 --> 0.582
Char. 132: 0.737 --> 0.782
Char. 133: 0.488-0.541 --> 0.797
Char. 135: 0.454 --> 0.604
Char. 138: 0.507-0.600 --> 0.872
Char. 208: 0.538 --> 0.312
Char. 209: 0.327-0.345 --> 0.205
Char. 214: 0.323-0.346 --> 0.508
Char. 215: 0.242 --> 0.481
Char. 226: 0.641 --> 0.642
Char. 227: 0.385 --> 0.506
Char. 228: 0.265-0.330 --> 0.438
Char. 233: 0.000 --> 1.000
Char. 235: 0.444-0.452 --> 0.364
Char. 236: 0.305-0.341 --> 0.420
Char. 237: 0.473-0.618 --> 0.822
Char. 238: 0.215 --> 0.133
Char. 253: 0.000 --> 0.125
Char. 320: 0.480-0.499 --> 0.551
Char. 321: 0.793-0.836 --> 0.930
Char. 322: 0.818-0.887 --> 0.695
Char. 324: 0.549-0.601 --> 0.309
Char. 326: 0.380-0.562 --> 0.625
Char. 328: 0.317-0.389 --> 0.162
Char. 329: 0.431 --> 0.271
Char. 333: 0.280 --> 0.261
Char. 335: 0.184 --> 0.182
Char. 337: 0.299-0.345 --> 0.371
Char. 338: 0.399 --> 0.459
Char. 340: 0.788 --> 0.802
Char. 342: 0.233 --> 0.039
Char. 344: 0.265 --> 0.238
Char. 346: 0.745-0.777 --> 0.802
Char. 348: 0.176-0.271 --> 0.148
Char. 351: 0.538 --> 0.596
Char. 353: 0.500-0.569 --> 0.969
Char. 354: 0.405-0.481 --> 0.532
Char. 355: 0.249-0.374 --> 0.534
Char. 356: 0.441 --> 0.257
Char. 358: 0.619 --> 0.620
Char. 359: 0.634 --> 0.708
Char. 362: 0.425-0.628 --> 0.723
Char. 363: 0.473-0.741 --> 0.755
Char. 364: 0.480-0.618 --> 0.647
Char. 365: 0.783 --> 0.885
Char. 368: 0.639 --> 0.661
Char. 370: 0.502-0.596 --> 0.319
Char. 400: 1 --> 2
Char. 414: 0 --> 1
Char. 415: 0 --> 1
Char. 429: 0 --> 1
Char. 430: 0 --> 1
Char. 462: 2 --> 1
Char. 463: 1 --> 2
Char. 465: 1 --> 0
Char. 474: 2 --> 1
Char. 502: 2 --> 1

Ceprano :

Char. 4: 0.453-0.574 --> 0.435
Char. 5: 0.356-0.551 --> 0.309
Char. 6: 0.327-0.330 --> 0.191

Char. 15: 0.418-0.478 --> 0.813
Char. 16: 0.582-0.590 --> 0.672
Char. 18: 0.545-0.636 --> 1.000
Char. 23: 0.745-0.811 --> 0.868
Char. 24: 0.592-0.597 --> 0.715
Char. 25: 0.564 --> 0.721
Char. 26: 0.457-0.462 --> 0.684
Char. 27: 0.599 --> 1.000
Char. 34: 0.614-0.671 --> 0.692
Char. 37: 0.558-0.581 --> 0.658
Char. 39: 0.384-0.520 --> 0.347
Char. 40: 0.592-0.628 --> 0.643
Char. 41: 0.377-0.550 --> 0.592
Char. 42: 0.294-0.425 --> 0.245
Char. 43: 0.274-0.295 --> 0.231
Char. 44: 0.290 --> 0.269
Char. 47: 0.621-0.668 --> 0.795
Char. 48: 0.567-0.599 --> 0.718
Char. 49: 0.764-0.816 --> 0.901
Char. 53: 0.651-0.704 --> 0.758
Char. 62: 0.486-0.541 --> 0.591
Char. 65: 0.395 --> 0.353
Char. 69: 0.441-0.449 --> 0.518
Char. 79: 0.638 --> 0.720
Char. 80: 0.684-0.756 --> 0.188
Char. 86: 0.796-0.801 --> 0.809
Char. 93: 0.571-0.614 --> 0.821
Char. 94: 0.549 --> 0.724
Char. 98: 0.297 --> 0.000
Char. 107: 0.738-0.797 --> 0.731
Char. 108: 0.667-0.677 --> 0.532
Char. 126: 0.424-0.434 --> 0.417
Char. 137: 0.881 --> 1.000
Char. 320: 0.480-0.499 --> 0.795
Char. 321: 0.793-0.836 --> 0.879
Char. 322: 0.818-0.887 --> 0.951
Char. 323: 0.478-0.668 --> 0.427
Char. 325: 0.533 --> 0.732
Char. 326: 0.562 --> 1.000
Char. 332: 0.369-0.382 --> 0.354
Char. 335: 0.184-0.189 --> 0.099
Char. 341: 0.252-0.334 --> 0.228
Char. 348: 0.176-0.271 --> 0.102
Char. 369: 0.946 --> 1.000
Char. 415: 0 --> 1
Char. 466: 0 --> 1
Char. 502: 2 --> 1

Steinheim :

Char. 0: 0.504-0.536 --> 0.446
Char. 2: 0.298-0.347 --> 0.173
Char. 5: 0.343-0.346 --> 0.263
Char. 6: 0.321-0.415 --> 0.315
Char. 7: 0.281-0.339 --> 0.177
Char. 8: 0.339-0.371 --> 0.236
Char. 9: 0.343-0.396 --> 0.261
Char. 10: 0.334-0.392 --> 0.285
Char. 13: 0.347-0.352 --> 0.039
Char. 15: 0.300-0.388 --> 0.002
Char. 16: 0.345-0.484 --> 0.000
Char. 17: 0.344-0.433 --> 0.085
Char. 18: 0.399-0.474 --> 0.000
Char. 20: 0.758-0.806 --> 0.660
Char. 21: 0.625-0.733 --> 0.808
Char. 22: 0.585-0.588 --> 0.164
Char. 23: 0.745-0.811 --> 0.675
Char. 24: 0.355-0.362 --> 0.000
Char. 25: 0.344-0.382 --> 0.000
Char. 26: 0.417-0.456 --> 0.252
Char. 27: 0.340-0.388 --> 0.000
Char. 29: 0.496 --> 0.000
Char. 32: 0.452-0.453 --> 0.368
Char. 33: 0.402-0.437 --> 0.294
Char. 34: 0.370-0.399 --> 0.000
Char. 37: 0.297-0.356 --> 0.000
Char. 38: 0.239-0.369 --> 0.000
Char. 39: 0.391-0.414 --> 0.191
Char. 40: 0.468-0.472 --> 0.398
Char. 43: 0.530-0.612 --> 0.658
Char. 45: 0.593-0.636 --> 0.563
Char. 46: 0.445-0.521 --> 0.432
Char. 49: 0.431-0.567 --> 0.385
Char. 50: 0.632-0.659 --> 0.565

Char. 59: 0.536-0.552 --> 0.504
Char. 60: 0.401-0.505 --> 0.376
Char. 62: 0.287-0.368 --> 0.275
Char. 64: 0.207-0.277 --> 0.199
Char. 67: 0.209-0.241 --> 0.188
Char. 69: 0.243-0.253 --> 0.265
Char. 72: 0.250-0.265 --> 0.311
Char. 73: 0.326-0.355 --> 0.300
Char. 74: 0.477-0.482 --> 0.170
Char. 75: 0.342-0.346 --> 0.451
Char. 78: 0.451 --> 0.513
Char. 80: 0.756 --> 0.000
Char. 82: 0.649-0.699 --> 0.730
Char. 85: 0.462 --> 0.207
Char. 86: 0.385-0.462 --> 0.291
Char. 87: 0.314-0.527 --> 0.237
Char. 88: 0.338-0.582 --> 0.306
Char. 89: 0.460-0.461 --> 0.164
Char. 90: 0.422-0.559 --> 0.105
Char. 91: 0.409 --> 0.435
Char. 92: 0.427-0.429 --> 0.397
Char. 93: 0.366-0.428 --> 0.534
Char. 95: 0.339 --> 0.151
Char. 96: 0.266-0.280 --> 0.027
Char. 97: 0.155-0.209 --> 0.094
Char. 98: 0.651-0.759 --> 0.833
Char. 99: 0.297-0.308 --> 0.269
Char. 102: 0.459-0.514 --> 0.443
Char. 106: 0.326-0.468 --> 0.000
Char. 107: 0.375-0.408 --> 0.094
Char. 108: 0.353-0.359 --> 0.118
Char. 109: 0.321-0.400 --> 0.265
Char. 110: 0.408-0.492 --> 0.323
Char. 111: 0.305-0.329 --> 0.298
Char. 112: 0.342-0.467 --> 0.282
Char. 114: 0.250-0.373 --> 0.149
Char. 117: 0.543-0.574 --> 0.334
Char. 118: 0.356-0.471 --> 0.307
Char. 119: 0.369-0.430 --> 0.241
Char. 120: 0.433-0.491 --> 0.203
Char. 121: 0.268 --> 0.000
Char. 125: 0.159-0.162 --> 0.146
Char. 126: 0.566-0.604 --> 0.691
Char. 127: 0.398-0.624 --> 0.292
Char. 129: 0.315-0.337 --> 0.405
Char. 130: 0.446 --> 0.386
Char. 131: 0.281-0.357 --> 0.092
Char. 137: 0.313-0.334 --> 0.000
Char. 223: 0.220-0.228 --> 0.154
Char. 226: 0.542-0.561 --> 0.568
Char. 228: 0.265-0.330 --> 0.020
Char. 230: 0.571 --> 0.857
Char. 231: 0.300-0.400 --> 0.100
Char. 233: 0.000 --> 0.666
Char. 241: 0.500 --> 0.200
Char. 320: 0.335-0.441 --> 0.000
Char. 321: 0.782-0.836 --> 0.937
Char. 322: 0.888-0.894 --> 1.000
Char. 323: 0.413-0.498 --> 0.860
Char. 324: 0.630-0.640 --> 0.667
Char. 325: 0.250-0.348 --> 0.117
Char. 326: 0.211-0.316 --> 0.123
Char. 329: 0.316-0.433 --> 0.000
Char. 332: 0.423-0.492 --> 0.748
Char. 333: 0.232-0.283 --> 0.110
Char. 335: 0.189 --> 0.114
Char. 338: 0.363-0.366 --> 0.329
Char. 340: 0.583-0.596 --> 0.735
Char. 341: 0.252-0.255 --> 0.180
Char. 343: 0.353-0.600 --> 0.621
Char. 345: 0.449-0.668 --> 0.417
Char. 346: 0.498 --> 0.630
Char. 347: 0.132-0.151 --> 0.188
Char. 348: 0.317-0.371 --> 0.297
Char. 349: 0.259-0.383 --> 0.411
Char. 354: 0.405-0.481 --> 0.578
Char. 355: 0.276-0.300 --> 0.002
Char. 358: 0.376-0.380 --> 0.106
Char. 361: 0.241-0.256 --> 0.196
Char. 362: 0.337-0.341 --> 0.106
Char. 363: 0.458-0.469 --> 0.194
Char. 364: 0.359-0.388 --> 0.307

Char. 365: 0.572-0.849 --> 0.495
Char. 367: 0.737-0.797 --> 0.885
Char. 368: 0.550-0.607 --> 0.632
Char. 369: 0.249-0.284 --> 0.000
Char. 370: 0.355-0.425 --> 0.096
Char. 406: 1 --> 0
Char. 424: 2 --> 1
Char. 427: 0 --> 1
Char. 447: 0 --> 1
Char. 450: 1 --> 0
Char. 459: 0 --> 2
Char. 462: 1 --> 2
Char. 467: 1 --> 0
Char. 469: 0 --> 1
Char. 471: 2 --> 1
Char. 487: 0 --> 1
Char. 490: 2 --> 1
Char. 494: 1 --> 2
Char. 499: 1 --> 0
Char. 500: 0 --> 1
Char. 502: 2 --> 1
Char. 513: 1 --> 0
Char. 514: 1 --> 0
Char. 516: 2 --> 0
Char. 609: 3 --> 2

Saldanha :

Char. 5: 0.356-0.551 --> 0.680
Char. 6: 0.330 --> 0.504
Char. 15: 0.418-0.478 --> 0.395
Char. 16: 0.582-0.590 --> 0.409
Char. 22: 0.585-0.588 --> 0.619
Char. 23: 0.745 --> 0.536
Char. 39: 0.384-0.520 --> 0.637
Char. 40: 0.592-0.628 --> 0.591
Char. 42: 0.294-0.425 --> 0.463
Char. 43: 0.274-0.295 --> 0.378
Char. 44: 0.290 --> 0.355
Char. 45: 0.715 --> 0.747
Char. 58: 0.590 --> 0.669
Char. 59: 0.560 --> 0.620
Char. 60: 0.697-0.714 --> 0.656
Char. 62: 0.399 --> 0.263
Char. 85: 0.732-0.748 --> 0.437
Char. 86: 0.796-0.801 --> 0.325
Char. 87: 0.515 --> 0.414
Char. 89: 0.720 --> 0.449
Char. 91: 0.675-0.869 --> 0.937
Char. 92: 0.503-0.534 --> 0.691
Char. 320: 0.480-0.499 --> 0.242
Char. 322: 0.818 --> 0.571
Char. 323: 0.478-0.668 --> 0.758
Char. 333: 0.417 --> 0.240
Char. 338: 0.517 --> 0.553
Char. 345: 0.704-0.893 --> 0.483
Char. 346: 0.745-0.777 --> 0.479
Char. 347: 0.074-0.100 --> 0.000
Char. 401: 0 --> 1
Char. 419: 1 --> 0

Bodo :

Char. 0: 0.529 --> 0.565
Char. 1: 0.491-0.558 --> 0.372
Char. 2: 0.487 --> 0.245
Char. 20: 0.769 --> 0.699
Char. 22: 0.585-0.588 --> 0.581
Char. 46: 0.691 --> 0.695
Char. 50: 0.627 --> 0.663
Char. 52: 0.475 --> 0.400
Char. 60: 0.697-0.714 --> 0.730
Char. 68: 0.609 --> 0.479
Char. 69: 0.441 --> 0.421
Char. 85: 0.732-0.748 --> 0.756
Char. 88: 0.523 --> 0.486
Char. 91: 0.675-0.869 --> 0.359
Char. 92: 0.503-0.534 --> 0.359
Char. 93: 0.493 --> 0.423
Char. 126: 0.459 --> 0.516
Char. 321: 0.793 --> 0.728
Char. 334: 0.152-0.201 --> 0.144
Char. 337: 0.243 --> 0.216
Char. 345: 0.704-0.893 --> 1.000
Char. 346: 0.745-0.777 --> 0.787
Char. 347: 0.074-0.100 --> 0.206

Char. 348: 0.176-0.271 --> 0.348
Char. 402: 1 --> 0
Char. 414: 0 --> 2
Char. 418: 1 --> 2
Char. 459: 0 --> 2
Char. 462: 2 --> 1
Char. 480: 0 --> 1
Char. 481: 0 --> 1
Char. 518: 1 --> 3

Ternifine_1_2_3_4 :

Char. 0: 0.504-0.529 --> 0.595
Char. 15: 0.388-0.478 --> 0.243
Char. 16: 0.525-0.590 --> 0.220
Char. 18: 0.475-0.636 --> 0.277
Char. 26: 0.457-0.462 --> 0.437
Char. 45: 0.568-0.593 --> 0.370
Char. 46: 0.479-0.563 --> 0.185
Char. 47: 0.513-0.644 --> 0.342
Char. 49: 0.675-0.732 --> 0.420
Char. 147: 0.377 --> 0.298
Char. 151: 0.327 --> 0.376
Char. 152: 0.365-0.567 --> 0.163
Char. 153: 0.412-0.548 --> 0.272
Char. 162: 0.817-0.888 --> 0.795
Char. 166: 0.906-0.908 --> 0.870
Char. 175: 0.696-0.702 --> 0.601
Char. 176: 0.585-0.706 --> 0.467
Char. 181: 0.444-0.471 --> 0.362
Char. 182: 0.321-0.389 --> 0.291
Char. 185: 0.358-0.400 --> 0.341
Char. 261: 0.170-0.213 --> 0.029
Char. 264: 0.189-0.191 --> 0.024
Char. 268: 0.721 --> 0.839
Char. 283: 0.489-0.523 --> 0.364
Char. 297: 0.333 --> 0.000
Char. 310: 0.421 --> 1.000
Char. 311: 0.325 --> 1.000
Char. 312: 0.285 --> 1.000
Char. 314: 0.324 --> 1.000
Char. 315: 0.714 --> 1.000
Char. 373: 0.232-0.591 --> 0.188
Char. 374: 0.568-0.778 --> 0.927
Char. 376: 0.380-0.400 --> 0.333
Char. 379: 0.845-0.848 --> 0.728
Char. 384: 0.378-0.385 --> 0.709
Char. 385: 0.320-0.351 --> 0.264
Char. 386: 0.605-0.606 --> 0.253
Char. 387: 0.551-0.559 --> 0.489
Char. 390: 0.347-0.365 --> 0.385
Char. 393: 0.781-0.811 --> 0.724
Char. 394: 0.376-0.395 --> 0.310
Char. 397: 0.199-0.218 --> 0.131
Char. 399: 0.361-0.416 --> 0.484
Char. 565: 0 --> 1
Char. 566: 1 --> 0
Char. 571: 2 --> 1
Char. 572: 2 --> 1
Char. 573: 0 --> 1
Char. 577: 0 --> 1
Char. 581: 2 --> 1
Char. 620: 0 --> 1

Peking_X_XII_XIII_LII_RC :

Char. 0: 0.368-0.378 --> 0.433
Char. 3: 0.608-0.637 --> 0.646
Char. 16: 0.657-0.752 --> 0.590
Char. 18: 0.622-0.675 --> 0.535
Char. 23: 0.534-0.540 --> 0.555
Char. 26: 0.547 --> 0.488
Char. 27: 0.441-0.442 --> 0.607
Char. 44: 0.290 --> 0.297
Char. 45: 0.568-0.593 --> 0.613
Char. 48: 0.614 --> 0.586
Char. 49: 0.675-0.752 --> 0.772
Char. 52: 0.437-0.520 --> 0.528
Char. 53: 0.603-0.670 --> 0.713
Char. 55: 0.269-0.300 --> 0.385
Char. 59: 0.314-0.416 --> 0.490
Char. 61: 0.325-0.329 --> 0.190
Char. 62: 0.631 --> 0.645
Char. 63: 0.331-0.340 --> 0.191
Char. 81: 0.570-0.579 --> 0.703
Char. 82: 0.604-0.699 --> 0.766

Char. 97: 0.425-0.506 --> 0.337
Char. 98: 0.445 --> 0.358
Char. 111: 0.531-0.623 --> 0.486
Char. 112: 0.623 --> 0.755
Char. 113: 0.691-0.774 --> 0.837
Char. 114: 0.466 --> 0.397
Char. 124: 0.319 --> 0.075
Char. 129: 0.366-0.396 --> 0.346
Char. 131: 0.309-0.357 --> 0.202
Char. 132: 0.767 --> 0.681
Char. 134: 0.339 --> 0.033
Char. 136: 0.303-0.870 --> 0.190
Char. 322: 0.506-0.549 --> 0.659
Char. 323: 0.618-0.677 --> 0.802
Char. 326: 0.564 --> 0.648
Char. 333: 0.814 --> 0.828
Char. 339: 0.301-0.332 --> 0.185
Char. 354: 0.536 --> 0.457
Char. 356: 0.496 --> 0.561
Char. 357: 0.394 --> 0.249
Char. 359: 0.634-0.678 --> 0.448
Char. 360: 0.499 --> 0.357
Char. 366: 0.265-0.346 --> 0.177
Char. 367: 0.910 --> 0.793
Char. 416: 1 --> 2
Char. 437: 1 --> 0
Char. 474: 2 --> 1
Char. 477: 0 --> 1
Char. 478: 1 --> 0
Char. 482: 0 --> 12

Nanjing1 :

Char. 0: 0.368-0.378 --> 0.260
Char. 1: 0.491-0.569 --> 0.473
Char. 2: 0.639-0.652 --> 0.593
Char. 3: 0.608-0.637 --> 0.600
Char. 5: 0.571 --> 0.138
Char. 6: 0.348-0.371 --> 0.038
Char. 12: 0.624-0.751 --> 0.785
Char. 20: 0.638 --> 0.579
Char. 22: 0.482 --> 0.322
Char. 23: 0.534-0.540 --> 0.302
Char. 39: 0.584-0.745 --> 0.294
Char. 40: 0.529-0.581 --> 0.358
Char. 41: 0.257-0.318 --> 0.167
Char. 42: 0.394-0.397 --> 0.269
Char. 43: 0.278 --> 0.274
Char. 46: 0.432 --> 0.265
Char. 47: 0.513-0.644 --> 0.231
Char. 49: 0.675-0.752 --> 0.607
Char. 51: 0.564 --> 0.335
Char. 52: 0.437-0.520 --> 0.187
Char. 53: 0.603-0.670 --> 0.581
Char. 55: 0.269-0.300 --> 0.000
Char. 56: 0.225 --> 0.159
Char. 58: 0.425-0.460 --> 0.149
Char. 59: 0.314-0.416 --> 0.172
Char. 61: 0.325-0.329 --> 0.360
Char. 63: 0.331-0.340 --> 0.360
Char. 79: 0.427 --> 0.689
Char. 81: 0.570-0.579 --> 0.396
Char. 85: 0.487 --> 0.344
Char. 86: 0.519-0.560 --> 0.402
Char. 87: 0.555 --> 0.367
Char. 88: 0.587-0.608 --> 0.439
Char. 89: 0.465 --> 0.370
Char. 90: 0.508 --> 0.332
Char. 91: 0.559 --> 0.299
Char. 92: 0.540 --> 0.600
Char. 93: 0.571 --> 0.504
Char. 94: 0.480 --> 0.523
Char. 95: 0.475 --> 0.424
Char. 96: 0.383 --> 0.373
Char. 105: 0.398 --> 0.394
Char. 106: 0.510 --> 0.266
Char. 107: 0.344 --> 0.202
Char. 108: 0.563 --> 0.403
Char. 109: 0.478 --> 0.444
Char. 110: 0.743 --> 0.594
Char. 111: 0.531-0.623 --> 0.650
Char. 113: 0.691-0.774 --> 0.593
Char. 125: 0.264 --> 1.000
Char. 126: 0.434 --> 0.585

Char. 127: 0.522-0.525 --> 0.427
Char. 128: 0.550 --> 0.536
Char. 130: 0.415-0.431 --> 0.397
Char. 133: 0.437 --> 0.403
Char. 135: 0.069-0.118 --> 0.058
Char. 136: 0.303-0.870 --> 0.872
Char. 322: 0.506-0.549 --> 0.444
Char. 323: 0.618-0.677 --> 0.528
Char. 334: 0.257-0.320 --> 0.203
Char. 335: 0.140-0.257 --> 0.411
Char. 336: 0.286-0.296 --> 0.208
Char. 337: 0.303-0.345 --> 0.158
Char. 338: 0.363-0.366 --> 0.373
Char. 347: 0.132 --> 0.297
Char. 348: 0.331 --> 0.849
Char. 349: 0.448-0.497 --> 0.537
Char. 353: 0.657 --> 0.749
Char. 355: 0.377 --> 0.183
Char. 356: 0.496 --> 0.490
Char. 357: 0.394 --> 0.594
Char. 365: 0.572 --> 0.438
Char. 422: 2 --> 0
Char. 473: 2 --> 3

Hexian :

Char. 5: 0.571 --> 0.255
Char. 6: 0.348-0.371 --> 0.085
Char. 9: 0.584 --> 0.580
Char. 10: 0.497 --> 0.495
Char. 12: 0.624-0.751 --> 0.561
Char. 15: 0.794 --> 0.840
Char. 16: 0.857 --> 1.000
Char. 17: 0.798 --> 0.839
Char. 18: 0.852 --> 0.924
Char. 20: 0.638 --> 0.780
Char. 24: 0.667 --> 0.684
Char. 26: 0.771 --> 1.000
Char. 27: 0.441-0.442 --> 0.306
Char. 30: 0.492 --> 0.719
Char. 31: 0.620 --> 0.978
Char. 32: 0.199-0.200 --> 0.167
Char. 33: 0.235 --> 0.132
Char. 34: 0.827 --> 0.946
Char. 35: 0.627-0.638 --> 0.514
Char. 36: 0.600 --> 0.591
Char. 39: 0.584-0.745 --> 0.327
Char. 40: 0.529 --> 0.423
Char. 43: 0.278-0.295 --> 0.408
Char. 44: 0.290 --> 0.330
Char. 45: 0.568-0.593 --> 0.716
Char. 46: 0.432-0.563 --> 0.424
Char. 48: 0.928 --> 0.948
Char. 50: 0.500-0.510 --> 0.595
Char. 52: 0.437-0.520 --> 0.384
Char. 54: 0.760 --> 0.851
Char. 55: 0.269-0.300 --> 0.101
Char. 56: 0.242-0.276 --> 0.474
Char. 57: 0.841 --> 0.784
Char. 60: 0.791 --> 0.881
Char. 62: 0.541-0.631 --> 0.260
Char. 65: 0.608 --> 0.737
Char. 66: 0.237-0.334 --> 0.654
Char. 70: 0.442 --> 0.420
Char. 71: 0.279 --> 0.266
Char. 72: 0.377 --> 0.384
Char. 75: 0.397-0.402 --> 0.465
Char. 82: 0.604-0.699 --> 0.493
Char. 83: 0.550 --> 0.402
Char. 85: 0.487-0.537 --> 0.397
Char. 86: 0.519 --> 0.313
Char. 87: 0.555-0.613 --> 0.000
Char. 88: 0.587-0.608 --> 0.000
Char. 89: 0.465-0.476 --> 0.348
Char. 91: 0.612 --> 0.756
Char. 92: 0.496 --> 0.492
Char. 93: 0.571-0.614 --> 0.619
Char. 94: 0.465-0.480 --> 0.406
Char. 98: 0.456-0.523 --> 0.659
Char. 126: 0.426-0.434 --> 1.000
Char. 137: 0.657 --> 0.631
Char. 138: 0.600 --> 0.474
Char. 214: 0.346 --> 0.678
Char. 215: 0.227-0.242 --> 0.611

Char. 216: 0.511 --> 0.598
Char. 217: 0.589 --> 0.759
Char. 226: 0.595 --> 0.662
Char. 227: 0.354 --> 0.543
Char. 230: 0.428 --> 0.285
Char. 231: 0.100 --> 0.000
Char. 234: 0.500 --> 1.000
Char. 236: 0.305-0.341 --> 0.542
Char. 237: 0.473-0.676 --> 0.704
Char. 238: 0.380 --> 0.395
Char. 242: 0.000-0.027 --> 1.000
Char. 244: 0.500 --> 1.000
Char. 320: 0.531 --> 0.751
Char. 321: 0.705-0.722 --> 0.775
Char. 323: 0.618-0.677 --> 0.287
Char. 324: 0.652 --> 0.858
Char. 325: 0.341-0.370 --> 0.000
Char. 326: 0.380-0.491 --> 0.188
Char. 331: 0.158 --> 0.029
Char. 332: 0.269 --> 0.244
Char. 334: 0.257-0.320 --> 0.127
Char. 335: 0.128 --> 0.074
Char. 336: 0.286-0.296 --> 0.213
Char. 337: 0.303-0.345 --> 0.206
Char. 338: 0.363-0.366 --> 0.729
Char. 339: 0.301-0.332 --> 0.438
Char. 340: 0.394-0.458 --> 0.477
Char. 346: 0.431 --> 0.405
Char. 347: 0.071 --> 0.067
Char. 348: 0.222 --> 0.130
Char. 370: 0.350 --> 0.278
Char. 400: 0 --> 1
Char. 401: 0 --> 1
Char. 402: 0 --> 1
Char. 469: 0 --> 3
Char. 477: 0 --> 1
Char. 478: 1 --> 0
Char. 481: 0 --> 1
Char. 482: 0 --> 1
Char. 484: 0 --> 1
Char. 487: 0 --> 1
Char. 497: 1 --> 0
Char. 502: 2 --> 0
Char. 505: 1 --> 0
Char. 523: 1 --> 0
Char. 603: 0 --> 1
Char. 605: 2 --> 1

Sambungmacan_1_3 :

Char. 0: 0.368-0.413 --> 0.341
Char. 1: 0.491-0.569 --> 0.445
Char. 3: 0.608-0.637 --> 0.484
Char. 4: 0.453-0.547 --> 0.355
Char. 5: 0.637 --> 0.693
Char. 6: 0.396 --> 0.604
Char. 7: 0.560 --> 0.648
Char. 8: 0.506 --> 0.712
Char. 9: 0.701 --> 0.718
Char. 10: 0.593 --> 0.725
Char. 17: 0.634-0.641 --> 0.627
Char. 20: 0.867 --> 0.893
Char. 22: 0.798 --> 0.882
Char. 24: 0.592-0.597 --> 0.599
Char. 25: 0.535 --> 0.516
Char. 27: 0.441-0.442 --> 0.631
Char. 28: 0.486-0.510 --> 0.418
Char. 32: 0.452-0.478 --> 0.303
Char. 33: 0.402-0.420 --> 0.331
Char. 34: 0.614-0.671 --> 0.611
Char. 44: 0.290 --> 0.398
Char. 45: 0.568-0.593 --> 0.621
Char. 46: 0.625 --> 0.851
Char. 47: 0.513-0.644 --> 0.363
Char. 48: 0.567-0.599 --> 0.473
Char. 59: 0.445-0.520 --> 0.526
Char. 62: 0.541-0.619 --> 0.373
Char. 65: 0.524-0.559 --> 0.630
Char. 66: 0.237-0.360 --> 0.421
Char. 67: 0.269 --> 0.257
Char. 68: 0.609-0.640 --> 0.587
Char. 71: 0.474-0.482 --> 0.358
Char. 72: 0.317 --> 0.263
Char. 74: 0.477-0.558 --> 0.194

Char. 76: 0.422 --> 0.000
Char. 77: 0.579-0.608 --> 0.553
Char. 79: 0.617-0.638 --> 0.709
Char. 80: 0.659-0.711 --> 0.407
Char. 86: 0.597-0.606 --> 0.625
Char. 91: 0.559-0.612 --> 0.481
Char. 137: 0.552 --> 0.435
Char. 320: 0.480-0.484 --> 0.589
Char. 323: 0.618 --> 0.506
Char. 324: 0.549-0.601 --> 0.545
Char. 325: 0.341-0.370 --> 0.442
Char. 331: 0.253-0.302 --> 0.239
Char. 335: 0.184-0.257 --> 0.612
Char. 342: 0.217 --> 0.000
Char. 346: 0.476 --> 0.420
Char. 369: 0.432 --> 0.406
Char. 370: 0.364 --> 0.210
Char. 464: 1 --> 2
Char. 469: 0 --> 3
Char. 473: 2 --> 1
Char. 486: 1 --> 0
Char. 500: 0 --> 1
Char. 502: 2 --> 01
Char. 514: 1 --> 0

Sangiran_2_17 :

Char. 0: 0.368-0.378 --> 0.284
Char. 1: 0.572 --> 0.766
Char. 2: 0.639-0.652 --> 0.903
Char. 3: 0.637 --> 0.828
Char. 4: 0.383-0.547 --> 0.612
Char. 5: 0.571 --> 0.750
Char. 6: 0.348-0.371 --> 0.417
Char. 7: 0.484 --> 0.566
Char. 8: 0.456 --> 0.457
Char. 9: 0.584 --> 0.670
Char. 22: 0.675 --> 0.759
Char. 27: 0.441-0.442 --> 0.638
Char. 28: 0.349-0.510 --> 0.588
Char. 30: 0.492 --> 0.370
Char. 37: 0.613 --> 0.626
Char. 39: 0.584-0.745 --> 0.776
Char. 41: 0.257 --> 0.234
Char. 42: 0.394 --> 0.341
Char. 43: 0.278-0.295 --> 0.213
Char. 44: 0.290 --> 0.161
Char. 45: 0.568-0.593 --> 0.504
Char. 46: 0.432-0.563 --> 0.760
Char. 47: 0.735 --> 0.887
Char. 49: 0.752 --> 0.753
Char. 50: 0.500-0.510 --> 0.362
Char. 51: 0.617 --> 0.824
Char. 52: 0.437-0.520 --> 0.685
Char. 53: 0.603-0.670 --> 0.797
Char. 55: 0.269-0.300 --> 0.624
Char. 58: 0.425-0.460 --> 0.464
Char. 61: 0.325-0.329 --> 0.000
Char. 62: 0.541-0.631 --> 0.876
Char. 63: 0.331-0.340 --> 0.000
Char. 64: 0.594 --> 0.735
Char. 66: 0.237-0.334 --> 0.224
Char. 67: 0.538 --> 0.567
Char. 68: 0.649 --> 0.918
Char. 69: 0.473 --> 0.626
Char. 70: 0.442 --> 0.518
Char. 74: 0.509 --> 0.471
Char. 77: 0.579-0.608 --> 0.719
Char. 79: 0.343 --> 0.281
Char. 80: 0.659 --> 0.552
Char. 81: 0.570-0.579 --> 1.000
Char. 82: 0.604-0.699 --> 0.736
Char. 83: 0.550 --> 0.665
Char. 87: 0.555-0.613 --> 0.804
Char. 88: 0.587-0.608 --> 0.851
Char. 93: 0.571-0.614 --> 0.568
Char. 94: 0.465-0.480 --> 0.571
Char. 126: 0.426-0.434 --> 0.206
Char. 138: 0.600 --> 0.608
Char. 214: 0.346 --> 0.257
Char. 215: 0.227-0.242 --> 0.196
Char. 217: 0.589 --> 0.122
Char. 226: 0.595 --> 0.533
Char. 228: 0.446-0.458 --> 0.482

Char. 229: 0.666 --> 0.333
Char. 235: 0.474-0.525 --> 0.453
Char. 236: 0.305-0.341 --> 0.280
Char. 237: 0.473-0.676 --> 0.385
Char. 239: 0.300 --> 0.200
Char. 240: 0.583 --> 0.500
Char. 241: 0.266-0.300 --> 0.100
Char. 321: 0.705-0.722 --> 0.564
Char. 330: 0.485 --> 0.362
Char. 334: 0.257-0.320 --> 0.420
Char. 336: 0.286-0.296 --> 0.434
Char. 337: 0.303-0.345 --> 0.505
Char. 338: 0.363-0.366 --> 0.203
Char. 339: 0.301-0.332 --> 0.000
Char. 340: 0.394-0.458 --> 0.302
Char. 341: 0.550 --> 0.578
Char. 345: 0.428 --> 0.393
Char. 369: 0.554 --> 0.479
Char. 422: 2 --> 1
Char. 424: 1 --> 0
Char. 486: 1 --> 0
Char. 494: 1 --> 0
Char. 511: 0 --> 1
Char. 513: 0 --> 1

Ngandong7_9_12 :

Char. 1: 0.491-0.569 --> 0.645
Char. 3: 0.608-0.637 --> 0.696
Char. 4: 0.453-0.547 --> 0.552
Char. 15: 0.606 --> 0.619
Char. 16: 0.657-0.713 --> 0.726
Char. 18: 0.622-0.638 --> 0.647
Char. 23: 0.856 --> 0.911
Char. 24: 0.592-0.597 --> 0.577
Char. 26: 0.550 --> 0.615
Char. 27: 0.441-0.442 --> 0.319
Char. 30: 0.490-0.492 --> 0.828
Char. 31: 0.555-0.595 --> 0.894
Char. 32: 0.452-0.478 --> 0.583
Char. 33: 0.402-0.420 --> 0.449
Char. 34: 0.614-0.671 --> 0.700
Char. 35: 0.627-0.638 --> 0.760
Char. 36: 0.600 --> 0.752
Char. 37: 0.526 --> 0.405
Char. 44: 0.290 --> 0.270
Char. 45: 0.568-0.593 --> 0.561
Char. 47: 0.513-0.644 --> 0.761
Char. 49: 0.675-0.732 --> 0.856
Char. 50: 0.500-0.557 --> 0.407
Char. 52: 0.469-0.520 --> 0.756
Char. 53: 0.670 --> 0.848
Char. 62: 0.541-0.619 --> 0.730
Char. 65: 0.524-0.559 --> 0.514
Char. 66: 0.237-0.360 --> 0.219
Char. 68: 0.609-0.640 --> 0.781
Char. 69: 0.492 --> 0.639
Char. 71: 0.474-0.482 --> 0.508
Char. 73: 0.488 --> 0.903
Char. 74: 0.477-0.558 --> 0.805
Char. 75: 0.621 --> 0.871
Char. 77: 0.579-0.608 --> 0.815
Char. 82: 0.699 --> 0.805
Char. 86: 0.597-0.606 --> 0.522
Char. 89: 0.577-0.596 --> 0.642
Char. 91: 0.559-0.612 --> 0.632
Char. 92: 0.503-0.534 --> 0.926
Char. 98: 0.531 --> 0.712
Char. 138: 0.508-0.600 --> 0.809
Char. 320: 0.480-0.484 --> 0.433
Char. 324: 0.549-0.601 --> 0.661
Char. 325: 0.341-0.370 --> 0.127
Char. 326: 0.380-0.479 --> 0.139
Char. 330: 0.593-0.596 --> 0.673
Char. 332: 0.365-0.382 --> 0.432
Char. 337: 0.303-0.345 --> 0.508
Char. 340: 0.394-0.458 --> 0.353
Char. 341: 0.242 --> 0.187
Char. 345: 0.668-0.732 --> 0.587
Char. 348: 0.374 --> 0.645
Char. 406: 1 --> 2
Char. 482: 0 --> 1
Char. 491: 1 --> 2
Char. 496: 1 --> 2

Char. 510: 1 --> 0
Char. 517: 1 --> 0
Char. 521: 1 --> 0

Dmanisi :

Char. 1: 0.249-0.418 --> 0.628
Char. 2: 0.174-0.411 --> 0.660
Char. 3: 0.402-0.528 --> 0.705
Char. 4: 0.569 --> 0.618
Char. 9: 0.719 --> 0.878
Char. 11: 0.515-0.569 --> 0.758
Char. 12: 0.403-0.578 --> 0.773
Char. 14: 0.282-0.413 --> 0.663
Char. 16: 0.584-0.627 --> 0.676
Char. 18: 0.466-0.551 --> 0.650
Char. 24: 0.627 --> 0.703
Char. 25: 0.641 --> 0.699
Char. 28: 0.486-0.510 --> 0.673
Char. 30: 0.516-0.521 --> 0.851
Char. 31: 0.610 --> 0.802
Char. 33: 0.312-0.402 --> 0.439
Char. 36: 0.358 --> 0.319
Char. 37: 0.574 --> 0.701
Char. 41: 0.382 --> 0.272
Char. 42: 0.425-0.507 --> 0.277
Char. 43: 0.295-0.390 --> 0.198
Char. 48: 0.480 --> 0.436
Char. 49: 0.528 --> 0.561
Char. 55: 0.300-0.305 --> 0.383
Char. 56: 0.259-0.395 --> 0.118
Char. 57: 0.522-0.635 --> 0.727
Char. 60: 0.615-0.669 --> 0.807
Char. 62: 0.540 --> 0.556
Char. 64: 0.601 --> 0.826
Char. 69: 0.568-0.594 --> 0.440
Char. 73: 0.313 --> 0.378
Char. 74: 0.616-0.788 --> 0.607
Char. 76: 0.543 --> 0.819
Char. 78: 0.553-0.720 --> 0.828
Char. 82: 0.492-0.649 --> 0.690
Char. 84: 0.556 --> 0.719
Char. 85: 0.546-0.570 --> 0.692
Char. 86: 0.597 --> 0.705
Char. 87: 0.196-0.450 --> 0.615
Char. 88: 0.190-0.492 --> 0.627
Char. 89: 0.530-0.537 --> 0.659
Char. 91: 0.235-0.411 --> 0.433
Char. 92: 0.242-0.394 --> 0.405
Char. 93: 0.574 --> 0.586
Char. 96: 0.682 --> 0.760
Char. 99: 0.764 --> 0.814
Char. 102: 0.111 --> 0.089
Char. 103: 0.562 --> 0.680
Char. 105: 0.481 --> 0.736
Char. 106: 0.552-0.576 --> 0.675
Char. 107: 0.453-0.462 --> 0.476
Char. 111: 0.623 --> 0.721
Char. 113: 0.693-0.774 --> 0.847
Char. 114: 0.736 --> 0.771
Char. 116: 0.648 --> 0.723
Char. 117: 0.690 --> 0.734
Char. 118: 0.622 --> 0.814
Char. 119: 0.780 --> 0.878
Char. 121: 0.750 --> 0.761
Char. 122: 0.447-0.465 --> 0.348
Char. 123: 0.818 --> 0.789
Char. 124: 0.640 --> 0.875
Char. 125: 0.066-0.067 --> 0.034
Char. 126: 0.495-0.846 --> 0.420
Char. 131: 0.673 --> 0.822
Char. 133: 0.488-0.665 --> 0.671
Char. 134: 0.560 --> 0.619
Char. 135: 0.560 --> 0.790
Char. 138: 0.600-0.699 --> 0.702
Char. 214: 0.673-0.807 --> 1.000
Char. 215: 0.775 --> 1.000
Char. 217: 0.706 --> 0.911
Char. 222: 0.513 --> 0.485
Char. 224: 0.250 --> 1.000
Char. 227: 0.733 --> 0.769
Char. 229: 0.888 --> 0.925
Char. 234: 0.500 --> 0.333
Char. 237: 0.473 --> 0.262

Char. 240: 0.666 --> 0.916
Char. 242: 0.000 --> 0.166
Char. 245: 0.694 --> 1.000
Char. 246: 0.887 --> 1.000
Char. 247: 0.107-0.348 --> 0.049
Char. 248: 0.878 --> 1.000
Char. 249: 0.600-0.650 --> 1.000
Char. 327: 0.612-0.654 --> 0.532
Char. 328: 0.158-0.187 --> 0.141
Char. 330: 0.576 --> 0.810
Char. 332: 0.294-0.307 --> 0.195
Char. 338: 0.461 --> 0.470
Char. 342: 0.276-0.305 --> 0.413
Char. 343: 0.208-0.299 --> 0.387
Char. 348: 0.364 --> 0.319
Char. 352: 0.565 --> 0.679
Char. 354: 0.618 --> 0.825
Char. 358: 0.265 --> 0.267
Char. 363: 0.458-0.633 --> 0.333
Char. 364: 0.386-0.392 --> 0.341
Char. 366: 0.413 --> 0.490
Char. 367: 0.697 --> 0.662
Char. 368: 0.593-0.695 --> 0.822
Char. 370: 0.558 --> 0.638
Char. 439: 0 --> 1
Char. 457: 1 --> 2
Char. 484: 0 --> 1
Char. 500: 0 --> 1
Char. 513: 0 --> 1

Rabat :

Char. 102: 0.459 --> 0.438
Char. 122: 0.329-0.373 --> 0.464
Char. 197: 0.250-0.500 --> 1.000
Char. 200: 0.413-0.444 --> 0.958
Char. 202: 0.750 --> 0.125
Char. 203: 0.500-0.625 --> 0.250
Char. 209: 0.554 --> 0.738
Char. 210: 0.200 --> 1.000
Char. 213: 0.031 --> 0.750
Char. 216: 0.406-0.466 --> 0.522
Char. 217: 0.613 --> 0.678
Char. 218: 0.100 --> 0.400
Char. 219: 0.300-0.600 --> 0.800
Char. 222: 0.525 --> 0.814
Char. 223: 0.242-0.324 --> 0.226
Char. 224: 0.250 --> 1.000
Char. 228: 0.270-0.330 --> 0.366
Char. 229: 0.444 --> 0.777
Char. 230: 0.571 --> 0.428
Char. 231: 0.300-0.400 --> 1.000
Char. 232: 0.153 --> 0.307
Char. 233: 0.000 --> 0.666
Char. 237: 0.533-0.545 --> 0.447
Char. 238: 0.227-0.274 --> 0.097
Char. 242: 0.166 --> 0.333
Char. 243: 0.000 --> 1.000
Char. 284: 0.500-0.875 --> 1.000
Char. 303: 0.000 --> 0.500
Char. 361: 0.241-0.256 --> 1.000
Char. 362: 0.337-0.404 --> 0.636
Char. 363: 0.458-0.469 --> 0.487
Char. 395: 0.560-0.570 --> 0.497
Char. 544: 2 --> 0
Char. 545: 1 --> 0
Char. 546: 1 --> 0
Char. 591: 2 --> 1
Char. 616: 2 --> 0
Char. 625: 0 --> 1
Char. 626: 1 --> 2
Char. 632: 0 --> 1
Char. 633: 1 --> 2

STW53 :

Char. 0: 0.047-0.067 --> 0.018
Char. 2: 0.174-0.411 --> 0.088
Char. 5: 0.571 --> 0.187
Char. 6: 0.348 --> 0.250
Char. 7: 0.678 --> 0.787
Char. 8: 0.647 --> 1.000
Char. 10: 0.802 --> 0.852
Char. 13: 0.547-0.575 --> 0.795
Char. 14: 0.282-0.413 --> 0.264
Char. 15: 0.684 --> 0.784

Char. 17: 0.715 --> 0.789
Char. 19: 0.246 --> 0.007
Char. 20: 0.335 --> 0.000
Char. 22: 0.485 --> 0.000
Char. 26: 0.454 --> 0.433
Char. 28: 0.486-0.510 --> 0.407
Char. 29: 0.578 --> 0.810
Char. 30: 0.516-0.521 --> 0.262
Char. 31: 0.610 --> 0.475
Char. 32: 0.478-0.521 --> 0.446
Char. 33: 0.312-0.402 --> 0.217
Char. 34: 0.811 --> 0.944
Char. 35: 0.377-0.433 --> 0.664
Char. 36: 0.358 --> 0.671
Char. 38: 0.625 --> 0.746
Char. 39: 0.584 --> 0.201
Char. 40: 0.506 --> 0.465
Char. 42: 0.425-0.507 --> 0.596
Char. 43: 0.295-0.390 --> 0.701
Char. 44: 0.121-0.173 --> 0.441
Char. 45: 0.650 --> 0.916
Char. 47: 0.299 --> 0.099
Char. 50: 0.526 --> 0.893
Char. 51: 0.545-0.580 --> 0.454
Char. 52: 0.365 --> 0.133
Char. 53: 0.513-0.621 --> 0.252
Char. 54: 0.519 --> 0.483
Char. 55: 0.300-0.305 --> 0.084
Char. 58: 0.302-0.404 --> 0.759
Char. 59: 0.288-0.381 --> 0.632
Char. 60: 0.615-0.669 --> 0.370
Char. 61: 0.472 --> 0.945
Char. 62: 0.540 --> 0.074
Char. 63: 0.479 --> 0.945
Char. 67: 0.521 --> 1.000
Char. 68: 0.653 --> 0.905
Char. 69: 0.568-0.594 --> 1.000
Char. 74: 0.616-0.788 --> 0.836
Char. 78: 0.553-0.720 --> 0.526
Char. 79: 0.517 --> 0.576
Char. 80: 0.643-0.687 --> 0.467
Char. 81: 0.417 --> 0.021
Char. 82: 0.492-0.649 --> 0.274
Char. 85: 0.546-0.570 --> 0.354
Char. 86: 0.597 --> 0.537
Char. 87: 0.196-0.450 --> 0.177
Char. 88: 0.190-0.492 --> 0.179
Char. 89: 0.530-0.537 --> 0.439
Char. 91: 0.235-0.411 --> 0.160
Char. 92: 0.242-0.394 --> 0.202
Char. 94: 0.674 --> 0.708
Char. 95: 0.688 --> 0.825
Char. 97: 0.674 --> 1.000
Char. 100: 0.581 --> 0.602
Char. 104: 0.408-0.552 --> 0.590
Char. 106: 0.552-0.576 --> 0.357
Char. 107: 0.453-0.462 --> 0.295
Char. 110: 0.852 --> 0.926
Char. 111: 0.623 --> 0.458
Char. 115: 0.779 --> 0.838
Char. 118: 0.622 --> 0.552
Char. 120: 0.877 --> 0.953
Char. 122: 0.447-0.465 --> 0.608
Char. 125: 0.066-0.067 --> 0.101
Char. 127: 0.330-0.383 --> 0.231
Char. 128: 0.513 --> 0.462
Char. 129: 0.447-0.488 --> 0.496
Char. 130: 0.348-0.364 --> 0.278
Char. 133: 0.488-0.665 --> 0.275
Char. 137: 0.787 --> 0.801
Char. 138: 0.600-0.699 --> 0.460
Char. 216: 0.742 --> 0.884
Char. 220: 0.846 --> 0.948
Char. 221: 0.771 --> 0.881
Char. 223: 0.509 --> 1.000
Char. 224: 0.250 --> 0.000
Char. 225: 0.750 --> 0.000
Char. 228: 0.320 --> 0.646
Char. 234: 0.500 --> 1.000
Char. 235: 0.627-0.833 --> 0.917
Char. 236: 0.656-0.724 --> 0.853
Char. 237: 0.473 --> 0.527

Char. 238: 0.486 --> 1.000
Char. 239: 0.766 --> 0.800
Char. 244: 0.166-0.500 --> 1.000
Char. 247: 0.107-0.348 --> 0.430
Char. 250: 0.833 --> 0.916
Char. 254: 0.000-0.500 --> 1.000
Char. 320: 0.522-0.523 --> 1.000
Char. 321: 0.081-0.327 --> 0.058
Char. 323: 0.801 --> 1.000
Char. 324: 0.390 --> 0.304
Char. 328: 0.158-0.187 --> 0.295
Char. 329: 0.324 --> 0.749
Char. 330: 0.576 --> 0.324
Char. 334: 0.244 --> 0.000
Char. 336: 0.227 --> 0.069
Char. 337: 0.224 --> 0.004
Char. 339: 0.440 --> 0.977
Char. 341: 0.700 --> 1.000
Char. 344: 0.785 --> 0.822
Char. 345: 0.721 --> 0.608
Char. 346: 0.812 --> 0.948
Char. 347: 0.215-0.246 --> 0.577
Char. 348: 0.364 --> 0.457
Char. 349: 0.550 --> 1.000
Char. 350: 0.765 --> 0.923
Char. 351: 0.695 --> 0.804
Char. 355: 0.379-0.395 --> 0.237
Char. 357: 0.446 --> 0.327
Char. 358: 0.265 --> 0.176
Char. 359: 0.805 --> 1.000
Char. 362: 0.424-0.510 --> 0.868
Char. 363: 0.458-0.633 --> 0.913
Char. 364: 0.386-0.392 --> 0.592
Char. 365: 0.128 --> 0.003
Char. 369: 0.690 --> 0.936
Char. 421: 0 --> 1
Char. 480: 0 --> 1
Char. 481: 0 --> 1
Char. 488: 2 --> 0
Char. 490: 0 --> 1
Char. 498: 1 --> 0
Char. 499: 1 --> 0
Char. 502: 1 --> 2
Char. 516: 2 --> 1
Char. 608: 0 --> 2
Char. 609: 12 --> 0

OH_9 :

Char. 1: 0.491-0.569 --> 1.000
Char. 2: 0.639-0.652 --> 1.000
Char. 3: 0.608-0.637 --> 1.000
Char. 4: 0.547 --> 0.864
Char. 5: 0.571 --> 1.000
Char. 6: 0.348-0.371 --> 0.474
Char. 7: 0.471-0.484 --> 0.527
Char. 8: 0.435-0.442 --> 0.312
Char. 9: 0.584 --> 0.707
Char. 10: 0.497-0.503 --> 0.419
Char. 11: 0.620 --> 1.000
Char. 12: 0.624-0.751 --> 1.000
Char. 13: 0.677 --> 1.000
Char. 15: 0.584-0.606 --> 0.706
Char. 17: 0.634-0.641 --> 0.664
Char. 19: 0.304-0.356 --> 0.287
Char. 22: 0.642-0.675 --> 0.954
Char. 26: 0.547-0.550 --> 0.514
Char. 27: 0.441-0.442 --> 0.371
Char. 30: 0.516-0.521 --> 0.523
Char. 33: 0.402-0.420 --> 0.424
Char. 34: 0.671 --> 0.888
Char. 37: 0.558-0.591 --> 0.622
Char. 39: 0.584-0.745 --> 1.000
Char. 40: 0.580-0.600 --> 1.000
Char. 41: 0.496 --> 0.762
Char. 42: 0.425-0.507 --> 0.616
Char. 43: 0.295-0.390 --> 0.414
Char. 44: 0.121-0.173 --> 0.034
Char. 45: 0.568-0.593 --> 0.653
Char. 46: 0.479-0.563 --> 0.576
Char. 47: 0.513 --> 0.450
Char. 48: 0.682 --> 0.751
Char. 50: 0.471 --> 0.354
Char. 51: 0.545-0.580 --> 0.201

Char. 52: 0.437-0.454 --> 0.278
Char. 53: 0.513-0.634 --> 0.483
Char. 54: 0.598 --> 0.500
Char. 55: 0.269-0.300 --> 0.205
Char. 57: 0.841-0.929 --> 1.000
Char. 58: 0.302-0.404 --> 0.200
Char. 59: 0.288-0.381 --> 0.136
Char. 60: 0.615-0.669 --> 0.535
Char. 61: 0.325-0.329 --> 0.254
Char. 63: 0.331-0.340 --> 0.312
Char. 64: 0.575 --> 0.966
Char. 65: 0.524-0.559 --> 0.279
Char. 68: 0.640 --> 0.880
Char. 72: 0.317-0.328 --> 0.303
Char. 73: 0.272-0.289 --> 0.429
Char. 76: 0.496 --> 1.000
Char. 78: 0.553-0.720 --> 0.745
Char. 79: 0.370-0.397 --> 0.000
Char. 81: 0.475 --> 0.422
Char. 85: 0.570-0.580 --> 0.944
Char. 86: 0.597-0.606 --> 1.000
Char. 87: 0.555-0.613 --> 0.715
Char. 88: 0.587-0.608 --> 0.629
Char. 89: 0.537-0.596 --> 0.950
Char. 90: 0.559-0.605 --> 1.000
Char. 91: 0.559-0.612 --> 1.000
Char. 92: 0.503-0.534 --> 0.792
Char. 93: 0.571-0.614 --> 1.000
Char. 94: 0.465-0.480 --> 0.609
Char. 98: 0.463-0.523 --> 0.843
Char. 106: 0.576-0.815 --> 0.919
Char. 108: 0.667-0.677 --> 0.773
Char. 109: 0.567-0.661 --> 0.716
Char. 112: 0.588-0.623 --> 0.876
Char. 138: 0.600-0.699 --> 0.970
Char. 320: 0.480-0.484 --> 0.254
Char. 322: 0.464 --> 0.396
Char. 324: 0.549-0.601 --> 0.479
Char. 325: 0.341 --> 0.136
Char. 326: 0.359-0.407 --> 0.114
Char. 332: 0.294-0.307 --> 0.291
Char. 334: 0.257-0.320 --> 0.369
Char. 335: 0.184-0.275 --> 0.375
Char. 336: 0.286-0.296 --> 0.117
Char. 337: 0.303-0.345 --> 0.174
Char. 338: 0.363-0.366 --> 0.238
Char. 339: 0.301-0.332 --> 0.265
Char. 340: 0.394-0.458 --> 0.000
Char. 342: 0.276-0.305 --> 0.485
Char. 343: 0.208-0.299 --> 0.330
Char. 347: 0.122 --> 0.072
Char. 348: 0.317-0.331 --> 0.210
Char. 369: 0.554-0.580 --> 0.404
Char. 513: 0 --> 1
Char. 516: 2 --> 0

Turkana_ER3733_3883 :

Char. 5: 0.571 --> 0.311
Char. 6: 0.348-0.371 --> 0.244
Char. 7: 0.440-0.484 --> 0.400
Char. 28: 0.486-0.510 --> 0.527
Char. 31: 0.610 --> 0.657
Char. 36: 0.358 --> 0.341
Char. 37: 0.484-0.574 --> 0.454
Char. 38: 0.461-0.488 --> 0.209
Char. 39: 0.584-0.736 --> 0.346
Char. 42: 0.425-0.507 --> 0.285
Char. 43: 0.295-0.390 --> 0.270
Char. 46: 0.479-0.563 --> 0.298
Char. 62: 0.540 --> 0.442
Char. 65: 0.524-0.570 --> 0.720
Char. 71: 0.474-0.553 --> 0.307
Char. 75: 0.397-0.402 --> 0.451
Char. 80: 0.643-0.687 --> 0.259
Char. 86: 0.597 --> 0.584
Char. 90: 0.549-0.605 --> 0.547
Char. 94: 0.417-0.480 --> 0.414
Char. 96: 0.414-0.467 --> 0.385
Char. 97: 0.324-0.445 --> 0.319
Char. 101: 0.506-0.592 --> 0.631
Char. 105: 0.475-0.481 --> 0.546
Char. 108: 0.616-0.664 --> 0.389
Char. 109: 0.518-0.572 --> 0.438

Char. 110: 0.773-0.852 --> 0.899
Char. 111: 0.623 --> 0.739
Char. 113: 0.693-0.774 --> 0.817
Char. 114: 0.516-0.680 --> 0.392
Char. 115: 0.477-0.501 --> 0.463
Char. 118: 0.622 --> 0.711
Char. 121: 0.403-0.572 --> 0.280
Char. 122: 0.447-0.462 --> 0.116
Char. 123: 0.818-0.827 --> 0.710
Char. 128: 0.550-0.562 --> 0.608
Char. 131: 0.309-0.357 --> 0.236
Char. 133: 0.488-0.541 --> 0.406
Char. 134: 0.339-0.475 --> 0.247
Char. 138: 0.600-0.699 --> 0.427
Char. 141: 0.564-0.633 --> 0.559
Char. 145: 0.341-0.407 --> 0.613
Char. 147: 0.377 --> 0.774
Char. 148: 0.352 --> 0.273
Char. 149: 0.564-0.576 --> 0.461
Char. 156: 0.508-0.781 --> 0.456
Char. 157: 0.548-0.588 --> 0.461
Char. 158: 0.527-0.659 --> 0.502
Char. 159: 0.530 --> 0.185
Char. 161: 0.371-0.424 --> 0.069
Char. 167: 0.541 --> 0.023
Char. 175: 0.752-0.760 --> 0.890
Char. 181: 0.615-0.736 --> 0.763
Char. 186: 0.667-0.670 --> 0.935
Char. 190: 0.493-0.494 --> 1.000
Char. 191: 0.631-0.829 --> 0.917
Char. 193: 0.291-0.417 --> 1.000
Char. 197: 0.500 --> 1.000
Char. 198: 0.505-0.791 --> 0.938
Char. 199: 0.464-0.538 --> 1.000
Char. 202: 0.500 --> 0.250
Char. 216: 0.466-0.511 --> 0.431
Char. 217: 0.589-0.706 --> 0.756
Char. 219: 0.600 --> 0.700
Char. 222: 0.513-0.522 --> 0.305
Char. 223: 0.381-0.509 --> 0.526
Char. 224: 0.250 --> 0.375
Char. 225: 0.750 --> 0.875
Char. 226: 0.595 --> 0.343
Char. 227: 0.348-0.354 --> 0.253
Char. 228: 0.119-0.320 --> 0.107
Char. 231: 0.300-0.500 --> 0.800
Char. 234: 0.500 --> 1.000
Char. 236: 0.305-0.341 --> 0.247
Char. 237: 0.473 --> 0.290
Char. 240: 0.666 --> 0.708
Char. 263: 0.473-0.939 --> 1.000
Char. 264: 0.189-0.308 --> 0.540
Char. 269: 0.610-0.626 --> 0.714
Char. 274: 0.616-0.625 --> 0.766
Char. 278: 0.123-0.159 --> 0.000
Char. 279: 0.838-0.989 --> 1.000
Char. 294: 0.333-0.666 --> 1.000
Char. 297: 0.333 --> 0.666
Char. 323: 0.618-0.709 --> 0.378
Char. 330: 0.576 --> 0.489
Char. 335: 0.184-0.275 --> 0.183
Char. 346: 0.627-0.659 --> 0.579
Char. 348: 0.364 --> 0.377
Char. 350: 0.673-0.765 --> 0.860
Char. 351: 0.514-0.695 --> 0.763
Char. 354: 0.536-0.618 --> 0.683
Char. 356: 0.549-0.554 --> 0.766
Char. 358: 0.265 --> 0.260
Char. 359: 0.634-0.678 --> 0.454
Char. 360: 0.566-0.591 --> 0.490
Char. 362: 0.381-0.416 --> 0.304
Char. 363: 0.458-0.469 --> 0.174
Char. 364: 0.386-0.388 --> 0.115
Char. 366: 0.265-0.346 --> 0.209
Char. 367: 0.910-0.931 --> 0.939
Char. 370: 0.477 --> 0.463
Char. 372: 0.414-0.655 --> 0.393
Char. 375: 0.226-0.263 --> 0.517
Char. 376: 0.380-0.400 --> 0.636
Char. 377: 0.223-0.255 --> 0.385
Char. 379: 0.845 --> 0.762
Char. 380: 0.362 --> 0.000

Char. 382: 0.221 --> 0.021
Char. 383: 0.578-0.652 --> 0.689
Char. 384: 0.226 --> 0.049
Char. 391: 0.235-0.446 --> 0.220
Char. 392: 0.210-0.451 --> 0.738
Char. 397: 0.254-0.265 --> 0.389
Char. 398: 0.167-0.266 --> 0.431
Char. 399: 0.343-0.416 --> 0.283
Char. 446: 0 --> 1
Char. 468: 0 --> 1
Char. 482: 0 --> 1
Char. 499: 1 --> 0
Char. 531: 0 --> 1
Char. 554: 2 --> 01
Char. 557: 1 --> 0
Char. 584: 0 --> 1
Char. 590: 0 --> 1
Char. 602: 0 --> 1
Char. 620: 0 --> 2
Node 56 :
Char. 85: 0.462 --> 0.441
Char. 106: 0.439-0.468 --> 0.556
Char. 205: 0.000-0.250 --> 0.750
Char. 208: 0.648-0.684 --> 0.938
Char. 209: 0.345 --> 0.554
Char. 213: 0.000 --> 0.031
Char. 217: 0.336-0.424 --> 0.613
Char. 222: 0.398-0.452 --> 0.525
Char. 224: 0.000 --> 0.250
Char. 242: 0.000 --> 0.166
Char. 280: 0.222-0.333 --> 1.000
Char. 285: 0.000 --> 0.333
Char. 288: 0.066-0.200 --> 0.000
Char. 333: 0.232-0.283 --> 0.108
Char. 394: 0.376-0.395 --> 0.523
Char. 427: 0 --> 1
Char. 608: 0 --> 1
Char. 619: 1 --> 0
Char. 631: 1 --> 0
Node 57 :
Char. 6: 0.356-0.424 --> 0.457
Char. 19: 0.492 --> 0.460-0.489
Char. 26: 0.417-0.456 --> 0.457
Char. 54: 0.373 --> 0.372
Char. 55: 0.364-0.401 --> 0.557
Char. 66: 0.338-0.581 --> 0.590
Char. 71: 0.495-0.502 --> 0.619
Char. 73: 0.326-0.355 --> 0.377
Char. 76: 0.376-0.420 --> 0.314-0.340
Char. 86: 0.512 --> 0.653-0.654
Char. 109: 0.400 --> 0.517-0.654
Char. 123: 0.840-0.855 --> 0.787-0.802
Char. 127: 0.507-0.642 --> 0.645
Char. 129: 0.315-0.337 --> 0.237
Char. 130: 0.446 --> 0.597
Char. 132: 0.544 --> 0.492-0.537
Char. 135: 0.292-0.307 --> 0.171-0.248
Char. 136: 0.243 --> 0.180
Char. 141: 0.128-0.374 --> 0.091
Char. 152: 0.365-0.567 --> 0.144
Char. 153: 0.412-0.548 --> 0.179
Char. 157: 0.548-0.549 --> 0.050-0.441
Char. 159: 0.582-0.616 --> 0.527
Char. 160: 0.715-0.794 --> 0.317-0.532
Char. 161: 0.658-0.674 --> 0.218-0.357
Char. 164: 0.428-0.479 --> 0.238
Char. 187: 0.483-0.541 --> 0.312-0.369
Char. 214: 0.209-0.323 --> 0.350-0.351
Char. 219: 0.000 --> 0.300-0.600
Char. 220: 0.232 --> 0.310
Char. 232: 0.000 --> 0.076-0.153
Char. 249: 0.200 --> 0.100
Char. 268: 0.721-0.745 --> 0.812
Char. 295: 0.222 --> 0.111
Char. 296: 0.000 --> 0.800
Char. 301: 0.505-0.658 --> 0.355
Char. 305: 0.000-0.333 --> 0.666
Char. 322: 0.850-0.892 --> 0.825-0.829
Char. 328: 0.221-0.317 --> 0.216
Char. 331: 0.312-0.558 --> 0.257-0.310
Char. 341: 0.252-0.255 --> 0.385
Char. 342: 0.437 --> 0.324-0.400

Char. 349: 0.259-0.306 --> 0.170
Char. 351: 0.398-0.495 --> 0.166-0.197
Char. 366: 0.354 --> 0.313
Char. 368: 0.490 --> 0.245-0.327
Char. 418: 1 --> 2
Char. 441: 1 --> 2
Char. 474: 0 --> 2
Char. 519: 2 --> 0
Char. 556: 1 --> 0
Char. 613: 1 --> 2
Node 58 :
Char. 22: 0.585-0.588 --> 0.689-0.720
Char. 27: 0.340-0.388 --> 0.463-0.501
Char. 35: 0.351-0.466 --> 0.575-0.595
Char. 46: 0.445-0.521 --> 0.658-0.665
Char. 49: 0.431-0.567 --> 0.746
Char. 77: 0.309 --> 0.333-0.395
Char. 84: 0.257-0.322 --> 0.129-0.250
Char. 86: 0.385-0.462 --> 0.512
Char. 88: 0.338-0.582 --> 0.619-0.624
Char. 116: 0.494 --> 0.333-0.380
Char. 124: 0.185 --> 0.268-0.294
Char. 133: 0.342 --> 0.303-0.338
Char. 223: 0.220-0.228 --> 0.242-0.324
Char. 335: 0.189 --> 0.210
Char. 344: 0.411-0.462 --> 0.150-0.184
Char. 346: 0.498 --> 0.480
Char. 354: 0.405-0.481 --> 0.292-0.315
Char. 356: 0.389 --> 0.309-0.356
Char. 368: 0.550-0.607 --> 0.490
Char. 421: 0 --> 1
Char. 438: 0 --> 1
Char. 440: 1 --> 0
Char. 442: 0 --> 1
Char. 443: 0 --> 1
Char. 486: 0 --> 1
Char. 488: 0 --> 1
Char. 489: 0 --> 1
Char. 504: 0 --> 1
Node 59 :
Char. 11: 0.308-0.391 --> 0.147-0.166
Char. 30: 0.200-0.212 --> 0.297-0.436
Char. 36: 0.451-0.472 --> 0.567
Char. 38: 0.411 --> 0.239-0.369
Char. 41: 0.279-0.282 --> 0.276
Char. 42: 0.425-0.481 --> 0.553
Char. 43: 0.368-0.506 --> 0.530-0.612
Char. 58: 0.539-0.586 --> 0.606
Char. 60: 0.544-0.697 --> 0.401-0.505
Char. 94: 0.292-0.362 --> 0.108-0.196
Char. 96: 0.370 --> 0.266-0.280
Char. 99: 0.535-0.555 --> 0.297-0.308
Char. 100: 0.229-0.230 --> 0.213
Char. 102: 0.519-0.554 --> 0.459-0.514
Char. 108: 0.386-0.422 --> 0.353-0.359
Char. 113: 0.656-0.679 --> 0.427-0.549
Char. 125: 0.171-0.245 --> 0.159-0.162
Char. 132: 0.546-0.682 --> 0.544
Char. 133: 0.472-0.488 --> 0.342
Char. 135: 0.317-0.434 --> 0.292-0.307
Char. 137: 0.413-0.455 --> 0.313-0.334
Char. 222: 0.563-0.617 --> 0.452
Char. 230: 0.428 --> 0.571
Char. 240: 0.500 --> 0.583
Char. 320: 0.480-0.484 --> 0.335-0.441
Char. 324: 0.594-0.601 --> 0.630-0.640
Char. 333: 0.417-0.474 --> 0.232-0.283
Char. 334: 0.199 --> 0.172
Char. 350: 0.635 --> 0.321
Char. 351: 0.514 --> 0.495
Char. 356: 0.410-0.441 --> 0.389
Char. 369: 0.437-0.522 --> 0.249-0.284
Char. 436: 1 --> 0
Char. 448: 1 --> 0
Char. 449: 0 --> 1
Char. 517: 1 --> 0
Char. 522: 1 --> 0
Char. 611: 1 --> 2
Node 60 :
Char. 4: 0.453-0.547 --> 0.418-0.443
Char. 11: 0.414-0.423 --> 0.308-0.391
Char. 12: 0.455 --> 0.325-0.351

Char. 19: 0.366-0.399 --> 0.492
Char. 53: 0.642-0.670 --> 0.445-0.586
Char. 56: 0.376-0.387 --> 0.453-0.534
Char. 64: 0.346-0.349 --> 0.207-0.277
Char. 71: 0.474-0.482 --> 0.495-0.502
Char. 79: 0.528-0.598 --> 0.465-0.516
Char. 110: 0.577 --> 0.490-0.565
Char. 113: 0.682 --> 0.656-0.679
Char. 326: 0.380 --> 0.211-0.316
Char. 340: 0.492 --> 0.583
Char. 370: 0.448 --> 0.415-0.430
Char. 463: 1 --> 2
Char. 508: 0 --> 1
Char. 519: 0 --> 2

Node 61 :

Char. 1: 0.326-0.363 --> 0.270
Char. 3: 0.476-0.637 --> 0.357
Char. 12: 0.460 --> 0.455
Char. 16: 0.525-0.590 --> 0.484
Char. 17: 0.634-0.641 --> 0.433
Char. 18: 0.475-0.636 --> 0.399-0.474
Char. 20: 0.824-0.827 --> 0.758-0.806
Char. 24: 0.592-0.597 --> 0.362
Char. 25: 0.524-0.550 --> 0.344-0.382
Char. 26: 0.457-0.462 --> 0.456
Char. 29: 0.670 --> 0.496-0.522
Char. 34: 0.614-0.671 --> 0.399
Char. 37: 0.558-0.581 --> 0.297-0.356
Char. 46: 0.533 --> 0.521
Char. 48: 0.567-0.599 --> 0.524
Char. 49: 0.578-0.732 --> 0.431-0.567
Char. 54: 0.598-0.634 --> 0.401-0.424
Char. 55: 0.269-0.300 --> 0.364-0.401
Char. 63: 0.490 --> 0.518
Char. 70: 0.322 --> 0.230-0.295
Char. 73: 0.289 --> 0.326-0.355
Char. 77: 0.579-0.608 --> 0.283-0.309
Char. 137: 0.657-0.754 --> 0.455
Char. 339: 0.516 --> 0.526
Char. 369: 0.554-0.668 --> 0.522
Char. 370: 0.502 --> 0.448
Char. 421: 1 --> 0
Char. 466: 0 --> 1

Node 62 :

Char. 1: 0.423 --> 0.326-0.363
Char. 2: 0.414 --> 0.347
Char. 5: 0.393 --> 0.343-0.347
Char. 7: 0.383-0.415 --> 0.339
Char. 43: 0.295 --> 0.368-0.506
Char. 44: 0.325 --> 0.383-0.407
Char. 79: 0.617-0.638 --> 0.528-0.598
Char. 85: 0.512 --> 0.481-0.511
Char. 86: 0.597-0.606 --> 0.385-0.462
Char. 89: 0.577-0.596 --> 0.502-0.509
Char. 107: 0.738-0.797 --> 0.375-0.408
Char. 112: 0.588-0.623 --> 0.467
Char. 323: 0.618-0.668 --> 0.413-0.528
Char. 346: 0.627-0.716 --> 0.498
Char. 404: 2 --> 0
Char. 414: 0 --> 1
Char. 462: 2 --> 1

Node 63 :

Char. 1: 0.491-0.569 --> 0.423
Char. 2: 0.520-0.579 --> 0.414
Char. 35: 0.627-0.638 --> 0.396-0.466
Char. 36: 0.600 --> 0.419-0.472
Char. 40: 0.580-0.600 --> 0.468-0.472
Char. 44: 0.290 --> 0.325
Char. 52: 0.475-0.520 --> 0.562-0.607
Char. 59: 0.476-0.520 --> 0.536-0.552
Char. 67: 0.269-0.446 --> 0.209-0.241
Char. 68: 0.609-0.639 --> 0.291-0.327
Char. 69: 0.441-0.449 --> 0.243-0.253
Char. 85: 0.570-0.580 --> 0.512
Char. 87: 0.555-0.613 --> 0.414
Char. 88: 0.587-0.608 --> 0.433
Char. 91: 0.559-0.612 --> 0.398-0.452
Char. 92: 0.503-0.534 --> 0.427-0.429
Char. 93: 0.571-0.614 --> 0.366-0.401
Char. 95: 0.503 --> 0.396
Char. 103: 0.371-0.456 --> 0.237-0.291
Char. 105: 0.475 --> 0.315-0.365

Char. 106: 0.524-0.661 --> 0.359
Char. 110: 0.773 --> 0.577-0.715
Char. 111: 0.531-0.623 --> 0.305-0.329
Char. 116: 0.492 --> 0.494-0.541
Char. 119: 0.594-0.621 --> 0.549
Char. 120: 0.651-0.727 --> 0.491
Char. 124: 0.256-0.473 --> 0.109-0.185
Char. 126: 0.424-0.434 --> 0.566
Char. 132: 0.737 --> 0.546-0.682
Char. 226: 0.595 --> 0.542-0.561
Char. 227: 0.348-0.354 --> 0.240
Char. 236: 0.305-0.341 --> 0.264
Char. 246: 0.297-0.407 --> 0.190
Char. 322: 0.818-0.887 --> 0.888-0.907
Char. 347: 0.122 --> 0.132-0.134
Char. 352: 0.362-0.418 --> 0.350
Char. 359: 0.634 --> 0.500
Char. 424: 1 --> 2
Char. 467: 0 --> 1
Char. 609: 2 --> 3
Node 64 :
Char. 520: 0 --> 1
Node 65 :
Char. 0: 0.368-0.413 --> 0.504-0.529
Char. 15: 0.584-0.606 --> 0.388-0.478
Char. 16: 0.657-0.713 --> 0.525-0.590
Char. 26: 0.547-0.550 --> 0.457-0.462
Char. 418: 2 --> 1
Char. 465: 2 --> 1
Char. 518: 0 --> 1
Node 66 :
Char. 20: 0.638 --> 0.824-0.827
Char. 23: 0.534-0.540 --> 0.745-0.811
Char. 29: 0.414-0.501 --> 0.670
Char. 48: 0.614-0.682 --> 0.567-0.599
Char. 51: 0.564-0.617 --> 0.693-0.719
Char. 58: 0.425-0.460 --> 0.480
Char. 59: 0.314-0.416 --> 0.445-0.520
Char. 70: 0.442 --> 0.370-0.409
Char. 79: 0.370-0.427 --> 0.617-0.638
Char. 83: 0.550 --> 0.448-0.481
Char. 321: 0.705-0.722 --> 0.774-0.797
Char. 322: 0.506-0.549 --> 0.781-0.814
Char. 328: 0.148-0.158 --> 0.317-0.348
Char. 329: 0.072-0.228 --> 0.431-0.433
Char. 464: 0 --> 1
Node 67 :
Char. 20: 0.555 --> 0.638
Char. 23: 0.503 --> 0.534-0.540
Char. 30: 0.516-0.521 --> 0.492
Char. 35: 0.388-0.433 --> 0.627-0.638
Char. 36: 0.555 --> 0.600
Char. 41: 0.496 --> 0.332
Char. 44: 0.121-0.173 --> 0.290
Char. 49: 0.547 --> 0.675-0.732
Char. 50: 0.471 --> 0.500-0.510
Char. 58: 0.302-0.404 --> 0.425-0.460
Char. 60: 0.615-0.669 --> 0.697-0.714
Char. 70: 0.469-0.520 --> 0.442
Char. 74: 0.616-0.662 --> 0.509-0.558
Char. 78: 0.553-0.720 --> 0.451-0.456
Char. 81: 0.475 --> 0.570-0.579
Char. 321: 0.389-0.392 --> 0.705-0.722
Char. 322: 0.464 --> 0.506-0.549
Char. 345: 0.738 --> 0.668-0.732
Char. 422: 1 --> 2
Char. 424: 0 --> 1
Char. 487: 1 --> 0
Char. 490: 0 --> 2
Char. 511: 1 --> 0
Node 68 :
Char. 0: 0.244 --> 0.368
Char. 1: 0.418 --> 0.491-0.569
Char. 2: 0.411 --> 0.639-0.652
Char. 3: 0.528 --> 0.608-0.637
Char. 11: 0.569 --> 0.620
Char. 12: 0.578 --> 0.624-0.751
Char. 13: 0.575 --> 0.677
Char. 14: 0.413 --> 0.629
Char. 16: 0.627 --> 0.657-0.713
Char. 18: 0.551 --> 0.622-0.638
Char. 20: 0.444 --> 0.555

Char. 31: 0.610 --> 0.595
Char. 36: 0.358 --> 0.555
Char. 49: 0.511-0.528 --> 0.547
Char. 57: 0.635 --> 0.841-0.929
Char. 62: 0.540 --> 0.541-0.619
Char. 66: 0.236 --> 0.237-0.334
Char. 67: 0.496-0.503 --> 0.446
Char. 69: 0.568 --> 0.441-0.473
Char. 87: 0.450 --> 0.555-0.613
Char. 88: 0.492 --> 0.587-0.608
Char. 91: 0.411 --> 0.559-0.612
Char. 92: 0.394 --> 0.503-0.534
Char. 107: 0.462 --> 0.572-0.744
Char. 108: 0.616-0.664 --> 0.667-0.677
Char. 112: 0.160-0.509 --> 0.588-0.623
Char. 126: 0.495 --> 0.426-0.434
Char. 330: 0.576 --> 0.593-0.596
Char. 341: 0.633-0.655 --> 0.469
Char. 347: 0.213 --> 0.122
Char. 348: 0.364 --> 0.317-0.331
Char. 404: 0 --> 2
Char. 408: 1 --> 2

Node 69 :

Char. 0: 0.047-0.067 --> 0.244
Char. 8: 0.444 --> 0.435-0.442
Char. 20: 0.344 --> 0.444
Char. 27: 0.445 --> 0.442
Char. 38: 0.603 --> 0.461-0.488
Char. 66: 0.227 --> 0.236
Char. 70: 0.665-0.678 --> 0.469-0.520
Char. 72: 0.338-0.409 --> 0.328
Char. 75: 0.269-0.393 --> 0.397-0.402
Char. 101: 0.436-0.457 --> 0.506-0.592
Char. 115: 0.702 --> 0.477-0.501
Char. 120: 0.864 --> 0.651-0.727
Char. 121: 0.577 --> 0.403-0.572
Char. 124: 0.640 --> 0.629
Char. 127: 0.330-0.383 --> 0.511
Char. 129: 0.447-0.488 --> 0.366-0.396
Char. 130: 0.348-0.364 --> 0.415-0.445
Char. 135: 0.514 --> 0.398-0.434
Char. 139: 0.726-0.809 --> 0.404-0.647
Char. 166: 0.876 --> 0.906-0.908
Char. 173: 0.777 --> 0.794-0.877
Char. 179: 0.589 --> 0.631
Char. 189: 0.367 --> 0.205-0.307
Char. 214: 0.673-0.807 --> 0.560
Char. 215: 0.664 --> 0.413
Char. 216: 0.523 --> 0.466-0.511
Char. 220: 0.799 --> 0.527-0.597
Char. 221: 0.741 --> 0.360
Char. 226: 0.694-0.861 --> 0.595
Char. 227: 0.707 --> 0.348-0.354
Char. 230: 0.476-0.714 --> 0.428
Char. 235: 0.627-0.833 --> 0.474-0.525
Char. 236: 0.656-0.724 --> 0.305-0.341
Char. 238: 0.428 --> 0.335
Char. 239: 0.700 --> 0.600
Char. 244: 0.166-0.500 --> 0.000
Char. 257: 0.187 --> 0.568
Char. 258: 0.121 --> 0.315
Char. 269: 0.467 --> 0.610-0.626
Char. 283: 0.290 --> 0.489
Char. 288: 0.500 --> 0.400
Char. 291: 0.391 --> 0.555
Char. 320: 0.522-0.523 --> 0.484
Char. 321: 0.081-0.327 --> 0.389-0.392
Char. 329: 0.287 --> 0.228
Char. 347: 0.215-0.246 --> 0.213
Char. 355: 0.379-0.395 --> 0.411
Char. 359: 0.805 --> 0.634-0.678
Char. 360: 0.791-0.995 --> 0.566-0.591
Char. 361: 0.214-0.227 --> 0.254-0.265
Char. 362: 0.424-0.510 --> 0.381-0.416
Char. 365: 0.271 --> 0.558
Char. 369: 0.596 --> 0.580
Char. 370: 0.512 --> 0.477
Char. 371: 0.778-0.788 --> 0.425-0.621
Char. 372: 0.701-0.752 --> 0.414-0.655
Char. 385: 0.568 --> 0.351
Char. 392: 0.198 --> 0.210-0.451
Char. 457: 1 --> 0

Char. 474: 1 --> 2
Char. 532: 0 --> 1
Char. 563: 3 --> 1
Node 70 :
No synapomorphies
Node 71 :
Char. 40: 0.468-0.472 --> 0.506
Char. 42: 0.425-0.481 --> 0.484
Char. 44: 0.383-0.407 --> 0.474
Char. 45: 0.593 --> 0.746
Char. 50: 0.539-0.659 --> 0.695
Char. 52: 0.562-0.607 --> 0.394
Char. 58: 0.586 --> 0.590
Char. 59: 0.536-0.552 --> 0.580
Char. 91: 0.452 --> 0.453
Char. 337: 0.303-0.432 --> 0.144
Char. 338: 0.363-0.366 --> 0.399
Char. 345: 0.579-0.668 --> 0.502
Char. 400: 1 --> 2
Char. 406: 1 --> 0
Char. 415: 0 --> 1
Char. 418: 1 --> 2
Node 72 :
Char. 0: 0.504-0.536 --> 0.585-0.595
Char. 15: 0.388-0.478 --> 0.612
Char. 16: 0.525-0.590 --> 0.686
Char. 26: 0.457-0.462 --> 0.520
Char. 32: 0.452-0.462 --> 0.384
Char. 76: 0.376-0.420 --> 0.370
Char. 320: 0.480-0.484 --> 0.649
Char. 330: 0.471-0.572 --> 0.448
Char. 334: 0.199-0.205 --> 0.128-0.130
Char. 487: 0 --> 1
Char. 499: 1 --> 0
Char. 502: 2 --> 3
Char. 503: 1 --> 0
Char. 504: 0 --> 1
Char. 506: 0 --> 1
Char. 520: 1 --> 0
Node 73 :
Char. 13: 0.347-0.352 --> 0.479
Char. 19: 0.492 --> 0.514-0.618
Char. 62: 0.287-0.368 --> 0.411-0.436
Char. 64: 0.246-0.277 --> 0.360-0.396
Char. 65: 0.524-0.619 --> 0.297
Char. 66: 0.338-0.581 --> 0.278
Char. 76: 0.376-0.420 --> 0.456-0.475
Char. 105: 0.282-0.315 --> 0.228-0.271
Char. 115: 0.370 --> 0.327
Char. 136: 0.243 --> 0.269
Char. 143: 0.479-0.560 --> 0.696
Char. 147: 0.589 --> 0.638
Char. 158: 0.557-0.594 --> 0.698-0.732
Char. 159: 0.582-0.616 --> 0.726-0.825
Char. 188: 0.339-0.414 --> 0.573-0.702
Char. 229: 0.333-0.444 --> 0.666
Char. 239: 0.300-0.400 --> 0.500
Char. 248: 0.163-0.281 --> 0.301
Char. 293: 0.500 --> 0.250
Char. 298: 0.236-0.363 --> 0.392
Char. 300: 0.589-0.655 --> 0.420
Char. 302: 0.500-0.833 --> 0.250
Char. 328: 0.221-0.317 --> 0.445
Char. 329: 0.316-0.433 --> 0.567
Char. 334: 0.139-0.172 --> 0.112-0.129
Char. 335: 0.210 --> 0.305-0.326
Char. 340: 0.583-0.596 --> 0.304
Char. 342: 0.437 --> 0.473-0.560
Char. 358: 0.376-0.380 --> 0.388-0.442
Char. 364: 0.359-0.388 --> 0.417
Char. 385: 0.338-0.437 --> 0.486-0.588
Char. 408: 2 --> 1
Char. 422: 2 --> 1
Char. 437: 1 --> 0
Char. 439: 1 --> 2
Char. 496: 1 --> 2
Char. 512: 1 --> 2
Char. 529: 0 --> 2
Char. 531: 0 --> 1
Char. 563: 1 --> 2
Char. 582: 12 --> 0
Char. 614: 0 --> 1

Node 74 :
Char. 42: 0.553-0.561 --> 0.446
Char. 43: 0.530-0.612 --> 0.408
Char. 60: 0.401-0.505 --> 0.604
Char. 91: 0.409 --> 0.290
Char. 139: 0.384 --> 0.129-0.149
Char. 347: 0.132-0.151 --> 0.280
Char. 348: 0.399 --> 0.478
Char. 357: 0.397-0.432 --> 0.219-0.381
Char. 402: 0 --> 1
Char. 409: 0 --> 1
Char. 411: 0 --> 1
Char. 412: 1 --> 0
Char. 421: 1 --> 2
Node 75 :
Char. 20: 0.804-0.845 --> 0.756
Char. 22: 0.689-0.826 --> 0.666
Char. 85: 0.462 --> 0.334-0.414
Char. 86: 0.512 --> 0.247-0.343
Char. 87: 0.502-0.566 --> 0.409
Char. 88: 0.619-0.637 --> 0.507
Char. 89: 0.460-0.461 --> 0.323-0.402
Char. 92: 0.427 --> 0.223-0.409
Char. 322: 0.850 --> 0.818
Char. 323: 0.396-0.498 --> 0.547
Char. 518: 1 --> 2
Node 76 :
Char. 9: 0.396-0.397 --> 0.381
Char. 15: 0.229 --> 0.204
Char. 16: 0.345-0.429 --> 0.323
Char. 17: 0.310 --> 0.255
Char. 26: 0.408 --> 0.382
Char. 27: 0.463 --> 0.243
Char. 32: 0.452 --> 0.335-0.431
Char. 34: 0.325 --> 0.318
Char. 35: 0.595 --> 0.750-0.781
Char. 36: 0.701 --> 0.705
Char. 37: 0.260 --> 0.245
Char. 324: 0.652 --> 0.670
Char. 326: 0.316 --> 0.146
Char. 332: 0.652 --> 0.673
Char. 333: 0.283 --> 0.442-0.574
Char. 338: 0.447 --> 0.506
Char. 429: 0 --> 1
Char. 430: 0 --> 1
Char. 482: 0 --> 1
Char. 517: 0 --> 1
Char. 520: 1 --> 3
Node 77 :
Char. 3: 0.195 --> 0.196
Char. 5: 0.369 --> 0.357
Char. 6: 0.581 --> 0.528
Char. 12: 0.209-0.237 --> 0.183
Char. 15: 0.091-0.140 --> 0.158
Char. 16: 0.101-0.139 --> 0.235
Char. 17: 0.023-0.105 --> 0.155
Char. 18: 0.126-0.204 --> 0.218
Char. 24: 0.054-0.061 --> 0.139
Char. 25: 0.086 --> 0.153
Char. 26: 0.244 --> 0.277
Char. 30: 0.335 --> 0.420
Char. 31: 0.170-0.243 --> 0.331
Char. 34: 0.165 --> 0.183
Char. 37: 0.169 --> 0.208
Char. 39: 0.378 --> 0.318
Char. 40: 0.413 --> 0.378
Char. 42: 0.538-0.634 --> 0.760
Char. 43: 0.554-0.646 --> 0.823
Char. 45: 0.834 --> 0.704
Char. 50: 0.803-0.856 --> 0.739
Char. 52: 0.379-0.450 --> 0.522
Char. 55: 0.202-0.364 --> 0.377
Char. 58: 0.838 --> 0.908
Char. 60: 0.497 --> 0.247
Char. 61: 0.689-0.797 --> 0.665
Char. 62: 0.111-0.185 --> 0.206
Char. 63: 0.764-0.826 --> 0.701
Char. 68: 0.323-0.392 --> 0.463
Char. 69: 0.389-0.473 --> 0.536
Char. 78: 0.117-0.163 --> 0.277
Char. 80: 0.738-0.758 --> 0.616
Char. 81: 0.219-0.283 --> 0.333

Char. 85: 0.115 --> 0.128
Char. 87: 0.409-0.554 --> 0.321
Char. 88: 0.507-0.735 --> 0.442
Char. 89: 0.110 --> 0.116
Char. 115: 0.209-0.212 --> 0.241
Char. 119: 0.302-0.303 --> 0.297
Char. 123: 0.855 --> 0.859
Char. 126: 0.293-0.526 --> 0.610
Char. 127: 0.276-0.299 --> 0.178
Char. 129: 0.290-0.337 --> 0.498
Char. 130: 0.446-0.463 --> 0.303
Char. 134: 0.246-0.321 --> 0.202
Char. 135: 0.216-0.274 --> 0.365
Char. 136: 0.222 --> 0.199
Char. 138: 0.430 --> 0.431
Char. 227: 0.187 --> 0.110
Char. 230: 0.571 --> 0.285
Char. 236: 0.083 --> 0.041
Char. 240: 0.583 --> 0.416
Char. 241: 0.100 --> 0.000
Char. 320: 0.266 --> 0.347
Char. 321: 0.726-0.786 --> 0.672
Char. 323: 0.652-0.878 --> 0.485
Char. 325: 0.314 --> 0.260
Char. 326: 0.144-0.316 --> 0.120
Char. 331: 0.558-0.559 --> 0.469
Char. 332: 0.769 --> 0.720
Char. 334: 0.128 --> 0.131
Char. 336: 0.194-0.219 --> 0.252
Char. 337: 0.156-0.179 --> 0.289
Char. 338: 0.506-0.536 --> 0.278
Char. 341: 0.182-0.255 --> 0.296
Char. 346: 0.317-0.424 --> 0.252
Char. 349: 0.463-0.499 --> 0.458
Char. 358: 0.510 --> 0.282
Char. 368: 0.347-0.524 --> 0.535
Char. 443: 1 --> 0
Char. 444: 2 --> 3
Char. 447: 0 --> 1
Char. 456: 0 --> 1
Char. 458: 1 --> 0

Node 78 :

Char. 5: 0.463 --> 0.369
Char. 27: 0.243 --> 0.193-0.234
Char. 30: 0.297-0.331 --> 0.335
Char. 35: 0.750 --> 0.664-0.697
Char. 39: 0.444-0.492 --> 0.378
Char. 40: 0.440-0.446 --> 0.413
Char. 46: 0.644-0.665 --> 0.469-0.579
Char. 76: 0.461 --> 0.289-0.339
Char. 98: 0.666 --> 0.617-0.664
Char. 101: 0.721 --> 0.602-0.684
Char. 125: 0.095-0.101 --> 0.104
Char. 131: 0.291-0.366 --> 0.163-0.252
Char. 133: 0.303 --> 0.224
Char. 136: 0.237-0.318 --> 0.222
Char. 139: 0.149 --> 0.242-0.309
Char. 140: 0.420 --> 0.381
Char. 141: 0.339-0.374 --> 0.133
Char. 145: 0.669 --> 0.443
Char. 148: 0.611 --> 0.365
Char. 154: 0.358 --> 0.392
Char. 156: 0.554 --> 0.575
Char. 168: 0.080 --> 0.594
Char. 169: 0.330 --> 0.478
Char. 170: 0.185 --> 0.514
Char. 171: 0.150-0.159 --> 0.516
Char. 172: 0.353-0.413 --> 0.451
Char. 173: 0.714 --> 0.691
Char. 175: 0.516-0.528 --> 0.681
Char. 176: 0.546 --> 0.682
Char. 177: 0.512 --> 0.712
Char. 178: 0.718 --> 0.757
Char. 179: 0.901-0.950 --> 0.812
Char. 180: 0.120 --> 0.156
Char. 185: 0.259 --> 0.550
Char. 186: 0.090 --> 0.378
Char. 227: 0.200 --> 0.187
Char. 228: 0.423 --> 0.200-0.366
Char. 229: 0.666 --> 0.444-0.555
Char. 236: 0.178 --> 0.083
Char. 238: 0.274 --> 0.195-0.207

Char. 289: 0.246 --> 0.253
Char. 301: 0.658 --> 0.651
Char. 325: 0.318-0.365 --> 0.314
Char. 333: 0.442-0.560 --> 0.361-0.413
Char. 342: 0.473-0.560 --> 0.316-0.395
Char. 351: 0.398-0.399 --> 0.475-0.530
Char. 366: 0.579 --> 0.218-0.436
Char. 367: 0.691 --> 0.680-0.689
Char. 371: 0.196 --> 0.267-0.346
Char. 372: 0.229 --> 0.333-0.396
Char. 373: 0.653 --> 0.228
Char. 374: 0.307 --> 0.495
Char. 376: 0.719-0.779 --> 0.627
Char. 380: 0.438-0.614 --> 0.397
Char. 382: 0.582 --> 0.536
Char. 383: 0.524-0.557 --> 0.621
Char. 388: 0.595 --> 0.442
Char. 389: 0.758 --> 0.602
Char. 390: 0.555-0.574 --> 0.210
Char. 397: 0.065-0.134 --> 0.224
Char. 398: 0.084-0.112 --> 0.154
Char. 399: 0.339 --> 0.264
Char. 452: 0 --> 1
Char. 543: 2 --> 1
Char. 553: 2 --> 0
Char. 555: 1 --> 0
Char. 556: 1 --> 0
Char. 570: 0 --> 1
Char. 627: 2 --> 1

Node 79 :

Char. 22: 0.584-0.616 --> 0.284-0.557
Char. 54: 0.495-0.536 --> 0.558-0.579
Char. 56: 0.453-0.624 --> 0.699
Char. 76: 0.475 --> 0.461
Char. 92: 0.189-0.201 --> 0.068-0.134
Char. 97: 0.349-0.368 --> 0.405
Char. 118: 0.212-0.242 --> 0.176
Char. 122: 0.473-0.545 --> 0.651
Char. 144: 0.266-0.423 --> 0.470-0.516
Char. 150: 0.656 --> 0.335-0.577
Char. 154: 0.077-0.198 --> 0.358
Char. 156: 0.465 --> 0.554
Char. 165: 0.570-0.641 --> 0.466-0.533
Char. 176: 0.478-0.537 --> 0.546
Char. 177: 0.349 --> 0.512
Char. 178: 0.616-0.624 --> 0.718
Char. 189: 0.377 --> 0.197-0.213
Char. 231: 0.100 --> 0.200-0.300
Char. 235: 0.130-0.252 --> 0.300-0.314
Char. 237: 0.533-0.766 --> 0.270
Char. 348: 0.423-0.478 --> 0.377-0.403
Char. 359: 0.445-0.529 --> 0.574-0.677
Char. 360: 0.273-0.331 --> 0.377-0.412
Char. 362: 0.501-0.503 --> 0.764
Char. 363: 0.576-0.623 --> 0.771
Char. 364: 0.437-0.543 --> 0.588
Char. 367: 0.692-0.693 --> 0.691
Char. 378: 0.815 --> 0.509-0.742
Char. 382: 0.624-0.639 --> 0.582
Char. 387: 0.575-0.620 --> 0.343-0.531
Char. 399: 0.361-0.416 --> 0.339
Char. 474: 1 --> 0
Char. 613: 1 --> 0

Node 80 :

Char. 0: 0.672 --> 0.713-0.750
Char. 1: 0.253 --> 0.161-0.171
Char. 3: 0.342 --> 0.195
Char. 6: 0.354-0.356 --> 0.581-0.610
Char. 12: 0.325-0.351 --> 0.209-0.237
Char. 17: 0.184 --> 0.103-0.105
Char. 20: 0.737-0.756 --> 0.616-0.642
Char. 24: 0.197 --> 0.060-0.061
Char. 25: 0.223 --> 0.086
Char. 26: 0.380 --> 0.244
Char. 28: 0.478 --> 0.223-0.287
Char. 34: 0.220 --> 0.165
Char. 41: 0.245 --> 0.203-0.220
Char. 47: 0.520-0.550 --> 0.366-0.499
Char. 49: 0.746 --> 0.558-0.679
Char. 63: 0.724 --> 0.764-0.826
Char. 78: 0.319 --> 0.119-0.163
Char. 85: 0.334 --> 0.115

Char. 89: 0.323 --> 0.110
Char. 90: 0.279 --> 0.177-0.206
Char. 91: 0.264 --> 0.127-0.161
Char. 92: 0.223-0.409 --> 0.189-0.201
Char. 93: 0.398 --> 0.188-0.274
Char. 94: 0.108-0.196 --> 0.018-0.078
Char. 95: 0.329 --> 0.207-0.234
Char. 99: 0.292 --> 0.149-0.249
Char. 108: 0.353 --> 0.261-0.337
Char. 111: 0.245 --> 0.101-0.105
Char. 112: 0.355 --> 0.178
Char. 132: 0.544 --> 0.473-0.538
Char. 156: 0.426 --> 0.465
Char. 158: 0.698 --> 0.605-0.659
Char. 159: 0.726 --> 0.680
Char. 160: 0.756 --> 0.724
Char. 162: 0.820 --> 0.784
Char. 166: 0.913 --> 0.891
Char. 174: 0.228-0.364 --> 0.369
Char. 181: 0.135 --> 0.117
Char. 188: 0.573 --> 0.427-0.482
Char. 330: 0.690 --> 0.786-0.850
Char. 345: 0.446 --> 0.375
Char. 347: 0.328 --> 0.384-0.513
Char. 355: 0.276-0.300 --> 0.337-0.403
Char. 358: 0.452 --> 0.510
Char. 359: 0.385-0.413 --> 0.445-0.529
Char. 391: 0.653 --> 0.727-0.773
Char. 392: 0.611 --> 0.487
Char. 408: 1 --> 0
Char. 543: 0 --> 2
Char. 552: 2 --> 1
Char. 564: 1 --> 2
Node 81 :
Char. 1: 0.263-0.540 --> 0.253
Char. 2: 0.298-0.532 --> 0.222
Char. 3: 0.345-0.354 --> 0.342
Char. 15: 0.204 --> 0.113-0.140
Char. 16: 0.323 --> 0.129-0.139
Char. 17: 0.255 --> 0.184
Char. 24: 0.211-0.233 --> 0.197
Char. 26: 0.382 --> 0.380
Char. 34: 0.318 --> 0.220
Char. 36: 0.705 --> 0.723-0.800
Char. 37: 0.245 --> 0.169
Char. 40: 0.468-0.504 --> 0.440-0.446
Char. 41: 0.254-0.276 --> 0.245
Char. 42: 0.372-0.446 --> 0.538-0.634
Char. 43: 0.341-0.408 --> 0.554-0.646
Char. 44: 0.523 --> 0.790
Char. 50: 0.755 --> 0.803-0.850
Char. 52: 0.487 --> 0.450
Char. 59: 0.706-0.840 --> 0.864-0.890
Char. 60: 0.604-0.670 --> 0.530
Char. 62: 0.411 --> 0.185
Char. 65: 0.218-0.297 --> 0.338-0.497
Char. 66: 0.237-0.278 --> 0.291-0.392
Char. 70: 0.216-0.295 --> 0.138-0.207
Char. 72: 0.224-0.265 --> 0.179
Char. 74: 0.477-0.482 --> 0.582
Char. 79: 0.352 --> 0.292-0.319
Char. 99: 0.297-0.308 --> 0.292
Char. 102: 0.462-0.514 --> 0.552-0.670
Char. 103: 0.155-0.267 --> 0.094-0.134
Char. 104: 0.618-0.718 --> 0.787
Char. 106: 0.397 --> 0.319-0.339
Char. 107: 0.373 --> 0.152-0.254
Char. 110: 0.408-0.492 --> 0.337-0.343
Char. 112: 0.429 --> 0.355
Char. 114: 0.250 --> 0.240
Char. 115: 0.254 --> 0.209-0.212
Char. 116: 0.315 --> 0.264
Char. 118: 0.294 --> 0.242
Char. 119: 0.347 --> 0.302-0.303
Char. 120: 0.396 --> 0.353
Char. 124: 0.380 --> 0.455
Char. 125: 0.111 --> 0.101
Char. 135: 0.292-0.307 --> 0.216-0.274
Char. 332: 0.673 --> 0.769-0.825
Char. 335: 0.326 --> 0.337
Char. 337: 0.183 --> 0.179
Char. 340: 0.196-0.304 --> 0.348-0.630

Char. 352: 0.350 --> 0.268-0.274
Char. 358: 0.388-0.442 --> 0.452
Char. 361: 0.241-0.256 --> 0.286-0.316
Char. 362: 0.469 --> 0.501-0.503
Char. 369: 0.249-0.284 --> 0.379-0.409
Char. 370: 0.425 --> 0.431-0.442
Char. 414: 1 --> 2
Char. 425: 0 --> 1
Char. 464: 1 --> 0
Char. 490: 2 --> 1
Char. 525: 1 --> 2

Node 82 :

Char. 0: 0.713-0.750 --> 0.805
Char. 3: 0.195 --> 0.148
Char. 5: 0.463-0.515 --> 0.534
Char. 6: 0.581-0.610 --> 0.714
Char. 26: 0.244 --> 0.236
Char. 34: 0.165 --> 0.163
Char. 37: 0.169 --> 0.116
Char. 41: 0.203-0.220 --> 0.192
Char. 42: 0.538-0.634 --> 0.780
Char. 43: 0.554-0.646 --> 0.774
Char. 45: 0.834 --> 0.755
Char. 60: 0.497-0.530 --> 0.304
Char. 74: 0.582-0.594 --> 0.632
Char. 76: 0.475 --> 0.493
Char. 84: 0.071-0.129 --> 0.037
Char. 86: 0.247-0.265 --> 0.163
Char. 87: 0.409 --> 0.346
Char. 88: 0.507 --> 0.492
Char. 96: 0.134-0.276 --> 0.048
Char. 97: 0.349-0.368 --> 0.320
Char. 99: 0.149-0.249 --> 0.146
Char. 110: 0.337-0.343 --> 0.120
Char. 112: 0.178 --> 0.162
Char. 114: 0.228-0.240 --> 0.106
Char. 115: 0.209-0.212 --> 0.089
Char. 117: 0.543-0.580 --> 0.462
Char. 119: 0.302-0.303 --> 0.277
Char. 120: 0.332-0.353 --> 0.284
Char. 121: 0.104-0.170 --> 0.089
Char. 122: 0.473-0.545 --> 0.415
Char. 123: 0.840-0.855 --> 0.807
Char. 125: 0.095-0.101 --> 0.080
Char. 132: 0.473-0.538 --> 0.460
Char. 135: 0.216-0.274 --> 0.145
Char. 137: 0.291-0.318 --> 0.285
Char. 139: 0.129-0.149 --> 0.090
Char. 237: 0.533-0.766 --> 0.918
Char. 320: 0.147-0.266 --> 0.341
Char. 321: 0.726-0.781 --> 0.630
Char. 324: 0.670-0.721 --> 0.614
Char. 331: 0.558-0.559 --> 0.475
Char. 334: 0.128 --> 0.169
Char. 338: 0.506-0.509 --> 0.376
Char. 342: 0.473-0.560 --> 0.659
Char. 344: 0.150-0.184 --> 0.118
Char. 345: 0.375 --> 0.345
Char. 346: 0.317-0.424 --> 0.188
Char. 350: 0.224-0.321 --> 0.164
Char. 351: 0.398-0.399 --> 0.357
Char. 355: 0.337-0.403 --> 0.455
Char. 358: 0.510 --> 0.549
Char. 363: 0.576-0.623 --> 0.567
Char. 368: 0.347-0.490 --> 0.308
Char. 487: 0 --> 1

Node 83 :

Char. 1: 0.263-0.270 --> 0.185
Char. 19: 0.492 --> 0.564-0.708
Char. 31: 0.214-0.294 --> 0.212
Char. 52: 0.562 --> 0.417-0.435
Char. 53: 0.445-0.586 --> 0.419-0.433
Char. 65: 0.524 --> 0.455-0.477
Char. 68: 0.276-0.327 --> 0.117-0.183
Char. 69: 0.243-0.253 --> 0.144-0.224
Char. 71: 0.495-0.502 --> 0.540
Char. 82: 0.649-0.699 --> 0.450-0.506
Char. 111: 0.305-0.329 --> 0.471-0.513
Char. 112: 0.467 --> 0.476-0.755
Char. 129: 0.315-0.337 --> 0.236
Char. 130: 0.446 --> 0.620-0.630
Char. 138: 0.333-0.468 --> 0.245-0.297

Char. 193: 0.411-0.417 --> 0.472
Char. 226: 0.542-0.561 --> 0.392-0.463
Char. 228: 0.265-0.330 --> 0.367-0.459
Char. 235: 0.271 --> 0.101-0.149
Char. 236: 0.212 --> 0.049-0.133
Char. 237: 0.533-0.618 --> 0.749
Char. 238: 0.227-0.274 --> 0.081-0.154
Char. 271: 0.176-0.248 --> 0.064
Char. 272: 0.295-0.358 --> 0.173-0.286
Char. 276: 0.309-0.336 --> 0.063-0.064
Char. 277: 0.231-0.232 --> 0.080-0.129
Char. 279: 0.528-0.621 --> 0.419
Char. 281: 0.323-0.365 --> 0.058-0.061
Char. 282: 0.231-0.292 --> 0.116-0.190
Char. 283: 0.489-0.523 --> 0.716-0.746
Char. 289: 0.212-0.238 --> 0.044-0.063
Char. 290: 0.245-0.326 --> 0.174-0.201
Char. 301: 0.627-0.722 --> 0.773-0.787
Char. 333: 0.417-0.474 --> 0.593-0.645
Char. 342: 0.437 --> 0.499
Char. 355: 0.276-0.300 --> 0.389-0.577
Char. 356: 0.410-0.441 --> 0.501
Char. 358: 0.376-0.380 --> 0.440-0.529
Char. 366: 0.354 --> 0.410-0.585
Char. 378: 0.256-0.433 --> 0.608-0.627
Char. 384: 0.378-0.385 --> 0.468
Char. 403: 2 --> 0
Char. 410: 0 --> 1
Char. 412: 1 --> 2
Char. 414: 1 --> 2
Char. 423: 0 --> 1
Char. 433: 1 --> 0
Char. 435: 1 --> 0
Char. 441: 1 --> 0
Char. 464: 1 --> 2
Char. 471: 2 --> 3
Char. 493: 2 --> 0
Char. 511: 0 --> 1
Char. 521: 1 --> 0
Char. 532: 1 --> 0
Char. 549: 0 --> 2

Node 84 :
Char. 0: 0.681-0.745 --> 0.572
Char. 5: 0.224 --> 0.121
Char. 6: 0.327 --> 0.233
Char. 16: 0.249-0.408 --> 0.436
Char. 23: 0.810 --> 0.939
Char. 25: 0.168-0.279 --> 0.315
Char. 26: 0.432-0.447 --> 0.467
Char. 27: 0.332-0.340 --> 0.380
Char. 30: 0.110 --> 0.046
Char. 40: 0.456-0.472 --> 0.567
Char. 41: 0.279-0.282 --> 0.527
Char. 58: 0.570 --> 0.590
Char. 59: 0.536-0.552 --> 0.612
Char. 66: 0.477 --> 0.545
Char. 91: 0.394-0.409 --> 0.419
Char. 100: 0.192 --> 0.200
Char. 106: 0.285-0.447 --> 0.448
Char. 111: 0.485 --> 0.574
Char. 114: 0.332-0.373 --> 0.382
Char. 137: 0.389-0.395 --> 0.441
Char. 322: 0.845-0.888 --> 0.922
Char. 323: 0.161 --> 0.038
Char. 345: 0.408-0.504 --> 0.562
Char. 347: 0.134-0.137 --> 0.116
Char. 351: 0.571 --> 0.527
Char. 357: 0.520 --> 0.553
Char. 360: 0.441-0.463 --> 0.480
Char. 369: 0.459 --> 0.479
Char. 492: 1 --> 0
Char. 504: 0 --> 1
Char. 525: 1 --> 0

Node 85 :
Char. 5: 0.343 --> 0.224
Char. 6: 0.410-0.415 --> 0.327
Char. 7: 0.147-0.177 --> 0.060-0.087
Char. 22: 0.588-0.604 --> 0.765-0.784
Char. 32: 0.316-0.384 --> 0.258-0.292
Char. 33: 0.397-0.437 --> 0.294-0.374
Char. 39: 0.371-0.431 --> 0.163-0.320
Char. 43: 0.414-0.469 --> 0.597-0.622

Char. 46: 0.498-0.546 --> 0.361-0.445
Char. 60: 0.541-0.615 --> 0.412-0.423
Char. 66: 0.338-0.449 --> 0.477
Char. 67: 0.198-0.226 --> 0.161-0.177
Char. 97: 0.506-0.594 --> 0.479
Char. 102: 0.616 --> 0.646-0.684
Char. 104: 0.719 --> 0.747-0.827
Char. 105: 0.198 --> 0.165
Char. 111: 0.389-0.471 --> 0.485
Char. 113: 0.656-0.679 --> 0.558-0.601
Char. 118: 0.164 --> 0.226-0.260
Char. 131: 0.249 --> 0.231
Char. 133: 0.171 --> 0.160
Char. 136: 0.220-0.230 --> 0.330
Char. 139: 0.162 --> 0.172-0.187
Char. 142: 0.414 --> 0.055
Char. 145: 0.341-0.346 --> 0.731
Char. 146: 0.392 --> 0.349
Char. 150: 0.550 --> 0.513
Char. 151: 0.327-0.345 --> 0.273
Char. 154: 0.228-0.236 --> 0.315
Char. 162: 0.931 --> 0.927
Char. 164: 0.486 --> 0.518
Char. 165: 0.704-0.726 --> 0.638
Char. 188: 0.392-0.414 --> 0.321
Char. 189: 0.119-0.240 --> 0.013
Char. 321: 0.739-0.789 --> 0.663-0.717
Char. 323: 0.515-0.532 --> 0.161
Char. 334: 0.198-0.199 --> 0.114-0.174
Char. 342: 0.499 --> 0.559
Char. 346: 0.310-0.410 --> 0.262-0.267
Char. 357: 0.254-0.397 --> 0.520
Char. 365: 0.609-0.729 --> 0.504
Char. 368: 0.684-0.762 --> 0.635
Char. 369: 0.445 --> 0.459
Char. 371: 0.172 --> 0.191-0.197
Char. 372: 0.188-0.194 --> 0.201-0.215
Char. 373: 0.666 --> 0.767
Char. 375: 0.263-0.367 --> 0.476
Char. 378: 0.608-0.627 --> 0.254
Char. 463: 2 --> 0
Char. 546: 1 --> 0
Char. 562: 0 --> 2
Char. 566: 1 --> 0
Char. 567: 0 --> 1
Char. 572: 2 --> 1

Node 86 :

Char. 17: 0.371-0.419 --> 0.239-0.324
Char. 18: 0.458-0.474 --> 0.429-0.433
Char. 21: 0.664-0.766 --> 0.825-0.879
Char. 24: 0.257 --> 0.197
Char. 34: 0.353 --> 0.202-0.278
Char. 37: 0.297-0.311 --> 0.239-0.249
Char. 62: 0.385-0.424 --> 0.427
Char. 64: 0.154 --> 0.149
Char. 65: 0.237-0.318 --> 0.131
Char. 72: 0.205-0.233 --> 0.088-0.126
Char. 94: 0.192-0.196 --> 0.177
Char. 102: 0.571-0.582 --> 0.616
Char. 103: 0.287-0.291 --> 0.223
Char. 104: 0.665-0.718 --> 0.719
Char. 105: 0.309-0.365 --> 0.198
Char. 110: 0.565 --> 0.508
Char. 131: 0.337-0.403 --> 0.249
Char. 132: 0.545 --> 0.488-0.513
Char. 133: 0.417-0.472 --> 0.171
Char. 166: 0.906 --> 0.792
Char. 179: 0.762-0.798 --> 0.822
Char. 186: 0.074-0.087 --> 0.021
Char. 201: 0.560 --> 0.578
Char. 205: 0.250 --> 0.875
Char. 208: 0.717 --> 0.784
Char. 237: 0.742-0.749 --> 0.556
Char. 238: 0.242 --> 0.247
Char. 246: 0.170-0.177 --> 0.125
Char. 247: 0.352-0.419 --> 0.313
Char. 248: 0.256-0.348 --> 0.191
Char. 263: 0.440 --> 0.553
Char. 280: 0.333-0.555 --> 0.666
Char. 303: 0.000 --> 0.500
Char. 361: 0.315-0.328 --> 0.339-0.373
Char. 369: 0.431-0.437 --> 0.445

Char. 393: 0.817-0.859 --> 0.754
Char. 398: 0.143-0.151 --> 0.126
Char. 453: 1 --> 2
Char. 494: 1 --> 2
Char. 507: 1 --> 0
Char. 521: 0 --> 1
Char. 536: 1 --> 2
Char. 591: 2 --> 1
Char. 602: 0 --> 1
Char. 603: 0 --> 1
Char. 621: 1 --> 2
Char. 631: 01 --> 2
Node 87 :
Char. 1: 0.185 --> 0.196-0.272
Char. 12: 0.325 --> 0.407-0.408
Char. 14: 0.374 --> 0.402
Char. 31: 0.212 --> 0.257-0.259
Char. 47: 0.595 --> 0.590
Char. 55: 0.364-0.401 --> 0.501-0.551
Char. 68: 0.183 --> 0.256-0.315
Char. 100: 0.230 --> 0.192
Char. 117: 0.641 --> 0.715-0.750
Char. 132: 0.588 --> 0.545
Char. 137: 0.413-0.455 --> 0.389-0.395
Char. 141: 0.402 --> 0.060-0.119
Char. 160: 0.715-0.794 --> 0.612-0.647
Char. 161: 0.658-0.815 --> 0.480-0.580
Char. 170: 0.413 --> 0.162-0.383
Char. 171: 0.498 --> 0.242-0.441
Char. 173: 0.748 --> 0.728-0.747
Char. 180: 0.416 --> 0.226-0.252
Char. 181: 0.444 --> 0.185-0.192
Char. 182: 0.321 --> 0.172-0.183
Char. 183: 0.256-0.257 --> 0.124-0.125
Char. 184: 0.220-0.342 --> 0.145-0.160
Char. 186: 0.181 --> 0.074-0.087
Char. 187: 0.434 --> 0.425-0.432
Char. 238: 0.154 --> 0.242
Char. 291: 0.482-0.629 --> 0.416-0.458
Char. 309: 0.725 --> 0.382-0.542
Char. 331: 0.620 --> 0.483-0.613
Char. 333: 0.593 --> 0.389-0.462
Char. 353: 0.500 --> 0.128-0.164
Char. 367: 0.766 --> 0.570-0.660
Char. 381: 0.816-0.824 --> 0.776-0.786
Char. 388: 0.475-0.515 --> 0.519-0.740
Char. 391: 0.558 --> 0.631-0.638
Char. 583: 0 --> 2
Char. 584: 0 --> 1
Char. 585: 0 --> 1
Char. 587: 0 --> 1
Node 88 :
Char. 0: 0.567 --> 0.681-0.745
Char. 13: 0.352-0.377 --> 0.343
Char. 15: 0.342 --> 0.329-0.332
Char. 20: 0.758 --> 0.725-0.744
Char. 25: 0.290 --> 0.279
Char. 30: 0.197 --> 0.110-0.117
Char. 32: 0.448 --> 0.316-0.384
Char. 36: 0.472 --> 0.578-0.614
Char. 65: 0.455-0.477 --> 0.318
Char. 75: 0.341 --> 0.306-0.327
Char. 78: 0.451 --> 0.340-0.346
Char. 79: 0.465 --> 0.227-0.419
Char. 84: 0.257 --> 0.237-0.244
Char. 85: 0.462-0.603 --> 0.217-0.297
Char. 86: 0.385-0.462 --> 0.302-0.360
Char. 89: 0.460-0.619 --> 0.249-0.308
Char. 90: 0.514-0.627 --> 0.231-0.241
Char. 92: 0.427-0.470 --> 0.303-0.358
Char. 94: 0.292 --> 0.192-0.196
Char. 95: 0.339-0.398 --> 0.214-0.215
Char. 96: 0.370 --> 0.322-0.347
Char. 97: 0.209 --> 0.506-0.594
Char. 99: 0.535-0.555 --> 0.446
Char. 107: 0.375-0.723 --> 0.280-0.339
Char. 108: 0.386 --> 0.143-0.216
Char. 109: 0.321-0.400 --> 0.247-0.279
Char. 115: 0.317 --> 0.217
Char. 116: 0.494-0.566 --> 0.268
Char. 118: 0.356 --> 0.164
Char. 119: 0.369 --> 0.292

Char. 120: 0.433 --> 0.307-0.314
Char. 121: 0.268-0.295 --> 0.124
Char. 122: 0.518 --> 0.588-0.809
Char. 123: 0.887 --> 0.898-0.933
Char. 136: 0.243 --> 0.220-0.230
Char. 138: 0.245-0.297 --> 0.212-0.236
Char. 139: 0.196 --> 0.162
Char. 214: 0.209 --> 0.037-0.122
Char. 221: 0.174-0.230 --> 0.096
Char. 226: 0.392-0.463 --> 0.312-0.389
Char. 227: 0.127-0.173 --> 0.033-0.100
Char. 230: 0.428 --> 0.714
Char. 239: 0.300-0.350 --> 0.200
Char. 241: 0.500 --> 0.400
Char. 245: 0.145 --> 0.102-0.114
Char. 246: 0.187 --> 0.177
Char. 307: 0.256 --> 0.119
Char. 308: 0.575-0.586 --> 0.682
Char. 320: 0.480-0.501 --> 0.423
Char. 323: 0.366-0.498 --> 0.515-0.532
Char. 327: 0.537-0.562 --> 0.298-0.478
Char. 328: 0.317-0.336 --> 0.383-0.423
Char. 330: 0.536 --> 0.338
Char. 332: 0.450 --> 0.536-0.548
Char. 335: 0.189 --> 0.196
Char. 340: 0.583 --> 0.513
Char. 341: 0.231 --> 0.166
Char. 344: 0.411 --> 0.310-0.325
Char. 345: 0.579-0.849 --> 0.408-0.504
Char. 346: 0.486 --> 0.310-0.429
Char. 348: 0.317-0.371 --> 0.266-0.303
Char. 349: 0.259-0.383 --> 0.393-0.411
Char. 350: 0.635-0.666 --> 0.547
Char. 351: 0.514 --> 0.571-0.662
Char. 358: 0.440-0.529 --> 0.542
Char. 359: 0.417-0.508 --> 0.634-0.724
Char. 361: 0.271-0.291 --> 0.315
Char. 362: 0.337-0.341 --> 0.552
Char. 363: 0.501 --> 0.724
Char. 364: 0.492 --> 0.621-0.662
Char. 368: 0.609 --> 0.684
Char. 370: 0.430 --> 0.447-0.545
Char. 371: 0.330 --> 0.172
Char. 372: 0.210 --> 0.188-0.194
Char. 452: 0 --> 1
Char. 468: 0 --> 1
Char. 491: 1 --> 3

Node 89 :

Char. 0: 0.536 --> 0.567
Char. 2: 0.298-0.347 --> 0.259-0.278
Char. 3: 0.354-0.357 --> 0.257
Char. 7: 0.281 --> 0.147-0.177
Char. 8: 0.339-0.371 --> 0.164-0.232
Char. 9: 0.343 --> 0.186
Char. 10: 0.334-0.392 --> 0.205
Char. 24: 0.355-0.362 --> 0.257
Char. 25: 0.344-0.382 --> 0.290
Char. 30: 0.200 --> 0.197
Char. 32: 0.452-0.462 --> 0.448
Char. 34: 0.370-0.399 --> 0.353
Char. 44: 0.386-0.407 --> 0.432
Char. 48: 0.524 --> 0.489
Char. 49: 0.431-0.567 --> 0.418-0.430
Char. 51: 0.693-0.698 --> 0.660-0.680
Char. 61: 0.461-0.503 --> 0.637
Char. 63: 0.518-0.540 --> 0.692
Char. 64: 0.207 --> 0.154
Char. 71: 0.540 --> 0.548
Char. 72: 0.250-0.265 --> 0.233
Char. 75: 0.342 --> 0.341
Char. 77: 0.283 --> 0.224
Char. 80: 0.756 --> 0.616-0.725
Char. 81: 0.450 --> 0.284
Char. 88: 0.582 --> 0.611-0.703
Char. 101: 0.543-0.592 --> 0.635-0.713
Char. 115: 0.370-0.373 --> 0.317
Char. 122: 0.339-0.462 --> 0.518
Char. 123: 0.845-0.855 --> 0.887
Char. 126: 0.566-0.604 --> 0.414
Char. 128: 0.417-0.461 --> 0.389
Char. 129: 0.236 --> 0.211-0.221
Char. 135: 0.317-0.434 --> 0.442-0.529

Char. 139: 0.384-0.440 --> 0.196
Char. 247: 0.317-0.348 --> 0.352
Char. 339: 0.526 --> 0.581-0.599
Char. 341: 0.252-0.255 --> 0.231
Char. 346: 0.498 --> 0.486
Char. 356: 0.501 --> 0.585-0.663
Char. 363: 0.458-0.469 --> 0.501
Char. 364: 0.359-0.388 --> 0.492
Char. 368: 0.550-0.607 --> 0.609
Char. 372: 0.414-0.557 --> 0.210
Char. 406: 1 --> 0
Char. 429: 0 --> 1
Char. 434: 1 --> 0
Char. 466: 1 --> 0
Char. 503: 1 --> 0
Char. 506: 0 --> 1
Char. 514: 1 --> 0
Char. 518: 1 --> 3
Node 90 :
Char. 19: 0.564 --> 0.512
Char. 88: 0.783 --> 0.870
Char. 126: 0.244 --> 0.195
Char. 248: 0.405 --> 0.493
Char. 341: 0.162-0.166 --> 0.216
Char. 348: 0.266-0.303 --> 0.252
Char. 370: 0.447-0.545 --> 0.392
Char. 450: 1 --> 0
Node 91 :
Char. 88: 0.611-0.703 --> 0.783
Char. 98: 0.581-0.695 --> 0.490-0.544
Char. 124: 0.109-0.193 --> 0.063
Char. 126: 0.414 --> 0.244
Char. 129: 0.211-0.221 --> 0.322
Char. 130: 0.620-0.630 --> 0.471
Char. 152: 0.317-0.396 --> 0.248
Char. 153: 0.271-0.436 --> 0.231
Char. 156: 0.199 --> 0.156
Char. 164: 0.428-0.486 --> 0.300
Char. 166: 0.906 --> 0.923
Char. 170: 0.162-0.383 --> 0.160
Char. 173: 0.728-0.747 --> 0.703
Char. 174: 0.340-0.364 --> 0.308
Char. 222: 0.416-0.563 --> 0.366
Char. 223: 0.220-0.271 --> 0.308
Char. 248: 0.256-0.348 --> 0.405
Char. 261: 0.184-0.213 --> 0.171
Char. 267: 0.123-0.175 --> 0.064
Char. 277: 0.067-0.129 --> 0.015
Char. 279: 0.227-0.323 --> 0.222
Char. 368: 0.684-0.762 --> 0.792
Char. 377: 0.267-0.390 --> 0.255
Char. 381: 0.776-0.786 --> 0.764
Char. 382: 0.567-0.676 --> 0.370
Char. 385: 0.713-0.773 --> 0.788
Char. 392: 0.616-0.648 --> 0.552
Char. 399: 0.259-0.339 --> 0.158
Char. 402: 0 --> 1
Char. 540: 1 --> 0
Char. 577: 0 --> 1
Char. 578: 1 --> 0
Char. 605: 2 --> 3
Char. 613: 1 --> 0
Char. 616: 2 --> 1
Node 92 :
Char. 5: 0.343 --> 0.366
Char. 20: 0.725-0.744 --> 0.757
Char. 23: 0.774-0.810 --> 0.756
Char. 50: 0.632-0.659 --> 0.600
Char. 53: 0.433-0.446 --> 0.457
Char. 62: 0.427 --> 0.455
Char. 79: 0.227-0.237 --> 0.180
Char. 92: 0.303-0.358 --> 0.362
Char. 107: 0.280-0.339 --> 0.427
Char. 321: 0.739-0.789 --> 0.816
Char. 334: 0.198-0.199 --> 0.205
Char. 404: 0 --> 1
Node 93 :
Char. 1: 0.417-0.497 --> 0.766
Char. 2: 0.367-0.461 --> 0.752
Char. 3: 0.349-0.354 --> 0.795
Char. 4: 0.302-0.420 --> 0.615
Char. 7: 0.359 --> 0.363

Char. 9: 0.396 --> 0.519
Char. 11: 0.091-0.166 --> 0.534
Char. 12: 0.391 --> 0.470
Char. 13: 0.347-0.352 --> 0.400
Char. 17: 0.344-0.599 --> 0.657
Char. 20: 0.806 --> 0.830-0.868
Char. 23: 0.823 --> 0.864
Char. 24: 0.355-0.389 --> 0.606
Char. 25: 0.344-0.398 --> 0.604
Char. 26: 0.536 --> 0.599
Char. 28: 0.478-0.574 --> 0.461
Char. 29: 0.496 --> 0.531
Char. 30: 0.431-0.522 --> 0.525
Char. 35: 0.575-0.605 --> 0.623
Char. 37: 0.326-0.465 --> 0.581
Char. 47: 0.595-0.702 --> 0.802
Char. 48: 0.537 --> 0.766
Char. 51: 0.693-0.716 --> 0.806
Char. 52: 0.562-0.589 --> 0.785
Char. 53: 0.460 --> 0.642
Char. 61: 0.241 --> 0.211
Char. 63: 0.400 --> 0.303
Char. 64: 0.277 --> 0.335
Char. 75: 0.311-0.346 --> 0.369
Char. 77: 0.333-0.499 --> 0.531
Char. 78: 0.167-0.451 --> 0.467
Char. 80: 0.756-0.769 --> 0.782
Char. 81: 0.450-0.474 --> 0.792
Char. 85: 0.522 --> 0.618
Char. 86: 0.653-0.654 --> 0.715
Char. 87: 0.596 --> 0.617
Char. 91: 0.409 --> 0.558
Char. 94: 0.316 --> 0.400
Char. 95: 0.381 --> 0.467
Char. 100: 0.200-0.213 --> 0.167-0.172
Char. 102: 0.459-0.514 --> 0.350
Char. 106: 0.439-0.468 --> 0.380
Char. 108: 0.353-0.359 --> 0.693
Char. 110: 0.552 --> 0.595-0.867
Char. 111: 0.329 --> 0.335-0.503
Char. 114: 0.250-0.373 --> 0.512-0.517
Char. 115: 0.370 --> 0.560
Char. 116: 0.333-0.380 --> 0.396
Char. 118: 0.356-0.570 --> 0.588
Char. 119: 0.377-0.546 --> 0.678
Char. 120: 0.433-0.539 --> 0.710
Char. 121: 0.268 --> 0.335
Char. 123: 0.787 --> 0.784
Char. 137: 0.313-0.334 --> 0.586
Char. 335: 0.210 --> 0.186
Char. 336: 0.173-0.219 --> 0.231
Char. 337: 0.257 --> 0.388
Char. 338: 0.363-0.366 --> 0.282-0.361
Char. 339: 0.336 --> 0.276
Char. 350: 0.283 --> 0.226
Char. 355: 0.240 --> 0.070
Char. 360: 0.167-0.331 --> 0.338
Char. 364: 0.359 --> 0.260
Char. 369: 0.284 --> 0.340
Char. 494: 1 --> 2
Char. 517: 0 --> 1
Char. 522: 0 --> 1

Node 94 :

Char. 12: 0.325-0.351 --> 0.391
Char. 26: 0.457 --> 0.536
Char. 48: 0.524 --> 0.537
Char. 50: 0.632-0.736 --> 0.544-0.547
Char. 58: 0.606-0.698 --> 0.566-0.602
Char. 59: 0.536-0.706 --> 0.516-0.528
Char. 61: 0.461 --> 0.241
Char. 63: 0.518-0.540 --> 0.400
Char. 68: 0.344 --> 0.519-0.531
Char. 85: 0.462 --> 0.522
Char. 87: 0.502-0.566 --> 0.596
Char. 89: 0.461 --> 0.637
Char. 92: 0.427-0.429 --> 0.514
Char. 94: 0.108-0.196 --> 0.316
Char. 95: 0.339 --> 0.381
Char. 96: 0.266-0.280 --> 0.352-0.409
Char. 101: 0.558-0.592 --> 0.632-0.711
Char. 104: 0.618-0.718 --> 0.759-0.835
Char. 107: 0.388-0.408 --> 0.512-0.867

Char. 109: 0.517-0.654 --> 0.679
Char. 110: 0.408-0.492 --> 0.552
Char. 126: 0.451-0.571 --> 0.440
Char. 139: 0.384-0.440 --> 0.208-0.361
Char. 216: 0.406-0.466 --> 0.318
Char. 240: 0.583 --> 0.500
Char. 332: 0.423 --> 0.417
Char. 334: 0.139-0.172 --> 0.212-0.243
Char. 339: 0.526 --> 0.336
Char. 354: 0.292 --> 0.230
Char. 355: 0.276-0.300 --> 0.240
Char. 358: 0.376 --> 0.269-0.270
Char. 406: 1 --> 0
Char. 409: 0 --> 1
Char. 430: 0 --> 1
Char. 452: 0 --> 1
Char. 453: 1 --> 2
Char. 467: 1 --> 0
Char. 484: 1 --> 0
Char. 493: 2 --> 0
Char. 502: 2 --> 3
Char. 511: 0 --> 1

Node 95 :

Char. 0: 0.522-0.666 --> 0.476
Char. 91: 0.558 --> 0.678
Char. 96: 0.352-0.409 --> 0.441
Char. 105: 0.282-0.315 --> 0.276
Char. 117: 0.524-0.543 --> 0.642
Char. 347: 0.132-0.151 --> 0.063
Char. 348: 0.317-0.402 --> 0.167
Char. 353: 0.302-0.591 --> 0.227
Char. 401: 0 --> 1
Char. 402: 0 --> 1
Char. 404: 0 --> 2
Char. 416: 0 --> 2
Char. 446: 1 --> 2
Char. 459: 0 --> 1

Node 96 :

Char. 142: 0.382-0.419 --> 0.339
Char. 146: 0.470-0.594 --> 0.364
Char. 157: 0.548-0.549 --> 0.341
Char. 158: 0.527-0.594 --> 0.482
Char. 159: 0.582-0.616 --> 0.466
Char. 160: 0.715 --> 0.618
Char. 161: 0.658 --> 0.632
Char. 162: 0.820-0.931 --> 0.947
Char. 180: 0.446-0.566 --> 0.574
Char. 188: 0.339-0.414 --> 0.328
Char. 273: 0.619-0.623 --> 0.539
Char. 292: 0.388-0.491 --> 0.558
Char. 302: 0.833 --> 0.875
Char. 381: 0.824 --> 0.879
Char. 391: 0.506-0.542 --> 0.612
Char. 395: 0.247-0.330 --> 0.200
Char. 396: 0.395 --> 0.216
Char. 398: 0.129-0.151 --> 0.127
Char. 528: 1 --> 0
Char. 538: 2 --> 0
Char. 540: 1 --> 2
Char. 547: 1 --> 2
Char. 562: 0 --> 2
Char. 584: 0 --> 1
Char. 617: 2 --> 1
Char. 618: 1 --> 2

Node 97 :

Char. 1: 0.491-0.569 --> 0.624
Char. 3: 0.608-0.637 --> 0.757
Char. 4: 0.453-0.574 --> 0.580
Char. 42: 0.425 --> 0.464
Char. 43: 0.295 --> 0.396
Char. 60: 0.697-0.714 --> 0.648
Char. 65: 0.524-0.559 --> 0.744
Char. 87: 0.555-0.613 --> 0.660
Char. 89: 0.720-0.723 --> 0.796
Char. 99: 0.666 --> 0.782
Char. 100: 0.302 --> 0.347
Char. 101: 0.506-0.592 --> 0.694
Char. 103: 0.371-0.456 --> 0.480
Char. 104: 0.618-0.718 --> 0.809
Char. 109: 0.649-0.705 --> 0.709
Char. 114: 0.707 --> 0.735
Char. 125: 0.171-0.245 --> 0.249

Char. 128: 0.407-0.562 --> 0.610
Char. 131: 0.386 --> 0.468
Char. 135: 0.434 --> 0.454
Char. 137: 0.657-0.754 --> 0.654
Char. 139: 0.404-0.647 --> 0.326
Char. 333: 0.417-0.445 --> 0.280
Char. 340: 0.449-0.579 --> 0.788
Char. 344: 0.387 --> 0.265
Char. 358: 0.541 --> 0.619
Char. 365: 0.583 --> 0.783
Char. 366: 0.265-0.346 --> 0.347
Char. 368: 0.550-0.607 --> 0.639
Char. 369: 0.554-0.668 --> 0.469
Char. 371: 0.425-0.621 --> 0.308
Char. 372: 0.414-0.655 --> 0.305
Char. 405: 0 --> 1
Char. 419: 1 --> 0
Char. 450: 1 --> 0
Char. 456: 0 --> 1
Char. 457: 0 --> 3
Char. 458: 1 --> 0
Char. 459: 0 --> 1
Char. 468: 0 --> 1
Char. 511: 0 --> 1
Char. 522: 1 --> 0

Node 98 :

Char. 32: 0.452-0.478 --> 0.549
Char. 36: 0.600 --> 0.638-0.803
Char. 41: 0.332 --> 0.360-0.430
Char. 45: 0.593 --> 0.681-0.687
Char. 49: 0.675-0.732 --> 0.764-0.816
Char. 85: 0.570-0.580 --> 0.732-0.748
Char. 86: 0.597-0.606 --> 0.796-0.801
Char. 89: 0.577-0.596 --> 0.720-0.723
Char. 90: 0.559-0.605 --> 0.772-0.784
Char. 91: 0.559-0.612 --> 0.675-0.823
Char. 95: 0.503 --> 0.518-0.620
Char. 113: 0.693-0.774 --> 0.805-0.807
Char. 114: 0.516-0.680 --> 0.707
Char. 117: 0.610-0.631 --> 0.797-0.858
Char. 121: 0.403-0.572 --> 0.614-0.645
Char. 122: 0.447-0.462 --> 0.589-0.649
Char. 127: 0.522-0.525 --> 0.663-0.753
Char. 131: 0.309-0.357 --> 0.386
Char. 338: 0.363-0.366 --> 0.382-0.399
Char. 344: 0.411-0.545 --> 0.387
Char. 346: 0.627-0.716 --> 0.745-0.777
Char. 347: 0.122 --> 0.074-0.100
Char. 348: 0.317-0.324 --> 0.176-0.271
Char. 358: 0.294-0.380 --> 0.541
Char. 360: 0.566-0.591 --> 0.743-0.750
Char. 362: 0.381-0.416 --> 0.425-0.628
Char. 363: 0.458-0.469 --> 0.473-0.741
Char. 364: 0.386-0.388 --> 0.480-0.618
Char. 406: 1 --> 0
Char. 427: 0 --> 1
Char. 428: 0 --> 1
Char. 453: 1 --> 2
Char. 508: 0 --> 1

Node 99 :

Char. 7: 0.383-0.415 --> 0.365
Char. 65: 0.524-0.559 --> 0.395
Char. 77: 0.579-0.608 --> 0.501
Char. 137: 0.657-0.754 --> 0.881
Char. 325: 0.341-0.370 --> 0.533
Char. 369: 0.554-0.668 --> 0.946
Char. 370: 0.502-0.596 --> 0.800
Char. 421: 1 --> 0
Char. 469: 0 --> 2
Char. 478: 1 --> 0

Node 100 :

Char. 2: 0.520 --> 0.487
Char. 20: 0.824 --> 0.769
Char. 45: 0.681-0.687 --> 0.715
Char. 46: 0.563 --> 0.691
Char. 50: 0.592 --> 0.627
Char. 58: 0.523-0.566 --> 0.590
Char. 59: 0.520 --> 0.560
Char. 62: 0.486-0.541 --> 0.399
Char. 87: 0.555-0.613 --> 0.515
Char. 88: 0.587 --> 0.523
Char. 93: 0.571-0.614 --> 0.493

Char. 126: 0.424-0.434 --> 0.459
Char. 337: 0.299 --> 0.243
Char. 338: 0.382-0.399 --> 0.517
Char. 520: 1 --> 2
Node 101 :
Char. 22: 0.642-0.675 --> 0.482
Char. 56: 0.242-0.276 --> 0.225
Char. 90: 0.559-0.605 --> 0.508
Char. 92: 0.503-0.534 --> 0.540
Char. 95: 0.503 --> 0.475
Char. 96: 0.414-0.467 --> 0.383
Char. 98: 0.456-0.523 --> 0.445
Char. 105: 0.475-0.481 --> 0.398
Char. 106: 0.576-0.815 --> 0.510
Char. 107: 0.572 --> 0.344
Char. 108: 0.667-0.677 --> 0.563
Char. 109: 0.567-0.661 --> 0.478
Char. 110: 0.773-0.801 --> 0.743
Char. 114: 0.516-0.680 --> 0.466
Char. 125: 0.159-0.245 --> 0.264
Char. 133: 0.488-0.541 --> 0.437
Char. 326: 0.380-0.491 --> 0.564
Char. 333: 0.445-0.549 --> 0.814
Char. 347: 0.122 --> 0.132
Char. 355: 0.411-0.476 --> 0.377
Char. 360: 0.566 --> 0.499
Char. 413: 1 --> 0
Char. 414: 0 --> 2
Char. 429: 0 --> 1
Char. 430: 0 --> 1
Char. 439: 0 --> 1
Char. 462: 2 --> 1
Char. 463: 1 --> 0
Char. 469: 0 --> 2
Node 102 :
Char. 24: 0.592-0.597 --> 0.618
Char. 25: 0.535-0.570 --> 0.593-0.608
Char. 32: 0.452-0.478 --> 0.199-0.200
Char. 41: 0.332 --> 0.257-0.318
Char. 42: 0.425 --> 0.394-0.397
Char. 54: 0.598-0.634 --> 0.650-0.745
Char. 60: 0.697-0.714 --> 0.729-0.736
Char. 71: 0.474-0.482 --> 0.332
Char. 72: 0.317-0.328 --> 0.345
Char. 73: 0.272-0.289 --> 0.190-0.256
Char. 78: 0.451-0.456 --> 0.438
Char. 85: 0.570-0.580 --> 0.487-0.537
Char. 86: 0.597-0.606 --> 0.519-0.560
Char. 89: 0.537-0.596 --> 0.465-0.476
Char. 99: 0.587-0.666 --> 0.541
Char. 116: 0.358 --> 0.317
Char. 135: 0.398-0.434 --> 0.069-0.118
Char. 192: 0.558-0.566 --> 0.546
Char. 208: 0.538-0.589 --> 0.307
Char. 228: 0.265-0.330 --> 0.446-0.458
Char. 231: 0.300-0.400 --> 0.266
Char. 241: 0.400-0.500 --> 0.266-0.300
Char. 291: 0.555-0.579 --> 0.734
Char. 300: 0.636-0.655 --> 0.702
Char. 302: 0.833 --> 0.750
Char. 304: 0.285-0.381 --> 0.142
Char. 331: 0.253-0.302 --> 0.186
Char. 343: 0.162-0.210 --> 0.145
Char. 345: 0.668-0.732 --> 0.434-0.533
Char. 349: 0.437 --> 0.448-0.497
Char. 350: 0.635-0.725 --> 0.487
Char. 368: 0.550-0.607 --> 0.075-0.156
Char. 440: 1 --> 0
Char. 443: 0 --> 1
Char. 459: 0 --> 1
Char. 491: 1 --> 0
Char. 498: 1 --> 2
Char. 499: 1 --> 0
Char. 517: 1 --> 0
Char. 525: 1 --> 0
Char. 592: 0 --> 1
Char. 593: 0 --> 1
Char. 631: 1 --> 2
Node 103 :
Char. 1: 0.491-0.569 --> 0.572
Char. 8: 0.442 --> 0.456
Char. 15: 0.584-0.606 --> 0.794

Char. 16: 0.657-0.752 --> 0.857
Char. 17: 0.634-0.641 --> 0.798
Char. 18: 0.622-0.675 --> 0.852
Char. 24: 0.618 --> 0.667
Char. 26: 0.547-0.550 --> 0.771
Char. 31: 0.555-0.595 --> 0.620
Char. 33: 0.402-0.420 --> 0.235
Char. 34: 0.624-0.671 --> 0.827
Char. 37: 0.591 --> 0.613
Char. 47: 0.513-0.644 --> 0.735
Char. 48: 0.614-0.682 --> 0.928
Char. 54: 0.650-0.745 --> 0.760
Char. 60: 0.729-0.736 --> 0.791
Char. 64: 0.542-0.575 --> 0.594
Char. 65: 0.559 --> 0.608
Char. 67: 0.339-0.446 --> 0.538
Char. 68: 0.609-0.640 --> 0.649
Char. 71: 0.332 --> 0.279
Char. 72: 0.345 --> 0.377
Char. 79: 0.370-0.427 --> 0.343
Char. 92: 0.503-0.534 --> 0.496
Char. 231: 0.266 --> 0.100
Char. 238: 0.317-0.335 --> 0.380
Char. 239: 0.400-0.600 --> 0.300
Char. 244: 0.000 --> 0.500
Char. 320: 0.480-0.484 --> 0.531
Char. 324: 0.549-0.601 --> 0.652
Char. 330: 0.593-0.596 --> 0.485
Char. 331: 0.186 --> 0.158
Char. 332: 0.294-0.382 --> 0.269
Char. 335: 0.140-0.257 --> 0.128
Char. 341: 0.298-0.469 --> 0.550
Char. 345: 0.434-0.533 --> 0.428
Char. 346: 0.627-0.628 --> 0.431
Char. 347: 0.122 --> 0.071
Char. 348: 0.317-0.331 --> 0.222
Char. 370: 0.477 --> 0.350
Char. 405: 0 --> 1
Char. 461: 0 --> 1
Char. 466: 0 --> 1
Char. 473: 2 --> 1

Node 104 :
Char. 5: 0.571 --> 0.637
Char. 6: 0.348-0.371 --> 0.396
Char. 7: 0.471-0.484 --> 0.560
Char. 8: 0.435-0.442 --> 0.506
Char. 9: 0.584 --> 0.701
Char. 10: 0.497-0.503 --> 0.593
Char. 20: 0.824-0.827 --> 0.867
Char. 22: 0.642-0.675 --> 0.798
Char. 23: 0.745-0.811 --> 0.856
Char. 37: 0.558-0.581 --> 0.526
Char. 46: 0.479-0.563 --> 0.625
Char. 69: 0.441-0.473 --> 0.492
Char. 73: 0.272-0.289 --> 0.488
Char. 75: 0.397-0.402 --> 0.621
Char. 98: 0.460-0.523 --> 0.531
Char. 137: 0.657-0.689 --> 0.552
Char. 341: 0.252-0.334 --> 0.242
Char. 342: 0.233-0.299 --> 0.217
Char. 346: 0.627-0.659 --> 0.476
Char. 348: 0.317-0.331 --> 0.374
Char. 369: 0.554-0.580 --> 0.432
Char. 370: 0.477 --> 0.364
Char. 404: 2 --> 0
Char. 409: 0 --> 1
Char. 422: 2 --> 0
Char. 489: 0 --> 1
Char. 505: 1 --> 0

Node 105 :
Char. 4: 0.547 --> 0.569
Char. 7: 0.440-0.484 --> 0.678
Char. 8: 0.444 --> 0.647
Char. 9: 0.579-0.584 --> 0.719
Char. 10: 0.497-0.581 --> 0.802
Char. 15: 0.495-0.606 --> 0.684
Char. 17: 0.541-0.641 --> 0.715
Char. 19: 0.304-0.365 --> 0.246
Char. 20: 0.344 --> 0.335
Char. 22: 0.642-0.675 --> 0.485
Char. 24: 0.484-0.597 --> 0.627
Char. 25: 0.443-0.570 --> 0.641

Char. 26: 0.547-0.562 --> 0.454

Char. 29: 0.338-0.501 --> 0.578

Char. 34: 0.671 --> 0.811

Char. 38: 0.603 --> 0.625

Char. 40: 0.580-0.600 --> 0.506

Char. 41: 0.496 --> 0.382

Char. 45: 0.513-0.593 --> 0.650

Char. 47: 0.513 --> 0.299

Char. 48: 0.682 --> 0.480

Char. 50: 0.471 --> 0.526

Char. 52: 0.437 --> 0.365

Char. 54: 0.598 --> 0.519

Char. 61: 0.325-0.384 --> 0.472

Char. 63: 0.331-0.408 --> 0.479

Char. 64: 0.575 --> 0.601

Char. 67: 0.496-0.503 --> 0.521

Char. 68: 0.640 --> 0.653

Char. 73: 0.272-0.289 --> 0.313

Char. 76: 0.496 --> 0.543

Char. 79: 0.397 --> 0.517

Char. 81: 0.475 --> 0.417

Char. 84: 0.483 --> 0.556

Char. 94: 0.417-0.480 --> 0.674

Char. 95: 0.503 --> 0.688

Char. 96: 0.414-0.467 --> 0.682

Char. 97: 0.324-0.445 --> 0.674

Char. 99: 0.616-0.749 --> 0.764

Char. 100: 0.289-0.477 --> 0.581

Char. 102: 0.112-0.257 --> 0.111

Char. 103: 0.371-0.456 --> 0.562

Char. 114: 0.680 --> 0.736

Char. 115: 0.702 --> 0.779

Char. 116: 0.358 --> 0.648

Char. 117: 0.593-0.631 --> 0.690

Char. 119: 0.716-0.723 --> 0.780

Char. 120: 0.864 --> 0.877

Char. 121: 0.577 --> 0.750

Char. 128: 0.550-0.562 --> 0.513

Char. 131: 0.309-0.357 --> 0.673

Char. 132: 0.767-0.798 --> 0.758

Char. 135: 0.514 --> 0.560

Char. 137: 0.534-0.689 --> 0.787

Char. 215: 0.664 --> 0.775

Char. 216: 0.523 --> 0.742

Char. 220: 0.799 --> 0.846

Char. 221: 0.741 --> 0.771

Char. 227: 0.707 --> 0.733

Char. 238: 0.428 --> 0.486

Char. 239: 0.700 --> 0.766

Char. 245: 0.634 --> 0.694

Char. 246: 0.641 --> 0.887

Char. 248: 0.465 --> 0.878

Char. 250: 0.750 --> 0.833

Char. 251: 0.833 --> 1.000

Char. 324: 0.549-0.630 --> 0.390

Char. 329: 0.287 --> 0.324

Char. 334: 0.257-0.320 --> 0.244

Char. 336: 0.286-0.321 --> 0.227

Char. 337: 0.303-0.357 --> 0.224

Char. 338: 0.363-0.445 --> 0.461

Char. 339: 0.301-0.412 --> 0.440

Char. 341: 0.633-0.655 --> 0.700

Char. 344: 0.552-0.664 --> 0.785

Char. 345: 0.738-0.739 --> 0.721

Char. 349: 0.437 --> 0.550

Char. 352: 0.362-0.434 --> 0.565

Char. 365: 0.271 --> 0.128

Char. 366: 0.265-0.346 --> 0.413

Char. 367: 0.910-0.931 --> 0.697

Char. 369: 0.596 --> 0.690

Char. 370: 0.512 --> 0.558

Char. 404: 0 --> 1

Char. 422: 1 --> 0

Char. 443: 0 --> 1

Char. 444: 3 --> 0

Char. 451: 1 --> 0

Char. 473: 2 --> 1

Char. 510: 1 --> 2

Appendix 8. Data matrix in NEXUS format for Bayesian tip-dating analyses

```
#NEXUS

BEGIN DATA;
	DIMENSIONS	NTAX = 55 NCHAR = 634;
	FORMAT DATATYPE = STANDARD GAP = - MISSING = ? SYMBOLS = "0 1 2 3 4 5";
	MATRIX
	Habilis_OH7_OH24_ER1805	10020?00100000200020001000??00000101001012003000111110{0
2}1?01100021000000?{0 1 2 3}121{0 1 2 3}00{0 1}00000001020010?011{1 2}11011101000111000 1{1
2}100011111000000 0?0??????10{1 2}211200??1??????????{0
3}0??????????????002210101?000001000101000 1100{0
1}10000002010010100100200020111145222100112322 22?5322322133323122344332114442042342510131312 21
2234341412442442?133113311121222311111232334333342234432430423222 43?31235???????????1??4?54??325
??14?53433423101153544535352330020230012000035 0012?43322344321454144203244223350523312344 20252
015551524553235523055152441251434423532324314 55320?????????????303?522411322151531123112 5?12132
1?3233145133211533355?????1??????343233112322115
	Antecessor
101210?0201000100??1012?20111101110000110211222001100100001???????????????????????????????????????
????????1?????????????1?????????????101?1?101211110212021002 2{0
1}00020101012201010101120000100120001{0 1}00{1
2}1110121112223201212012120010010 0012????1??????????????4434???3???????????00???????????????????0???
?????????????????????233?242210110301321313223220022233331101 13????121001??3?0010033004?000010102
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Arago_II_XIII_XXI_XLVII
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???????????????????1011012?{0 1}10{0 1}001{0 1 2}02{1 2}0002{0 1}{1 2}02112{1 2}{0
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112335?43?43????333?3?211011?????????35?3?233223322222222312314224332234333333222402332131321 21
4341222212212323325222232554452233334244444332222231321???????????????????????212200??????31121200
02122122000111112200 0????????????????33342222312235010122235010222334110 0?????????????1554?12????
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Broken_Hill
111221002000210010100120101110000111110111003200100112001301102111011113112 20?10002001100020121
112110121010111111101110110121???
???1??002???21131????????????????????3334343222223222323240342232342230333234323214333434235023 3
232222432322421212332433524444444432320342433422444424442224333334111332224222232 1?????????????
????????????????????????????????????1451????14524???3233????1130????????3212110002221223000113111000
5??1445321322332111112242111440114332 1
12133412224243231l1???????????????????????????
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11211011101011 1?111102?10110121???
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231211422202 22???0325344?244334432333214233253453433354334344434112541334423134 2?????????????
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Ceprano

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Steinheim

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Saldanha

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Bodo

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???
??3443322???312??3?2??210??42?2????????????????????21??????
??????????????????????

Sangiran_2_17 000021102000110011{1 2}00110001??000011111100101120001100100031{0
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1}0?01112001210100002101112000011120???
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01212??53223431222445022 34??????????????????????????

Ngandong7_9_12 00020?202120010021{1 2}{0 1}0100{0 1}01{0
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Dmanisi 0{0 1}{0 1}{0 1}10{1 2}0{1 2}00001201120000000??0000010100011{1
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Rabat ???0100001???????????
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STW53
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0011000021010001210001110001112 1??
????????000??20?000???????????????????0102311454432414342 00?0?332?2412215333412234 25?02342112023
4325053??55533224133332 01?323112?1134435?432133221??52?34433345434314122134133?424??????????????
???3444??54350034344??05543543200534243552 0
5??50?52??31422220?0025?5114353255 43?3
1?21551453023353 44???????????????????????????

OH_9
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Turkana_ER3733_3883 10{0 1}20?2010001110{0 1}12{0 1}{0 1}01000??000001010000 12003{0
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1}2{0 1}0011111001002011012111 00??10{0 1}100221001101011022000001102221101001 2000???0??{0 1}10{0
1}20{0 1}0200?{0 1 2 3}022211222101101{1
2}????12233212233333223 3322?322232323322322212321113133323233213223222341333222132233212 3?2332
233223232234231233322244142223443114302332214212232223222334124233332231104321503 33444?442234
433345321553502055521120 0????????32242332232421142403521123420 00??????????2332535353443340431 41
4305133255232233255233??????????????????????22223223112112112222232134312244 2?3242122121131 53322
23233214020302?333?144222221

;

END;

Appendix 9. MrBayes commands for tip-dating, with backbone partial constraints from the results of parsimony analysis

```
Begin MrBayes;
	set autoclose=yes nowarnings=yes;

	exe data.nex;

	[partitions]
	charset discrete = 1-234;
	charset continuous = 235-634;
	partition two = 2: discrete, continuous;
	set partition = two;

	[substitution model]
	ctype ordered: 5 7 9 17 20 22 23 25 30 46 47 60 63 65 66 68 70 72 74 75 76 83 89 97 98 99
		103 119 125 126 127 206 210 211 212 213 214 216 217 221 222 223 227 230 231 234-634;
	lset applyto = (all) coding = variable rates = gamma; [Mkv+G]
	prset applyto = (all) ratepr = variable;

	[relaxed clock model]
	prset clockratepr = exp(300);
	prset clockvarpr = wn;
	prset wnvarpr = exp(2);
	unlink wnvar = (all);

	[constraints]
	constraint aa1 partial =Antecessor Eliye_Springs Rabat : Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Steinheim Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;
	constraint aa2 partial =Xiahe Dali Hualongdong Harbin Jinniushan : Antecessor Rabat Eliye_Springs Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Steinheim Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;
```

constraint aa3 partial =Narmada Maba Xuchang : Xiahe Dali Hualongdong Harbin Jinniushan Antecessor Eliye_Springs Rabat Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Steinheim Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa4 partial =Xiahe Dali Hualongdong Harbin Jinniushan Antecessor Eliye_Springs Rabat Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang Tabun_2 : Steinheim SH4_5 Tabun_1 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Ndutu Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa5 partial =Xiahe Dali Hualongdong Harbin Jinniushan Antecessor Eliye_Springs Rabat Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang Tabun_2 Steinheim : SH4_5 Tabun_1 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Ndutu Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa6 partial =Mauer_1 Arago_II_XIII_XXI_XLVII : Antecessor Eliye_Springs Rabat Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan Narmada Maba Xuchang Broken_Hill Petralona_1 Ceprano Steinheim Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa7 partial =Broken_Hill Petralona_1 Ceprano Saldanha Bodo : Antecessor Eliye_Springs Rabat Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Steinheim Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa8 partial =Broken_Hill Petralona_1 Ceprano Saldanha Bodo Antecessor Eliye_Springs Rabat

Ndutu Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Steinheim : Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa9 partial =Steinheim Antecessor Eliye_Springs Rabat Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan : Ndutu Narmada Maba Xuchang Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa10 partial =Steinheim Antecessor Eliye_Springs Rabat Irhoud_1_2 Florisbad Omo_II LH_18 Skhul_V_IX Qafzeh_IX Mladec_I_II_V_VI Cro_Magnon_I_II_III Oase_1_2 ZKD_UC_101_103 Liujiang SH4_5 Tabun_1 Tabun_2 Spy_I_II Gibraltar_1 Amud La_Chapelle_aux_Saints La_Ferrassie_1 Shanidar_1_5 Cesaire Saccopastore_I_II Neanderthalensis_type Xiahe Dali Hualongdong Harbin Jinniushan Ndutu Narmada Maba Xuchang : Mauer_1 Arago_II_XIII_XXI_XLVII Broken_Hill Petralona_1 Ceprano Saldanha Bodo Ternifine_1_2_3_4 Peking_X_XII_XIII_LII_RC Nanjing1 Hexian Sambungmacan_1_3 Sangiran_2_17 Ngandong7_9_12 Dmanisi STW53 OH_9 Turkana_ER3733_3883 Habilis_OH7_OH24_ER1805;

constraint aa11 hard = 2-.;

[fossil ages in thousand years ago]

calibrate

Habilis_OH7_OH24_ER1805 = uniform(1780, 1850)

Antecessor = uniform(800, 900)

Narmada = uniform(236, 780)

Eliye_Springs = uniform(200, 300)

Ndutu = fixed(350)

Irhoud_1_2 = uniform(281, 349)

Florisbad = uniform(224, 294)

Omo_II = fixed(195)

LH_18 = uniform(120, 150)

Skhul_V_IX = fixed(90)

Qafzeh_IX = fixed(90)

Mladec_I_II_V_VI = fixed(35)

Cro_Magnon_I_II_III = fixed(31)

Oase_1_2 = uniform(39.41, 41.47)

ZKD_UC_101_103 = fixed(27)

Liujiang = fixed(67)

```
    SH4_5 = fixed(430)
    Tabun_1 = uniform(100, 122)
    Tabun_2 = uniform(100, 122)
    Spy_I_II = fixed(40)
    Gibraltar_1 = fixed(75)
    Amud = fixed(53)
    La_Chapelle_aux_Saints = fixed(52)
    La_Ferrassie_1 = fixed(70)
    Shanidar_1_5 = fixed(50)
    Cesaire = uniform(40.66, 41.95)
    Saccopastore_I_II = fixed(250)
    Neanderthalensis_type = fixed(42)
    Xiahe = uniform(155, 164.5)
    Dali = uniform(258.3, 267.7)
    Hualongdong = uniform(275, 331)
    Harbin = uniform(146, 150)
    Jinniushan = uniform(200, 310)
    Maba = uniform(230, 278)
    Xuchang = uniform(105, 125)
    Mauer_1 = uniform(569, 649)
    Arago_II_XIII_XXI_XLVII = uniform(407, 469)
    Broken_Hill = uniform(274, 324)
    Petralona_1 = uniform(150, 400)
    Ceprano = fixed(850)
    Steinheim = fixed(300)
    Saldanha = fixed(350)
    Bodo = fixed(600)
    Ternifine_1_2_3_4 = fixed(750)
    Peking_X_XII_XIII_LII_RC = uniform(280, 580)
    Nanjing1 = uniform(580, 620)
    Hexian = uniform(387, 437)
    Sambungmacan_1_3 = fixed(200)
    Sangiran_2_17 = uniform(1300, 1500)
    Ngandong7_9_12 = uniform(108, 117)
    Dmanisi = fixed(1770)
    Rabat = fixed(300)
    STW53 = fixed(1900)
    OH_9 = fixed(1470)
    Turkana_ER3733_3883 = uniform(1535, 1780)
;
prset nodeagepr = calibrated;
```

```
    [fossilized birth-death tree prior]
    prset brlenspr = clock:fossilization;
    prset speciationpr = exp(1000);
    prset extinctionpr = beta(1, 1);
    prset fossilizationpr = beta(1, 1);
    prset treeagepr = offsetexp(2800, 3600);
    prset topologypr = constraints(1-11);

    mcmcp nruns = 4 nchains = 8 ngen = 100000000 samplefreq = 2000 printfreq = 50000 diagnfr = 500000;
    mcmcp filename = homo relburnin=yes burninfrac=0.3 temp=0.05;

    [finetune proposal weights]
    propset NNIClock$prob=20;
    propset NodesliderClock$prob=40;
    propset Multiplier(Clockrate{all})$prob=5;

    mcmc;
    sump;
    sumt output = homo.maj;
    sumt output = homo.all contype=allcompat;
End;
```

Appendix 10. BioGeoBEARS script for model selection and Biogeographical Stochastic Mapping analyses

```
######################################################
# Setup
######################################################
library(optimx)
library(FD)

library(optimx)
library(FD)

library(cladoRcpp)
library(BioGeoBEARS)

wd = np("~/Documents/nix/Papers/Harbin_cranium/biogeobears/")
setwd(wd)
getwd()
list.files()

######################################################
# DEC
######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
trfn="homo.tre"
geofn="homo_geo_3.txt"
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE
BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"
BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE
```

```
BioGeoBEARS_run_object
BioGeoBEARS_run_object$BioGeoBEARS_model_object
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table
check_BioGeoBEARS_run(BioGeoBEARS_run_object)
results_DEC = bears_optim_run(BioGeoBEARS_run_object)

#######################################################
# DEC+J
#######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE
BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"

BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE

dstart = results_DEC$outputs@params_table["d","est"]
estart = results_DEC$outputs@params_table["e","est"]
jstart = 0.0001

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","init"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","est"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","init"] = estart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","est"] = estart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","type"] = "free"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","init"] = jstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","est"] = jstart
```

```
check_BioGeoBEARS_run(BioGeoBEARS_run_object)
results_DEC_J = bears_optim_run(BioGeoBEARS_run_object)

#######################################################
# DIVALIKE
#######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE

BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"

BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","est"] = 0.0

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ysv","type"] = "2-j"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ys","type"] = "ysv*1/2"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["y","type"] = "ysv*1/2"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","type"] = "ysv*1/2"

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","init"] = 0.5
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","est"] = 0.5
```

```
check_BioGeoBEARS_run(BioGeoBEARS_run_object)
results_DIVALIKE = bears_optim_run(BioGeoBEARS_run_object)

#######################################################
#DIVALIKE+J
#######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE

BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"

BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE

dstart = results_DIVALIKE$outputs@params_table["d","est"]
estart = results_DIVALIKE$outputs@params_table["e","est"]
jstart = 0.0001

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","init"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","est"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","init"] = estart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","est"] = estart

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","est"] = 0.0

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ysv","type"] = "2-j"
```

```
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ys","type"] = "ysv*1/2"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["y","type"] = "ysv*1/2"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","type"] = "ysv*1/2"

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","init"] = 0.5
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01v","est"] = 0.5

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","type"] = "free"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","init"] = jstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","est"] = jstart

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","min"] = 0.00001
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","max"] = 1.99999

check_BioGeoBEARS_run(BioGeoBEARS_run_object)
results_DIVALIKE_J = bears_optim_run(BioGeoBEARS_run_object)

#######################################################
# BAYAREALIKE
#######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE

BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"

BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE
```

```
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","est"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","est"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ysv","type"] = "1-j"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ys","type"] = "ysv*1/1"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["y","type"] = "1-j"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","init"] = 0.9999
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","est"] = 0.9999

check_BioGeoBEARS_run(BioGeoBEARS_run_object)
results_BAYAREALIKE = bears_optim_run(BioGeoBEARS_run_object)

#######################################################
# BAYAREALIKE+J
#######################################################
BioGeoBEARS_run_object = define_BioGeoBEARS_run()
BioGeoBEARS_run_object$trfn = trfn
BioGeoBEARS_run_object$geogfn = geofn
BioGeoBEARS_run_object$max_range_size = 3
BioGeoBEARS_run_object$min_branchlength = 0.000001
BioGeoBEARS_run_object$include_null_range = TRUE

BioGeoBEARS_run_object$distsfn = "distances_rescaled_3.txt"

BioGeoBEARS_run_object$on_NaN_error = -1e50
BioGeoBEARS_run_object$speedup = TRUE
BioGeoBEARS_run_object$use_optimx = "GenSA"
BioGeoBEARS_run_object$num_cores_to_use = 1
BioGeoBEARS_run_object$force_sparse = FALSE

BioGeoBEARS_run_object = readfiles_BioGeoBEARS_run(BioGeoBEARS_run_object)

BioGeoBEARS_run_object$return_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_TTL_loglike_from_condlikes_table = TRUE
BioGeoBEARS_run_object$calc_ancprobs = TRUE
```

```
dstart = results_BAYAREALIKE$outputs@params_table["d","est"]
estart = results_BAYAREALIKE$outputs@params_table["e","est"]
jstart = 0.0001

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","init"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","est"] = dstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","init"] = estart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","est"] = estart

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["s","est"] = 0.0

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","init"] = 0.0
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["v","est"] = 0.0

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","type"] = "free"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","init"] = jstart
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","est"] = jstart

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","max"] = 0.99999

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ysv","type"] = "1-j"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["ys","type"] = "ysv*1/1"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["y","type"] = "1-j"

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","type"] = "fixed"
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","init"] = 0.9999
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["mx01y","est"] = 0.9999

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","min"] = 0.0000001
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["d","max"] = 4.9999999

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","min"] = 0.0000001
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["e","max"] = 4.9999999

BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","min"] = 0.00001
BioGeoBEARS_run_object$BioGeoBEARS_model_object@params_table["j","max"] = 0.99999

check_BioGeoBEARS_run(BioGeoBEARS_run_object)
```

```
results_BAYAREALIKE_J = bears_optim_run(BioGeoBEARS_run_object)


#########################################################
# CALCULATE SUMMARY STATISTICS TO COMPARE
# DEC, DEC+J, DIVALIKE, DIVALIKE+J, BAYAREALIKE,
# BAYAREALIKE+J
#########################################################

restable = NULL
teststable = NULL
tr = read.tree(trfn)

#########################################################
# Statistics -- DEC vs. DEC+J
#########################################################
# We have to extract the log-likelihood differently, depending on the
# version of optim/optimx
LnL_2 = get_LnL_from_BioGeoBEARS_results_object(results_DEC)
LnL_1 = get_LnL_from_BioGeoBEARS_results_object(results_DEC_J)

numparams1 = 3
numparams2 = 2
stats = AICstats_2models(LnL_1, LnL_2, numparams1, numparams2)
stats

# DEC, null model for Likelihood Ratio Test (LRT)
res2 = extract_params_from_BioGeoBEARS_results_object(results_object=results_DEC, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)
# DEC+J, alternative model for Likelihood Ratio Test (LRT)
res1 = extract_params_from_BioGeoBEARS_results_object(results_object=results_DEC_J, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)

# The null hypothesis for a Likelihood Ratio Test (LRT) is that two models
# confer the same likelihood on the data. See: Brian O'Meara's webpage:
# http://www.brianomeara.info/tutorials/aic
# ...for an intro to LRT, AIC, and AICc

rbind(res2, res1)
tmp_tests = conditional_format_table(stats)
```

```
restable = rbind(restable, res2, res1)
teststable = rbind(teststable, tmp_tests)

#######################################################
# Statistics -- DIVALIKE vs. DIVALIKE+J
#######################################################
# We have to extract the log-likelihood differently, depending on the
# version of optim/optimx
LnL_2 = get_LnL_from_BioGeoBEARS_results_object(results_DIVALIKE)
LnL_1 = get_LnL_from_BioGeoBEARS_results_object(results_DIVALIKE_J)

numparams1 = 3
numparams2 = 2
stats = AICstats_2models(LnL_1, LnL_2, numparams1, numparams2)
stats

# DIVALIKE, null model for Likelihood Ratio Test (LRT)
res2 = extract_params_from_BioGeoBEARS_results_object(results_object=results_DIVALIKE, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)
# DIVALIKE+J, alternative model for Likelihood Ratio Test (LRT)
res1 = extract_params_from_BioGeoBEARS_results_object(results_object=results_DIVALIKE_J, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)

rbind(res2, res1)
conditional_format_table(stats)

tmp_tests = conditional_format_table(stats)

restable = rbind(restable, res2, res1)
teststable = rbind(teststable, tmp_tests)

#######################################################
# Statistics -- BAYAREALIKE vs. BAYAREALIKE+J
#######################################################
# We have to extract the log-likelihood differently, depending on the
# version of optim/optimx
LnL_2 = get_LnL_from_BioGeoBEARS_results_object(results_BAYAREALIKE)
LnL_1 = get_LnL_from_BioGeoBEARS_results_object(results_BAYAREALIKE_J)

numparams1 = 3
numparams2 = 2
```

```
stats = AICstats_2models(LnL_1, LnL_2, numparams1, numparams2)
stats

# BAYAREALIKE, null model for Likelihood Ratio Test (LRT)
res2 = extract_params_from_BioGeoBEARS_results_object(results_object=results_BAYAREALIKE, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)
# BAYAREALIKE+J, alternative model for Likelihood Ratio Test (LRT)
res1 = extract_params_from_BioGeoBEARS_results_object(results_object=results_BAYAREALIKE_J, returnwhat="table", addl_params=c("j"), paramsstr_digits=4)

rbind(res2, res1)
conditional_format_table(stats)

tmp_tests = conditional_format_table(stats)

restable = rbind(restable, res2, res1)
teststable = rbind(teststable, tmp_tests)

################################################################################
# ASSEMBLE RESULTS TABLES: DEC, DEC+J, DIVALIKE, DIVALIKE+J, BAYAREALIKE,
# BAYAREALIKE+J
################################################################################
teststable$alt = c("DEC+J", "DIVALIKE+J", "BAYAREALIKE+J")
teststable$null = c("DEC", "DIVALIKE", "BAYAREALIKE")
row.names(restable) = c("DEC", "DEC+J", "DIVALIKE", "DIVALIKE+J", "BAYAREALIKE", "BAYAREALIKE+J")
restable = put_jcol_after_ecol(restable)
restable

# Look at the results!!
restable
teststable

############################################################
# Save the results tables for later -- check for e.g.
# convergence issues
############################################################

# Loads to "restable"
save(restable, file="restable_v1.Rdata")
load(file="restable_v1.Rdata")
```

```
# Loads to "teststable"
save(teststable, file="teststable_v1.Rdata")
load(file="teststable_v1.Rdata")

# Also save to text files
write.table(restable, file="restable.txt", quote=FALSE, sep="\t")
write.table(unlist_df(teststable), file="teststable.txt", quote=FALSE, sep="\t")

#######################################################
# Model weights of all six models
#######################################################
restable2 = restable

# With AICs:
AICtable = calc_AIC_column(LnL_vals=restable$LnL, nparam_vals=restable$numparams)
restable = cbind(restable, AICtable)
restable_AIC_rellike = AkaikeWeights_on_summary_table(restable=restable, colname_to_use="AIC")
restable_AIC_rellike = put_jcol_after_ecol(restable_AIC_rellike)
restable_AIC_rellike

# With AICcs -- factors in sample size
samplesize = length(tr$tip.label)
AICtable = calc_AICc_column(LnL_vals=restable$LnL, nparam_vals=restable$numparams, samplesize=samplesize)
restable2 = cbind(restable2, AICtable)
restable_AICc_rellike = AkaikeWeights_on_summary_table(restable=restable2, colname_to_use="AICc")
restable_AICc_rellike = put_jcol_after_ecol(restable_AICc_rellike)
restable_AICc_rellike

# Also save to text files
write.table(restable_AIC_rellike, file="restable_AIC_rellike.txt", quote=FALSE, sep="\t")
write.table(restable_AICc_rellike, file="restable_AICc_rellike.txt", quote=FALSE, sep="\t")

# Save with nice conditional formatting
write.table(conditional_format_table(restable_AIC_rellike), file="restable_AIC_rellike_formatted.txt",
quote=FALSE, sep="\t")
write.table(conditional_format_table(restable_AICc_rellike), file="restable_AICc_rellike_formatted.txt",
quote=FALSE, sep="\t")

restable
```

```
teststable

#########################################################
# Biogeographical Stochastic Mapping (BSM)
# — run AFTER basic example script
#########################################################
model_name = "DEC+J"
res = results_DEC_J
tipranges = getranges_from_LagrangePHYLIP(lgdata_fn=geofn)

pdffn = paste0("Homo_", model_name, "_v1.pdf")
pdf(pdffn, width=6, height=6)

analysis_titletxt = paste0(model_name, " on Homo")

# Setup
results_object = res
scriptdir = np(system.file("extdata/a_scripts", package="BioGeoBEARS"))

# States
res2 = plot_BioGeoBEARS_results(results_object, analysis_titletxt, addl_params=list("j"), plotwhat="text", label.offset=0.45, tipcex=0.7, statecex=0.7, splitcex=0.6, titlecex=0.8, plotsplits=TRUE, cornercoords_loc=scriptdir, include_null_range=TRUE, tr=tr, tipranges=tipranges)

# Pie chart
plot_BioGeoBEARS_results(results_object, analysis_titletxt, addl_params=list("j"), plotwhat="pie", label.offset=0.45, tipcex=0.7, statecex=0.7, splitcex=0.6, titlecex=0.8, plotsplits=TRUE, cornercoords_loc=scriptdir, include_null_range=TRUE, tr=tr, tipranges=tipranges)

dev.off()    # Turn off PDF
cmdstr = paste("open ", pdffn, sep="")
system(cmdstr) # Plot it

# Stochastic mapping on DEC+J
clado_events_tables = NULL
ana_events_tables = NULL
lnum = 0

#Get the inputs for Biogeographical Stochastic Mapping

BSM_inputs_fn = "BSM_inputs_file.Rdata"
```

```
runInputsSlow = TRUE
if (runInputsSlow)
	{
	stochastic_mapping_inputs_list = get_inputs_for_stochastic_mapping(res=res)
	save(stochastic_mapping_inputs_list, file=BSM_inputs_fn)
	} else {
	# Loads to "stochastic_mapping_inputs_list"
	load(BSM_inputs_fn)
	} # END if (runInputsSlow)

# Check inputs (doesn't work the same on unconstr)
names(stochastic_mapping_inputs_list)
stochastic_mapping_inputs_list$phy2
stochastic_mapping_inputs_list$COO_weights_columnar
stochastic_mapping_inputs_list$unconstr
set.seed(seed=as.numeric(Sys.time()))

runBSMslow = TRUE
if (runBSMslow == TRUE)
	{
	# Saves to: RES_clado_events_tables.Rdata
	# Saves to: RES_ana_events_tables.Rdata
	BSM_output = runBSM(res, stochastic_mapping_inputs_list=stochastic_mapping_inputs_list, maxnum_maps_to_try=200, nummaps_goal=100, maxtries_per_branch=40000, save_after_every_try=TRUE, savedir=getwd(), seedval=12345, wait_before_save=0.01)

	RES_clado_events_tables = BSM_output$RES_clado_events_tables
	RES_ana_events_tables = BSM_output$RES_ana_events_tables
	} else {
	# Load previously saved...

	# Loads to: RES_clado_events_tables
	load(file="RES_clado_events_tables.Rdata")
	# Loads to: RES_ana_events_tables
	load(file="RES_ana_events_tables.Rdata")
	BSM_output = NULL
	BSM_output$RES_clado_events_tables = RES_clado_events_tables
	BSM_output$RES_ana_events_tables = RES_ana_events_tables
	} # END if (runBSMslow == TRUE)

# Extract BSM output
```

```
clado_events_tables = BSM_output$RES_clado_events_tables
ana_events_tables = BSM_output$RES_ana_events_tables
head(clado_events_tables[[1]])
head(ana_events_tables[[1]])
length(clado_events_tables)
length(ana_events_tables)

include_null_range = TRUE
areanames = names(tipranges@df)
areas = areanames
max_range_size = 3

states_list_0based = rcpp_areas_list_to_states_list(areas=areas, maxareas=max_range_size, include_null_range=include_null_range)
colors_list_for_states = get_colors_for_states_list_0based(areanames=areanames, states_list_0based=states_list_0based, max_range_size=max_range_size, plot_null_range=TRUE)

#######################################################
# Summarize stochastic map tables
#######################################################
length(clado_events_tables)
length(ana_events_tables)

head(clado_events_tables[[1]][,-20])
tail(clado_events_tables[[1]][,-20])

head(ana_events_tables[[1]])
tail(ana_events_tables[[1]])

areanames = names(tipranges@df)
actual_names = areanames
actual_names

# Get the dmat and times (if any)
dmat_times = get_dmat_times_from_res(res=res, numstates=NULL)
dmat_times

# Extract BSM output
clado_events_tables = BSM_output$RES_clado_events_tables
ana_events_tables = BSM_output$RES_ana_events_tables
```

```
# Simulate the source areas
BSMs_w_sourceAreas = simulate_source_areas_ana_clado(res, clado_events_tables, ana_events_tables, areanames)
clado_events_tables = BSMs_w_sourceAreas$clado_events_tables
ana_events_tables = BSMs_w_sourceAreas$ana_events_tables

# Count all anagenetic and cladogenetic events
counts_list = count_ana_clado_events(clado_events_tables, ana_events_tables, areanames, actual_names)

summary_counts_BSMs = counts_list$summary_counts_BSMs
print(conditional_format_table(summary_counts_BSMs))

# Histogram of event counts
hist_event_counts(counts_list, pdffn=paste0(model_name, "_histograms_of_event_counts.pdf"))

#######################################################
# Print counts to files
#######################################################
tmpnames = names(counts_list)
cat("\n\nWriting tables* of counts to tab-delimited text files:\n(* = Tables have dimension=2 (rows and columns). Cubes (dimension 3) and lists (dimension 1) will not be printed to text files.) \n\n")
for (i in 1:length(tmpnames))
	{
	cmdtxt = paste0("item = counts_list$", tmpnames[i])
	eval(parse(text=cmdtxt))

	# Skip cubes
	if (length(dim(item)) != 2)
		{
		next()
		}

	outfn = paste0(tmpnames[i], ".txt")
	if (length(item) == 0)
		{
		cat(outfn, " -- NOT written, *NO* events recorded of this type", sep="")
		cat("\n")
		} else {
		cat(outfn)
		cat("\n")
		write.table(conditional_format_table(item), file=outfn, quote=FALSE, sep="\t", col.names=TRUE, row.names=TRUE)
```

```
        } # END if (length(item) == 0)
    } # END for (i in 1:length(tmpnames))
cat("...done.\n")

#########################################################
# Check that ML ancestral state/range probabilities and
# the mean of the BSMs approximately line up
#########################################################
library(MultinomialCI)      # For 95% CIs on BSM counts
check_ML_vs_BSM(res, clado_events_tables, model_name, tr=NULL, plot_each_node=FALSE, linreg_plot=TRUE,
MultinomialCI=TRUE)


#########################################################
# Plot tree on map
#########################################################
library(phytools)
library(phangorn)
library(plotrix)
setwd("~/Documents/nix/Papers/Harbin_man/biogeobears/")
getwd()
list.files()
trfn="homo.tre"
tr = read.tree(trfn)
tr$tip.label
library(ape)
library(phytools)
coords<-read.table("geography.txt", header=TRUE, row.names=1)
coords
lat<-as.matrix(coords)[, 1]
long<-as.matrix(coords)[, 2]
xx <- phylo.to.map(tr, cbind(lat, long), rotate = FALSE, plot = FALSE)
tmp<-read.table("colors.txt", header=TRUE, row.names=1)
colors<-matrix (tmp$color_code, nrow(coords),2,dimnames=list(rownames(coords)))
colors
plot(xx,ftype="off",lwd=c(1.25,0.5), xlim=c(-10,160), ylim=c(-50,100),colors=colors,lty="solid")

#########################################################
#########################################################
```