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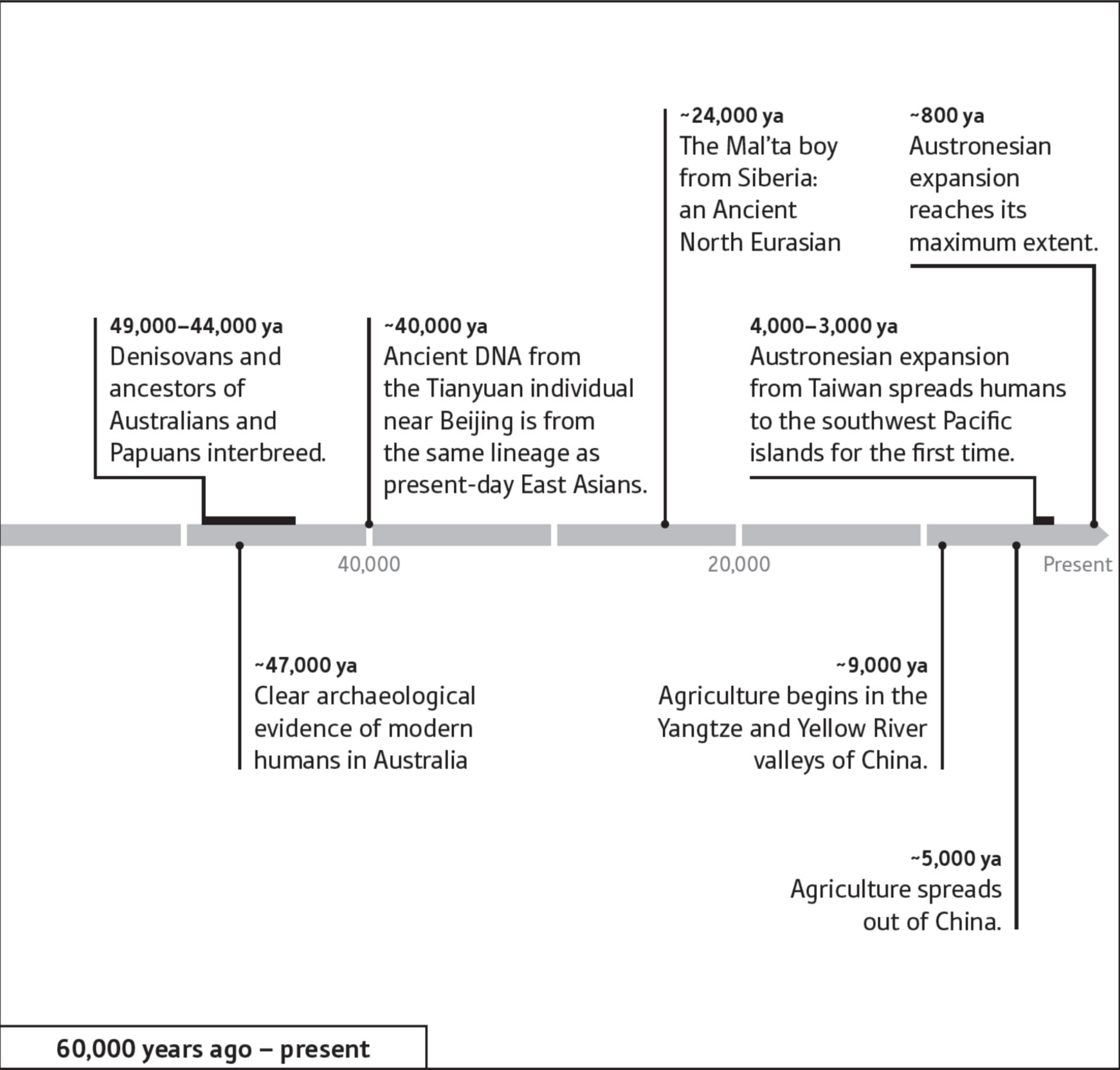
Ancient DNA

Session 8 - November 16, 2022

Today's Meeting

- Modern humans in East Eurasia.
- The Southern Route hypothesis.
- Ghost populations of the Yangtze and Yellow River Valleys.
- Expansion into the periphery of East Asia.

Modern Humans in East Eurasia



Modern Humans in Eurasia - Timeline

- Migration of modern humans into Eurasia around 130,000 to 100,000 YA.
- This population interbreeds with Neanderthals (and perhaps *Homo Erectus*).
- Eurasia before 50,000 YA is a mix of archaic human and modern human populations.
- Another migration of modern human into Eurasia around 50,000 YA.
- This population also interbreeds with Neanderthals in Near East, and splits into two lineages.
- One lineage (A) of this population splits off between 51,000 and 47,000 YA, and begins migrating into East Eurasia.
- This lineage A interbreeds with Denisovans around 49,000 and 44,000 YA.
- The other lineage (B) develops Upper Paleolithic tools. Lineage A separates before this time.
- Lineage B migrates into West Eurasia.

Modern Humans in East Eurasia

“Southern Route” Hypothesis

- Lack of archaeological evidence of Upper Paleolithic tool sets in East Eurasia.
- There is archaeological evidence of behavioral changes that indicate the presence of modern humans.
- This led to the hypothesis of a migration out of Africa that occurred 10,000 years earlier than the migration that occurred around 50,000 YA.
- This population’s migration path skirted the coast of the Indian Ocean, leaving descendants today among the indigenous peoples of Australia, New Guinea, the Philippines, Malaysia, and the Andaman Islands.

Modern Humans in East Eurasia

“Southern Route” Hypothesis

- This earlier population interbred with indigenous archaic populations. Did this leave ancestry in present-day East Eurasians?
- Willerslev’s study:
 - Europeans share more mutations with East Asians than Aboriginal Australians.
 - This supports the Southern Route hypothesis.
 - Estimate that ancestors of Aboriginal Australians split from ancestors of present-day Europeans 75,000 to 62,000 YA.
 - Estimate that ancestors of present-day Europeans split from ancestors of present-day East Asians 38,000 to 25,000 YA.

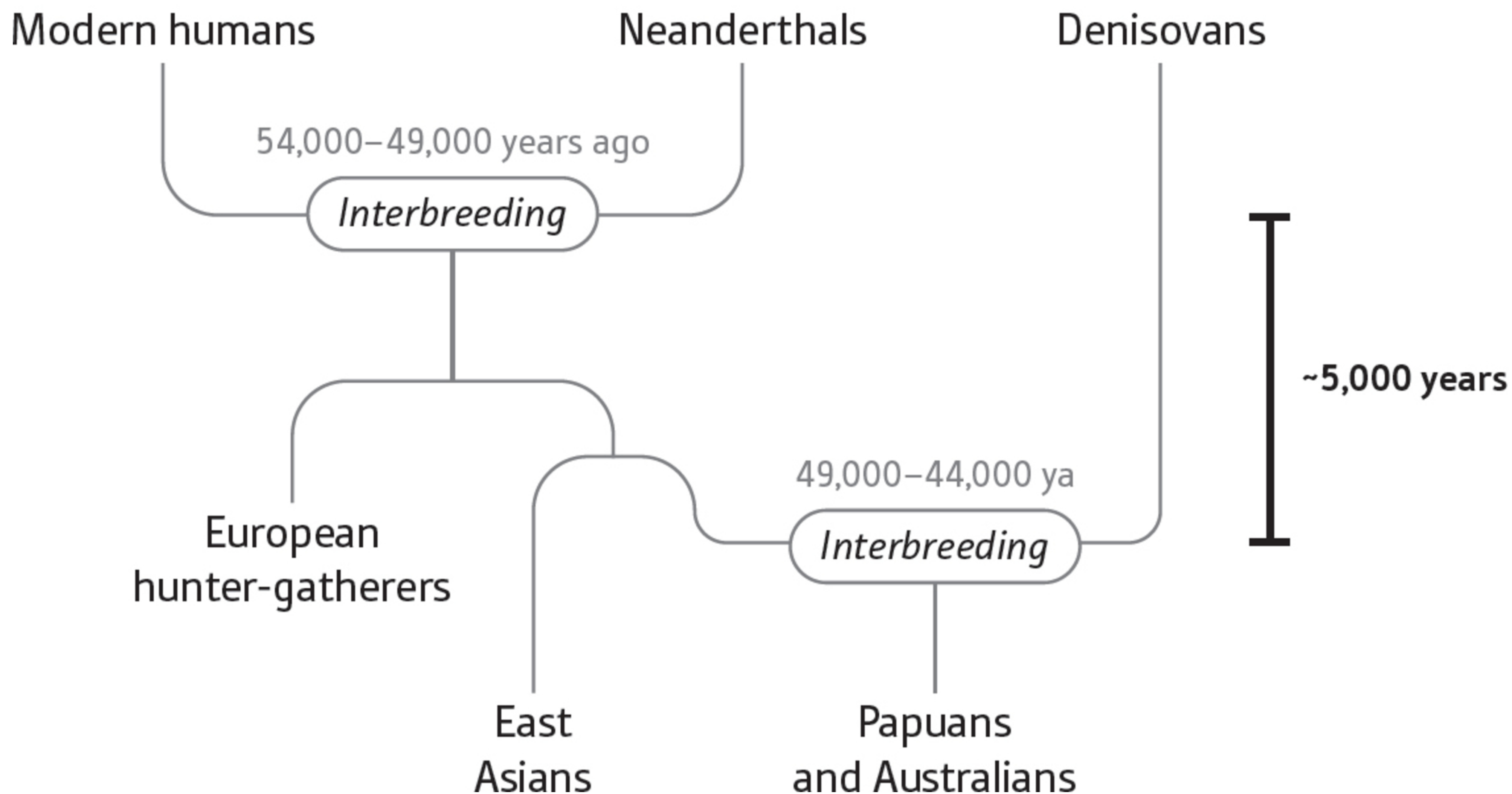
Modern Humans in East Eurasia

“Southern Route” Hypothesis

- Reich’s analysis:
 - Willerslev did not account for the 3 to 6 percent ancestry that Aboriginal Australians inherited from archaic Denisovans.
 - Adjusting for this ancestry and re-running the data, Reich found that Europeans do not share more mutations with Chinese than Australians.
 - And that Chinese and Australians derive almost all their ancestry from a single homogeneous population that split earlier from the ancestors of Europeans.
- Revelation that a series of major population splits in the history of non-Africans occurred in an exceptional short time span.

Modern Humans
in Eurasia

Two Major Population Splits Within About 5,000 Years



Modern Humans in East Eurasia

“Southern Route” Hypothesis

- Even if there was interbreeding between the earlier population of modern humans and archaic humans in East Eurasia, there was no lasting effect.
- The rapid succession of lineage separations suggests that modern humans were moving into new environments and displacing the previous populations.
- Even if the Southern Route populations existed, they too were replaced by later waves of human migration.
- There is no genetic evidence of any substantial ancestry from these earlier populations in present-day East Asians.

Modern Humans in East Eurasia

“Southern Route” Hypothesis

- So, why no evidence of Upper Paleolithic stone tools in East Eurasia?
- The main split of West Eurasian and East Asian ancestors occurred before the development of these stone tools.

Modern Humans in East Eurasia

Ancestry of East Asians

- In 2015, Reich gained access access to a large amount of genome-wide data from diverse populations of present-day Chinese.
- Combined with his ancient DNA data, Reich found that the ancestry of East Asians can be described by three clusters:
 - First cluster centered on people living in the Amur River basin of northeastern China.
 - Second cluster centered on the Tibetan Plateau.
 - The third cluster centered in Southeast Asia.
- Compared these clusters with Native Americans, New Guineans and Andaman Islanders (proxies for ancient DNA).
- Reich found that the ancestry of the great majority of mainland East Asians derives from mixtures of two lineages that separated very anciently.

Modern Humans in East Eurasia

Ancestry of East Asians

- In Southeast Asia and Taiwan, most populations derive their ancestry from a homogeneous ancestral population.
- The location of these populations are in rice farming areas.
- Rice farming expanded in this area from the Yangtze River Valley.
- Reich speculates that the “Yangtze River Ghost Population” contributed the overwhelming majority of the ancestry of present-day Southeast Asians.

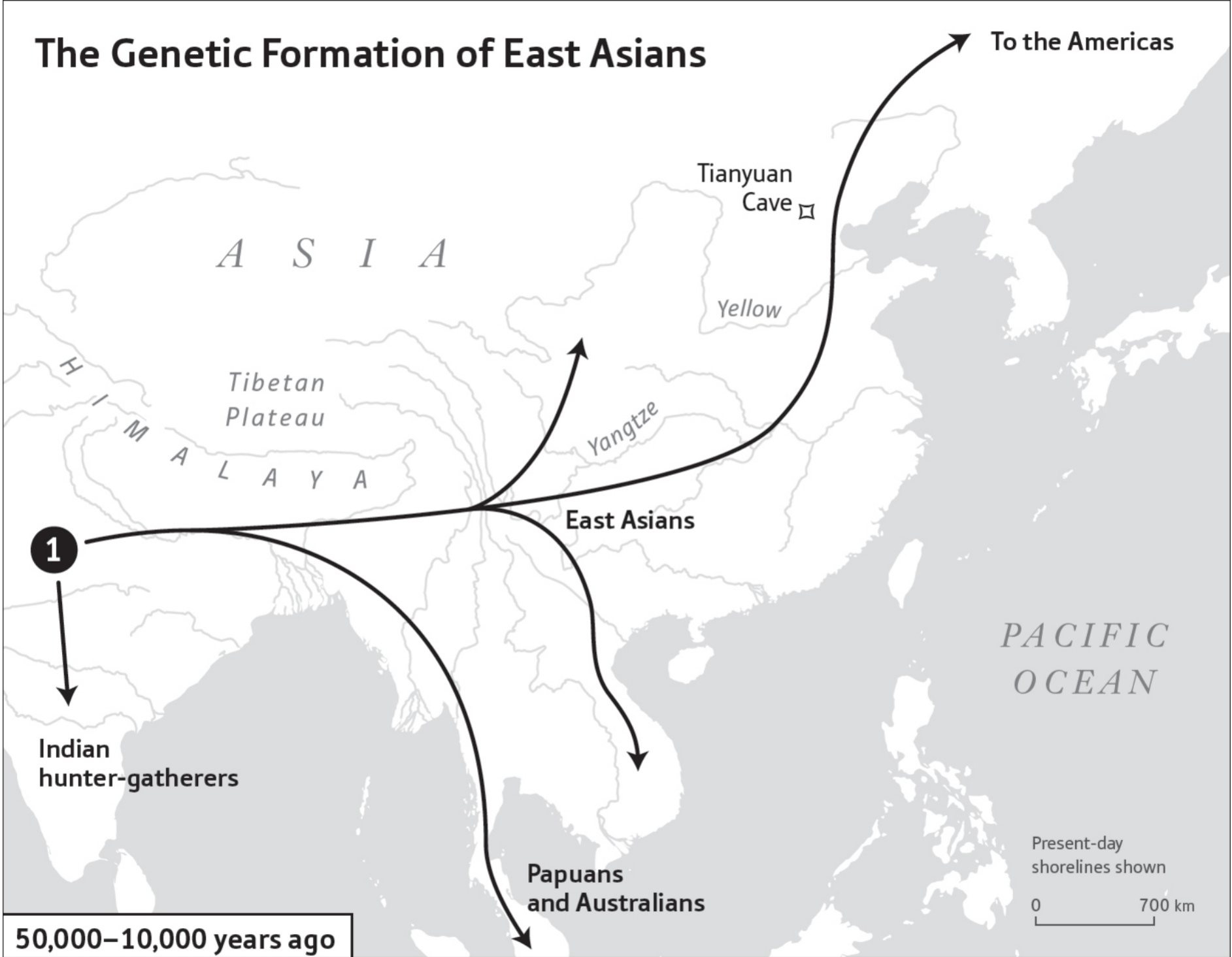
Modern Humans in East Eurasia

Ancestry of East Asians

- Han Chinese descended from another deeply divergent East Asian lineage.
- The Han emerged from tribes in the Yellow River Valley.
- The Han and Tibetans share a large proportion of their ancestry with a common ancestral population.
- Reich speculates that the Han and Tibetans ancestral population is the “Yellow River Ghost Population.”

Modern Humans in East Eurasia

Migration Patterns



Modern Humans in East Eurasia

Ancestry of East Asians - Ghost Populations Expand

- Peoples of the Tibetan Plateau - 2/3rds from Yellow River ghost population and 1/3rd from indigenous hunter-gatherers.
- Japanese - 80% farmers (migrants from Korea) and 20% Ainu, indigenous hunter-gatherers.
- Southeast Asia - variable proportion of Yangtze River ghost population and early splitting East Eurasian lineage.
- Indonesia - mixture of ancestry from Austroasiatic and Austronesian speakers.

Modern Humans in East Eurasia

Ancestry of East Asians - Expansion of Austronesians

- Around 5,000 YA mainland East Asian farming spread to Taiwan, where the deepest branches of the Austronesian language family is found.
- These farmers invented the outrigger canoes.
- These farmers spread southward to the Philippines 4,000 YA, and then to the islands near New Guinea and the Pacific islands further to the east.
- After 3,500 YA, they spread farther into the Pacific, reaching as far east as Vanuatu.
- A few hundred years later, they reached Tonga and Samoa.
- They reached New Zealand, Hawaii and Easter Island by 800 YA.
- They also expanded to the west, reaching Madagascar 1,300 YA.

Modern Humans in East Eurasia

Migration Patterns

