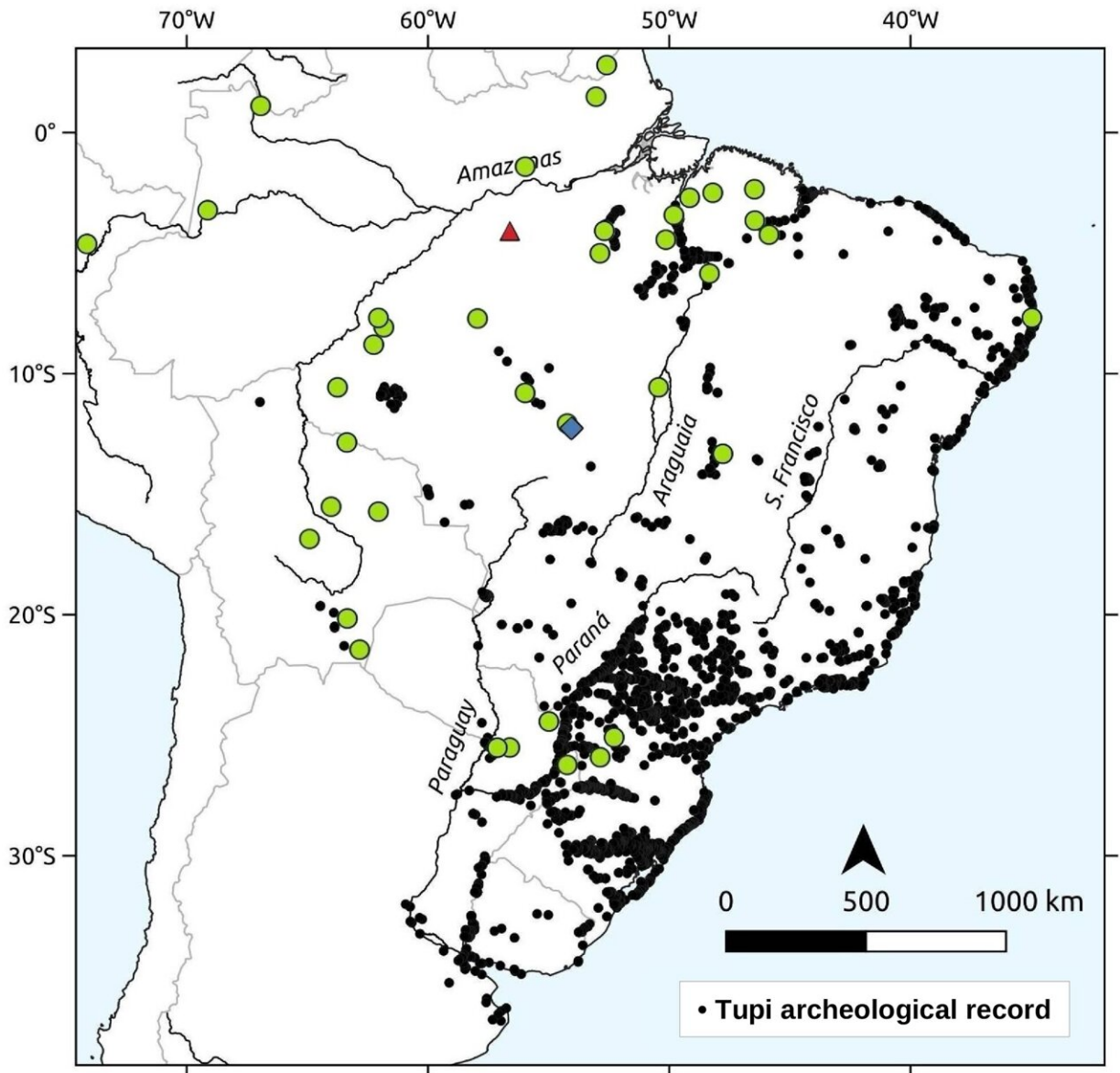


# Seeking the origin of Indigenous languages in South America

June 15 2023



The Tupí-Guaraní languages used in this study (in green) and the Tupían (non-TG) Awetí (in blue), and Mawé (in red), along with the distribution of the TG archaeological record (black dots). Prepared by the authors with QGIS 3 [29], based on public domain data and raster images from “Natural Earth”, including data from [30–32] and an unpublished database by Corrêa and Noelli. Credit: *PLOS ONE* (2023). DOI: 10.1371/journal.pone.0272226

A new study indicates that one of the largest of the Indigenous language families in Latin America originated in the sixth century BCE in the basin of the Rio Tapajós and Rio Xingu, near the present-day city of Santarém in the Brazilian state of Pará.

There are around fifty languages in the Tupí-Guaraní language family, which gave us [words](#) like "jaguar" and "piranha." Now, Dr. Fabrício Ferraz Gerardi from the University of Tübingen's Institute of Linguistics and a team of international researchers have used methods developed in the field of molecular biology to compare and investigate the Tupí-Guaraní languages. This has shed light on how the languages are related to each other, as well as on their geographical and chronological evolution. The new study has been published in the latest edition of *PLOS ONE*.

Little is known about the history of the Tupí-Guaraní language family. It includes about 40 languages still spoken today, and at least another nine that have died out. The number of speakers per language ranges from less than 100, as in Amondawa and Juma, to 6 million, as in Paraguayan Guaraní. Only a few of the Tupí-Guaraní languages have been written down.

"It is mainly the extinct languages that we know from phonetic transcriptions noted down by researchers in past centuries," Fabrício

Gerardi says.

## **Comparison of basic vocabulary**

For the relationship analysis of the various Tupí-Guaraní languages, the research team used comparative lists of basic [vocabulary](#). They asked, for example: Are the words for "leg," "sing," or "bat" the same or similar in the languages studied? Or do they not share a common root?

"In molecular biological relationship analysis, for example of different animal or plant species, the respective gene sequences are used. They indicate which areas are the same or similar. The general random rate of gene changes—mutations—can also be used to estimate how long ago two related species split off from a common ancestor," Gerardi explains.

The mutations in the genes of biological species correspond to phonetic shifts or substitutions in related languages. Thus, in Tupinambá, one of the Tupí-Guaraní languages, the tapir is called "tapi?ir"; in Awetí, a language that split off from these languages, it is called "tapi?it."

Large-scale analyses of the vocabulary and [grammatical structures](#) of the Tupí-Guaraní languages using algorithms from molecular biology can be used to create a family tree.

"We wanted to know what the tree looked like, how strongly related individual languages were to each other, how old each language was, and when it split into new languages," Gerardi says.

## **Timeframe calibrated via archaeological finds**

The distribution of the Tupí-Guaraní language family extends more than 4000 kilometers in both width and breadth.

"In some cases, we have archaeological finds from the same area that we try to assign to the individual languages. For example, there are certain words in the languages for describing special properties of the ceramics discovered there," says Gerardi. "This allows us to establish a temporal and spatial relationship between the language and the archaeological finds. The ceramics could be dated using the radiocarbon method—so we indirectly have a temporal calibration of language development," he adds.

Along the way, Gerardi and the research team were able to pinpoint the probable place of origin of the Tupí-Guaraní language family to the Tapajós-Xingu basin some 2,550 years ago. "However, to better corroborate our findings, the archaeological and linguistic evidence would need to be further explored," he says.

**More information:** Fabrício Ferraz Gerardi et al, Lexical phylogenetics of the Tupí-Guaraní family: Language, archaeology, and the problem of chronology, *PLOS ONE* (2023). [DOI: 10.1371/journal.pone.0272226](https://doi.org/10.1371/journal.pone.0272226)

Provided by University of Tübingen

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