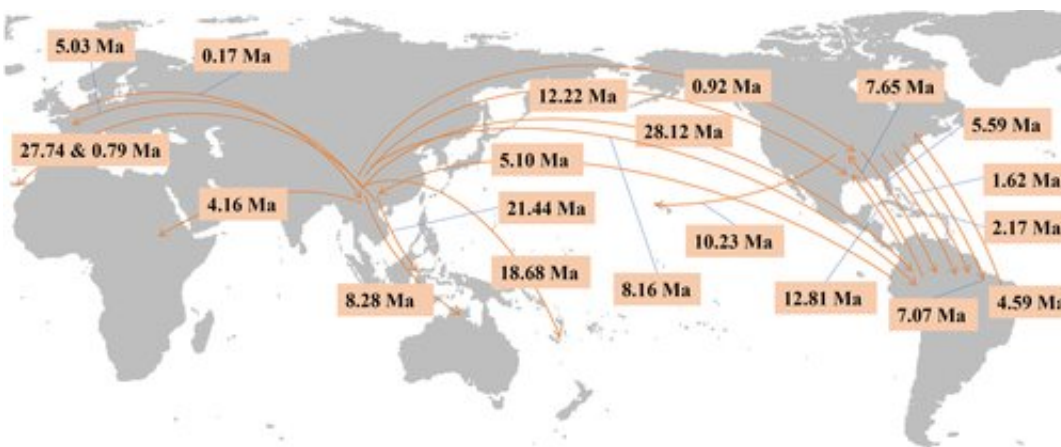


Study pushes back origin of existing *Ilex* crown clade into early Eocene

March 6 2020, by Zhang Nannan



Historical migrations in *Ilex* estimated from the ancestral area reconstruction. Number near each migration is the estimated migration time. Credit: *Journal of Systematics and Evolution* (2020). DOI: 10.1111/jse.12567

The holly genus, *Ilex* L., in the monogeneric Aquifoliaceae, is the largest woody dioecious genus (more than 664 species). It has a very uniform reproductive biology and is instantly recognizable in flower or fruit, although leaf morphology is diverse and growth forms range from prostrate shrubs to tall trees.

A previous phylogeny, based on 108 species, found widespread discordance between plastid and nuclear trees, and suggested a mid-Miocene origin for the crown clade in East Asia or North America.

In a study published in the *Journal of Systematics and Evolution*, researchers from Xishuangbanna Tropical Botanical Garden (XTBG) sampled many additional species, particularly from the most likely area of origin, East Asia, and constructed a new phylogeny based on two nuclear genes and calibrated using three macrofossil records.

The [phylogenetic tree](#) showed that the five main clades had a common ancestor in the early Eocene, much earlier than previously suggested. *Ilex* originated in subtropical Asia and extant clades colonized South America by 30 Ma, North America by 23 Ma, Australia by 8 Ma, Europe by 6 Ma, and Africa by 4 Ma. South and North America were colonized multiple times. *Ilex* also reached Hawaii (10 Ma) and other oceanic islands.

Macrofossil and pollen records show the genus has subsequently used efficient seed dispersal to track this mesic climate type through space and time, colonizing suitable areas rapidly, but disappearing when the climate changed.

"Our study has pushed back the origin of the existing *Ilex* crown clade into the early Eocene, with multiple lines of evidence suggesting that the MRCA grew in moist subtropical East Asia," said Dr. YAO Xin, first author of the study.

"Over 50 million years, *Ilex* appears to have expanded its range of tolerance to temperature, but not to moisture. The current near-cosmopolitan distribution, with extreme variation in regional diversity, thus reflects a balance between dispersal, diversification, and extinction," added YAO Xin.

More information: Xin Yao et al. Phylogeny and biogeography of the hollies (*Ilex* L., Aquifoliaceae), *Journal of Systematics and Evolution* (2020). [DOI: 10.1111/jse.12567](https://doi.org/10.1111/jse.12567)

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