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Coffee, tea, and chocolate converge

Caffeine has evolved multiple times among plant species, but no one knows whether these events involved similar genes. Denoeud *et al.* sequenced the *Coffea canephora* (coffee) genome and identified a conserved gene order (see the Perspective by Zamir). Although this species underwent fewer genome duplications than related species, the relevant caffeine genes experienced tandem duplications that expanded their numbers within this species. Scientists have seen similar but independent expansions in distantly related species of tea and cacao, suggesting that caffeine might have played an adaptive role in coffee evolution.

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Abstract

Coffee is a valuable beverage crop due to its characteristic flavor, aroma, and the stimulating effects of caffeine. We generated a high-quality draft genome of the species *Coffea canephora*, which displays a conserved chromosomal gene order among asterid angiosperms. Although it shows no sign of the whole-genome triplication identified in Solanaceae species such as tomato, the genome includes several species-specific gene family expansions, among them *N*-methyltransferases (NMTs) involved in caffeine production, defense-related genes, and alkaloid and flavonoid enzymes involved in secondary compound synthesis. Comparative analyses of caffeine NMTs demonstrate that these genes expanded through sequential tandem duplications independently of genes from cacao and tea, suggesting that caffeine in eudicots is of polyphyletic origin.

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