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### Special Issue

## Cryptic species and phylogeographical structure in the tree *Cedrela odorata* L. throughout the Neotropics

Stephen Cavers, A. Telford, F. Arenal Cruz, A. J. Pérez Castañeda, R. Valencia, C. Navarro, A. Buonamici, A. J. Lowe, G. G. Vendramin

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Correspondence: Stephen Cavers, Centre for Ecology and Hydrology, CEH Edinburgh, Bush Estate, Penicuik, Midlothian EH26 0QB, UK.  
E-mail: [scav@ceh.ac.uk](mailto:scav@ceh.ac.uk)

## Abstract

### Aim

The origins of much Neotropical biodiversity remain a topic of debate, with both palaeogeographical and more recent climatic drivers playing a role in diversification both among and within species. Here we use a combination of molecular data to assess genetic variation within and among species in the Neotropical tree genus *Cedrela*, with a focus on *Cedrela odorata*, to test hypotheses on the drivers of diversification, to place known ecotypic variation in context and to detect intraspecific phylogeographical structure.

### Location

Central and South America, Cuba, Cayman Islands, Trinidad and Guadeloupe.

## Methods

Samples were collected from the field, existing collections and herbaria from across the geographical range, including a total of 528 individuals from 72 sites. A phylogenetic framework was constructed using internal transcribed spacer (ITS) sequence data (intergenic spacers plus flanking 18S and 26S regions), and genetic structure was analysed using a combination of chloroplast DNA sequences (*trnC-ycf6*, *trnH-psbA*) and chloroplast and nuclear microsatellite (single sequence repeat, SSR) loci. Phylogenetic reconstruction was undertaken using a combination of Bayesian and parsimony-based approaches; divergence times were estimated for major nodes. Geographical structure in chloroplast SSR data was analysed using SAMOVA, while that in nuclear SSR data was assessed using a combination of Bayesian clustering and principal coordinates analysis.

## Results

ITS sequence data supported phylogenetic distinctiveness of four morphologically cryptic species within *C. odorata*. Chloroplast sequence and microsatellite data showed geographical structuring both among and within species, suggesting the influence of climatic and geographical drivers. Intraspecific genetic divergence was also present in nuclear microsatellite data, suggesting contemporary gene flow limitation across sea and mountain barriers.

## Main conclusions

The data support diversification of the genus *Cedrela* in South America with subsequent recolonization into Central America prior to the formation of the Isthmus of Panama. At least four morphologically cryptic taxa were evident within *C. odorata* and within-species phylogeographical divergence across the Andes and within Central America was present, the latter suggestive of Pleistocene climatic influence. Previously recognized ecotypes in Central America should be elevated to species level. The new molecular data support the recent reclassification and will support the monitoring of exploitation in the

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