



## Validation of the names linked to the oldest fossil Connaraceae wood (*Connaroxylon*, *Connaroxylon dimorphum*)

PIETER BAAS<sup>1</sup>\*, STEVEN MANCHESTER<sup>2</sup>, ELISABETH A. WHEELER<sup>3</sup> & RASHMI SRIVASTAVA<sup>4</sup>

<sup>1</sup> Naturalis Biodiversity Center, PO Box 9517, 2300 RA Leiden, The Netherlands

✉ [pieter.baas@naturalis.nl](mailto:pieter.baas@naturalis.nl); <https://orcid.org/0000-0003-2139-4961>

<sup>2</sup> Florida Museum of Natural History, University of Florida, Gainesville, FL 32611-7800, U.S.A.

✉ [steven@flmnh.ufl.edu](mailto:steven@flmnh.ufl.edu)

<sup>3</sup> Department of Forest Biomaterials, N.C. State University, Raleigh, NC 27695-8005, U.S.A.

✉ [xylem@ncsu.edu](mailto:xylem@ncsu.edu); <https://orcid.org/0000-0002-9075-9939>

<sup>4</sup> Birbal Sahni Institute of Palaeosciences, 53 University Road, Lucknow 266 007, India

✉ [rashmi57\\_bsip@gmail.com](mailto:rashmi57_bsip@gmail.com)

\*Corresponding author: ✉ [pieter.baas@naturalis.nl](mailto:pieter.baas@naturalis.nl)

In 2017 we published a detailed description of a striking fossil wood from the Deccan Intertrappean Beds (Upper Maastrichtian—Lowermost Paleocene) sharing a combination of rare and highly diagnostic anatomical features with modern Connaraceae and named it *Connaroxylon dimorphum* (Baas *et al.* 2017). Recently it was brought to our attention by Dr. Alexander Doweld, editor of the International Fossil Plant Names Index (IFPNI) that both genus and species name had been invalidly published, because we had failed to indicate whether the plates we used to illustrate the description were based on the type specimen. The latter requirement is mandatory from 2001 onwards according to article 43.3 of the International Code of Nomenclature of Algae, Fungi and Plants (Shenzhen Code) (Turland *et al.* 2018). In fact, on one hand, according to this article, the species name was invalidly published; on the other hand, as the description of the new monotypic genus relied on the same description generico-specifica (article 38.5 of Turland *et al.* 2018), it is invalid as well, because the requirement of art. 38.5(c) was not fulfilled.

Hereby we clarify that all illustrations in Baas *et al.* (2017) are micrographs taken from the holotype, archived at the Birbal Sahni Institute of Palaeosciences in Lucknow, India.

Finally, we here provide the simultaneous publication of the name of the monotypic genus *Connaroxylon* and of the species *C. dimorphum* through a single description (descriptio generico-specifica), according to Arts. 38.5–38.6 of Turland *et al.* 2018).

***Connaroxylon*** Baas, Manchester, Wheeler & Srivasta, *gen. nov.* (monotypic genus).

***Connaroxylon dimorphum*** Baas, Manchester, Wheeler & Srivastava, *sp. nov.*

**Description:**—*Growth rings* indistinct or faint and then marked by radially flattened fibers. *Vessels* diffuse, 20–25% solitary, remainder in radial multiples of 2–3 (–6 or rarely more than 10; longest multiples in wood adjacent to pith), 14–30 per sq.mm, circular to oval when solitary, flattened at the place of contact when in radial multiples; tangential diameter 62 (29–115; SD 17) µm, radial diameter 79 (43–116; SD 23) µm. Perforations simple. Vessel elements 387 (174–743; SD 159) µm long. Intervessel pits alternate, 8–10 µm, bordered with slit-like or round apertures; vessel—ray pits mostly with strongly reduced borders and circular to elongate. Thin-walled tyloses occasionally present. *Fibers* of two types: 1) thin-walled and in parenchyma-like bands of varying widths alternating with 2) thick-walled in zones that vary from narrow to wide. Most fibers non-septate, but some septate. Fiber wall pitting not observed, probably minutely bordered to simple, typical of libriform fibers. Radial fiber diameter 20 (14–25; SD 4) µm. The parenchyma-like fiber bands are much more common in the juvenile wood than in the more mature wood towards the periphery of the sample. *Axial parenchyma* scanty paratracheal, extremely sparse, in strands of 5–6 cells, cells 16–30 µm in radial diameter. *Rays* almost exclusively uniseriate, but a few rays with short biseriate portions, 11–23 per mm, heterocellular, composed mainly of square or upright cells with a few procumbent cells present in biseriate central portions, or upright, square and weakly procumbent cells mixed throughout the rays. Height 2–20 cell or 539 (146–942; SD 241) µm. *Crystals*. Prismatic crystals present in chambered upright ray cells and in chambered fibers. *Herringbone patterned rays and tubules*. In radial sections some of the rays show a herringbone pattern with cells converging towards narrow tubules with dark contents. *Pith*. The pith is wide, rounded to pentagonal with central large-celled parenchyma. The peripheral pith is small-celled, in some regions giving an impression of internal phloem, separated by some small-celled parenchyma layers from the protoxylem vessels.

**Type (holotype):**—Birbal Sahni Institute of Palaeosciences, Lucknow Museum 40975.

**Illustration:**—Illustrations of the holotype have been published as figs. 1–9 in Baas *et al.* (2017: pp.127, 128).

*Connaroxylon dimorphum* is the oldest known fossil wood of the Connaraceae, and one of the oldest fossils of the order Oxalidales, to which the family belongs. Because its identity/botanical affinity is robust, and the fossil is well dated at 65 +/- 1 Ma, we encourage future students of the phylogeny of Oxalidales and related angiosperm orders to use this record to calibrate molecular clock analyses.

## ACKNOWLEDGEMENTS

We thank Gea Zijlstra (Utrecht) and David Mabberley (Sydney) for nomenclatural advice and Alexander Doweld (Moscow) for pointing out our initial omission.

## REFERENCES

- Baas, P., Manchester, S.R., Wheeler, E.A. & Srivastava, R. (2017) Fossil wood with dimorphic fibers from the Deccan Intertrappean Beds of India – the oldest fossil Connaraceae? *IAWA Journal* 38 (1): 124–133.  
<https://doi.org/10.1163/22941932-20170162>
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (Eds.) (2018) *International Code of Nomenclature for algae, fungi and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017*. Regnum Vegetabile 159. Koeltz Botanical Books, Glashütten, 254 pp.  
<https://doi.org/10.12705/Code.2018>