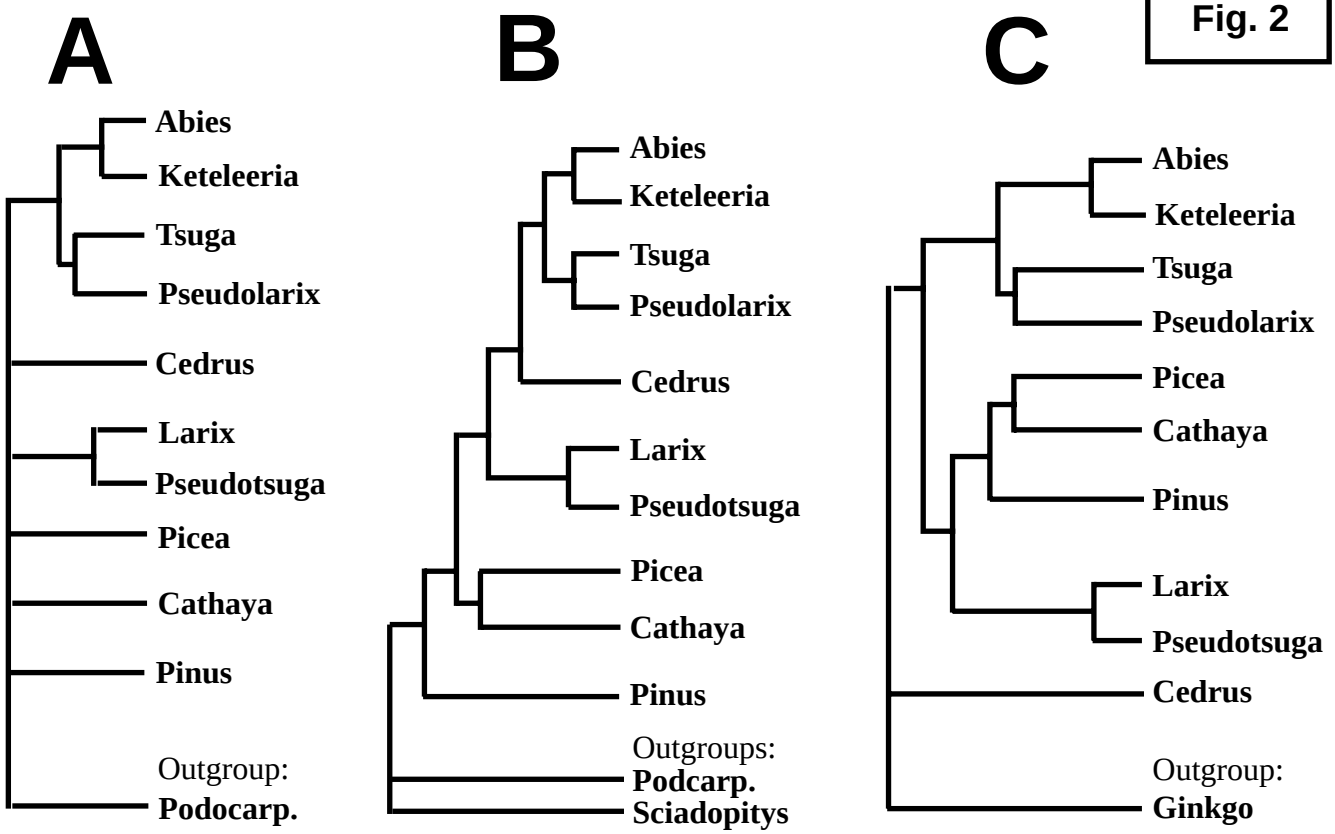
Phylogeny of Pinaceae

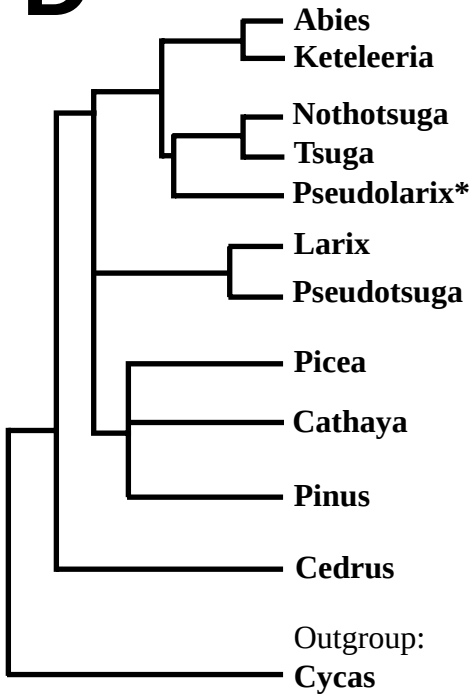
Fig. 2



rbcL, MP-Bootstrap (1000)

rbcL, NJ, Outgr.: Podocarp.
+ RFLP-trnK, MP 50% cons.

rbcL, NJ, Outgr.: Ginkgo



OBS*: Pseudolarix is first in the clade by nad5 (and may be 4CL).

matK+nad5+4CL; MP=ML; Outgr.: Cycas

Genera of Pinaceae:

Molecular genetics:

Cedrus is most likely to be prior to all other genera in Pinaceae.
Abies and Keteleeria are very close sisters.
Pseudolarix + Nothotsuga/Tsuga + Abies/Keteleeria is a very safe clade, but it is unknown, whether Pseudolarix is first or is in a clade with Tsuga.
Larix og Pseudotsuga are close sisters.
Picea, Cathaya and Pinus is probably one clade, but very far related.
Cathaya is perhaps a little closer related to Picea than to Pinus.

Morphology of shoots:

Cedrus leaves possibility for all in **D** shown evolution of shoots.

Position of mature female cones:

Big, upright cones seem rather contrary to gravity, and upright mature cones is probably the original (also found in Araucariaceae).
Upright cones is more easily changed to hanging than vice versa.
Cedrus has upright mature cones, like in Larix + the whole clade of Abies/Keteleeria/Pseudolarix/Tsuga/Nothotsuga except Tsuga.

Resin canals in stem and root.

Only Pinus, Cathaya, Picea, Larix og Pseudotsuga has always resin canals as well in xylem as in young tap root.

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