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Treatment of multiple trees in resampling analyses.

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When Felsenstein first used bootstrapping in phylogenetic analyses he did not discuss how to treat multiple optimal trees that might be found for a single pseudoreplicate. He subsequently introduced a method in which all optimal trees found for a pseudoreplicate are passed to the majority-rule summary tree calculation, each tree being weighted by the inverse of the number of trees found for the pseudoreplicate. While this method is still use in both PHYLIP and PAUP, no justification has ever been offered for it, and in fact it seems to have been adopted originally simply because the old PHYLIP consensus program could not process multifurcating trees. We point out here that this method is defective in that it can yield high resampling frequencies for groups that are actually unsupported by the data, and this can occur in both parsimony and likelihood analyses.