April 1, 2012

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Phylogenetics of *Morus* (Moraceae) Inferred from ITS and *trnL-trnF* Sequence Data

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Communicating Editor: Andrew Hipp

**Abstract**—*Morus* (Tribe Moreae, Moraceae) consists of ca. 13 species of trees distributed in Asia, Africa, Europe, and North, Central, and South America. The broad geographical distribution of the genus, overlapping ranges of many taxa, and documented hybridization between some species present interesting questions of taxonomy, phylogeny, and biogeography. Phylogenetic data for *Morus* also contribute to higher level taxonomic work in the family. We used sequence data from ITS of the nrDNA and the chloroplast *trnL-trnF* intergenic spacer to study phylogenetic relationships of *Morus*. Phylogenies based on separate data sets were not statistically incongruent, and the combined tree reveals that *Morus*, as currently circumscribed, is non-monophyletic. Subgenus *Morus* (sensu Leroy) is resolved as a clade and consists of two well-supported clades: one of Asian taxa and one of North American taxa. Sampled members of the genus *Trophis* (two, including the type) form a clade sister to subgenus *Morus*. *Morus mesozygia* (Africa; subgenus *Afromorus*) and *M. insignis* (Neotropics; subgenus *Comphoromorus*), which have not been included to date in other phylogenetic studies of the family, are placed outside the subgenus *Morus*-Trophis clade. This work is an important step in elucidating relationships of *Morus* and along with other recent phylogenetic studies in Moraceae, underscores the need for further work within Tribe Moreae to clarify natural generic relationships.

**Keywords**—ITS, Moraceae, Moreae, *Morus*, phylogeny, *trnL-trnF*.

*Morus* L. (Moraceae) comprises 10–13 species (Berg 2001, 2005a) distributed in Asia, Africa, Europe, and North, Central, and South America. *Morus* species are economically important to the silk industry, as they are host plants for *Bombyx mori* larva (Watanabe 1958).

Additionally, species have been cultivated in many parts of the world for their edible fruits and as ornamental trees. *Morus* is the type genus of the cosmopolitan family Moraceae, which includes 37 genera, some of which have been subjects of recent phylogenetic work (e.g. *Artocarpus*, Zerega et al. 2010; *Ficus*, Rönstedt et al. 2008). Tribal classification within *Morus* has received much attention in recent years, with both taxonomic and phylogenetic study spurring realignments (Berg 2001, 2005a; Datwyler and Weiblen 2004; Clement and Weiblen 2009). Closest relatives to *Morus* include *Bagassa* Aubl., *Milicia* Sim, *Sorocea* A. St.-Hil., *Streblus* Lour. (in part), and *Trophis* P. Br. (in part), tribe Moreae of Clement and Weiblen (2009). However, *Morus* remains paraphyletic pending further study and recircumscription of *Streblus* and *Trophis*, each of which include species more closely related to tribe Dorstenieae Gaudich. (based on *ndhF* and 26S data; Datwyler and Weiblen 2004; Zerega et al. 2005; see also Clement and Weiblen 2009); and Weiblen and colleagues call for further work on these genera (Datwyler and Weiblen 2004; Clement and Weiblen 2009). *Tribe Moreae* exhibits pleisiomorphic characters including a simple inflorescence, tetramerous flowers and usually inflexed (“urticaceous”) stamens (see Sytsma et al. 2002; Zerega et al. 2005; see also Clement and Weiblen 2009); and Weiblen and colleagues call for further work on these genera (Datwyler and Weiblen 2004; Clement and Weiblen 2009). *Tribe Moreae* exhibits pleisiomorphic characters including a simple inflorescence, tetramerous flowers and usually inflexed (“urticaceous”) stamens (see Sytsma et al. 2002; Zerega et al. 2005; see also Clement and Weiblen 2009); and Weiblen and colleagues call for further work on these genera (Datwyler and Weiblen 2004; Clement and Weiblen 2009).

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