Phylogeny of Asian Homalomena (Araceae) Based on the ITS Region Combined with Morphological and...
Phylogeny of Asian Homalomena (Araceae) based on the ITS Region Combined with Morphological and Chemical Data

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Abstract—A phylogenetic analysis of the genus Homalomena (Araceae: Homalomenaceae) based on the nITS region is presented. Eighty-nine taxa are included; representing all Asian supergroups, several Neotropical species currently assigned to Homalomena, and selected species of Philodendron. Asian Homalomena is well supported as monophyletic and excludes Neotropical Homalomena. The Cyrtocladon supergroup is monophyletic after transferring the Insignis complex and Havilandii complex into the Punctulata supergroup. The Homalomena and Chamaelecond supergroups are well supported. A reduced phylogeny of 20 accessions representing 15 taxa was used for subsequent morphological and chemical marker optimization. A constricted spathe and four stamens per staminate flower are plesiomorphic for Homalomena. Staminate floral morphologies, notably interpistillar staminodes, and (2) specimens collected post-anthesis by which time determinations. Much of the material is effectively indeter-

Homalomena Schott is the most species-rich, taxonomically complex, and least well understood aroid genus in tropical Asia. The genus is estimated to comprise more than 500 species, making it the third-largest family after Anthurium Schott and Philodendron Schott (Boyce et al. 2010; Boyce and Croat 2011). Based on the current circumscription, Homalomena is distributed in the Neotropics and Asian tropics, with the overwhelming majority of species and greatest diversity in the tropical forests of Southeast Asia where there are three centers of diversity: Sumatra, Borneo, and New Guinea (Boyce and Wong 2008). Studies currently focus on Borneo where only 30 accepted names are available to date (P. C. Boyce, pers. obs.), of which 17 are recently described (Boyce and Wong 2008; Baharuddin and Boyce 2010; Boyce et al. 2010; Tung et al. 2010; Hoe et al. 2011a, b; Kurniawan et al. 2011; Wong and Boyce 2011; Wong et al. 2011). Despite the abundance of Homalomena specimens in herbaria, the majority of specimens are either undetermined or have incorrect determinations. Much of the material is effectively indeterminate owing to: (1) post-preservation depredation by beetles, and (2) specimens collected post-anthesis by which time critical floral morphologies, notably interpistillar staminodes, have been irreparably damaged during pollination. However, provided concise locality data are available, it is often possible to re-visit key localities, and prepare adequate samples (e.g. images, inflorescences in alcohol) for suspected new species (Boyce and Wong 2008).

Homalomena has been previously divided into sections based upon the work of Schott (1860) and Engler (1912), with additions by Furtado (1939) and Hotta (1967). Mayo et al. (1997) recognize five sections: Curmeria (Linden & André) Engl. & K. Krause (including Adelomena Schott) restricted to the Neotropics; Homalomena (‘Euhomalomena’ of Engl. & K. Krause); Cyrtocladon (Griff.) Furtado; Chamaelecond (Miq.) Engl. & K.Krause, and Genticulae M.Hotta. With the exception of Genticulae, all have been recognised as genera at some point in their history. In previous papers (Boyce and Wong 2008; Ng et al. 2011; Wong and Boyce 2011), Asian Homalomena was divided into informal morphotype units, supergroups and complexes, as useful tools to facilitate taxonomic study until phylogenetic testing is undertaken. This approach has been used in other taxonomically intractable groups (e.g. Alocasia G.Don., Schismatoglottis Zoll. & Moritzi, Pothos L., and Rhaphidophora Hassk.; see Boyce 2000a, b, 2001a, b; Boyce and Hay 2001; Hay 1998; Hay and Wise 1991; Hay and Yuzammi 2000). The four sections of Asian Homalomena were reduced to informal supergroups (SGs): Homalomena, Chamaelecond, Cyrtocladon, and Punctulata (Boyce and Wong 2008; Ng et al. 2011), the last being a replacement name for Hotta’s Genticulae.

The Homalomena supergroup (SG) comprises medium to large erect to creeping plants with strongly aromatic tissues, pleionanthic or rarely hapaxanthic shoot modules, and spathes exceeding 1.5 cm long, with no or only a very weak constriction between the lower and upper spathe. Spathic movements during anthesis, where known, comprise simple gaping and closing of the spathe limb, and no spadix movements have been recorded, although in many species the staminode portion of the spadix elongates swiftly at anthesis until it protrudes from the spathe. The ovary is usually three- to four- locular, with the associated staminode equalling the pistil height, exceptionally staminodes are absent (H. expedita