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Genus *Dendrophthoe* Mart. (Loranthaceae) from Bay Islands with a new record for India and inventory of host species

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ABSTRACT

Singh L. J. & Murugan C. 2013. Genus *Dendrophthoe* Mart. (Loranthaceae) from Bay Islands with a new record for India and inventory of host species. Geophytology 43(1): 41-49.

The present paper deals with the taxonomic revision of the genus *Dendrophthoe* Mart. (Loranthaceae) in Bay Islands. Orange mistletoe, *Dendrophthoe glabrescens* (Blakely) Barlow, is reported here, for the first time, from Bay Islands (Andaman & Nicobar Islands) as a new record for India and with this only two species are found in Bay Islands. In addition, various host species for *Dendrophthoe* have been recorded from Bay Islands, for the first time. These are: *Citrus reticulata* Blanco (Rutaceae), *Grewia calophylla* Kurz. (Tiliaceae), *Horsfieldia glabra* (Blume) Warb. (Myristicaceae), *Psidium guajava* L. (Myrtaceae).

Key-words: *Dendrophthoe glabrescens*, Loranthaceae, new record, host species, Bay Islands, India.

INTRODUCTION

Among the various nutritional modes displayed by flowering plants, haustorial parasitism represents one of the most successful ones. This heterotrophic mode has evolved independently within angiosperms (Stauffer 1969, Stern 1972, Kuijit 1981, Barlow 1995, Nickrent 2001, Fineran 2001, Wilson & Calvin 2006, Der & Nickrent 2008, Vidal-Russell & Nickrent 2008a). One such group is Santalales, an order that includes sandal woods and mistletoes. Mistletoes are polyphyletic group of parasitic flowering plants with worldwide distribution, except Antarctica. They are represented by five families: Loranthaceae, Viscaceae, Mensodendraceae, Eremolepidaceae and Santalaceae. (Kuijit 1969, Barlow & Weins, 1973, Raven & Axelrod 1974, Davidar 1980, Barlow 1983, Watson 2001, APG 2003, 2009, Wilson & Calvin 2006, Vidal–Russell & Nickrent 2008b, Angus et al. 2009, Nickrent et al 2010, Parker 2012). They are also well represented on oceanic Islands. (Kuijit 1969, Barlow 1983, Hawksworth 1983, Polhill & Weins 1998) while their greatest diversity is in tropical regions. About 1% of the flowering plants are considered to be parasitic, of which ca. 1400 species are classified as mistletoes, (Kuijit 1969, Calder 1983, Calder & Bernhardt 1983, Nickrent 2001).

Despite the fact that mistletoes are well represented on oceanic Islands, only 8 species of loranthaceous mistletoes are recorded from Bay Islands, India. It is due to lack of a comprehensive attempt to establish an inventory of mistletoe species in Bay Islands. However, Bay Islands rank among few most diverse phytogeographical regions of the world and contribute to rich and unique plant diversity. The present study deals with a taxonomic revision of the genus *Dendrophthoe* from Bay Islands with new record for India and an inventory of host species.

The *Dendrophthoe* Mart. is a genus of hemi-parasitic species belonging to Loranthaceae family of mistletoes. It was described by German naturalist Carl Friedrich Philipp Von Martius in 1830, which is probably a relatively unspecialized derivative of a Gondwana stock which reached Asia after fragmentation of Gondwana (Barlow 1990). The genus *Dendrophthoe* Mart., comprising about 38 species, spreads across tropical Africa, Asia and Australia. Of these, 9 species are found in India and only two species are recorded from Bay Islands, including *Dendrophthoe glabrescens* (Blakeley) Barlow. It is reported for the first time from Bay Islands as a new record for India.

MATERIAL AND METHOD

During 2011-2012, the authors documented and studied the herbarium specimens of *Dendrophthoe* available at the Botanical Survey of India, Port Blair (PBL). As a result, a review of the genus *Dendrophthoe* Mart. (Loranthaceae) from Bay Islands is provided here. Besides, one of the authors (L.J.S) collected an interesting specimen of *Dendrophthoe* Mart (Loranthaceae) while undertaking explorations at Hut Bay, Little Andaman and its environs. After careful examination and perusal of literature (Roxburgh 1832, Bentham & Hooker 1862-1883, Engler 1897, Parkinson 1923, Fischer 1926, Danser 1929, Hutchinson 1959, Duthie 1960, Barlow 1964, 1983, 1984, 1987, 1995, 1997, 2002, Willis 1966, Hooker 1978, Cronquist 1988, Wilson & Calvin 2006, Pandey & Diwaker 2008, Watson 2011), it was identified as *Dendrophthoe glabrescens* (Blakeley) Barlow. The present report from Bay Islands forms a new distributional record for India.

KEY TO SPECIES

1a. Leaves usually darker and more lustrous on the upper surface; inflorescence and flowers tomentose when young.....*Dendrophthoe curvata*

b. Leaves dull on both sides; inflorescence and flowers entirely glabrous.....*Dendrophthoe glabrescens*

DESCRIPTION

Dendrophthoe Mart.

Dendrophthoe curvata (Blume) Miq.

Plate 1, figures A-I, Text-figures 1A-G

Dendrophthoe curvata (Blume) Miq. Fl. Ind. Bat 1(1): 820. 1856; Tiegh, Bull. Soc. Bot. France 42: 252. 1895; Barlow, Blumea 40: 17. 1995; Barlow, Fl. Males. 13: 311. 1997; *Loranthus curvata* Blume, Bijdr: 665. 1826; *Loranthus falcatus* Linn. f. Suppl. P1.: 211.1781; *Dendrophthoe falcatus* (L.f.) Ettingsh, Dinkschr. k. Akad. Wiss., Math, Nat. Kl.Wein 32: 52. 1872; Danser, Bull. Jard. Bot. Buitencorg III, 11: 403. 1931; Baker & Bakh. f., Fl. Java 2: 73. 1965; Barlow, Austral. J. Bot 22: 607. 1947.

Description: Glabrous shurb except for the young parts. Leaves scattered or subopposite, narrowly to broadly ovate or obovate, (4-)10-15 x (1.5-)3-5(-8) cm, attenuate to cuneate at base, mostly obtuse or rounded (sometimes acute) at apex, darker and glossy above or dull on both sides usually soon glabrescent, very rarely completely glabrous; venation pinnate with the midrib and the main laterals visible above and often more distinct below; petiole 10-20 mm long. Inflorescences lateral racemes; axis 10-25 (-30) mm long. Flowers (2-)5-10(-16), bisexual, actinomorphic; pedicels (1-)2-4(-5) mm along. Perianth in mature bud 5-merous, (28-)30-48 mm along, uniformly widened upwards, slightly narrowed to a neck and usually weakly clavate and acute at the apex, various shades of yellow to red and often differently coloured below and above; tube in the open flower 18-30 mm long with the lobes reflexed 4-6 mm long, curved, more deeply split on one side. Stamens 5, anther 3-5 mm long, obtuse, 0.5-1 times as long as the free part of the filament. Ovary, globose, 1-celled; ovule 1, basal placentation; style slender; stigma capitate, 1.5-2 times as wide as the style. Fruit widest near at the base, 8-14 mm long, pale green, turning reddish brown when ripe, stalk 2-5 mm long.

Flowering and fruiting: September-March.

Distribution: Northern Australia, Solomon Islands; Malesia: widespread from Sumatra to New Guinea, India.

Text-figure 1. A-G. *Dendrophthoe curvata* (Blume) Miq. A. Twig. B. Flower bud. C. Flowers. D. Perianth split open. E. Stamen with perianth lobe. F. Pistil. G. Ovary (C.S.), x40.

Plate 1

A-I. *Dendrophthoe curvata* (Blume) Miq. A. Habit. B-D. Inflorescence. E. Flower. F. Perianth (split open). G. Stamen with perianth. H. Pistil. I. Fruit (immature).

Habitat and ecology: Predominantly in humid forests, common in lowlands, recorded hosts in Andaman and Nicobar Islands, India include many genera from many different families.

Specimens examined: India, Andaman & Nicobar Islands, North Andaman: Saddle Peak, 02.12.1976, N. P. Balakrishnan & N. G. Nair 4787 (PBL); South Andaman, Port Blair, 01.05.1964, J. E. Ellis & K. Ramamurthy 18995 (PBL); Dundus Point, 09.06.1973, N. P. Balakrishanan 241 (PBL), Havelock Island, 18.05.1974, R. Ansari 1429 (PBL); Mount Harriet, 15.02.1975, N. Bhargava & N. G. Nair 2253 (PBL), Port Mout, 30.07.1976, N. P. Balakrishnan & N. G Nair, 4262 (PBL); Viper Island, 29.07.1978, P. Basu 6675 (PBL), 23.7.2001, R. Sumathi 1795 (PBL); Wandoor, 03.02.2004, K. Karthigeyan 19697 (PBL); Forest Dera of Kalaton, 30.09.2008, G. S. Lakra 28070 (PBL); Rani Jhansi Marine National Park, Henry Lawrence (South), 14-12-2011, C. Murugan 29760 (PBL); Nayashahar 19.12.2012, L. J. Singh & C. Murugan 29510 (PBL). Little Andaman, Hut Bay, 03.01.1975, N. Bhargava 3310 (PBL), 14.9.2004, L. Rasingam 17568 (PBL).

***Dendrophthoe glabrescens* (Blakely) Barlow**

Plate 2, A-H, Text-figures 2, A-I

Dendrophthoe glabrescens (Blakely) Barlow, Proc. Linn. Soc. New S. Wales 87: 55. 1962; *Loranthus vitellinus* var. *glabrescens* Blakely, Proc. Linn. Soc. New S. Wales 50: 19. 1925; *Dendrophthoe pelagica* Barlow, Austral. J. Bot. 22: 609. 1974; in Handb. Fl. Papua New Guinea 2: 242. 1981.

Description: Glabrous shrub. Leaves scattered or sub-opposite narrow, lanceolate to elliptic or obovate, 5-8(-20) x 1.5-4 cm, dull on both sides, attenuate at base, rounded at the apex; venation pinnate with the midrib distinct and the main laterals usually visible on both sides; petioles (3-)8-25 mm long. Inflorescence lateral racemes; peduncle. Flowers (3-) 5-10 (-20), bisexual, actinomorphic; pedicel, axis (5-) 30-60 mm long. Perianth in mature bud 5-merous, 30-45 (-50) mm long, uniformly widened upwards, slightly narrowed to a neck, cylindrical or weakly clavate and acute at the apex, mostly yellow, often darkening with age, sometimes red, especially in the upper part; tube in the open flower 20-35 mm long with the lobes reflexed 2-4 mm higher, curved. Stamens 5; anther 3-5 mm long, obtuse at apex, 0.5-1 times as long as the free part of the filament. Ovary 1-celled, ovule 1, basal placentation; style slender; stigma capitates. Drupes elliptic-oblong, 9-16 mm long, greenish yellow, turning reddish pink when ripe, stalk 3-6 mm long.

Flowering and fruiting: February-May.

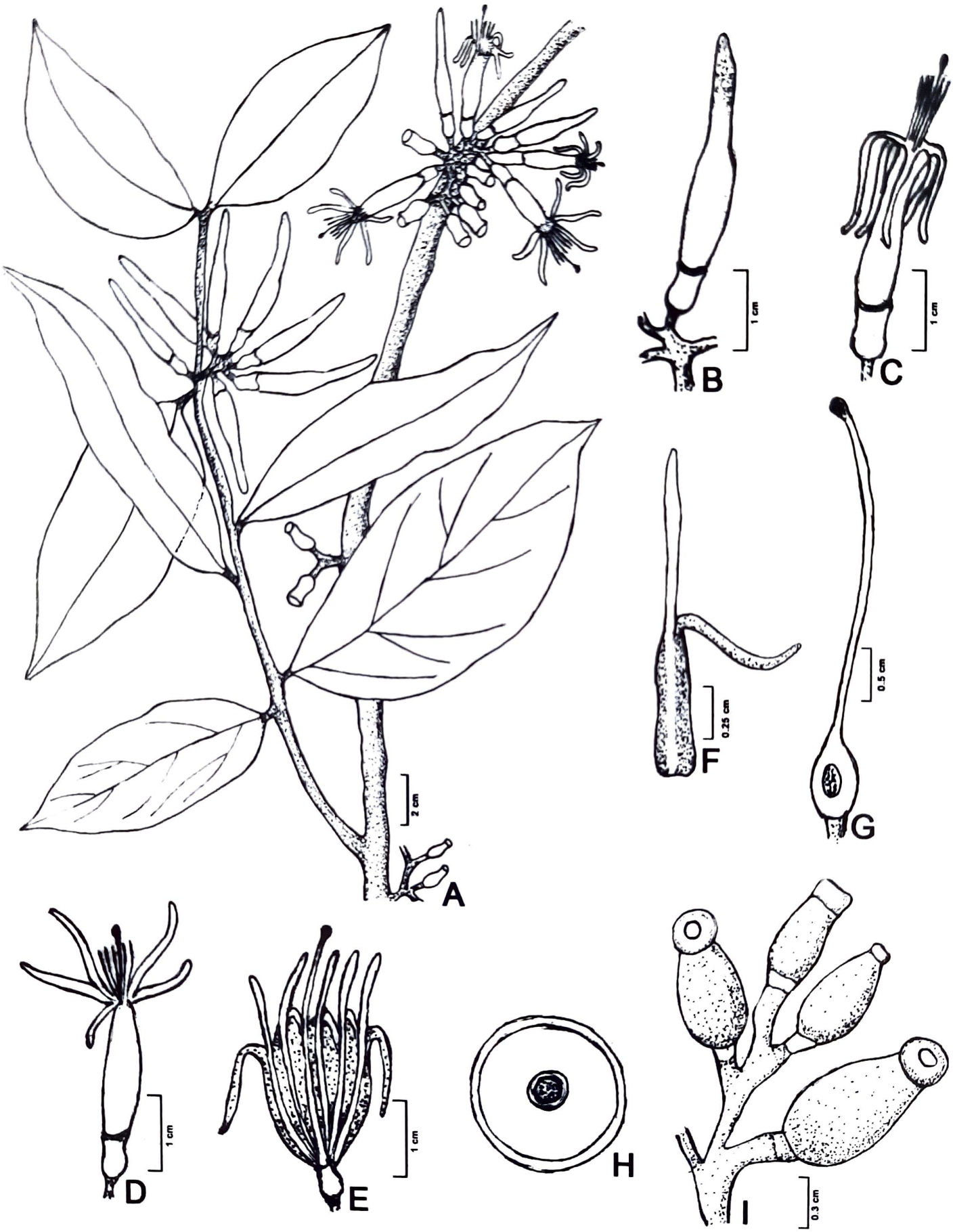
Habitat and ecology: Monsoon forests and woodlands, 58 m altitude; Besides *Eucalyptus* spp. recorded as hosts in India: Andaman & Nicobar Islands include *Psidium guajava* L. of Myrtaceae.

Distribution: India (Andaman and Nicobar Islands), Australia; Malesia: Lesser Sunda Islands (Lombok, Timor Alor), Papua New Guinea (Western Province).

Specimens examined: India, Andaman & Nicobar Islands, Little Andaman, Hut Bay, near V-vet Guest House, 01.04.2012, Lat. 10° 3521.0' N: Long. 092° 3225.6' E, L. J. Singh 29533 (PBL) and Forest of Netajee Nagar, 07.04.2012, N 10'3906.0, E 092'3153.5, L. J. Singh 29538 (PBL).

Remarks: The species is growing as a semiparasite on *Psidium guajava* L. of Myrtaceae in open and humid tropical forests of little Andaman of Bay Islands, India.

In addition, the present study also recorded the new host species for *Dendrophthoe* from Bay Islands, for the first time. The species of mistletoes have host specific relationship with a particular host species. (Barlow &Weins 1977, Barlow 1984) and exhibit a high degree of mimicry (Balow & Wiens 1977, Calder 1983). Sometimes, the mimicry is so close that they are almost impossible to detect. Although Dean et al. (1994) stated that our knowledge of host species is incomplete, the genus *Dendrophthoe* is commonly parasite on eucalypts of Myrtaceae family (Barlow & Weins 1977, Barlow 1981, 1984, Turner 1991, Downey 1998, Downey 1988). In Bay Islands, common misconception is that only mistletoe host species is parasite on members of the genus *Mangifera* of Anacardiaceae. However, in the present study, authors



Text-figure 2. A-I. *Dendrophthoe glabrescens* (Blakely) Barlow. A. Twig. B. Flower bud. C-D. Flowers. E. Perianth split open. F. Stamen with perianth lobe. G.Pistil. H. Ovary (C.S.), x40. I. Fruits.

Plate 2

A-H. *Dendrophthoe glabrescens* (Blakely) Barlow. A. Twig. B-D. Inflorescence. E. Perianth (split open). F. Stamen with perianth lobe. G. Pistil. H. Fruits.

have physically observed that the genus *Dendrophthoe* parasitises on *Citrus reticulata* (Rutaceae), *Grewia calophylla* Kurz. (Tiliaceae), *Horsfieldia glabra* (Blume) Warb. (Myrsticaceae), *Mangifera indica* L (Anacardiaceae), *Eucalyptus botryoides* J. E. Smith and *Psidium guajava* L. (Myrtaceae) and commonly reduce their growth and can kill them with heavy infestation. The authors have noticed the parasite *Dendrophthoe curvata* (Blume) Miq. growing luxuriantly on *Grewia calophylla* Kurz. and *Dendrophthoe glabrescens* (Blakely) Barlow on *Psidium guajava* L. and exhibit a network of epicortical roots.

DISCUSSION

The genus *Dendrophthoe* Mart. is probably a relatively unspecialized derivative of a Gondwana stock which reached Asia after fragmentation of Gondwana supercontinent (Barlow 1990). Barlow (1995) stated that the species *Dendrophthoe glabrescens* tends to be geographically replacing *Dendrophthoe curvata* which mostly occurs in humid forest. At the interface between humid forests and seasonal monsoon vegetation in New Guinea and northern Australia, there is a morphological transition which indicates there is introgression between the two species. *Dendrophthoe curvata* (Blume) is regarded as a very polymorphic species extending from India to Australia. The parasites of Indian flora remained neglected and unexplored. The aim of this study is to establish a base line inventory of known taxa to species level as well as inventory of host species and to stimulate systematic documentation of species of such type of fascinating plants.

Apart from the issue of mistletoe exploration in India, only few attempts have been made to establish an inventory of host species for mistletoes (Fischer 1926, Sarma 1952, Oza 1962, Johari & Bhatnagar 1972, Thriveni et al. 2010). In the present study, the invention of host species indicated the diversity of plant species which can be parasitized within each mistletoe species.

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