

ADDITIONAL NOTES ON THE DISTRIBUTION OF *PALAQIUM RAVII* SASIDH. & VINK (SAPOTACEAE) AND LOCAL VICARIANCE AND ENDEMISM IN *PALAQIUM*

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ABSTRACT

Palaquium ravii Sasidh. & Vink, formerly known from the districts of Trichur and Idukki has been collected from the Nelliampathy forests of Palakkad district. The species assumes to have a wider distribution than thought before, spanning from South of Palakkad (Palghat) gap up to Aryankavu pass. The genus *Palaquium* is a typical example for local vicariance and local endemism; while *P. ellipticum* (Dalz.) Baillon is distributed throughout the W. Ghats, *P. bourdillonii* Brandis is restricted to the Agasthyamalai ranges (Ashambu Hills) and *P. ravii* Sasidh. & Vink is restricted to the Anamalai-Palni-Cardamom hill complex.

INTRODUCTION

Sapotaceae is a pan-tropical family of 53 genera and about 1,100 species, mostly comprising laticiferous trees in humid forests, but some extending to semi-arid and arid regions. *Palaquium* Blanco is a moderately large genus in the family. The genus is distributed from India through S. E. Asia to the Pacific Islands and comprises 110 species, with its main centres of concentration in Borneo and the Philippines (Van Royen, 1960; Verdcourt & Meijer, 1995). Monopodial tree architecture, coriaceous, petiolate, entire leaves clustered at the apex of the branchlets, pedicellate flowers fascicled in the axils of

leaves/fallen leaf scars and the fleshy berries with 1-2 seeds and the thick cotyledons characterise the genus. The Indo-Sri Lankan region is represented by about 12 species of the genus, viz. *Palaquium bourdillonii* Brandis, *P. canaliculatum* (Thw.) Engl., *P. ellipticum* (Dalz.) Baillon, *P. laevifolium* (Thw.) Engl., *P. pauciflorum* (Thw.) Engl., *P. petiolare* (Thw.) Engl., *P. polyanthum* (Wall.) Baillon, *P. grande* (Thw.) Engl., *P. obovatum* (Griff.) Engl., *P. rubiginosum* (Thw.) Engl., *P. thwaitesii* Trimen and *P. ravii* Sasidh. & Vink (Sasidharan & Vink, 1991). Out of these 12 species, three are

found distributed in the Western Ghats, viz. *Palaquium ellipticum* (Dalz.) Baillon, *P. bourdillonii* Brandis and *P. ravii* Sasidh. & Vink (Gamble, 1921; Sasidharan & Sivarajan, 1996; Sasidharan, 1998, 2004).

The present authors, while making an ecological study of the evergreen forests of the Nelliampathy hills, came across a tree of *Palaquium* (V. S. Ramachandran & K. Swarupanandan 24361), which did not agree with *P. ellipticum* (Dalz.) Baillon, the common species of the genus widely distributed throughout the Western Ghats. This material on further investigation was found to belong to *P. ravii* Sasidh. & Vink. This species was first described from the Peechi Forest Range falling in the Thrissur District, Central Kerala (Sasidharan & Vink, 1991). Later, it was reported from the forests of Mlappara region of Periyar Tiger Reserve, Idukki District (Sasidharan, 1998). The present report, therefore, extends the distribution of the species, beyond its known distribution areas.

The species is related to *P. obovatum* (Griff.) Engl. in the obovate-obtuse or obovate-rounded leaves and the obovoid berry, but differs in the absence of arcuate connections between the secondary nerves and where the tertiary nerves are transverse (Sasidharan & Vink, 1991). As detailed description of the species is not available in local taxonomic works, we provide below, a short description of the species.

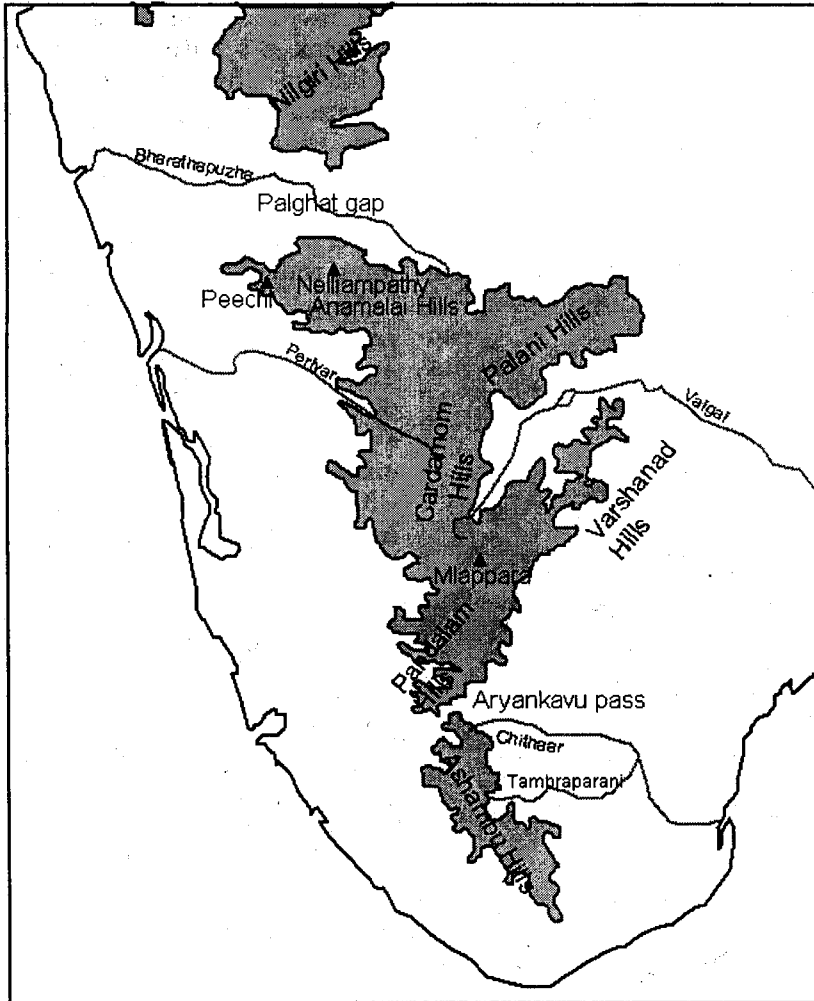
***Palaquium ravii* Sasidh. & Vink in Blumea 35 : 385. 1991.**

Trees, up to 45 cm in diam. and 30-35 m tall. Branchlets 3-5 mm thick, resting bud pubescent; stipules small, outer surface pubescent, caducous. Bark 10-12 mm thick,

greyish brown, smooth, semifibrous, blaze flesh red in colour; latex milk white. Leaves clustered on branchlets; petioles 1.5-2.5 cm long, glabrescent; blade 7-13 x 3.5-6.5 cm, obovate, obtuse or rounded, base attenuate, coriaceous; midrib prominent below; lateral nerves 6-8 pairs, archingly joined, prominent below, intercostae widely reticulate. Flowers solitary or in 2 to 8-flowered axillary clusters; pedicels 7-9 mm long, minutely brown tomentose. Sepals 6, in 2 series, obtuse to acute, minutely brownish tomentose outside; outer sepals ovate, 4-5 x 2.5-3 mm; inner ones ovate-oblong, 4-5.5 x 2-2.5 mm. Petals creamy white, tube 3 mm long, throat woolly; lobes oblong, 5 x 2 mm, acute. Stamens 12, in 2 series; filaments 3 mm long; anthers 1 mm long, apex bifid. Ovary globose, 1.5-2 x 1.5-2 mm, hirsute, slightly 12-ribbed, 6-celled; style 7-9 mm long, glabrous; stigma mucicous. Fruits obovoid, 2 x 1.5-1.8 cm; pericarp brown, 1-2 mm thick. Seeds 1 or 2, elliptic or orbicular, somewhat plano-convex, 11 x 8 x 4 mm, scar 10 x 4 mm; cotyledons plano-convex, 9 x 6 mm (Fig. 1).

Distribution : Western Ghats in Kerala between Palghat gap and Aryankavu pass, in evergreen forests between 700 and 900 msl (Map 1). The species has been ranked 'endangered' (Sasidharan, 2004). The approximate aerial distance between Nelliampathy and Peechi is 40 km) while that between Nelliampathy and Mlappara is ca 190 km. Although *P. ravii* Sasidh. & Vink has not been recorded from any other location in the Anamalai-Palni-Cardamom hill complex; there is a very likelihood that the species inhabits many other areas there.

Specimens examined : India : Kerala : Trichur Dt., Sasidharan 5062 (KFRI); Peechi Range, Trichur, 21.4.1988, fl. & fr. (KFRI); Palakkad Dt., V. S. Ramachandran & K. Swarupanandan 24361 (KFRI); Thuthampara, Nelliampathy, fr., 17.4.2004 (KFRI); Idukki Dt., Jomy Augustine 13616 (KFRI); Mlappara, Periyar Tiger Reserve, 21.4.1994, fl. & fr. (KFRI).



Map 1. Showing the physiographic units of Southern Western Ghats (>450 msl) and the distribution of *Palaquium ravii* Sasidh. & Vink.

PHYTOGEOGRAPHIC SIGNIFICANCE

By virtue of some mountain passes that cut across the relief of the Western Ghats, physiographic segments are identifiable in the latter. The Palghat gap and the Aryankavu (Chenkotta) pass are

two such passes that segment the Southern Western Ghats in Kerala. The region bounded by the two above passes is a natural mountain segment, the Anamalai-Palni-Cardamom hill complex (Subramanyam & Nayar, 1974); this segment of the Western Ghats is considered a biodiversity

hotpot and a microcenter of endemic plants in India. Approximately 137 endemic flowering plants are reported from this segment (Nayar, 1996). It consists of three mountain ranges, Anamalai hills towards the north, the Cardamom hills (Elamalai) forming the southern half and the Palni hills being the eastern extension in Tamilnadu. It is interesting to note that all the three collections of *Palaquium ravii* Sasidh. & Vink (Thuthampara in Nelliampathy hills, Peechi Forest Range in Trichur, and Mlappara in Periyar Tiger Reserve) fall within the Anamalai-Palni-Cardamom hill complex.



Fig. 1. Photograph of herbarium sheet of *Palaquium ravii* Sasidh. & Vink from Nelliampathy.

Endemic plants belonging to the W. Ghats are of different geographic categories: species restricted to Southern W. Ghats, Central W. Ghats, Northern W. Ghats, etc. have been recognized (see Gamble, 1915-1936; Sanjappa, 1991; Ahmedulla & Nayar, 1987). As already

indicated, Anamalai-Palni-Cardamom hill complex is a natural segment of W. Ghats delimited by Palghat gap and the Aryankavu pass. This is indicative of the fact that the specific features of the mountain relief system, i.e. continuities and discontinuities, have played an important role in manifesting and maintaining endemism in the Western Ghats.

The ups and falls in the mountain relief, in addition to physiographic discontinuities, also create niche discontinuities. Western Ghats receive an average annual rainfall of well over 2000 mm. Although this is true for the entire W. Ghats, the number of rainy days is more towards the south and the total quantum higher towards the north (Legris & Viart, 1965; Labroue *et al.*, 1965; Pascal, 1988). A larger number of rainy days in the Southern W. Ghats is considered to be one of the reasons why there is an excessive aggregation of endemics over there (Pascal, 1988). As orography directly affects atmospheric circulation and pluvial pattern (Meher-Homji, 1978; Petrosyants, 1968), orographic discontinuities also create niche discontinuities and island-like situations in turn (Subramanyam & Nayar, 1974). When ecological or niche discontinuities exist, species adapted to specialized niches fail to cross the niche barriers, creating endemism.

PALAQIUM, AN EXAMPLE OF LOCAL VICARIANCE AND ENDEMISM

Of the three species of *Palaquium*, *P. ellipticum* (Dalz.) Baillon is endemic to the Western Ghats but is widespread throughout its entire length (ca 1,600 km) in low and medium elevation evergreen

forests up to 1,500 msl (Pascal, 1988; Sasidharan, 2004). It is a lofty tree reaching up to 1 m in diameter (Balasubramanyan *et al.*, 1985). While *P. ellipticum* (Dalz.) Baillon is widely distributed, the other two species are of narrow distribution, the distributional areas of which fall within the distribution area of the former. The second species, *P. bourdillonii* Brandis, is endemic to Southern W. Ghats, and is not known north of the Aryankavu pass, being restricted to Quilon and Trivandrum in the Agasthyamalai hills (Sasidharan, 2004). Gamble (1921) described it a medium-sized tree. The third, *P. ravii* Sasidh. & Vink, as already described, is restricted to the Anamalai-Palni-Cardamom hill complex, falling north of Aryankavu pass. Although *P. bourdillonii* Brandis and *P. ravii* Sasidh. & Vink are sympatric with *P. ellipticum* (Dalz.) Baillon, reciprocally *P. bourdillonii* Brandis and *P. ravii* Sasidh. & Vink are not.

Vicariance, i.e. local replacement of a species by other species of the same genus or taxonomic group often leads to endemism and is known for a number of tree genera all along the W. Ghats (Pascal, 1988). For example, in the genus *Dipterocarpus* (Dipterocarpaceae), *D. indicus* Bedd. is distributed along the W. Ghats from South Canara to Thirunelveli, whereas *D. bourdillonii* Brandis is restricted to the segment of W. Ghats south of Carcoor ghats (Karnataka) up to Aryankavu pass. In the genus *Vateria* (Dipterocarpaceae), *V. indica* L. has a distribution similar to that of *Dipterocarpus indicus* Bedd. i.e. from South Canara to Thirunelveli, whereas *V. macrocarpa* Gupta is restricted to

Attappadi forests, the segment lying between Attappady pass and Palghat gap. Similarly, in the genus *Garcinia* (Clusiaceae), *G. gummi-gutta* (L.) Robson and *G. morella* (Gaert.) Desr. are found throughout the W. Ghats, while *G. travancorica* Bedd. is found only in the southern-most parts of W. Ghats up to 1000 m, *G. wightii* T. Anders., a riparian species, is found only in Central and Northern Travancore, *G. rubro-echinata* Kosterm., a species of medium elevation (800-1,500 m), is found in the whole of Travancore and Thirunelveli hills, where it succeeds the preceding two species in altitude (Pascal, 1988). The distribution of the various species of *Palaquium* also falls examples of local vicariance and endemism.

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