



Research article

## Status of the Genus *Pisonia* L. (Nyctaginaceae) in Andaman & Nicobar Islands, India

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**Abstract:** The family Nyctaginaceae is represented by 6 genera and 14 species in India of which the genus *Pisonia* L. is the most significant genus due to its woody, arborescent habit, differential leaf arrangement pattern, presence of unisexual, hermaphrodite and polymorphic flowers in same and or different plants, unique characters of anthocarps and distinct types of pollen grains. During carrying out the taxonomic revision of the family Nyctaginaceae in India, the first author has emphasized the genus *Pisonia* with detailed account of infra-generic taxa. The present paper deals with current status of the species of *Pisonia* in Andaman & Nicobar Islands, along with their correct nomenclature, diagnostic characters, phenology, ecology, distribution and uses. A key has been provided to help in easy identification of the species.

**Keywords:** *Pisonia* L. - Status - Andaman & Nicobar Islands.

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### INTRODUCTION

The Andaman and Nicobar Islands, situated in the Bay of Bengal within 92°–94° E and 6°–14° N is characterized by tropical rain forests enriched with mangrove vegetation. The genus *Pisonia* L. comprises ca. 40 species in world (Mabberley 2008), mostly distributed in tropical America, few in continental South-east Asia; only one species has reported in east Africa and two others in Madagascar. In India, the genus is represented by only 3 species, viz. *P. aculeata* L., *P. grandis* R.Br. and *P. umbellifera* (Forst.) Seem. All the species are reported from Andaman and Nicobar Islands (Fig. 1) of which *P. umbellifera* is endemic to this region.

### MATERIALS AND METHODS

The preset study is primarily based on thorough scrutiny of herbarium specimens of 3 species of the genus *Pisonia* L. deposited at the herbarium of Botanical Survey of India, Andaman and Nicobar Circle, Port Blair (PBL), Southern Circle (MH) and Central National Herbarium (CNH), Howrah, W.B. The cibachrome photographs of types provided from Royal Botanic Garden Herbarium (K) were consulted. Identification of taxa was done with the help of local and regional literatures (Hook 1885, Parkinson 1923). For studied species, a key to the species along with correct nomenclature, diagnostic features, phenology, ecology, distribution and uses are provided.

### RESULTS

#### Observation

The genus *Pisonia* L. is characterized by dioecious, or monoecious shrubs, small trees or vines, sometimes overhanging climbers, unarmed or with axillary recurved thorns, up to 30 m high. Bark soft, brittle, pale cream in colour. Leaves opposite or alternate, or ternate or conferted to the end of the twigs, chartaceous or leathery or papery or membranous. Inflorescence many-flowered in umbelliform or corymbosely thyriform, pedunculate cymes. Flowers unisexual or bisexual or polymorphic, bracteates; bracts caducous. Male and female flowers of

different shapes, Stamens 6–10 in male flowers. Carpel rudimentary. Staminode as long as ovary, with rudimentary anthers in female flowers. Anthocarp (fruit) dry, indehiscent, utricle with coriaceous perianth base, obscurely or distinctly 5-angled, with or without monoserial to biserial prickles.

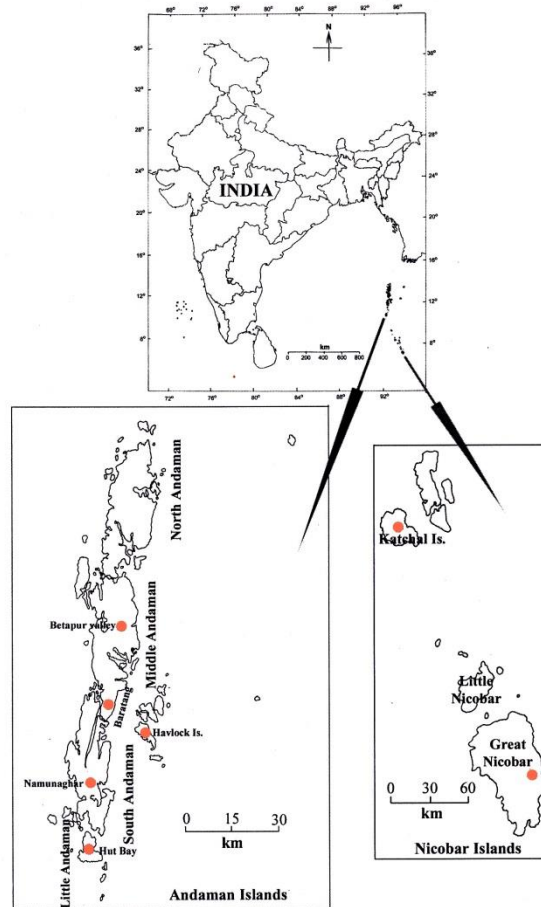


Figure 1. Distribution of the genus *Pisonia* L. in Andaman & Nicobar Island.

*Key to the studied species*

- 1a. Overlapping woody climber, mostly with recurved axillary thorns; male and female flowers of different shape; anthocarps with 5 biserial rows of viscid prickles..... **1. *P. aculeata***
- 1b. Unarmed shrubs or trees; dioecious plants, male and female flowers of similar shape; anthocarp otherwise..... **2**
- 2a. Leaves with distinct dark veins contrasting with lighter coloured intercostal veins; lateral and intercostal veins hairy beneath; anthocarps with monoserial prickles..... **2. *P. grandis***
- 2b. Leaves without distinctly contrasting dark veins; veins glabrous beneath; anthocarps glabrous, neither prickled or muricate..... **3. *P. umbellifera***

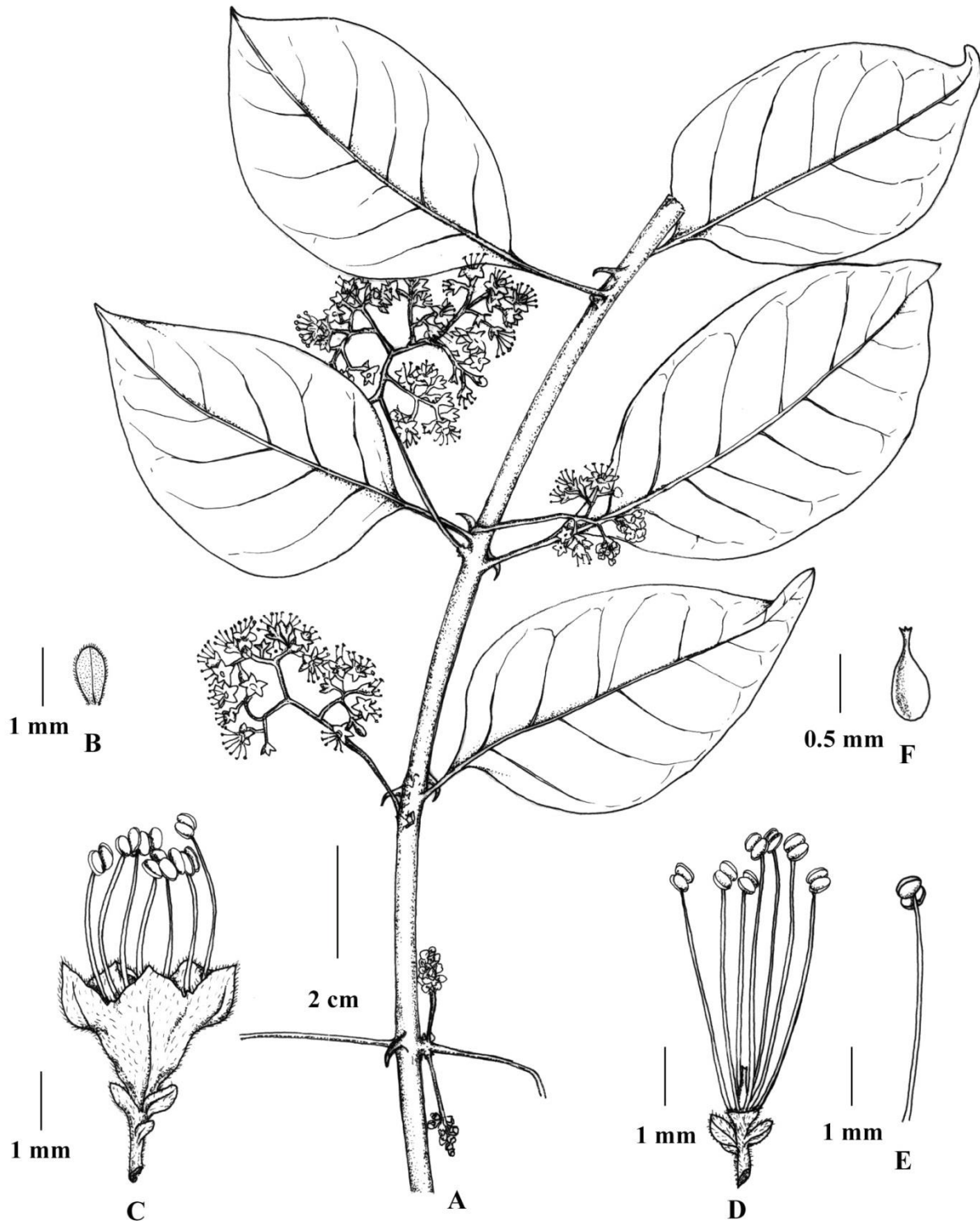
*Enumeration of the studied species*

**1. *Pisonia aculeata*** L., Sp. Pl. ed. 1: 1026. 1753; Parkinson, Forest Fl. Andaman Is. 222. 1923; Banerjee *et al.*, Diversity Coastal Plant Comm. India 326. 2002. **(Fig. 2, 3, 4)**

Tall woody overhanging thorny climber, or shrub, to 6 m tall with smooth, olive green bark. Branches pubescent, with numerous thorns as abortive shoots, 0.5–1.0 cm long, axillary, recurved, sharp, glabrous or rusty pubescent. Inflorescences dense axillary and terminal corymbose cymes; male flowers in compact corymbose cymes; female flowers in lax divaricate cymes, brown, short hairy. Flowers unisexual. Fruit (anthocarp) narrowly oblong or clavate-oblong or clavate, 1–3×0.4–0.6 cm, with 5-biserial rows of viscid prickles, tomentose between the ribs, rounded at apex, narrowed at base, thinly coriaceous.

**Phenology:** *Fl.*- December–January; *Fr.*- February–March.

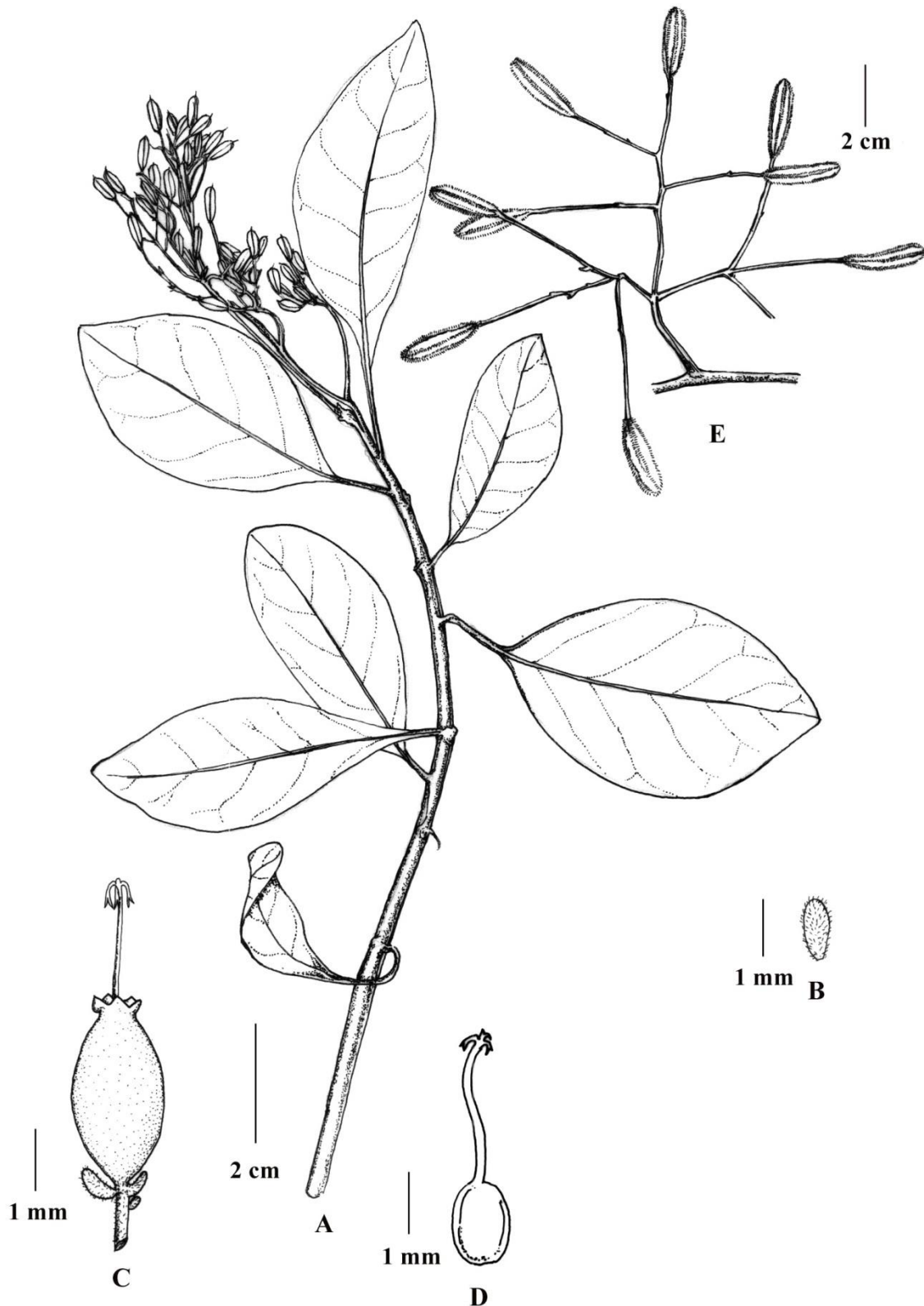
**Ecology:** The plant is found to grow along coasts, hedges, rain forests and semi dry places forming impenetrable messes on forest edges; from low land up to 500 m.



**Figure 2.** *Pisonia aculeata* L. (Male plant): **A**, A portion of flowering twig; **B**, Floral bract; **C**, Flower; **D**, Stamens surrounding rudimentary carpel; **E**, Stamen; **F**, Rudimentary carpel; [A–F: R.K. Premnath 8451(CAL)].

**Distribution:** India (Andaman Islands, Andhra Pradesh, Bihar, Jharkhand, Karnataka, Kerala, Maharashtra, Orissa, Tamil Nadu, West Bengal), Africa, America, Australia, Malagasy, Mauritius, Myanmar, Seychelles, Sri Lanka, Vietnam.

**Uses:** The bark and leaves of the plant are used as a counter-irritant for swellings and rheumatic pains. The juice of the leaves, mixed with pepper and other ingredients is given to children, suffering from pulmonary complaints. Decoction of the fresh leaves is used to wash scabies. The plant makes an excellent hedges (Kirtikar & Basu 1918, Anonymous 1962).



**Figure 3.** *Pisonia aculeata* L. (Female plant): **A**, A portion of fruiting twig; **B**, Floral bract; **C**, Flower; **D**, Carpel; **E**, Inflorescence [A–E: D. Hooper & M.S. Ramaswami 39273(CAL)].

**Specimens examined:** INDIA, Nicobars, Battimalo, March 1891, *Prain s.n.* (CAL); Andaman Is., Long Island, sea level, 5.12.1915, *Parkinson* 760 (CAL, DD); Andaman, Little Andaman beach, 2 m, 10.03.1959, *Thothathri* 9266 (CAL, MH); South Andamans, Havelock Island, Camp no. 4, 24.03.1980, *Rao, Chakraborty & Premnath* 7664 (CAL); South Andamans, Havelock Island, Camp no. 3, Sea level, 27.03.1980, *Rao & Premnath* 7939



(CAL); Little Andaman, Hut Bay, 11.02.1981, *Premnath* 8451 (CAL); Little Andaman, Hut Bay, 16.02.1981, *Premnath* 8479 (CAL).



**Figure 4.** *Pisonia aculeata* L.: Photograph of the portion of fruiting twig.

**2. *Pisonia grandis*** R. Br., Prodr. Fl. Nov. Holl. 1: 422. 1810. **(Fig. 5, 6)**

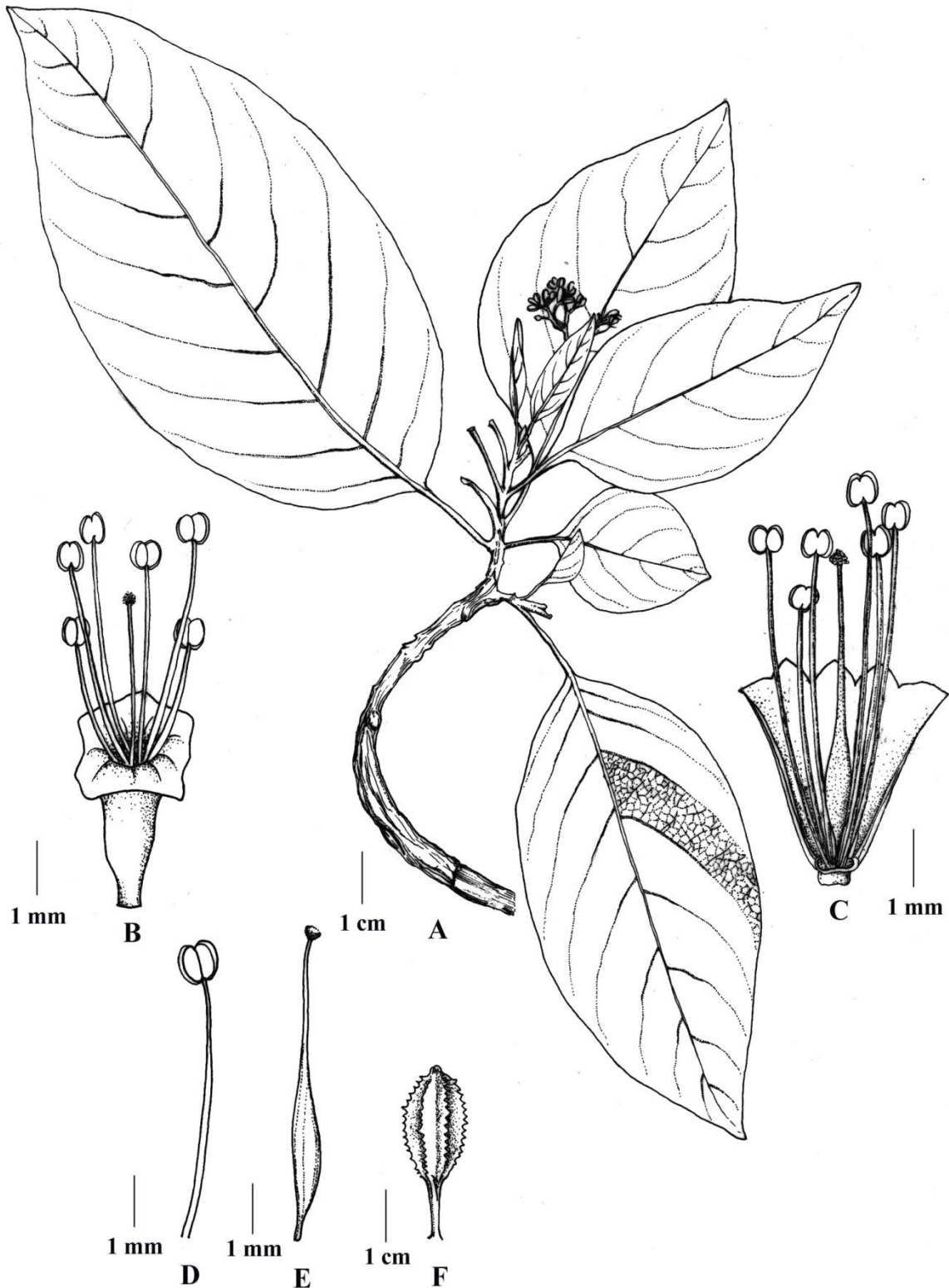
*P. alba* Span. in Linnaea 15: 342. 1841; Hook. f. in Hook. f., Fl. Brit. India 4: 711. 1885. *P. morindifolia* R. Br. ex Wight, Ic. t. 1765.1852.

Terrestrial, evergreen, arboreous, unarmed, branched shrub, or a small tree, 8–12 m tall with exposed roots. Bark white-grey with conspicuous furrows, large leaf-scars and conspicuous lenticels. Leaves lettuce green at maturity, yellowish-white at younger stage. Inflorescences terminal, dense corymbose cymes with polygamous flowers. Fruits (anthocarp) narrow, elongated to club-shaped, or clavate, 5-ribbed or angled; each angle with monoserial row of prickles; hairy between ribs.

**Phenology:** *Fl. & Frt.*- January–March.

**Ecology:** The plant grows on dry to semi-dry places, along coasts, sandy or rocky situation, up to 50 m, on oceanic islets and often dominant. This Species is also cultivated as an ornamental plant in gardens.

**Distribution:** India (Andaman Islands, Dadra, Daman, Diu, Goa, Gujarat, Kerala, Maharashtra, Nagarhaveli, Nicobar Islands, Tamil Nadu), Australia, China, Laccadive, Malagasy, Maldives Island, Malesia, New Caledonia, Polynesia, Pakistan, Sri Lanka.



**Figure 5.** *Pisonia grandis* R.Br.: **A**, A portion of flowering twig; **B**, Flower; **C**, Flower splitted open; **D**, Stamen; **E**, Carpel; **F**, Fruit [A–F: V. Balasubramaniam 1359 (CAL, MH)].

**Uses:** The fresh leaves, moistened with Eau-de-cologne, are used to subdue inflammation of a filarioid nature in the legs and other parts. Plant is used as diuretic (Anonymous 1969). The root is considered as purgative. Leaves are taken as green vegetable. The plant also serves as a good hedge. Native people sometimes use the sticky fruits to catch birds. In several islands the leaves are used as vegetables specially the cultivated land race with creamy or yellowish chlorotic leaves described as so-called “Moluccan Cabbage” or “Lettuce tree”.



**Specimens examined:** INDIA, South Andaman, Narcondam, 1891, *Prain s.n.* (CAL); Little Andaman, Way to Harmander Bay, sea level, 07.01.1976, *Bhargava 3284* (CAL, PBL); Andaman Islands, 10.02.1979, *Krishanlal, Bramoh 33* (DD).



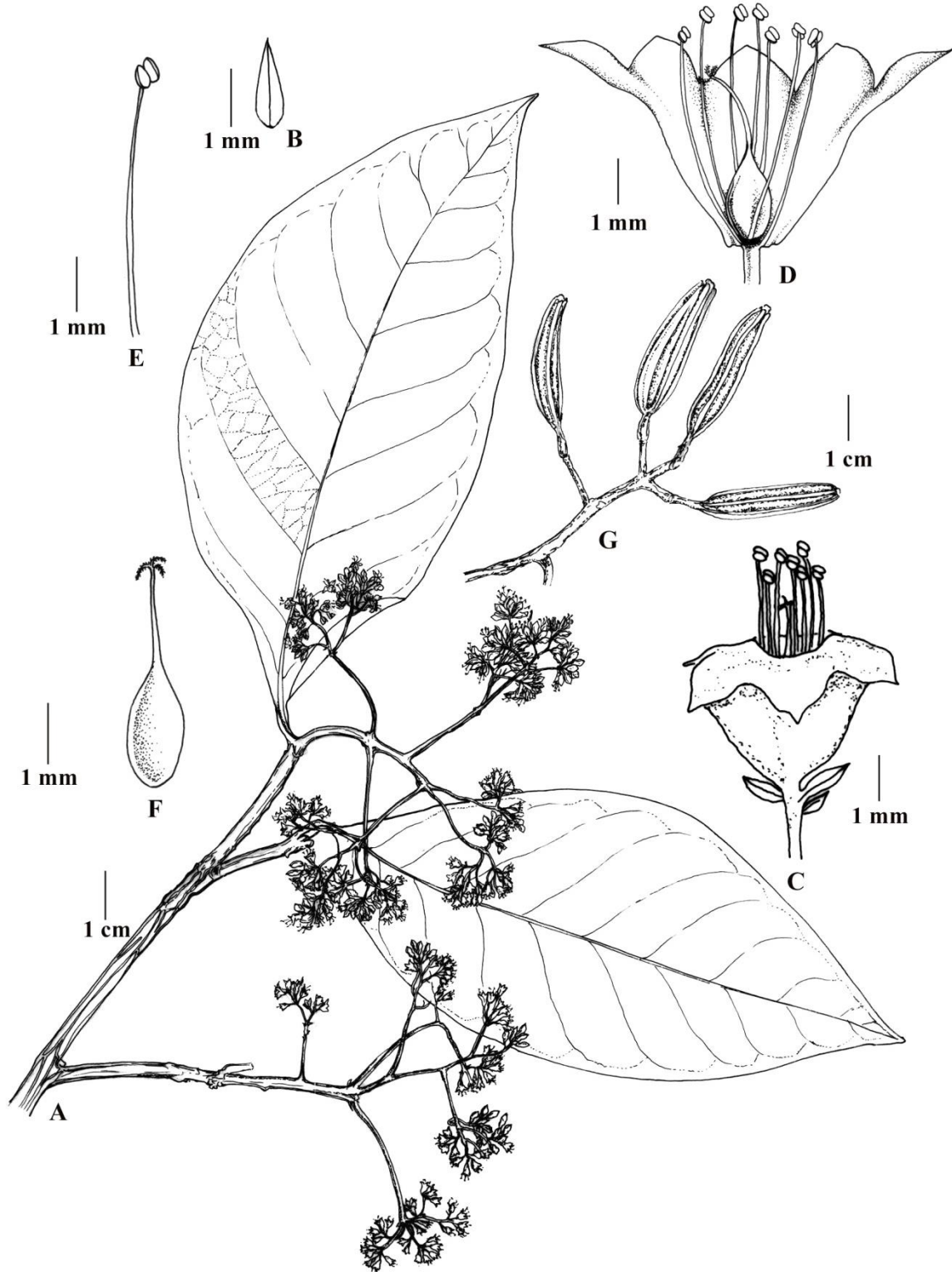
**Figure 6.** *Pisonia grandis* R.Br.: Photograph of the plant [Inset –Portion of flowering twig (right below); portion of fruiting twig (left top)].



**3. *Pisonia umbellifera*** (Forst.) Seem. in Bonplandia 10: 154. 1862.

(Fig. 7, 8)

*Ceodes umbellifera* Forst., Char. Gen. 71, t. 71. 1776. *Pisonia excelsa* Bl., Bijdr. 735. 1825; Choisy in DC., Prod. 13(2): 441. 1849; Parkinson, Forest Fl. Andaman Is. 222. 1923; *P. brunoniana* Endl., Prodr. Fl. Norfolk 43. 1833. *Heimerliodendron brunonianum* (Endl.) Skottsbo. in Svensk. Bot. Tidskr. 35: 364. 1941. *Bugainvillia racemosa* Blanco, Fl. Filip. 307. 1837; Merr., Sp. Heimerl Oest. Bot. Z. 63: 284. 1913.



**Figure 7.** *Pisonia umbellifera* (Forst.) Seem.: **A**, A portion of flowering twig; **B**, Floral bract; **C**, Flower; **D**, Flower splitted open; **E**, Stamen; **F**, Carpel; **G**, Infructescence (In portion) [A-F: Dr. Prain's collector 47(CAL); G: N.P. Balakrishnan and N.C. Nair 3591(CAL)].



Evergreen, perennial shrub, or a small-sized tree, up to 30 m high with spreading, unarmed branches. Bark smooth, grayish with soft, cream-coloured sap wood. Inflorescences terminal, compact, multi-branched, many-flowered, compound umbel, 3–9 cm across, sericeous or glabrous. Flowers polygamous. Fruits (athocarps) cylindrical or clavate, subterete, 2–4×0.3–0.5 cm, slightly curved, indistinctly 5-ribbed, coriaceous, enclosed within persistent calyx, black-brown; ribs very viscid, without prickle-like glandular structures.

**Phenology:** *Fl.*- January–February; *Frt.*- March–May



**Figure 8.** *Pisonia umbelliera* (Forst.) Seem.: Photograph of the plant growing in the garden, Hadda, Port Blair, BSI [Inset- Portion of the flowering twig with buds (left below) and portion of flowering twig (right below)].

**Ecology:** This plant is found to grow often in coastal areas, from low to medium elevations, exposed to winds, both in ever-wet and monsoon forests; also grows along river banks, creeks, on sandy clay, sand and rocks under xeric habitat. It is known to grow up to the altitude of 243 m.

Anthocarps of this species being too much viscid and becomes adhered with feathers of birds and thus they are known to have fallen victim. This species has been commonly named as ‘Bird Lime’ tree.

**Distribution:** India (Andaman Islands and Great Nicobar Islands), South Africa (Cape of Good Hope); Christmas Island (S. of Java), Formosa, Hainan, Malagasy, Malesia, Mascarenes, Mauritius, New South Wales, North Australia, Pacific (Bonin Island), Micronesia (Palau, Yap, Truk), Melanesia (Bismarck Arch., Fiji, Lord Howe Island, Mangareva, Marquesas, North Island Of New Zealand, Norfolk Island, Pitcairn, Samoa, Solomon Island, Tanna, Tubuai Island), Queensland.

**Uses:** In Pacific region the sticky-viscid anthocarps of *Pisonia umbellifera* (Forst.) Seem. have been noted to use as bird catcher. The fruits or infructescences hang as fly or bird catcher. The birds disseminate the sticky fruits but due to excessive accumulation of fruits on feathers of small birds render them incapable of further flight and cause their eventual death (Govett 1884, Kirk 1884, John 1951, Stemm. 1964, White 1924). The wood of this plant is soft and full of sap, eaten with relish by elephants (Parkinson 1923) and is said that the sheep, which eat it get over their teeth a golden colour and appeared just like gold.

**Specimens examined:** INDIA, Andaman Islands, 1884, *King’s Collector* Y (DD); S. Andamans, Namuna ghar-hilly jungle, 13.12.1890, *King s.n.* (CAL); S. Andaman, Part monat jungle hill, 28.02.1891, *King s.n.* (CAL); S. Andaman, Tea garden, January 1893, *King’s collector s.n.* (CAL); S. Andaman, Hikk jungle at Hobdaypur, 04.03.1893, *King’s collector s.n.* (CAL); S. Andaman, Perseverance Point-Hill jungle, 19.12.1894, *King’s collector s.n.* (CAL); S. Andaman, Peseverance by, *Kurz, s.n.* (CAL); Andamans, 23.01.1901, *Prain’s collector* 42 (CAL); Andaman Islands, Mount Harett, 800 ft., 02.01.1916, *Parkinson* 836 (CAL); Andamans, Betapur valley, sea level, 25.03.1916, *Parkinson* 1141 (CAL, DD); Andaman Islands, Havelock Islands, 2 m, 20.01.1959, *Thothathri* 9097 (MH); Andaman Islands, Colinpur, Mount Harriet, ±50 m, 16.01.1974, *Nair* 780 (CAL); S. Andamans, Kalapathar, Havelock Islands, ±1 m, 02.09.1977, *Premnath* 6128 (CAL); S. Andamans, inside the nalli on the way to Bishnunali, Baratang, ±20 m, 28.01.1978, *Basu* 6850 (PBL); Little Andaman, 22 km from Hut Bay, 28.01.1981, *Premnath* 8322 (CAL, PBL).

## DISCUSSION AND CONCLUSION

The present study indicates that the genus *Pisonia* L., represented by three species in India, *viz.* *P. aculeata* L., *P. grandis* R.Br. and *P. umbellifera* (Forst.) Seem., is of woody habit and have very restricted distribution. Among the three species, *P. umbellifera* is found to grow only in Andaman & Nicobar Islands, not yet reported from mainland of India.

In regards to growing region, *P. aculeata* attains an extended range of distribution from sea level to 500 m followed by *P. umbellifera* and *P. grandis* growing from low to 250 m and upto 50 m respectively, can be correlated with their differential phenological characters. Regarding analysis of phenological characters in respect to growing region and altitudinal range, some distinctive features have been noticed. The maximum range of both flowering and fruiting period of *P. aculeata* has been correlated to the extended altitudinal range of distribution while short flowering and fruiting period of *P. grandis* and *P. umbellifera* can be correlated to the low altitudinal range of distribution. The distinct woody habit in combination with unisexual flower and unique nature of anthocarp made the genus unique representative of the family Nyctaginaceae.

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