

THE GENUS *ZANTHOXYLUM* LINN. (RUTACEAE) IN INDIA

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ABSTRACT

This paper deals with the taxonomic revision of the genus *Zanthoxylum* Linn. as occurring in India. A total number of 13 species is recognised in the area, of which 3 species, *Z. burkillianum* Babu, *Z. nepalense* Babu and *Z. pseudoxyphyllum* Babu are new to science. *Z. nitidum* (Roxb.) DC. is recorded for the first time from Andaman Islands. *Z. myriacanthum* Wall. ex Hook. f. and *Z. tomentellum* Hook. f. are new records to Sikkim and Assam Himalayas respectively. The description of *Z. tomentellum* Hook. f. is amended. *Z. acanthopodium* DC. var. *timbor* Hook. f. and *Z. hamiltonianum* Wall. ex Hook. f. var. *tomentosum* Hook. f. are reduced to synonyms of *Z. acanthopodium* DC. and *Z. nitidum* (Roxb.) DC., respectively. *Z. nitidum* Wall. sensu Hook. f. is deleted from the synonymy of *Toddalia asiatica* (Linn.) Link. and ascertained to *Z. nitidum* (Roxb.) DC. Each species is described in detail, and its synonymy, flowering and fruiting times, distribution, uses, etc. are ascertained. Lectotypes for *Z. oxyphyllum* Edgew., *Z. tetraspermum* Wt. and *Z. tomentellum* Hook. f. are designated for the first time.

This study of the genus *Zanthoxylum* L. is a precursor treatment to the revision of the family Rutaceae in India. The area as defined here includes present day India, including Andaman and Nicobar Islands, Bhutan, Burma, Nepal and Sikkim.

The genus *Zanthoxylum* was established by Linnaeus (1753, 1754) with two species, namely *Z. clava-herculis* L. and *Z. trifoliatum* L. [= *Acanthopanax trifoliatum* (L.) Merr.], and characterised by the plants having flowers with uniseriate perianth. Later, Linnaeus (1759) recognized the genus *Fagara* for the plants having flowers with biseriate perianth, and included two species, *F. pterota* L. [= *Z. fagara* (L.) Sarg.] and *F. piperita* L. (= *Z. pimpinelloides* DC.). Since then, these two Linnean genera have been subjected to controversy both taxonomically as well as nomenclaturally. Taxonomists differed in their opinions, whether to regard *Fagara* L. as a distinct genus or to unite with the genus *Zanthoxylum* Linn. Thus, Humboldt, Bonpland & Kunth (1823), De Candolle (1824), Benham & Hooker f. (1862) and Hooker f. (1875) considered both the genera as one

genus and reduced *Fagara* L. to a synonym of *Zanthoxylum* L. (sensu lato), based on Linnaeus's view that the flowers of *Zanthoxylum* L. are apetalous, while those of *Fagara* L. have sepals and petals. This view has also been adopted by Triana & Planchon (1872) and Engler (1874), who treated *Fagara* L. as a subgenus of *Zanthoxylum* L.

However, Engler (1896, 1931), after the reconsideration of his earlier view, recognized *Fagara* L. as a distinct from *Zanthoxylum* L., on the basis that the perianth of *Zanthoxylum* L. is of simple and primitive type, and not homologous with the sepals, and that it cannot be derived from the double perianth of *Fagara* L. During recent times Rehder (1945) suggested that both the genera were closer and should be treated as sub-genera or sections of one genus. Reeder & Cheo (1951) recognized *Fagara* L. and *Zanthoxylum* L. as distinct genera, as has been done by Engler, and stated that the flowering specimens of both the genera were quite different inspite of close similarity in the vegetative characters.

Very recently, this problem has been re-

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viewed and discussed in detail by Brizicky (1962) who came to the conclusion that "the simple perianth is most likely a secondary condition, derived by reduction from that of the *Fagara* type by abortion of some or all the sepals", and further stated that "the occurrence of species which appear in their perianth structure to be transitional to *Fagara* not only supports this view but also is ample reason to regard *Fagara* as a subgenus of *Zanthoxylum*." Brizicky's view was based upon Saunder's (1934) floral anatomical data of carpellate flowers of *Zanthoxylum planispinum* Sieb. & Zucc. (= *Z. armatum* DC.) and Moore's (1936) considerations of the phylogeny of Rutaceae, together with his own observations on the occurrence of the species of *Zanthoxylum* L. in Mexico and Central America (probably in S. America), which appear to be transitional to *Fagara* in their perianth structure. Hartley (1966), who recently reviewed the Malesian species of *Zanthoxylum* L., has accepted this view, except that he reduced *Fagara* L. to a synonym of *Zanthoxylum* L., instead of treating it as a subgenus of *Zanthoxylum*, as has been done by Brizicky (1962). Moreover, he showed that some specimens of *Z. dimorphophyllum* Hemsl. of China well connect the two genera by having flowers with both kinds of perianth types. Hence, the genus *Fagara* L. cannot be maintained as either distinct from *Zanthoxylum* L. or subgenus of it, and, therefore, the author followed Hartley (*loc. cit.*) in treating it as a synonym of *Zanthoxylum* Linn.

It may be pertinent to mention here that some of the specimens of *Z. armatum* DC. from Sikkim have flowers with 2-fid perianth-segments instead of entire ones. This suggests that the increase or variation in the number of perianth-segments, at least in this species might be perhaps due to splitting of some of the original perianth-segments.

The nomenclatural confusion between *Zanthoxylum* L. and *Fagara* L. has been

solved by Fosberg (1959), who typified the genus *Zanthoxylum* L. *sensu lato* by *Zanthoxylum fraxineum* Willd., since the two original Linnean species, upon which the genus *Zanthoxylum* L. was established did not actually belong to *Zanthoxylum* L. *sensu stricto*. Brizicky (1962), however, considered *Z. americanum* Mill. is the type of the genus *Zanthoxylum* L. *sensu lato*, as *Z. fraxineum* Willd. is taxonomically as well as nomenclaturally, a synonym of *Z. americanum* Mill. As such, the author followed Brizicky (1962) in adopting *Z. americanum* Mill. as the type of *Zanthoxylum* L.

The name *Zanthoxylum* is of Greek origin which means Yellow wood (*Xanthos*=yellow and *Xulon*=wood). The correct spelling of this generic name is *Zanthoxylum* and not *Xanthoxylum*, since Linnaeus took the name *Zanthoxylum* from Plukenet and Catesby and not an orthographic error for *Xanthoxylum* (Sprague, 1928).

The genus comprises about 200 to 215 species, chiefly pantropical in distribution, with several species extending into the temperate zone of Eastern Asia and North America. Hooker f. (1875) recognized 11 species in all for British India, including *Z. myriacanthum* Wall. ex Hook. f., a species described from Malaya Peninsula. Kanjilal (1937) recorded the above species for Assam, and, thus making the total number of species recorded for India is 11. With the reduction of *Z. budrunga* (Roxb.) DC. to *Z. rhetsa* (Roxb.) DC. by Hartley, the total number of species recorded for India is reduced from 11 to 10. The present author recognised 13 species in the present treatment for this region, of which *Z. burkillianum* Babu, *Z. nepalense* Babu and *Z. pseudoxyphyllum* Babu are described for the first time.

Zanthoxylum L. *sensu lato* is readily distinguished from the rest of the Indian genera of the tribe *Zanthoxyleae* by having

alternate leaves and flowers with 3-5 stamens.

ZANTHOXYLUM Linn.

Zanthoxylum Linn. Sp. Pl. 270. 1753; Gen. Pl. ed. 5. 130. 1754; DC. Prodr. 1: 725. 1824; Benth. & Hook. f. Gen. Pl. 1: 297. 1862; Hook. f. in Fl. Brit. Ind. 1: 492. 1875; Engler in Pflanzenfam. 111.4: 115. 1896; ed. 2. 19a: 214. 1931. *Fagara* Duhamel, Traite Arb. Arbust. 1: 229. pl. 97. 1755. *Pterota* P. Br. Hist. Jamaic. 146. t. 5. 1756. *Fagara* Linn. Syst. Nat. ed. 10. 897. 1759, nom. cons; Engler, ibid.; ibid. 217. *Blackburnia* Forst. Char. Gen. t. 6. 1776. *Zanthoxylon* Walter, Fl. Carol. 52. 243. 1788. *Curtisia* Schreb. Gen. 199. 1789. *Ochroxylum* Schreb. Gen. 826. 1791. *Aubertia* Bory, Voy. 1: 356. 1804. *Doratum* Soland. ex J. St-Hill. Expos. 2: 267. 1805. *Tenorea* Raf. Speechis. 5: 193. 1814. *Pseudopetalon* Raf. Fl. Ludov. 107. 1817. *Tipalia* Dennst. in Schluss. Hort. Malab. 31. 1818. *Xanthoxylon* Spreng. Anleit. ed. 2. 2: 743. 1818. *Poholana* Leand. Sacram. in Denkschr. Akad. Muench. 229. 1819. *Tobinia* Desv. in Ham. Prodr. Pl. Ind. Occ. 56. 1825. *Pentanome* Moc. & Sesse ex DC. Prodr. 1: 725. 1824, pro syn. *Thylax* Raf. Med. Bot. 2: 114. 1830. *Lacaris* Buch.-Ham. ex Wall. Cat. No. 7119. 1832 (nom. nud.). *Mioptrila* Raf. Amer. Man. Mulberry Trees 37. 1839. *Zanthoxylum* Linn. subgenus *Fagara* (Linn.) Triana & Planch. in Ann. Sci. Nat. Bot. Ser. 5. 14: 308, 311. 1872; Engler in Mart. Fl. Bras. 12: 2. 1874; Brizicky in Journ. Arn. Arb. 43: 8. 1962. *Zanthoxylum* Linn. subgenus *Thylax* (Raf.) Rehder in Journ. Arn. Arb. 24: 71. 1945.

Evergreen or deciduous, aromatic, dioecious, armed, erect or scandent or climbing shrubs or small trees to trees. Leaves alternate, 3-foliolate to imparipinnately or paripinnately compound; petiole and rachis with or without wings; leaflets 1-16 pairs, subsessile to short-petioluled, opposite to al-

ternate, very variable in shape and size, entire to glandular-serrate, with or without pellucid dots, usually abruptly acuminate at apex. Inflorescence terminal and/or axillary, cymose panicle. Flowers unisexual, subsessile to short-pedicelled, solitary to umbellate or in clusters; perianth either uniseriate with 4-8 undifferentiated segments or biseriate with 4-5 outer sepals and inner 4-5 petals; stamens 4-8, distinct, alternate to perianth segments or to petals; staminate flowers usually with 1-4 rudimentary carpels; gynoecium of 1-4 sessile, distinct, or partly connate carpels, styles short, divergent to coherent, stigmas capitate, distinct or coherent; ovaries 1-many carpellate, 1-locular, each with 2 collateral, pendulous ovules. Fruits 2-valved follicles, distinct or partly connate, ovoid-subglobose, glandular-punctate or pustular, 1-seeded, red to black, firm or fleshy, with straw-coloured, cartilaginous endocarp; seeds ovoid to globose, often hanging from the opened follicles by funicles at maturity, shining, crustaceous.

TYPE SPECIES: *ZANTHOXYLUM AMERICANUM* MILL. ("XANTHOXYLUM")

The Indian species of the genus are quite variable in their habit ranging from shrubby climbers to erect trees of 30 m tall. All the Indian species are armed with prickles which vary from straight, compressed, pseudostipular pairs to scattered, hooked or straight with very broad conical bases. The number of leaflets, their arrangement as well as the shape and size are quite variable within the given species but very often form diagnostic characters for delimiting the related species. The nature of the leaf-margin and the presence or absence of oil glands on the leaf surfaces are of little taxonomical value, as both the characters are so variable that a given species may show all kinds of variations. Inflorescence and flowers are more or less uniform within the species and form diagnostic characters of the species.

The structure and shape of the fruits are remarkably uniform among the Indian species except in the size and number.

The Indian species of *Zanthoxylum* L. are mostly confined to evergreen rain forests and thickets, between 800 m and 2000 m. *Z. rhetsa* DC. often descends as low as 80 m altitude in the lower ranges, and is often cultivated in the plains.

Five out of 13 species recorded here are apparently confined to this region and one species *Z. tetraspermum* Wt. & Arn. occurs only in Ceylon outside this area. The remaining 7 species show Asiatic distribution.

In general, the Indian species show geographical affinities with Chinese and Malaysian species.

The collection numbers are cited according to the sequence of the phytogeographical regions adopted by Chatterjee (1940). Collections from outside India are also cited based on the specimens represented at CAL. The names of contributing herbaria for this study are indicated at the end of each collection number within the parenthesis by abbreviations, following Lanjouw & Stafleu's 'Index Herbariorum', (1964). The following are the abbreviations used for the contributing herbaria.

- ASSAM : Botanical Survey of India, Eastern Circle, Shillong.
 CAL : Botanical Survey of India, Central National Herbarium, Calcutta.
 MH : Botanical Survey of India, Southern Circle, Coimbatore.

KEY TO THE SPECIES

1. Perianth uniseriate or irregularly 2-seriate, with 4-8 nearly equal, undifferentiated segments. Branchlets usually armed with predominantly pseudostipular, straight and compressed prickles. Petiole and rachis winged or occasionally without wings :
 2. Inflorescences in the axils of the lateral leaves, 0.5-2 cm long. Carpels 2-5. Branchlets usually ferruginous-pubescent or occasionally glabrate. Fruiting inflorescences usually short, dense, sessile, globose clusters. Lateral nerves upto 30 pairs. ... 1. *Z. acanthopodium*
 2. Inflorescences terminal or rarely axillary, usually 3-8 cm long. Carpels 1-3. Branchlets almost always glabrous. Lateral nerves upto 15 pairs :
 3. Inflorescences terminal at the ends of main branchlets, sessile, short, corymbose panicles. Petiole and rachis unwinged or slightly margined. ... 6. *Z. nepalense*
 3. Inflorescences generally at the ends of short axillary, lateral branchlets, peduncled, cymose panicles. Petiole and rachis usually winged. ... 2. *Z. armatum*
1. Perianth 2-seriate, differentiated into 4-5 outer sepals and 4-5 inner petals. Branchlets armed with scattered, short, straight or hooked prickles. Petiole and rachis unwinged :
 4. Leaves digitately 3-foliolate. Carpel solitary. ... 8. *Z. ovalifolium*
 4. Leaves imparipinnate or paripinnate, if 3-foliolate, then the carpels are more than one :
 5. Erect, tall trees, with septate pith in the wood. Inflorescences large, terminal, cymose, corymbose panicles arising from the ends of woody main branchlets. Prickles on the main branches with stout, broad, conical bases :
 6. Flowers 4-merous. Carpel solitary. ... 4. *Z. rhetsa*
 6. Flowers 5-merous. Carpels 1-4. ... 5. *Z. myriacanthum*
 5. Scandent or climbing shrubs, with non-septate pith in the wood. Inflorescences terminal and axillary. Prickles without conical bases :
 7. Leaflets 1-3 (-4) pairs, upto 15 cm long. Inflorescences often fascicled in the axils of the leaves :
 8. Inflorescences terminal and axillary. Leaves with sinuate-glandular-crenate margins. ... 12. *Z. tetraspermum*
 8. Inflorescences predominantly axillary. Leaves with entire to remotely glandular-crenate margins :
 9. Leaflets opposite, usually turning to black on drying, with entire to glandular-crenate, non cartilagenous margins. Follicles upto 0.7 cm across. ... 7. *Z. nitidum*
 9. Leaflets alternate or subopposite, not turning to black on drying, with entire, conspicuous cartilagenous margins. ... 3. *Z. burkillianum*
 7. Leaflets 3-10 pairs, if less than 3 pairs, then the leaf-margin is not as above :
 10. Branchlets perfectly glabrous. Flowers upto 0.35-0.7 cm long :
 11. Flowers umbellate, upto 0.7 cm long. Sepals eciliate. Leaves 5-30 cm long, with 3-10 pairs of leaflets. ... 9. *Z. oxyphyllum*
 11. Flowers solitary or in cymose clusters, upto 0.35 cm long. Sepals eciliate. Leaves 3-12 cm long, with 1-2 pairs of opposite leaflets. ... 10. *Z. pseudoxyphyllum*

10. Branchlets velvety-pubescent to tomentose, if glabrous, then the leaflets with cuspidate-acuminate apex. Flowers upto 0.55 cm long :
 12. Flowers 0.5-0.55 cm long. Branchlets, leaf rachis, and inflorescences densely velvety-tomentose. Leaflets shortly, abruptly acuminate, pubescent on the lower surface, at least on the midrib. ... 13. *Z. tomentellum*
 12. Flowers upto 0.2-0.25 cm long. Leaflets with cuspidate-acuminate apex, perfectly glabrous on both surfaces. ... 11. *Z. scandens*

1. *Zanthoxylum acanthopodium* DC. Prodr.
 1: 727. 1824; Hook. f. in Fl. Brit. Ind. 1: 493. 1875; Duthie, North-West Ind. Pl. 34. 1885; Gamble, Trees, Shrubs & Climbs. Darj. Dist. 14. 1896; Engler in Pflanzenfam. 4: 115. 1897; ed. 2. 19a: 217. 1937; Strachey, Cat. Kum. Pl. 31. 1906; Cowan & Cowan, Trees North Beng. 29. 1929; Kanjilal *et al.*, Fl. Ass. 1: 200. 1937; Hartley in Journ. Arn. Arb. 47: 209. 1966. *Z. hostile* Wall. Cat. No. 1210. 1829, pro parte (*nom. nud.*). *Z. alatum* Wall. Cat. No. 1209. 1829, pro parte (*nom. nud.*). *Z. timbor* Wall. Cat. No. 7116. 1832 (*nom. nud.*). *Z. acanthopodium* DC. var. *timbor* Hook. f. in Fl. Brit. Ind. 1. 493. 1875.

Erect or scandent shrubs or small trees, upto 6 m tall. Branchlets terete, ferruginous-pubescent to glabrate, usually armed with straight, compressed, pseudo-stipular, reddish-brown, 0.5-1.8 (2) cm long prickles or rarely unarmed; bark reddish- or greyish-brown, lenticellate. Leaves digitately 3-foliolate to imparipinnate, 3-25 (-30) cm long [incl. 1-4 (-5) cm long petiole]; petiole and rachis grooved above, generally armed with straight, compressed prickles on both sides or occasionally unarmed, usually winged with wing as much as 0.8 cm broad on both sides, ferruginous-pubescent or glabrate; leaflets 1-7 pairs, sub-sessile, opposite, articulate, ovate-lanceolate to oblong or elliptic-lanceolate, acute or cuneate and oblique at base, acute to acuminate or rarely obtuse at apex, subentire to glandular-seriate, subcoriaceous, turning to dark-brownish on the upper surface and to reddish-brown on the lower surface on drying, with or without pellucid dots, usually rusty-pubescent, especially on the lower surface,

1-10(-12) × 0.5-3 cm, lateral nerves faint to subprominent, 5-28 (-30) pairs, often prickly on the midrib. Panicles axillary, dense, ferruginous-pubescent, upto 1.5(-2) cm long. Male flowers; bracts minute, hairy, 0.05-0.08 cm long; pedicels slender, pubescent, 0.15-0.3 cm long; perianth-segments 5-8, irregularly 2-seriate, nearly equal, lanceolate or oblanceolate (ligulate), subacute or obtuse, 0.1-0.15 cm long; stamens 4-8, 0.3-0.35 cm long, filaments linear, 0.2-0.25 cm long, anthers reddish-purple prior to anthesis, 0.08-0.1 cm long; pistillode of 2-3 (5) carpels; disc pulvinate, 0.15 cm across; female flowers; pedicels stout, 0.15-0.2 cm long; perianth as in male flowers; staminodes absent; carpels 2-5, ovoid, glandular-punctate, glabrous or hairy, 0.1-0.15 cm high, styles articulate, 0.05-0.07 cm long, stigmas capitate. Follicles 1-4 with 3, 2, 1 or 0 abortive, caducous carpels, ovoid-subglobose, pustular, ± 0.4 cm across; seeds black, 0.4-0.25 × 0.3 cm; fruiting pedicels 0.1-0.5 cm long.

Type: Wallich, 1821 (G-DC).

Flowers: Dec.-May. *Fruits:* Oct.-May.

Specimens examined: INDIA: MEGHALAYA: Khasia Hills. Mawphlang, Carter 1641 ♀ (CAL), alt. 1800 m, Kanjilal 5835 ♀ (CAL, ASSAM), without definite locality, J. D. H. & T. T., s. n. (CAL) (as *Z. hostile* Wall.), Kurz 166 ♂ (CAL), alt. 900 m, Mann 364 ♀ (ASSAM); Shillong. Laitkor, Kar 29459 ♂ (ASSAM); K. & J. Hills. Dumpep, Sharma 10567 ♂ (ASSAM); Abor Hills. Yabung, Burkill 37698 ♀ (CAL). MANIPUR. Japoo, alt. 1500 m, Watt 6237 (CAL). ARUNACHAL PRADESH: Tirap F. D. From Tinchu on the way to Khonsa to Laju, Deb 25959 ♀ (ASSAM), Trichalaju, alt. 1750-1916 m, Panigrahi

14694♀ (ASSAM) (as *Z. alatum*); Kameng F. D., Sheargon-Jigaon, *Panigrahi* 15922♀, 16629♀ (ASSAM) (as *Z. alatum* Roxb.). WEST BENGAL. Darjeeling Dt. Darjeeling, alt. 2270 m, *Clarke* 35202♂ (CAL), alt. 2270 m, *Gamble* 7112♂ (CAL), *Modder* 99D♀ (CAL). UTTAR PRADESH. Kumaon. Kurini, alt. 1900 m, *Strachey & Winterbottome* 2♀ (CAL). BHUTAN: Without definite locality, *Griffith* 1186/2A & B♂ (CAL). SIKKIM: Yakzum, alt. 1400 m, *Anderson* 406♂ (CAL); Gassing to Ratong, *Anderson* 418♂ (CAL). NEPAL: E. Nepal. Papung, alt. 2420 m, *Banerjee* 763♀ (CAL) (as *Z. alatum* Roxb.), Mans Ekdanta, *Wallich* 1209♀ (CAL). BURMA: Upper Burma. Kachin Hills, *Shaik Mokim*, s. n. (CAL), Chin Hills, *Abdul Huk*, s. n. (CAL); South Shan States. Keng Kung, alt. 1200 m, *MacGregor* 987♂ (CAL).

Distribution: India, Nepal, Sikkim, Bhutan, East Pakistan, Burma, Thailand, S. W. China and Sumatra; in India: common between 1 m and 2000 m in the Himalayas.

Economic importance: Kanjilal (loc. cit.) reported that the fruits are said to be used for killing fish.

Notes: Very closely allied to *Z. armatum* DC., but readily distinguished from it by its pubescent branchlets and in having short inflorescences in the axils of lateral leaves, which appear in fruiting specimens as sessile, dense, globose clusters. Hartley (loc. cit.) keyed out this from *Z. armatum* DC. by the presence of reddish-purple anthers and prominent lateral nerves, in addition to short axillary inflorescences. But the frequent occurrence of reddish-purple anthers and prominent lateral nerves among the Indian material of *Z. armatum* DC. brings the two species much closer than ever before, and breaks the apparent differences between the two species. Kumaon and Nepal specimens are more densely pubescent than the Eastern Himalayan ones.

Hooker f. (loc. cit.) recognized var. *timbor* (based on Wallich's *nomen nudum*, *Z. tim-*

bor) on the basis of its densely rusty-tomentose branchlets. The author has not seen the type, but the above variety cannot be maintained on the basis of the very variable character of pubescence alone, since pubescence in this species is so variable that all intergrades exist between glabrate to tomentose condition within the species. Hence the author reduced *Z. acanthopodium* DC. var. *timbor* Hook. f. to a synonym of *Z. acanthopodium* DC.

2. *Zanthoxylum armatum* DC. Prodr. 1: 727. 1824; Hartley in Journ. Arn. Arb. 47: 211. 1967. *Z. alatum* Roxb. [Hort. Beng. 72. 1814, *nom. nud.*] Fl. Ind. 3: 768. 1832; Bedd. Fl. Sylvat. (For. Man.) 42. 1871; Brand. For. Fl. 47. 1874; Hook. f. in Fl. Brit. Ind. 1: 493. 1875; Duthie, North-West Ind. Pl. 34. 1885; Fl. Upp. Gang. Plain 1: 134. 1903; Gamble, Trees, Shrubs & Climb. Darj. Dist. 14. 1896; Fl. Presid. Madras 1: 149, 150. 1915; Engler in Pflanzenfam. 111. 4: 115. 1897; ed. 2. 19a: 217. 1931; Kanjilal, For. Fl. 49. 1901; Strachey, Cat. Kum. Pl. 30. 1906; Parker, For. Fl. 61. 1918; Collete, Fl. Siml. 78. 1921; Kanjilal *et al.*, Fl. Ass. 1: 199. 1937; Mooney, Suppl. Bot. Bihar & Orissa 37. 1950. *Z. hostile* Wall. Cat. No. 1210. 1829, pro parte (*nom. nud.*). *Z. planispinum* Sieb. & Zucc. Abh. Akad. Munch. 4: 2. 138. 1846; Engler, loc. cit. *Z. alatum* Roxb. var. *planispinum* (Sieb. & Zucc.) Rehd. & Wils. in Pl. Wils. 2: 125. 1914; Rehder, Man. Cult. Trees and Shrubs ed. 2. 524. 1949.

Erect or subscandent shrubs or small trees, upto 6 m tall. Branchlets terete, glabrous, usually armed with straight, compressed, reddish-brown, predominantly pseudostipular or rarely scattered, 0.3-2 cm long prickles; bark darkish-brown or greyish-brown. Leaves 3-foliolate to imparipinnate, 2.5-20 cm (incl. 0.8-5 cm long petiole) long; petiole and rachis grooved above, narrowly to broadly winged with wings as much as 0.6 cm broad,

occasionally prickly with the same type of prickles as on the stem, glabrous; leaflets 1-5 pairs, sub-sessile, opposite, ovate-lanceolate or elliptic-lanceolate to oblong, acute to cuneate at base, acute to acuminate at apex, entire to glandular-crenate, thinly coriaceous to chartaceous, glabrous, with or without pellucid dots, $1.5-1.5 \times 0.5-3$ cm, lateral nerves usually faint or occasionally prominent, 5-15 (-18) pairs, often prickly on the midrib. Panicles terminal on short, lateral branchlets, glabrate to puberulous, 2-8 (-10) cm long. Flowers in short cymes; male flowers: bracts minute, ovate; pedicels slender, glabrate to puberulous, 0.15-0.3 cm long; perianth-segments (4-) 6-8, uni or irregularly 2-seriate, ovate-triangular or linear-lanceolate, acute or acuminate, often 2-fid at the apex, 0.05-0.1 cm long; stamens 6-8, 0.2-0.25 cm long, filaments 0.1-0.15 cm long, anthers ovoid, yellowish or reddish-purple prior to anthesis, with prominent gland-tipped connective, 0.05-0.08 cm long, pistilode absent; disc pulvinate, 0.1-0.15 cm across; female flowers: pedicels 0.05-0.15 cm long; perianth-segments and disc as in males; staminodes absent; carpels 1-3 or rarely 4, ovoid-globose, glandular-punctate, 0.15-0.2 cm long, stigmas capitate. Follicles 1-3 with 2, 1 or 0 caducous, abortive carpels, ovoid-subglobose, apiculate with persistent styler base, pustular, 0.3-0.4 (-0.5) cm across; seeds ovoid, black, 0.3-0.4 cm across; fruiting pedicels 0.1-0.3 cm long.

Lectotype: Lambert, 1816 ♀ (G-DC).

Flowers: April-May. *Fruits*: Aug.-Oct.

Specimens examined: INDIA: ORISSA. Koraput. Siklapari, alt. 1000 m, Raju 2147 ♀ (CAL), Subba Rao 29890 (ASSAM), Bagghola Forest, Subba Rao 30012 ♀ (ASSAM); Ganjam; Boragharo, Narayanaswami 5937 ♀ (MH), Curangi, Narayanaswami 5823 (MH), Daringabadi, alt. 970 m, Barber 1366 (MH). ANDHRA PRADESH. Vizakapatnam Dt. Anantagiri, alt. 900 m, Balakrishnan 835 ♀ (CAL), Subba Rao 19562 ♀ (MH). MEGHALAYA: Kha-

sia Hills. Without definite locality, alt. 600 m, J. D. H. & T. T., s. n. (CAL), alt. 1200 m, Clarke 5775 ♀ (CAL), Mawpat, Carter 1145 ♂ (as *Z. acanthopodium* DC.); Shillong, Carter 888 ♀ (CAL), alt. 1300 m, Clarke 40315 ♀ (CAL); Aka Hills. Bor 19459 ♂ (ASSAM); Laitumkhrah, Deka 33170 ♀ (ASSAM). MANIPUR. Kanglatung, Dr 17478 (ASSAM), Lingli North East, alt. 600-1800 m, Watt 5014 (CAL). NAGALAND. Naga Hills, alt. 12-1500 m, Watt 7231 ♂ (CAL), Prain s. n. (CAL). ARUNACHAL PRADESH. Kameng F. D. Jabrang, alt. 1900 m, Panigrahi 6554 ♀ 6684 ♂ (ASSAM); Tirap F. D. Soha Village, alt. 1060 m, R. S. Rao 20383 (ASSAM), Waka, Panigrahi 14919 ♀ (ASSAM). UTTAR PRADESH. Chamba. Chamba Dehil, alt. 10-1500 m, Lace 1912 ♂ (CAL), Gutkar to Masrond, alt. 10-1500 m, Lace 1800 ♀ (CAL); Mussoorie, Mackinnon, s. n. (CAL), King 1869 ♀ (CAL); Kumaon. Almora, Inayat 24291 ♀ (CAL), above Jahat, alt. 2300 m, Strachey & Winter bottome 3 ♀ (CAL), Jamuna Valley, alt. 15-1800 m, Duthie, s. n. (CAL), Amparaw, alt. 1060 m, Gill 644 ♀ (CAL); Dehra Dun. King, s. n. ♂ (CAL); near Mussoorie, King 1869 ♀ (CAL); Hazara. Jabori, Saran range, Inayat, s. n. (CAL); without definite locality, alt. 1060-1500 m, Steewart 223 ♀ (CAL). BHUTAN: Without definite locality, without Collector's name 26 (CAL). NEPAL: Without definite locality, Wallich 1210 ♀ (CAL) (as *Z. hostile* Wall). BURMA: Mishmee. Without definite locality, without Collector's name, s. n. (CAL); Southern Shan State. Taungyi, Khalil, s. n. (CAL); Maymyo Dt., Mr. Ruh-ton's Compound, alt. 1030 m, Mgkan 571 ♀ (CAL), Lace 3259 (CAL). TIBET: Chumbi. Tax-si Cluce-doone, King's Collector 533 ♀ (CAL). CHINA: HUPEH. Without definite locality, Henry 7687 ♀, 1072 ♀ (CAL). YUNYAN. Without definite locality, Delavay, s. n. (CAL). SHANGAI. Without definite locality, Maingay 767 ♀ (CAL) (as *Z. planispinum* Sieb. & Zucc.) JAPAN: Yokohama,

Maximowicz 1862♀ (CAL) (as *Z. planispinum* Sieb. & Zucc.).

Distribution: West Pakistan and India east to Japan and Taiwan; south only in the Philippines and Lesser Sunda Islands: in India; from 10-2000 m in the Himalayas and 90-1000 m in the Eastern Ghats.

Economic importance: Follicles are often used as a substitute for pepper in India, China and Japan (Burkill, 1935). Bark and fruits are used in treatment of small-pox, cholera, dyspepsia and diarrhoea. Bark and seeds are used for stupefying fish. Brandis (1874) noted that the fruits are used to purify water. Bark has been used in China to repel insects from furs of animals, and various parts of the plant are used to season food in China and India. Watt (1893) noted that the oil obtained from the fruiting carpels might act as antiseptic and disinfectant. Leaves and fruits are used by the Chinese as a stimulant, sudorific and anthelmintic and silk worms are fed upon the leaves. Small branches, thorns and bark are used for cleaning teeth (Brandis, 1874).

Notes: The number, shape and size of the leaflets are quite variable in this species. In general, leaflets are fewer, smaller and more coriaceous, with faint lateral nerves in the North Himalayan specimens, whereas the Eastern Himalayan specimens have more, larger and less coriaceous leaflets with prominent lateral nerves. The intergradation is so complete between these two groups that it is impossible to recognize infraspecific units. Burmese specimens show closer affinity to Chinese specimens in having very large, fewer leaflets and lax inflorescences.

Hartley (*loc. cit.*) described that the perianth-segments are 6-7 and stamens 4-6, with yellowish anthers. But the Indian material constantly have 6-8 perianth-segments and 6-8 stamens, with frequent reddish-purple anthers. Further, a female specimen from

the Sikkim Himalaya have flowers with 2-fid or 2-partite perianth-segments, a feature that may probably account for the variation in the number of perianth-segments.

Forbes & Hemsley (1886) reduced *Z. planispinum* Sieb. & Zucc., a Sino-Japanese species having 3-5 leaflets, to *Z. alatum* Roxb. This view has been adopted by Hartley (*loc. cit.*) who reduced the former to a synonym of *Z. armatum* DC. The author followed Hartley (*loc. cit.*) in reducing *Z. planispinum* to a synonym of *Z. armatum* DC., since the number of leaflets is quite variable in this species, and there are intergrades, which well connect the two species.

Hartley (*loc. cit.*) replaced the widely accepted binominal *Z. alatum* Roxb. for this plant by *Z. armatum* DC. The author accepted this change because that De Candolle intentionally substituted the epithet '*armatum*' for Roxburgh's '*alatum*' in 1824, and at the same time validated it by supplementing with the description much earlier than the valid publication of *Z. alatum* Roxb. (1832).

3. *Zanthoxylum burkillianum* Babu, sp. nov. *Z. hamiltonianum* auct. non Wall. ex Hook. f. 1875. Burkill in Rec. Bot. Surv. Ind. 10: 253, 1924.

Manifeste affinis *Z. nitido* DC., sed foliolis alternis vel suboppositis, marginibus foliolorum prominentibus cartilagineis integrisque, folliculis majoribus differt; necnon affinis *Z. dissito* Hemsl., sed inflorescentiis majoribus folliculis nonalatis recedit.

Frutex scandens. Ramulis lignosis, teretibus, glabris plerumque armatis; spinæ dispersae, recurvae, 0.15-0.23 (-0.3) cm longae. Folia imparipinnata, ad 30 cm longa (petiolo 0.6-0.7 cm longo incluso); petiolis teretibus, crassis, glabris, plerumque armatis. Foliola 3-4 juga, petiolulata (petiolulo 0.02-0.05 cm longo), alterna vel subopposita, ob-

longa vel elliptico-oblonga, 8-16 × 4-6 cm, basi acuta, cuneata ad oblique obtusa, apice acuminata, acumen retuso 0.5-1 cm longo, chartacea vel coriacea, glabra, supra nitida, infra pallida, margine integra cartilagineaque, nervis lateralibus prominentibus 8-18 (-20)-jugis, pellucido-puncta nulla. Inflorescentiae paniculatae, axillares, ad 12 (-15) cm longae. Flores masculi et foeminei non visi. Follicula 2-4; carpella globosa, ad 1 cm diam.; pedunculus fructifer crassus, 0.4-0.5 cm longus.

Typus lectus a Burkill ad locum Rotung, Dihang altit. 396 cm in provincia assamica et positus in herbario indico nationali (CAL) sub numero *Burkill* 37598 (A). Isotypus 37598 (B) ibidem positus.

Climbing or straggling shrubs. Branchlets woody, terete, glabrous, generally armed with scattered hooked, 0.15-0.23 (-0.3) cm long prickles; bark greyish. Leaves imparipinnate, upto 30 cm long (incl. 0.6-0.7 cm long petiole); petiole and rachis stout, terete, glabrous, usually armed with hooked prickles; leaflets 3-4 pairs, shortly petioluled with 0.02-0.05 cm long petiolule, alternate or subopposite, oblong or elliptic-oblong, acute to cuneate or obtuse, and oblique or not at base, acuminate with 0.5-1 cm long retuse acumen, chartaceous to coriaceous, glabrous, glossy above and pale beneath, entire with conspicuous cartilagenous margins, without pellucid dots, 8-16 × 4-16 cm, lateral nerves prominent, 8-16 (-20) pairs. Panicles axillary, paniculate, upto 12 (-15) cm long. Male and female flowers not seen. Follicles 2-4 with 2, 1 or 0 persistent abortive carpels, globose, pustular, upto 1 cm across; fruiting pedicels stout, 0.4-0.5 cm long.

Type: *Burkill* 37598 ♀ (CAL).

Fruits: December.

Specimens examined: INDIA: MEGHALAYA: Abor Hills. Rotung on hillside over Dihang, alt. 396 m, *Burkill* 37598 + [CAL—(A) holotype; (B) isotype].

Distribution: India; apparently restricted to the type locality.

Notes: Very similar to *Z. nitidum* DC., but it is easily recognized from *Z. nitidum* by alternate or subopposite leaflets with entire conspicuous cartilagenous margins, larger follicles and also by its perfectly glabrous condition. It is also closely allied to *Z. dissitum* Hemsl., a Chinese species, but the latter is characterised by shorter inflorescences and follicles with winged sutures.

The author dedicated this species to I. H. Burkill who collected this remarkable plant from the Abor Hills.

4. *Zanthoxylum rhetsa* (Roxb.) DC. Prodr. 1: 728. 1824; Thwaites, Enum. Pl. Zeyl. 69. 1858; Dalz. & Gibs. Bomb. Fl. 45. 1861; Bedd. Fl. Sylvat. (For. Man.) 41. t. 6. 1871; Hook. f. *loc. cit.*; Trimen, Handb. Fl. Ceylon 215. 1893; Talb. Trees Bomb. 30. 1894; Woodr. in Journ. Bomb. Nat. 5: 267. 1897; Cook., Fl. Presid. Bomb. 1: 178. 1901; Gamble, *loc. cit.*; Kanjilal *et al.*, *loc. cit.*; Hartley in Journ. Arn. Arb. 51: 424. 1970; *F. rhetsa* Roxb. Fl. Ind. 1: 438. 1820; Engler in Pflanzenfam. 111. 4: 118. 1897; ed. 2. 1921: 221. 1931; *Z. limonella* (Dennst.) Alston in Trim. Handb. Fl. Ceyl. Suppl. 37. 1931 (*nom. invalid.*); Hartley in Journ. Arn. Arb. 47: 197. 1966. *Tipalia limonella* Dennst. in Schlüss. Hort. Malab. 31. 1818 (*nom. nud.*); *Fagara budrunga* Roxb. Fl. Ind. 1: 437. 1820; Engler *loc. cit.* *Zanthoxylum budrunga* (Roxb.) DC. Prodr. 1: 728. 1824 (*sub species non satis notae*); Wall. Cat. No. 1211. 1829; Hook. f. in Fl. Brit. Ind. 1: 495. 1875; Kurz in Journ. Asiat. Soc. 44: 3. 130. 1875; For. Fl. Brit. Burm. 1: 182. 1877; Gamble, Trees, Shrubs & Clim. Darj. Dist. 14. 1896; Fl. Presid. Madras 1: 106, 107. 1915; Prain, Beng. Pl. 1: 299. 1903; Strachey, Cat. Pl. Kum. 30. 1906; Parkinson, For. Fl. Andam. Isl. 110. 1923; Haines, Bot. Bihar & Orissa 1: 2. 160. 1921 (incl. var. *rhetsa*); Cowan & Co-

wan, Trees North Bengl. 29. 1929; Kanjilal *et al.*, Fl. Ass. 1: 198. 1937. *Z. crenatum* Wall. Cat. No. 1216. 1829 (*nom. nud.*). *Z. oblongum* Wall. Cat. No. 1218. 1829 (*nom. nud.*). *Z. rhetsa* DC. var. *budrunga* (Roxb.) Pierre, Fl. Foresti. Cochinch. 4: t. 290. 1893. *Z. budrunga* DC. var. *paucijuga* Koords. & Val. Booms. Java 4: 224. 1896; & Exk. Fl. Java 2: 418. 1912, pro syn.

Erect, deciduous, armed trees, upto 30 m tall. Main stem armed with stout, straight, 2-3.5 (-4) cm long prickles having 4-5 cm broad conical bases; branchlets woody, terete, often tortuous and hollow inside or with septate pith, prickly with scattered, stout, conical, straight or slightly incurved, 0.2-0.4 cm long prickles; bark greyish, lenticellate. Leaves appear with flowers and crowded towards the ends of branchlets, imparipinnate, 20-60 cm long. (incl. 5-10 cm long petiole); petiole and rachis nearly terete at maturity or slightly grooved above when young, unarmed or very rarely armed with a few, short, scattered, hooked prickles. Leaflets (2-) 4-16 pairs, petioluled with 0.2-0.7 cm long petiolule, opposite or subopposite or alternate, acute to cuneate and oblique or not at base, acuminate-caudate with 1.5-3 cm long, retuse acumen, subcoriaceous, entire to remotely crenate with glands in the sinuses of the crenatures, quite glabrous, with or without pellucid-dots, 7-15 × 3-5 (-7) cm, lateral nerves prominent beneath, spreading, 8-20 pairs. Panicles terminal and axillary, corymbose, glabrate to puberulous, upto 20 (-25) cm long, often prickly especially on the flattened primary and secondary branches. Flowers in clusters or umbellules, 0.2-0.25 cm long; male flowers: bracts ovate-triangular, obtuse, 0.05 cm long; petals 4, elliptic-oblong, obtuse, 0.2-0.25 cm long; stamens 4, 0.25-0.3 cm long, filaments linear, 0.2 cm long, anthers yellowish, 0.08-0.1 cm long; disc pulvinate, 0.05 cm high; female flowers: pedicels, sepals and petals as in males; staminodes absent; carpel soli-

tary, styles ecentric, stigmas capitate. Follicles globose, apiculate with persistent styler base, pustular, 0.8-1 cm across; fruiting pedicels 0.1-0.4 cm long.

Lectotype: Roxburgh's *Icones* 2113.

Flowers: March-June. *Fruits*: Sept.-Nov.

Specimens examined: INDIA: ANDHRA PRADESH: Godavari Dt. Rumpa Hills, alt. 660 m, *Gamble* 16072 (CAL). KARNATAKA: Saklaspur. Bargnai, *Barber* 6285 (MH); without definite locality, *Gibson*, s. n. (CAL). KERALA. Malabar. Taliparamba Farm, *Barber* 8683 ♀ (MH), Nedumboil, *without Collector's name* 9628 ♂ (MH); Travancore. Aiyannam, alt. 330 m, *Burdillon* 389 ♂ (MH); Calicut Dt. Kutiyadi, alt. 190 m, *Naithani* 24663 ♂ (MH). MAHARASHTRA. Ratnagiri, *without Collector's name*, s. n. (CAL). ANDAMAN ISLANDS. Without definite locality, *Conoiet*, s. n. (CAL). UTTAR PRADESH. Saharanpur, without definite locality, *Reporter to Economic Products of India*, s. n. (CAL). BIHAR. Ranchi Ghats. Bishanpur, *Haines* 3803 (CAL). ASSAM. Sibsagar. Banfathar, alt. 80 m, *Kanjilal* 3897 ♂ (CAL); Golaghat, alt. 99 m, *Kanjilal* 1539 ♂ (ASSAM), Nimbar Forest, *Reporter of Economic Products to the Government of India* 11403 ♂ (CAL); Cachar Dt., alt., 33-77 m, *R. S. Rao* 9080 (ASSAM) (as *Z. piperitum* DC.); MEGHALAYA: Shillong. Chirapunji, Mahanagi Hill, *Mann*, s. n. (ASSAM); Kamrup Dt. Luri Garden, *Kanjilal* 5481 ♂ (ASSAM); Garo Hills. Adogiri to Tura Road, *Kanjilal* 5286 (ASSAM), alt. 660 m, *Kanjilal* 5284 (ASSAM), Barnirat, *Panigrahi* 4518 (ASSAM); K. & J. Hills. Tharia, alt. 66 m, *Kanjilal* 4609 (ASSAM), Umsaw Forest, *De* 20408 ♂ (ASSAM). SIKKIM: Tipperah Hill. Noagon near Rani Bazar, alt. 198-298 m, *Debbarmann's Collector* 1098 ♂ (CAL). BURMA: Yoma. *Kurz* 1354 (CAL); Pegu. *Kurz* 2012 (CAL); Tavoy. *Mokim* 505, 643 ♂ (CAL), *Meebold* 14963 (CAL), *Wallich* 1218 (CAL), (as *Z. oblongum* Wall.); Katha, alt. 165 m,

without Collector's name. 301 ♂ (CAL). BANGLADESH: Silhet, Wallich 1211 ♀ (CAL); Chittagong, J. D. H. & T. T., s. n. (CAL), King's Collector 356 ♂ (CAL). CEYLON: Central Province. Thwaites 3490 ♀ (CAL).

Distribution: India, Ceylon, Burma, Sikkim, Thailand, S. Vietnam, Malaya Peninsula, Java, Philippines, Moluccas and southern Papua; in India; ascending upto 300 (-500) m in the Western Peninsula, Himalayas, the Rumphia Hills in Andhra Pradesh and the Ranchi Ghats in Bihar. Sometimes descending as low as 90 m.

Economic importance: Kanjilal (*loc. cit.*) noted that the unripe carpels and seeds are used as condiments in South India. The cork from the base of the prickles of the trunk is made into beads and other ornamental articles in Assam. The young leaves are eaten by Aitonias. Nagas use powdered seeds for catching the fish. An essential oil obtained from the fruit is said to be used in medicine. The wood is used by Kukis for house posts and for looms, by Meches.

Notes: Distinguished from its closely allied species, *Z. myriacanthum* Wall. ex Hook. f. by its smaller leaflets and 4-merous flowers.

Roxburgh (*loc. cit.*) established *Fagara budrunga* and *F. rhetsa*, and characterised the former by 12-20 cm long leaves with 5-6 pairs of leaflets and the latter by 30-50 cm long leaves with 8-16 pairs of leaflets. De Candolle (*loc. cit.*) accepted this two-species concept, and transferred then to *Zanthoxylum* L., but kept *Z. budrunga* DC. under *species non satis notae*. Hooker (*loc. cit.*) adopted De Candolle's view and distinguished *Z. budrunga* DC. from *Z. rhetsa* DC. by the glandular-crenate leaf-margins, in addition to the characters given by Roxburgh. Further, he commented about the confusion on the identity of the two species in the following words: "I find no plant corresponding to either Roxburgh's *F. rhetsa* or *F. budrunga* in any Silhet, Assam & Bengal col-

lections..... to suspect that Roxburgh may, by some mistake have described a specimen of *Z. rhetsa* DC. with few leaflets for one of Silhet *Z. budrunga* DC." Gamble (*loc. cit.*) and Kanjilal (*loc. cit.*) followed Hooker f. in distinguishing these two species. Pierre (*loc. cit.*) was the first to show the close similarity between the two species by reducing *Z. budrunga* DC. to a variety of *Z. rhetsa* DC. Haines (*loc. cit.*), more or less held the same view, but erroneously reduced *Z. rhetsa* DC. to a variety of *Z. budrunga* DC., without being aware of earlier Pierre's work. It is clearly evident from the above points that there must be a confusion on the identity of the two Roxburghian species. A critical study of the Indian specimens of the two species shows that the characters such as the length of leaves, number of leaflets, upon which Roxburgh established his species, are quite variable. The nature of leaflet-margin, a character to which Hooker f. attached greater importance in distinguishing the two species, is so variable that the single leaflet shows entire lower margin and glandular-crenate along the upper margin. Further, the Indian specimens can be grouped into two categories, those having short leaves with fewer number of leaflets, and with inflorescences belong to shoots of the current season and those having longer leaves with more number of leaflets and sterile shoots of the previous year growth. This may probably accounts the fact that *F. budrunga* Roxb. might be a specimen of *F. rhetsa* Roxb. having shorter leaves with fewer number of leaflets, a view also held by Haines: who remarked in the following words: "He (Roxburgh) knew his *Fagara rhetsa* well but seems to have had a specimen of *F. budrunga* with very few leaflets". Hence, *Z. budrunga* DC. cannot be maintained as a distinct species. *Tipalia limonella* Dennst. (1818), the earliest name for this taxon, is a *nomen nudum* (cf. Rickett & Stafleu in Taxon 10: 80. 1961; Manitz in

Taxon 17: 496-501. 1968). The next earliest, legitimate, validly published binomials are *Fagara budrunga* Roxb. (1820) and *F. rhetsa* Roxb. (1820) which have the same date of publication, and are the basionyms of *Z. budrunga* DC. and *Z. rhetsa* DC., respectively. Since Pierre (1893) was the first to reduce *Z. budrunga* to a variety of *Z. rhetsa*, his choice should be followed according to the rules of ICBN (ed. 1972). Hence the correct name for this plant is *Z. rhetsa* (Roxb.) DC.

5. *Zanthoxylum myriacanthum* Wall. (Cat. no. 1214. 1829, *nom. nud.*) ex Hook. f. in Fl. Brit. Ind. 1: 496. 1875; Kanjilal *et al.* Fl. Ass. 1: 199. 1937; Hartley in Jour. Arn. Arb. 47: 185. 1966. *Z. longifolium* Wall. Cat. No. 7115. 1832 (*nom. nud.*). *Z. rhetsoides* Drake in Journ. Bot. Paris 6: 275. 1892. *Fagara myriacantha* (Wall. ex Hook. f.) Engler in Pflanzenfam. 111. 4: 118. 1896; ed. 2. 19a: 221. 1931. *Zanthoxylum diabolicum* Elmer, Leaf. Philip. Bot. 2: 477. 1908. *Evodia odorata* Levl. in Repert. Sp. Nov. 9: 458. 1911. *Zanthoxylum odoratum* (Levl.) Levl. *Ibid.* 13: 266. 1914. *Fagara gigantea* Hand.-Mazz. in Amzeig. Akad. Wiss. Wien. 58: 64. 1921. *Zanthoxylum giganteum* (Hand.-Mazz.) Rehder in Journ. Arn. Arb. 8: 64. 1927. *Fagara diabolica* (Elmer) Engler in Pflanzenfam. ed. 2. 19a: 220. 1931. *Fagara odorata* (Levl.) Hand.-Mazz. Symb. Sinica 7: 623. 1933. *Fagara rhetsoides* (Drake) Reeder & Cheo in Journ. Arn. Arb. 8: 151. 1927. *Fagara rhetsoides* Drake, var. *pubescence* Huang in Acta Phytotax. Sinica 6: 1. 48. 1957.

Erect, evergreen, armed trees, upto 25 m tall. Main stem armed with stout, broad, straight, conical, 3 cm long prickles; branchlets woody, tortuous, hollow inside or with septate pith, densely prickly with brownish, straight or slightly incurved, 0.15-0.5 cm long prickles. Leaves imparipinnate, 20-45 (-60) cm long (incl. 10-15 cm long petiole);

petiole and rachis stout, terete, usually unarmed or rarely prickly beneath, especially in the lower half; leaflets 3-9 (-11) pairs, petioluled with 0.15-0.6 cm long petiolule, opposite or subopposite, oblong or oblong-elliptic, obliquely rounded or subcordate at the base, acuminate at apex, with 0.5-1.5 cm long acumen, coriaceous, turning to dark-brownish on drying, subentire to glandular-crenate, glabrous, glossy above, pellucid-dotted, 8-20 × 5-8.5 (-9) cm, lateral nerves prominent beneath, arching upwards near margins, 8-20 pairs. Panicles terminal and also from the axils of the upper most leaves, puberulous to pubescent or rarely glabrous, upto 30 cm long (incl. 15 cm long prickly peduncle). Male flowers: in cymose clusters, 0.2-0.3 cm long; pedicels 0.05-0.15 cm long; sepals 5, free to the base, triangular, obtuse, 0.07-0.08 cm long; petals 5, elliptic-ovate, abruptly acuminate, 0.25 cm long, 3-nerved with prominent midrib and two lateral faint nerves, 0.25 cm long; stamens 5, slightly exceeding the petals, 0.3 cm long, filaments linear, 0.22 cm long, anthers ovoid, 0.08-0.1 cm long; pistillode of 3 carpels, ovoid-globose, 0.05 cm high; disc irregularly lobulate, 0.1 cm across; female flowers: pedicels, sepals and petals as in males; staminodes absent; carpels 1-4, ovoid-subglobose. Follicles 1-4 with 3, 2, 1 or 0 persistent abortive carpels, subglobose, pustular, apiculate, 4.5 cm across; fruiting pedicels upto 0.25 cm long.

Type: Porter (Wallich 1214), (K):

Flowers: March-April. Fruits: Oct.-Nov.

Specimens examined: INDIA: ASSAM. Lakhimpur. Dulong Res., alt. 99 m, Kanjilal 3682 ♂ (CAL, ASSAM). SIKKIM: Rangjo Jhora, alt. 660 m, Ribu & Rhomoo 4052 ♂ (CAL); Pzang, alt. 1155 m, King, s. n., (CAL). BANGLADESH. Silhet, Wallich 7115 ♂ (CAL). (as *Z. longifolium* Wall.). MALAYA PENINSULA: PENANG. Without definite locality, Porter, [Wallich 1214; (CAL)]—isotype of *Z. myriacanthum* Wall. ex Hook. f.]

Curtis 1076 (CAL). PERAK. Goping Dt. Tohohflow Hills, *King's Collector* 8157 ♂ (CAL); without definite locality, *Scortechini* 275 (CAL). MALACCA. Sg. Udang, *Derry* 1121 ♀ (CAL).

Distribution: India, Sikkim, N. Vietnam, S. W. China, Malesia and the Philippines; in India: apparently confined to the forests of Lakhimpur in Assam.

Economic importance: Hartley (*loc. cit.*) reported that the fruits are said to be used as a condiment in Assam. Kanjilal (*loc. cit.*) suggested that the wood might be suitable for manufacturing tea boxes.

Notes: Closely resembles to *Z. ailanthoides* Sieb. & Zucc., a Sino-Japanese species, which can be distinguished from *Z. myriacanthum* Wall. ex Hook. f. in having ovate-lanceolate leaves, with attenuate apex and serrate margins.

Indian specimens have much longer and broader leaves than those of Malesian ones. Hitherto known only from Assam and Sylhet in the Indian Subcontinent.

6. *Zanthoxylum nepalense* Babu, sp. nov.

Arcte affinis *Z. armato* DC., sed inflorescentiis corymboso-paniculis, sessilibus, brevibus, petiolis nonalatis, foliolis brevioribus ovatis, nervis lateralibus conspicuiis distinguenda; Ex affinitate *Z. simulanti* Hance, sed inflorescentiis brevioribus, foliolis minoribus coriaceis, nervis lateralibus conspicuiis differt.

Frutices vel arbores erectae armatae ad 5-7 m altae. Ramulis teretibus glabris plerumque armatis, aculeis rectis purpureo-brunneis, 0.5-1.5 (-2) cm longis, cortice purpureo. Folia imparipinnata, 4-15 cm longa (petiolo 1-2.5 cm longo incluso); petiolis supra sulcatis glabris leviter angustaque marginatis; foliolis 3-5 jugis subsessilibus, oppositis, ovato-ellipticis ad lanceolatis, 1-3 × 0.5-1.5 cm, basi oblique acutis ad cuneatis, apice obtusis ad abrupte acuminatis, marginibus glandulosis crenato-serratisque, char-

taceis vel subcoriaceis, glabris supra in sicco fuso brunneis, infra in sicco brunneis; nervis lateralibus subtus prominentibus, plus minusve patulis, 7-14 (15)-jugis, sine pellucido punctatis. Inflorescentiae terminales, sessiles, corymboso paniculatae, puberulae ad 3 × 3 cm. Flores non visi. Folliculis 2-3 vel 4; carpella ovoideo-subglobosa, leviter compressa 0.5 cm diam.

Typus lectus a R. S. Rao in Namchi Bazar-Mango in statu Nepal, et positus in ASSAM sub numero R. S. Rao 13990.

Erect, armed shrubs or small trees, upto 5-7 m tall. Branchlets terete, glabrous, usually armed with straight, reddish-brown, pseudo-stipular, 0.5-1.5(-2) cm long prickles; bark dark-brownish. Leaves imparipinnate, 4-15 cm long (incl. 1-2.5 cm long petiole); petiole and rachis grooved above, glabrous, slightly narrowly margined; leaflets 3-5 pairs, sub-sessile, opposite, ovate-elliptic to lanceolate, obliquely acute to cuneate at base, obtuse to abruptly acuminate, crenate-serrate, with glands in the sinus, chartaceous to subcoriaceous without pellucid-dots, glabrous, except tuft of hairs in the axils of nerves on the lower surface at base, turning to dark-brownish above and brownish beneath on drying, 1-3 × 0.5-1.5 cm, lateral nerves prominent beneath, more or less spreading, 7-14(-15) pairs. Panicles terminal, sessile, corymbose, puberulous, upto 3 × 3 cm. Flowers not seen. Young follicles 2-3 or 4 with 1, 2, 3 or 0 abortive carpels, ovoid-subglobose, slightly compressed, pustular, with persistent styler base, 0.5 cm across.

Type: R. S. Rao 13990 ♀ (ASSAM).

Fruits: July-Aug.

Specimens examined: NEPAL: E. NEPAL. Namchi Bazar-Manjo, alt. 3100 m, R. S. Rao 13990 ♀ (ASSAM—holotype of *Z. nepalense*). (as *Z. alatum* Roxb.).

Distribution: India; known only from the type locality in Nepal.

Notes: Apparently very closely allied to *Z. armatum* DC., but at once recognized

this from *Z. armatum* by the presence of sessile, short, corymbose panicles, unwinged petioles and rachis, and shorter ovate leaflets with prominent lateral nerves. It also resembles *Z. simulans* Hance (= *Z. bungii* Planch.), a Chinese species, in having short, sessile, corymbose inflorescences, larger and less coriaceous leaflets with faint lateral nerves.

7. *Zanthoxylum nitidum* (Roxb.) DC. Prodr. 1: 727. 1824 (nec St.-Hill. 1825); Wall. Cat. No. 1207. 1829; Hartley in Journ. Arn. Arb. 47: 180. 1966. *Fagara nitida* Roxb. Fl. Ind. 1: 439. 1820. *Piper pinnatum* Lour. Fl. Cochinch. 31. 1790 (non *Zanthoxylum pinnatum* (J. R. & G. Forst) Druce, 1917). *Z. torvum* F. Muell. Frag. Phyt. Austral. 7: 140. 1871. *Z. hamiltonianum* Wall. (Cat. No. 7117. 1832, *nom. nud.*) ex Hook. f. in Fl. Brit. Ind. 1: 494. 1875: Kurz, For. Fl. Brit. Burm. 1: 181. 1877. Gamble, Trees, Shrubs & Climbs. Darj. Dist. 14. 1896; Cowan & Cowan, Trees North Beng. 29. 1929; Kanjilal *et al.*, Fl. Ass. 1: 201. 1937. *Z. hamiltonianum* Wall. ex Hook. f. var. *tomentosum* Hook. f. in Fl. Brit. Ind. 1: 494. 1875. *Fagara torva* (F. Muell.) Engler in Pflanzenfam. 111. 4: 119. 1896. *F. warburgii* Perk. Fragm. Fl. Philip. 160. 1905. *Zanthoxylum hirtellum* Ridl. in Journ. Fed. Malay States 10: 131. 1920. *Z. collinsae* Craib in Kew Bull. 1926: 165. 1926. *Fagara hamiltoniana* (Wall. ex Hook. f.) Engler in Pflanzenfam. ed. 2. 19a: 221. 1931. *F. hirtella* (Ridl.) Engler, *loc. cit.* *Zanthoxylum scabrum* Guill. in Bull. Soc. Bot. Fr. 91: 215. 1944. *Fagara oblongifolia* Bakh. f. in Blumea 6: 366. 1950. *F. pendaluensis* Bakh. f. *loc. cit.* *Zanthoxylum asperum* Huang, Acta Phytotax. Sinica 6: 75. 1957. *Z. asperum* Huang, var. *glabrum* Huang, *loc. cit.* 76.

Scandent or climbing or rarely sub-erect, armed shrubs, upto 20 m tall. Branchlets woody, terete, glabrous to velvety-pubescent

or tomentose, generally armed with scattered, few, hooked or rarely straight, brownish, 0.3-0.5 cm long prickles or occasionally unarmed; bark dark to reddish-brown, usually destitute of lenticels, striated. Leaves 3-foliolate to imparipinnate, 10-40 cm long (incl. 5-10 cm long petiole), often slightly arched; petiole and rachis grooved above, nearly terete at maturity, glabrous to velvety-tomentose, usually prickly beneath with short, hooked prickles or occasionally unarmed; leaflets 1-3 (-4) pairs, petioluled with 0.25-0.5 cm long petiolules, opposite, broadly ovate-elliptic to oblong, rounded or subcordate or cuneate at base, oblique or not, abruptly acuminate at apex, with 0.5-1.5 cm long retuse acumen, coriaceous, glabrous on both surfaces or often hairy beneath especially on the nerves, shining above, usually turning to black on drying, with or without pellucid dots, entire to remotely glandular-crenate (5-)6-15 × 3.5-6.5 (-7) cm, mid-rib and lateral nerves depressed above and raised beneath, often prickly beneath on the mid-rib, lateral nerves (5-)7-15 pairs. Panicles axillary, often fascicled, velvety-tomentose, 3-15 cm long. Male flowers: solitary or in cymose clusters; bracts linear-lanceolate, 0.1 cm long; pedicels pubescent, 0.08-0.15 cm long; sepals 4, ovate-triangular, obtuse, 0.1-0.12 cm long; petals 4, elliptic-ovate, obtuse, 0.3 cm long; stamens 4, 0.4-0.45 cm long, filaments linear, 0.3-0.35 cm long, anthers ovoid, 0.1 cm long, with blackish gland-tipped connective; pistillodes of 4 carpels, linear, 0.1 cm long; female flowers: subsessile to shortly pedicelled; sepals and petals as in males, staminodes absent; carpels 4, ovoid, 0.2-0.25 cm high, styles very short, stigmas capitate, cohering into a pel-tate disc. Follicles 2-4 with 2, 3, 1 or 0 persistent abortive carpels, globose or slightly compressed, apiculate with persistent stylar base, pustular, 0.5-0.6 cm long; seeds rounded, smooth, 0.4 cm across; fruiting peduncles 0.3-0.6 cm long.

Lectotype: Roxburgh's *Icones* 2430.

Flowers: Feb.-March. *Fruits*: Sept.-Oct.

Specimens examined: INDIA: BIHAR. Borybari (near Bhagalpur), *Hamilton*, 12 Feb. 1809 ♂ (*Wallich* 7117) (K—holotype of *Z. hamiltonianum* Wall. ex Hook. f.; CAL—isotype). ASSAM. Sibsagar. Gourisagar, alt. 90 m, 2134 ♂ (CAL), Sonari, *Kanjilal* 1443 ♂ (ASSAM), Hollongapar, *R. N. Dr* 18108 ♀ (ASSAM), Baruasali, *Kanjilal* 3470 ♂ (ASSAM); Brahmaputra Plains, *Mann*, s. n. (CAL). Lakhimpur, Dibrugarh, alt. 90 m, *Clarke* 37757 ♀, 37747 ♀ (CAL); Jeypur, *Bor* 14043 ♂ (ASSAM), *Deka* 15029 ♀ (ASSAM); Golaghat, *Kanjilal* 4171 ♀ (ASSAM), *Jenkins*, s. n. (CAL—isotypes of *Z. hamiltonianum* Wall. ex Hook. f. var. *tomentosum* Hook. f.); Goalpara. Harthgaon, *Kanjilal* 5068 ♂ (ASSAM), *Deka* 18115 ♂ (ASSAM). NAGALAND. Naga Hills. Baligan Jabocka, *Prain's Collector* 758, 987 ♀ (CAL). ARUNACHAL PRADESH: Siang F. D. Without definite locality, alt. 460 m, *Murthy* 13027 ♂ (ASSAM). ANDAMAN ISLANDS. Without definite locality, *Prain's Collector* 14 ♀ (CAL), (as *Z. budrunga* DC.). BURMA: Katha. Vadu Hill, alt. 990 m, *Lace* 5118 ♂ (CAL). CHINA: TAIWAN. *Odashima* 17815 ♀ (CAL); FORMOSA. *Henry* 205 D-E ♂, 2054 ♀ (CAL).

Distribution: India east to Taiwan and the Ryukyu Island; south in South Vietnam, Thailand, Malesia and N. E. Queensland; in India: between 90 m and 100 m in the Assam Himalayas and also in the Andaman Islands.

Economic importance: *Kanjilal* (*loc. cit.*) reported that the fruits are used for poisoning fish. The bark is used for treatment of toothache in the Malayan Peninsula. *Hartley* (*loc. cit.*) recorded that the collectors from China and Philippines have noted that the plant was pounded and placed in pools to stupefy fish. In China the roots are deemed sudorific and thought to furnish a valuable febrifuge (*Sargent* 1947).

Notes: Closely allied to *Z. tetraspermum*

Wt. & Arn., a Peninsular Indian and Ceylonese species, but *Z. nitidum* can be easily distinguished from it by having terminal and axillary inflorescences and also in the sinuate crenate margins of the leaflets.

Hooker f. (*loc. cit.*) described var. *tomentosum* under *Z. hamiltonianum* Wall. ex Hook. f. and distinguished it from the latter by dense tomentose branchlets, petioles and inflorescences. The author has got an opportunity to see isotypes of both and a critical study of the same reveals that both the specimens are conspecific except that the variety *tomentosum* has denser pubescence than in the type. Further, the pubescence in this species is so variable that there are several intermediates which well connect the glabrate forms to the densely tomentose forms. Hence the variety *tomentosum* Hook. f. cannot be maintained and, therefore, it is treated under the synonymy of *Z. nitidum* DC., the earliest legitimate binomial for this plant.

Hooker f. (*loc. cit.* 497) erroneously reduced *Wallich* Cat. No. 1207, a specimen collected from the cultivated plant in the Botanical Garden, Calcutta, and annotated as *Z. nitidum* DC., to *Toddalia aculeata* Pers. [*T. asiatica* (Linn.) Lamk.] The same error has crept into the *Index Kewensis*. A critical study of the above specimen reveals that it is a specimen of *Z. nitidum* DC., and not of *Toddalia asiatica* (Linn.) Lamk, a plant distinguished from the former in having 3-foliolate leaves and syncarpous ovary.

It is evident from the above list of synonyms that *Piper pinnatum* Lour. is the earliest validly published binomial for this plant, but the specific epithet "*pinnatum*" cannot be taken up here, as it is already preoccupied under *Zanthoxylum* for Norfolk Island species, *Z. pinnatum* (J. R. & G. Forst.) Druce. The next earliest, valid, legitimate name is *Fagara nitida* Roxb., a name based on which De Candolle (*loc. cit.*)

made the necessary combination under *Zanthoxylum*. Therefore, the correct name for this plant is *Z. nitidum* (Roxb.) DC.

8. *Zanthoxylum ovalifolium* Wt. Illust. Ind. Bot. 1: 169. 1839; Bedd. Fl. Sylvat. (For. Man.) 42. t. 6. f. 3. 1871; Hook. f. in Fl. Brit. Ind. 1: 492. 1875; Gamble, Trees, Shrubs & Climbs. Darj. Dist. 14. 1896; Fl. Presid. Madras 149. 150. 1915; Talb. Trees Bomb. 30. 1894; Woodr. in Journ. Bomb. Nat. 5: 267. 1897; Cooke, Fl. Bomb. 1: 178. 1903; Parkinson, For. Fl. Andam. Isl. 109. 1923; Kanjilal *et al.*, Fl. Ass. 1: 202. 1937. *Z. lucidum* Wall. Cat. No. 1212. 1829 (*nom. nud.*). *Z. sepearium* Wt. Illust. Ind. Bot. 1: 169. 1839. *Z. ovalifolium* Wt. var. *sepearium* (Wt.) Hook. f. in Fl. Brit. Ind. 1: 493. 1875. *Fagara ovalifolia* (Wt.) Engler in Pflanzenfam. 111. 4: 118. 1896; ed. 2. 19a: 220. 1931. *Zanthoxylum inerme* White & Francis in Bot. Bull. 22: 6. 1920 (non Sesse & Mocino, 1894; Koidz, 1919). *Fagara varians* Domin in Bibliot. Bot. 22: 846. 1927 (non *Z. varians* Benth. 1843). *Zanthoxylum dominianum* Merr. & Perry in Journ. Arn. Arb. 22: 32. 1941 (based on *Fagara varians* Domin.). *Z. suberosum* White in Proc. Roy. Soc. Queensl. 53: 208. 1942 (based on *Z. inerme* White & Franchis).

Erect, usually unarmed or rarely armed shrubs or small trees, upto 8 m tall. Branchlets terete, glabrous, generally unarmed or occasionally prickly with short, straight or slightly incurved, scattered, reddish-brown, 0.2-0.4 (-0.5) cm long prickles; bark reddish or greyish-brown, lenticellate. Leaves digitately 3-foliolate or occasionally 1-2-foliolate or very rarely pinnate, 8-30 cm long (incl. 0.5-10 cm long petiole); petiole and rachis slightly flattened, narrowly margined, unarmed, leaflets 1-3 or rarely 5, subsessile or shortly petioluled with 0-0.5 cm long petiolules, elliptic-oblong or obovate, abruptly acuminate with short, retuse acumen or retusely subobtusate at apex, acute to cuneate

at base and slightly oblique, especially the lateral ones, subentire-glandular-crenate to double crenate, quite glabrous, usually pellucid-dotted, glossy on the upper surface, 5-25 × 2-7 cm, lateral nerves 8-17(-20) pairs. Panicles terminal and axillary, lax, glabrate to puberulous. Male flowers: in clusters or in cymose umbellules, 0.2-0.3 cm long; pedicels slender, glabrate to puberulous, 0.15-0.3 cm long; sepals 4 or rarely 3, free to the base, ovate-triangular, acute, 0.08-0.1 cm long; petals 4 or rarely 3, lanceolate to oblong or elliptic, subobtusate, whitish, with prominent midrib, 0.2-0.3 × 0.1-0.12 cm; stamens 4 or rarely 3, 0.3 cm long, filaments linear, 0.2 cm long, anthers 0.08-0.1 cm long; pistillode of 1 carpel, 0.1 cm long; disc pulvinate, lobulate, 0.05-0.07 cm long; female flowers: 0.3-0.4 cm long, pedicels, sepals and petals as in males; staminodes 4, filiform, 0.1-0.12 cm long; carpel solitary, ovoid, glandular-punctate, styles ecentric, 0.1 cm long, stigmas globose; disc pulvinate, 0.05-0.08 cm high. Follicles subglobose, pustular, apiculate with persistent style, 0.5-0.8 cm long; seeds black, smooth, 0.5 cm across; fruiting pedicels upto 0.5 (-0.7) cm long; seeds black, smooth, 0.5 cm across.

Type: Wight 356 ♂ ♀ (K).

Flowers: May-June. *Fruits:* Sept.-Oct.

Specimens examined: INDIA: MADRAS. Annamalai Hills. Vandal-Anaimalai Hills, alt. 1030 m, *Fischer* 3393 ♀ (MH), Ibea-Anaimalai Hills, alt. 1515 m, *Fischer* 3815 ♀ (MH), Shola above Andiparai, *Barber* 6034 ♂ (MH); Madura Dist. High Wavy Mountains, alt. 1390 m, *Jacob* 7716 ♀ (MH); Tinivilly Hills. *Beddome*, s. n. (MH); Pulicate Hills. *Wight* 355 (CAL—isotype of *Z. sepearium* Wt.); Coimbatore Dt. Between Punchi and Monica, *Barber* 6034 ♂ (MH). KERALA. Travancore State. Tenmalai, *Calder & Ramaswami* 871 ♀ (MH), Vendamettu, alt. 1030 m, *Meebold* 13063 ♂ (MH), Mathara, *Rao* 1654 ♀ (MH); Kottayam Dt. Kuttikanam-Permade, alt. 1025 m, *Viveka-*

nanthan 2396 ♀ (MH). KARNATAKA. Barg-nai. Saklaspur, Barber 6280 (MH); South Kanara. Without definite locality, *without Collector's name*, s. n. (CAL); North Kanara, alt. 600 m, Talbot 3503 (MH), alt. 500 m, Sedgewick & Bell 6992 (MH). MEGHALAYA: Khasia Hills. Without definite locality, alt. 600 m, Clarke 45128B ♀ (CAL), Griffith 1182 (CAL), alt. 1200 m, J. D. H. & T. T., s. n. (CAL); K. & J. Hills. 38th mile Cherra Thoria Road, alt. 1000 m, Kanjilal 4378 ♀ (CAL), Sohra Raim, Kanjilal 942 (ASSAM). ANDAMAN ISLANDS. South Andaman. Parkinson 616 ♂ (CAL). King's Collector 298 ♂ (CAL), Heinig 247 ♀ (CAL), Prain's Collector 147 ♂ (CAL). SIKKIM: Without definite locality, King 2345 (CAL); Teesta Valley, Prain's Collector 415 (CAL); Ryang Valley, Lister, s. n. (CAL). BURMA: Bhamo Dt. Lace 4480 ♀ (CAL); Upper Burma. Kachin Hills, Shaik Mokum, s. n. (CAL).

Distribution: Sikkim and India southeast to Queensland, in India: ascending from 500-1500 m in the Western ghats and the Assam Himalayas and also in Andaman Islands.

Notes: The Andaman specimens have larger more glossy and less reticulate leaflets than those from Western Peninsula and Assam. Assam specimens have conspicuously reticulate-rugose leaflets a character not seen in other specimens, but cannot be taken as a taxonomical character in recognizing infraspecific units. The occurrence of 5-pinnately compound leaf (Sedgewick & Bell 6992) and 2-carpelled ovaries (Kanjilal 9421) in this species may probably suggests that the 3-foliolate leaves coupled with solitary carpellate ovaries might be a derived condition by reduction from pinnately compound leaves and 2-many-carpellate ovaries.

Hooker f. (*loc. cit.*) reduced *Zanthoxylum sepearium* Wt., a species recognized by Wight (*loc. cit.*) to a variety of *Z. ovalifolium* Wt. Following Hartley (*loc. cit.*), the

author reduced the former to a synonym of the latter, since the prickly nature of *Z. sepearium* Wt., by which this was separated from *Z. ovalifolium* Wt. by the earlier taxonomists, is also a frequent feature of *Z. ovalifolium*.

9. *Zanthoxylum oxyphyllum* Edgew. in Trans. Linn. Soc. 20: 42. 1846; Brand. For. 47. 1874; Hook. f. in Fl. Brit. Ind. 1: 494. 1875; Duthie, List North-West Ind. Pl. 34. 1885; Gamble, Trees, Shrubs & Climb. Darj. Dist. 14. 1896; Strachey, Cat. Pl. Kum. 30. 1906; Cowan & Cowan, Trees North Beng. 29. 1929; Kanjilal *et al.*, Fl. Ass. 1: 201. 1937. *Z. violaceum* Wall. Cat. No. 1213. 1829, pro parte (*nom. nud.*) *Fagara oxyphylla* (Edgew.) Reeder & Cheo in Journ. Arn. Arb. 32: 69. 1951; Engler in Pflanzenfam. 111. 4: 118. 1806; ed. 2. 19C: 221. 1931.

Scandent or climbing, armed shrubs, upto 3-5 m tall. Branchlets terete, woody, generally armed with hooked, brownish, 0.2-0.5 cm long or rarely with straight, pseudostipular, 1.5 cm long prickles; bark greyish, lenticellate. Leaves imparipinnate, straight or slightly arched, 5-30 cm long (incl. 1.5-5 cm long petiole); petiole and rachis grooved above, nearly terete on maturity, glabrous except the pubescent groove, densely prickly beneath or rarely so on the upper surface; leaflets (1-)2-9(-10) pairs, petioluled with 0.1-0.6(-0.7) cm long petiolule, opposite and alternate or subopposite, ovate-lanceolate to ovate-elliptic to oblong, rounded to obtuse or acute to cuneate and oblique or not at base, attenuate to acuminate with retuse tip, thinly to subcoriaceous, crenate to glandular-serrate, quite glabrous, glossy above and pale beneath, more or less spreading, 8-20 pairs, often prickly beneath on the midrib. Panicles mostly terminal or rarely axillary, puberulous, often prickly on the main and primary branches, 3-12 cm long. Male flowers: in umbels, 0.5-0.7 cm long; bracts linear-

lanceolate, 0.2-0.25 (-0.3) cm long; pedicels glabrescent to puberulous, 0.3-0.5 (-0.6) cm long; sepals 4, slightly connate at the base, ovate-triangular, glabrous, subobtusate, tipped with a gland at the apex, 0.15-0.2 cm long; petals 4, fleshy, ovate-elliptic, subobtusate, 0.5 × 0.3 cm; stamens 4, 0.7-0.8 cm long, filaments linear, 0.5-0.6 cm long; anthers oblong, yellowish, 0.2 cm long; pistillode of 1 or 2 carpels, 0.1-0.15 cm long; disc pulvinate, 0.2 cm long; female flowers: 0.5 cm long; sepals and petals as in males; staminodes absent; carpels 4, ovoid, compressed, glandular-punctate, 0.4-0.45 cm long, styles 0.1-0.15 cm long, stigmas capitate, cohering to form a peltate disc of 0.08-0.1 cm across; disc pulvinate. Follicles 2-4 with 2, 1 or 0 persistent abortive carpels, subglobose, apiculate with persistent styler base, 0.5-0.6 cm across, pustular; seeds black, 0.4 cm across; fruiting peduncles 0.5-0.8 (-1) cm long.

Lectotype: Edgeworth (K).

Flowers: Dec.-May. *Fruits*: Aug.-Nov.

Specimens examined: INDIA: MEGHALAYA: Khasia Hills, Vale of Rocks, alt. 1500 m, Clarke 45469 B ♀ (CAL); without definite locality, alt. 12-1800 m, J. D. H. & T. T., s. n. (CAL). MANIPUR: Sirohifurur forests, alt. 18-2400 m, Watt 6435 (CAL) (as *Z. hamiltonianum* Wall. ex Hook. f.), Chingsow, alt. 21-2400 m, Watt 6599 ♂ (CAL). ARUNACHAL PRADESH: Kameng F. D. Seargaon-east side, *Panigrahi* 15818 ♂ (ASSAM) (as *Z. alatum* Roxb.), Jabrang, alt. 1570 m, *Panigrahi* 6535 ♂ (ASSAM). WEST BENGAL. Darjeeling Dt. Senchal Forest, alt. 2270 m, *Lace* 2218 ♀ (CAL), Darjeeling, alt. 2360 m, *Clarke* 26920 A ♀ (CAL), *Kurz*, s. n. (CAL), Goonikaha, alt. 2270 m, *Gamble* 7208 ♀ (CAL), Lachung Valley, alt. 2270 m, *Gammie* 1210 ♀ (CAL), Lachen to Chetan to Shepala, *Rao* 419 ♂ (ASSAM). UTTAR PRADESH. Garhwal. *Hole* 920 ♂ (CAL); Kumaon. Dwali, alt. 2490 m, *Strachey & Winterbottom* 177 ♂ (CAL), Kathi, alt. 2060-2220 m, *Strachey & Winterbottom* 1 ♂ ♀ (CAL).

SIKKIM: Zemu Valley, alt. 2720 m, *Smith & Cave* 2 ♀ (CAL), Jumblong, alt. 1960 m, *Clarke* 27706 ♂ (CAL), without definite locality, *Hole*, s. n. (CAL), without definite locality, alt. 18-2700 m, J. D. H., s. n. (CAL). NEPAL: E. Nepal. Dingla to Bhojpur, alt. 2720 m, *Banerjee* 906 ♀ (CAL) (as *Z. hamiltonianum* Wall. ex Hook. f.), without definite locality, *Wallich* 1213 (CAL) (as *Z. violaceum* Wall.).

Distribution: India; apparently confined to the Himalayas between 15 m and 2700 m.

Economic importance: Watts (1893) noted that the fruits are used along with the tobacco for hukka.

Notes: Readily distinguished from the rest of the Indian species by its larger flowers which are arranged in umbellate clusters. Very variable species, and shows great variation in number, shape and size of the leaflets. Specimens from Manipur have fewer number of leaflets and approach to *Z. pseudoxyphyllum*, but differs from it in having smaller flowers which are solitary or in cymose clusters but not in umbels. Sikkim and Nepal specimens usually have larger leaves than the Western Himalayan ones.

Hooker f. (*loc. cit.*) reduced *Z. violaceum* Wall., a *nomen nudum*, to a synonym of *Z. oxyphyllum* Edgew. There are 3 Wallichian sheets of the above species in the herbarium of CAL, of which, specimens on two sheets are conspecific with *Z. oxyphyllum* Edgew., but the third one is composed of one branchlet and few detached leaflets of *Z. oxyphyllum* Edgew., in addition to two fragments of flowering branchlets of *Z. armatum* DC. Therefore, only a major part of *Z. violaceum* Wall. is conspecific to *Z. oxyphyllum* Edgew., but not the whole of it, as has been interpreted by Hooker f.

The combination *Fagara oxyphylla* has not been actually made by Engler (*loc. cit.*), who merely cited as *F. oxyphylla* Edgew. Reeder and Cheo (*loc. cit.*) correctly made the above combination, with *F.*

oxyphylla Edgew. as its basionym. Therefore, the combination *F. oxyphylla* should be credited to Reeder & Cheo and not to Engler.

10. *Zanthoxylum pseudoxyphyllum* Babu, sp. nov.

Manifeste affinis *Z. oxyphylla* Edgew., a qua tamen differt foliolis paucioribus, oppositis, inflorescentiis paniculatim racemosis brevioribus, floribus solitaribus vel 2-3-natis minoribus, sepalis ciliatis.

Frutex scandens ad 6 m altus. Ramulis crassis teretibus raro spinosis, spinae dispersae, paucae recurvae glabraeque 0.1 cm longae, cortice cinereo. Folia trifoliolata vel imparipinnata, 3-12 cm longa (petiolo incluso 1-3 cm longo); petiolis supra canaliculatis pilosisque, aliter glabris, rarius spinosis, spinae paucae dispersae recurvaeque ornatis. Foliolis 1-2-jugis, subsessilibus, petiolulis brevibus, 0.0-0.2 cm longis, praecipue oppositis, elliptico-oblongis vel obovatis, basi acutis ad cuneatis vel rotundatis, spice obtusis ad abrupte acuminatis, acumen retuso, marginibus crenatis glandulisque, supra subterque glabris, coriaceis, infra pellucidopunctatis, 2.6 × 1.2.5(-3) cm, nervis lateralibus infra prominentibus sursum arcuatis 5-12 jugis. Inflorescentiae terminales atque axillares racemiformes vel paniculiformes, paniculae parce ramosae, 1-4(-5) cm longae. Flores solitarii vel 2-3 aggregati. Flores masculi: bracteis ovato-rotundatis, 0.07-0.08 cm longis ciliatis, pedicellis brevibus puberulis, 0.0-0.1(0.15) cm longis; sepala 4, late triangulo-rotundata, obtusa, ciliata 0.1 × 0.08 cm; petala 4, imbricata, elliptico-oblonga, obtusa, 0.35 cm longa. Stamina 4, antheris oblongis. Pistillodia 2-3 carpellata, 0.07-0.1 cm longa. Discus tumescens 0.05-0.07 cm longus. Flores foeminei non visi.

Typus lectus a Watt in loco Sirohifurar, in regione Manipur, et positus in CAL sub numero 6452.

Scandent or climbing shrubs, upto 6 m

tall. Branchlets stout, terete, unarmed or armed rarely with few, scattered, brownish, hooked, 0.1 cm long prickles, glabrous, bark greyish or greyish-brown. Leaves 3-foliolate or imparipinnate, 3-12 cm long (incl. 1-3 cm long petiole); petiole and rachis grooved above, glabrous except hairy groove, unarmed or rarely prickly beneath with few, scattered, hooked prickles; leaflets 1-2 pairs, subsessile or shortly petioluled, with 0.0-0.2 cm long petiolules, almost always opposite, elliptic-oblong or obovate, acute to cuneate or rounded, oblique or not at base, obtuse to abruptly acuminate with retuse tip at apex, glandular-crenate, glabrous on both surfaces, coriaceous, pellucid-dotted beneath, 2.8(-10) × 1.4.5(-5) cm; lateral nerves prominent beneath, arching upwards, 5-12 pairs. Inflorescences terminal and axillary, puberulous, racemes or sparsely branched panicles, 1-4(-5) cm long. Flowers solitary or in clusters of 2-3; male flowers: bracts ovate-rounded, 0.07-0.08 cm long, ciliate; pedicels short, puberulous, 0.0-0.1 (-0.15) cm long; sepals 4, broadly triangular-rounded, obtuse, ciliate, 0.1 × 0.08 cm; petals 4, imbricate, elliptic-oblong, obtuse, 0.35 cm long; stamens 4, anthers oblong; pistillode of 2-3 carpels, 0.07-0.1 cm long; disc pulvinate, 0.05-0.07 cm long; female flowers: not seen.

Type: Watt 6452 ♂ (CAL).

Flowers: April-June.

Specimens examined: INDIA: MANIPUR. Sirohifurar, alt. 2420 m, Watt 6452 ♂ [CAL (A) holotype of *Z. pseudoxyphyllum* Babu; (B) isotype].

Distribution: India known only from Manipur in the Eastern Himalayas between 2000 m and 2500 m.

Notes: Apparently similar to the preceding species, but this differs from it in having fewer opposite leaflets, shorter, paniculate raceme-like cymose inflorescence, solitary or 2-3-nate, small flowers and also in ciliate sepals.

The specific epithet adopted is suggestive of its apparent resemblance to *Z. oxyphyllum* Edgew.

11. *Zanthoxylum scandens* Bl. Bijdr. 249. 1825; Hartley in Journ. Arn. Arb. 47: 177. 1966. *Z. cuspidatum* Cham. ex Benth. in Journ. Bot. Kew Misc. 3: 329. 1851; *Z. khasianum* Hook. f. in Fl. Brit. Ind. 1: 494. 1875; Kanjilal *et al.* Fl. Ass. 1: 202. 1937. *Fagara scandens* (Bl.) Engler in Pflanzenfam. 111: 4: 118. 1896; ed. 2. 19a: 221. 1931. *F. cuspidata* (Cham. ex Benth.) Engler *loc. cit.* *F. laxifoliolata* Hay. in Ic. Pl. Formosa 3: 50. 1913. *F. cyrtorachia* Hay. in Ic. Pl. Formosa 6: 8. 1916. *F. leiorhachina* Hay. in Ic. Pl. Formosa 6: 10. 1916. *F. chinensis* Merr. in Philip. Journ. Sci. (Bot.). 13: 141. 1918. *Zanthoxylum chinensis* (Merr.) Chung in Mem. Sci. Soc. China 1: 123. 1924. *Fagara kwangsiensis* Hand.-Mazz. Sinensia 3: 186. 1933. *Zanthoxylum yunnanense* Huang in Acta Phytotax. Sinica 6: 1. 59. 1957. *Z. laxifoliolatum* (Hay.) Huang, *loc. cit.* 81. *Z. leiorhachium* (Hay.) Huang, *loc. cit.* *Z. cyrtorachium* (Hay.) Huang, *loc. cit.*

Scandent or climbing shrubs. Branchlets slender, terete, generally armed with a few short, brownish, hooked, 0.1-0.5 cm long prickles or occasionally unarmed, velvety-pubescent or rarely glabrescent; bark greyish, lenticellate. Leaves alternate, straight or slightly arched, imparipinnate, 8-30 cm long (incl. 1.5-3 cm long petiole); petiole and rachis slender, grooved and slightly margined on the upper side and generally armed beneath, velvety-pubescent or rarely glabrate; leaflets 3-12 pairs, shortly petioluled, mostly alternate or subopposite or occasionally opposite, ovate-elliptic to lanceolate, obliquely acute to cuneate or rounded at base, abruptly acuminate (trapaezoid) at apex with 0.5-2 cm long, retuse or obtuse acumen, thinly coriaceous, quite glabrous, shining above and pale beneath except a few

occasional hairs on the midrib, with or without pellucid dots, entire below the middle and glandular-crenulate above the middle, 2.6 × 1.3 cm; lateral nerves 6-12 (-15) pairs. Panicles terminal and axillary, velvety-pubescent, 2-10 (-12) cm long. Flowers usually in cymose clusters or solitary, sessile or shortly pedicellate; pedicels puberulous, 0.02-0.1 cm long; sepals 4, ovate-triangular, subacute, glabrous, ciliate or not, 0.08-0.1 cm long; petals 4, ovate-oblong, obtuse, glabrous, 0.2-0.25 cm long; stamens 4, slightly exceeding the petals, filaments linear, 0.2 cm long; anthers yellowish, oblong, 0.075-0.08 cm long; pistillodes 1-3, linear, 0.1 cm long; disc flat, 0.1 cm across; female flowers: pedicels, sepals and petals as in males; staminodes absent; carpels 2-4. Follicles 1-4 with 3, 2, 1 or 0 persistent abortive carpels, ovoid-subglobose, pustular, 0.5-0.6 cm long; seeds smooth, shining, 0.3-0.35 cm across; fruiting pedicels 0.2-0.6 cm long.

Type: Blume 1603 ♀ (L.).

Flowers: April-May. *Fruits:* Oct.-Dec.

Specimens examined: INDIA: MEGHALAYA: Khasia Hills. Without definite locality, alt. 12-1800 m, J. D. H. & T. T., s. n. (CAL isotype of *Zanthoxylum khasianum* Hook. f.); Shillong. Shillong Peak, alt. 1940 m, Kanjilal 4408 ♀ (CAL), alt. 1800 m, Clarke 38590E (CAL), Deka 22821 ♀ (ASSAM), Panigrahi 3854 ♀ (ASSAM), Lao-Myang Sain, alt. 1690 m, Kanjilal 5913, 2316, 6681 (ASSAM), near Mawlai Stream side, Dutta 32714 ♂ (ASSAM).

Distribution: India east to Taiwan and south in Sumatra, Java and North Borneo; in India: apparently restricted to Shillong in the Assam Himalayas between 12 m and 1800 m.

Notes: Differs from *Z. oxyphyllum* Edgew. to which it is closely allied by having pubescent branchlets, petioles and inflorescences, smaller, less coriaceous leaflets with conspicuous trapaezoid apex and also

in smaller flowers which are not arranged in umbels.

This species is highly variable in number, shape and size of leaflets, pubescence and prickly nature.

12. *Zanthoxylum tetraspermum* Wt. & Arn. Prodr. 1: 148. 1834; Thw. Enum. Pl. Zey. 69. 1858; Bedd. Fl. Sylvat. (For. Man.) 42. 1872; Hook. f. in Fl. Brit. Ind. 1: 495. 1875; Trimen, Handb. Fl. Ceylon 1: 215. 1893; Gamble, Fl. Presid. Madras 1: 149. 1915; Fyson, Fl. Nilg. Pulney Hill-Tops 1: 73. 1915; Fl. South Ind. Hill Stat. 1: 99. 1932. *Fagara tetrasperma* (Wt. & Arn.) Engler in Pflanzenfam. 111. 4: 118. 1897; ed. 2. 19C: 221. 1931.

Climbing, armed shrubs. Branchlets woody, terete, glabrous, densely prickly with hooked, brownish, 0.2-0.3 cm long prickles; bark dark or reddish-brown or greyish-brown. Leaves alternate, 3-foliolate to imparipinnate, 8-20(-25) cm long (incl. 1.5 cm long petiole); petiole and rachis glabrous, nearly terete at maturity, prickly beneath; leaflets 3 pairs, subsessile to shortly petioluled with 0.05-0.4 (-0.5) cm long petiolule, opposite, elliptic to oblong or ovate or often obovate to cuneate or rarely rounded and slightly oblique or not at base, acuminate to caudate with retuse, 0.5-1.5 cm long acumens, thickly coriaceous, glabrous, glossy on the upper surface, turning to ash or black colour on drying, sinuate-crenate or undulate with a gland in each sinus, with or without pellucid dots, 4-10(-12) × 2-6 cm. Lateral nerves prominent beneath, more or less spreading or arching upwards, 10-16(-20) pairs, often prickly on the midrib. Panicles terminal and axillary, pubescent-velvety tomentose, often fascicled, upto 3-15 (-20) cm long. Flowers in cymose clusters; male flowers: yellowish; pedicels pubescent, 0.08-0.2 cm long; sepals 4, slightly connate at base, ovate-triangular, obtuse, 0.1 cm long; petals 4, ovate, obtuse, 0.25 cm long; stamens

4, 0.3 cm long, anthers 0.1 cm long, with glandular connective; pistillode of 4 ovoid carpels, with subulate, 0.1-0.12 cm long styles; female flowers: pedicels upto 0.1 cm long; sepals and petals as in males; staminodes absent; carpels 4, ovoid-subglobose, 0.15 cm long, styles very short, stigmas capitate, cohering to form a peltate disc. Follicles 1-4 with 3, 2, 1 or 0 persistent, abortive carpels, subglobose, pustular, 0.5-0.6 cm long; seeds black, smooth, 0.5 cm across; fruiting pedicels upto 0.1-0.4 (-0.5) cm long.

Lectotype: Wight 981 ♀ (K).

Flowers: Dec.-March. *Fruits*: Oct.-Dec.

Specimens examined: INDIA: MADRAS. Nilgiri Mountains. Devicolum Trav., alt. 1800 m, Meebold 13486 (CAL), without definite locality, Hook. f. & Thomson, s. n. (CAL), without definite locality, without Collector's name, 386 ♀ (CAL), Shembaganur, Auglade 1797 ♂ (CAL), Kotagiri, alt. 1800 m, Fischer 4071 ♂ (CAL), Park-side R. F., alt. 2000 m, Sebastine 2554 ♂ (MH); Trichinopoly Dt. Kovimalai, Barber 11384 ♀ (MH). KARNATAKA: CONOOR, without Collector's name 10818B ♂ (CAL), Lamb's Rock Shola, Lawson, s. n. (MH); Coorg. without Collector's name, s. n. (CAL). CEYLON: Central Province, alt. 900-1500 m, Thwaites 386 ♂ ♀ (CAL).

Distribution: India and Ceylon; in India: ascending upto 2000 m in the Nilgiri mountains of Western Peninsular India.

Notes: Indeed, very closely allied to *Z. nitidum* DC., and may perhaps a southern geographical counter part of the latter. But the sinuate-crenate-glandular margin of the leaflets and the axillary and terminal inflorescences of this species well distinguish it from *Z. nitidum* DC.

13. *Zanthoxylum tomentellum* Hook f. (in Fl. Brit. Ind. 1: 493. 1875) emend. Babu. *Fagara tomentella* (Hook. f.) Hand.-Mazz. Sym. Sin. 7: 624. 1933.

Scandent or erect, armed small trees, upto 8-10 m tall. Branchlets woody, terete, velvety-pubescent-tomentose, armed with scattered, brownish, hooked, 0.2-0.5 cm long prickles; bark greyish, lenticellate. Leaves imparipinnate, upto 15-30 cm long (incl. petiole); petiole and rachis terete, velvety-tomentose or pubescent, prickly beneath with hooked prickles, leaflets 6-8 pairs, shortly petioluled with 0.2 cm long petiolules, alternate or subopposite or opposite, ovate-oblong to elliptic, obliquely acute to cuneate at base or rarely obtuse, obtuse to abruptly acuminate with retuse tip, entire except the crenate apical portions, coriaceous, glossy and glabrous above except hairy midrib and pale and softly pubescent beneath, especially on the nerves, 3.6(-8) × 1.5-3(-3.5) cm; lateral nerves depressed above and raised beneath, more or less spreading, 6-15(-16) pairs. Panicles terminal and axillary, sparsely branched, velvety-tomentose, 2-12(-15) cm long; male flowers in clusters on short, lateral branches of the slender panicles; pedicels pubescent, 0.15-0.3 cm long; sepals 4, ovate-triangular, subacute-obtuse, ciliate, glabrous or hairy on the back, 0.2 cm long; petals 4, oblong, 0.3-0.35 cm long; stamens 4, 0.5 cm long, filaments linear, 0.4 cm long, anthers oblong, yellowish, 0.15 cm long; pistillode of 1 carpel, ovoid, 0.15-0.2 cm long. Female inflorescences stout, sparsely branched with short branches; flowers in cymose clusters; pedicels upto 0.04-0.1 cm long; sepals and petals as in males; staminodes absent; disc small; carpels 4, ovoid, 0.2 cm long, glandular-punctate, styles 0.05-0.07 cm long, persistent in the fruit as a beak, stigmas capitate. Follicles 1-4 with 3, 2, 1 or 0 persistent abortive carpels, compressed, tipped with persistent style, pustular, 0.5 × 0.45-0.5 cm; seeds smooth, black, 0.4 cm across; fruiting peduncles stout, woody, 0.3-0.7 cm long.

Lectotype: Griffith 743 ♀ (CAL).

Specimens examined: INDIA: MEGHALAYA: Kingdonward 11213 ♂ (CAL), without Col-

lector's name, s. n. (CAL). BHUTAN: Panuka, without Collector's name, 743 ♀ (CAL-lectotype of *Zanthoxylum tomentellum* Hook. f.).

Distribution: India, Bhutan and Sikkim; in India: known only from the Eastern Himalaya.

Notes: Closely resembles *Z. oxyphyllum* Edgew., but *Z. tomentellum* differs from it by pubescent-tomentose nature, shorter leaflets with more or less entire margins and by the smaller size of flowers which are arranged in clusters but not in umbels, and also in having large, compressed, hooked fruits.

Hooker f. (*loc. cit.*) described that the plants are erect trees, and leaflets are alternate and further stated that the male flowers are not known. A study of the more material necessitates the alteration of the diagnostic characters given by Hooker f., and, hence the author proposes the above emended description.

Previously known only from Bhutan and Sikkim Himalaya.

DOUBTFUL OR EXCLUDED SPECIES

Fagara triphylla Roxb. Fl. Ind. 416. 1832 = *Euodia roxburghiana* Benth. [= *E. lunurankenda* (Gaertn.) Merr.].

Zanthoxylum andamanicum Kurz in Journ. Asiat. Soc. Beng. 44: 130. 1875 (*nomen*); For. Fl. Brit. Burm. 1: 181. 1877 = *Harrisonia perforata* (Blanco) Merr. (*H. benetii* Benn.), (Simaroubaceae).

Kurz (*loc. cit.*) described *Z. andamanicum* on the basis of a sterile specimen collected from Andaman Islands. Parkinson (1927) doubtfully expressed that it might be conspecific with *Harrisonia benetii* Benn. The author, on a careful study of the type specimen, comes to the conclusion that it is a sterile branchlet of *Harrisonia perforata* (Blanco) Merr. (= *H. benetii* Benn.), and not at all belongs to the genus *Zanthoxylum* Linn.

Zanthoxylum bajarnandia Wall. Cat. No.

7118. 1832 (nom. nud.), according to Hooker f. Fl. Brit. Ind. 1: 496. 1875, this may be *Z. rhetsa* DC. (= *Z. limcnella* Alst.).

Zanthoxylum connaroides Wt. & Arn. Prodr. 1: 148. 1834 = *Trichilia connaroides* (Wt. & Arn.) Benth. in Acta Bot. Neerl. 11: 11-20. 1962 *Walsura trijuga* (Roxb.) Kurz = *Heynea trijuga* (Roxb.) (Meliaceae).

Zanthoxylum finlaysonianum Wall. Cat. No. 7114. 1832 (nom. nud.), according to Hooker f. Fl. Brit. Ind. 1: 496. 1875, this may be probably a native of Siam.

Zanthoxylum floribundum Wall. Cat. No. 1206. 1829 (nom. nud.) = *Toddalia asiatica* (Linn.) Lamk. (= *T. aculeata* Pers.).

Zanthoxylum limonifolium Wall. ex Voigt, Hort. Suburb. Calc. 185, 1842. The author has not seen any sheet of this plant, but the description is too meagre to determine the exact identity of this plant.

Zanthoxylum nilagiricum Miq. Fl. Ind. Bat. Suppl. 532. 1860 = *Euodia roxburghiana* Benth. ('*Evodia*'), [= *E. lunur-ankenda* (Gaertn.) Merr.], according to Hooker f. Fl. Brit. Ind. 1: 487. 1875.

Zanthoxylum obtusifolium Poir. Suppl. 2: 293. 1811. According to Hooker f. Fl. Brit. Ind. 1: 496. 1875, this is a doubtful native of India and probably not a *Zanthoxylum*.

Zanthoxylum rhoifolium Lamk. sensu DC. Prodr. 1: 727. 1824 is not an Indian species, but a native of America, according to Hooker f. Fl. Brit. Ind. 1: 496. 1875.

Zanthoxylum sapindifolium Wall. Cat. No. 1215, (nom. nud.). According to Hooker f. Fl. Brit. Ind. 1: 496. 1875; there is no specimen in Wallich's Herbarium.

Zanthoxylum serra Turcz. in Bull. Soc. Nat. Mosc. 1: 440. 1858 = *Saurauia nepalensis* DC. ('*Saurauja*'), according to Hooker f. Fl. Brit. Ind. 1: 286. 1875.

Zanthoxylum spondiaefolium Wall. (Cat. No. 1217. 1829, nom. nud.) ex Hook f. Fl. Brit. Ind. 1: 496. 1875 (as doubtful species). The author has not seen the type, but from the short description given by Hooker f., it

appears to be not *Zanthoxylum* at all.

Zanthoxylum triflorum Turcz. in Bull. Soc. Nat. Mosc. 1: 597, 1863. According to Hooker f. Fl. Brit. Ind. 1: 496. 1875, it may be *Melicope indica* Wt.

Zanthoxylum triphyllum Wt. Ic. t. 1. 204. 1839 = *Euodia roxburghiana* Benth. [*Euodia lunur-ankenda* (Gaertn.) Merr.], according to Hooker f. Fl. Brit. Ind. 1: 487. 1875.

Zanthoxylum undulatum Wall. Cat. No. 1208. 1829 (nom. nud.) = *Toddalia lanceolata* according to Index Kewensis.

Zanthoxylum wallichianum Steud. No-med. 2. 797. 1841 (nomen), based on *Z. lucidum* Wall. (non Bl.) = *Z. ovalifolium* Wt.

Zanthoxylum zeylanicum DC. Prodr. 1: 728. 1824 = *Euodia roxburghiana* Benth. [= *E. lunur-ankenda* (Gaertn.) Merr.], according to Hooker f. Fl. Brit. Ind. 1: 492. 1875.

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