

Revision of *Aralia* L. (Araliaceae) in India

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Abstract

A revision of *Aralia* L. in India is provided based on field studies, and examination of herbarium collections. Eleven species of *Aralia* are recognized in India: *A. armata*, *A. cachemirica*, *A. foliolosa*, *A. leschenaultii*, *A. gigantea*, *A. kingdon-wardii*, *A. malabarica*, *A. parasitica*, *A. subcordata*, *A. thomsonii*, and *A. tibetana*. Descriptions are made for all these species and a taxonomic key is constructed. *Aralia tibetana* is newly recorded from India.

INTRODUCTION

Araliaceae in India have been treated historically in a number of floristical studies (e.g., Roxburgh, 1832; Wight & Walker-Arnott, 1834; Wight, 1845; Kanjilal *et al.*, 1938; Gamble, 1957; Deb, 1961; Haridasan & Rao, 1985; Vajravelu, 1990; Singh, 2000). However, extensive nomenclatural changes have been made in Araliaceae in the past few decades (see Wen *et al.*, 2001 for discussions). We herein provide a revision of the genus *Aralia* L. from India to aid in floristic, conservation, and evolutionary studies.

Aralia has been recently delimited (Wen, 1993) and the genus *Pentapanax* was merged with *Aralia* based on the character intermediate between the two genera. This taxonomic treatment was subsequently supported by morphological and molecular phylogenetic evidence (Wen, 2001, 2002). In these studies, *Pentapanax* was shown to be nested within *Aralia* and the two "genera" have highly similar floral and fruit morphology, differing mostly in leaf architecture. But when all species are compared, intermediate morphology occurs among taxa of the two "genera". This revision reflects the nomenclatural changes proposed by Wen (1993), Jebb and Wen (2001), and Wen *et al.* (2001).

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Eleven species of *Aralia* are recognized in India. They are: *A. armata*, *A. cachemirica*, *A. foliolosa*, *A. gigantea*, *A. kingdon-wardii*, *A. malabarica*, *A. parasitica*, *A. subcordata*, *A. thomsonii*, and *A. tibetana*. These 11 species belong to three sections of the genus: sect. *Aralia* (*A. cachemirica* and *A. tibetana*), sect. *Dimorphanthus* (Miq.) Miq. (*A. armata*, *A. foliolosa*, *A. malabarica*, and *A. thomsonii*) and sect. *Pentapanax* (Seemann) J. Wen (*A. leschenaultii*, *A. gigantea*, *A. kingdon-wardii*, *A. parasitica*, and *A. subcordata*).

TAXONOMY

Aralia L., Sp. Pl. 273. 1753; Gen. Pl., ed. 5:134.1754.

Dimorphanthus Miq., Comm. Phytogr. 3: 95.1840.

Pentapanax Seemann, J. Bot. 2: 294.1864.

Acanthophora Merrill, Philipp. J. Sci. 13: 316. 1918. *nom. illeg.*, non Lamouroux, 1813.

Neoacanthophora S.S.R. Bennet, Ind. J. Forest. 2: 283. 1979.

Parapentapanax Hutch., Gen. Fl. Pl. 2: 56. 1967.

Trees, shrubs, lianas or herbs with rhizomes, armed or unarmed; leaves alternate, 1-4-pinnately compound, rachis articulated, mostly stipulate; inflorescence terminal, paniculate or corymbose or umbellate, usually consisting of umbels, capitula or racemes, occasionally umbels solitary; flower 5-8-merous, with pedicels articulated below; sepals 5-8; petals 5-8, imbricate in buds; stamens 5-8, recurved in buds; ovary inferior, 5-8-locular, with a floral disk, styles distinct or connate at the base or completely connate; fruit a berry, 5-8-locular, more or less globose; endosperm uniform.

About 67 species, distributed primarily in China, India and Southeastern Asia (about 57 species), and also in North and Central America.

Key to species of *Aralia* in India

- 1a. Herbaceous plants; leaves ternately compound 2
- 1b. Woody shrubs to small trees or epiphytes; leaves 1-4-pinnately compound.....3
- 2a. Stems green to greenish purple; leaflets narrowly ovate to less commonly ovate, (4)-8-21 cm long, 3-8.5 cm wide, acute to acuminate at apex, nearly glabrescent to slightly scabrous on adaxial surface, glabrescent to slightly puberulent on abaxial surface.
.....*A. cachemirica*

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- 2b. Stems purple to dark purple; leaflets ovate, or occasionally narrowly so to elliptic, 3.5-11.5 cm long, 2.3-5.5 cm wide, sharply acuminate at apex, adaxial surface pilose along veins to rarely glabrescent, abaxial surface pilose, or at least along the veins and veinlets: *A. tibetana*
- 3a. Stems unarmed; often epiphytes; leaves pinnately compound with 3-7 leaflets 4
- 3b. Stems prickly; non-epiphytes; leaves 2-4- pinnately compound 8
- 4a. Leaflets glaucous beneath, entire at margin, relatively small (2.5-5.5 cm long, 1.5-2.5 cm wide) *A. parasitica*
- 4b. Leaflets green beneath, toothed at margin, relatively large (7.5-15.5 cm long, 4-9 cm wide) 5
- 5a. Flowers in racemes; inflorescence whitish green; leaflets bluntly serrate at margin 6
- 5b. Flowers in umbels; inflorescence purplish green; leaflets serrulate to ciliate at margin 7
- 6a. Leaves with 3-5 leaflets; petiolules of lateral leaflets 1.5-3 cm long; those of lowermost leaflets of the pinna conspicuously articulated below the leaflet blade; inflorescence glabrous; styles mostly united *A. subcordata*
- 6b. Leaves with 5-7 leaflets; petiolules of lateral leaflets 0-1.3 cm long; those of lowermost leaflets of the pinna slightly articulated; inflorescence more or less pilose; styles mostly free *A. gigantea*
- 7a. Leaves trifoliolate; leaflets margin sharply ciliate; inflorescence with a main axis, umbels racemosely arranged on the primary inflorescence branches; pedicels glabrous. *A. kingdon-wardii*
- 7b. Leaves with 3-7, usually 5 leaflets; margin serrate; inflorescence without a main axis, primary inflorescence branches with a terminal umbel and 1-6 umbels clustered umbellately below the terminal umbel; pedicels pilose *A. leschenaultii*
- 8a. Leaflets glabrous 9
- 8b. Leaflets more or less pubescent 10

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- 9a. Leaves 3-4-pinnately compound; leaflets serrulate at margin, with more or less rounded teeth; fruits small, 3-3.5 mm in diameter *A. foliolosa*
- 9b. Leaves 2- or rarely 3- pinnately compound; leaflets doubly serrate and ciliate at margin; fruits large, 6-6.5 mm long, 5-5.5 mm wide *A. malabarica*
- 10a. Leaflets obovate to elliptic, pubescent with appressed hairs; bracts and bracteoles persistent; fruits small, 3.5-5 mm in diameter *A. thomsonii*
- 10b. Leaflets lanceolate to narrowly ovate, glabrescent to pilose; bracts and bracteoles caducous; fruits large, 5-6 mm in diameter *A. armata*

1. *Aralia parasitica* (D. Don) J. Wen, Brittonia 45:53.1993.

Hedera parasitica D. Don, Prodr. Fl. Nepal. 188. 1825. *Pentapanax parasiticus* (D. Don) Seemann, J. Bot. 2: 296. 1864. TYPE: NEPAL, Near Narainhetty, 7 Nov 1802, *F. Hamilton s.n.* (Holotype: BM!).

Aralia paracitica Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 188. 1825. *pro syn.*

Hedera glauca Wall. ex G. Don, Gen. Hist. 3:394. 1834. TYPE: NEPAL, Kamaon, *Wallich 4921* (Holotype: BM; isotype: K-W!).

Small trees, small or large shrubs, epiphytic climbers or big straggling shrubs. Leaves exstipulate, with 5 or sometimes 3 leaflets, petioles glabrous; leaflets thick chartaceous, ovate to elliptic, 2.5-5.5 cm long, 1.5-2.5 cm wide, acuminate to acute at apex, rounded to cuneate at base, entire at margin, lateral veins 8-9, inconspicuous, adaxial surface glabrous and green, abaxial surface glabrous and glaucous, petiolules 0-2 mm long, glabrous. Inflorescence terminal, consisting of a single or occasionally up to 5 umbels umbellately arranged, 4-7.5 cm long; terminal umbels with 30-80 flowers, peduncles 1-5.5 cm long; pedicels glabrous or pilose, 8-15 mm long, tip slightly enlarged; bracteoles lanceolate, 1-1.5 mm long, 0.7-0.9 mm wide, pubescent. Sepals triangular, ca. 0.5 mm long. Petals ovate, 1.5-2 mm long. Stamens 5, filaments 2.0-3.2 mm long, anthers ca. 0.5 mm long. Styles 3-5 divided at the tip. Fruits black, 5-locular, globose, 4-4.5 mm long, 3.5-4 mm wide, with persistent styles, styles 2.5-4 mm long, slightly divided at the tip.

Phenology: Flowering in November; fruiting in January.

Distribution: In northern India (Arunachal Pradesh, Assam, Nagaland and Uttar Pradesh), Western China, Nepal and northern Thailand.

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Ecology: In mixed evergreen deciduous forests; alt. 2000-3000 m.

Additional specimens examined: CHINA: **Sichuan:** Ebian, Shaping, near Daping, 1 Aug 1939, G.W.Yao 4416 (PE, 2 sheets); Ebian, 2000 m, in forest, Aug 1925, in fl., W.C. Cheng 6433 (PE). **Xizang (Tibet):** 1935, F. Kingdon-Ward 12473 (BM). **Yunnan:** Gongshan Xian, Dulongjiang, near Xiongdang, 1900-2100 m, 3 Sep 1982, in fl., Qinghai- Xizang Exped. Team 9861 (KUN); Nanhua, on mountain slope, in mixed deciduous forest, 2300-2400 m, 5 Sep 1982, in fl., Qinghai-Xizang Exped. Team 9935 (KUN). Kunming, Kunming Working Station 00010 (KUN, 2 sheets). Songming, Chao-Hsi-Shan, 2400 m, in thickets, 15 Oct 1950, in fl.; P. I. Mao 232 (KUN, 2 sheets, PE). INDIA: **Arunachal Pradesh:** Jabrang, R.S .Rao 1309 (ASSAM, CAL, 2 sheets), Dirang Zong- Nyak- Madong, R .S.Rao 1538 (ASSAM , CAL); R.S Rao s.n. (CAL, 2 sheets). **Assam:** Manda La , Balipara Frontier 9000 ft, a small tree or a large bush of the drier forest, 1935, Kingdon-Ward 11472 (BM, 2 sheets). **Nagaland:** Tekkhubama, Naga Hills, 7000- 7500 ft, 19 Nov 1935, a small tree, sometimes epiphytic, in the forest F. Kingdon-Ward 12551 (BM, 2 sheets). Tehri (Garhwal) , 8000 ft, 13 Oct 1954, in fl., K, C.Sahni 21643 (BH). N.W. Himalaya, Dr. Royle s.n. (GH). N.W. Himalaya , Mussoorie, 15 Jan 1898, P.W.Mackinnon s.n. (CAL). N.W. Himalaya, Mussoorie, on oaks, 6000ft, 15 Oct 1898, P.W.Mackinnon s.n. (CAL 2 sheets). N. W. Himalaya , 19 May 1898 , P.W.Mackinnon s.n. (CAL 2 sheets). NW India, near Sosa 8-9000 ft, parasite on *Symplocos craetagoides*, 13 July 1886, Duthie 6320 (BM, CAL). THAILAND: **Chiang Mai:** Doi Chiang Dao Wildlife Sanctuary, east end of the Doi Luang Valley, slightly west of the summit of Doi Chiang Dao, 1850 m, open, very exposed limestone hill, ragged terrain in mixed seasonal, evergreen and deciduous hardwood forest, 31 Jan 1996, in fruits, J.F. Maxwell 96-146 (A, BKF). Doi Angka, east slope, 1850 m, 30 Nov 1920, in fl., H.B.G.Garrett 611 (A, BKF).

2. *Aralia kingdon-wardii* J. Wen, Lowry & Esser, *Adansonia* 23:307, f.l. 2001.

Gamblea longipes Merrill, *Brittonia* 4:128. 1941, non *Aralia longipes* Truff., Rev.Hort. 1891:224: 1891. TYPE: MYANMAR, Ngawchang valley, north of Htawgaw, 1370 m, forest, in shady gullies, 30 Dec 1938, in fl. F. Kingdon-Ward (*Vernay- Cutting Expedition*) 179, (Lectotype:NY!, designated by Wen *et al.*, 2001; isolectotype: A!).

Pentapanax trifolitaus K.M.Feng, Fl. Yunnanica 2:506. 1979. TYPE: CHINA, Yunnan, Gongshan, Dulongjiang, alt. 1200 m, 13 Nov 1959, K.M.Feng 24264 (Holotype: KUN!).

Shrubs, climbers or epiphytes. Leaves exstipulate, trifoliate, petioles glabrous; leaflets chartaceous, ovate, 8.5-13.5 cm long, 4-8 cm wide, glabrous on both surfaces, petiolules glabrous, those of the two lower leaflets with an inconspicuous articulation below the leaflet blade, 3.5-4.5 cm long, those of the terminal leaflets inarticulate, 4-6 cm long acuminate at apex, rounded to broadly acute at base, ciliate at margin, lateral veins 8-10 per side. Inflorescences terminal, glabrous, main axis 5-15 cm long, primary branches 11-12, each 11-17 cm long, each with 8-12 paniculately arranged umbels. Umbels 25-35 flowered, pedicels

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glabrous, 10-20 mm long, bracteoles caducous. Sepals triangular, 0.25-0.3 mm long. Petals ovate, 1.6-2 mm long. Stamens 5, 2.2-3 mm long. Ovary 5-locular, often enlarged at anthesis; base of the style not forming a conical stylopodium-like structure. Fruits globose, strongly ribbed when dry, 5-6 mm in diameter, with persistent styles 1.5-2 mm long, slightly divided at the tip.

Phenology: Flowering from December to March; fruiting from March to May.

Distribution: NE India (Arunachal Pradesh, Assam, Sikkim, and West Bengal), also in Bhutan, N. Myanmar (Burma) and western China (Xizang and Yunnan).

Ecology: In evergreen or deciduous and evergreen mixed forests; alt. 1200-2000 m (Wen et al., 2001).

Representative specimens from India examined: INDIA: **Arunachal Pradesh**: Aka Hill, May 1933, *N.L. Bor 19059* (ASSAM, 2 sheets); Mishmi hills, 24 Mar 1876, *Duthie s.n.* (CAL); Mishmi hills, Glo Lake, Kamlang valley, 3500 ft., 28 Mar 1949, *F. Kingdon-Ward 18459* (BM); Dibang Valley, at the edge of the forest, 1300 m, May 2001, *M.K. Pathak 3940* (CAL); Subansiri District, NEFA, Hapoli, Western Hills, 13 Apr 1965, along edge of forest, *A.R.K. Sastry 41088* (ASSAM); Palin-Randang village in forests, 17 May 1966, *A.R.K. Sastry 45390* (ASSAM). **Sikkim**: Singhanebans to North Regu, 1800-2000 m, 11 Apr 1996, *G.P. Sinha 17542* (BSHC, 2 sheets); location and collector unknown, specimen labeled with "serial no. 2040, herb. specimen sent to Mr. K. P. Biswas, Royal Botanic Garden, Calcutta" (LBG, 2 sheets). **West Bengal**: Middle Rechilla-Mulkharka, 2490-2120 m, 29 Apr 1995, fl., *A.P. Das 1155* (NBU); location unknown, *A.P. Das 449* (NBU).

Aralia kingdon-wardii was recently reported from India (Wen et al., 2001). This species is characterized by its large and green leaflets (8.5-13.5 cm long, 4-8 cm wide), sharply ciliate leaflet margin, the presence of a main inflorescence axis, umbels racemously arranged on an inflorescence branch, and glabrous inflorescence and pedicels.

3. *Aralia leschenaultii* (DC.) J. Wen, Brittonia 45: 53. 1993.

Panax leschenaultii DC., Prodr. 4:254. 1830. *Hedera leschenaultii* (DC.) Wight & Arn., Prodr. Fl. Ind. Orient. 1:337. 1834. *Pentapanax leschenaultii* (DC.) Seemann, J. Bot. 2:296. 1864. TYPE: INDIA, Tamil Naidu, Nilgiri Hills, *J. Leschenault s.n.* (Holotype: G!).

Hedera fragrans D. Don, Prodr. Fl. Nepal. 187. 1825. - *Pentapanax fragrans* (D. Don) Ha, Nov. Syst. Vyssh. Rast. 11:227. 1974. *Aralia fragrans* (D. Don) Jebb & J. Wen, Adansonia 23: 311. 2001. TYPE: NEPAL, location unknown, *N. Wallich 4937* (Holotype: K-W!; isotype: W!, WU!).

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Hedera trifoliata Wight & Arn., Prodr. Fl. Ind. Orient. 1:377, 1834. TYPE: INDIA, Dindygul Hills, *R. Wight s.n.* (Holotype: K!).

Pentapanax umbellatum Seemann, Rev. Heder. 22. 1868. *Pentapanax leschenaultii* (DC.) Seemann var. *umbellatum* (Seemann) C.B. Clarke in J.D. Hook., Fl. British India 2:725. 1879. TYPE: INDIA, Meghalaya, Mont Khasia, 5-6000 ft., *J.D.Hooker & T.Thomson s.n.* (Holotype: BM!; isotypes : CAL!, K!, W!).

Pentapanax longipedunculatus N.S.Bui, Adansonia, ser. 2, 3:392. 1969. *Pentapanax fragrans* (D.Don) Ha var. *longipedunculatus* (N.S Bui) Ha, Nov. Syst. Vyssh. Rast. 11:227. 1974. TYPE: VIETNAM, Prov. Lao Cai, Tonkin, Chapa, 1800m, Aug. 1930, in fl., *Petelot 4624* (Holotype: P!; isotypes: A! US!, HN!).

Pentapanax leschenaultii (DC.) Seemann var. *simplex* K.M. Feng, Fl. Yunnanica 2:506. 1979. TYPE : CHINA, Yunnan, Jingping, Hetouzai, in dense forests, 1900m, 12 May 1956, *Yunnan Exp. Team 1332* (Holotype: KUN!).

Pentapanax leschenaultii var. *villosus* Y.R. Li, Acta Bot. Yunnan. 2:109. 1980. TYPE: CHINA, Xizang, Yadong Xian, Asan Qiao, 2750 m, 3 June 1975, *Qinghai-Xizang Exped. (Supplement) 750178* (Holotype : KUN; isotype: PE!).

Climbing or epiphytic shrubs, to small trees, 5-15 m tall, unarmed. Leaves stipulate; pinnately compound with (3-) 5 (-7) leaflets; leaflets chartaceous, ovate, narrowly ovate, oblong to elliptic, 6-15.5 cm long, 2.5-8 cm wide, glabrous on both surfaces to more or less pilose on lower surface, acuminate or acute at apex, rounded to acute at base, serrulate at margin, lateral veins 8-10 per side, conspicuous above and below; petiolules glabrous to somewhat pilose, those of the two lower leaflets 0.2-2.8 cm long, those of terminal leaflets inarticulate, 2.5-4.5 cm long. Inflorescences terminal at the branch apex, pilose to occasionally glabrous, usually without a main axis or with only a short axis (up to 3.5 cm long), primary branches (4-) 7-13, each with 1-5 (-7) umbellately arranged umbels; terminal umbels 25-55-flowered, pedicels articulated, glabrous to pilose, 8-15 mm long, lateral umbels 12-28-flowered, pedicels 6-15 mm long, bracteoles caducous, lanceolate, 1-1.3 mm long, 0.3-0.4 mm wide. Sepals triangular, 0.25-0.35 mm long. Petals ovate, 1.8-2 mm long, 1.3-1.5 mm wide, sometimes forming a calyptra. Stamens 3.5-4 mm long, anthers 1-1.3 mm long. Ovary 5-locular, sometimes enlarged at anthesis; base of the style often forming a conical stylopodium-like structure, or sometimes flat. Fruits globose, 4.5-5.5 mm in diameter, strongly ribbed when dry, with persistent styles, 2-2.5 mm long, slightly divided at the tip.

Phenology : Flowering in May to December; fruiting in July to December.

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Distribution: India (from Nilgiri Hills to Assam, Sikkim, Uttar Pradesh, and West Bengal), also in Bangladesh, Bhutan, China (Yunnan and Xizang Provinces), Nepal, Sri Lanka, N. Thailand (Chiang Mai) and N. Vietnam (Lai Cai).

Ecology : It usually occurs in moist mixed forests, edges of forests, near ravines, and streambanks; alt. 1250-3500 m (Jebb & Wen, 2001).

Representative specimens from India examined : INDIA: **Sikkim :** 6-10,000 ft. *J.D. Hooker s.n.* (U, 2 sheets, W, 2 sheets) : Lachin, 8800 ft. 25 Jul 1909, *Smith & Cave s.n.* (U); Rathong Chu, 13000 ft., 12 Aug 1913, *G.H. Cave 1079* (LBG); Tong Ru, May 1877, *J.L. Lister s.n.* (U); 1874, collector unknown (W, 2 sheets); on way to Zemie, 10 May 1953, *R.S. Rao 464* (BSHC); N. Sikkim, Lachung to Dombeyang, 27 Jul 1997, *S.S. Dash & A. Maiti 18551* (BSHC, 3 sheets); Tallam - Samdong to Gompa towards Lachen, frequent, 23 Jul 1986, *D.C.S. Raju & S.Singh 6237*; Zakophyak on way to Thankarla, frequent, 11 Jul 1986, *D.C.S. Raju & S. Singh 5805* (BSHC) ; South Sikkim, Manion Reserve Forest, 21 Aug 1986, *A.K. Verma 5496* (BSHC, 3 sheets); West Sikkim, Hilley Reserve Forest, 2800 m, 26 Aug 1994, *P. Singh 16311* (BSHC, 2 sheets); 15 May 1995, *P. Singh 17339* (BSHC). **Uttar Pradesh:** Dhanpur Garhwal, 8500 ft. 21 Jun 1918, *A.E. Osmastou 950* (BM). **Tamil Nadu:** Nilgiri hills, 7500 ft., *J.S. Gamble 18155* (WU) ; *Perrotet 425* (W, 2 sheets), 427 (W, 2 sheets); *Herb. Col. R.H. Beddome 3404* (WU); *unknown collector 86* (W, 2 sheets). **West Bengal:** Alubari to Jaributti, 2280 - 2195 m, 14 Jun 1995, *A.P. Das & P.C. Rai 079* (NBU); Chowbhanjan, 11000 ft., Sep 1905, *G.H. Cave 843* (LBG); Darjeeling, 7300 ft. 17 Jun 1875, *C.B. Clarke 26719C* (U); Goompahar, in forest, 7500 ft., 25 May 1919, *G. H. Cave s.n.* (LBG); Sinchul, 8000 ft., 14 Jul 1917, *G.H.Cave s.n.* (LBG); Suriel, 5000 ft., 27 Oct 1885, *G.A. Gamnie 1396* (LBG) ; Tiger Hill, 2450 m, 12 Jul 1981, *A.P. Das/TH/502* (NBU); 503 (NBU); Tiger Hill- Senchal, 2400 m, 12 Jul 1981, *A.P.Das/TH/504* (NBU); Tiger Hill area, 1 Sep 1985, *B. Krishna 4617* (BSHC, 2 sheets); Tonglo, in forest, 9000 ft., 26 Aug 1924, *G.H. Cave s.n.* (LBG). Peninsular India: *Herb. Wright 1204* (W).

Aralia leschenaultii differs from *A. kingdon-wardii* by former's serrate (vs. ciliate) leaflet margin, absence of a main inflorescence axis, umbellately (vs. racemosely) arranged umbels on the primary inflorescence branches, and pilose (vs. glabrous) pedicels.

4. *Aralia gigantea* J. Wen, Brittonia 45: 47. 1993.

Pentapanax racemosus Seemann, J. Bot. 2: 295. 1864. *Parapentapanax racemosus* (Seemann) Hutch., Gen. Fl. Pl. 2:56. 1967. TYPE: INDIA, Sikkim, 4000-6000 ft, *J.D. Hooker & T.Thomson s.n.* (Holotype: BM!; isotypes: CAL!, 2 sheets, K!).

Small trees up to 10 m or epiphytic shrubs. Leaves exstipulate, pinnately compound with (3-) 5-7 leaflets; leaflets thick chartaceous, ovate, 9-20 cm long, 3.5-10 cm wide, acuminate to acute at apex, rounded, subcordate to rarely cordate or acute at base, glabrous on both surfaces, sparsely serrate at margin, lateral veins 6-8, conspicuous on both sides;

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petiolules glabrous, those of the two lower leaflets of the pinna with an inconspicuous articulation below the leaflet blade, those of lateral leaflets 0-1.3 cm long, those of terminal leaflets 3.5-5.5 cm long. Inflorescences terminal at the branch apex, pilose to occasionally glabrescent, primary branches 6-15, mostly umbellately arranged, with a main axis up to 11 cm long. Flowers in a raceme, each secondary inflorescence branch bearing 20-35 greenish white flowers, pedicels pilose, 0.5-1.5 mm long at anthesis, bracteoles lanceolate to narrowly triangular, 1-1.8 mm long at anthesis. Sepals triangular, 0.25-0.3 mm long. Petals ovate, 1.0-1.5 mm long. Stamens 1.5-1.8 mm long. Ovary 5-locular, base of the style enlarged, forming a conical stylopodium-like structure; styles only connate at the base. Fruits globose, 3-4 mm in diameter, with recurved persistent styles.

Phenology: Flowering in late May and June; fruiting in June and July.

Distribution: India (Arunachal Pradesh, Assam, Nagaland, Sikkim and West Bengal), also in Bhutan, Nepal, Tibet and China.

Ecology: In evergreen to warm temperate forests; alt. 1200-3050 m.

Additional specimens examined: BHUTAN: Duke La Limpu, 8000 ft, 17 Aug 1914, R. E. Cooper 3206 (BM); East Bhutan, Nyoth, N.P. Balakrishnan 44213 (ASSAM). CHINA, Xizang: Chuola, Le, 2600 m, 28 Aug 1975, in young fr., Qinghai-Xizang Exped. (Supplement) 751736 (KUN, 2 sheets, PE, 3 sheets). Gelin, at the edge of forests, 1800 m, 26 Dec 1992, in fl., H. Sun et al. 2614 (KUN, 2 sheets). INDIA: **Arunachal Pradesh**: Kameng F.D., NEFA, Kalaktang-Morsing, 18 May 1958, G. Panigrahi 15885 (ASSAM); Rapa- Jabrang, 23 May 1958, G. Panigrahi 16045 (ASSAM, 2 sheets). **Assam**: Senge Dzong, 9000 ft., 31 May 1935, F. Kingdon-Ward 11577 (BM, 2 sheets). **Nagaland**: Naga Hills, Jun 1936, N.L. Bor 18549 (ASSAM); Kohima, 10,000 ft., 1 Sep. 1937, N.L. Bor 15806 (ASSAM). **Sikkim**: 4-6000 ft, J.D. Hooker s.n. (U,W); T. Thomson s.n. (LE); R. S. Rao 613 (CAL, 4 sheets); the Park, 6500 ft., Jun 1880, J.S. Gamble 8175 (CAL, 2 sheets); G. King s.n. (CAL); G. King 2170 (CAL); Gonk, 4000 ft., 15 Jun 1862, T. Anderson 299 (CAL); below Pankarseu, 7000 ft., 12 Aug 1912, G.H. Cave s.n. (LBG); Sinchal, 8000 ft., Jul 1862, T. Anderson 397 (CAL). **West Bengal**: Darjeeling, 7000 ft., 19 Jun 1875, C.B. Clarke 26729C (BM), 26729D (CAL), 26729E (CAL); 6500 ft., 16 Jul 1918, G.H. Cave s.n. (A); Labdah, 6000 ft., 26 Jun 1917, G.H. Cave s.n. (LBG); 14 Feri [Chauda Feri]- Zero Point, Neora Valley, 2285 m, 7 May 1995, A.P. Das & P.C. Rai 1386 (NBU); Lloyd Botanic Garden, Darjeeling, common, A.P. Das 246 (NBU, 2 sheets). NEPAL: Kasawa Khola of East Nepal, 10,000 ft., 27°38'N, 87°15'E, 31 May 1974, in *Magnolia*-*Acer* forest, J.D.A. Stainton 7059 (BM, 2 sheets). Meklayam, 26°51'N, 87°34'E, 7000 ft., 25 May 1969, L.H.J. Williams 184 (BM).

Aralia gigantea is similar to *Aralia subcordata* that they both possess a racemose inflorescence unit, and have an articulation on the petiolules although those of *A. subcordata* are more conspicuous. They differ in that *A. gigantea* has shorter (0-1.3 vs. 1.5-3 mm long) petiolules on lateral leaflets, sparsely serrate (vs. crenately serrate) leaflet margin, pilose (vs.

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glabrous) inflorescences, and styles mostly divided (vs. only slightly divided at the tip) in fruits.

5. *Aralia subcordata* (Don) J. Wen, Brittonia 45:47. 1993.

Hedera subcordata Wallich ex Don, Gen. Syst. 3:394, 1834. *Pentapanax subcordatus* (Don) Seemann, J. Bot. 2 : 295. 1864. *Parapentapanax subcordatus* (Seemann) Hutch., Gen. Fl. Pl. 2:56. 1967. TYPE: INDIA, Silhet, *N. Wallich 4917* (Holotype: K-W!).

Hedera subcordata Wallich, Numer. List no. 4917. 1832. *nom. nud.*

Shrub or small tree, often epiphytic. Leaves exstipulate, pinnately compound with 3-5 leaflets; leaflets thick chartaceous to thin coriaceous, ovate, 7.5-15.5 cm long, 4.5-9 cm wide, acuminate at apex, rounded, truncate to subcordate at base, glabrous on both surfaces, crenately serrate and undulate at margin, lateral veins 8-9, conspicuous on both sides; petiolules glabrous, with an articulation below the leaflet blade, those of lateral leaflets 1.5-3 cm long, those of terminal leaflets 2.5-8 cm long. Inflorescences terminal, glabrous, primary branches 6-12, mostly umbellately arranged, sometimes with a main axis of 2-10 cm long. Flowers in a raceme, each secondary inflorescence branch usually bearing 15-25 flowers, pedicels glabrous, 2-3 mm long at anthesis, bracteoles lanceolate, 0.5-1 mm long at anthesis; sepals triangular, 0.25-0.3 mm long; petals ovate, 1.2-1.5 mm long; stamens 1.5-2 mm long; base of the style enlarged, forming a conical stylopodium-like structure; styles only slightly divided. Fruits globose, 3-4 mm in diameter, with persistent styles only slightly or not divided.

Phenology: Flowering in April and May; fruiting in May and June.

Distribution: Khasi hills, India and south western Yunnan, China.

Ecology: In evergreen or evergreen and deciduous mixed forests; alt. 1200- 2000 m.

Additional specimens examined: CHINA: **Yunnan**: Shweli-Salwin divide, 1924-25, *G. Forrest 24226* (PE). INDIA: **Meghalaya** : Chhang Chong forest, 5200 ft., 7 Apr 1914, *U. Kanjilal 6699* (ASSAM, 2 sheets); Jakrem Lot Spring area, along the river bank, 2 May 1975. *G.H. Bhaumik 61887* (ASSAM); Mont Khasia, 4-6000 ft., *J.D. Hooker & T. Thomson s.n.* (BM, GH, U [leaves only], W); Khasi Hills and Brahmaputra Plains, *S. Kurz s.n.* (BM); Khasia, Surareen, 5000 ft., 8 May 1886, 5000 ft., *C.B. Clarke 43709B* (BM); Surareen, 5000 ft., 15 May 1886, *C.B. Clarke 43893A* (CAL); Khasi Hills, *G. Mann 190* (ASSAM); Jun 1876, *S. Kurz 402* (CAL, 2 sheets); *G.Mann 402* (ASSAM, 2 sheets); Kyllang Rock, 5800 ft., 10 Sep 1913, *U. Kanjilal 2535* (ASSAM); Maflung, 4 Oct 1931, *P.C. Kanjilal 9510* (ASSAM); Mauphlung, 17 May 1932. *A. Das 10304* (ASSAM, 2 sheets); Maus Mai forest, 18 May 1932, *P.C. Kanjilal 10104* (ASSAM); Mukjar River, ca. 5 mi from Jowai on Jordin- Jowai road, along the edge of forest, 31 May 1965, *N.P. Balakrishnan 42284* (ASSAM 2 sheets); Nong Khlaw, 4500 ft., 11

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Apr 1914, *U. Kanjilal* 6713 (ASSAM, CAL); Nongstoin Village, 20 Jun 1958, *G. Panigrahi* 16482 (ASSAM, 3 sheets); Nongstoin, 30 Mar 1962, *G.V. S. Rao* 28440 (ASSAM); Shillong Peak, 6445 ft., 15 Jul 1913, *U. Kanjilal* 2299 (ASSAM); 6400 ft., 15 Jul 1913, *U. Kanjilal* 2308 (ASSAM); Shillong Peak, 5500 ft., 30 Jul 1914, *U. Kanjilal* 6619 (ASSAM); 6500 ft., 21 Jun 1916, *U. Kanjilal* 7023 (ASSAM, 2 sheets, CAL); Shampung, 5000 ft., May 1890, *B. Khan s.n.* (CAL, 2 sheets); Sohrarim forest, 2 May 1941, *G.K. Deka* 20418 (ASSAM, 2 sheets); Sohrarim, 29 May 1932, *P.C. Kanjilal* 10218 (ASSAM); Swear, Dumpep, 30 May 1911; *R.K. Das* 34933 (CAL, 2 sheets); Um Put forest, 4000 ft., 15 Oct 1913, *U. Kanjilal* 2707 (ASSAM).

6. *Aralia armata* (Wallich ex Don) Seemann, *J. Bot.* 6:134. 1868.

Panax armatum Wallich ex Don, *Gen. Syst.* 3: 386. 1834. TYPE: MYANMAR (BURMA), Tenasserim: Tavoy, *W. Gomez s.n.* (Holotype : BM!; isotypes: K-W!, G!, 4 sheets).

Panax armatum Wallich, *Numer. list no.* 4933. 1831, *nom. nud.*

Aralia tengyuehensis C.Y. Wu, *Fl. Yunnanica* 2:493. 1979. TYPE: CHINA. Yunnan, Tengcong Xian, Wuhe, in pine forest, 1400 m, 19 Oct 1960, *W. Q. Ying* 60-1485 (Holotype: KUN!).

Aralia thomsonii Seemann ex C.B. Clarke var. *glabrescens* C.Y. Wu, *Fl. Yunnanica* 2: 498. 1979, TYPE: CHINA. Yunnan, Gongshan, Kiukang Valley, Muhenga, margin of woods, 1150 m, 27 Sep 1938. *T.T. Yu* 20491 (Holotype : KUN!; isotypes: A!, E!).

Prickly shrubs 2.5-6 (-10) m tall. Leaves stipulate, bipinnate or occasionally tripinnate or pinnate, 70-100 cm long, 50-70 cm wide; petioles pilose or glabrescent, prickly to slightly prickly, prickles conical to slightly recurved; leaflets 6-14.5 cm long, 2.5-6.5 cm wide, thin-chartaceous, lanceolate to narrowly ovate, long-acuminate to acuminate, rounded or obtuse, occasionally subcordate at base, serrulate, lateral veins 6-9 pairs, adaxial surface green, pilose, pilose on veins or glabrescent, abaxial surface green, pilose or glabrescent, conspicuously reticulate, petiolules 0-2 mm long, pilose or slightly pilose. Inflorescence lax, paniculate, 40-100 cm long, pilose to glabrescent, sometimes prickly, primary branches 6-9, each 25-50 cm long; bracts and bracteoles pubescent, lanceolate, usually caducous; umbels 10-15-flowered, pedicels 10-18 mm long, pilose. Sepals triangular, 0.6-0.7 mm long, 0.8-1 mm wide at base. Petals triangular to ovate, ca. 2.5 mm long, 1.8-2 mm wide at base. Stamens 5; filaments ca. 4 mm long; anthers ovate, ca. 0.8 mm long. Ovary 5-locular; styles distinct, persistent and radiating in fruit. Fruit globose, 5-6 mm in diameter, 5-ridged when dry.

Phenology: Flowering from August to November.

Distribution: Northeastern and north India, also in northwestern Myanmar (Burma), southwestern and western Yunnan province of China, and Thailand.

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Ecology : Roadsides, streamsides, edges of woods and disturbed areas; alt. 200-2000 m..

Additional specimens examined : CHINA: **Yunnan** : Shweli valley, *Forrest 11821* (A, BM, E); Shang-Pa Hsien, *Tsai 54215* (A, NAS), *54715* (A, NAS), *54757* (A, NAS), *54987* (A, NAS); Tengcong Xian, Qushi Xiang, Qinghe Chun, Sheng-gou-zhai-zhi, *Wen 530* (OS); Wuhe Xiang, Xiang-shan-zhai-zshi, *Wen 538* (OS), Wuhe Xiang, Wang-jia-zhai, *Wen 539* (OS); Kiukiang Valley (Taron), Monting, 1350 m. *Yu 20200* (A). INDIA: **Meghalaya**: Jowai K. J. Hills, *Kapon et al. 71773* (MO). Maosingkrem, Khasia [Khasi Hills], 4500 ft., *C.B. Clarke 44699A, D, H*, (G); Khasia, 2-4000 ft., *Hooker & Thomson s.n.* (BM, G, K,U,W). **Nagaland** : Piffina, Naga hills, 1500 ft., *C.B. Clarke 40908H* (BM, CAL); Baligan near Naga Hills, *Dr. Prain's Collector 228* (A,U). **Orissa** : above Medeng Gandi in the Bhalupodar valley, near Pottangi, Koraput district, 3700 ft., *Mooney 4111* (A, K, NY). **Sikkim**: Nohore, *Anderson 639* (G); 4-6000 ft., *Hooker s.n.* (G, GH, LE, U, W); *King s.n.* (G, WU); *Kurz s.n.* (WU). **West Bengal** : Rurybee River, Darjeeling, *C.B. Clarke 8694* (E); Rishap, Darjeeling, 3000 ft., *C.B. Clarke 12519* (BM); Budum Than, Darjeeling, 4000 ft., *C.B. Clarke 27078D* (BM); 8 Nov 1893, *Cowan s.n.* (E), MYANMAR (BURMA): **Kachin**: Sumprabum Rd., 26.2 mi mark, Myitkyina, *Belcher 823* (G); Watugyi, Myitkyina district, 600 ft., *Lace 5573* (E). Kachin hills, N of Myitkyina, on road to Kanpti long via Malihka branch, *Tappin 4002* (E). THAILAND: **Chiang Mai**: Doi Sutep, 1100 m, *Native collector 144* (BKF). **Chumphon**: Srepzhan, 5 Sep 1927, *PUT 949* (BK). **Nakhon si Thammarat**: Tung Song, 23 Jul 1929, Ao Kao Kom, *Rabil 170* (BK, BM). **Pattani**: Kao Kalakiri, ca. 600 m, 10 Sep 1923, *A.F. G. Kerr 9964* (BK).

Aralia armata is characterized by its prickly petioles, thin-chartaceous, lanceolate to narrowly ovate, pilose to glabrescent leaflets, usually caducous bracts and bracteoles, long staminal filaments (ca. 4 mm or longer), and projected floral disc.

7. *Aralia malabarica* Beddome, Fl. Sylv. 2:121, t. 15, f. 2. 1874. TYPE: INDIA, Tamil Nadu, Coonoor ghat in Wynad, *R.H. Beddome 774* (Lectotype : K!, designated by Wen, 2002).

Prickly shrubs. Leaves stipulate, bipinnate, occasionally tripinnate, 40-100 cm long; leaflets ovate to lanceolate, mostly narrowly ovate, 5.5-14 cm long, 2.5-6 cm wide, thin chartaceous to membranaceous, long acuminate to acuminate, obtuse to rounded at base, margins doubly serrate and ciliate, lateral veins 8-10 pairs, both surfaces more or less setose when young, becoming glabrescent or slightly setose on veins and veinlets, upper leaflets sessile to subsessile, lower ones usually with petiolules 1-6 mm long. Inflorescence terminal, paniculate, 15-35 cm long, glabrous or nearly so, prickly, especially on the primary axis; bracts and bracteoles persistent or sometimes falling off at the fruiting stage, bracteoles 4.5-5 mm long; umbels 10-20-flowered, pedicels glabrous or slightly setose, 9-16 mm long, tip nonbristly. Sepals minute, triangular, 0.7-1 mm in height, ca. 0.8 in width at the base. Petals triangular to ovate, 1.8-2.2 mm long, ca. 1.5 mm wide. Filaments 2.5-3 mm long; anthers oblong, 0.6-0.7 mm long. Ovary 5-locular; styles 5, distinct, radiating. Floral disc swollen, slightly projected. Fruits globose to obovoid globose, 6-6.5 mm long, 5-5.5 mm wide.

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Phenology: Flowering from April to June.

Distribution: Southern India (Kerala and Tamil Nadu).

Ecology: In open habitats; alt. 700-1250 m.

Additional specimens examined: INDIA: Kerala : Silent Valley, Malabar, 4000 ft, *Beddome* 3402 (BM); Pomachi Hills, 4000 ft., *Beddome* 3403 (BM); Kottayam district. Pamba, 1025 m, *Deb* 30320 (CAL); Palghat district, Karapara reserve forest, 9000 m, *Vajravelu* 48746 (CAL). Tamil Nadu : Nilgiris, Gray's Garden, Coonoor, Bourne 2526 (K); Coonoor ghat, 2500 ft, *Gamble* 18423 (K); 2000 ft., *Lawson s.n.* (K).

This species is similar to *A. armata*, in that both species have slightly recurved prickles, slightly projected floral disc, and relatively large fruits. *Aralia malabarica* is glabrous (vs. pilose or glabrescent in *A. armata*), with more or less persistent (vs. usually caducous) bracts and bracteoles, and doubly serrate and ciliate leaflet margins. *Aralia malabarica* is restricted to southern India.

8. *Aralia thomsonii* Seemann ex C.B. Clarke in J.D. Hook., Fl. British India 2 : 723. 1879, TYPE : INDIA, Meghalaya, Khasia Mts., 2000-4000 ft., *J.D. Hooker & T. Thomson s.n.* [Araliaceae, no. 42] (Lectotype : K!, designated by Wen, 2002: isolectotypes: BM!, CAL!, G!, 2 sheets, K!, 7 sheets, L!, 2 sheets, NY!, U!, 2 sheets).

Aralia thomsonii Seemann, J. Bot. 6:134. 1868, *nom. nud.*

Aralia thomsonii var. *integerrima* Ha, Nov. Syst. Vyssh. Rast. 11 : 236. 1974. TYPE : VIETNAM, Hoa Binh, 200 m, 12 Dec 1969, *I.V. Grushvitzky, N.N. Arnautov, Ha Thi Dung, Phan Ke Loc, Phan Van Nguyen, Mai Nghi & So Va Nghi 81* (Holotype : HN!; isotypes : LE!, 3 sheets),

Aralia thomsonii var. *petiolulosa* Ha, Nov. Syst. Vyssh. Rast. 11 : 236. 1974. TYPE : VIETNAM, Ha Tay, Mt. Ba Vi. 250 m. 10 Oct. 1963, *I.V. Grushvitzky & P.G. Gorovoj 50* (Holotype : HN!; isotypes: LE!, 3 sheets).

Aralia thomsonii var. *brevipedicellata* K. M. Feng, Fl. Yunnanica 2: 498. 1979. TYPE : CHINA. Yunnan, Xishuanbabna, Da-du-gang, Apr 1957, *Yunnan Exped. Team 5832* (Holotype : KUN!).

Prickly shrubs or treelets 1.5-10 m tall. Leaves bipinnate, 60-200 cm long. 40-125 cm wide, stipulate; leaflets 8-20 cm long, 3.5-10.5 cm wide, thin chartaceous to chartaceous, lanceolate to ovate, acuminate, long acuminate or occasionally acute at apex, rounded or

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obtuse, occasionally subcordate at base, serrulate at margin, lateral vein 8-10, adaxial surface green, densely covered with patent simple trichomes, abaxial surface green or more or less pale green, densely pubescent, leaflets near the tip of pinnae sessile or nearly so, those near the base with petiolules 0-12 mm long, pubescent. Inflorescence terminal, densely pubescent, unarmed or occasionally with sparse prickles, large, 40-90 cm long, up to 170 cm wide; bracts and bracteoles persistent, the bracteoles 2-3.5 mm long; umbels 8-25-flowered, pedicels 3-11 mm long, densely pubescent. Sepals triangular or more or less ovate, ca 0.5-0.8 mm in height, 0.5-0.7 mm in width at the base. Petals more or less triangular, 1.8-2 mm in height, ca. 1.2 mm in width at the base. Stamens 5, anthers white, filaments 3.5-4 mm long. Ovary 5-locular; styles free. Fruits black or purplish black, globose to ovoid globose, 3.5-5 mm in diameter.

Phenology : Mostly flowering from June to August, occasionally in May, September and October.

Distribution : Northeastern India, also in southern Yunnan and south western Guangxi of China, Penang, Perak and Selangor of Malaysia, Myanmar (Burma), Thailand, and northern Vietnam.

Ecology : Roadsides, mountain slopes, streamsides, edges of forests, or even in the woods; it grows mostly in sunny places and is often found in disturbed habitats; alt. 200-2000 m.

Additional specimens examined : CHINA : **Guangxi** : Lungchow, *Henry 371* (NY). **Yunnan** : Szemao, 4600 ft, *Henry 9479A* (K, NY), 4500 ft, *Henry 9479B* (A, K); Ling Chang Xian, Ma-yi-dui, Nan-buo-he, 1350 m, *Mu 379* (KUN); between Muang Hun and Muang Hai, *Rock 2417* (A, CA); Sheau-meng-yeang, Che-li Hsien, 1000 m, *Wang 75510* (A, PE). 1050 m, *Wang 75696* (A); Fo-Hai, 1030 m, *Wang 74622* (A), 1660 m, *Wang 74892* (A), 1800 m, *Wang 77283* (A); Meng-soong, Dah-meng-lung, Che-li Hsien, 1900 m, *Wang 78394* (A, IBSC); Shunning, Tehseling, 2000 m, *Yu 17622* (A). INDIA : **Arunachal Pradesh** : Tiraf F. D. (N.E.F.A.), Kheti - Tinchu, 22 Aug. 1958, *Panigrahi 145701* (ASSAM, 2 sheets); Lailongrong (Chenglang), 510 M, 19 Jun 1961, *Deb 25840* (ASSAM); Wakka, *Panigrahi 14902* (ASSAM); Wakka to Nagminu, *Deb 26531* (ASSAM).; **Assam** : Mizo Hills, Longtlai forest, *Dutta 33777* (ASSAM, 2 sheets). **Meghalaya** : Nungklao, Khasia, 4000 ft, C.B. *Clarke 19291A* (K), 3500 ft, C.B. *Clarke 44027* (G); Shillong, 3000 ft, C.B. *Clarke 44214A* (G), 4500 ft., *Clarke 44502* (BM, CAL); Khasia, *Hooker & Thomson s.n.* (K); Khasi Hills, 3-4000 ft, *Kurz 352* (BM). MALAYSIA : **Penang** : *Dr. King's Collector 1574* (BM, G). **Perak** : Cameron Highlands, 1000 m, *van Balgooy 2694* (A, CA, L, NY); road from Tapah to Cameron Highlands, ca 4 mi below Ringlet, 3500 ft., *Stone 7289* (G, KLU, L, NCU). **Selangor** : Ginting Simpah, 2000 ft, *Nur 34296* (A, L); *Ridley 7290* (E); Genting Sempah, 23rd mi, 2000 ft., *Stone 5753* (CA, G, KLU, L). MYANMAR (BURMA): **Kachin** : Bhamo, Sinlum, 5750 ft., *Cubitt 352* (E). Valley of the Mali Hka, mile 150 Putae Road, *Kingdon-Ward 12822* (BM). **Shan** : King Lung, *Mac Gregor 574* (E). THAILAND : **Chiang Mai** : near Angka Noi village (RS-14), the north side of the main route, 1050 m, Doi Inthanon, at edge of mixed forest by road, 5 Aug 1988, *N. Fukuoka T-62540* (BKF). **Chiang Rai** : higher elevation of Doi Tung, 1200-1450 m, *Iwatsuki et al. 11068* (BKF. KLU, L). **Loei** : from Wang Kuang waterfall (RS-12) to Phen Phon Mai

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waterfall (RS-16), 1180-1240 m. Phu Kradung, in clearing, 31 Aug 1988, *N. Fukuoka T-63749* (BKF). **Nakorn sawan:** Mae Wong N.P., Kampaeng Phet, Klong Lan, near transect 2 at km 93 rangerstation, 1300 m, exposed ridge in evergreen forest, 14 Aug 1998, *M. van de Bult 82* (BKF). **Narathiwat:** Nikhomwang, 14 Mar 1968, *Pragad 1214* (BK). **Pattani:** Betong, ca. 300 m, 31 Jul. 1928, *A.F.G. Kerr 7432* (BK). **Hetchabun :** Phu Miang, along the way between the hill tribe villages, 1200-1300 m, *Shimizu et al. 11347* (BKF, KLU). **Prachinburi:** Khao Yai National Park, Khao Khieo, Heo Suwat Falls, 750 m, *Larsen et al. 104* (BKF); E. Nakhon Ratchasima, Kao Yai National Park, 600-800 m, *Murata 16434* (BKF, L), *16452* (L). **Phrae:** Mae Bray, 700 m, *Beusekom et al. 4761* (L). **Surat Thani :** Klong Sok, *Prapat 165* (BKF). VIETNAM: **Lao cai:** Chapa (Sa Pa), *Petelot 4571* (NY).

Aralia thomsonii differs from *A. armata* by the former's appressed hairs on leaves and inflorescences, ovate to elliptic (vs. lanceolate to narrowly ovate) leaflets, larger leaflets, mostly 9-18 cm long and 4.5-8.5 cm wide (vs. mostly 9-14 cm long and 4.6 cm wide), and persistent (vs. caducous) bracts and bracteoles.

9. *Aralia foliolosa* Wallich ex C.B. Clarke in J.D. Hook., Fl. British India 2:723. 1879. TYPE : INDIA, Meghalaya [formerly Assam], Mont Sillet [Khasi Hills], Wallich's Numer. List no. 4928, collected by *F. De Silva s.n.* (Holotype : KW!; isotypes: G!, 3 sheets).

Panax ? foliolosa Wallich, Numer. List no. 4928. 1831, *nom. nud.*

Aralia foliolosa Seemann, J. Bot. 6:134. 1868, *nom. nud.*

Aralia foliolosa var. *sikkimensis* C.B. Clarke in J.D. Hook., Fl. British India 2:723. 1879. TYPE : INDIA, Sikkim, 5000 ft., *J.D. Hooker s.n.* (Lectotype: K!, designated by Wen, 2002; isolectotype: K!).

Aralia lantsangensis Hoo in Hoo & Tseng, Acta Phytotax. Sin., Add. 1:171. 1965. TYPE : CHINA, Yunnan, Ban-na-meng-wang, 730-800 m, in forest, 6 Dec 1951 *K. M. Feng 14159* (Holotype, PE!; isotype:PE!).

Prickly shrubs or treelet, 1.5-10 m tall. Leaves large, tri or bipinnate, up to 2-4 m long ultimate pinnules with 5-11 leaflets; petioles glabrous, with recurved prickles; leaflets ovate to elliptic, or sometimes lanceolate, coriaceous or sometimes chartaceous, 3.5-11 cm long 2-5.5 cm wide, long acuminate at apex, rounded or slightly subcordate at base, margins serrulate, with more or less rounded teeth, lateral veins 6-9 pairs, glabrous or nearly so on both surfaces, shining green above, petiolules 0.5-3 mm long, sometimes leaflets sessile. Inflorescence large, ca 100 cm long, terminal, densely paniculate, glabrous or nearly so, scattered with short straight to slightly recurved prickles on primary and the bases of secondary axes; umbels 7-15-flowered; bracteoles 2-3.5 mm long; pedicels 5.13 mm long, varying with umbel position, terminal umbels with longer pedicels, glabrous. Sepals minute, triangular to rounded, 0.6-0.8 mm in height, 0.4-0.6 mm in width. Petals ovate, 1.8-2 mm long, 1-1.2 mm long. Stamens 5,

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filaments slender, 3.5-4 mm long, anthers oblong, 0.8-1mm long. Ovary 5-locular; styles 5, slightly connate at base. Fruit globose to ovoid globose, 3-3.5 mm in diameter.

Phenology : Flowering from September to March; fruiting in January to March.

Distribution : India (Arunachal Pradesh, Assam, Meghalaya, Mizoram, Sikkim and West Bengal), also in Bangladesh, Myanmar (Kachin), China (southren Yunnan), Thailand (Chiang Mai and Loei) and Vietnam.

Ecology: In open habitats scattered in secondary forests, hillsides and roadsides; alt. 700-1700 m.

Additional specimens examined. BANGLADESH : **East Bengal** : Griffith 2659 (K,L, LE, W). CHINA : **Yunnan** : Szemao, Henry 12711 (A, MO, NY); Ling Chang Prefecture, Genma Xian, Mengding Qu, Mengding township, Tuguoazai, Li 002026 (KUN). INDIA : **Arunachal Pradesh**: Lohit Dist. (N.E.F.A.), Joseph 48460 (ASSAM); Siang F. D. (N.E.F.A.), Rao 17934 (ASSAM, 2 sheets); Subansiri F.D. (N.E.F.A.), after crossing Palin river, Sastry 40949 (ASSAM). **Assam**: Jenkins s.n. (LE); Bagmarei R. F., Panigrahi 22572 (ASSAM). **Meghalaya**: Khasia, 2-4000 ft., Hooker & Thomson s.n. (GH); Garo Hills Baghmara reserve forest, Panigrahi 22572 (CAL, L); 3000 ft., Parry 1131 (K); K. & J. Hills near Tyrua below canal bank, Kanjilal 6242 (ASSAM), 2 sheets); Khais Hills, Nongpoh, Kanjilal 9759 (ASSAM, 3 sheets). **Mizoram** : Lushai Hills, Sairep, 5000 ft., Parry 476 (K); Darzo, 5000 ft., Parry 594 (K). **Sikkim** : Rumman, 2000 ft, C.B. Clarke 24917 (K); Hooker s.n. (K); 5000 ft., Hooker s.n. (BM, G, GH, K, LE, W). **West Bengal** : Darjeeling, Teendaria, 3000 ft, Gamble 3036 (K). MYANMAR: **Kachin**: between Ning W'Krok and Kanang, on the W slope of Gwe-Kya-Kat-Bum, 4-5000 ft., Keenan et al. 3351 (A). THAILAND. **Chiang Mai**: Doi Suthep-Pui, at KM 17 on the road to the palace, 1200 m, Anderson 4088 (UC). **Loei**: Mt. Phu Luang, 1000 m, van Beusekom & Phengklai 3067 (BKF, E). VIETNAM : **Tuyen Duc**: Vidal 4902 (L).

Aralia foliolosa is recognized by its glabrous parts, prickly tripinnate or occasionally bipinnate leaves, coriaceous or sometimes chartaceous leaflets, long acuminate at apex, prickly inflorescence, few flowered (7-15) umbels, and small fruits (3-3.5 mm in diameter).

10. *Aralia cachemirica* Decne. in Jacquem., Voy. Inde. 4:72. 1844. TYPE: INDIA, Kahsmir, Mt. Vestervonne, 3087 m, 12 Jun 1831. V. Jacquemont 718 (Lectotype, P!, here designated).

Aralia macrophylla Lindl., Edward's Bot. Reg. 30:73. 1844. TYPE: INDIA, North part (type, n.v.).

Robust and unarmed herbs, stems green to greenish purple. Leaves ternately compound; leaflets thick papery, narrowly ovate to ovate, (4)-8-21 cm long, 3-8.5 cm wide, acute to acuminate at apex, acute, rounded to subcordate at base, commonly oblique on lateral

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leaflets, serrate to serrulate, or doubly so at margin; lateral veins 8-12 on each side, nearly glabrescent to slightly scabrous on adaxial surface, often along veins and veinlets, glabrescent to slightly puberulent on abaxial surface, petiolules 0-2.2 cm long, glabrescent to slightly pilose. Inflorescence terminal and axillary, 15-45 cm long, consisting of numerous umbels; terminal umbels mostly 35-70 flowered, pedicels pubescent, 7-10 mm long; lateral umbels 15-25-flowered, pedicels 5-8 mm long; bracteoles linear, 1.2-2.2 mm long, somewhat ciliate at margin. Sepals broadly to narrowly triangular, 0.3-0.4 mm long, persistent on fruits. Petals ovate, greenish white to white, with a conspicuous vascular bundle in the middle, 1.7-2.2 mm long, ca. 1 mm wide. Stamens 5, 1.8-2 mm long, Ovary 5-locular. Fruits globose, ca. 3 mm long, 3.8-4 mm wide, persistent styles divided to the middle, ca. 1 mm long.

Phenology: Flowering in late June to early October; fruiting in September and October.

Distribution: Northwestern India, northern Pakistan, and western and central Nepal; most often collected from the Kashmir region.

Ecology: Common in river valleys and mixed forests; alt. 2100-3650 m.

Additional specimens examined. INDIA: **Uttaranchal**: N.W. Tehri - Garhwal., Gaules Valley, 9-10,000 ft., Oct 1818, *J.F. Duthie s.n.* (BM); Ganges Valley, 9-10,000 ft., Oct 1881, fr. *J.F. Duthie s.n.* (WU); 8-9000 ft, 1884, *J.F. Duthie 595* (LE); N.W. India, *J.F. Royle s.n.* (LE, 2 sheets); NW India, 1871, *J.L. Stewart s.n.* (LE, 2 sheets); Garhwal, 8000 ft., *T. Thomson s.n.* (LE). **Jammu & Kashmir**: Erin Valley, near Bandapur, 8,000 ft., 25 Jul 1940, on edge of cultivation, *F. Ludlow & G. Sheriff 7831* (E); Kulewan, 7750 ft., 22 Jul 1876, *C.B. Clarke 29470* (LE); Sonamurg, 8500 ft, 1 Sep 1876, fl. *C.B. Clarke 30906* (LE, WU); Rajparyan Sanctuary, 10,500 ft, 24 Aug 1943, *F. Ludlow & G. Sherriff 9366* (BM, E); below Zaiwan, 9,500 ft, 30 Aug 1956, *O. Polunin 56/606* (BM, 2 sheets, E); Kishtvar to the Pir Patsaski or Kishvar Pass, 1-4 Aug 1856, *Schlagintweit 3796*; Kashmir, 7-9500 ft, *T. Thomson s.n.* (LE, U, W); Dunga Fali, Aug 1880, *A.P. Young s.n.* (BM, 2 sheets); NEPAL: Garjigoth, 9500 ft., 9 Aug 1952, *O. Polunin et al. 5045* (BM, E). PAKISTAN: Hazara Distr., Kaghan, 7500 ft, 3 Oct. 1966, *M.A. Giddigi 4052* (W). N.W. Himalayas. Taunsar, Konain, 19 Sep 1936, young fr, *M.B. Raizada 7263* (E); N.W. Himalayas, Chamba State, Dharwas, 9,000 ft, Jun 1896, young fr & fl, *J. H. Lace 1476* (E).

11. *Aralia tibetana* G. Hoo, Acta Phytotax. Sin., Add. 1:175. 1965. TYPE: CHINA, Tibet [Xizang Prov.], Rung-sa, Mt. Jolmo Lungma, under forests of *Tsuga*, 3100 m, 2 Aug. 1959, *Mt. Jolmo Lungma Exped. Team 758* (Holotype: PE!).

Panax decompositum Wallich ex DC., Prodr. 4:255. 1830 (non *Aralia decomposita* Reinw. ex de Vries). TYPE: NEPAL, 1821, N. *Wallich 4935* (Holotype: G!; isotype: K-W!).

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Panax tripinnatum Wallich ex Don, Gen. Hist. 3:384, 1834 (non *Aralia tripinnata* Blanco, Fl. Filip. ed. 1:223). TYPE : NEPAL, Gosaingthan, *N. Wallich 4934* (Holotype: BM!; isotype : G!, K-W!).

Unarmed herb, up to ca, 2 m tall, stem purple to dark purple. Leaves ternately compound, stipulate; leaflets membranaceous, ovate, or occasionally narrowly so to elliptic, 3.5-11.5 cm long, 2.3-5.5 cm wide, sharply acuminate or sometimes acuminate at apex, rounded to subcordate at base, doubly serrulate to doubly serrate at margin, lateral veins 7-9 on each side, adaxial surface green, scabrous when young, pilose along veins to glabrescent when mature, abaxial surface whitish green, pilose, or at least along the veins and veinlets, petiolules 1-20 mm long, slightly pilose, Inflorescence terminal and axillary, 20-40 cm long, consisting of numerous umbels, primary inflorescence branches 12-30, mostly racemously arranged, often 3-7 forming a circle on the main inflorescence axis; terminal umbels mostly 30-70 flowered, pedicels pubescent, 6.5-11.5 mm long, enlarged at the tip, hairs at the pedicel tip enlarged as well, the hairs and the enlarged tip forming a somewhat disk-like structure at the base of the flower; lateral umbels 15-25 flowered, pedicels 4.5-9.5 mm long; bracteoles lanceolate, 1.3-2.2 mm long, glabrous. Sepals triangular, 0.4-0.5 mm long. Petals ovate, pale pinkish, 1.5-2.0 mm long, ca. 1 mm wide. Stamens 5, 2-2.2 mm long. Ovary 5-locular, styles 0.7-0.8 mm long at anthesis, base of styles slightly enlarged or some what flat. Fruits globose, 2.8-3.2 mm long, 3.2-3.6 mm wide, persistent styles divided to the middle, 1.1-1.3 mm long.

Phenology : Flowering in July and August; fruiting in August and September.

Distribution : In the eastern Himalayas, including Sikkim, eastern and central Nepal, western Bhutan, and southern Tibet of China.

Ecology : In shady forests or edge of woods among rocks and shrubs, especially in mixed *Rhododendron* forests in Nepal and Bhutan; alt. 2800-4600 m.

Additional specimens examined : BHUTAN : Tilaging Timpu, 8000 ft, 17 Aug 1914, *R. E. Cooper & A. K. Bulley 2567* (BM); west Bhutan, Darmthaug, 30 Sep 1933, *F. Ludlow & G. Sherriff 535* (BM). CHINA : **Xizang** : Tibet. Chumbi, 9 Jul 1913, *R.E. Cooper & A.K. Bulley 270* (BM, E); Chumbi, 12000 ft., 24 Sep. 1923, *G.H. Cave s.n.* (LBG); Chumbi, 8,000 ft., 25 Aug 1913. *R.E. Cooper 650* (BM); Chumbi, 10 Aug 1857. *A. Fleming 331* (E), INDIA : **Sikkim** : *G. King 4436* (BM); Kanglasa, 10000 ft, 20 Sep 1916, *G.H. Cave s.n.* (LBG); Zemu Valley, 9000 ft, 20 Jul 1909, *Smith & Cave 2786* (LBG); East District. Karponong, 8 Aug. 1980, *P. K. Hajra 525* (BSHC); Changu, rare, *B. Krishna 2238* (BSHC); East Sikkim, *S.S. Dash 24052* (BSHC, 2 sheets); Karponang -Chhangu, 4 Aug 1985, *D.C.S. Raju 4128* (BSHC, 2 sheets); Kayannosla Alpine Sanctuary, 28 Jun. 2000, *S.S. Dash 20990* (BSHC, 3 sheets); North District, on way from Lachen to Thangu, 3500 m, ca. 1.5 m tall, 26 Aug 1982, *P. Chakraborty 2397* (BSHC, 2 sheets); North Sikkim, Lachung - Zakophyak, 3000 m, 25 Jul 1990, *S. Kumar & P. Singh 9562* (BSHC, 3 sheets); North Sikkim, Lachung to Dambergang, 27 Jul 1998, *S.S. Dash & A. Maih 18555* (BSHC, 3 sheets); North Sikkim, between Phuni an Yakche, 3230 m,

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14 Jul 1996, G.P. Singh & D. G. Long 17851 (BSHC). NEPAL: Kasuwa Khola, 11,000 ft., mixed *Rhododendron* forest, 19 Aug 1975, L.W. Beer 25333 (BM); East Nepal, Baroya Khimty-Thakma Khola, 16 Nov 1963, H. Hara et al. 6301046 (BM); Langtang forest area, 1 Aug 1949, O. Polunin 1639 (BM, E); near Dhorpatan, 9,5000 ft., 12 Jul 1954, Stainton et al. 3474 (E); Central Nepal, Langtang, 28°15'N, 87°57'E, 8,000 ft, 22 Sep 1965, J. D. A. Stainton 5147 (BM); Simbua Khola, 27°30'N, 87°57'E, 10,000 ft., 24 Jun 1969, L. H. J. Williams 903 (BM); Toketey, 13,000-14,000 ft., L. Dhwoj 493 (BM, E).

This is a new record of *A. tibetana* from India. Hoo and Tseng (1965) described the species from Tibet, China. The species was mistakenly identified as *Aralia cachemirica* in the Indian herbaria (e.g., CAL, ASSAM, and BHSC).

Aralia tibetana is distinguished from *A. cachemirica* by the former's purple to dark purple (vs. green to purplish green) stems, mostly ovate (vs. narrowly ovate), pilose (vs. glabrescent) and smaller (3.5-11.5 x 2.3-5.5 cm vs. 8-21 x 3-8.5 cm) leaflets, sharply acuminate (vs. acute to acuminate) leaflet apex, and verticillately (vs. racemosely) arranged inflorescence branches on a main axis.

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