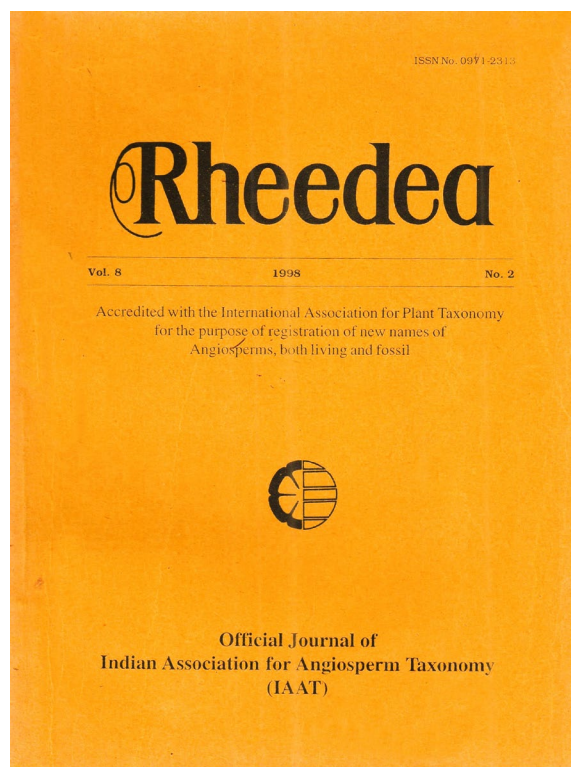




Revision of the Family Berberidaceae of the Indian Region – II

Rao R.R., Tariq Husain, Bhaskar Datt & Arti Garg



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Revision of the Family Berberidaceae of the Indian Region - II

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Abstract

The present part of the article contains the details of the remaining 20 species of *Berberis*. For each species the correct binomial, basionym in cases when applicable, and synonyms, followed by a complete description, phenology, distribution and notes on ecology and nomenclature are provided. Specimens examined and the approved acronyms of the names of herbaria where the specimens are deposited are cited. The taxonomic and nomenclatural notes wherever applicable are provided.

DESCRIPTION OF SPECIES

36. *Berberis virescens* Hook.f. & Thoms., Bot. Mag. 116: t. 7116. 1880; Ahrendt, J. Linn. Soc. Bot. 57: 125. 1961; Grierson & Long, Fl. Bhutan 1(2): 326. 1984; Guha Bakshi in Sharma *et al.*, Fl. India 1: 353. 1993.

Type: Sikkim: 1849, *Hooker s.n.* (holo - K).

B. vulgaris L. var. *brachybotrys* (Edgew.) Hook.f. & Thoms. in Hook.f., Fl. Brit. India 1: 109. 1872.

B. brachybotrys Edgew. in Trans. Linn. Soc. 20: 29. 1846. *B. paravirescens* Ahrendt, J. Asiat. Soc. Beng. (Sci.) 11: 4. 1945, et in J. Linn. Soc. Bot. 57: 148. 1961. *Type*: Sikkim: *Hooker s.n.* (?).

B. himalaica Ahrendt, J. Bot. Lond. 79 (Suppl.) 68. 1942, et in J. Linn. Soc. Bot. 57: 137. 1961. *Type*: Bhutan (N.E.): Me La, 12500 ft., 5 Oct. 1934, *Ludlow & Sherriff* 1013 (holo - BM).

B. ignorata Schneid. in Bull. Herb. Boissier (2), 5: 661. 1905; Ahrendt in J. Linn. Soc. Bot. 57: 145. 1961. *Type*: Sikkim: Lachen valley, 9750 ft., 4 June 1849, *Hooker s.n.* (*Type*, K).

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Shrubs, 2-3 m high; stems terete, dark red, often purplish, lustrous, glabrous; spines 6-15 mm long, 3-fid, concolorous, subsulcate. Leaves 10-30 x 4-15 mm, oblong-obovate, spathulate, apex obtuse, cuneate to decurrent to petiole at base, generally entire, openly veined, not reticulate, dull green above, grey pruinose below. Inflorescence umbellate-racemose, usually subumbellate above, 4-8-fld, slender, 3-5 cm long, including 5-10 mm long peduncle. Flowers 6-8 mm across, pale yellowish green; pedicels 4-12 mm long. Prophylls concolorous, oblong-lanceolate; outer sepals 3-5 x 1.5-2 mm, ovate; inner sepals 5-6 x 3.5-4 mm, obovate. Petals 3-4 x 2.5 mm, obovate, clawed at base, often notched at apex, lateral and middle veins branched; glands 0.6 x 0.3 mm. Stamens 3-5 mm long, produced, conico-apiculate. Style 0.5 - 0.75 mm long; ovules 4-5. Berries 8-10 x 3.5-5 mm, ellipsoid, red, turning to black, epruinose, estylose.

Fl. & Fr.: April - Aug.

Distribution: INDIA: Sikkim; CHINA (S.E.Tibet); NEPAL; BHUTAN.

Ecology: Open hillsides in scrub jungles and *Pinus excelsa* forest and forest clearings; 2000-3800 m.

Specimens examined: Sikkim: N. Sikkim, Lachen to Zakophyak, 12.9.1988, S. Kumar & S. Singh 9735 (BSHC, LWG); Lachen valley, April, 1892, G.A. Gammie s.n. (DD); Rookah, near Lachen valley, April, 1892, G.A. Gammie s.n. (DD); Rookah, near Lachen, 3300 m, May, 1885, G. King s.n. (CAL); Lachen, 3000m, 5/11/1941, J. Sinclair s.n. (CAL).

Notes: Ahrendt (1961) has pointed out that *Berberis virescens* is confused with *B. paravirescens* and *B. ignorata*, according to him these three species resemble in habit, stem, leaf and inflorescence but he had given some points on which these three species differ from each other. Grierson and Long (1984) have merged these three and also *B. himalaica* under *B. virescens*, which has been followed here.

37. *Berberis angulosa* Wall. ex Hook.f. & Thoms. in Hook. f., Fl. Ind. 1: 227. 1855, et in Fl. Brit. India 1:111. 1872; Bot. Mag. 115: t. 7071. 1889; Chatterjee, Rec. Bot. Surv. India 16(2): 24. 1953; Ahrendt J. Linn. Soc. Bot. 57: 113. 1961; Grierson & Long, Fl. Bhutan 1 (2): 323. 1984; Sur in Sharma et al., Fl. India 1: 355.1993.

Type: Nepal: Gossain Than, Wallich 1475 [iso - BM; holo (part) - K].

Berberis angulosa Wall. ex Hook.f. & Thoms. var. *fasciculata* Ahrendt, J. Bot. Lond. 79 (Suppl.): 42. 1941, et in J. Linn. Soc. Bot. 57 : 114. 1961; Sur in Sharma et al., Fl. India 1: 355. 1993. *Type* Sikkim: 10700 ft, Hooker & Thomson s.n. (K).

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Shrubs 1-1.5 m tall; stout, stems rigid brownish or yellow, strongly grooved, conspicuously black 0.7-2.5 cm long, 3-fid, slender, puberulous. Leaves 1-4 x 0.6-1.5 cm, obovate or elliptic-obovate, apex rounded or acute, base cuneate, margins entire or sometimes spinose-toothed. Inflorescence solitary, fascicled to subumbellate (One umbell consisting of 2-3 flowers and one solitary flower coming out from the axil), 2-4-fld; pedicels 8-20 mm long, sulcate. Outer sepals 8-10 x 5-7 mm; inner sepals 8-10 x 7-9 mm. Petals 7-8 x 5-6 mm, obovate, apex rounded, entire. Berries 10-12 x 9-12 mm, red, very lustrous, ellipsoid subglobose, style short or absent.

Fl. & Fr.: May - Nov.

Distribution: INDIA: West Bengal, Sikkim; NEPAL; CHINA (S.E.Tibet); BHUTAN.

Ecology: Mountain screes and open rocky hillsides; 3500-1200m.

Specimens examined: West Bengal: Darjeeling Sandakphu, 3540m, 10.6.1892, G.A. Gammie s.n. (CAL); Sandakphu, 3600m, July, 1881, J.S. Gamble 9536 (CAL); Sandakphu west, 3633, 16.9.1962, B. Salfni 1723 (CAL).

Notes: The key characters given by Ahrendt (1961) and Sur (1993) for differentiating the two varieties of *Berberis angulosa* are: flowers solitary in var. *angulosa* and flowers fascicled in var. *fasciculata*. Whereas, the isotype from BM (*Wallich 1475*) has fasciculate to subumbellate inflorescence. Therefore, the two varieties can conveniently be merged.

38. *Berberis concinna* Hook.f. & Thoms. in Bot. Mag. 79: t. 4744. 1853, et in Hook. f., Fl. Brit. India 1:111. 1872; Chatterjee in Rec. Bot. Surv. India. 16(2): 26. 1953. Ahrendt in J. Linn. Soc. Bot. 57, f. 30, 118. 1961; Grierson & Long, Fl. Bhutan 1(2): 324. 1984; Sur in Sharma *et al.*, Fl. India 1: 355. 1993.

Shrubs upto 2 m tall; stems glabrous stout, very sulcate; internodes 1-2.5 cm long; spines 1-1.5 cm long, 3-fid, sulcate. Leaves 1-3 x 0.5 - 1.4 cm, suborbicular or obovate, apex ending into a spine, base cuneate, coriaceous, margins 3-7 strongly spinose - dentate, whitish pruinose below, densely finely papillose. Flowers solitary; pedicels 0.5-3 cm long. Prophylls 2-2.5 x 1.5-2 mm, oblong - triangular, acuminate. Outer sepals 4-6 x 3-4 mm, oblong - ovate, subacute; median and inner sepals 9-10 x 6-7 mm, obovate. Petals 6.5 x 4-5 mm, obovate, apex acutely emarginate with 2 rounded lobes at apex. Stamens 4-4.5 mm long, truncate. Ovules 6-8. Berries 10-16 x 6-8 mm, ellipsoid, red, estylose.

Notes: Ahrendt (1961) had segregated three varieties under this species, vars. *concinna*, *brevior* and *extensiflora*; the var. *extensiflora* is reported from Nepal and hence we have excluded this in the present treatment.

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Key to varieties (after Ahrendt, 1961)

1. Pedicels 15-30 mm long; fruits 13-16x 6-8mm **B. concinna** var. **concinna**
 1. Pedicels 5-10 mm; fruits 10-11 x 7-8mm **B. concinna** var. **brevior**

B. concinna var. **concinna**

Type: Sikkim: Lachen valley, 12,000 - 13,000 ft., Fl. 31 July 1849, *Hooker s.n.* (K).

Fl & Fr.: May - Oct.

Distribution: INDIA: Sikkim; NEPAL

Ecology: Rocky mountain sides; 3400-4200 m.

Specimens examined: Sikkim: Nov. 1874, *J.S.Gamble 474* (CAL); Sebu valley, 6.9.1892, *G.A.Gammie 1156* (SIKKIM); Llouh, 31.7.1909, *Smith & Cave 1816* (SIKKIM) *R.S.Rao 555* (SIKKIM).

B. concinna var. **brevior** Ahrendt, *J. Asiat. Soc. Beng. (Sci.)* 11:3. 1945, et in *J. Linn. Soc. Bot.* 57: 119. 1961; Chatterjee, *Rec. Bot. Surv. India* 16 (2): 26. 1953; Sur in Sharma *et al.*, *Fl. India* 1:356. 1993.

Type: Nepal: Namlang, 9000 ft, 28 Oct. 1931, *K.N. Sharma E269* (holo - BM).

Fl. & Fr.: June - Oct.

Distribution: INDIA: Uttar Pradesh, Sikkim; NEPAL.

Ecology: In rock crevices; 3000 - 4500 m

Specimens examined: Uttar Pradesh: Garhwal, 4.9.1885, *Duthie 1816* (SIKKIM).

39. Berberis kumaonensis Schneid., *Bull. Herb. Boissier* 2, 5: 397. 1905; Chatterjee, *Rec. Bot. Surv. India* 16(2): 25. 1953; Ahrendt, *J. Linn.Soc. Bot.* 57: 120, f. 31. 1961; Sur in Sharma *et al.*, *Fl. India* 1: 356. 1993.

Type: Kumaon: rocks near Garbyang, Kali valley, 13,000 ft, 15 Sept. 1894, *Duthie 2697* (holo - K).

Suberect or prostrate compact shrubs; stems glabrous; shoots slightly reddish; internodes 5-20 mm long; spines 1.2-2.5 cm long, 3-fid, sulcate. Leaves 0.9-2 x 0.4-0.9 cm,

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obovate, apex acuminate or ending into a spine, base cuneate, glabrous on both surfaces, coriaceous; margins 1-2 spinose serrate. Flowers solitary; pedicels 5-9 mm long; prophylls 2 x 1.5 mm, triangular, acuminate. Outer sepals 7-7.5 x 3.5-4 mm, ovate, acute; median sepals 8-10 x 5-6 mm, oblong - obovate. Petals 5.5 mm long, obtuse, acutely emarginate, lobes subobtusate. Stamens 4.5 mm long, produced, apiculate. Ovules 6-8. Berries 1-1.3 x 6-7 mm, ovoid, red, attenuate and bent with short thick style at apex.

Fl. & Fr.: June - Nov.

Distribution: INDIA: Uttar Pradesh; NEPAL.

Ecology: 2500-4500 m.

Specimens examined: Uttar Pradesh: Garhwal; Chamoli Distt., Kuari pass area Sept. 1980, *s.l.* 44223 (BSD); Junganath, 3000 m, 17.10.1970, *B.D. Naithani 42199* (BSD); Rankadhar, 3100 m, 28.9.1963, *U.C. Bhattacharyya 30922* (BSD, LWG); Sub Tal, 2750m, 3.6.1918, *A.E. Osmaston 947* (DD); Dasoli, 3300m, July 1915, *A.E. Osmaston 701* (DD); Kumaon: Pithoragarh, On way to Bogdiar, 2500m, *s.l.* 77707 (BSD); Almora, Dhakuri, 3000 m, 15.7.1920, *W.J. Lambert s.n.* (DD); Dhauliganga valley, Tuktung, 3210 m, 20.7.1923, *R.N. Parker 2102* (DD); Lili, 2750 - 3300 m, *W.J. Lambert s.n.* (DD); Way to Tungnath, 17.10.1970, *B.D. Naithani 42199* (CAL); On way to Pindari Glacier, Dhakuri Mountain, 2850 m, 19.5.1950, *D.D. Awasthi 761* (LWG).

40. *Berberis macrosepala* Hook.f. & Thoms., Fl. Ind. 228. 1855, et in Hook.f., Fl. Brit. India 1: 111. 1872; Chatterjee, Rec. Bot. Surv. India 16(2): 25. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 115. 1961; Grierson & Long, Fl. Bhutan 1(2): 323. 1984; Sur in Sharma *et al.*, Fl. India 1: 357. 1993.

Shrubs 1-1.8 m tall; stems yellow-brown, often somewhat sulcate, subterete when mature, subangled, young shoots pubescent; internodes 1-3 cm long; spines 1-1.5 cm long, 3-fid. Leaves 2-4.5 x 1.2 cm, obovate, apex mucronate, base contracted to decurrent petiole; petiole 2-7 mm long; margins with 2-14 spinose serrations, 4-7 mm apart, grey below, pruinose. Flowers solitary, bright yellow; pedicels 2-3 cm long. Outer and inner sepals 8.5-10 x 5-6 mm. Petals 6-7 x 3.5-4.5 mm, obovate, emarginate; glands 1.5x0.3 mm. Stamens 4-4.5 mm, rounded-truncate. Berries 1.5 x 1 cm, ellipsoid, red.

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Key to varieties (after Ahrendt, 1961)

1. Stems subangled or terete; leaves with apices rounded
..... **B. macrosepala** var. **macrosepala**
1. Stems sulcate; leaves with apices acute.
 2. Leaves with 2-7 spinules on each margin; pedicels 8-15 mm long
..... **B. macrosepala** var. **sakdenensis**
 2. Leaves with 8-14 spinules on each margin; pedicels 25-30 mm long
..... **B. macrosepala** var. **setifolia**

B. macrosepala var. **macrosepala***Type:* Sikkim: *Hooker s.n.* (holo - K)*Fl. & Fr.:* June-Oct.*Distribution:* INDIA: Sikkim, Arunachal Pradesh; BHUTAN; CHINA (S.E.Tibet).*Ecology:* Rocky alpine and subalpine regions; 3500-4300 m.*Specimens examined:* Sikkim: 22.6.1878, *s.l., s.n.* (CAL); Zewai valley, 15.7.1909, *Smith & Cave 1492* (CAL). Arunachal Pradesh: Kameng, Sella pass, 22.5.1957, *R.S. Rao 7702* (CAL, ASSAM).**B. macrosepala** var. **sakdenensis** (Ahrendt) Ahrendt, *J. Linn. Soc. Bot.* 57: 116. 1961; Sur in *Sharma et al.*, *Fl. India* 1:357.1993. (Fig. 1).*Type:* E. Bhutan: Sakden, at Nyuksang La, 12500 ft, 6 July 1934, *Ludlow & Sherriff 604* (BM).*B. ludlowii* Ahrendt var. *sakdenensis* Ahrendt in *J. Bot. Lond.* 79 (Suppl.): 44. 1941.*Fl. & Fr.:* June - Sept.*Distribution:* INDIA: Sikkim; BHUTAN.*Ecology:* Open rocky hillsides amongst *Rhododendron* scrub; 3750 m.*Specimens examined:* Sikkim: South of Changh, 7.7.1910, *W.W. Smith 3140* (CAL). Changu, 11.10.1986, *M.P.Sharma 15780* (LWG); North Sikkim: Lachung to Yumtheng, 23.5.1987, *D.C.S. Raju & B. Mitra 7427* (LWG, BSHC).

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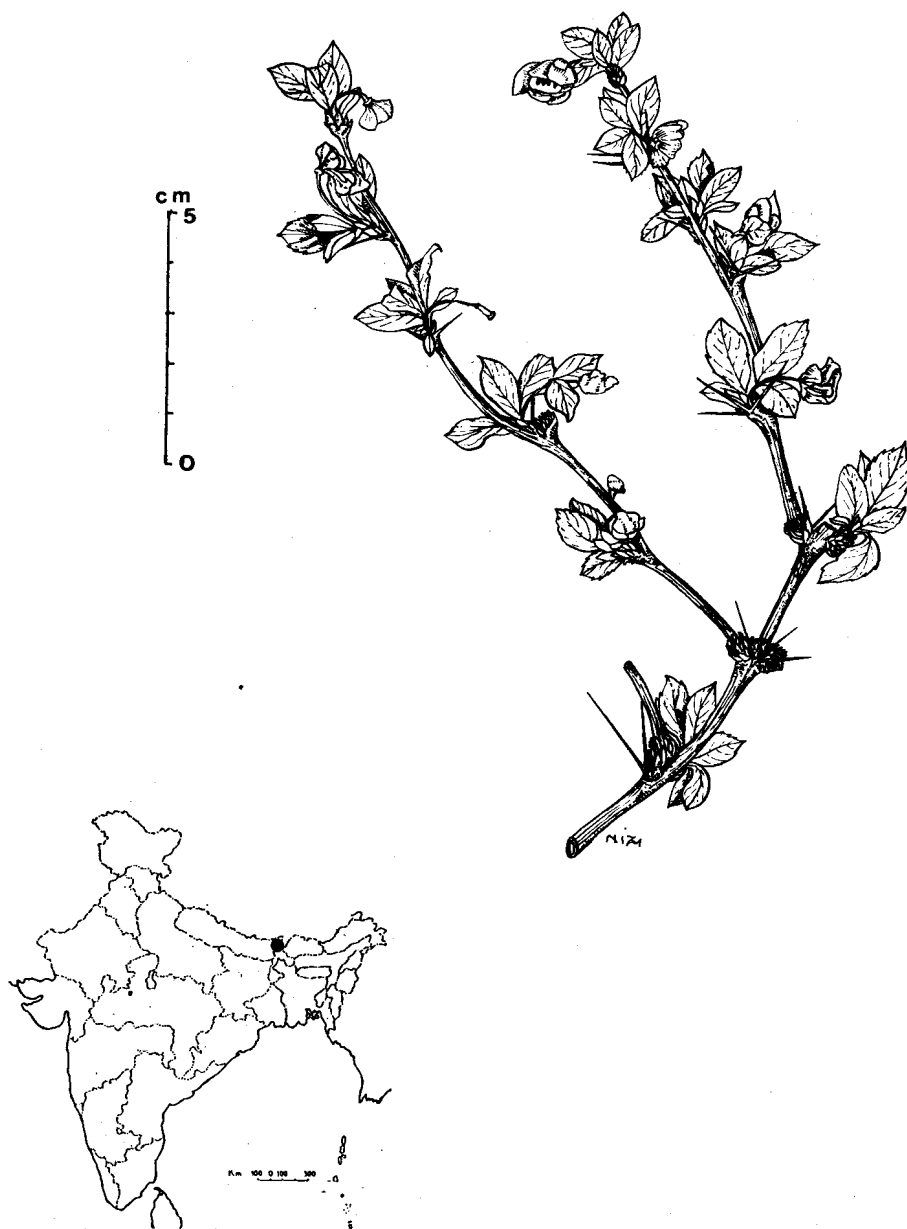


Fig. 1. *Berberis macrosepala* Hook. f. & Thoms. var. *sakdenensis* (Ahrendt) Ahrendt

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B. macrosepala var. **setifolia** Ahrendt, J. Bot. Lond. 79 (Suppl.): 46. 1941, et in J. Linn. Soc. Bot. 57: 116. 1961; Sur in Sharma *et al.*, Fl. India 1: 357. 1993.

Type: N.E. Bhutan: Me La, 14,500 ft., 5 Oct. 1934, *Ludlow & Sherriff 1025* (BM).

Fl. & Fr.: July - Oct.

Distribution: INDIA: Sikkim; BHUTAN

Ecology: Open rocky hillslopes, above tree line; 3600 m.

Specimens examined: Sikkim: Jang rito aloktang, 1869, *T. Anderson 360* (CAL).

Notes: Except for the colour of stem and spiny nature of leaf the Type (*Ludlow & Sherriff 1025*) of *Berberis macrosepala* var. *setifolia* tallies with the Type (Kingdom - Ward 11044) of *B. ludlowii* var. *deleica*.

41. Berberis everestiana Ahrendt var. **ventosa** Ahrendt, J. Linn. Soc. Bot. 57:117. 1961.

Type: Nepal: between Pudamigaon and Ringmigaon, 14,000 ft, 22 Sept. 1952, *Polunin, Sykes & Williams 3554* (BM).

Small shrub less than 1 m tall; stems sulcate, shoots reddish, mature stems pale yellow; internodes 5-12 mm; spines 3-6 fid, 5-12 mm long, weak. Leaves 5-15 x 3-8 mm, entire or with margins 2-3 spinose, venation branched. Flowers solitary; pedicels 5-8 mm long. Outer sepals 6 x 3 - 3.5 mm, ovate-elliptic, subacute. Inner sepals 7-7.5 x 4-4.5 mm, obovate. Petals 5x3 mm. Stamens 4 mm, produced, apiculate. Berries 7 x 4 mm, red oblong- ovoid, estylose or with an extremely short, thick style.

Fl.: Aug.

Distribution: INDIA: Sikkim; NEPAL.

Ecology: Growing abundantly in the area; 4200 m.

Specimens examined: North Sikkim: Muguthang Army camp area, 5.8.1988, *S.K. Rai 9490* (LWG, BSHC).

Notes: This species was reported from Nepal only (Ahrendt, 1961) but recent collections from North Sikkim show the extended distribution of this species in this area.

42. Berberis lambertii Parker in Bull. Misc. Inf. Kew 1921: 367. 1921; Chatterjee, Rec. Bot. Surv. India 16(2): 29. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 135. 1961; Rao & Uniyal

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in Nayar & Sastry, Red Data book of Indian Plants 1: 98. 1987; Gupta in Sharma *et al.*, Fl. India 1: 364. 1993.

Type: Kumaon: Almora, *Lambert s.n.* (holo - K).

Small shrubs, up to 1 m tall; stems glabrous, angled and finely sulcate, pale yellow; internodes upto 0.5-1.5 cm long; spines 1.5 cm long, 1-3-fid. Leaves 12-28 x 2-7 mm, oblanceolate, apex mucronate, base attenuate, sessile, entire, revolute with few lateral veins above; below much paler, whitish. Inflorescence pseudumbellate- subracemose, 4-7-fld., 2.5-5.5 cm long; pedicels 5-10 mm long in fruits, glabrous. Ovules 3-6. Berries 1-1.2 x 0.5-0.7 cm, red, ovoid, oblong, estylose.

Fr.: Oct.

Distribution: INDIA: Uttar Pradesh (Endemic)

Ecology: Growing along with *B. chitria*; 2430-2550m.

Notes: The authors could not examine this species in any of the herbaria. This species is listed in the Red data book of Indian Plants as Vulnerable or Endangered. Ahrendt (1961) had mentioned the locality of this species "between Humidhura and Ratapani" our efforts to collect this species have failed.

43. *Berberis osmastonii* Dunn, Kew Bull. 1920: 335. 1920; Ahrendt, J. Roy. Hort. Soc. 74: 406. f. 146. 1949; Chatterjee, Rec. Bot. Surv. India 16(2): 9. 1953, et in J. Linn. Soc. Bot. 57: 41. 1961; Das Gupta in Sharma *et al.*, Fl. India 1: 365. f. 57, 1993.

Subprostrate shrubs, about 20 cm tall; stems terete or subterete; shoots pubescent; mature stems yellow, lustrous, glabrous; internodes 5-10 mm long; spines 3-fid, 1-2 cm long. Leaves 10-20 x 2-3 mm, linear-oblong, or very narrowly elliptic, margins entire; enervate; lustrous above; pruinose white below, papillose. Flowers solitary; pedicels 3-5 mm long; bracts 1 mm long. Prophylls 3 x 0.4 mm, linear-lanceolate, acuminate. Outer sepals 3.5 x 1 mm, oblong-lanceolate; inner sepals 7 x 3.5 mm, narrowly obovate. Petals 6 x 2.5 mm, similar, entire; base slightly clawed, attenuate. Stamens 5 mm long, apiculate. Ovules 6-8. Berries 10 x 6 mm, ovoid, stylose; style 1.5 mm long. Fl.: May

Distribution: INDIA: Uttar Pradesh (Garhwal Himalaya)

Ecology: bare rocky slopes; 1700-3000m.

Specimens examined: U.P.: Garhwal; Kheta village, 1700m, 14.5.1970, C.M. Arora 41448 (BSD); Khetra, Pindar valley, 2800m, 14.5.1892, A.E. Osmaston 1494 (DD); Khetra, 2640m, 15.5.1918, A.E. Osmaston 919 (DD).

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Notes: Ahrendt (1961) had placed this species under section *Wallichianae*, subsection *Hookerianae* along with *Berberis hookeri*. Chamberlain and Hu (1985) had not mentioned this species under his series *Hookerianae*. Das Gupta (l.c.) had mentioned this species under section *Angulosae*, subsection *Jaeschkeanae* along with several other species. We have also followed Das Gupta (l.c.) in placing this species under subsection *Jaeschkeanae* as the characters of this species tally with the characters of this subsection.

44. *Berberis hamiltoniana* Ahrendt, Gard. Illustr. 64: 426. 1944; Chatterjee, Rec. Bot. Surv. India 16(2): 20. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 137. 1961; Das Gupta in Sharma et al., Fl. India 1: 360, f. 55. 1993.

Shrubs 1.5-2.5 m tall; stems glabrous, sulcate, terete in older parts, angled towards the apex; internodes 1-1.5 cm long; spines 7-10 mm long, 3-fid, central spine slightly longer than the lateral ones. Leaves 2-3.5 x 0.6-1.3 cm, 4-9 from a single node, obovate, apex obtuse or subacute or spiny, entire or spiny along margins, sublustrous, yellowish green on dorsal surface, below grey, pruinose, revolute along margins, prominently reticulate. Inflorescence pseudumbellate-subracemose, sometimes fascicled, 5-10-fld, 2.3 cm long; peduncles 0.3-2 cm long; pedicels 5-10 mm long; bracts 1.5-2.5 mm long, lanceolate, acuminate. Sepals 6.5 x 3.4 mm, elliptic, revolute along margins, concave. Petals 5x4 mm, obovate, emarginate, cuneate at base; nector-glands non-marginal, separate, suboblong. Stamens 4-5 mm long, sometimes produced and subtruncate or obtuse at apex. Ovary oblong, estylose; ovules 3-5. Berries 9-10 x 6 mm, very bright red, dry, estylose.

Fl. & Fr.: June-Oct.

Distribution: INDIA: Himachal Pradesh; NEPAL; CHINA (Tibet).

Ecology: Stony hillsides, dry slopes and among boulders on river banks; 2875-4500 m.

Specimens examined: Himachal Pradesh: Kalpa, Chini, Bashahar, 2875 m, 3.6.1962, *N.C.Nair* 22386 (BSD).

45. *Berberis jaeschkeana* Schneid., Bull. Herb. Boissier (2) 5: 399. 1905; Parker, For. Fl. Punj. Hazara & Delhi 14. 1918; Chatterjee, Rec. Bot. Surv. India 16(2): 29. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 138. 1961; Jafri in Nasir & Ali, Fl. W. Pakistan 87: 16. 1975; Das Gupta in Sharma et al., Fl. India 1:363, f. 56. 1993. (Fig. 2).

Deciduous shrubs 1-2 m tall, stem stout, angled, at first slightly reddish, yellow-brown at maturity; internodes 0.5-2 cm long; spines 3-fid, 0.5 - 1.5 cm long, central one longer than the laterals, concolorous sulcate; both stem and spines minutely hairy; hairs multicellular, arising in multiples from lenticel-like black dots, scattered throughout. Leaves 1-3.5 x 0.5 - 1 cm, 3-5 at

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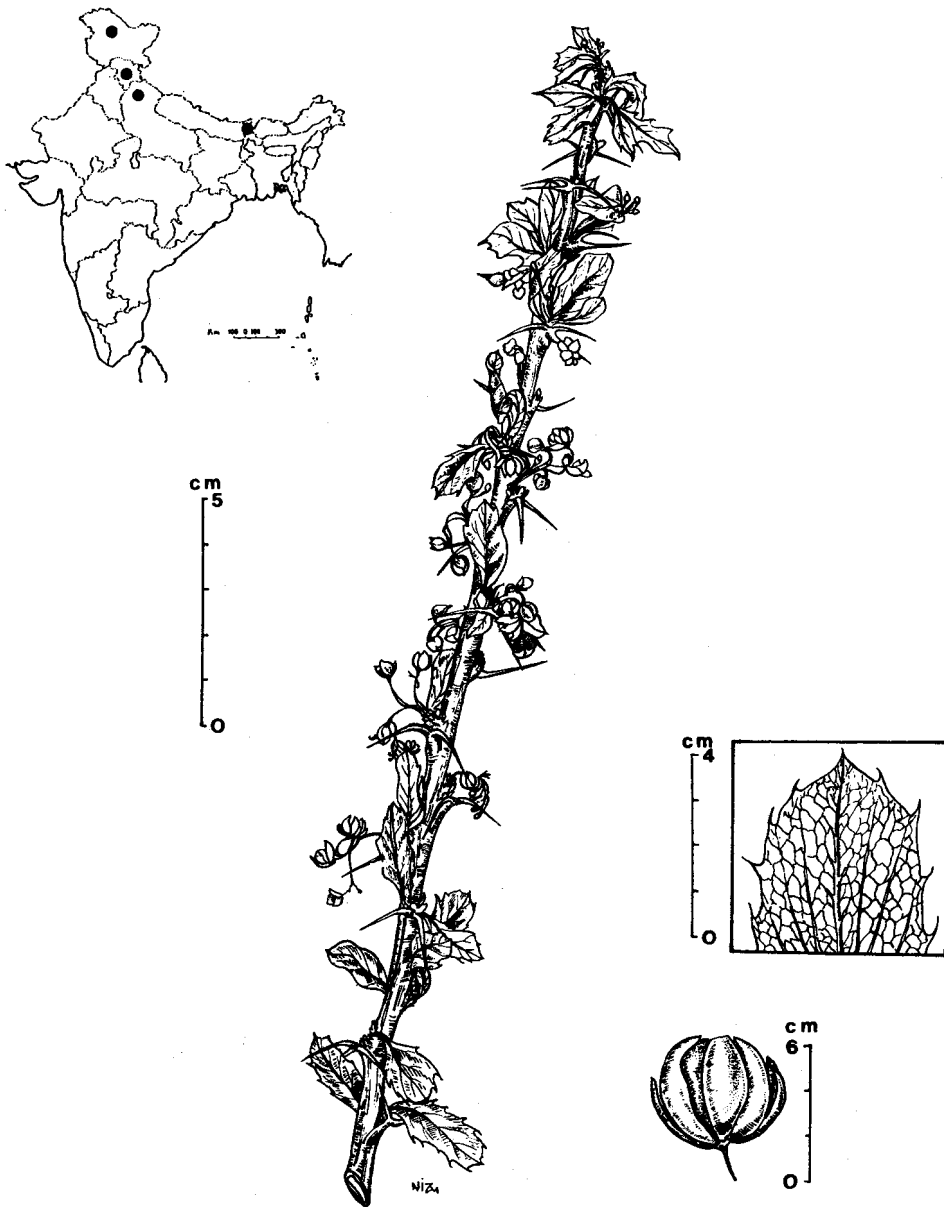


Fig. 2. *Berberis jaeschkeana* Schneid.

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each node, obovoid-oblong, oblong-elliptic or narrowly obovoid-oblong, apex mucronate or sometimes rounded, base attenuate, mostly with margins 2-5 spinose; spines 1-1.5 mm long; slightly grey pruinose, beneath, green above, both surfaces openly veined and reticulate, sessile or subsessile. Inflorescence 3-5 fld, umbellate or subumbellate, 1-4 cm long, glabrous. Flowers 8-10 mm across, yellow; pedicel 9-13 mm long, glabrous; bracts 2.5 - 3 x 1 mm, minutely puberulous; outer and middle sepals 4.5-7 mm long, obovate-elliptic, subacute, entire, inner sepals 8-9 x 7-8 mm, obovate, concave, entire. Petals 6.5-7 x 5.5-6 mm, obovate, base clawed, conspicuously veined, glands 2 mm long. Stamens slightly produced, truncate; anthers 2.5 mm long; filaments 3.5 mm long. Ovules 4-6. Berries 8-10 x 5 mm, red, oblong-ovoid, epruinose, very shortly stylose.

Key to varieties (after Ahrendt, 1961)

1. Stems puberulous; petals entire **B. jaeschkeana** var. **jaeschkeana**
1. Stems glabrous; petals emarginate.
 2. Pedicels 3-6 mm long; berries epruinose **B. jaeschkeana** var. **usteriana**
 2. Pedicels 6-12 mm long; berries pruinose blue **B. jaeschkeana** var. **bimbilaica**

B. jaeschkeana var. **jaeschkeana**

Type: Kashmir: *Falconer 97* (holo - Vienna).

Fl. & Fr.: May-Aug.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim; PAKISTAN; NEPAL.

Ecology: Forming dense patches on rocky or sandy slopes among boulders; 2200-5200m.

Specimens examined: Himachal Pradesh: Lahul; Tandi-Trilokinath, 3200 m, 10.7.1970, *U.C.Bhattacharyya 40704* (BSD); Bissugadla, 3500 m, 27.6.1988. *M.A.Rau 5936* (BSD); Dhanchhu, 3200 m, 28.6.1974, *B.M.Wadhwa 53449* (BSD); Kinnaur Dist., Between Chitkul and Ranikanda, 3500 m, 29.6.1964, *N.C.Nair 34418* (BSD); Sangla Kanda, 3000 m, 22.9.1964, *N.C.Nair 34157* (BSD); Chini, 2800 m, 1.9.1961, *N.C.Nair 30310* (BSD); Nagastic, 3750 m, 25.5.1972, *K.P.Janardhanan 47457* (BSD); Lahul; 25.6.1954, s.l. 03 (CAL); Koksar, 3300 m, 3.7.1938, *N.L. Bor 12286* (DD); Between Gondhla & Sissu, 3150 m, 21.6.1968, *S.P.Sethi & R.S.Negi 430* (DD); Kangra Dt., near Kyelong, 25.6.1954, *R.S. Vasudeva 3* (DD); Toswal, Kullu, Parbatti valley, 2580 m, 2.6.1934, *C.E.Parkinson 4028* (DD); Chamba State, Pangri, 3420 m, 18.7.1920, *R.N. Parker 34* (DD); Bhurj, Kagan Hazara, 15.7.1899, *Inayat s.n.* (DD).

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Uttar Pradesh: Garhwal: Chamoli Dt., Tungnath, *B.D.Naithani 44154* (LWG, BSD); Bhyundar valley, *U.C.Bhattacharyya 66357* (LWG); Mandakini Valley, Kedarnath to Garurchatti, 30.5.1972, *Mehrotra & Party 3337* (LWG). Mana Vasundhara, 300-3500 m, 9.10.1959, *M.A.Rau 10467* (BSD); Mana, 3200 m, 11.10.59, *M.A.Rau 10515* (BSD); Chamoli, Niti proper, 8.9.1975, *B.D.Naithani 56117* (BSD); Chamoli, Duggalbhitta, 2200 m, 13.5.1985, *R.R.Rao 76241* (BSD); On way to Hemkund, 4000 m, 19.6.1969, *U.C.Bhattacharyya 39067* (BSD); Tehri-Garhwal, Panwali, 3200 m, 2.6.1972, *B.D.Naithani 48126* (BSD, Sikkim); On way to Kedarnath, 11.10.1965; 3200 m, *N.C.Nair 35875* (BSD); Way to Dunogini above-Kga, 3200 m, 18.8.1974, *B.D.Naithani 53975* (BSD); Jaunsar, May 1892, *J.S.Gamble 9378* (CNH); Tehri-Garhwal, June, 1893, *J.S.Gamble 24467* (CAL); Kedarnath valley, *Sada Nand* s.n. (DD); Kumaon: Ralam valley, 4000 m, 17.9.1969, *Pant & Naithani* (BSD); Bogdwar/Martoli, 3000-4500 m, 14.7.1958, *T.A. Rao 6817* (BSD); Shelang glacier, 5000 m, 16.6.1958, *T.A.Rao 6918* (BSD); Pithoragarh Dt. On way to Beirphoo, June, 85, *C.L.Malhotra & B. Balodi 77589* (BSD); Milam glacier, 4000-5200 m, 18.6.1958, *T.A.Rao 6983* (BSD); Hunthor (Milam village) *C.L.Malhotra & B. Balodi 77643* (BSD); Garbyang, 14.6.1960, *T.A. Rao 11887* (CAL). Sikkim: 1900, Prain 290 (CAL).

Notes: Leaves in this species are distinctly grey pruinose, a character which could be easily observed in the field. A common species rather well collected by botanists.

B. jaeschkeana var. **usteriana** Schneid., ull. Herb. Boissier 2(5): 399. 1905; Ahrendt, J. Linn. Soc. Bot. 57: 139.1961; Jafri in Nasir & Ali, Fl. W. Pakistan 87: 18, 1975; Das Gupta in Sharma *et al.*, Fl. India 1: 364. 1993.

Type: Kumaon: Chelab, Byans, *Duthie 5307* (holo - K).

B. usteriana (Schneid.) Parker, Ind. For. 50: 399. 1924.

Fl. & Fr.: June - Sept.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh; NEPAL.

Ecology: 2850-4500m.

Specimens examined: Uttar Pradesh: Kumaon: Almora, Garbyang, 3090 m, 13.7.1923, *R.N.Parker 2078* (DD); Byans, 19.7.1886, *J.F.Duthie 5308* (DD); Byans, Budhi, 2850 m, 13.7.1923, *R.N. Parker 2075* (DD).

Notes: This variety differs from the type variety by the glabrous stem and shoots and red, epruinose berries.

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B. jaeschkeana var. **bimbilaica** Ahrendt, J. Bot., Lond. 79 (Suppl.) 65. 1941, et in J. Linn. Soc. Bot. 57: 139. 1961.

Type: S.E. Tibet: Tsari district, Bimbila, 11,000-13,000 ft, 13 Oct. 1938, *Ludlow, Sherriff & Taylor 6305* (holo - BM).

Fl. & Fr.: July-Oct.

Distribution: INDIA: Himachal Pradesh; TIBET.

Ecology: 3300-3900m.

Specimens examined: Himachal Pradesh: Lahul valley, Tandi-Gondha, 3400 m, 23.9.1978, *B.S.Aswal 10064* (LWG),.

Notes: This variety which was known only from Tibet has extended its distribution to Himachal Pradesh.

46. Berberis apiculata (Ahrendt) Ahrendt, J. Linn. Soc. Bot. 57: 135. 1961; Rao & Uniyal in Nayar & Sastry, Red Data Book of Indian Plants 2: 75. 1988; Das Gupta in Sharma et al., Fl. India 1: 360. f. 54: 1993.

Type: Simla Hill State, Kamru Baspa valley, 12000 ft., 26.6.1930, *Ludlow & Sherriff 7356* (holo - BM).

B. usteriana (Schneid.) R. Parker var. *apiculata* Ahrendt, J. Asiat. Soc. Beng. 11:3.1945.

Shrubs 1.5-1.7 m tall; stems subterete, gland-dotted, yellow, glabrous, densely leafy; internodes 5-10 mm long; spines 8-15 mm long, 3-fid. Leaves 2-3 x 0.6-0.7 cm, upto 10 from each node, narrowly obovate, apex rounded or mucronate, attenuate at base; margins with 2-3 spinose serrations, lustrous above, paler beneath, openly veined. Inflorescence subumbellate, 5-8-fld, 2.5-4 cm long; peduncles very short or absent. Flowers yellow; pedicels 3-9 mm long; bracts 2.2-2.5 x 1 mm, lanceolate, acute, puberulous along margins. Prophylls 3-3.5 x 1-1.5 mm, ovate, obtuse. Outer sepals 5-6 x 2.5-3 mm, elliptic, obtuse; inner sepals 8 x 5-5.5 mm, obovate, obtuse. Petals 6.5 x 3.75 mm, subacute to subobtuse, entire, base clawed, with separate, oblanceolate glands; stamens 5 mm, produced, conspicuously apiculate; ovules 5-7, stigma stipitate. Fruits not seen.

Fl. & Fr.: June- Sept.

Distribution: INDIA: Himachal Pradesh, West Bengal; BHUTAN (Rare).

Ecology: On the banks of streams and open dry places on hill slopes; 3600-3700 m.

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Specimens examined: West Bengal: 22.4.1996, s.l. 224 (CAL).

Notes: The Type of *Berberis apiculata* (Ludlow & Sherriff 7356, BM) looked quite similar to *B. jaeschkeana* but for some minor differences.

47. *Berberis orthobotrys* Bienert ex Aitch. in J. Linn. Soc. Lond. 19: 150. 1882; Schneid. in Bull. Herb. Boissier (2) 5: 662. 1905; Chatterjee in Rec. Bot. Surv. India 16 (2): 28. 1953; Ahrendt in J. Linn. Soc. Bot. 57: 142. 1961; Jafri in Nasir & Ali, Fl. W. Pak. 87: 18.f. 6 A-B. 1975; Rao & Kumar in Sharma *et al.*, Fl. India 1: 366.1993. (Fig. 3)

Shrubs 1-2 m tall, glabrous; stems often dark red or pale-brownish or sometimes orange yellow; internodes 1-3.5 cm long; spines 1-2.5 cm long, mostly 3-fid, same colour as the stem. Leaves 1-3.5 x 0.5-1.5 cm, usually obovate, 5-20 spinose-serrate at the margins, rarely subentire, green, sometimes subpruinose grey beneath, subsessile or shortly petiolate. Inflorescence racemose, subumbellate, umbellate-racemose or racemose-subfasciated, rarely compound below, 5-20-fl'd. Flowers yellow to pale-yellow; pedicels 4-15 mm long, lower often longer than the upper ones, slender. Sepals 4-7 mm long, outer smaller; petals about as long as or slightly shorter than the inner sepals, emarginate to entire stamens about as long as or shorter than the petals, connective not produced. Ovules 3-5. Berries 7-10 x 5-6 mm, oblong, subovoid or subobovoid, red, estylose.

Notes: According to Ahrendt (1961), Jafri (1975) and, Rao and Kumar (1993) this is a variable species with respect to leaf architecture and size, serrations, fruit shape, size and colour and length of pedicels. Jafri (*l.c.*) recognises two distinct subspecies under this species as below:

Key to subspecies (after Jafri, 1975)

1. Leaves usually 2-3.5 cm long; inflorescence somewhat lax, simple; pedicels 10-12 mm long; berries oblong, rarely sub-ellipsoid **B. orthobotrys** subsp. **orthobotrys**
1. Leaves usually 10-20 mm long; inflorescence, short, congested, sometimes compound, somewhat capitate; pedicels 5-10 mm long; berries sub-obovoid to sub-ellipsoid **B. orthobotrys** subsp. **capitata**

Notes: According to Kumar *et al.* (1996) "the Indian varieties of *Berberis orthobotrys* falls under subsp. *orthobotrys* (pedicel 10-12 mm long) except var. *sinthanensis* (pedicel 5-10 mm long)" thus var. *sinthanensis* is placed under subsp. *capitata*.

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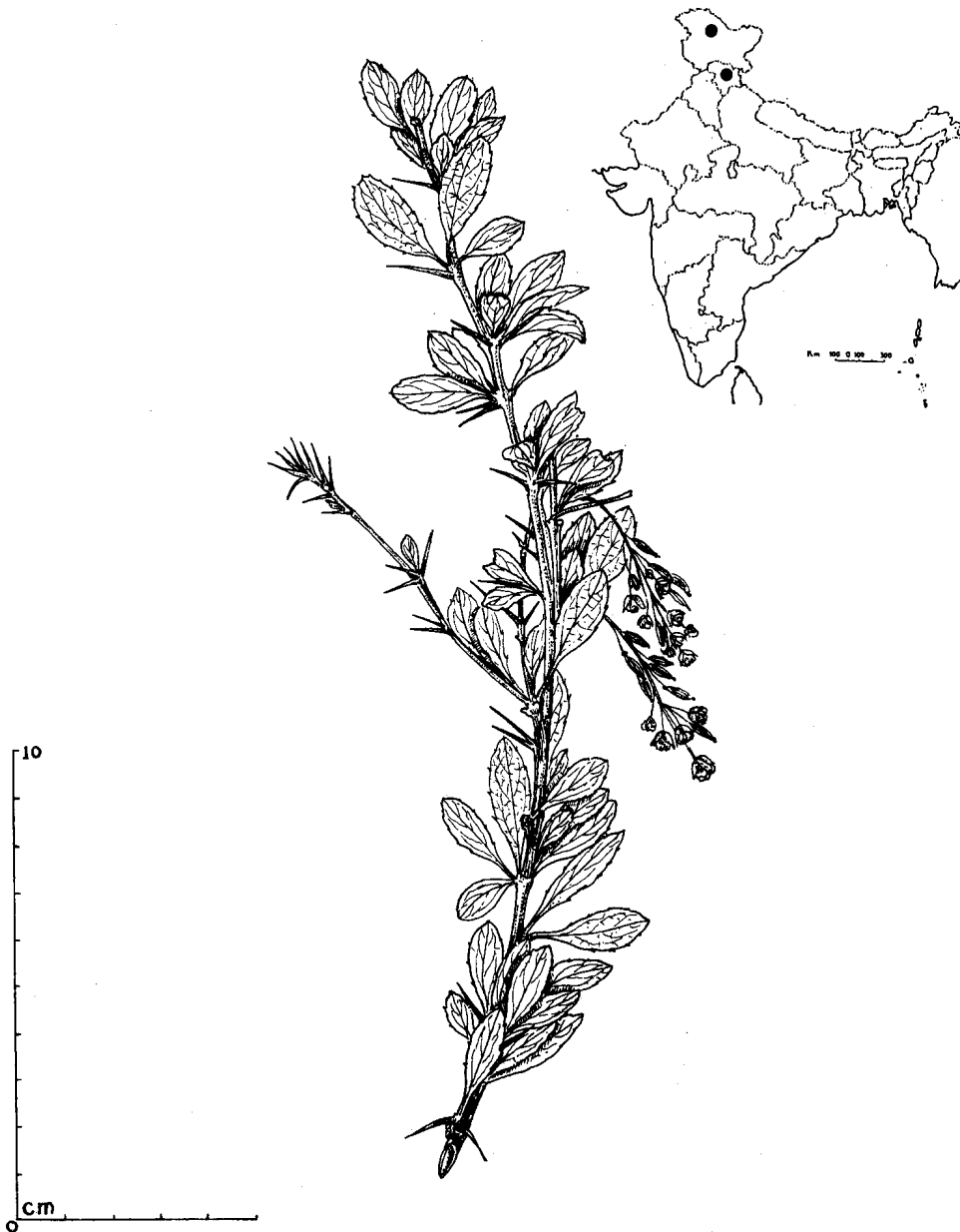


Fig. 3. *Berberis orthobotrys* Bienert ex Aitch.

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I. *B. orthobotrys* subsp. *orthobotrys*Key to varieties of *B. orthobotrys* subsp. *orthobotrys*

1. Leaves epruinose below.
 2. Stamens conspicuously produced; leaves narrow
..... ***B. orthobotrys* subsp. *orthobotrys* var. *rubicunda***
 2. Stamens scarcely produced, leaves broad.
 3. Stamens shorter than petals; berries 8-10 mm long
..... ***B. orthobotrys* subsp. *orthobotrys* var. *orthobotrys***
 3. Stamens slightly exceeding the petals; berries up to 7 mm long.....
..... ***B. orthobotrys* subsp. *orthobotrys* var. *conwayi***
1. Leaves grey pruinose below ***B. orthobotrys* subsp. *orthobotrys* var. *canescens***

B. orthobotrys* subsp. *orthobotrys* var. *orthobotrys

Type: Afghanistan: Kurrum valley, Hills above Kaiwas, 11,000 ft, 3 July 1879, *Aitchinson* 726 (K).

Fl. & Fr.: June - Sept.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh; AFGHANISTAN; PAKISTAN; NEPAL; BHUTAN; CHINA (Tibet).

Ecology: 2000 - 3000 m.

Specimens examined: Jammu & Kashmir: Tangmarg, *G. Singh* 110 (Univ. of Kashmir), Himachal Pradesh: Chamba Pangi, road near Sauch Pass, 4 July 1879, *Harsukh* s.n. (CAL); Hazara, Richmaji, Dara Panjal, 22 Aug. 1899, *Inayat* s.n. (CAL).

B. orthobotrys* subsp. *orthobotrys* var. *canescens Ahrendt, *J. Linn. Soc. Bot.* 57: 144. 1961; Rao & Kumar in *Sharma et al.*, *Fl. India* 1: 368. 1993.

Type: ?

Fl. & Fr.: May - Nov.

Distribution: INDIA: Kashmir; NEPAL.

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Notes: Often cultivated for berries.

B. orthobotrys subsp. **orthobotrys** var. **conwayi** Ahrendt, J. Linn. Soc. Bot. 57: 143. 1961;
Rao & Kumar in Sharma *et al.*, Fl. India 1: 368. 1993.

Type: Sinkiang: North Kashmir border, Karakoram, 15000 ft, 1892, *Conway 146* (K).

Distribution: INDIA: Jammu & Kashmir; AFGHANISTAN.

B. orthobotrys subsp. **orthobotrys** var. **rubicunda** Ahrendt, J. Linn. Soc. Bot. 57: 144. 1961.

Type: Central Nepal: Langtang, on cliffsides above, 11,500 - 12,500 ft, *Polunin 514* (BM).

Fl & Fr.: June

Distribution: NEPAL.

II. B. orthobotrys subsp. **capitata** Jafri in Nasir & Ali, Fl. W. Pakistan 87: 20. f. 6, C-D. 1975.

Type: Baltistan, Skardu, 2600 m, 24.6.1955, *E. Nasir & G.L. Webster 5782* (holo - RAW).

Notes: According to Jafri (1975) subsp. *capitata* is an interesting taxon closely resembling the Type subsp., *Berberis kunawurensis* Royle and *B. pseudumbellata* Parker.

Key to varieties of B. orthobotrys subsp. capitata

1. Inflorescence congested, capitate **B. orthobotrys** subsp. **capitata** var. **capitata**
1. Inflorescence lax racemose, racemose-subfascicled or racemose -subumbellate
..... **B. orthobotrys** subsp. **capitata** var. **sinthanensis**

B. orthobotrys subsp. **capitata** var. **capitata**

Fl. & Fr.: June - July.

Distribution: INDIA: Jammu & Kashmir; PAKISTAN.

B. orthobotrys subsp. **capitata** var. **sinthanensis** (Ahrendt) Kumar, Husain & Rao, Ind. Journ. For. 19 (1): 97. 1996.

Type: Kashmir: Sinthan pass, head of Bringhi valley, 10,000 ft, 24 Oct. 1940, *Ludlow & Sherriff 8279* (BM).

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B. orthobotrys Bienert ex Aitch. var. *sinthanensis* Ahrendt, J. Linn. Soc. Bot. 57: 143. 1961; Rao & Kumar in Sharma et al., Fl. India 1: 369. 1993.

Fl. & Fr.: July - Oct.

Distribution: INDIA: Kashmir (Endemic).

48. *Berberis pachyacantha* Koehne, Deutshe Dend. 170. 1893; *Parker*, For. Fl. Punjab, Hazara & Delhi 12. 1918; *Chatterjee*, Rec. Bot. Surv. India 16(2): 31. 1953; *Ahrendt*, J. Linn. Soc. Bot. 57: 191. 1961; *Jafri* in *Nasir & Ali*, Fl. W. Pakistan 87: 21. f.5, A. 1975; *Singh & Kachroo*, For. Fl. Srinagar 164, 1976; *Uniyal & Rao* in *Sharma et al.*, Fl. India 1: 391. 1993. (Fig. 4)

Shrubs 2-3 m tall, deciduous; stems dark-red, yellow or pale-brownish, subterete; internodes 2-4 cm long; spines 5-12 mm long if present, solitary or 3-fid. Leaves 2.2-6 x 1-2 cm, oblong-obovate or obovate-elliptic, apex shortly mucronate, below pruinose, many spinulose on margin, petioled; petiole 1-12 mm long. Inflorescence racemose, 15-30-fld; peduncle 10-15 mm long, sulcate. Flowers 7-9 mm across; pedicels 10-15 mm long. Sepals in 2 whorls; outer sepals 3 x 2 mm, ovate-obtuse; inner sepals 5-6 x 3.5-4 mm, obovate. Petals 4-4.5 x 3 mm, acutely emarginate. Ovary oblong, 1-2-ovuled. Berries 8-11 x 4-7 mm, oblong-ovoid, red, epruinose, estylose.

Key to subspecies (after Jafri, 1975)

1. Stems usually dark-red to pale brownish; flowers 7-9 mm across; pedicels usually 10-15 mm long ***Berberis pachyacantha* subsp. *pachyacantha***
1. Stems usually pale; flowers 5-6 mm across; pedicels usually 4-8 mm long.....
..... ***Berberis pachyacantha* subsp. *zebeliana***

Berberis pachyacantha* subsp. *pachyacantha

Fl. & Fr.: April - Aug.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh; PAKISTAN; IRAN.

Ecology: Moist shady localities; 2000-3300 m.

Specimens examined: Jammu & Kashmir: Kashmir: Aharbal, *M.Y. Baba 313* (Univ. of Kashmir); Bobjan, *U. Dhar 1482* (Univ. of Kashmir); Harwan slopes, *G. Singh 103*

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Fig. 4. *Berberis pachyacantha* Koehne

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(Univ. of Kashmir); Harwan slopes, *G.N. Javeid* 562 (Univ. of Kashmir); Khillnarg, *G. Singh* 4969 (Univ. of Kashmir); Aharbal, *A.R. Naqshi* 7597, 7598 (Univ. of Kashmir). Himachal Pradesh: Trilokinath, 2900 m, 21.8.1971, *U.C. Bhattacharyya* 45911 (BSD); Lahul, Sissu, 3180 m, 16.7.1938, *N.L. Bor* 12383 (DD); Lahul, Sept. 1883, L. Schlich (CAL); Simla, Narkanda, 30.6.1878, *J.S. Gamble* 530 (CAL). Uttar Pradesh: Tehri Garhwal, Nag Tibba, 3000 m, 3.6.1978, *A.K. Goel* 64053 (BSD); Tehri Dist., Gangotri-Kedarganga, 3246, 20 Sept. 1967, *B.D. Naithani* 37387 (BSD).

Notes: According to Jafri (1975) "this species differs from *Berberis petiolaris* Wall. ex. G. Don, primarily by the estylose berries and thinner leaves".

Berberis pachyacantha* subsp. *zebeliana (Schneid.) Jafri in Nasir & Ali, Fl. W. Pakistan 87:21.f.5, B. 1975; Uniyal & Rao in Sharma *et al.*, Fl. India 1:392. 1993.

Type: India: Kashmir, *Falconer* 95 (K).

B. zebeliana Schneid. in Bull. Herb. Boiss. 2,5:667. 1905; Chatterjee in Rec. Bot. Surv. India 16(2):31. 1953; Ahrendt in J. Linn. Soc. Bot. 57:184. 1961.

Fl. & Fr.: April - Oct.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Meghalaya; PAKISTAN; IRAN.

Ecology: Dry open places; 2100 m.

Specimens examined: Jammu & Kashmir: Kashmir: Tangmarg, *A.R. Naqshi* 4886 (Univ. of Kashmir); Gulmarg, *G. Singh* 906 (Univ. of Kashmir); Pahalgam, Liddar range, 2100 m, 1.9.1927, *Lambert* 197, 199 (DD); Gulmarg, 2700 m, 7.9.1954, *K.M. Vaid s.n.* (DD); Koragbal, 2520 m, 6.7.1927, *Lambert* 179 (DD). Meghalaya: K. & J. Hills, *P.C. Kanjilal* 8004 (ASSAM).

Notes: According to Jafri (1975) this taxon differs from the Type subspecies by the smaller flowers on shorter pedicels (4-8 mm long), petals 3x2 mm; spines 1-3-fid, 5-10 mm long, sometimes absent.

49. *Berberis koehneana* Schneid., Bull. Herb. Boiss. 2,5: 814. 1905; Chatterjee, Rec. Bot. Surv. India 16(2): 32. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 210.f. 48. 1961; Uniyal & Rao in Sharma *et al.*, Fl. India 1:378. 1993. (Fig. 5)

Type: India: Uttar Pradesh, Kumaon, Budhi, Byans, 8-9000, *Duthie* 5309 (W, DD & K)

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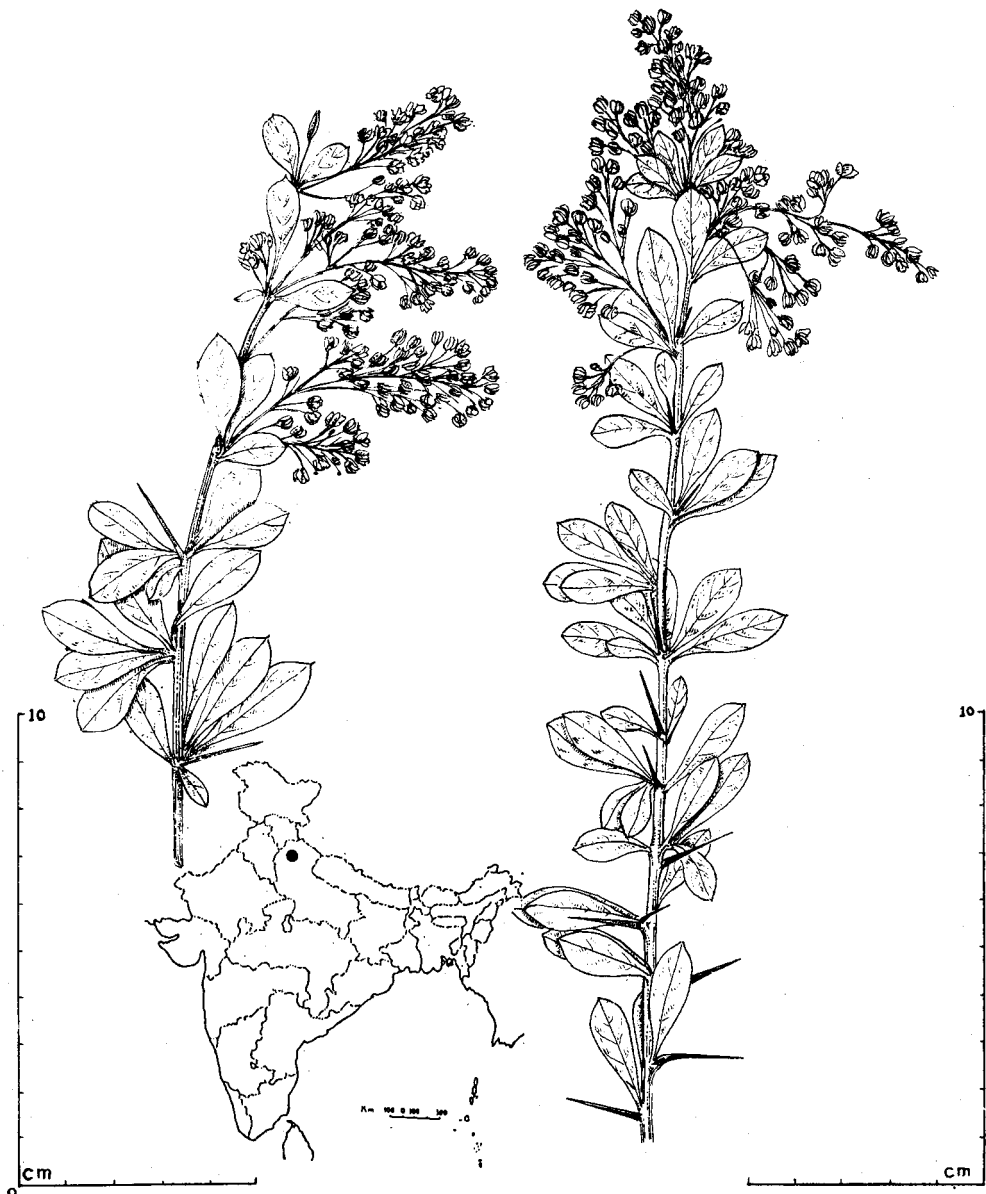


Fig. 5. *Berberis koehneana* Schneid.

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Shrubs up to 2.5 m tall; young shoots red-brown, subsulcate; internodes 1.5-3 cm long; spines 1-2 cm long; 1-3-fid. Leaves 1-4 x 0.4 - 1.8 cm, obovate to oblong-oblancheolate, apex mucronate, base cuneate, subsessile, entire or few spinulose on margins, greyish beneath, papillose. Inflorescence paniculate, many-fl'd., 8-17 cm long, branches up to 8 cm long; pedicels 2-7 mm long; bracts ca 1.5 mm long. Sepals in 3 whorls; outer sepals 3x2 mm, ovate; median sepals 4.5x4 mm, oblong-ovate; inner sepals 7x4.5 mm, obovate. Petals 5-6 x 3-4 mm, apex incised; glands obovate. Berries 6-8 x 3-4 mm, bright red, epruinose, oblong.

Fl. & Fr.: July - Nov.

Distribution: INDIA: Uttar Pradesh; NEPAL.

Ecology: 2550-3500 m.

Specimens examined: Uttar Pradesh: Kumaon, Pithoragarh, Budhi-Byans, 2550 m, 12 July, 1923, *Parker 2047* (DD).

Notes: Ahrendt (1961) separates *Berberis koehneana* var. *auramea* from var. *koehneana* by yellow stems. These yellow stemmed plants have been described from Nepal (Uniyal & Rao, 1993).

50. *Berberis kunawurensis* Royle, *Illustr. Bot. Himal.* 64. 1834-39; Parker, *For. Fl. Punjab with Hazara & Delhi* 13. 1918; Chatterjee, *Rec. Bot. Surv. India* 16 (2): 32. 1953; Ahrendt, *J. Linn. Soc. Bot.* 57: 211. 1961; Jafri in Nasir & Ali, *Fl. W. Pakistan* 87: 22. 1975; Uniyal & Rao in Sharma *et al.*, *Fl. India* 1: 379. 1993. (Fig. 6)

B. vulgaris L. var. *actnensis* Hook.f. & Thoms. in Hook.f., *Fl. Brit. India* 1: 109. 1872 (non *B. actnensis* Presl., 1826. Type: Kashmir, Poshiana, 8000 ft, 26 June 1902, *Drummond 13893* (K).

B. edgeworthiana Schneid., *Bull. Herb. Boissier* (2) 8: 263. 1908; Parker, *For. Fl. Punj. with Hazara & Delhi* 14. 1918; Ahrendt in *J. Linn. Soc. Bot.* 57: 211. 1961. Type: N.W. Himalaya, 8000-11000 ft, 1844, *Edgeworth 65* (K)

B. brachybotrys Edgeworth in *Trans. Linn. Soc. Lond.* 20. 29. 1846, non C. Gay, 1845.

B. vulgaris L. var. *brachybotrys* Hook. f. & Thoms. in *Hook. f., Fl. Brit. Ind.* 1: 109. 1872.

Shrubs, 1-1.5 m tall; young shoots red, minutely puberulous, mature stems sulcate, black tuberculate, multicellular hairs arising from tubercles, brown or yellowish-red; internodes 1-1.5 cm long; spines 3-fid, 0.5-1.5 cm long, central spine slightly longer than the lateral ones, sulcate, slender. Leaves 1-3 x 0.5-1 cm, narrowly obovate, lanceolate or elliptic, apex mucronate, base attenuate, 3-8 spinose (spines 1-1.2 cm long), scarcely reticulate, openly

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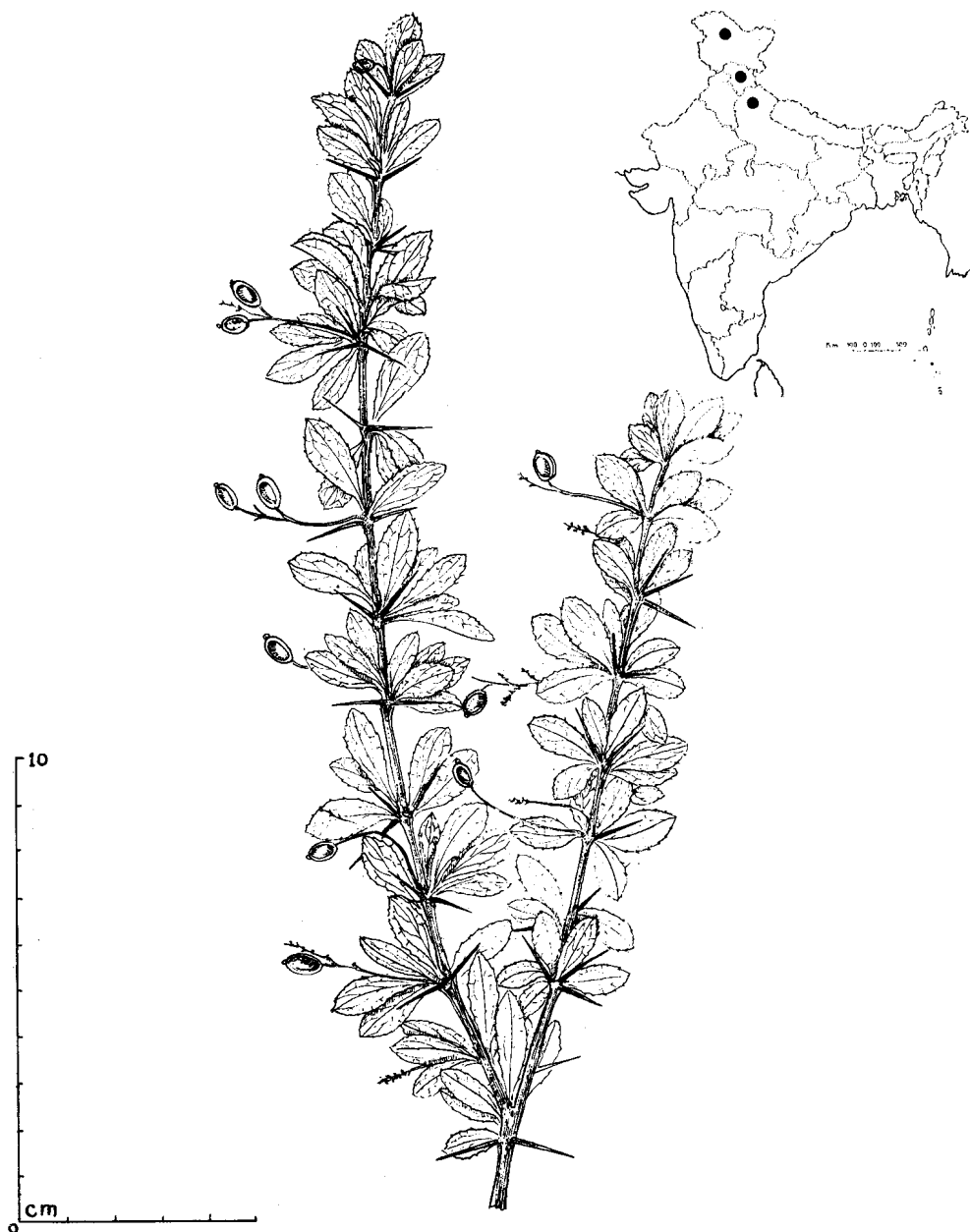


Fig. 6. *Berberis kunawurensis* Royle

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veined, papillose beneath, papillae inconspicuous. Inflorescence paniculate, 4-25-fl'd; panicle 1-5 cm long; bracts 2 mm long. Flowers 5-8 mm across; pedicel 5 mm long; outer sepals 2-2.5 mm long; inner sepals 5-7 x 4-5 mm, obovate; petals 4.5 - 5 x 3 mm, subequal, apex deeply and narrowly incised; glands on petals oblong, 0.7 x 0.4 mm. Stamens obtuse, produced, 3 mm long. Ovules 2. Berries bright orange-red, stylose or very shortly styled.

Key to varieties (after Husain *et al.*, 1994)

1. Leaves green, membranous, acute to subacuminate at apex, with secondary veins not prominent on both surfaces, epapillose; panicles upto 4.5 cm long **Berberis kunawurensis** var. **kunawurensis**
1. Leaves crimson, coriaceous, rounded at apex with secondary veins prominent on both surfaces, papillose on the upper surface; panicles upto 6 cm long, axis more or less zig-zag; bracts up to 3mm long **Berberis kunawurensis** var. **diversifolia**

Berberis kunawurensis var. **kunawurensis**

Type: Punjab: Kunawur, 1834, *Royle* s.n. (K).

Fl. & Fr.: May - Sept.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh; PAKISTAN.

Specimens examined: Jammu & Kashmir: Kashmir, 12.11.1893, *T. Thomson 17041* (CAL). Himachal Pradesh: Lahul, *U.C. Bhattacharyya 51878* (LWG, BSD); Kalpa Bashahar, 2900 m, 4.6. 1962, *N.C. Nair 22389* (BSD); Kalpa Bashahar, 2850 m, 1.6. 1962, *N.C. Nair 22273* (BSD); Triund, Kangra, 3000 m, 10.6.1958, *M.A. Rao 5670* (BSD); Near 8 km point on Mastarang, Chitkul Road, 23.9.1971, *K.P. Janardhanan 46169* (LWG, BSD); Chini, 2800 m, 1.9.1961, *N.C. Nair 30311* (BSD); Bagi, Bashahar Dn., 21.6.1911, *R.S. Hole 283* (BSD). Uttar Pradesh: Nandadevi National Park, Himtoli, 1.9.1981, *P.K. Hajra 73488* (BSD); Tehri-Garhwal, way to Kushkalyan, 2700-2800 m, 24.9.1974, *M.V. Vishwanathan 54924* (BSD); Chhakrata, 2200 m, 27.6.1961, *U.C. Bhattacharyya 14886* (BSD); Jaunsar; Mundali, 2400 m, June 1895, *J.S. Gamble 25342* (BSD, CAL) Deoban, 2700 m, 1.6.1897, *Duthie 19850* ("BSD); Deoban Konaim, 2550 m, 5.6.1936, *C.E. Parkinson 7063* (BSD); Buder, 2700m, 28.5.1936, *C.E. Parkinson 7011* (BSD); Uttarkashi, Above Suki, 17.6.1883, *J.F. Duthie 598* (CAL); Pithoragarh, Garbyang Byans, 3090 m, 26.5.1913, *Lyll 33* (CAL).

Notes: Leaves are inconspicuously papillose on the lower surface, a character which has escaped attention of Ahrendt (1961) and other workers.

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Berberis kunawurensis var. **diversifolia** Ahrendt ex Husain, Datt & Rao, Rheedea 4(1): 37-39. f. 1. 1994. (Fig. 7)

Type: India: Assam, Walong, 10000 ft, 9. 10. 1950, *Kingdon-Ward 20263* (holo - BM).

Fr.: Oct.

Distribution: INDIA; Assam.

Ecology: Exposed grassy and rocky slopes, ca 3000 m.

Notes: This variety has been proposed for inclusion in the Red Data Book of India.

51. Berberis cretica L., Sp. Pl. 331. 1753; Ahrendt in J. Linn. Soc. Bot. 57: 225. 1961; Rao & Kumar in Sharma *et al.*, Fl. India 1: 375. 1993.

B. vulgaris var. *cretica* (L.) Hook.f. & Thoms. in Fl. Brit. India 1: 109. 1872.

Shrubs 1-2 m high; stems glabrous, stout, sulcate, mature lustrous; spines yellow to orange. Leaves 10-17 x 4-7 mm, obovate, apex acute to subacute, base cuneate, sessile, entire, both surfaces openly reticulate with distinct lateral veins. Inflorescence fascicled, 3-6-fld, 6-10 mm long; pedicels 2-5 mm long. Outer sepals 4 x 2.5 mm, elliptic; inner sepals 4-4.5 x 3 mm, obovate. Petals 4-4.7 x 3 mm, obovate, entire; glands 3, orange, oblanceolate, submarginal. Stamens 3.5-4.5 mm. Ovules 2. Berries 6-7 x 4-5 mm, ellipsoid, red, black or dark blue at maturity, epruinose or slightly pruinose, shortly stylose.

Fl. & Fr.: May - July.

Chr. No.: 2n=28 (Darlington & Wylire, Chromosome Atlas of Flowering Plants 28. 1955)

Distribution: INDIA: Himachal Pradesh, Uttar Pradesh (Garhwal); CYPRUS; CRETE; GREECE.

Ecology: 3300 m.

52. Berberis calliobotrys Aitch. ex Koehne, Deutsche Dendr. 168. 1898; Chatterjee, Rec. Bot. Surv. Ind. 16(2): 30.1953; Ahrendt, J. Linn. Soc. Bot. 57: 225. f. 49. 1961; Jafri in Nasir & Ali., Fl. W. Pakistan 87: 23. f.3, E-G. 1975; Rao & Kumar in Sharma *et al.*, Fl. India 1:375. 1993. (Fig.8)

Type: Afghanistan: Kurrum valley, between Sergal and Sikaram, 8000 -10000 ft., 4 June 1879, *Aitchinson 490* (K,DD).

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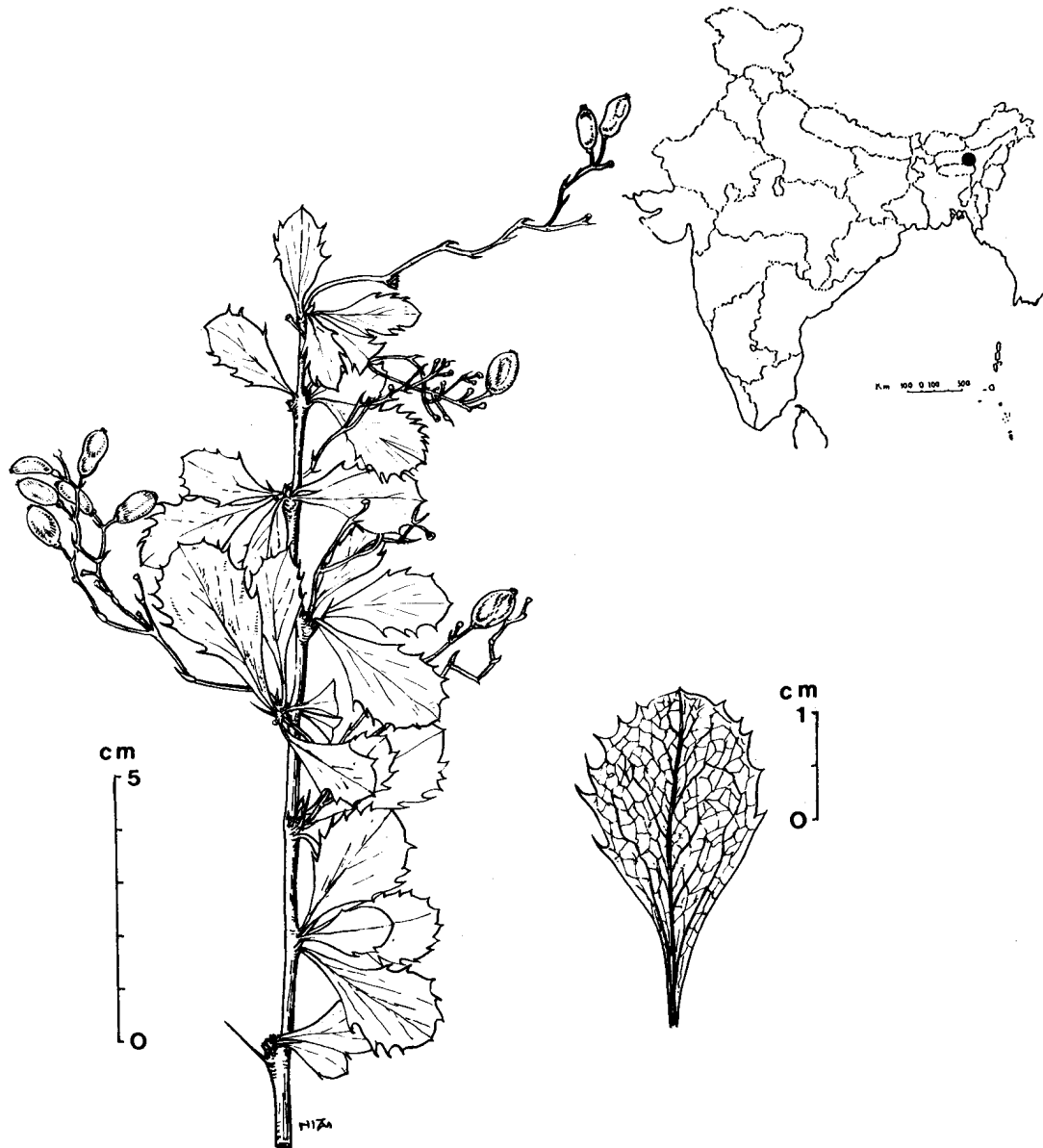


Fig. 7. *Berberis kunawurensis* var. *diversifolia* Ahrendt ex Husain et al.

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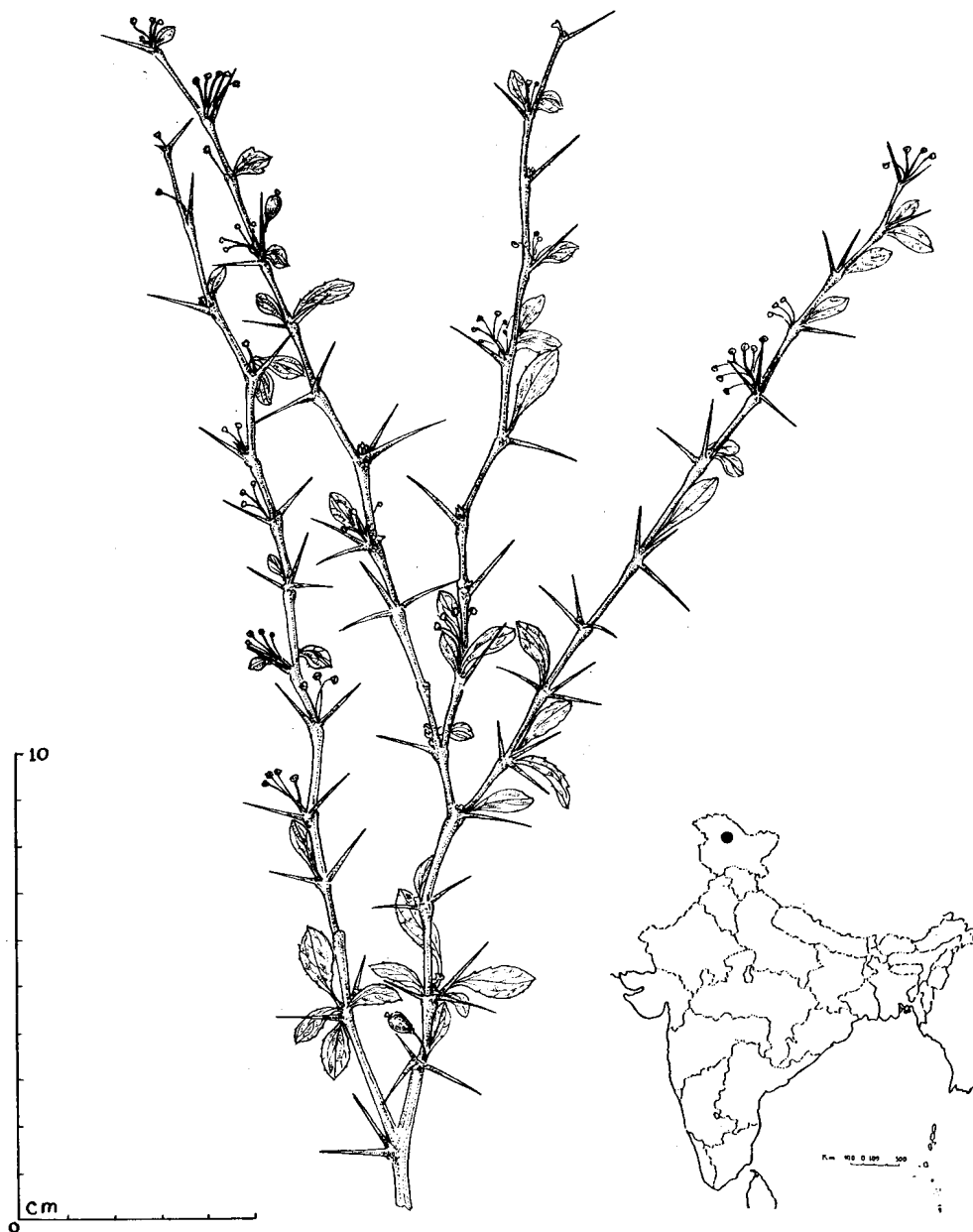


Fig. 8. *Berberis calliobotrys* Aitch. ex Koehne

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B. vulgaris auct. non L.: Aitch., J. Linn. Soc. Lond. 19: 151. 1882.

B. lycium auct. non Royle: Burkill, List Fl. Pl. Baluch. (rep. ed.) 5. 1956.

B. waziristanica Ahrendt, J. Asiat. Soc. Beng. 11:3. 1945, et in J. Linn. Soc. Bot. 59: 225. 1961.

B. gambleana Ahrendt in J. Asiat. Soc. Beng. 11:3.1945, et in J. Linn. Soc. Bot. 57: 225. 1961.

Shrubs, 1-2 m tall; stems glabrous, red-brown to pale-brown, sulcate; internodes 1-2 cm long; spines 1-2 cm long, 3-fid. Leaves 1.0-3.5 x 0.4-1.0 cm, oblanceolate to oblong-obovate, apex spine tipped, sessile to subsessile, mostly entire, rarely 1-4-spinose-serrulate, green, epapillose, often reticulate. Inflorescence subfascicled, racemose or racemose-fascicled, 2-10-fl'd, 2-3 cm long; peduncle 1-10 mm long. Flowers 6-8 mm across, yellow; pedicels long, glabrous. Outer sepals ca 4 x 2-2.5 mm, obovate; inner sepals ca 6 x 4-4.5 mm. Petals 5.5 - 6x3 mm, obovate. Stamens 4 mm long, truncate. Ovules 2. Berries 6-8 x 4-5 mm, globose - ovoid to somewhat obovoid, black, conspicuously pruinose, stylose; style ca 1 mm long.

Fl. & Fr.: April - June.

Distribution: INDIA: Jammu & Kashmir; AFGHANISTAN; PAKISTAN.

Ecology: On arid hills; ca 2100 m.

Specimens examined: Jammu & Kashmir; Draphoma (VIP Lodge) Dachigam Sanctuary, 1800 m, 1 Nov. 1977, A.S. Rao 63605 (BSD).

Notes: According to Jafri (1975) and, Rao and Kumar (1993) this species is cultivated in Kashmir and the leaves are said to be a cure for jaundice.

53. *Berberis pseudumbellata* Parker, Kew Bull. 1921: 118.1921; Chatterjee, Rec. Bot. Surv. India 16 (2): 22. 1953; Ahrendt, J. Linn. Soc. Bot. 57: 226. 1961; Jafri in Nasir & Ali, Fl. W. Pakistan 87: 25. f. 7 B-C. 1975; Rao & Kumar in Sharma *et al.*, Fl. India 1: 376. 1993. (Fig. 9).

Shrubs 2-3 m tall, deciduous; stems sulcate, angled or subterete, dark-red to brownish or yellowish; internodes up to 2.5 cm long; spine 1-3-fid, 0.6-1.5 cm long. Leaves 15-35 x 6-20 mm, oblong-obovate, apex rounded or mucronate, narrowed below, entire or 2-8 spinose at margins, veins raised on the lower surface; petiole ca 1 mm long. Inflorescence umbellate to subumbellate, 3-10-fl'd; peduncle 5-10 mm long, sulcate. Flowers 1 cm in diam; pedicels upto 15 mm long, stout; outer sepals 2.75 x 1.75 mm, ovate; inner sepals 5 x 3 mm, obovate. Petals 5-6 x 3.5-4 mm, obovate, somewhat clawed; glands submarginal. Stamens 4 mm long, truncate.

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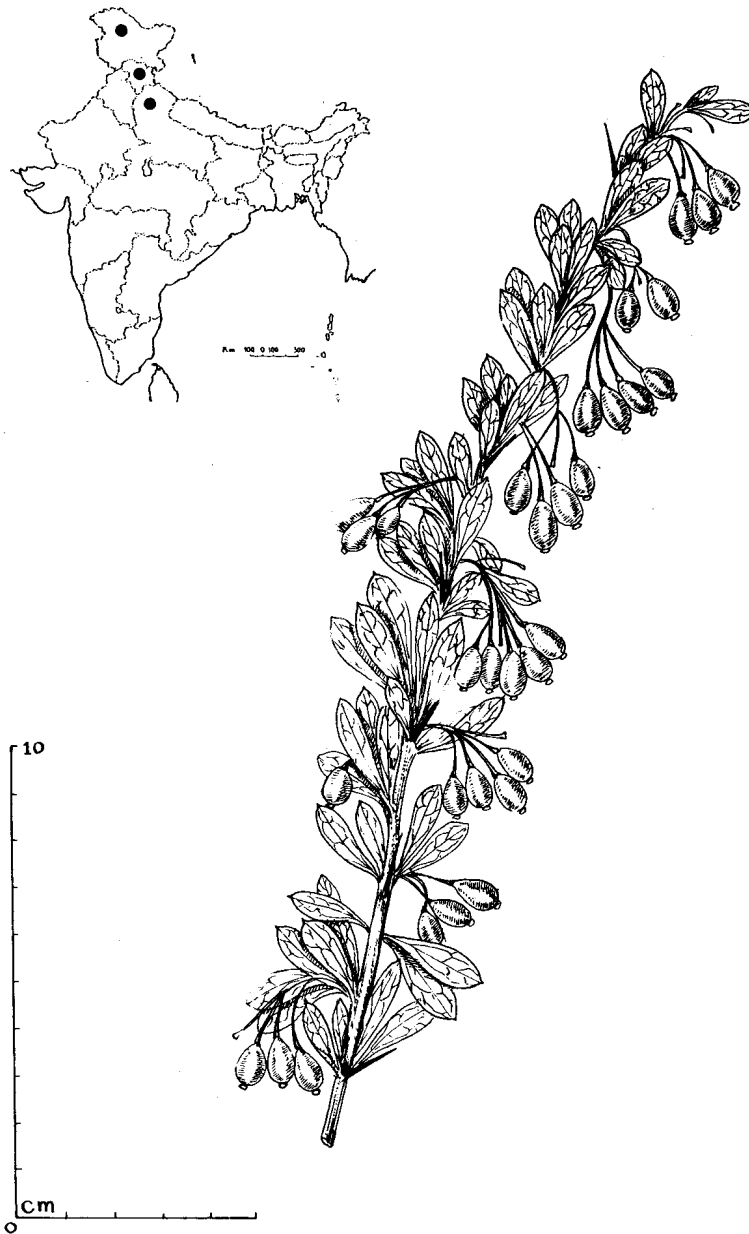


Fig. 9. *Berberis pseudumbellata* Parker

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Ovules 2-3. Berries 9-10 x 6-9 mm, obovoid to somewhat ovoid, black or purple, pruinose, estylose.

Notes: Jafri (1975) recognises 2 subspecies as below:

Key to the subspecies

1. Inflorescence umbellate to subumbellate, 3-7-fl'd, simple; berries conspicuously pruinose **B. pseudumbellata** subsp. **pseudumbellata**
1. Inflorescence racemose-subumbellate, 10-15-fl'd, simple to paniced below; berries scarcely pruinose **B. pseudumbellata** subsp. **gilgitica**

B. pseudumbellata subsp. **pseudumbellata**

Type: India: Himachal Pradesh, Chamba, Ravi valley, Ulansa, 7300 ft, 17.7.1920, *Parker s.n.* (?)

Fl. & Fr.: May - Oct.

Distribution: INDIA: Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh; PAKISTAN.

Ecology: In Cedrus forest; 2100-3000 m.

Specimens examined: Himachal Pradesh: Lahul & Spiti, Thiro, 2600 m, 17 Aug. 1971, *U.C. Bhattacharyya 45359* (BSD); Manali, 2400 m, 15.7.1992, *U.C. Bhattacharyya 48529* (BSD). Uttar Pradesh: Chamoli Dist., Malari, ca 3000 m, 31 Aug. 1975, *B.D. Naithani 55931* (BSD); Uttarkashi, way to Nelang, 3000 m, July 1988, *B. D. Naithani 66492* (BSD)

B. pseudumbellata subsp. **gilgitica** Jafri in Nasir & Ali, *Fl. W. Pakistan* 87: 26.f. 8, A. 1975; Rao & Kumar in Sharma *et al.*, *Fl. India* 1: 377. 1993.

Type: Gilgit Dist: Naltar, hills of sandy loam, ca. 10000 ft., 16.7.1974. *A. Ghaffoor 815* (holo - KUH).

Fl. & Fr.: May - Aug.

Distribution: INDIA: Jammu & Kashmir (Endemic)- Gilgit region.

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54. *Berberis royleana* Ahrendt, J. Asiat. Soc. Bengal (Sci.)11: 5. 1945, et in J. Linn. Soc. Bot. 57: 227. 1961; Chatterjee, Rec. Bot. Surv. India 16(2): 31. 1953; Jafri in Nasir & Ali, Fl. W. Pakistan 87: 27. f. 8, D. 1975; Rao & Kumar in Sharma *et al.*, Fl. India 1: 377. 1993. (Fig. 10)

Type: Kashmir: Srinagar, Takht-i-Sulaiman, 5000-8000 ft, 7 May 1892, *Duthie 10816* (K, DD).

Shrubs 2-3 m tall; stems glabrous, red-brown, sulcate; internodes ca 2 mm long; spines 1-1.5 cm long, stout, 1-3-fid. Leaves 0.7-2 x 0.6-1 cm, broadly obovate or oblong-obovate, rounded at apex, base attenuate, entire, grey pruinose below, subsessile; petiole 1-2 mm long. Inflorescence fascicled or subumbellate - subfascicled, 3-8-fl. Pedicels 5-10 mm long, stout. Berries 8-10 x 3.5-5 mm, blue or black, pruinose grey, oblong, estylose.

Fl. & Fr. May - Aug.

Distribution: INDIA: Jammu & Kashmir; PAKISTAN.

Ecology: 1500-2400 m.

55. *Berberis ulicina* Hook.f. et Thoms., Fl. Ind. 227. 1855, et in Fl. Brit. India 1:111. 1872; Chatterjee, Rec. Bot. Surv. India 16(2): 33. 1953; Ahrendt in J. Linn. Soc. Bot. 57: 228. f. 55. 1961; Jafri in Nasir & Ali, Fl. W. Pakistan 87: 16. f. 7, D.1975. Rao & Kumar in Sharma *et al.*, Fl. India 1: 391. 1993. (Fig. 11).

Type: W. Tibet: adjacent to Nubra, 14,000-16,000 ft., dry rocks, 1849, *Hooker s.n.* (holo - K).

Small shrubs 1-3 m tall; stem glabrous, densely spiny, much branched, reddish-brown; internodes 5-10 mm long; spines 3-fid, 1-2.2 cm long, central spine slightly longer than the laterals. Leaves 5-15 x 2-4 mm, linear-lanceolate or very narrowly oblanceolate, apex mucronate or ending into a spine, base attenuate, green to subglaucous; margins 1-2 spinose; spines 0.5 - 1.25 mm long. Inflorescence fascicled or fascicled-subumbellate, 3-6 fld. Flowers orange-yellow, 5 mm in diam.; pedicels 2-5 mm long; outer sepals 3.5 x 1.25 mm; inner sepals 4.5-5 x 2.5-3 mm; petals 4-5 x 2-3 mm, emarginate. Stamens truncate; anthers 1-5 mm long; filaments 1.5 mm long. Ovules 3-5. Berries epruinose, globose or suborbicular, 4-6 mm long, blackish, estylose.

Fl. & Fr.: June - Sept.

Distribution: INDIA: Jammu & Kashmir (Ladakh); TIBET

Ecology: Alpine Himalayas; 4200 - 5514 m.

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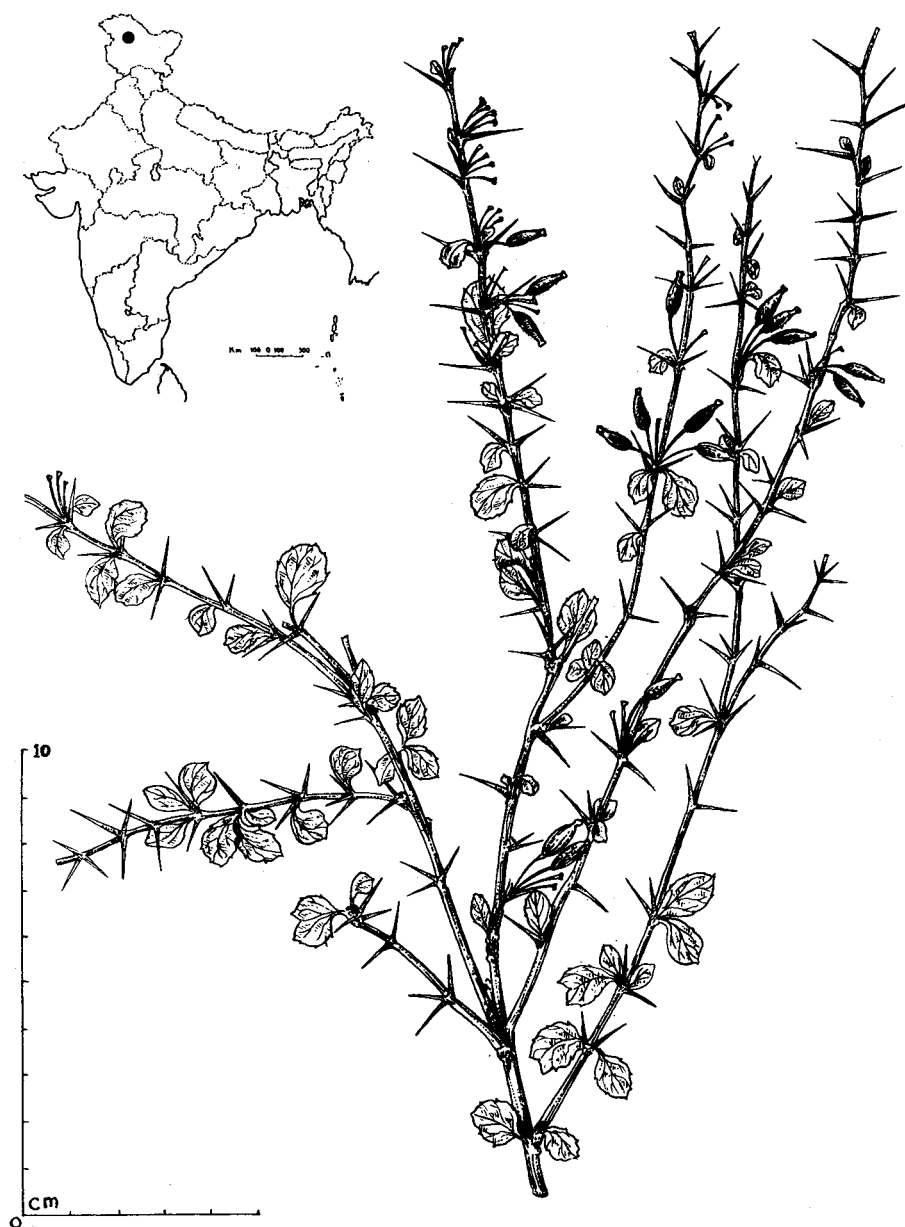


Fig. 10. *Berberis royleana* Ahrendt

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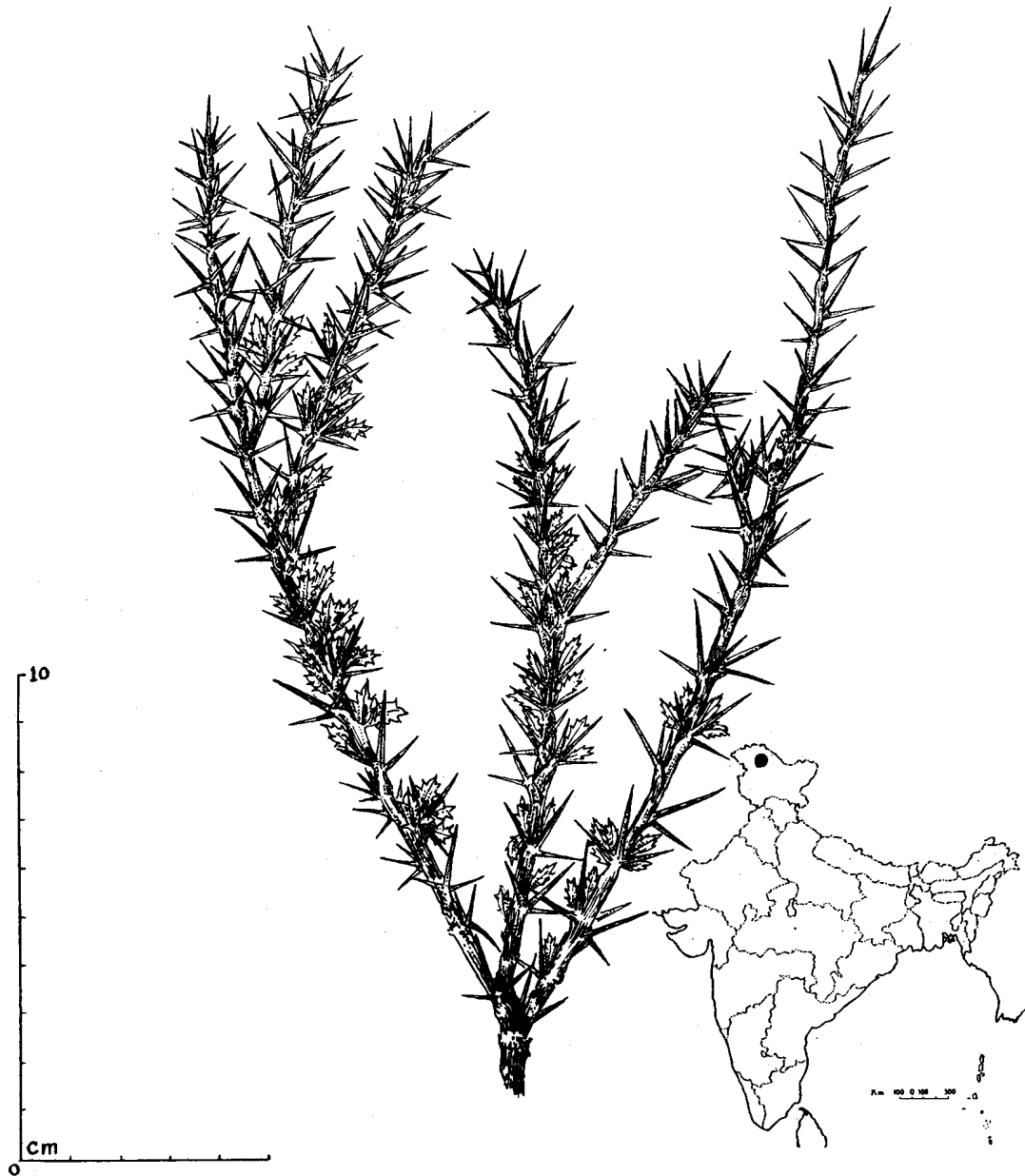


Fig. 11. *Berberis ulicina* Hook. f. & Thoms.

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Specimens examined : Jammu & Kashmir: Ladakh, Pulu North, 4350-5514 m, 14.8.1975, B.M. Wadhwa 59924 (LWG, BSD): Shylok, 4200 m, 29.8.1975, M.V. Vishwanathan 55054 (BSD).

Notes: In Ladakh locally known as 'Kerapa', the plants are used for preparing eye drops.

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