

Rediscovery of two endemic species of *Berberis* from Uttarakhand, Western Himalaya, India

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Abstract: Two endemic *Berberis* species (Berberidaceae) viz., *Berberis ahrendtii* R. R. Rao and Uniyal and *Berberis lambertii* Parker, are first time rediscovered after ca. 100 years since their type localities were found. These species are recorded from the Chamoli and Pithoragarh districts of Uttarakhand, India. Taxonomic description, synonyms, distribution information, locality details of specimens examined and photographs are provided for each species.

Key words: *Berberis ahrendtii*, *Berberis lambertii*, Berberidaceae, endemic, Uttarakhand

1. Introduction

The family Berberidaceae, established by A. L. Jussieu de (1879), is distributed both in Old and in New World and represented by ca. 12 genera including about 600 species, of which as many as 500 species belong to *Berberis* L (Ahrendt 1945, 1961). In India, the family is represented by 3 genera and 68 species. Largest among them is the genus *Berberis* which has 55 species. Majority (>95%) of them are distributed in the Himalayan region. Only five species (viz., *B. asiatica*, *B. tinctoria*, *B. wightiana*, *B. nilegrica* and *B. hainesii*) are found away from the Himalayan region i.e., Nilgiri hills, Chhota Nagpur Plateau and Pachmarhi hills of Madhya Pradesh (Rao & Hajra 1993; Rao *et al.* 1998a, 1998b).

Endemism refers to the restricted distribution of a species in a particular biogeographical province or on a single island or mountain top or even a single rock outcrop (Huston 1994). The Western Himalaya is one of the three major geomorphological divisions considered as mega centres of endemic plants, with Garhwal-Kumaon Himalaya recognized as one of the twenty-five micro-centers for endemic plants (Nayar 1996). About 5725 species of flowering plants endemic to India represent 147 genera and 47 families (Nayar 1996). Among the endemic species, ca. 3471 are found in Himalaya and 84 species are endemic to the Uttarakhand state (Rao

& Hajra 1993; Uniyal *et al.* 2007). The endemism in the flora of country or geographical region provides an important insight into the biogeography of that region, the centres of diversity, and adaptive evolution of the floristic components of that region. About 22 taxa of *Berberis* are endemic to India (Rao & Hajra 1993; Rao *et al.* 1998a, 1998b), from that number, 18 taxa are endemic to the Himalayan region and 11 taxa are endemic to the western Himalaya (Rao & Hajra 1993; Rao *et al.* 1998a, 1998b). The geographical position, physiography and geological history of Uttarakhand state have together contributed to the considerably higher number of endemic *Berberis* species in the relatively young mountain system. The genus *Berberis* has maximum representation of endemic species in this state as compared to other Indian states.

2. Taxonomic treatments

1. *Berberis ahrendtii* R. R. Rao and Uniyal in Indian J. For. 8(4): 334. 1985; Uniyal and Rao in Sharma *et al.*, Fl. India 1: 369. 1993. *Type:* Cultivated: Fl. June, 1939; Fr. 27 Sept., 1939 (Type - BM) (Figs. 1-2). *Synonym:* *B. lycioides* Stapf in Bot. Mag. 151, 1902. 1926; Ahrendt in J. Linn. Soc. Bot. 57: 89. 1961, non Lowe, nec Linden and Planch, 1883. *Morphological description:* shrubs up to 3.5 m tall; stems pale yellow, glabrous, terete; internodes 3-5 cm

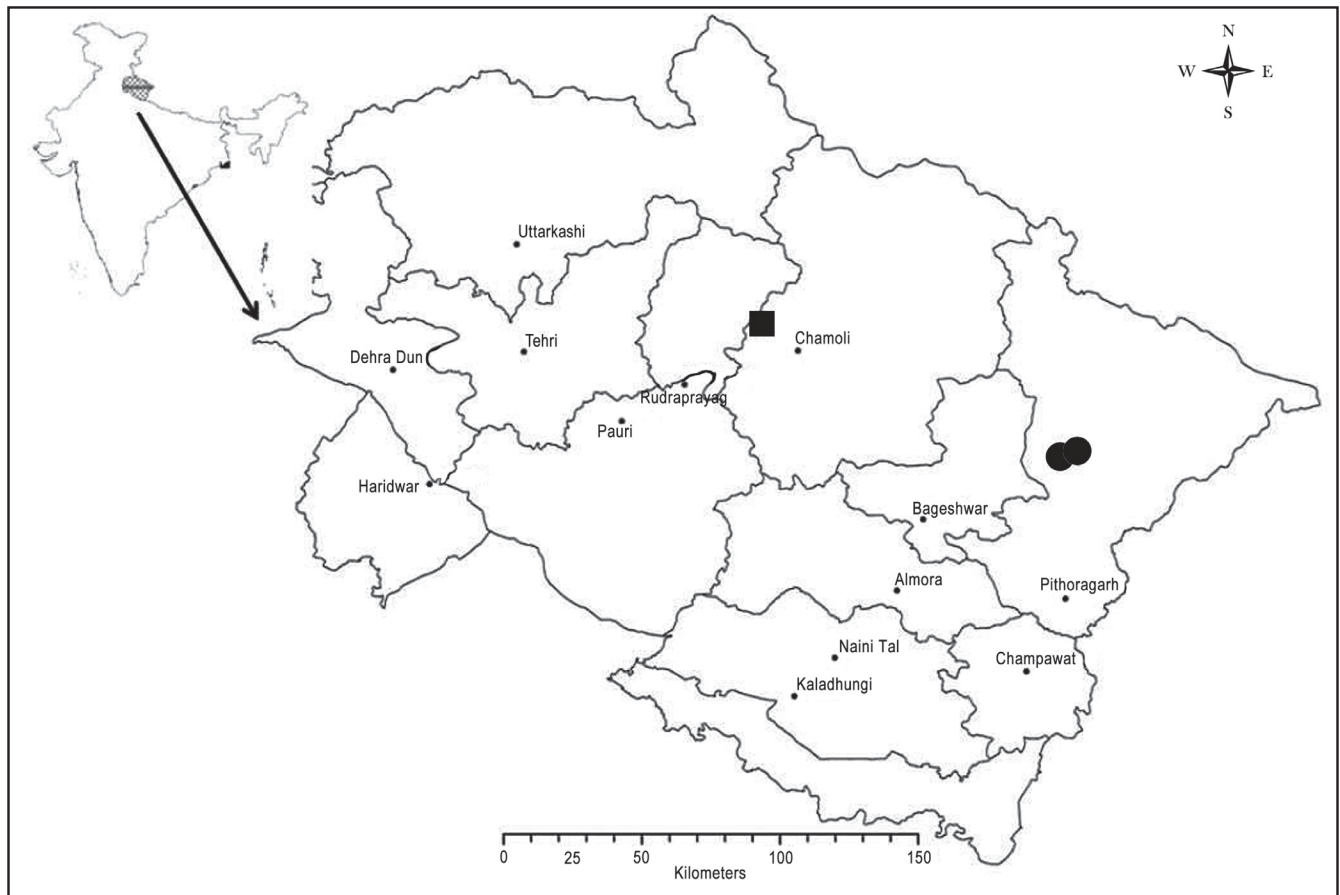


Fig. 1. Locations of *Berberis lambertii* (●) and *Berberis ahrendtii* (■) in Uttarakhand

long; spines, 1-2 cm long, solitary. Leaves 1.5-7 x 0.5-1.8 cm, narrowly obovate, apex subacute or mucronate, base attenuate, sessile, entire or slightly spinulose, finely reticulate, epapillose. Inflorescence – racemose, 10-20-flowers, dense, drooping, sometimes compound; peduncles 1-2 cm long; flowers 12-14 mm across; pedicels 7-10 mm long. Bracts 2-3 mm long. Prophylls 2, triangular with acute apex, 1.5-2 mm long. Sepals in 3 whorls; outer sepals 2.5 x 1.5 mm, ovate, acute; median ones 5x2.5 mm; inner ones ca 7.5-8 x 4.5-5 mm. Petals 6-5 x 4 mm, obovate-elliptic, entire, shorter than the inner sepals; marginal glands 6.5 x 4 mm. Stamens 6, 5 mm long, apiculate. Berries 11x6 mm, oblong-ovoid, pruinose, grey-white; style 1-1.25 mm long.

Flowering and Fruiting: April-October.

Ecology: Moist places, often along streams in alpine meadows.

Altitude range: 1500-2700 m a.s.l. Critically Endangered (Nayar 1996).

Distribution: Uttarakhand: Chamoli (Endemic).

Specimens examined: Uttarakhand: CAL: Chamoli, Sept. 1864, *Brandis 3275*; WII: Bairangana, Chamoli, 1680 m a.s.l., 10/05/2009, Umeshkumar Tiwari *UKT-988*; Trishula block-I, Pangarbassa,

Chamoli, 2680 m a.s.l., 10/05/2009, Umeshkumar Tiwari *UKT-989*; Trishula block-I, Pangarbassa, Chamoli, 2550 m a.s.l., 06/07/2009, Umeshkumar Tiwari *UKT-1068*.

Notes: A new name for *Berberis lycioides* Stapf. (1926) was proposed as this name is a later homonym of *B. lycioides* Linden and Planch, 1863 (Rao & Uniyal 1985). During the collection of material in the field, we found only two populations of the species in the wild state. The first population near Bairangana village, Chamoli district, contained three individuals and the second, near Pangarbassa on the way to Tungnath in Chamoli district, two individuals. As we found only five individuals of this species and no other populations are known from the other place, this species needs immediate conservation implementation.

2. *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 and Uniyal in Nayar and Sastry, Red Data book of Indian Plants 1: 98. 1987; Gupta in Sharma *et al.*, Fl. India 1:364. 1993. Type: Kumaon: Humidhura,

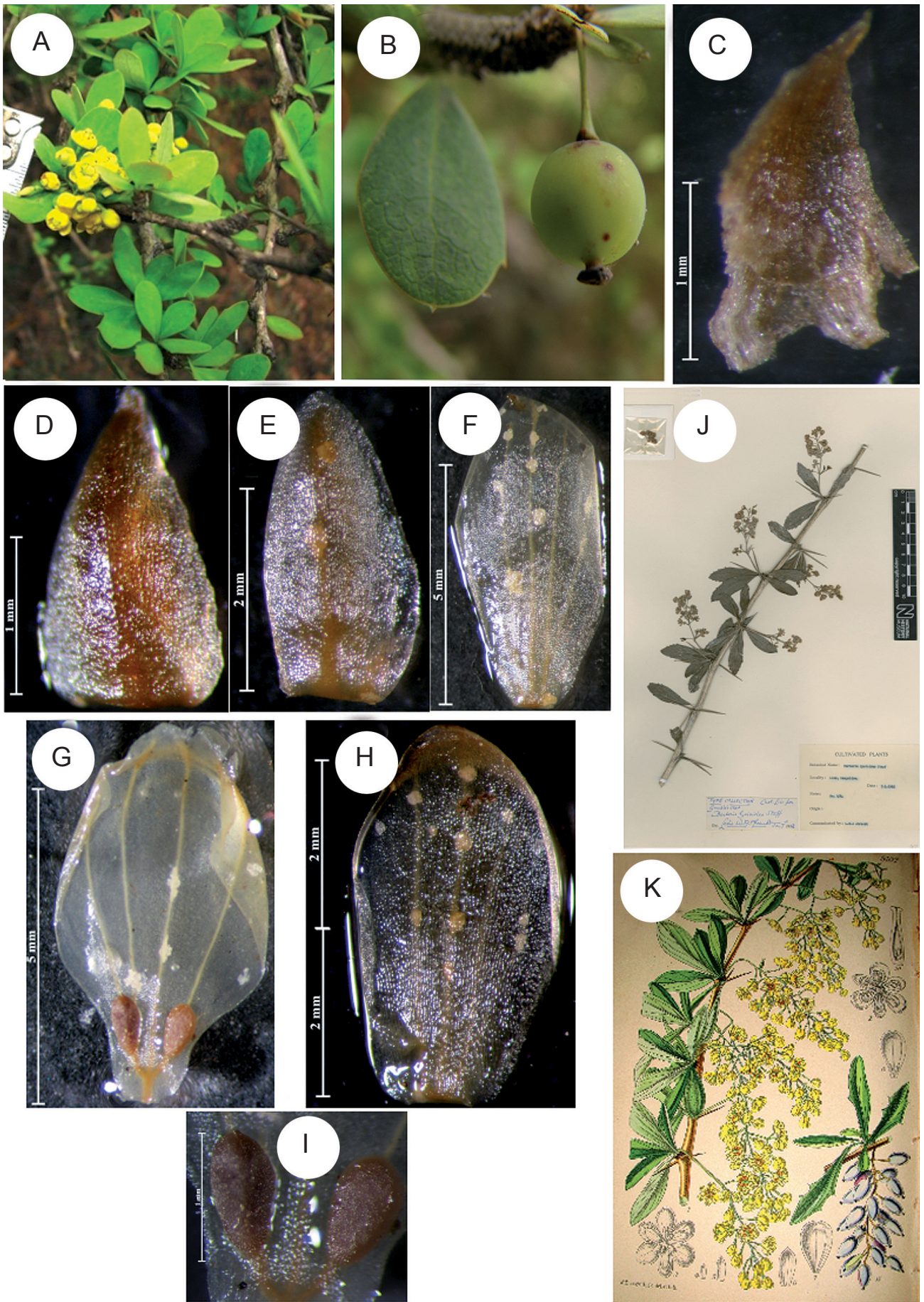


Fig. 2. *Berberis ahrendtii* (UKT-1068)

Explanations: A – plant with inflorescence, B – fruit, C – bract, D – prophylls, E – outer sepal, F – middle sepal, G – petal, H – inner petal, I – glands on a petal, J – type – BM, K – type illustration by Stapf (1926)

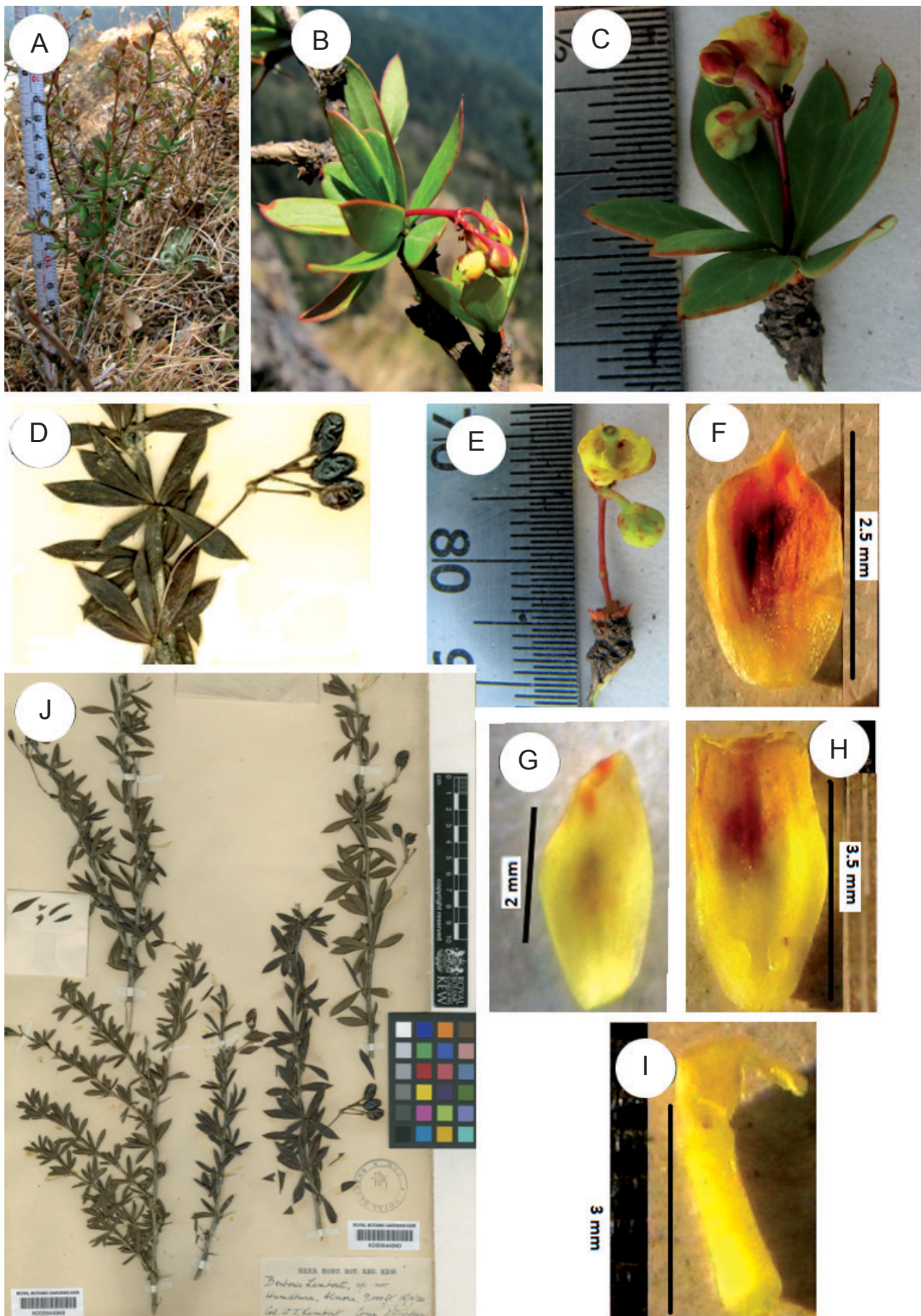


Fig. 3. *Berberis lambertii* (UKT-2112)

Explanations: A – habit, B-C – plant with inflorescence, D – fruit, E – inflorescence, F – outer sepal, G – inner sepal, H – petal with glands, I – stamen, J – type specimen of *Berberis Lambertii* s.n. (Royal Botanic Gardens, Kew)

Almora, 9000ft *W.J. Lambert s.n. 18.10.1920* (K) (Figs. 1, 3).

Morphological description: Small shrubs, up to 1 m tall; stems glabrous, angled and finely sulcate, pale yellow; internodes up to 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, upper surface dark green with a few lateral veins, lower surface much paler, whitish. Inflorescence pseudumbellate-subracemose, 4-7-flid. 2.5-5.5 cm long; pedicels 5-10 mm long in fruits, glabrous, bracts 1.5-2 mm. Sepals in 2 whorls; outer sepals, 2-3 mm, ovate with acute apex, reddish ting; inner sepal ca 3-3.5 x 1.5-2 mm. Petals 3.5-4 x 2-2.5 mm, obovate-elliptic, entire, longer than the inner sepals; glands 0.6 x 0.1 mm. Stamens 2.5-3 mm long, apiculate. Ovules 3-6. Berries 1-1.2 x 0.5-0.7 cm, red, ovoid, oblong, estylose.

Flowering and Fruiting: August-October.

Ecology: Moist places, often along streams in alpine meadows.

Altitude range: 1500-2800 m. Critically Endangered.

Distribution: INDIA: Uttarakhand (N.W. Himalaya): Pithoragarh: On the way to Humidhura and Kalamuni (Endemic).

Specimens examined: Uttarakhand: DD: Humidhura, Almora, 9000ft, 20.10.1920, *W.J. Lambert 22394*; WII: Humidhura, Pithoragarh, 2802 m a.s.l., 11/4/2010, Umeshkumar Tiwari *UKT-2035*; Kalamuni, Pithoragarh, 2788 m a.s.l., 11/4/2010, Umeshkumar Tiwari

UKT-2044; Humidhura, Pithoragarh, 2840 m a.s.l., 12/07/2010, Umeshkumar Tiwari *UKT-2111*; Kalamuni, Pithoragarh, 2780 m a.s.l., 12/07/2010, Umeshkumar Tiwari *UKT-2112*.

Notes: In vegetative phases, this species resembles *B. osmastonii* Dunn, but its leaves are rather larger, not so rigid or so white beneath, but are densely papillose on the lower surface (Parker 1921). This species is listed in the Red Data Book of Indian Plants (Nayar & Sastri 1987) as Vulnerable or Endangered (Nayar 1996). Ahrendt had mentioned the locality of this species "between Humidhura and Ratapani" (Ahrendt 1961). We recorded two localities of the species in the State, the first near Betulidhar, closer to Humidhura (Pithoragarh, Uttarakhand), where 32 individuals were observed and the second locality near the Kalamuni top (Pithoragarh, Uttarakhand) with 71 individuals. In this paper, for the first time, the species has been described in detail, along with its floral characters, as the other literature positions do not include floral characteristics.

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