

Circumscription of *Diplarche multiflora* J.D. Hooker & T. Thomson and *D. pauciflora* J.D. Hooker & T. Thomson (Ericaceae) with notes on the rediscovery from India

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Abstract

Diplarche multiflora J.D. Hooker & T. Thomson and *D. pauciflora* J.D. Hooker & T. Thomson of Ericaceae are recircumscribed. The morphological variations, both vegetative as well as reproductive, is discussed. Based on the critical observation conspecific nature of both the taxa is established. The specific status of *D. multiflora* is retained, whereas, *D. pauciflora* is reduced to a synonym of the former. Notes on rediscovery, habitat, IUCN threat status, etc. are provided.

Key words: *Diplarche multiflora* J.D. Hooker & Thomas Thomson; *D. pauciflora* J.D. Hooker & Thomas Thomson; Ericaceae, circumscription, conspecific, rediscovery, India.

INTRODUCTION

Hooker and Thomson (1854) described *Diplarche* J.D. Hooker & T. Thomson as 'very remarkable' East Himalayan genus referring to 'the two series of stamens, which is its most remarkable character' in Ericaceae. However, Airy Shaw (1964) stated that 'What is more remarkable is that in spite of this character they assigned the genus to the Ericaceae' and advocated its inclusion under Diapensiaceae with the establishment of a separate tribe *Diplarcheae* (Klotzsch) Airy Shaw based on the concept of Klotzsch (in Monatsber. Deutsch. Akad. 1857: 16.1857, as Diplarchaceae Klotzsch).

The genus *Diplarche* Hooker f. & Thomson of Ericaceae is with two species, viz. *D. multiflora* Hooker f. & Thomson and *D. pauciflora* Hooker f. & Thomson since its first description. The genus is very restricted in distribution and known to occur in India, Nepal, Bhutan, China and Myanmar. Notably, later species has much narrower range of occurrence and found in few states/provinces of India, Bhutan and China (TAR). In India, *D. multiflora* is distributed in Sikkim and Arunachal Pradesh, where as *D. pauciflora* occurs only in Sikkim. The type localities are the interior valleys of Lachen and Kanko La for *D. multiflora* and *D. pauciflora* respectively. In Indian region the last collection record of *D. multiflora* was by G.H. Cave in 1924 from Sikkim and Kingdon-Ward in 1950 from Arunachal Pradesh and *D. pauciflora* by Smith and Cave in 1909 from Sikkim only. After that no collection record is seen in the country and thus the occurrence of both the taxa in India becomes doubtful.

On a visit to North Sikkim in the sense of the study of floristic composition of the region, the authors came across few small populations of the genus in high mountain regions of upper Thangu valley. The populations were observed in three successive years, 2013 – 2015. Specimens were identified critically with the help of relevant literature (Hooker & Thomson 1854; Clarke 1882; Rae 1991; Hanbi & Chamberlain 2005). This rediscovery after around a century confirms the existence of the genus in India.

On examination of its specimens, in the field, laboratory and herbaria, a great variability of characters were noticed. Notably, from this search it is evident that a good number of intermediates occur in between two species for many morphological characters, conventionally used as diagnostic features to separate both species by all previous authors (Hooker & Thomson 1854; Clarke 1882; Airy Shaw 1964; Rae 1991; Kron *et al.* 2002; Hanbi & Chamberlain 2005; Panda & Sanjappa 2014) and thus challenged on their specific status. Even, the most important diagnostic feature, i.e. the nature of the attachment of lower series of stamens is also variable in *D. multiflora*. This remarkable finding advocated recognizing a single species in the genus *Diplarche*.

MATERIALS AND METHODS

Specimens were collected from the upper Thangu valley of North Sikkim, India and were deposited at CUH. Flowers were dissected for detailed characterization and illustration. Specimens at CAL & Lloyd Botanic Garden, Darjeeling were also examined critically for proper circumscription of both the species. All relevant literatures were consulted. Study of pollen grains was carried out through LM as well as SEM. High-resolution images of type specimens of both the names *D. multiflora* and *D. pauciflora* were also examined.

OBSERVATION

At the time of establishment of the genus Hooker and Thomson (1854) stated that “We have named this very remarkable genus *Diplarche* in allusion to the two series of stamens, which is its most remarkable character”. Other notable characters of the genus, stated by them, are the plant habit and longitudinal dehiscence of anthers. In this context they established two species, principally based on the differences in the nature of the attachment of the stamens: inner series attached to the corolla well above the base and inner series is free from the corolla for *D. multiflora* and *D. pauciflora* respectively. Outer staminal series is epipetalous in both the species and inserted near to the throat of the corolla. The other diagnostic characters used in recognizing these two species are: the size of leaves (6 – 6.5 mm vs. 3 – 4 mm), number of flowers (more, 8 – 30 vs. less, 2 – 6), nature of indumentums (glandular hairy vs. nearly glabrous) and the shape of calyx lobes (linear oblong vs. ovate-oblong). It is important to note that in both the species vegetative twigs are perfectly glabrous and glandular hairs as well as non glandular hairs appear after the commencement of flowers. However, the names literally derived from the number of flowers they have: more number of flowers referred to the former and less number of flowers indicates the latter species. Moreover, *D. pauciflora* is a small-sized plant than *D. multiflora* which generally shows robust, tall growth habit. All literature dealt with these species are well agreed with the protologue and treated both the taxa as good species, without mentioning any variability in their circumscription (Hooker & Thomson 1854; Clarke 1882; Airy Shaw 1964; Rae 1991; Kron *et al.* 2002; Hanbi & Chamberlain 2005).

Panda and Sanjappa (2014) in a recent revision of the genus in India recognized both the species without showing any variation in morphological characters. It is evident that they



Fig. 1. *Diplarche multiflora* Hooker f. & Thomson: A. Habitat; B – D. Habit forms: B. Robust; C. Medium; D. Small; E. Inflorescence; F. Infructescence; G – K. Transition of growth forms, very small to large and robust. [Scale bar 1 cm]

essentially followed Hooker and Thomson's (1854) treatment in recognizing both the taxa as good species.

Since the rediscovery of the genus in India, we have visited the populations during 2013 – 2015 to evaluate the morphological variability within the species complex. This rediscovery and examination of the specimens both in the field, herbarium as well as laboratory produced a remarkable result.

We collected good number of specimens, recorded field data and other associated information for further analysis. As stated earlier, two species can well be recognized in field by their habit, being larger and robust with more number of flowers attributed to *D. multiflora* and smaller and dwarf with less number of flowers attributed to *D. pauciflora*. However, we have identified in the field and collected several intermediate specimens in respect to the growth habit, size of the leaves and the number of flowers. These specimens could be either species based on pre-recognized characters. More than 50 flowers were dissected to see the staminal diagnostics to identify them properly. Surprisingly, flowers of most of these three years' collections, irrespective of the growth habit of the plants, smaller, medium and larger-robust, exhibit same androecium characteristics, i.e. outer series though epipetalous, the inner series perfectly free from corolla. The largest plant, which is nearly 20 cm tall with robust habit, observed in the present study with many-flowers, densely glandular inflorescence and 6–8 mm long leaves also have free inner series of stamens. The larger plants with comparatively larger leaves and many flowers are densely glandular hairy in all flowering twigs. Smaller plants are glabrous or with few scattered glandular hairs towards the base of the inflorescence. Notably, the shape of the calyx lobes is often variable even in the same flower. In the larger robust plants the calyx lobes varies from linear-oblong, ovate to broadly elliptic. Number of flowers per inflorescence in both the species is also connected by several intermediates.

Notably, the epipetalous stamens of outer series in many cases, particularly in robust specimens, attached at very different radii and sometimes so up and down that 1 or 2 of those comes near to the base of the corolla (c. 1 mm above base), though retain perfect epipetalous nature. Flowers sometimes show hexamerous condition with six corolla as well as calyx lobes (often heteromorphic). In one flower, probably due to teretological effect, two stamens are attached in one group: one as fertile and the other as staminode, one from each series. Moreover, the bundle is free from corolla (in this case outer stamen is also free!). More importantly, if we suppress the staminal attachment nature and the intermediate specimens, the both small and large form can be identified as previously recognized two species. Larger robust specimens are densely glandular hairy mixed with non glandular hairs and many-flowered inflorescence (= *D. multiflora*), in contrast to the dwarf one with glabrous to glabrescent inflorescence twigs and few-flowered inflorescence (= *D. pauciflora*).

This observation prompted us to examine the specimens housed at CAL. In this repository we got opportunity to examine a good number of specimens, collected not only

Legend for Fig. 2 [remaining part]:

H. Split corolla with two series of stamens (note lower series perfectly free); **I.** Capsule partly enclosed by calyx; **J.** T.S. of ovary; **K–P:** Dwarf form (= *D. pauciflora sensu* Hooker f. & Thomson): **K.** Habit; **L.** Lower stem; **M.** Upper stem (note, glandular and eglandular hairs); **N.** Reproductive leaf; **O.** Gynoecium with calyx (note, obovate calyx lobes); **P.** Split corolla with two series of stamens (note, lower series perfectly free); **Q–R:** Hexamerous corolla from robust plants (= *D. multiflora sensu* Hooker f. & Thomson): **Q.** Adhesion of stamens (marked with arrow); **R.** Stamens of upper series attached at very different radii (marked with arrow), lower stamens perfectly free; **S.** Stamens of both series perfectly epipetalous (typical of *D. multiflora sensu* Hooker f. & Thomson)

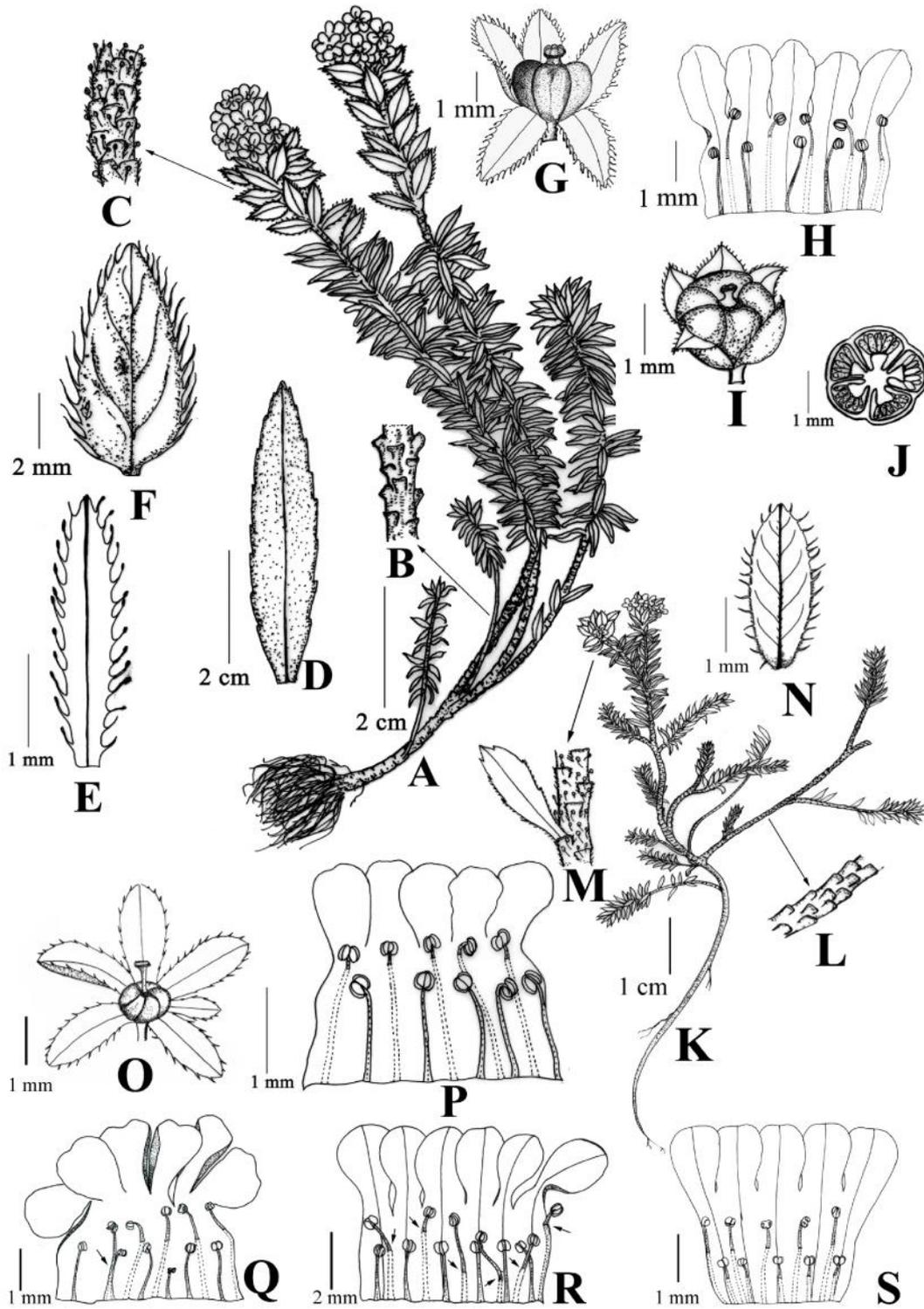


Fig. 2. *Diplarche multiflora*: A – J. Robust form (= *D. multiflora* sensu Hooker f. & Thomson): A. Habit; B. Lower stem; C. Upper stem; D – E. Vegetative leaves: D. Lower; E. Middle; F. Upper reproductive leaf; G. Gynoecium with calyx (note, elliptic-ovate calyx lobes); [continued in P-498]

from India but also from neighbouring countries, Bhutan and China (TAR). All specimens were identified as either of the species. Moreover, we could able to examine two plates, one from each species (*Smith & Cave* 1363 for *D. pauciflora* and *Gammie* 554 for *D. multiflora*), with dissected floral parts. In these plates, typical androecium features present for both the species as stated by Hooker and Thomson (1854).

However, specimens of *D. multiflora* from SE Tibet, viz. *G. Forrest* 18923, acc. no. 268002 (with three plants) and *Ludlow, Sherriff & Elliot* 15409 (with four plants) show very small leaves, hardly exceeding 3 mm in length. *Ludlow, Sherriff & Elliot* 13973 of the same species shows both linear-oblong as well as elliptic calyx lobes. Specimens from Bhutan, *Ludlow, Sherriff & Hicks* 20368 and from Sikkim, *Smith & Cave* 1272, acc. no. 267990 possess almost glabrous inflorescence twig except few glandular hairs towards the base of the inflorescence. It is also important to note that the vegetative branches are always glabrous in both the species. The present study confirms that the dwarf plants shows glabrous habit and robust, tall plants achieve glandular hairy nature. Both the forms are interconnected with moderate-sized plants with glabrescent habit. Or it may be explained *vice-versa*. In this way both the species are connected in almost all morphological characters through several intermediates. There is no correlation of diagnostic characters (e.g. robust, tall, large-leaved, glandular hairy specimens with linear-oblong to broadly elliptic calyx lobes also have free inner stamens), provided by Hooker and Thomson (1854) and later on by others. The tendency is, when the plant size are gradually increased, the leaf size also response in a positive way and becomes larger. Side by side the degree of hairiness, both glandular and eglandular, increased and ultimately reaches to dense nature in robust, tall plants. The fact may also be explained reversibly.

Capsules are often described in the literature as either pubescent or glandular hairy in both the taxa (*Hanbi & Chamberlain* 2005). However, present collections show perfectly glabrous capsules in both the forms.

The present study suggests that *Diplarche multiflora* and *D. pauciflora*, which hitherto have been recognized as two species, are conspecific representing a single species. The two species names were proposed validly in the same publication (in Hooker's *J. Bot. Kew Gard. Misc.* 6: 383. 1854) and have equal priority. Therefore, we can choose one name as the accepted name and treat the other name as a synonym. Between these two names, *D. multiflora* seems more widely used. Furthermore, it is emphasized here that *D. multiflora* is the type species of the genus *Diplarche* Hook. f. & Thomson. So we choose *D. multiflora* as the accepted name and treat *D. pauciflora* as a synonym.

Pollen grains are in tetrads, often associated with viscin threads as also found in most of the Ericaceous members. The size of the tetrad is more or less same (35 – 38 µm in diam.) in all the studied specimens. Detail examination of the pollen grains of available specimens reveals that these are heteromorphic in this species complex in regard to the surface ornamentation. Pollen grains from small and dwarf plants show warty exine, though warts are sparse at the peripheral regions. In contrast to this pollen grains from comparatively larger and robust plants have psilate to scabrate exine ornamentation. In some specimens exine is psilate to very faintly scabrate, however, in other specimens the pollen grains are more or less distinctly scabrate to rugulate and ornamentation is more prominent towards the aperture. In LM study pollen grains of all studied specimens appear more or less psilate. However, *Nair & Kothari* (in *Advances in Pollen Spore Research* 13:17.1985) reported areolate exine under LM and rugoid exine under SEM in *D. multiflora*. The heteromorphic nature of pollen grains is not uncommon and often found in many angiosperm species or species complexes, even in the family Ericaceae (*Rosatti* 1988; *Reunova et al.* 2007).

Amplified diagnosis of *Diplarche multiflora* Hook. f. & Thomson with illustrations as well as field photographs are provided in favour of proper circumscription of the species.

TAXONOMIC TREATMENT:

DIPLARCHE J.D. Hooker & Thomson in Hooker's J. Bot. Kew Gard. Misc. 6: 382. 1854; Hooker *f.* in Bentham & Hooker *f.*, Gen. Pl. 2: 597. 1876; C.B. Clarke in Hooker *f.*, Fl. Brit. India 3: 462. 1882; Drude in Engler & Prantl, Nat. Pflanzenfam. 4(1): 39. 1889; Watson, J. Linn. Soc. London (Bot.) 59: 123. 1964; Stevens, Bot. J. Linn. Soc. 64(1): 28. 1971; Rae in Grierson & Long, Fl. Bhutan 2(1): 351. 1991; Anderb., Pl. Syst. Evol. 184: 224. 1993; Stevens in Kuzbitzki, Fam. Gen. Vas. Pl. 6: 170. 2004; Hanbi & Chamberlain in Wu *et al.*, Fl. China 14: 258. 2005; Panda & Sanjappa in Sanjappa & Sastri, Fasc. Fl. India 25: 4. 2014.

Type: *D. multiflora* Hooker *f.* & Thomson

Diplarche multiflora Hooker *f.* & Thomson in Hooker's J. Bot. Kew Gard. Misc. 6: 383, t.11 A. 1854; C.B. Clarke in Hooker *f.*, Fl. Brit. India 3: 462. 1882; Smith & Cave in Rec. Bot. Surv. India 4 (5): 215. 1911; Handel-Mazzetti, Symb. Sin. 7: 786. 1936; Merrill, Brittonia 4(1): 149. 1941. Hara in Hara *et al.*, Enum. Fl. Pl. Nepal 3: 55. 1982; Press in Press *et al.*, Ann. Checkl. Fl. Pl. Nepal 101. 2000; Rae in Grierson & Long, Fl. Bhutan 2(1): 351. 1991; Hanbi & Chamberlain in Wu *et al.*, Fl. China 14: 258. 2005; Panda & Sanjappa in Sanjappa & Sastri, Fasc. Fl. India 25: 5. 2014.

Type: India, Sikkim, Lachen, 10000 -12000 ft, 09.06.1849, *J.D. Hooker, s.n.*, K, barcode K000780191, photo vidi; *Isotypes:* P, barcode P00710240, photo vidi; K, barcode K000780192, photo vidi; GH, barcode GH00057347, photo vidi (type?).

Diplarche pauciflora J. D. Hooker & Thomson, Hooker's J. Bot. Kew Gard. Misc. 6: 383. 1854; C.B. Clarke in Hooker *f.*, Fl. Brit. India 462. 1882; Smith & Cave in Rec. Bot. Surv. India 4 (5): 215. 1911; Rae in Grierson & Long, Fl. Bhutan 2(1): 352. 1991; Hanbi & Chamberlain in Wu & Hong, Fl. China 14: 258. 2005; Panda & Sanjappa in Sanjappa & Sastri, Fasc. Fl. India 25: 7. 2014. **syn. nov.**

Type: India, Sikkim, Konko La, 15000 ft (4500 m), 21.8.1849, *J.D. Hooker, s.n.* (K, barcode K000780190, photo vidi); *isotypes:* M, barcode M0173346, photo vidi; P, barcode P000710241, photo vidi; GH, barcode GH00014863, photo vidi; E, barcode E00273805, photo vidi).

Rhododendron chamberlainii Craven in Blumea 56(1): 34. 2011, **syn. nov.** *Rhododendron sophistarum* Craven in Blumea 56(1):35.2011, **syn. nov.** [Fig.1,2&3].

Prostrate to ascending or decumbent, profusely branched woody shrub, to 20 cm tall; stem 0.7 – 2 mm diam.; branches ashy gray or brown with prominent leaf scars, glabrous or sparsely glandular hairy, mixed with non-glandular hispidulous hairs; leaves throughout young stem, aggregated towards apex in older branches, sessile or subsessile; lamina dimorphic: vegetative: closely imbricated, linear-oblong, linear elliptic, lanceolate or oblanceolate, 1.5 – 8 × 0.5 – 2 mm, serrulate, serrate or ciliate; cilia often spinescent, gland-tipped; often entire towards lower half, subacute or acute, usually gland-tipped, base bluntly cuneate, glabrous, shiny green above, translucent gland-dotted beneath (most visible when dry); mid-vein prominent; reproductive: distantly spaced, ovate, elliptic or oblong, 1.2 – 8.2 × 0.4 – 3.2 mm, serrate; serrations often long ciliate in robust forms, mixed with hispid cilia in lower two third, spinescent without hispid cilia in dwarf forms; mid-vein prominent, densely hispidulous adaxillary towards base; inflorescence subcapitate, 2 – 15 (–30)-flowered, to 1.5 cm, sparsely to densely glandular hairy, mixed with non-glandular hairs; bracts ovate, elliptic or oblong, 1.8 –

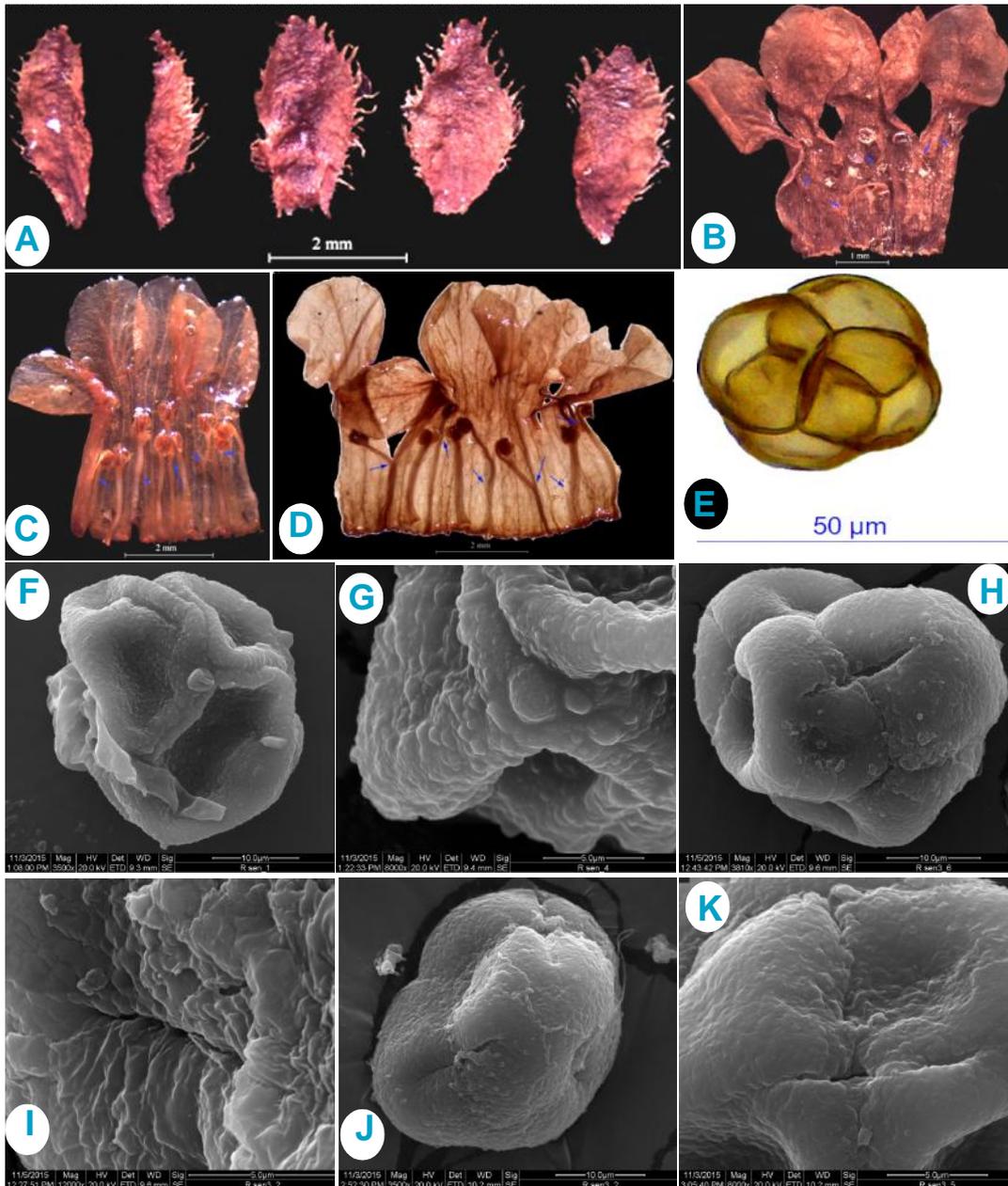


Fig. 3. *Diplarche multiflora*: **A – E.** From robust plant (= *D. iplarche multiflora sensu* Hooker f. & Thomson); **A.** Variable shape of calyx lobes in one flower; **B – D.** Split corolla with outer stamens at different radii (marked with arrows) [note, hexamerous flower in D]; **E.** One pollen tetrad under LM; **F – K.** Pollen grains under SEM: **F – G.** Pollen grains from dwarf plant (= *D. pauciflora sensu* Hooker f. & Thomson); **H – K.** Pollen grains from medium and robust plants (= *D. multiflora sensu* Hooker f. & Thomson); **G, I & K.** Enlarged surface view of **F, H & J** respectively.

6 × 1 – 4 mm, apex acute, margin ciliate; cilia often gland-tipped, base obtuse or cuneate; midvein hispidulous, particularly towards base, otherwise glabrous; bracteoles narrower than bracts; flowers pentamerous, rarely hexamerous, subsessile; calyx lobes elliptic, linear-oblong, ovate or narrowly obovate, 2 – 5 × 0.5 – 1.2 mm, apex bluntly acute or obtuse, margin ciliate; cilia spinescent, often gland-tipped; glabrous; corolla hypocrateriform, rose, pink or light pink (white?), deciduous; tube 1.5 – 4 (– 7) mm; lobes broadly obovate, orbicular or oblong, 1.5 – 3 × 1 – 2 mm, apex rounded, rarely shallowly emarginate, margin often wavy; stamens 10, rarely 12, in two series, diplostemonous; outer series epipetalous, often at very different radii, very rarely one free, attached below middle to apex of corolla tube (near throat), 1.2 – 2.5 mm above corolla base; filaments 0.2 – 1.8 mm long; anthers broadly ellipsoid or rounded, 0.2 – 0.4 × 0.2 – 0.4 mm; inner series epipetalous (always below middle of corolla tube, often towards base) or free; filaments 1–2 mm; anthers subglobose, 0.2 – 0.5 × 0.2 – 0.5 mm; ovary globose, flat-topped at apex, 1 – 2 × 1 – 2.5 mm, deep purple, glabrous; disc inconspicuous; style columnar, 0.4 – 1.1 mm, purple, glabrous; stigma capitate, 0.7 mm diam., 5 – (6 –) lobulate, dark purple; fruiting rachis elongated to 7 cm; capsules globose, flat-topped, 5-lobed, 2 – 3 × 2.5 – 3 mm, septicidal, glabrous, pubescent or glandular-pubescent, partially enclosed within persistent calyx; seeds many, minute, obovate-angular; testa reticulate.

Phenology: *Flowering:* June – August; *fruiting:* July – October.

Habitat: Grows on open alpine pasture, grassy slopes, amongst thickets at 3300 – 4800 m elevation.

Associated plants: The species is commonly grows in association with *Gaultheria trichophylla* Royle, *G. pyroloides* Hooker f. & Thomson ex Miquel, *Cassiope fastigiata* (Wallich) D. Don, *C. selaginoides* Hooker f. & T. Thomson, *Ranunculus* sp., *Bergenia purpurascens* (Hooker f. & T. Thomson) Engler, *Potentilla* sp., *Gentiana tubiflora* (G. Don) Grisebach, *Gentiana infelix* C.B. Clarke, *Rhododendron anthopogon* D. Don, *R. campanulatum* D. Don, *Primula capitata* Hooker, *Diapensia himalaica* Hooker f. & T. Thomson, *Rheum nobile* Hooker f. & T. Thomson, *Bistorta affinis* (D. Don) Greene, *Koenigia nummularifolia* (Meisner) Misîèek & Soják, *Aletris pauciflora* (Klotzsch) Handel-Mazzetti, *Nardostachys grandiflora* DC., *Anaphalis triplinervis* (Sims) Sims ex C.B. Clarke, etc.

Distribution: Himalaya: E. Nepal; India (Sikkim, Arunachal Pradesh); Bhutan (Trongsa district, Upper Kulong Chu district, Chumbi); China (NW Sichuan, NW Yunnan, SE Xizang); Myanmar (Adung Valley).

IUCN threat status & conservation: In India the species is at present known only from three populations, consisting of less than 100 individuals (2015 estimation), discovered in the alpine pasture of north Sikkim. Earlier collection record of the species is in 1950 from Arunachal Pradesh and in 1924 from Sikkim. Except present work no recent collection is recorded from the country. Repeated searches around the population sites in the upper Thangu valley in three successive years (2013 – 2015), and frequent exploration in different places of Sikkim Himalaya since 1999, have failed to locate any other population. This species has not yet been assessed for the IUCN Red List, but is in the Catalogue of Life (<http://www.iucnredlist.org>, version 2015.3; searched on 14.12.2015). Under such a situation it is best to consider the species as Endangered (EN) in India (IUCN 2014). The habitat of the species is popular grazing ground and also highly threatened by severe anthropogenic activities. Therefore, some conservation measures should initiate immediately to save this species in its natural habitat.

DISCUSSION

Phenotypic variability of many species or species complex, particularly from Himalayan region has been elucidated in recent years by different authors (Weberling 1978; Maity & Springate 2005; Maity *et al.* 2005; Maity 2006; Maity *et al.* 2009; Dey *et al.* 2015). Apart from the genetic factors, the microclimatic condition, altitudinal effect, and other edaphic factors are often responsible for morpho-variability within the species. Extreme 'forms', often recognized as distinct taxa, however, the species complex are interconnected by many intermediates. Sometimes, wide distributional range promotes such type of variability within species. Thus proper circumscription of a taxon can be only established through extensive and rigorous research on plant materials from different geographical regions. In case of the genus *Diplarche*, the so called two distinct species are interlinked with many intermediates. Exhaustive study of these specimens reveals total absence of any correlation of characters which are long being used as diagnostic features of its two species. Probably the most important one, i.e. the nature of attachment of two series of stamens, is also variable. There is not a single character which can separate the two taxa and therefore, fail to distinguish them. In this context single species is recognized here and amplified diagnosis is provided.

The taxonomic position of *Diplarche* remains debatable and thus interesting. The androecium feature promotes to include it in the family Diapensiaceae (Airy Shaw 1964; Rae 1991). However, recent molecular studies strongly advocated retention of the genus in Ericaceae (Kron *et al.* 2002; Gillespie & Kron 2010).

In a recent treatment, Craven (2011) stated that "The morphological differences between *Diplarche*, *Menziesia* and *Rhododendron* are not so great that the molecular evidence supporting inclusion of the two first-named genera in *Rhododendron* should be rejected" and transferred *Diplarche* (as well as *Menziesia*) to *Rhododendron* and published *R. chamberlainii* Craven (= *Diplarche multiflora* J.D. Hooker & Thomson) and *R. sophistarum* Craven (= *Diplarche pauciflora* J.D. Hooker & Thomson). However, the two series of stamens along with the epipetalous nature in *Diplarche* is so great morphological difference that it cannot be included under *Rhododendron*. This character is absent in the entire Ericaceae (see, Clarke 1882; Airy Shaw 1964; Long & Rae 1991; Mingyuan *et al.* 2005). Moreover, longitudinal dehiscence of anther rejects its recognition as species of *Rhododendron* where anthers show porous opening to disperse pollens. However, the Diapenceous affinity of the genus had been illustrated by Airy Shaw (1964), Rae (1991) and others. Panda and Sanjappa (2014) preferred to retain the genus in Ericaceae following unique diagnostics. Kron *et al.* (2002) preferred to include *Diplarche* in *Rhodoreae*, however, Gillespie and Kron (2010) advocated to include it under *Empetreae*. But, both these phylogenetic studies maintained the independent generic status of *Diplarche*. In this context Craven's treatment (2011), at least in case of *Diplarche* is surprising. *Rhododendron chamberlainii* Craven and *R. sophistarum* Craven are here considered as synonyms of *Diplarche multiflora*.

We, at present, following Hooker and Thomson (1854), Kron *et al.* (2002), Gillespie and Kron (2010) treat *Diplarche* as an independent, well defined genus and advocate its retention in Ericaceae. Moreover, the pollens are in tetrads in *Diplarche*, associated with prominent viscin threads, a fact that also support its inclusion under Ericaceae. Diapenceous pollens are entirely of different type and not in tetrads (Erdtman 1952).

Specimens examined:

Sikkim, Eumtso La (pass) Sikkim, 14600 ft (4400 m), 20.07.1906, *Cave* 164; Zemu valley, 14000 ft (4200 m), 15.07.1909, *Smith & Cave* 1539, acc. no. 267999; Zemu valley, 14500 ft (4400 m),

13.07.1909, *Smith & Cave* 1363, acc. no. 268000; (all at CAL, identified as *D. pauciflora*). Sikkim, Tankra Mt, 15000 ft (4500m), 04.08.1892, *Gammie* 554 (fl pink), acc. nos. 267996, 267997; Paigu, 12300 ft (3700 m), 17.07.1906, *Cave* 134; Eumtso La, 15000 ft (4500 m), 12.07.1909, *Smith & Cave* 1272, acc. no. 267990 (all at CAL); Lungnak La, North district, 16000 ft (4850 m), 07.10.1924, *Cave, s.n.*, acc. no. 6584 (Lloyd Botanic Garden, Darjeeling); Arunachal Pradesh, on the way to Sadiya from Lohit valley, 1950, *Kingdon-Ward, s.n.*, (ASSAM). Bhutan, Me La, south side, 13000 ft (3900 m), 16.06.1949, *Ludlow, Sherriff & Hicks* 20368 (note: vegetative twigs with only very few glandular hairs otherwise glabrous). Flora of South Eastern Tibet, Chubumu La, Langong, 12500–13500 ft (3800–4100 m); 06.06.1938, *Ludlow, Sherriff & Taylor* 3979, acc. no. 562039; South Eastern Tibet, 1917–1919 exploration of *George Forrest* 18923, acc. no. 268002 (note: leaves small, number of flower much more); Lushu chu, 12500 ft (3800 m), 10.06.1938, *Ludlow, Sherriff & Elliot* 4653; Lisum, Nunkhu Phu chu valley, near Tongyuk, Pome, 11000 ft (3300 m), 26.05.1947, *Ludlow, Sherriff & Elliot* 13772; Deyang La, Kongbo, 12500 ft (3800), 04.06.1947, *Ludlow, Sherriff & Elliot* 15126; Ba La, Pasum Chu, Kongb, 14500 ft (4400 m), 22.06.1947, *Ludlow, Sherriff & Elliot* 13973 (note: calyx lobe linear-oblong to linear-elliptic). Flora of Chumbi & Phari, July 1879, *Dungboo, s.n.*, acc. nos. 267991, 267992, 267993, 267994, 267995; Nambu La, Kongbo, 14500 ft (4400 m), 12.07.1947, *Ludlow, Sherriff & Elliot* 15409 (note: plant is very delicate with very small leaves, numbers of flowers also less) (all at CAL, identified as *D. multiflora*). *Present collections*: Sikkim, Upper Thangu valley, 4200 m, 13.07.2013, *Maity* 20112, 20113; Upper Thangu valley, 4200 m, 15.07.2013, *Maity* 20309; Upper Thangu Valley, 4100 m, 26.07.2014, *Dey & Maity* 21556; Upper Thangu valley, 4200 m, 04.08.2015, *Dey & Maity* 21727, 21728 (very small plants); Upper Thangu valley, 4100 m, 04.08.2015, *Dey & Maity* 21726; Upper Thangu Valley, 4200 m, 05.08.2015, *Dey & Maity*, 21732, 21733 (medium plants); Upper Thangu Valley, 4400 m, 05.08.2015, *Dey & Maity* 21729, 21730 (large-robust plants) (all at CUH).

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