

NAMING COMMON HIMALAYAN *PARAQUILEGIA* J.R.DRUMM. & HUTCH. (RANUNCULACEAE)

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Taxonomic study on the Himalayan species of the genus *Paraquilegia* J.R. Drumm. & Hutch. (Ranunculaceae), followed by literature consultation (Royle, 1833 - 1834; Hooker & Thomson, 1855, 1872; Drummond & Hutchinson, 1920; Ulbrich, 1925; Shipchinskii, 1937; Tamura & Lauener, 1968a, 1968b; Stewart, 1972; Hara, 1979; Lauener, 1980; Grierson, 1984; Polunin & Stainton, 1984; Chowdhery & Wadhwa, 1984; Riedl, 1991; Rechinger, 1992; Rau, 1993; Hajra & Balodi, 1993; Press & al., 2000; Dezhi & Robinson, 2001; Zhu, 2001) revealed that the name *Paraquilegia microphylla* (Royle) J.R.Drumm. & Hutch., currently applied to the most common Himalayan *Paraquilegia* is an erroneous application. True *P. microphylla*, described by Royle (1833) as *Isopyrum microphyllum* Royle based on the collection from Yamnotri and Badrinath (spelled as Budrinath) in the Indian Western Himalaya, is an early flowering (April-May) species showing restricted distribution in the Sino-Indian Himalayan region. This species, as illustrated by Royle (1833) and also in the Flora China, Vol. 6 illustrations (Zhu, 2001), is characterized by slender habit, sparsely branched stem, comparatively longer petioles, much dissected leaf lamina with 3 - 4-ternate divisions showing ternatisect or pinnatisect leaflets [segmentation described by Royle (l.c.) as supra-decompound] with leaflet segments usually not more than 3×1.2 mm, smaller than petals/nectaries and 3-lobed bracts [see here Fig. 1(K-N)]. The most common Himalayan *Paraquilegia* [see here Fig. 1(A-J)] (widely treated as *P. microphylla*), on the other hand, is a comparatively late flowering (June-August) species characterized by stout, densely caespitose habit, much branched, moderately thick (due to persistent, sheathing petiole bases) stems, comparatively smaller petioles, 2-ternate or ternate-ternatisect (sub-2-ternate) leaf lamina with leaflet segments larger than petals/nectaries and simple-entire bracts, hence considerably distinct from the former and merits the status of a new species. The same is described and illustrated here as *Paraquilegia gangotriana*.

***Paraquilegia gangotriana* Pusalkar & D.K.Singh, sp. nov.**

[Fig. 1(A-J)]

P. microphylla sensu J.R.Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 157. 1920, including fig. 2, non *Isopyrum microphyllum* Royle, 1833 - 1834; Polunin & Stainton, Flow. Himalaya: 2, Pl. 2(4). 1984; Rau in Sharma & al., Fl. India 1: 111. 1993, p.p.; Dezhi & Robinson in Zhengyi & al., Flora China 6: 277. 2001, p.p, excluding fig. 237. *I. grandiflorum* sensu Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 23. 1872, p.p., non Fisch. ex DC., 1824.

Paraquilegia gangotriana Pusalkar & D.K.Singh, sp. nov., *Paraquilegiae microphyllae* (Royle) J.R.Drumm. & Hutch. affinis, sed habito confirtim caespitoso; caule ramosissimo; foliis 2-ternatis; foliolis 3-partitis, obovatis, cuneatis; extremo-segmentis foliorum oblongo-obovatis (plus quam 3 mm longis, plus quam 1.5 mm latis); bracteis simplicibus, ellipticis ad oblanceolatis et petalis/nectariis foliolis brevioribus differt.

Typus (here designated): India: Uttarakhand, Tehri Garhwal (presently Uttarkashi district), Phulaldaru in Nila valley, 14000 - 15000 ft., 21.08.1883, J.F. Duthie 746 b (Holotype: DD; Isotypes: 746 a, 746 c, 746 e: DD).

Perennial, densely caespitose herb, forming clumps; stem much branched; branches many, abbreviated or well-developed, erect to ascending, stout, densely covered with indurated or fibrous remains of persistent

petiole bases. Leaves petioled; petiole 1–10 cm long, slender, lower part broadened into thick, persistent sheathing base with thin sub-membranous or scarious margins; leaf lamina green, 2-ternate or ternate-ternatisect (sub-2-ternate), 9-leafleted; leaflets flabellate, rhomboid or obovate-cuneate, 5–13 × 8–15 mm, 3-partite, deeply 3-sect, 3-dentate or 3-lobed; lobes entire or 2–3-lobuled; ultimate lobules linear-oblong, oblong-oblongeolate, oblong-obovate or obovate, 1.0–3.2 × 0.2–1.3 mm, glabrous or glaucous. Scapes few to many on one plant, exceeding foliage, to 18 cm long, usually 1-flowered, rarely 2-flowered (with second flower arising from axis of bract); bracts 2, usually sub-opposite, rarely slightly distant, usually with green, simple, undivided, narrowly lanceolate, oblanceolate, linear, elliptic to subulate lamina, to 8 × 3 mm and abruptly broadened base forming white membranous/scarious sheath; pedicels to 3 cm long, usually curved or nodding, glabrous or glaucous. Flowers blue, lilac, bluish-violet, purple or white, 1.5–4(-4.4) cm across. Sepals 5, rarely 4, petaloid, sub-erect to spreading, imbricate, oblong, broadly elliptic, ovate, oblong-obovate or obovate, rarely sub-orbicular, (5–)10–18(-25) × 4–15(-20) mm, apex sub-acute, obtuse, shortly sub-acuminate, truncate, retuse to rounded. Petals/nectaries 5, pale to deep yellow, oblong, oblong-obovate to obovate-cuneate, 3–5.2 × 1–2.2 mm, smaller than stamens, apex notched or retuse, base narrowed and shallowly impressed forming saccate concavity of nectar sac. Stamens numerous, slightly exceeding petal-nectaries to half the sepals; filaments with broadened base, 3–8 mm long, unequal; anthers yellow, oblong or ovate-oblong, 0.5–1.5 mm long. Carpels 3–7, free; ovary lanceolate to oblong-elliptic, 2.0–3.7 mm long; style 0.6–2.0 mm long, much shorter than ovary; stigmatic part curved, hooked or recurved. Follicles 3–7, sub-sessile to shortly stipitate, lanceoid to ovoid, 5–13 × 3–5 mm, sub-coriaceous, conspicuously margined, surface glabrous, conspicuously veined; base with 0.2–0.5 mm long stipe; stylar beak curved or hooked, 1–3 mm long; seeds many, pale to dark brown, oblong, 1.0–1.7(-2.0) × 0.5–1.0 mm, glabrous, surface wrinkled, with pectinate outgrowth forming pale brown, curled marginal wing, which is broadened at one end and tapering towards the other end.

Fl. & Fr.: June–September.

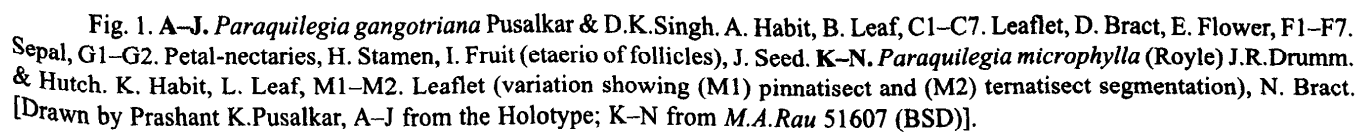
Habitat: Common, on rocks, rocky ledges, rock fissures, crevices in rock-cliffs, on rocky walls, rocky over hangings and amidst boulders between 2800–5400 m altitudes.

Photo: Polunin & Stainton (l.c.).

Conservation Status: Least concerned.

Distribution: Afghanistan, Bhutan, India (Jammu & Kashmir to Sikkim), China, Nepal, Pakistan (?), Central Asia (?), Russia (?).

Specimens Examined (Paratypes): India: Jammu & Kashmir: Sagnum valley, 13000–14000 ft., 27.07.1893, *J.F.Duthie* 13268 (DD); Baltistan, Dras valley, 11000–13000 ft., 29.06.1892, *J.F.Duthie* 11650 (DD); Ghanteara pass, overtopping Sind valley, 13000–14000 ft., 13.08.1893, *J.F.Duthie* 13565 (DD); Alampi La, Astor side, 14000 ft., 25.09.1892, *J.F.Duthie* s.n. (DD); Baltistan, Lanchen Nullah, above Drass, 11000–12000 ft., 25.08.1893, *J.F. Duthie* 13760 (DD); Jhelam valley, Harmukh, 14000 ft., *Keshavanand* 1349 (DD); Jhelam valley, 12000 ft., 07.08.1909, *Keshavanand* 1313 (DD); Jhelam valley, Harmukh, 14000 ft., 09.08.1909, *Keshavanand* 1349 (DD); Western Kashmir, Shakara pass, head of Sagnum valley, 15000–16000 ft., 04.08.1906, *Keshvanand* 331, 366 (DD); Kishen Ganga valley, Baboon pass, 14000–16000 ft., 08.08.1906, *Keshvanand* 332 (DD). Himachal Pradesh: Lahul, 13000 ft., *Brandis* 3259 (DD); Lahul, Jispa, 13000 ft., *W. Koeltz* 787/ DD Acc. No. 68175 (DD); Chamba, Sach Pass, 14000 ft., 14.08.1897, *J.H. Lace* 1616 (DD); Chamba, Sach Pass, 4535 m, 23.07.1964, *N.C. Nair* 32760 (BSD). Uttarakhand: Garhwal Division: Tehri Garhwal (earstwhile, now Uttarkashi district), Phulaldaru in Nila valley, 21.08.1883, *J.F. Duthie* 746 f (DD); Ourie gad in Nila valley, 14000–15000 ft., 15.08.1883, *J.F. Duthie* 746 e (DD); Nila valley, 15000–16000 ft., 16.08.1883, *J.F.Duthie* 746 d (DD); Chamoli, Nanda Devi Biosphere Reserve, Near Dharansi, 31.08.1981, *P.K.Hajra* 73456 (BSD); Chamoli, Nanda Devi Biosphere Reserve, Dharansi, 01.07.1982, *P.K.Hajra* 73787 (BSD); Chamoli, Nanda Devi Biosphere Reserve, Pathal khan to Bhujgara, 06.07.1982, *P.K.Hajra* 73798 (BSD); Kumaon Division: Nipchiang valley, Darma, 13000–14000 ft., 31.08.1884, *J.F. Duthie* 2669 (DD); Byans, Rocks above Chalek, 12000–13000 ft., 23.07.1886, *J.F.Duthie* 5298 A (DD); Pindari glacier, 13.06.1933, *Bis Ram* 2101 (DD). Nepal: Nampha Gad, 13000–14000 ft., 27.07.1886, *J.F.Duthie* 5298 (DD).



Etymology: The species is named after its type locality in the Gangotri National Park.

Note: In the protologue of *I. microphyllum* Royle (l.c.) stated "*I. microphyllum*; Capsulis 5, foliis ternatis, supra-decompositis, foliolis tripartitis, lobis cuneatis, segmentis oblongis, acutis, obtusisve, petalis emarginatis. Hab.: Jumnotri, Budrinath". It is very clear from protologue description and accompanied illustration that specimens referred by Royle as *I. microphyllum* were with supra-decompound leaves showing ternate divisions and not one with 2-ternate foliage. Plants with 2-ternate leaves were referred by him to *I. grandiflora* (sensu Royle, non Fisch. ex DC.), of which a very good colour plate is also provided by him (Royle, l.c., t. 11, f. 3).

Hooker and Thomson's (1855, 1872) description under *Isopyrum grandiflorum* (non Fisch. ex DC., 1824) is a mixture of three taxon, i.e., *Isopyrum grandiflorum* sensu Hook.f. & Thomson [= *Paraquilegia anemonoides* (Willd.) Ulbr.], *Isopyrum microphyllum* Royle [= *Paraquilegia microphylla* (Royle) J.R.Drumm. & Hutch.] and *Paraquilegia gangotriana* Pusalkar & D.K.Singh the species considered here. True *P. microphylla* was probably not seen by the later authors dealing with the complex, and hence Hooker and Thomson's (l.c.) treatment was subsequently followed by them.

SYNOPTIC ACCOUNT OF THE GENUS *PARAQUILEGIA*

***Paraquilegia* J.R.Drumm. & Hutch. Bull. Misc. Inform. Kew 1920: 154, 156. 1920.**

A genus comprising 6 species growing on rocks, rocky slopes, stony areas, boulder-strewn moraines and fissures in rock walls in alpine belt of Central Asian and Himalayan mountains.

Type: *P. microphylla* (Royle) J.R. Drumm. & Hutch. (= *Isopyrum microphyllum* Royle)

Key to the species

- 1a. Leaves 4-ternate or sub-4-ternate [3 ternate with ternatisect segments]
or 3 ternate with sub-pinnatisect [apparently ternatisect] segments;
bracts 3-lobed ... 5. *P. microphylla*
- 1b. Leaves 1- or 2-ternate or sub-2-ternate [1 ternate with ternatisect segments];
bracts simple, not lobed ... 2
- 2a. Pubescent / canescent herbs with dense downy pubescence; leaf lamina usually
1-ternate ... 3
- 2b. Glabrous herbs; leaf lamina 2-ternate or sub-2-ternate ... 4
- 3a. Sepals + 8 mm long; foliage thick, grayish-green; leaf segments 3 - 4 mm
long; follicles + 6 × 2 mm ... 1. *P. altimurana*
- 3b. Sepals 10 - 12 mm long; foliage thin, greenish; leaf segments 4 - 11 mm
long; follicles 10 - 12 × 5 mm ... 3. *P. caespitosa*
- 4a. Scape equalling foliage; sepals as long as leaflets (7 - 8 mm); flowers less than
1.5 cm across; petal-nectaries sub-orbicular; style apex straight, erect or
slightly curved ... 6. *P. uniflora*
- 4b. Scape exceeding foliage; sepals 1.5 - 5 times the length of leaflets; flowers
more than 2 cm across; petal-nectaries oblong or obovate; style apex straight,
erect, slightly curved to recurved-hooked ... 5
- 5a. Seeds puberulous; seed marginate or not, not winged (without pectinate
outgrowth); leaf segments 3-lobed with broad lobules; bracts inserted + at or
slightly above the middle of the scape; style apex straight, erect or slightly curved ... 2. *P. anemonoides*
- 5b. Seeds glabrous; seed margin unequally winged (with pectinate outgrowth)
on one side; leaf segments 3-sect with narrow lobules; bracts inserted
in distal part (upper 1/4th) region of the scape; style apex curved or
recurved-hooked ... 4. *P. gangotriana*

1. *Paraquilegia altimurana* Rech.f., Fl. Iranica 171: 9, 269, t. 5. 1992.

Type: Afghanistan, Gardez, Safed Kuh ad occidentem jugi Altimur 23 Km N Gardez, 3200 m, 33°37'N, 69°09'E, 05.07.1965, K.H.Reehinger fil. 31857 (W).

Icon: Rech.f. (l.c.).

Distribution: Afghanistan, endemic.

- 2. *Paraquilegia anemonoides*** (Willd.) Ulbr. in Repert. Spec. Nov. Regni Veg. Beih. 12: 369. 1922 & Notizbl. Bot. Gart. Berlin-Dahlem 9: 210. 1925, non *P. anemonoides* (Kar. & Kir.) N. Schipcz. 1924; Tamura & Lauener in Notes Roy. Bot. Gard. Edinburgh 28: 266, 273. 1968; Riedl in Nasir & Ali, Fl. Pakistan 193: 11, f. 2(E-H). 1991; Rechinger, Fl. Iranica 171: 7, t. 2, 269. 1992; Rau in Sharma & al., Fl. India 1: 110. 1993. *Aquilegia anemonoides* Willd. in Mag. Neuesten Entdeck. Gesammten Naturk. Ges. Naturf. Freunde Berlin 5: 401, t. 9, f. 6. 1811. *Isopyrum grandiflorum* Fisch. ex DC., Prodr. 1: 48. 1824; Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 23. 1872, p.p. excl. syn. *I. microphyllum* Royle. *Paraquilegia grandiflora* (Fisch. ex DC.) J.R. Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 156. 1920; Schipschinskii in Komarov & Shishkin, Fl. URSS 7: 76. 1937, excl. syn. *I. uniflorum* Aitch. & Hemsl., 1882; Tamura in Kitam., Fl. Afghan.: 60. 1964.

Type: Altai (named Schangimatrovia in Willdenow's handwriting) (B-WILLD)

Icon: Willd. (l.c.), Riedl (l.c.), Rechinger (l.c.).

Distribution: Afghanistan, China (Tibet), India (Jammu & Kashmir, Himachal Pradesh, Uttarakhand), Mongolia, Pakistan, Russia; Central Asia (Pamir-Altai mountain to Tien Shan)

- 3. *Paraquilegia caespitosa*** (Boiss. & Hohen.) J.R. Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 158. 1920; Schipschinskii in Komarov & Shishkin, Fl. URSS 7: 77. 1937; Tamura & Lauener in Notes Roy. Bot. Gard. Edinburgh 28: 266, 273. 1968; Riedl in Nasir & Ali, Fl. Pakistan 193: 12. 1991; Rechinger, Fl. Iranica 171: 8, t. 4, 1992. *Isopyrum caespitosum* Boiss. & Hohen. in Diagn. Pl. Nov. Orient. Ser. 1(8): 7. 1849 & in Boiss., Fl. Orient. 1: 64. 1867.

Type: Iran (cited as Persia), Mt. Elbrus, 3500 m, 11.07.1843, Kotschy 501 (G).

Icon: Rechinger (l.c.)

Distribution: Afghanistan, China, India (Jammu & Kashmir), Iran, Pakistan, Russia (Pamir-Altai), Turkey.

- 4. *Paraquilegia gangotriana*** Pusalkar & D.K. Singh, sp. nov. *P. microphylla* sensu J.R. Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 157, 1920, including f. 2, non *Isopyrum microphyllum* Royle, 1833–1834; Polunin & Stainton, Flow. Himalaya: 2, Pl. 2(4). 1984; Rau in Sharma & al., Fl. India 1: 111. 1993, p.p.; Dezhvi & Robinson in Zhengyi & al., Flora China 6: 277. 2001, p.p. excl. f. 237. *I. grandiflorum* sensu Hook.f. & Thomson in Hook.f., Fl. Brit. India 1: 23. 1872, p.p., non Fisch. ex DC., 1824.

[Fig. 1(A–J)]

Type: India: Uttarakhand: Tehri Garhwal (presently Uttarkashi district), Phulaldaru in Nila valley, 14000 - 15000 ft., 21.08.1883, J.F. Duthie 746 b (Holotype: DD).

Icon: Royle (l.c.), J.R. Drumm. & Hutch. (l.c.).

Distribution: Afghanistan, Bhutan, India (Jammu & Kashmir to Sikkim), China, Nepal, Pakistan (?), Central Asia (?), Russia.

- 5. *Paraquilegia microphylla*** (Royle) J.R. Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 157. 1920, *nom.*, excluding key descr. & fig. 2; Hajra, Pl. Wealth Nanda Devi Biosph. Reserve: 40. 1993; Dezhvi & Robinson in Zhengyi & al., Flora China 6: 277. 2001, p.p.; Zhu, Fl. China Ill. 6: f. 237. 2001. *Isopyrum microphyllum* Royle, Ill. Bot. Himal. Mts. 2: t. 11, f. 4. 1833 & l.c. 1: 54. 1834. *I. grandiflorum* DC. var. *microphyllum* (Royle) Finet & Gangnep. in Bull. Soc. Bot. France 4: 409. 1904. [Fig. 1(K – N)]

Type: India, N.W. Himalaya, Royle s.n. (Lectotype: K, Isolectotype: LIV!).

Icon: Royle (l.c.), Zhu (l.c.).

Distribution: China, India [Uttarakhand (Uttarkashi and Chamoli)].

Notes: During the typification of Royle's Ranunculaceae, for *Isopyrum microphyllum* Royle, Launer (1980) stated, and we quote "*Isopyrum microphyllum* Royle. Lecto K. No specimen of *I. microphyllum* was found in the Wallichian herbarium, although Royle stated that the illustration was from imperfect specimen in

the East Indian herbarium. There is a specimen in Kew general herbarium labeled as '*Isopyrum grandiflorum* Fisch., *I. microphyllum* Royle, N.W. India, Hb. Royle', which I here designate as the lectotype. The sheet is composed of mixed collections". As the Badrinath collection cited by Royle was collected by Wallich's collectors, we believe that though Royle's collection is without precise locality, but likely to be collected from Yamnotri [also collected and provided to Royle by Victor Jacquemont as mentioned by Royle himself (l.c.)]. Notably, though collection in Liverpool herbarium (Isolectotype - LIV Acc. No. 1952.121.270/4042A) is also designated by Launer as a type (dated August 1976), but has no mention in Launer's (l.c.) above paper. There is also one more collection of Royle [1/29, No. 393] belonging to *P. microphylla* in the herbarium of Forest Research Institute, Dehradun (DD!).

In addition to lectotype (K) and Isolectotype (LIV!), following complete and excellent specimens of this species are present in Indian Herbaria: Western Himalaya, Uttarakhand, Tehri Garhwal (presently Uttarkashi district), Jumna-Bhagirathi water shade, 13000 - 14000 ft., 28.06.1949, *A.C. Joshi* s.n./ DD Acc. No. 103756, 103758 (DD!), Flowers deep blue; Gidyara, near Oncha lara, 14800 ft., 31.05.1956, *K.C. Sahni* 24925 (DD!), Flowers blue turning pink on drying; Uttarkashi, Jumnotri, 2800 m, 14.05.1973, *M.A. Rau* 51607 (BSD!); Uttarkashi, Jamna valley, 10000 ft., April 1974, *Som Deva* s.n./ BSD Acc. No. 58064 (BSD!).

6. ***Paraquilegia uniflora*** (Aitch. & Hemsl.) J.R. Drumm. & Hutch. in Bull. Misc. Inform. Kew 1920: 158. 1920, excluding syn. *Isopyrum anemonoides* Kar. & Kir., 1842; Rechinger, Fl. Iran. 171: 7 - 8, t. 3. 1992. *Isopyrum uniflorum* Aitch. & Hemsl. in J. Linn. Soc., Bot. 19: 149. 1882. *Isopyrum anemonoides* sensu Riedl in Ali & Nasir, Flora Pakistan 193: 9. 1991, p.p., non *I. anemonoides* Kar. & Kir., 1842.

Type: Pakistan, Kurram, Shendtoi valley, 3000 m, 10.07.1879, *J.E.T. Aitchison* 802 (K).

Icon: Rechinger (l.c.).

Distribution: Pakistan (Kurram), endemic.

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