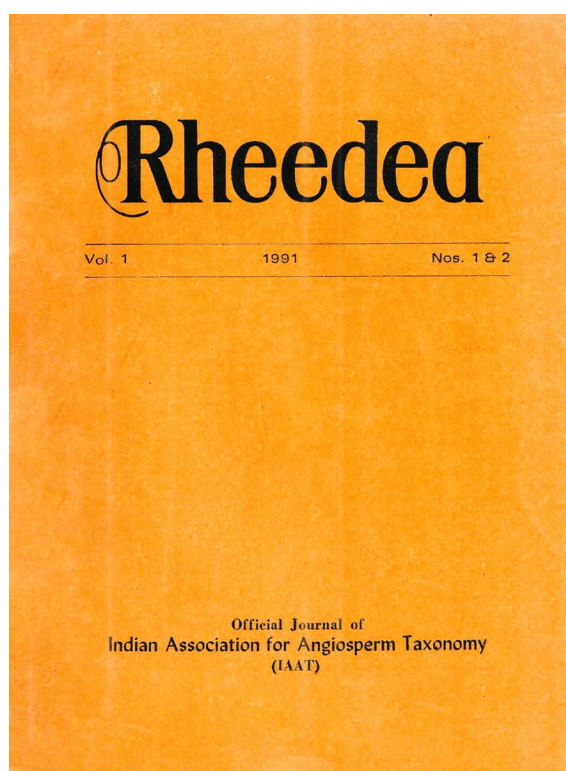




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Systematics of Three Subgenera of *Potentilla* L. (Rosaceae) in India

G. Panigrahi

Ex-Joint Director, Botanical Survey of India
A 13/3, Kalindi Housing Estate, Calcutta-700 089

Abstract

The paper deals with the taxonomic revision of three subgenera of *Potentilla* L., viz. subgen. *Schistophyllidium* Juzepczuk (1 sp.), subgen. *Trichothalamus* (Spreng. ex Lehm. Reich. (3 taxa) and subgen. *Fragariastrum* (Heist. ex Fabr.) Reich. (6 taxa) in India. Artificial keys to the sections, species and infraspecific taxa, diagnostic characters to the subgenera are provided, and four of the ten taxa illustrated, and notes on their ecology, cytology, distribution and comments on their taxonomy and nomenclature are also appended.

Panigrahi and Dikshit (1987) delineate within *Potentilla* L., s. s. (LT.: *P. reptans* L.) the occurrence of 80 taxa belonging to nine subgenera and 19 sections in India. In an earlier paper in the series, taxonomic revision of the most primitive subgenus, subgen. *Dasi-phora* (Rafin.) Panigr. & Dikshit comprising six taxa in India, has been presented (Panigrahi, 1991, *ined.*). The present paper restricts to a similar treatment for three of the remaining eight subgenera, viz. subgen. *Schistophyllidium* Juzepczuk, with one species, subgen. *Trichothalamus* (Spreng. ex Lehm.) Reich. with two species and one variety and subgen. *Fragariastrum* (Heist. ex Fabr.) Reich. with four species and two varieties.

Diagnostic features of the three subgenera, artificial keys to the sections, species and infrageneric taxa are provided, but not the detailed description of the taxon concerned; four of the 10 taxa are

illustrated. Notes on their ecology, cytology, and distribution and comments on their taxonomy and nomenclature, are appended. For brevity of space, only representative specimens studied from India proper are cited with herbarium acronyms.

Subgenus: *Schistophyllidium* Juzepczuk in Fl. U. S. S. R. (ed. V. L. Komarov) 10: 81. 1914 (Eng. ed: 61. 1971); Ball *et al.* in Fl. Europ. 2: 39. 1968; Panigrahi & Dikshit, Bull. Bot. Surv. India 27: 180, 183, 190, 195. 1987. LT. *Potentilla bifurca* L. (selected by Panigrahi & Dikshit, *l. c.* 180).

Potentilla L. sect. *Potentillastrum* Ser. in A. P. DC., Prodr. 2: 571. 1825 *p. p.*, incl. *Potentilla bifurca* L.

Potentilla L. sect. *Herbaceae* Lehm. ser. *Pinnatae* trib. *Bifurcatae* Lehm. Nova Acta. Acad. Leop.-Carol. 4: 23. 1856, *nom. invalid.* (Art 4. 1, 5.1).

Potentilla L. sect. *Potentilla* Hook., f., Fl. Brit. India 2: 349. 1873, p. p., incl. *Potentilla bifurca* L.

Potentilla L. sect. *Trichocarpae* Wolf subsect. *Rhopalostylae* Wolf grex *Bifurcae* Wolf in Bibl. Bot. Heft 71, Band 16: 45, 62. 1908, nom. invalid (Art. 4. 1, 5. 1).

Potentilla L. sect. *Bifurcae* Grossh, Fl. Kawkasa 5: 68. 1952; Schiman Czeika in Fl. Iran. (ed. K. H. Rechinger), No. 66: 84. 1969.

Undershrubs, low-growing, branching from the slightly woody base, with stems dying near base in winter; leaves imparipinnate, leaflets entire or 2-3-lobed at apex; flowers dioecious, androdynamic (with a few abortive pistils) or gynodynamic (with short stamens and usually abortive anthers); petals yellow; receptacle saucer-shaped; after anthesis becoming short-hairy; styles lateral, gradually dilated upwards from thin base, i. e. claviform, three times longer than ovary; achenes glabrous, with smooth surfaces.

***Potentilla bifurca* L., Sp Pl. 497. 1753.**
ssp. *moorcroftii* (Wall. ex Lehm.)
Sojak ex Panigrahi, stat. nov. (Figs. A—E).

Potentilla moorcroftii Wall. ex Lehm., Nova et Minus Cogni. Stirp. Pugil. 29. 1831, et Nova Acta Acad. Leop.-Carol. 4: 23. 1856; Juzepczuk, op. cit. 83. 1941 (Eng. edn. 63. 1971).
Type: India, Kashmir, Ladak, *Moorcroft* vide Wall., Num. List No. 1041 (K WALL; microf. CAL).

Potentilla glauca Cambess., Voy. dans l'Inde 2: t. 66; 4: 54. 1844. Type: India, Kinaur [Kansor], Hangrung-Ghauti, c.

4000 m, *Jacquemont* 1679 (P; isotype K; Photo CAL).

Potentilla bifurca L. var. *moorcroftii* (Wall. ex Lehm.) Wolf, l. c. 64. 1908. Kitamura, Pl. W. Pak. Afgan. 84. 1964.

Potentilla bidens Bertol., Misc. Bot. 16: t. 4. 1863. Type: Tibet, alpine regione, 3050-5185 m, *sine lect.*, s. n. (BOLO-destroyed during World War II, vide Curator of BOLO dated 27. 1. 1981, in litt.).

Potentilla bifurca sensu Hook., f., Fl. Brit. India 2: 353. 1878, non L. (1753).

Notes: Sojak, (in litt. dated Feb. 1986) would distinguish two subspecies in *P. bifurca* L., ssp. *bifurca* with leaves patent hairy (Type loc.: Siberia; LINN 655.19), and ssp. *moorcroftii* the Himalayan element with hairy leaves appressed.

Flowering: June-Aug.; fruiting: Aug.-Sept.

Ecology: Grows at an elevation of 2745 - 4575 m, on sandy river bottom, interstices of boulders, gravels, stony slopes, pastures and sandstones.

Distribution: India (Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim), Nepal, Bhutan, China, Pakistan and West Asia.

Chromosomes: 2n=56 Popoff, 1935 (for ssp. *bifurca*).

Petiole anatomy: Epidermis single-layered, thickly cuticularised; hypodermis 3-5-layered, collenchymatous; cortex 2-3-layered, of thick-walled oval-shaped cells without intercellular spaces; vascular bundles 3 in number, middle one larger

than the two laterals; arched on proximal side by 2 - 3 - layered collenchymatous cells.

Representative specimens examined:

India. Kashmir: Gilgit, 1855, *G. M. Giles* s. n. (CAL Acc. no 149076); Ladak, Dras to Kharbu, 3050 m, 2 Aug. 1940, *R. R. Stewart* 21153 (DD). Himachal Pradesh: Baspa Valley, Nagasti, 3425 m, 25 May 1972, *K. P. Janardanan* 47439 (BSD); Zaskar, east of Pensi - la, west of Paddam, Aug. 1865, *Stoliczka* s. n. (CAL Acc. no. 149168). Uttar Pradesh: Chamoli. Hemkund, 3900 m, 17 Aug. 1963, *U. C. Bhattacharya* 29504 (BSD); Milam glacier, 3810 m, 29 Aug. 1848, *Strachey & Winterbottom* 27 (CAL).

Subgenus: TRICOTHALAMUS (Spreng. ex Lehm.) Reich., Consp. Regn. Vegetab.: 167. 1828.

Trichothalamus Spreng. [Anleit. zur Kennt. Gewas. ed. 2. 2: 864. 1818] ex Lehm. in Nova Acta Acad. Leop. -Carol. 10: 585. 1821. Type: *Trichothalamus lignosus* Willd. ex Schlecht.) Lehm. (*Potentilla lignosa* Willd. ex Schlecht.).

Potentilla L. sect. *Fragariastrum* Ser. in A. P. DC., Prodr. Syst. Nat. Reg. Veget. 2: 583. 1825, p. p., incl. *Potentilla salesoviana* Stephan tantum.

Comarum sensu Ledeb., Fl. Ross. 2: 63. 1843; Schiman-Czeika, Fl. Iran. No. 66: 114. 1869, omnes p. p., incl. *Comarum salesovianum* (Stephan) Ledeb., non L. (1753).

Potentilla L. sect. *Fruticulosae* et *Suffruticulosae* Lehm., Revis. Potentill. Icon. Illust.: 24. 1856, p. p. minore, incl. *Potentilla salesoviana* Stephan et *P. lignosa* Willd. ex Schlecht.

Potentilla L. sect. *Trichothalamus* (Lehm.) Hook. f., Fl. Brit. India 2: 347. 1878; Focke in Natur. Ver. Bremen. 10: 414. 1869; omnes p. p. minore, incl. *P. salesoviana* Stephan

Potentilla L. sect. *Trichocareae* Wolf subject. *Nematostylae* Wolf ser. *Suffruticulosae* Wolf grex *Palustris* Wolf, Bibl. Bot. Heft 71, Band 16: 45. 1908, p. p. incl. *Potentilla salesoviana* Stephan

Potentilla L. sect. *Xylorrhizae* (Wolf) Schiman-Czeika, op. cit.: 85. 1969.

Potentilla L. subg. *Lasiocarpa* Dikshit & Panigr. Journ. Sci. Club, Calcutta 33-34: 39. 1982 (1979). Type: *Potentilla salesoviana* Stephan

Shrubs, bark peeling off; caudex subterranean; without a rosette of radical leaves; leaves chiefly cauline, imparipinnate; leaflets finely serrulated or dented; receptacle after anthesis becoming densely villous; flowers bisexual; petals white; styles filiform, two (three-) four times longer than ovary; six achenes clothed with and concealed by long woolly hairs.

Key to the taxa in India

- 1a. Leaves not articulate; petioles with pulvinate base; leaflets dented, glabrous - glabrescent, with white farinaceous covering beneath; flowers 2-3.5 cm diam.; styles 3 - 4 - times longer than ovary; t. s. of the petioles irregularly triangular in shape, cortex of irregularly shaped cells; vascular bundles three in number... i. *P. salesoviana*.
- b. Leaves articulate; petioles without pulvinate base; leaflets finally serrulated, sparsely - densely hairy or sericeous, without white farinaceous

- covering; flowers 1-1.8 cm diam.; styles two times longer than ovary; t.s. of the petioles oval in shape, cortex of more or less circular cells; vascular bundles five in number.....
.....2. **P. sericophylla**
- 2a. Leaves closely pressed, 1-4.5 cm long; petioles silky and white, 0.5-3 cm long; leaflets up to 16×7 mm, both surfaces densely appressed white silky-hairy, apex mucronulate, upper-half of the leaflets revolute along margins.....
.....2. var. **sericophylla**
- b. Leaves spreading, 4-7.5 cm long; petioles appressed hairy, but not white, 3.2-4.8 cm long; leaflets up to 27×11 mm, both surfaces sparsely hairy; apex obtusely rounded; margin flat or slightly revolute at apex.....
.....2b. var. **longifolia**
1. **Potentilla salesoviana** Stephan in Mem. de la Soc. des Natur. de Mosc. 2: 6, t. 3. 1809; Dixit & Panigrahi in Journ. Sci. Club, Calcutta 33-34: 4, 1982 (1979). *Type*: "Torrens Tschnis. siberiae, Salesoy 85 (holotype - LE; Photo-CAL).
Farinopsis salesoviana (Stephan) Chrtek & Sojak in Casopsis naroduiho Musea, Praha 153: 10 1984.
Local name: Shour (Ladak).
Flowering: July-Sept; *fruiting*: Aug.-Sept.
Habitat: Grows between 2745 and 4100 m on stony beds of streams, river banks, rubbly mountain slopes and moraines.
Distribution: India (Jammu & Kashmir, Himachal Pradesh), Nepal, Bhutan, China, Mongolia, USSR, Pakistan, Afganistan and Iran.
- Representative specimens examined*: India. Himacal pradesh: Lahul valley, Raasse, Upper Chenab, 3050 m, 15, Aug. 1971, *U. C. Bhattacharya* 45338 (BSD). Jammu & Kashmir: Ladakh, Kanmi, 3050-3355 m, 1 July 1905, *A. Meebold* 2910 (CAL); Pass from Jaunpore to Balso, 17 July 1847, *Winterbottom* 824 (CAL).
- Petiole anatomy*: Epidermis single-layered, thickly cuticularised, with a few simple eglandular hairs; hypodermis 2-layered, collenchymatous; cortex 7-8-layered, collenchymatous, of irregularly-shaped large cells arranged without intercellular spaces; vascular bundles three, the middle one the largest, arched on the proximal side by 4 - 5 - layered collenchymatous tissue.
2. **Potentilla sericophylla** Parker in Kew Bull. 1921: 217. 1921; Dixit & Panigrahi in Journ. Sci. Club, Calcutta 33-34: 42, figs. 2 A-C. 1982 (1979). *Syntypes*: Pakistan, Hazara, 2400 m, *Stewart* 352 (isosyn, CAL); *Parker & Barret s. n.* (K, sheet no. H. 4755/65. *p. p.*; Photo-CAL).
- P. davurica* sensu Parker, *op. cit.* 215. 1918, non Nestler (1816).
- 2a. **sericophylla**
- Flowering & fruiting*: June-Aug.
- Habitat*: Grows at 2805-3050 m on on rocks and mountain precipices.
- Distribution*: India (Jammu & Kashmir, Himachal Pradesh), Pakistan and E, Tibet.
- Representative specimens examined*: Pakistan: Dunga galli, 2805 m, 11 June 1896, *Inayat* 19402 (DD); Saran range, Shadal, 16 Aug. 1899, *Inayat s. n.* (CAL, DD).

Petiole anatomy: Epidermis single-layered, thickly cuticularised, with simple and eglandular hairs; hypodermis 2-3-layered, collenchymatous; cortex 7-8-layered, parenchymatous without intercellular spaces; vascular bundles 5, the middle one the largest.

2b. var. **longifolia** Dixit & Panigr., in Journ. Sci. Club, Calcutta 33-34: 43. 1982 (1979) (Figs. F-G).

Holotype: India, Jammu & Kashmir, Dudnial forests, Kishanganga valley, 2440 m, 1 Nov. 1906, *Keshavananda* 636 (DD; isotype DD).

Habitat: Grows on rocks at 2440-3050 m.

Distribution: India (Jammu & Kashmir). Endemic.

Specimens examined: India, West Kashmir, Kishanganga valley, on rocks near Doodnial, 3050 m, 1 Nov. 1906, *Keshavananda* 1615 (DD); *ibid.*, *Inayat* 19402 (CAL).

Subgenus: FRAGARIASTRUM (Heist. ex Fabr.) Reich. Consp. Regn. Veg. 1671. 1828; Ball *et al.* in Fl. Europe. 2: 45. 1968.

Fragariastrum Heist. ex Fabr., Enum. Method. Pl. 64. 1759; Panigrahi & Dixit in Taxon 35(2): 350. 1986. LT.: *F. sterilis* L. (selected by Panigrahi & Dixit, *l. c.*).

Fragariastrum (Ser. ex DC.) Schur, Verh. Mith Sieben. Ver. Nat. 4: 23. 1853, *isonym* (vide Nicolson in Taxon 24: 461. 1975). LT.: *F. sterile* (L.) Schur. (*Fragaria sterilis* L.) (selected by Panigrahi & Dixit, *l. c.*).

Potentilla L. sect. *Fragariastrum* Ser. ex DC., Prodr. 2: 583. 1825. LT.: *Poten-*

tilla fragaria Poir. (1804), *nom. illeg.* *Fragaria sterilis* L., *Potentilla sterilis* (L.) Garcke) (selected by Panigrahi and Dixit *l. c.*).

Potentilla L. sect. *Trichothalamus* sensu Hooker f., Fl. Brit. India 2: 349. 1878, *p. p.* incl. '*P. curviseta* Hooker f., et. *P. pteropoda* Royle, non (Spreng.) Hooker f.

Herbs, bark not peeling off, caudex aerial, with a rosette of radical leaves, leaves chiefly radical, ternate; receptacles after anthesis becoming densely villous; styles lateral or subterminal; achenes clothed with and concealed by long woolly hairs.

The subgenus comprises three sections, as keyed below;

- 1a. Herbs; receptacles saucer-shaped; achenes short-hairy, not concealed by the hairs sect. 1. **curvisetae**
- b. Undershubs; receptacles subglobose; achenes concealed by hairs..... 2
- 2a. Caudex imbricately clothed with remnants of stipules, snake-like; leaflets up to 5-6 cm long, (3-) 5-9-toothed to lobed up to base, terminal leaflets conspicuously petiolulate; styles subterminal to terminal; t. s. of petioles cells below the endodermis.....
..... sect. 2. **Eriocarpae**
- b. Caudex without remnants of stipules; leaflets up to 1.5 cm long, 3-toothed at apex only, terminal leaflets sessile; t. s. of petioles irregular in shape, vascular bundle with a patch of sclerenchymatous cells below the endodermis.....
..... sect. 3. **Tridentate**

Section 1. **Curvisetae** Schiman-Czeika in Fl. Iran. (ed. R. H. Rechinger) 66:

87. 1969 [as "(Wolf) Schiman - Czeika"].

Potentilla L. *Trichocarpae* Wolf subsect. *Nematostylae* Wolf ser. *Herbaceae* grex *Curvisetae* Wolf, Bibl. Bot. Heft 71, Band 16: 47, 94. 1908, *nom. invalid.* (Art. 4.1, 5.1). LT.: *Potentilla curviseta* Hooker f., (selected by Panigrahi & Dixit, 1987).

Potentilla L. sect. *Herbaceae* Lehm. ser. *Ternatae* Lehm. trib. *Erigidae* Lehm. subtrib. *Nanae* Lehm., Nova Acta Acad. Leop.-Carol. 23: 7157 1856, *nom. invalid.* (Art. 4.1, 5.1).

Herbs perennial; rootstocks woody, imbricately clothed with the remnants of broad stipules and stiff persistent recurved dead petioles; stipules adnate up to half-3/4th length of the petioles forming a narrow wing; leaflets appressed hairy, or silvery-silky; receptacles saucer-shaped and densely hairy; styles subterminal, filiform, evenly thickened, one and a-half times longer than ovary; achenes all through short-hairy and not concealed by hairs.

Key to the species

- 1a. Radical leaves ternate and digitately quinately (extreme lateral leaflets minute); leaflets oblong-obovate, up to 4.3 cm long, 1.6 cm broad, apex 3-9-dented.....3. **P. pteropoda**
- b. Radical leaves ternate; leaflets oblong-lanceolate, up to 2.7 cm long and 0.8 cm broad apex 3-dented.....2
- 2a. Plants rigid and elastic, sparsely short-appressed-hairy; pedicels after anthesis reflexed; petals obovate, apex retuse, two times longer than sepals.....2. **P. curviseta**

b. Plants fragile, appressed silver-silky pedicels after anthesis erect, petals elliptic, apex entire, a little longer than sepals.....1. **P. collettiana**

1. **Potentilla collettiana** Aitch.&Hems. in J. Linn. Soc. 19: 53. 1880; Schiman-Czeika, *op. cit.* 87. 1969. *syn-types*: Pakistan, Kurrum vally, Mount. Sikaram, 3660-4270 m, 7 Aug. 1879 *Aitchison* 728 (DD; isosyntype-K, CAL).

Local Name: Majrikon (Afghanistan).

Flowering: July-Sept.; *fruiting*: Sept.

Habitat: Grows from 2440 to 4270 m on rocks, forming a very handsome hard rock plant.

Distribution: India (Jammu & Kashmir); Pakistan and Afghanistan.

Representative specimens examined: India. Jammu & Kashmir: Above Surzil, *Winterbottom* 329 (CAL); near Gurais 2440-2745 m, 6 Sept. 1892, *J. E. Duthie s. n.* (DD). Himachal Pradesh: Lahul Valley, Upper Chenab, Rasse, 15 Aug. 1971, *U. C. Bhattacharya* 45350(BSD).

2. **Potentilla curviseta** Hooker f., Fl. Brit. India 2: 358. 1878; Wolf, Bibl. Bot. Heft 71, Band 16: 95. 1908; Stewart, Annot. Fl. West Pakistan: 355. 1972. (Figs. K-O).

Syntype: India, Jammu & Kashmir, Tilail, 3660 m, 24 Aug. 1876, *C. B. Clarke* 30711 A (K, Photo CAL).

Flowering: June-Aug.; *fruiting*: Aug.-Sept.

Etymology: *Curviseta* derived from the Latin word *curvus* means bent and *seta* means a bristle, refers to the recurved bristles (i. e. the relics of dead petioles on the rootstock).

Habitat: Grows from 2440 to 4420 m on crevices of precipitous rock cliffs, moist or dry rock fissures, alpine hillocks in the vicinity of *Ephedra gerardiana* and common in *Pinus wallichiana* forests.

Distribution: India (Jammu & Kashmir, Himachal Pradesh and Pakistans.

Representative specimens examined: India, Jammu & Kashmir, above Burzil, Winterbottom 329 (CAL); Kalpani, 3355-3660 m, 25 Aug. 1892, Duthie 14150 (CAL, DD); Tilail, 3660 m, 24 Aug. 1876, C.B. Clarke 30711 D (CAL). Himachal Pradesh, Lahul valley, Upper Chenab, Rasse, 13 Aug. 1971, U. C. Bhattacharya 45340 (BSD)

Petiole anatomy: Epidermis single-layered, with many simple and eglandular hairs; hypodermis 3-4-layered, collenchymatous and restricted to the proximal side only; cortex 5-6-layered, parenchymatous with intercellular spaces; vascular bundles 3 in number, middle one larger; bundle sheath not distinct.

3. *Potentilla pteropoda* Royle, Illust. Bot. Himal. Mount. 2: t. 40, f. 2. 1834, et 1: 207. 1835; Stewart, *op. cit.* 358. 1972.

Type: India, mountains surrounding Kashmir, Royle 64.1 (LIV; Photo-CAL).

Flowering & Fruiting: July.

Distribution: India (Jammu & Kashmir), Pakistan.

Specimen examined: Pakistan. Hazara dist., Kagan valley, 19 July 1879, Inayat 21284 (GAL).

Section 2. *Eriocarpae* Juzepczuk, *op. cit.* 88. 1941 (Eng. ed., 1971); Grossn.,

Fl. Kawkasa 5: 68. 1952 [as "(Wolf) Juz."].

Potentilla L. sect. *Trichocarpae* Wolf subsect. *Nematostylae* Wolf ser. *Suffruticulosae* Wolf grex *Eriocarpae* Wolf, *op. cit.* 46, 79. 1908 *nom. invalid.* (Art. 4.1, 5.1). *LT. Potentilla eriocarpa* Wall. ex Lehm. (selected by Panigrahi & Dixit, 1987).

Potentilla L. sect. *Fruticulosae* et *Suffruticulosae* Lehm., *op. cit.* 3, 13. 1856, *p. p.* incl. *P. eriocarpa* Wall. ex Lehm. tantum.

Potentilla eriocarpa Wall. ex Lehm., Nov. et Minus Cogn. Stirp. Pugil, No. 3: 35. 1831, et Nova Acta Acad. Leop.-Carol. 25: 22, t. 4. 1856; Hooker f., *op. cit.* 348. 1878; Wolf, *op. cit.* 66. 1908.

Syntypes: India, Kumaon, R. Blinkworth vide Wallich, Num. List No. 1012. 1; Gossain Than, Wallich, Num. List No. 1012.2 (K-WALL, microf. CL).

Key to the varieties

- 1a. Stems, leaves, cauline stipules and calyx-lobes glabrous.....
.....1a. var. *eriocarpa*
- b. Stems, leaves, cauline stipules and calyx-lobes hairy.....
.....1b. var. *tsarongensis*

1a. var *eriocarpa* (Fig. H-J.)

Type same as for *P. eriocarpa* Wall. ex Lehm.

Common names: Hairy-fruited *Potentilla* (Eng.); *Solpo Mendo* (Bhutan).

Etymology: *Eriocarpa* is derived from the Greek word, "erion" meaning wool; the epithet refers to the long woolly hairs of receptacle and achenes.

Flowering: July-Sept.; *fruiting:* Aug.-Oct.

Habitat: Grows on moist shady rocks between 3000 and 5000 m altitudes.

Distribution: India (Jammu & Kashmir; Himachal Pradesh, Uttar Pradesh, Sikkim), Nepal Bhutan and China.

Representative specimens examined: India. Jammu & Kashmir: Musjid valley, 3660-3965 m, 25 July 1893, *Duthie* 13207, 14177 (DD). Himachal Pradesh: Lahul valley, Keylang, Manga 1, 3200 m, 10 Aug. 1971, *U. C. Bhattacharya* 45208 (BSD).

Petiolar anatomy: Outline oblong; epidermis single-layered, thickly cuticularised; hypodermis 2-3-layered, of collenchymatous cells, no intercellular spaces; cortex 4-5-layered, of thin-walled cells; vascular bundles 3, the middle one the largest; arched on proximal side by 2-4-layered collenchymatous tissue.

Note: It is a plant for the rock gardens, fully frost-hardy, tolerant to both rain and drought. It exhibits a good deal of plasticity, with variations in habit, size, degree of cutting of foliage and indumentum. The typical plants, common in the Himalayas have a wide range from Jammu & Kashmir to Yunnan and Sinkiang in China and are glabrous except for the stipular sheaths on the rootstocks.

1b. var. *tsarongensis* Evans in Notes Roy. Bot. Gard. Edinb. 13: 178, 1921; Fletcher, Notes Roy. Bot. Gard. Edinb. 20: 210, 1950. *Type:* S. E. Tibet, Nam la, 4200-4500 m, 27 July 1924, *Kingdon Ward* 6011 (holotype K; Photo. AL).

P. eriocarpa Wall. ex Lehm. var. *major* Kitamura, Fauna Fl. Nepal Himal. 150, f. 1955. *Type:* Nepal, Banguku-

hola, 3500 m, 23 July 1953, *Nakao s. n.* (holotype KYO, Photos. CAL).

Habitat: Grows on ledges, crevices of cliffs, scree and humus-covered boulders.

Distribution: India (Sikkim), Nepal, China.

Representative specimens examined: India. Sikkim: Goraphu chu, 1985 m, 6 Aug. 1909, *Smitth & cave* 2197 (CAL); Sikkim Himalaya, *G. A. Gammie s. n.* (CAL)

Note: Sikkim plants referred to this variety are dwarf (2-3 cm tall) with flowering stems as long as or shorter than radical leaves, the leaves 1.0-1.5 cm long.

Section 3. *Tridentatae* Dixit & Panigr. in Journ. Orissa Bot. Soc. 3(1): 31, 1981 [as "(Wolf) Dixit & Panigr."].

Potentilla L. sect. *Trichocarpae* Wolf subsect. *Nematostylae* Wolf grex *Tridentatae* Wolf, *op. cit.* 46, 77, 1908' *nom. invalid.* (Art. 4.1, 5.1). *LT:* *Potentillai cuneifolia* Bertol. (selected by Dixit & Panigrahi, 1981).

Potentilla L. sect. *Fruticulosae* et *Suffruticulosae* Lehm., *op. cit.* 3: 13, 1856, *p. p.* incl. *P. ambigua* Cambess. tantum.

Potentilla cuneifolia Bertol in Misc. Bot. 24: 15. t. 24; 15 t. 2. 1863; Dixit & Panigrahi in Journ. Orissa Bot. Soc. 3(1): 35, fig. 1 (A-D), 1981. *Type:* India, Sikkim, 2745-4575 m, *sine lect. s. n.* (BOLO; destroyed during World War II, vide Curator of BOLO dated 27. 1. 1981, *in litt.*) (*Iconotype:* Bertol. l. c. t. 2).

P. ambigua Cambess. in Jacquem., Voy. dans Inde Bote. 2: 51, t. 62. 4. 1844,

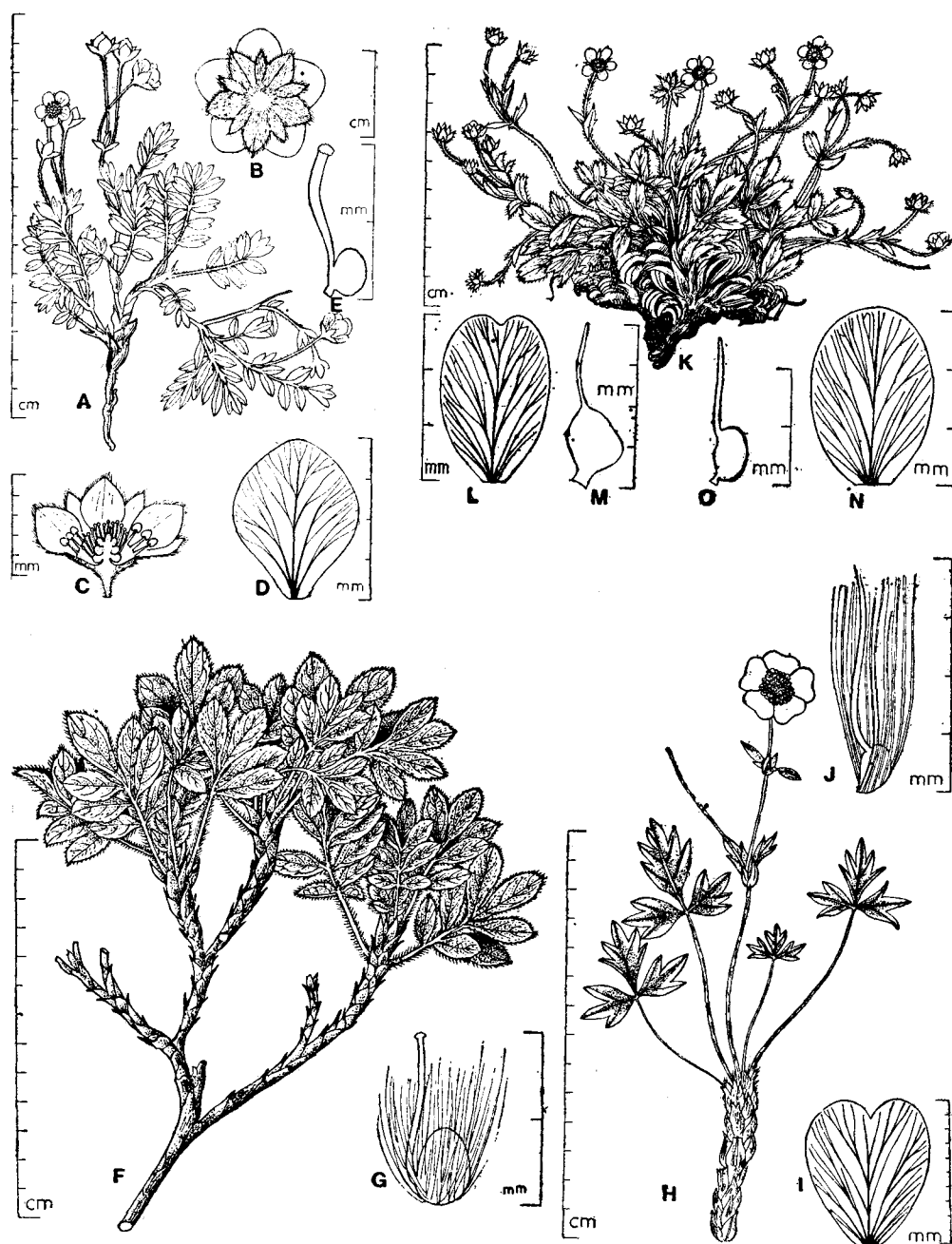


Fig. A-E, *Potentilla bifurca* L. ssp. *moorcroftii* (Wall. ex Lehm.) Sojak ex Panigr. drawn from U. C. Bhattacharya 49155 (CAL). A. Habit. B. Dorsal view of flower. C. L. S. of flower. D. Petal showing its shape and venation. E. Mature pistil with glabrous ovary and claviform style.

Fig. F-G, *Potentilla sericophylla* Parker var. *longifolia* Dixit & Panigr.-drawn Inayat 19402 (CAL). F. Habit, G. Pistil with hairy ovary and filiform style.

Fig. H-J, *Potentilla eriocarpa* Wall. ex Lehm.-drawn from N. L. Bor 16536 (CAL). H. Habit, I. Petal showing its shape and venation. J. Pistil with long-hairy ovary and filiform style.

Fig. K-O, *Potentilla curviseta* Hook. f.,-drawn from U. C. Bhattacharya 45240 (CAL). K. Habit, L, N, Petals showing shape and venation. M & O Pistils showing ovary, terminal and filiform style.

non Gaud. 1828; Lehm., Rev. Potent. 21. 1856; Hook. f., Fl. Brit. India 2: 348. 1878; Wolf, Bibl. Bot. Heft 71, Band 16: 78. 1908; Fletcher in Notes Roy. Bot. Gard. Edinb. 20: 207. 1850. *Type*: "In fissuris rupium prope pagum Rogui in Provincia Kanaor alt. 3000m", Jacquemont 1202 (K, Photocal).

Note: *P. ambigua* Gaud. (1828), with its digitately 5-foliate radical leaves and pinnatifid leaflets is confined to Europe, whereas the Himalayan species, *P. cuneifolia* Bertol is characterised by ternate leaves and leaflets tridentate at apex.

Undershrubs, branching from woody base; radical leaves ternate, leaflets usually 3-toothed at apex, rarely 2-5-toothed; receptacles after anthesis becoming subglobose and densely villose; styles lateral, filiform, evenly thickened, 4-5-times longer than ovary; achenes all through long-hairy and concealed by hairs.

Flowering: June-Sept.; *fruiting*: Aug.-Sept.

Habitat: Grows at altitudes between 2000 and 5200 m on open dry moist slopes amongst grasses and *Juniperus communis*, shady exposed soils, sandy river-banks, dry rocky situations, glacier and metamorphosed rocks, forming large patches.

Distribution: India (Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Sikkim, Arunachal Pradesh); Pakistan, Nepal, Bhutan, China, and Burma.

Representative specimens examined: India. Arunachal Pradesh, Kakilamukh, 3 Mar. 1959, B. N. Saikia, W. N. 34 (ASSAM); on the way to Sadiya, Kingdon Ward 19584 (ASSAM).

Petiolar anatomy: Outline irregular in shape; epidermis single-layered, thickly cuticularised, with simple and eglandular hairs; hypodermis 2-3-layered, thick-walled cells; cortex 3-4-layered, also of thick-walled cells; vascular bundles 3 in number, the middle one bigger than the two laterals, with patches of sclerenchymatous cells below the upper epidermis.

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