Taiwania, 54(2): 122-133, 2009

Critical Taxonomic Appraisal of Some Taxa of *Pedicularis* from Indian Himalayas Belonging to Section *Siphonanthae*

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(Manuscript received 16 October 2008; accepted 10 March 2009)

ABSTRACT: The existing confusion on the taxonomic status of five taxa of *Pedicularis viz. P. punctata* Decne, *P. siphonantha* D. Don, *P. hookeriana* Wall. ex Benth., *P. megalantha* D. Don and *P. hoffmeisteri* Kl. ex Kl. & Garcke is resolved on the basis of critical morphological study. These taxa belong to section *Siphonanthae*, subgenus *Longirostres*. Pennell's view of segregating these taxa into distinct species is defended and upheld.

KEY WORDS: Himalayas, India, *Pedicularis hoffmeisteri*, *Pedicularis hookeriana*, *Pedicularis megalantha*, *Pedicularis punctata*, *Pedicularis siphonantha*, Scrophulariaceae, *Siphonanthae*.

INTRODUCTION

Pedicularis L. is the largest genus in the snapdragon family Scrophulariaceae and is one of the largest angiosperm genus with *ca.* 800 species world-wide (Mill, 2001) and 83 species in India (with many more infra-specific taxa), of which 80 species find their place in high altitudes of Indian Himalayan ranges.

The genus holds immense complexities due to diverse floral morphological characters among their members and was therefore revised with the aim of solving the existing complexities. The section Siphonanthae of Prain (1890), subgenus Longirostres was one such complex which needed immediate attention due the existing confusion among the various members *viz. P. punctata* Decne, *P. siphonantha* D. Don, *P. hookeriana* Wall. ex Benth., *P. megalantha* D. Don and *P. hoffmeisteri* Kl. ex Kl. & Garcke.

Hooker (1885), had placed *Pedicularis hookeriana, P. punctata, P. labellata, P. himalaica* and *P. hoffmeisteri* under *P. siphonantha*, but he treated *P. megalantha* as a distinct species. Prain (*l.c.*) had distinguished *P. siphonantha* as a separate species and distinguished 2 varieties under this species *viz*. var. *typica* and var. *brevituba.* Further, he divided var. *typica* into 2 forms based on habitat and leaves *viz*. *f. vera* and *f. hookeriana-himalayca.* His *f. vera* was equivalent to *P. siphonantha* while the other f. *hookeriana-himalayca* was treated as equivalent to *P. hookeriana and P. himalaica.* Prain's (*l.c.)* var. *brevituba* was further sub-divided into 2 distinct forms viz. *f. elephas* and *f. punctata; f. punctata* was considered equivalent to *P. punctata* and *P. labellata. Pedicularis megalantha* was treated again as a distinct species by Prain (*l.c.*) who placed 2 varieties viz. var. *typica* and var. *pauciflora* under *P. megalantha,* however, *P. hoffmeisteri* was considered synonym of *P. megalantha* var. *typica.* All these taxa were included under the subgenus *Longirostres* Maxim. section *Siphonanthae* Benth.

Pennell (1943), opined that *P. punctata, P. hookeriana* and *P. siphonantha* were all valid species, each pertaining to its own part of the Himalayas, further, *P. hoffmeisteri* and *P. megalantha* were also clearly differentiated on the basis of key characters. Based on the distinguishing features of all five closely allied taxa namely *P. hoffmeisteri, P. megalantha, P. punctata, P. siphonantha* and *P. hookeriana* (Fig. 1, Table 1) the author agrees with Pennell's (*l.c.*) view and differentiates these taxa into distinct species with correct nomenclature, type, description, flowering and fruiting time, distribution and ecology, appended with critical notes and provided with identification key. List of specimens examined is also appended.

Identification key to the species resolved

1. Leaves with pinnae 3-6 pairs; labium with white throat ..…….... ……. 1. *P. punctata*
1. Leaves with pinnae more than 6 pairs; labium of uniform colour … 2
2. Dwarf densely tufted herbs; calyx 3-lobed, lobes adentate ……..….. ……..……2. *P. siphonantha*
2. Erect or sub-erect herbs; calyx 2-lobed or 5-lobed, lobes dentate … 3
3. Calyx 2-lobed, deeply cleft; leaves bi-pinnatisect; bracts branched once; galea with minute hairs; stamens inserted at the base of galea ……..... 3. *P. hookeriana*
3. Calyx 5-lobed; leaves pinnatifid; bracts un-branched; galea glabrous; stamens inserted at top of tube ……. 4
4. Corolla purple; galea without tooth; anterior pair of filaments hairy, posterior glabrous ……..……..... 4. *P. megalantha*
4. Corolla bright to pale yellow; galea with sharp tooth at base; all filaments hairy, anterior pair densely hairy, posterior with few hairs below the anther …….....…….. 5. *P. hoffmeisteri*

TAXONOMIC TREATMENTS

1. ***Pedicularis punctata*** Decne. in Jacq. Voy. Bot. 117, t. 122. 1844; Pennell in Acad. Nat. Sci. Philadelphia,

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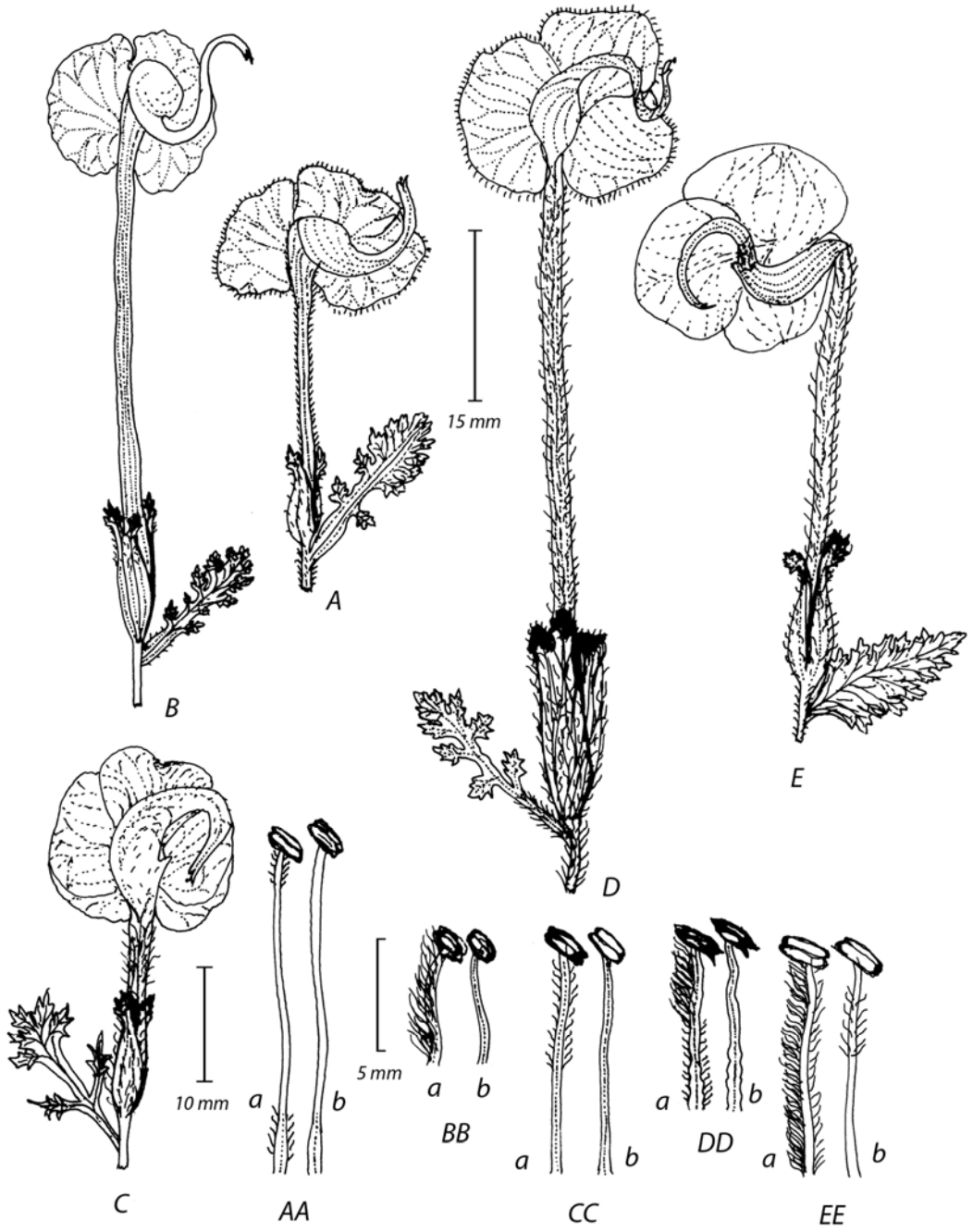


Fig. 1. A: *Pedicularis punctata.* Complete flower, AA: Stamens, a-anterior, b-posterior. B: *Pedicularis siphonantha*. Complete flower, BB: Stamens, a-anterior, b-posterior. C: *Pedicularis hookeriana*. Complete flower, CC: Stamens, a-anterior, b-posterior. D: *Pedicularis megalantha*. Complete flower, DD: Stamens, a-anterior, b-posterior. E: *Pedicularis hoffmeisteri*. Complete flower, EE: Stamens, a-anterior, b-posterior.

Monogr. 5: 154. 1943; Chowdhery & Wadhwa, Fl. Himachal Pradesh 2: 527. 1984; Polunin & Stainton, Fl. of Himalaya. 303. 1984; Aswal & Mehrotra, Fl. of Lahul-Spiti 481. 1994; Dhaliwal & Sharma, Fl. Kullu Dist. 485. 1999. *P. siphonantha* sensu Hook.f. in Hook.f., Fl. Brit. Ind. 4: 313. 1885, *p.p.;* Rao in Bull. Bot. Surv. India 2: 83. 1960. - (Type: *n.v.*). Fig. 3

Common name: Hurbul.

Erect or ascending herbs 6-35 cm tall; stem usually several, hollow, ridged, sparsely pubescent, few-many from the roots, slender and leafy. Radical leaves pinnatifid, linear-oblong to ovate-oblong, petioled; pinnae 3-6 pairs, teeth acute or somewhat rounded; petiole 7-45 mm long. Cauline leaves alternate, sessile or

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Table 1. Comparitive floral morphology to the species of belonging to section Siphonanthae of *Pedicularis* L.

	P. punctata	*P. siphonantha*	*P. hookeriana*	*P. megalantha*	*P. hoffmeisteri*
Leaves	Pinnatifid	Pinnatisect	Bi-pinnatisect	Pinnatifid	Deeply pinnatifid
Calyx	2-lobed, deeply cleft, hairy	3-lobed, upper half hairy	2-lobed, deeply cleft, densely hairy	5-lobed, hairy	5-lobed, hairy
Bracts	Pinnatifid	Unbranched	Branched	Foliaceous	Foliaceous
C. tube	Hairy	Smooth	Hairy	Hairy	Hairy
Galea	Twisted Narrow, glabrous	Base rounded, glabrous	Base broad, minutely hairy	Incurved coiled, glabrous	coiled, glabrous
Filaments	Ap: few hairs below top and near base Pp: glabrous	Ap: dense hairy on one margin Pp: glabrous	Ap: upper half hairy Pp: glabrous	Ap: densely woolly above on outside, hairy on both sides below Pp: glabrous	Ap: densely pilose on outer less on inner edge Pp: hairy below Top
Colour	Purple, throat of labium white	Purple-crimson	Purple	Purple	Bright - pale yellow
Labium	Ml smaller than laterals	Ml notched, all equal	Ml notched, all equal	Ml ovate, half width of laterals	Ml ovate, longer than laterals, all triangular

Abbreviations used in table: C – corolla, Ap – anterior pair, Pp – posterior pair, Ml – Mid lobe.

subsessile, oblong to elliptic; lobes narrow crenate-serrate. Inflorescence axillary and in terminal racemes. Flowers pedicillate, bracteolate; pedicel 1-3 mm long, hairy; bracts, foliaceous, pinnatifid. Corolla purple, throat of labium white; tube 1.8-2 cm long, 2-4 times the calyx length, slender, finely to densely hairy; galea narrow, continuing into a long sharp beak, twisted, glabrous; tip of beak deeply notched, circinately incurved and contorted; labium 1.2-1.5 x 1.3 cm, 3-lobed, the middle lobe smaller, margin hairy. Calyx 7-11 mm long, sparsely hairy, bilobed, each lobe with crested dentate lobules, deeply cleft, coriaceous, longitudinally nerved, nerves forked into dentate lobes, tooth with pointed tips. Stamens inserted in the upper half of the corolla tube; anthers 2 mm long; filaments 3 cm long, anterior pair with few sparse hairs slightly below the top and near the base, posterior pair glabrous. Stigma minutely globose; style 4.2 cm long, glabrous.

Flowering and Fruiting: June-September

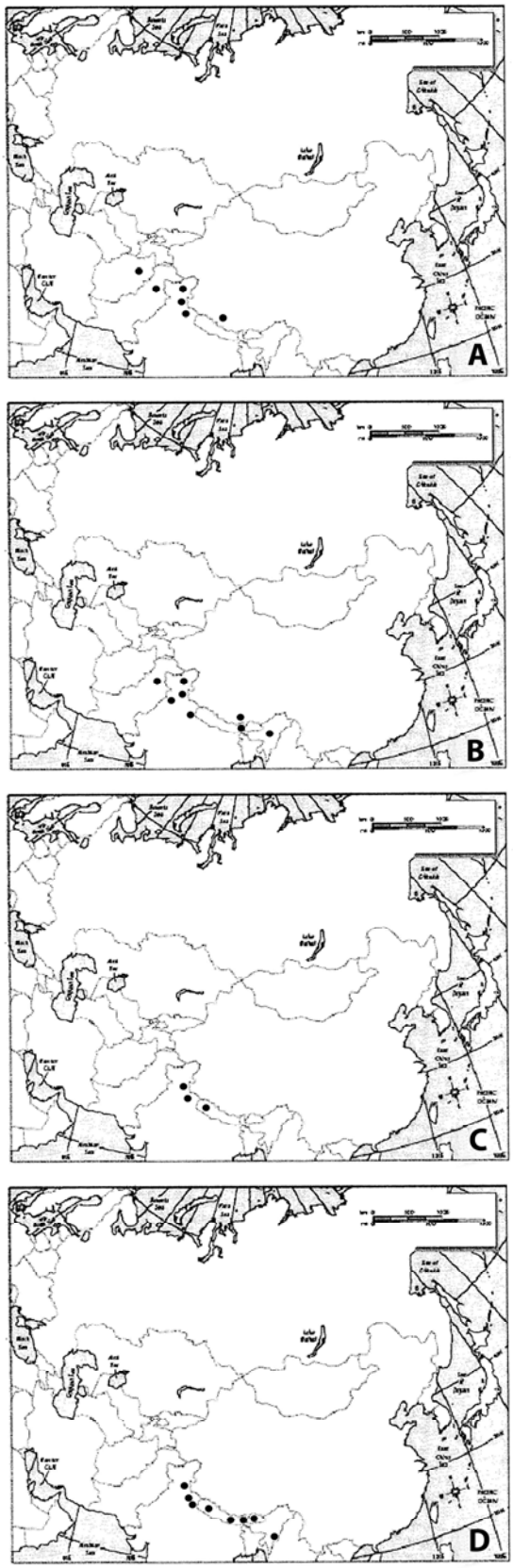
Distribution: *Pedicularis punctata* occurs throughout the Western Himalayas from eastern Afghanistan, Pakistan to Jammu and Kashmir, Himachal Pradesh, Uttaranchal and Uttar Pradesh in India uptill western Tibet. (Fig. 2A).

Ecology: It spreads gregariously on by spring, stream course, along running streams on mountain slopes, at altitudes ranging from 2500 to 4550 meters. It's microhabitat is comprised of *Trifolium* sp., some mosses and grasses.

Notes: *Pedicularis siphonantha* Don var. *brevituba* of Prain (in Journ. Asiat. Soc. Bengal. 58, pt II: 271, 1889) includes both *P. punctata* and *P. elephas* Boiss. but according to Pennell (1943), the description fits only the former species whereas the latter species is a native of Persia. The author noticed that on one sheet of BM *(J. H. Barbour s. n*., BM) there were two specimens mounted. The specimen indicated as 'A' was of *Pedicularis punctata* while the other specimen 'B' was *P. pectinata* var. *bipinnatifida.*

Specimens examined: Jammu & Kashmir: Gulmarg: 3333-3700 m, 8.1922, *J. H. Barbour s. n.* (BM); Gulmarg, on shady open ground, 2600 m, 27.7.1980, *U. C. Bhattacharya 71146* (BSD); Gulmarg, Khillar Marg, 2500 m, 31.8.1972, *M. A. Rau 50287* (BSD); Liddar, 3000 m, 6.7.1902, *J. R. Drummond* 14130 (BM); Jammu province, Sinthon, 3333 m, 23.7.1957, *G. Saran & Party 30326* (LWG); Wardwani, Jamer, 4000 m, 21.7.1963, *Aslam Khan & Amin Shah 84463* (LWG); Synthen Pass, 4000 m, 8.1986, *J. N. Vohra & Naithani 83089* (BSD); Sonamarg, 10.8.1987, *B. M. Wadhwa, S. K. Murti & P. C. Pant 85204* (BSD); Dachigan Game Sanctuary, 25.8.1987, *B. M. Wadhwa, S. K. Murti & P. C. Pant 85416* (BSD); Pahalgam, 12.9.1960, *S. K. Mehrotra 12252* (BSD); Pir pass/Banihal ridge, 3000-3330 m, 17.9.1958, *T. A. Rao 7755* (BSD); Ladakh, Pilung chho, 20.7.1976, *B. M. Wadhwa 58802* (BSD); Ladakh, Sonmarg, 25.7.1988, *U. C. Bhattacharya 71146* (BSD); Gulmarg, Khillar Margs, 2500m, 31.8.1972, *M. A. Rau_50287* (BSD); Thajwas, 3000m, 24.8.1972, *M. A. Rau_50216* (BSD); Bhadrawaha-Sevj, 2800m, 8.1986, *J. N. Vohra & B. D. Naithaini 83016* (BSD); Desu Rakh, 3200m, 2.7.1959, *T. A. Rao 9839* (BSD); Chandanwadi, 2900m, 24.7.1966, *N. C. Nair* 36928 (BSD); Desu Rakh, 3200 m, 2.7.1959, *T. A. Rao 9839* (BSD); Dagwan, 11.9.1979, *B. M. Wadhwa 66967* (BSD); Ladakh, Menehi, on Kargil Surn Road, 5.9.1975, *M. V. Vishwanathan 55671* (BSD); Ladakh, Dras, 3110-3250m, 16.7.1976, *B. M. Wadhwa 58566* (BSD); Ladakh, Sanhoo, 21.8.1976, *B. M. Wadhwa 59850* (BSD); Chandanwadi, 2900m, 24.7.1966, *N. C. Nair 36928* (BSD); Himachal Pradesh: Lahul: Gemur (on way to Jipsa from Keylong, 18 Km), 3335 m, 14.9.2001, *Tariq Husain & T. S. Rana 222138* (LWG); Thirot, U. Chenas, 2650m, 18.8.1971, *U. C. Bhattacharya 45380* (BSD); Gondla, 3500m, 28.6.1958, *M. A. Rau_5955* (BSD); Sissu-Gondla, 3500m, 27.6.1958, *M. A. Rau 5955* (BSD); Chamba (Pangi), Surail valley, 2900-4000m, 17.7.99, *Harsukh s.n.* (CAL); Chhatru, 3375m, 4.9.1961, *N. C. Nair 16655* (BSD); Koksar, 3200m, 3.7.1973, *U. C. Bhattacharya 51785* (BSD); Rohtang slope, 3600m, 3.8.1971, *U. C. Bhattacharya 45062* (BSD); Koksar, 3200m, 4.8.1970, *U. C. Bhattacharya s.n*. (BSD); Koksar 3200m, 19.7.1972, *U. C. Bhattacharya 48742* (BSD); Spiti: Kunzum Pass, 4535m, 7.9.1961, *N. C. Nair 16745* (BSD); Kulu Dist, Dibibokri Nal, 4266m, 15.7.1952, *E. Schelpe 3520* (BM); Kulu, near summit of Rohtang Pass, 4300m, 8.1978, *C. D. Sayers_3641* (BM); Rohtang (Kulu) 3600m, 3.8.1970, *U. C. Bhattacharya 40612* (BSD); Rohtang, 3500m, 24.9.1960, *M. A. Rau 12676* (BSD); Lahul, Gondla & Sissu, 3600m, 10.7.1888, *J. R. Drummond 8909* (BM); Pangu, *Stoliczka* 3 (BM); Rabla, 2200m, 2.8.1970, *U. C. Bhattacharya 40446* (BSD); Kilar, 2625m, 18.7.1964, *N. C. Nair 32626* (BSD); Chamba District, Bindrabam, 2500m, 17.7.1964, *N. C. Nair 32504* (BSD); Rawa, 2800m, 31.8.1962, *N. C. Nair 16512* (BSD); Kalpa, Bashahr, 2725m, 31.8.1963, *N. C.Nair 30299* (BSD); Uttaranchal: Pangu, *Stocliczka* 3 (BM); Uttarkashi District: on way to Barasu pass, 21.8.1996, *Bipin Balodi 92221*(BSD); Chamoli district: Bagra pass, 9.1993, *Bipin Balodi 82640* (BSD); Valley of flowers, 9.1978, *B. M. Wadhwa 62660* (BSD);

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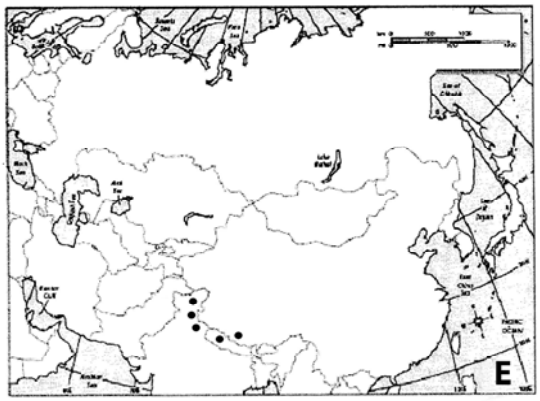


Fig. 2. Distribution Maps. A: *Pedicularis punctata* Decne. B: *Pedicularis siphonantha* D. Don. C: *Pedicularis hookeriana* Wallich D: *Pedicularis megalantha* D. Don. E: *Pedicularis hoffmeisteri* Kl.ex. Kl. and Garcke.

Kedarnath, 3400m, 7.1978, *A. S. Rao* 58479 (BSD); Valley of flowers, 9.1978, *B. M. Wadhwa 62493* (BSD); Valley of flowers, 15.9.1982, *D. Basu 72012* (BSD); Unknown locality: *s.l. s.n.* (LWG); W. Himalaya, *J. F. Duthie_24792* (BM); 3000m, 18.8.1886, *Ram Baksh 5187* (BM).

2. ***Pedicularis siphonantha*** D. Don, Prodr. Prodr. fl. nepal 95. 1825; Wall., Cat. 417. 1829 (*nom. nud.*); Hook.f. in Hook.f.Fl. Brit. Ind. 4: 313. 1884, p.p.; Prain in Ann. Royal Bot. Gard. Calcutta 3: 113, t.2A. 1890, *p.p.;* Polunin & Stainton, Fl. of Himalaya 303. 1984. (Type: Nepal, Gossain Than, *Wallich* 417 CAL, BM). Fig. 4

Dwarf densely tufted herbs, 5-15 cm tall; stemless or with decumbent stems, many from the root, glabrous. Radical leaves numerous, mostly 3-5 cm long, linear-oblong in outline, petiolate pinnatisect, upper surface with short sparse hairs; pinnae 9 pairs, opposite, distant, dentate; petiole 3 mm long. Inflorescence dense terminal cluster. Flowers numerous, pedicellate, bracteolate; pedicel 5 mm long, glabrous; bracts 15 x 5 mm, bi-pinnatipartite, unbranched, foliaceous, petiolate; petiole 5mm long having few distant hairs; pinnae 5 pairs, sub-alternate, a-dentate. Corolla purple-crimson; tube 3-5 cm long, glabrous, 3-5 times length of the calyx; galea sharpely coiled from base, glabrous, beak slender, tip bifid, one arm smaller; labium with broad, rounded lateral lobes and notched mid-lobe. Calyx tubular-campanulate, 12mm long, 3-lobed, foliaceous, glabrous below becoming slightly hairy above; tube 9mm long; lobes having 3mm long leafy apex with adentate, coriaceous, 5-pinnate lobules, mounted on 1mm stalk, mid-lobe smaller; each lobule further 5-lobed; margin of base of lobule stalk hairy. Stamens inserted at the base of galea; anthers 1.5 mm long; filaments 3-4mm long, anterior pair hairy with hairs confined to one side. Stigma capitate.

Flowering and Fruiting: June-August.

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Distribution: The species spreads from Kashmir, Himachal Pradesh, Punjab, Uttaranchal in western Himalayas to Sikkim and Assam in eastern Himalayas uptill eastern Tibet. (Fig. 2B).

Ecology: It occurs scattered along the grassy edges of alpine streams, open slopes and below pass among peat and gravels, at altitudes of 3300 to 5000 meters.

Specimens examined: Kashmir: Ramu, 1900m, 15.8.1891, *G.A.Gammie s. n.* (CAL). Himachal Pradesh: Tehri-Garhwal, Dudu glacier moraine, 4800-5000m, 10.8.83, *J.F. Duthie 565* (CAL); Chamba, Satlundi to Sach Pass, 4330m, 7.9.1895, *J.H.Lace 1236* (CAL). Uttaranchal: Kumaon, Ralam, 4000m, *R. Strachey & J. E. Winterbottom* 4 (BM). Sikkim: 3660-5000m, *J. D. Hooker* s.n. (BM); 3600m, 5.1885, *C. B. Clarke 46414* (BM); Dzlep La, 4660m, 2.10.1913, *R. E. Cooper 997* (BM); Changu, 4000, 27.9.1913, *R. E. Cooper 966* (BM). Assam: Orka La, 4300, 12.6.1938, *F. Kingdon-Ward 13735* (BM). E. Tibet, W. Yunan: Tali, 3600-4000m, Sept. 1906, *George Forest* 5078 (CAL); near Tachienlu, 3000-4500m, *A.E.Pratt 586* (CAL).

3. ***Pedicularis hookeriana*** Wall., Cat. 421. 1829 (*nom. nud*.); Benth., Scroph. Ind. 53. 1835; Pennell in Acad. Nat. Sci. Philadelphia, Monogr. 5: 155. 1943; Rau, High Alt. Flow. Pls. 162. 1975; Aswal & Mehrotra, Fl. of Lahul-Spiti 477. 1994. *P. siphonantha* sensu Hook.f. in Hook. f., Fl. Brit. Ind. 4: 313. 1884, *p.p. P. siphonantha* D. Don var. *siphonantha* f. *hookeriana-himalayca* Prain in Ann. Royal Bot. Gard. Calcutta 3: 115, t.2 B.1890. *P. himalayca* Klotzsch in Klotzsch & Garcke, Bot. Ergebn. Reise Wald. 107. t. 58. 1862. Fig. 5

Type: Kumaon, *Wallich* 421.

Erect or sub-erect herbs upto 10-35 cm tall; stem leafy, many from the root, glabrous or sparsely pubescent, ridged. Leaves petioled, glabrous, ovate-lanceolate, bi-pinnatisect; pinnae 6-14 pairs, oblong. Inflorescence terminal few flowered racemes. Flowers pedicillate, bracteolate; pedicel upto 5mm long, glabrous; bracts 7-8 x 2-3 mm, with two lateral branches at the base, bi-pinnatisect, foliaceous, glabrous. Corolla purple; tube 18-22 mm long, hairy, almost twice the length of the calyx; galea sharply incurved, toothed at base, surface with minute hairs, base broad, beak tapering initially then slender towards the tip; tip bifid, one arm slightly smaller; labium 3-lobed, lobes broad, spreading, median lobe slightly notched. Calyx linear, 12 mm long, deeply cleft nearing upto the base, hairy, tube 9mm long, margin not hairy; each lobe having 5-lobulate, dentate apex upto 2.5 mm long. Stamens inserted at the base of the galea; anthers 1.5 mm long; filaments 10 mm long, anterior pair hairy, hairs confined to upper half, posterior pair glabrous; stigma minute, globose.

Flowering and Fruiting: June-October.

Distribution and notes: The species ranges from Simla in Himachal Pradesh (Western Himalayas) to Nepal. (Fig. 2C).

Ecology: It is common in meadows, open hillside and glacial moraines, at altitudes ranging from 2700 to 4833 meters.

Specimens examined: Himachal Pradesh: Simla hill States, Dhaola Dhar Range, Rupin Pass, 4833 m, 8.7.1939, *G. Sherrif 7414* (BM); Simla hill States, Baspa valley, Sangla Rukti Gad, 4000m, 27.6.1939, *G. Sherriff 7358* (BM); Bharog (Chir Mt.), 18.?.86, *Ram Baksh 5187* (CAL). Uttaranchal: Tehri-Garhwal, 4000-4430m, 7.8.1883, *J. F. Duthie 562* (BM); Garhwal, Kidar Kanta, 3330 m, 13.6.1904, *J. R. Drummond 14841* (BM)

4. ***Pedicularis megalantha*** D. Don, Prodr. fl. nepal 94. 1825; Wall., Cat. 411. 1829 (*nom. nud.*); Benth., Scroph. Ind. 53. 1835; Hook.f. in Hook.f., Fl. Brit. Ind. 4: 312. 1884; Prain in Jour. As. Soc. Beng. 58, pt. II: 58. 1889; et in Ann. Royal Bot. Gard. Calcutta 3: 117, t.4 A-C. 1890; Collett, Fl. Siml. 361. 1902; Pennell in Acad. Nat. Sci. Philadelphia, Monogr. 5: 149. 1943; Polunin & Stainton, Fl. of Himalaya 302. 1984. Fig. 6

Type: Nepal, Emadus and Gossain Than, *Wallich* 411 CAL.

Erect herbs, 30-60 cm tall; stem one or several, hollow, stout, cylindrical, glabrous. Leaves pinnatifid, surface glabrous but hirsute along veins; pinnae 7-10 pairs, lubulate-dentate, lobes short or long; radical leaves 5-25 cm long, very long petioled; petiole 1.5-17 cm long; cauline leaves alternate, oblong-lanceolate. Inflorescence usually in a dense terminal head, sometimes a spike. Flowers large, pedicellate, bracteolate; pedicel 4-10 mm long, densely hairy; bracts 2.8 cm long, foliaceous, petiolate; petiole densely hairy. Corolla purple; tube upto 5.3-7 cm long, slender, hairy, 2-3 times the length of calyx; galea incurved, coiled, glabrous, with transverse nerves, beak long, slender, tip bifurcate into unequal arms; labium three lobed, mid lobe ovate, about half width of the rounded lateral lobes, margin minutely hairy. Calyx 1.8 cm long, 5-lobed, lobes crested, mostly hairy, margin recurved. Stamens inserted at the top of corolla tube slightly below the base of galea; anther 3.5 mm long, saggitate; filament 6-7 mm long; anterior pair densely woolly with long hairs on one side in the upper region and on both sides in the lower, margin wavy near base; posterior pair glabrous. Stigma capitate, style glabrous.

Flowering and Fruiting: June-October

Distribution and notes: *Pedicularis megalantha* is found to occur from the Himalayas of Himachal Pradesh, Uttar Pradesh to Sikkim in India, upto Bhutan (Fig. 2D).

Ecology: It generally grows on loam over gravel and on rocky hillsides, also , Nepal with peaty moss at altitudes of 2800 to 4300 meters.

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Notes: Hooker (1885) placed *Pedicularis hoffmeisteri* in the synonyms of *P. siphonantha*. However, Prain (*l.c.*) transferred *P. hoffmeisteri* under *P. megalantha*. Both these authors were of the opinion that color of flowers of *P. megalantha* is a phenotypic character and varied only geographically. Pennell (*l.c)* recognised three distinct species along the Himalayan range mainly on the basis of flower colour viz. *P. hoffmeisteri* which is distributed in the western Himalayas has yellow corolla whereas *P. megalantha* and *P. pauciflora* which are purely eastern in distribution have purple corollas.

The two eastern Himalayas species of Pennell (*l.c.*) viz. *P. hoffmeisteri* and *P. megalantha* were differentiated on the basis of inflorescence type, size of the corolla tube, pedicel length and mid lobe of labium. We have not yet come across any specimen of *P. pauciflora*. Our specimens of *P. megalantha* show some overlapping characters such as flowers in laxly disposed inflorescence along the whole length of the stem is found to overlap and should not be considered a distinguishing character.

Polunin & Stainton (1984) treated *Pedicularis megalantha* as a distinct species and stated the flowers to be pink to reddish-purple but extended the distribution of this species from Uttar Pradesh (Uttaranchal) to S. E. Tibet, this is very remarkable as Pennell (*l.c.*) had stated the distribution of this species to be from Eastern Nepal to Sikkim and finally to Bhutan. We have not yet examined any specimen from Uttaranchal or Tibet thus we will follow Pennell (*l.c.*) regarding the distribution of this species.

Dhaliwal & Sharma (1999) had treated *Pedicularis megalantha* as a synonym of *P. hoffeisteri* ignoring the colour of flower which he stated to be yellow for both the species.

Specimens examined: Sikkim: Changu & Kapup, 4000-4333m, 19.8.1913, *R. E. Copper 551* (BM); Changu, 4333m, 7.8.1942, *Ludlow & Sherriff 10095* (BM); Changu and Kapup, 4333m, 28.9.1913, *R. E. Cooper 976* (BM); Kapup, 4333m, 2.10.1913, *R. E. Cooper 1004* (BM).

5. ***Pedicularis hoffmeisteri*** Klotzsch ex Klotzsch & Garcke, Bot. Ergebn. Reise Wald. 108.t. 60. 1862; Pennell in Acad. Nat. Sci. Philadelphia, Monogr. 5: 147. 1943; Rau, High Alt. Flow. Pls. 30 & 161. 1975; Chowdhery & Wadhwa, Fl. Himach. Prad. 2: 525.1984; Polunin & Stainton, Fl. of Himalaya 300.t.95.1984. Aswal & Mehrotra, Fl. of Lahul-Spiti 479. 1994; Dhaliwal & Sharma, Fl. Kullu Dist. 484. 1999. *P. siphonantha* sensu Hook.f. in Hook. f., Fl. Brit. Ind. 4: 313. 1885, *p.p.* Fig. 7

Erect herbs, 30-60 cm tall, stem pubescent, cylinderical. Leaves deeply pinnatifid, petiolate; petiole hairy; surface sparsely hairy, ovate-oblong; pinnae 9-11 pairs, lobulate-crenate, close, oblong, dentate-lobed, apex rounded; radical leaves long petioled; petiole 5-6cm long; lamina 8 x 2.5-3.5 cm; cauline leaves opposite to alternate, petioled 1-4cm long. Inflorescence terminal many flowered racemes or often axillary solitary, occupying most of the distal half of the stout erect stem. Flowers pedicellate, bracteolate; pedicels 5-8 mm long, hairy; bracts foliaceous, 1.5 cm long. Corolla bright golden-yellow and sulfur-yellow; tube 3-5 cm long, hairy, 2-4 times as long as the calyx, thin, slender; galea incurved, sharpely toothed towards base, coiled, glabrous, with transverse nerves, beak long, slender, tip bifurcated into unequal arms; labium 3-lobed, mid lobe ovate, lateral lobes small, triangular, margin minutely hairy. Calyx 1-1.5 cm long, 5-lobed, papery, hairy; lobes crestate, margin straight. Stamens inserted near the top of corolla tube slightly below the galea base; anthers 3 mm long; filaments 7-9 mm long, all hairy, anterior pair densly pilose on outer side and less on inner, posterior pair with few hairs slightly below the top, glabrous below. Stigma capitate, style glabrous.

Flowering and Fruiting: June-August

Distribution and notes: The species occurs from Kashmir Himalayas to Kumaon in Uttaranchal to Nepal and western Tibet (Fig. 2E).

Ecology: It grows on moist slopes, along streams and on open grassy slopes, at altitudes of 2100 to 4000 meters.

Notes: The treatment of Pennell (*l.c.*) is followed here while treating all the yellow flowering plants from Western Himalaya as *Pedicularis hoffmeisteri.* Polunin & Stainton *(l.c.*) have extended the distribution of this species upto E. Nepal though Pennell (*l.c.*) had very clearly demarcated the boundaries of *P. hoffmeisteri* and *P. megalantha*. The specimens studied by us till now do not agree with Polunin & Stainton's (*l.c.*) distribution of the two species.

One specimen form BM from Kashmir which might be true *P. hoffmeisteri* having extended in distribution from the neighboring area i.e. Chamba in Himachal Pradesh to Kashmir.

Specimens examined: Jammu & Kashmir: Unknown locality, 1914-1915, *Mrs Prescott Decie s. n.* (BM); Himachal Pradesh: Simla, 2666m, 1886, *Ram Buksh 5180* (BM); Simla, 8.1886, *Ram Buksh 5178* (BM); Kangra, 4.10.1885, *A. Barclay 145* (BM); On way to Hattu Peak, 9.1994, *Bipin Balodi 88765* (BSD); Narkanda forest, 9.1994, *Bipin Balodi 88725* (BSD); Above Rahla, 2500m, 2.8.1970, *U. C. Bhattacharya 40418* (BSD); Dhanchu, 2950m, 26.7.1963, *C. L. Malhotra & V. J. Nair 28413* (BSD); On way to Dhanchu, 2400m, 3.7.1974, *B. M. Wadhwa 49500* (BSD); Sangla, Bashahr, 2900m, 22.9.1964, *N. C. Nair 34151* (BSD); Chitkal, 24.9.1971, *K. P. Janardhanan 46190* (BSD); Sangla, 2600m, 20.9.1964, *N. C. Nair 33077* (BSD); Rahla forest, 2800m, 28.9.1960, *M. A. Rau 12715* (BSD); Rahla forest, 2800m, 28.9.1960, *M. A. Rau 12792* (BSD); Uttaranchal: Garhwal: Chamoli Dist., Badrinath, on way to Manna village, 12.9.1968, *L. D. Kapoor & Party 70268/D* (LWG); Chakrata to Dehra Dun, 2500m, 19.10.1949, *D. D. Awasthi 116* (LWG); Chamoli, 8.9.1968, *S. L. Kapoor*

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Fig. 3. ***Pedicularis punctata*** **Decne.**

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Fig. 4. ***Pedicularis siphonantha*** **D. Don.**

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Fig. 5. *Pedicularis hookeriana* Wallich.

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Fig. 6. *Pedicularis megalantha* D. Don var. *pauciflora* Prain.

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Fig. 7. *Pedicularis hoffmeisteri* Kl. ex. Kl. and Garcke.

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& Party 70268 (LWG); Chamoli Dist, Kanga area, 3000m, 17.8.1975, *B. D. Naithani 54097*(BSD); Tehri Dist., Birodh to Khorsuli, 2.10.1991, *S. C. Majumdar & Bipin Balodi 81538* (BSD); Tehri Dist., Pinswar, 2500m, 22.9.1974, *M. V. Vishwanathan 54864* (BSD); Chamoli Dist., Nem Belta, 227.8.1989, *P. K. Hajra* 87223 (BSD); Kukini Khal, 3200m, 4.10.1963, *U. C. Bhattacharya 31039* (BSD); Chamoli Dist., Tolma-Himtoli, *P. K. Hajra 87223* (BSD); Chamoli Dist., Mandal, Chopta road, 29.8.1978, *Panigrahi & Wadhwa 65517* (BSD); Tehri Dist., Gangi, 800m, 12.8.1978, *A. K. Goel 64397* (BSD); Valley of flowers, 3700m, 13.10.1962, *U. C. Bhattacharya 24436* (BSD); On way to Hemkund, 3500m, 17.8.1963, *U.C.Bhattacharya 29534* (BSD); Chamoli Dist., Ghangharia, 15. 1982, *D. Basu 72074* (BSD); Mandakani Valley, 8.1968, *M. A. Rau* 38649 (BSD); Hemkund on way, 3500m, 17.8.1963, *U. C. Bhattacharya 29534* (BSD); Tehri Garhwal, Nag Tibba, 2700m, 27.7.1964, *U. C. Bhattacharya 33736* (BSD); Tehri Garhwal, On way Khatling, 3000m, 19.9.1979, *A. K. Goel 67921* (BSD); Kumaon: Pithoragarh, between Girgam and Munsiyari, 14.11.1958, *J. G. Srivastava & Party 53800* (LWG); Almora, between Railkot and Bugdiar, 12.11.1958, *J. G. Srivastava & Party 53509* (LWG); Almora, between Millam & Railkot, 11.11.1958, *J.G.Srivastava 52489* (LWG); Almora Dist., Baryoyar-Rilkot, 3000-3166m, 5.10.1950, *D. D. Awasthi* 1801 (LWG); near Kutli in Byans, 9.9.1884, *J. F. Duthie 3220* (BM); Kathi/Dwali, 2500-3300m, 21.9.1957, *T. A. Rao 4354* (BSD); On way to Munsiari, 30.2800m, *T. A. Rao 7199* (BSD); Bhatia-Khan, 3600m, 7.8.1972, *C.M.Arora 49703* (BSD); 8.1969, *Pant & Naithani 39511* (BSD); Rathi-Girgaon, 2000-3500m, 26.6.1958,); Bdafia forest (Maithi), 3000m, 10.9.1971, *C. M. Arora 45621* (BSD); Way to Ralam Glacier, 4000m, 15.9.1969, *Pant & Naithani 39717* (BSD); Kathi, Dwali, 2500-3300m, 21.9.1957, *T. A. Rao 4354* (BSD); Betuli Dhar, 24.6.1963, *P. C. Pant 28248* (BSD); Pithoragarh Dist., On way to Khaliya top, 3100m, 13.9.1983, *Bipin Balodi 75171* (BSD).

ACKNOWLEDGEMENTS

The author is thankful to the Department of Science and Technology, New Delhi for financial assistance, Director, N.B.R.I. for facilities and Director, Botanical Survey of India for encouragement.

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印度馬先蒿屬 *Siphonanthae* 節

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(收稿日期：2008 年 10 月 16 日；接受日期：2009 年 3 月 10 日)

摘要：經由詳細的形態研究，本文釐清馬先蒿屬(*Pedicularis*)中五個分類地位混淆的分類群，亦即 *P. punctata* Decne, *P. siphonantha* D. Don, *P. hookeriana* Wall. ex Benth., *P. megalantha* D. Don 以及 *P. hoffmeisteri* Kl. ex Kl. & Garcke 等五種。這些分類群隸屬於 *Longirostres* 亞屬 *Siphonanthae* 節。本文再度肯定 Pennell 劃分這些分類群為不同種的觀點。

關鍵詞：玄參科、印度、喜馬拉雅山、*Pedicularis hoffmeisteri*, *Pedicularis hookeriana*, *Pedicularis megalantha*, *Pedicularis punctata*, *Pedicularis siphonantha*, *Siphonanthae*.

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