

Christolea : with Special Reference to the Species in N.W. Himalayas, W. Pakistan and Afghanistan

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Recent investigations have revealed that *Christolea* Cambess. (1844) and *Ermania* Chamisso (1831) are congeneric. Although *Ermania* is the earlier, it is not a valid name. It was published originally as an alternative name for *Draba*? *parryoides* Cham. (Linnaea, vi, 533: 1831). Chamisso wrote, "*Draba*? *parryoides* n.sp. vel potius novum genus e solo fructu, deficiente flore, haud rite definiendum. *Draba* dolichocarpis subjungimus pro tempore plantam aliquanduo fors jure meritoque nomine inventoris ERMANIAM parryoidem salutandam. . . ."

Ledebour (Fl. Ross. i, 132: 1842) regarded *D.*? *parryoides* Cham. as a species of *Parrya* and named it *Parrya Ermanii*. N. Busch (in Fl. Sib.: 1931) retained *P. Ermanii* Ledeb. but later on (in Komarov, Fl. U.R.S.S. viii, 328: 1939) she correctly recognized it as a species of *Christolea*, making a new combination *Christolea parryoides* (Cham.) N. Busch. Thus, it was Busch who first found that *Ermania* was congeneric with *Christolea* and the former being invalid she took up the valid generic name *Christolea*. At the same time she transferred two more species to *Christolea*, bringing the number of species to five in the Russian territory. But out of these five, only three remain as distinct species, because the other two are nothing but states of *Christolea crassifolia* Cambess.; this was revealed during my studies in the British herbaria after examining a large number of specimens.

The original description of *Christolea* given by Cambessedes, based only on Jacquemont's collection from Himalayas, is incomplete. Apparently the flowers look yellowish in Jacquemont's specimens, but a careful examination shows that the lilac tinge is present at the base of most flowers. Probably, due to this yellowish colour of the flower the genus was included under the tribe Sisymbrieae by Cambessedes and most other authors. But now there is a very large collection of specimens present at Kew and a study into *Christolea crassifolia* Cambess. shows a very wide range of variation: densely pilose to glabrous habit; flowers yellowish to pale lilac. Therefore, the original generic description does not hold good. The same is true when we see the other species, which also have the same kind of variations. This has compelled me to give an adequate description of the genus.

O. E. Schulz (in Engler & Prantl, Nat. Pflanzenfam. 2 Aufl.: 1936) not only recognizes *Ermania* Cham. and *Christolea* Cambess. as two distinct genera but keeps them under two different tribes: the former under Arabideae and the latter under Sisymbrieae. He includes about 10 species under *Ermania*, quoting *Desideria* Pamp. (1926: based on an abnormal specimen of *Ermania himalayensis*) as a synonym, and 3 species under *Christolea*. He described a new species of *Draba*, *D. laujarica* (in Fedde, Rep. xxxiii, 109: 1935), without apparently realizing that the type specimen quoted for this was already the type of *Ermania lanuginosa* (Hook. f. et Thoms.) O.E. Schulz (syn. *Parrya lanuginosa* Hook. f. et Thoms.). Thus, Schulz obscured the generic concept of *Ermania* and *Draba* by inadvertently placing

the same specimen in both genera. This specimen, *Strachey and Winterbottom* no. 7 (K1) from Laujar, W. Tibet, has a superficial resemblance in its fruits to some species of *Draba*: for the pods are large, ovate-oblong or broadly linear. But the habit and every other character of this specimen leaves no doubt that it is a species of *Christolea* (*Ermania*). Such fruit shape is even present on the type species of *Christolea*, *C. crassifolia*. The septum is incomplete in the type specimen of *Parrya lanuginosa* Hook. f. et Thoms., but other records show a range from slightly incomplete to very incomplete septum. It is probably due to the septum being thinnest in the middle, a character present in most of the species of *Christolea* included here.

Recently Eric Hultén, in his *Flora of Alaska & Yukon* (1945), recognized two species of *Ermania* from his region, *E. parryoides* Cham. and *E. borealis* (Greene) Hultén. His *E. borealis* also shows incomplete to complete septum character. He quotes *Melanidion* Greene (1912) and *Arcroschizocarpus* Gombocz (1940) as synonyms of *Ermania* Cham. Hultén's interesting discussion leaves no doubt that they must now be placed as synonyms of *Christolea*, as *Ermania* is not a valid name.

Very recently K. H. Rechinger (in *Phyton*, iii, 59: 1951) described a new monotypic genus, *Koelzia* from Afghanistan. He doubtfully included it under the tribe Arabideae. It is interesting to note that his new genus and new species, *Koelzia afghanica*, is nothing but *Christolea crassifolia* placed under the tribe Sisymbrieae by Schulz and other previous authors. Rechinger was perfectly right in placing his *Koelzia* under Arabideae. *Christolea* with that sort of flower and fruit character occupies a very odd place under the tribe Sisymbrieae.

Christolea is a remarkably distinct genus especially in its habit, leaf, indumentum, flower and fruit characters: radical leaves short \pm spatulate often tufted, usually 3-10-toothed or lobulate above and entire below, pilose with simple and furcate hairs; flowers usually lilac; silique linear or lanceolate to ovate-oblong, compressed to sub-inflated, often \pm pilose; lateral nectariferous glands semi-annular or annular, median joining the laterals. These characters leave me in no doubt that its proper place is under the tribe Arabideae as given for *Ermania* and not under Sisymbrieae as given for *Christolea* by O. E. Schulz. *Christolea* including *Ermania* as synonym has been given a place between *Octoceras* and *Farsetia* by Busch (in Komarov, Fl. U.R.S.S. viii, 328: 1939).

I find the following thirteen species of *Christolea* Cambess.; one new species is described from Kashmir. The genus is primarily central Asian and Himalayan.

Christolea Cambess. in Jacquemont, Voy. Bot. 17, t. 17 (1844); Bentham & Hooker, Gen. Plant. i, 80 (1853); Schulz in Engler & Prantl, Nat. Pflanzenfam. 2 Aufl. 17b, 464 (1936); Busch in Komarov, Fl. U.R.S.S. viii, 328 (1936).

Syn.: *Ermania* Cham. in Linnaea, vi, 533 (1831)—not valid.

Melanidion Greene in Ottawa Nat., xxv, 146 (1912).

Desideria Pamp. in Bull. Soc. Bot. Ital., 107 (1926).

Arcroschizocarpus Gomb. in Bot. Kozl. xxxvii, 1 (1940).

Koelzia Rechinger fil. in *Phyton*, iii, 59 (1951).

Perennial, often tufted and somewhat dark coloured herbs, pilose with simple or furcate white hairs, very rarely glabrous. *Branches* often procumbent or suberect, mostly developing from the base, leafy or not. *Leaves* spatulate or obovate-oblong, 1-5(-10)-toothed or lobulate usually above, \pm entire below, sometimes obscurely toothed, often pilose, very rarely glabrous, 1-5-veined; basal leaves rosulate, somewhat larger than the upper leaves. *Racemes* few- to many-flowered, subcorymbose above, bracteate or ebracteate, sometimes scapose. *Flowers* small or medium sized, usually lilac, rarely white or yellowish with \pm lilac bases. *Pedicels* short or long often pilose, often \pm unilateral. *Sepals* suberect equal or subequal, oblong, obtuse, inner pair not or hardly saccate at the base, sometimes persistent even in fruit. *Petals* spatulate or obovate-oblong. *Stamens* six; filaments not appendaged; anthers oblong, obtuse or sub-apiculate. *Lateral nectariferous glands* annular; median joining the laterals. *Ovary* narrowly to broadly linear, rarely ovate, often pilose, few to many ovuled; stigma depressed capitate, sessile or subsessile, rarely on short style. *Siliquae* narrowly to broadly linear, lanceolate or oblanceolate, short or long, bilocular, dehiscent; valves plane-compressed to sub-inflated, pilose to glabrous, usually with a distinct mid-vein, and reticulate venation; seeds 1-2-seriate; septum membranous, complete, rarely incomplete, thinnest in the middle.

Thirteen species, chiefly in Himalayas and central Asia.

Enumeration of the species

1. *Christolea crassifolia* Cambess. in Jacquemont, Voy. Bot. 17, t. 17 (1844).

Syn.: *C. pamirica* Korsh. in Mem. Acad. Petersb. ser. 8, iv, 89 (1896).

C. crassifolia var. *pamirica* (Korsh.) Korsh., Fragm. Fl. Turk., 415 (1898).

C. incisa Schulz in Notizblatt Bot. Gart. Berlin, ix, 1073 (1927).

Koelzia afghanica Rech. fil. in Phytion, iii, 59 (1951).*

Type: W. Tibet, Jacquemont (P, K!).

GEOG. DIST.: Himalayas, C. Asia and Afghanistan.

2. *C. parryoides* (Cham.) Busch in Komarov, Fl. U.R.S.S. viii, 331 (1939).

Syn.: *Draba* ? *parryoides* Cham. in Linnaea, vi, 533 (1831).

Ermania parryoides Cham. l.c. et in Erman, Verz., 62 (1835)—not validly published.

Parrya Ermanii Ledeb., Fl. Ross. i, 132 (1842).

Type: North Asia, Kamtchatka, Erman (L?, K!).

GEOG. DIST.: N. Asia and Alaska.

* Add the synonym *Christolea afghanica* (Rech. fil.) Rech. fil. in Anz. Math.-Nat. Kl. Ost. Akad. Wiss. 1954, No. 7, 64.

3. *C. borealis* (Greene) Jafri, **comb. nov.**
 Syn.: *Melanidion boreale* Greene in Ottawa Nat. xxv, 146 (1912).
Arcroschizocarpus Kolianus Gombocz in Bot. Kozl. xxxvii, 1 (1940).
Ermania borealis (Greene) Hultén, Fl. Alaska and Yukon, 878 (1945).
 Type: Alaska, Runt creek (?), *Craines* (?—not seen).
 GEOG. DIST.: Endemic.
4. *C. lanuginosa* (Hook. f. et Thoms.) Jafri, **comb. nov.**
 Syn.: *Parrya lanuginosa* Hook. f. et Thoms., in Journ. Linn. Soc. Bot. v, 136 (1861).
Ermania lanuginosa (Hook. f. et Thoms.) Schulz in Fedde, Rep. xxxiii, 185 (1933).
E. Koelzii Schulz in Fedde, Rep. xxxi, 332 (1933), et xxxiii, 109 (1935).
 Type: W. Tibet, Laujar, 5250 m., *Strachey* & *Winterbottom* 7 (K1).
 GEOG. DIST.: Himalayas (Kashmir to eastern Tibet).
5. *C. flabellata* (Regel) Busch in Komarov, Fl. U.R.S.S. viii, 330 (1939).
 Syn.: *Parrya flabellata* Regel in Bull. Soc. Nat. Mosc. ii, 261 (1870).
Ermania flabellata (Regel) Schulz in Bot. Jahrb. lxvi, 98 (1933).
 Type: Turkestan, *Regel* (L, K1).
 GEOG. DIST.: C. Asia.
6. *C. albiflora* (T. Anders.) Jafri, **comb. nov.**
 Syn.: *Cheiranthus albiflorus* T. Anders. in Hook. f. Fl. Brit. India, i, 133 (1872).
Ermania albiflora (T. Anders.) Schulz in Bot. Jahrb. lxvi, 98 (1933).
 Type: West Tibet, Zanskar, 3600–4800 m., *T. Thomson* (K1).
 GEOG. DIST.: Known from the type locality only.
7. *C. Parkeri* (O. E. Schulz) Jafri, **comb. nov.**
 Syn.: *Ermania Parkeri* Schulz in Fedde, Rep. xxxi, 333 (1933).
 Type: Kashmir, Sonmarg, 3900 m., *R. Stewart* 9874 A(B—not seen).
 GEOG. DIST.: Kashmir, extending to Karakoram range.
8. *C. villosa* (Maxim.) Jafri, **comb. nov.**
 Syn.: *Parrya villosa* Maxim., Fl. Tangut., 55 (1889).
Ermania villosa (Maxim.) Schulz in Fedde, Rep. xxxiii, 186 (1933).
 Type: North Tibet, *Przewalski* (L, K1).
 GEOG. DIST.: Tibet.
9. *C. maidantica* (M. Pop. et Bar.) Busch in Komarov, Fl. U.R.S.S. viii, 330 (1939).
 Syn.: *Parrya maidantica* M. Pop. et Bar. in Not. Syst. Hort. Petrop. iv, 175 (1923).
 Type: C. Asia, Mt. Talas–Ala–tau, Maidantal, *Popov* et al. (L—not seen).
 GEOG. DIST.: Central Asia.

10. *C. prolifera* (Maxim.) Jafri, **comb. nov.**
 Syn. : *Parrya prolifera* Maxim., Fl. Tangut., 56 (1889).
Ermania prolifera (Maxim.) Schulz in Bot. Jahrb. lxvi, 98 (1933).
 Type : North Tibet, Przewalski (L, Kl).
 GEOG. DIST. : Tibet.
11. *C. scaposa* Jafri, **sp. nov.** (description follows).
12. *C. Stewartii* (T. Anders.) Jafri, **comb. nov.**
 Syn. : *Cheiranthus Stewartii* T. Anders. in Hook. f., Fl. Brit. India, i,
 133 (1872).
Ermania Stewartii (T. Anders.) Schulz in Bot. Jahrb. lxvi, 98
 (1933).
 Type : Kashmir, Ladak, J. L. Stewart (Kl).
 GEOG. DIST. : Kashmir.
13. *C. himalayensis* (Cambess.) Jafri, **comb. nov.**
 Syn. : *Cheiranthus himalayensis* Cambess. in Jacquemont, Voy. Bot., 14
 (1844).
Cheiranthus himalaicus Hook. f. et Thoms. in Journ. Linn. Soc.
 Bot. v, 137 (1861).
Desideria mirabilis Pamp. in Bull. Soc. Bot. Ital., 110 (1926).
Ermania himalayensis (Cambess.) Schulz in Notizblatt, ix, 1080
 (1927).
Christolea linearis Busch in Komarov, Fl. U.R.S.S. viii, 331 and
 636, t. 15 (1929).
 Type : N.W. Himalayas, Kunawar, Jacquemont (P, Kl).
 GEOG. DIST. : Himalayas, W. Pakistan (Chitral) and C. Asia.

SPECIES IN N.W. HIMALAYAS, W. PAKISTAN AND AFGHANISTAN.*

For synonyms, type and geographical distribution see above under enumeration of all the species.

1. Racemes bracteate, at least below :
- | | |
|--|----------------------------|
| 2. Siliquae glabrous | 12. <i>C. Stewartii</i> |
| 2. Siliquae pilose : | |
| 3. Plants clothed with short stellate hairs ; flowers white | 6. <i>C. albiflora</i> |
| 3. Plants pilose with simple rarely furcate hairs ; flowers lilac : | |
| 4. Leaves narrow \pm entire ; flowers white, often with lilac bases ; hairs short | 7. <i>C. Parkeri</i> |
| 4. Leaves spatulate, 1-3-toothed above ; flowers lilac ; hairs long | 13. <i>C. himalayensis</i> |

* The area whose Crucifers have been studied by me for my Ph.D. thesis.

1. Racemes ebracteate :

5. Fruits ovate-oblong or broadly linear with a length/breadth ratio of 2-2.5; septum incomplete; seeds biseriate . . . 4. *C. lanuginosa*
5. Fruits linear or lanceolate with a length/breadth ratio of 4-8; septum complete; seeds uniseriate (rarely sub-biseriate) :
6. Cauline leaves absent; radical leaves with \pm orbicular lamina having (5-)8-10 regular short lobes . . . 11. *C. scaposa*
6. Cauline leaves present; radical leaves with spatulate or obovate lamina having 3(-5) irregular \pm triangular teeth . . . 1. *C. crassifolia*

1. *C. crassifolia* Cambess. (Fig. 1A).

Perennial, 15-40 cm. tall, branched, decumbent or suberect, densely pubescent to glabrous; hairs simple rarely forked; branches sparsely leaved. *Leaves* very variable in size and shape, obovate-oblong or spatulate, 1.5 \times 0.3-2.5 cm., usually \pm 3-toothed above, sometimes sinuate toothed or subentire, usually somewhat fleshy often 3-veined; teeth \pm triangular, irregular. *Racemes* 10-25-flowered, ebracteate, corymbose above, increasing up to 8 cm. in fruit. *Flowers* 4-7 mm. in diameter, yellowish often with lilac bases; pedicels 2-6 mm. increasing up to 10 mm. in fruit, filiform, often subappressed and curved towards the apex. *Sepals* 2.8-3.8 \times 1-1.8 mm. *Petals* 4.8-6.2 \times 1.5-3 mm., spatulate, apex rounded. *Stamens* 3-3.5 : 3.5-4 mm. long; anthers about 1 mm., oblong, obtuse or subapiculate. *Siliquae* 1.2-3.2 \times 0.3-0.4 cm., broadly linear, compressed, rarely subcontorted, glabrous or hairy; valves with a distinct mid-vein and reticulate venation; stigma sub-bilobed, depressed-capitate, subsessile or on very short style; seeds 5-10 in each loculus, uniseriate, about 2 \times 1 mm.; septum complete.

AFGHANISTAN. Badakhshan, 3000-3600 m., *Giles* 238 (K!), 245 (K!); Minjan pass, 3600 m., *Koelz* 12723 (V, US!).

N. W. HIMALAYAS. Kunawar, *Thomson* (K!); Spiti, 3600 m., *Gill* 2000 (K!); Ascent to Kiber, Piti, 3900-4200 m., *Thomson* (K!); (without locality), *J. L. Stewart* (E!).

KASHMIR. Baltistan, *Falconer* (K!); 2700 m., *Ludlow* 370 (BM!); Ladak, 3900-4200 m., *Thomson* (K!); Gya, 4050 m., *Ludlow* & *Sherriff* 8486 (BM!); Lamayuru, 3300 m., *Ludlow* & *Sherriff* 8379 (BM!); Gogna, 4650 m., *Ludlow* 825 (BM!); Kharchor, 3090 m., *Ludlow* 510 (BM!); N. Khardong valley, 4200 m., rocky banks of streams, *Clifford* 12 (K!); Lamayuru, 3450 m., *Osmaston* 35 (K!); Puga, Rupshu, 4650 m., on dry sandy plains, *W. Koelz* 2160 (K!); Ladak, 3300 m., *Kohli* 5 (K!); Khardong gorge 3300-3900 m., *Clifford* 23 (K!); Baltistan, Thalle La, 3000 m., *R. Stewart* 20588 (R!).

WEST TIBET. (Without locality), *Jacquemont* (K!); *Thomson* (K!); Sutlej river banks, 4050 m., *Strachey* & *Winterbottom* (K!); Nubra, *Munro* (K!);

Thomson (K!); *Schlagintweit* cat. no. 2364 (E!); Zanskar, 3600-4500 m., Thomson (K!); (without locality), Thomson (E!); Pangkong, *Schlagintweit* cat. no. 2562 (BM!); Karakash, watershed, *Cayley* (K!).

A very variable species, especially in shape and size of leaves and degree of pubescence. Size of siliquae also shows a wide range of variation. Any separation of taxa on these characters would be valueless. The above measurements show a continuous range of variation.

4. *C. lanuginosa* (Hook. f. et Thoms.) Jafri (Fig. 1, C).

Perennial, 1-5 cm. tall, erect, pilose with simple and branched white hairs; flowering branches aphyllous. *Radical leaves* rosulate, spatulate, 7-13 × 2-6 mm., entire or with 1-3 blunt teeth above. *Racemes* 8-15-flowered (rarely about 3-flowered), ebracteate, subcorymbose, increasing up to 2 cm. in fruit. *Flowers* 3-4 mm. in diameter, mauve; pedicels 2-4 mm., increasing up to 6 mm. in fruit, ± spreading. *Sepals* 2.5-3(-5) × 1-1.5 mm., somewhat persistent. *Petals* 5-6(-9) × 2-2.5 mm., spatulate, apex sub-emarginate. *Stamens* 3-4: 4-6 mm.; anthers about 1 mm., oblong, obtuse. *Siliquae* (almost mature) about 2 × 0.8 cm., broadly linear or oblong-ovate, acute flattened, often subcontorted, ± glabrous; valves with a distinct mid-vein; style short about 0.5 mm. with short, sub-retuse stigma; seeds 4-6 in each loculus, biseriate, 1.5-2 × 0.8-1.2 mm. elliptic, smoke-brown; septum incomplete, often confined to the margins.

N.W. HIMALAYAS. Kashmir: Rupshu kyensa La, 5700 m., *W. Koelz* 2231 (B—not seen). W. Tibet: Laujar, 5250 m., *Strachey & Winterbottom* 7 (K!).

6. *C. albiflora* (Γ. Anders.) Jafri (Fig. 1, D).

Perennial, 3-10 cm. tall, clothed with stellate, short hairs, erect, leafy. *Radical leaves* narrowly spatulate or oblong-obovate, 1-2 × 0.15-0.4 cm., entire or shortly 1-3-lobulate, apex rounded; upper leaves oblanceolate or linear; uppermost usually acting as bracts. *Racemes* 10-15-flowered, corymbose above, bracteate below. *Flowers* 5-6 mm. in diameter, white; pedicels 1.5-3 mm. long, increasing about twice their length in fruit. *Sepals* 2.7-3 × 1-1.5 mm. *Petals* 7-8 × 3-3.5 mm., obovate, apex sub-truncate. *Stamens* about 3: 3.5 mm.: anthers about 0.7 mm., oblong, obtuse. *Siliquae* (very young) about 5 × 0.8 mm., linear, densely hairy; style about 0.7 mm, glabrous with short depressed, sub-retuse stigma.

Known from the type locality only. Mature siliquae still unknown.

7. *C. Parkeri* (O. E. Schulz) Jafri (Fig. 1, B).

Perennial, 2.5-10 cm. tall, erect, leafy, hairy with simple rarely forked hairs. *Radical leaves* narrowly spatulate, 1-1.5 × 0.3-0.5 cm., entire or slightly 1-3-toothed, apex rounded; upper leaves short, oblanceolate to linear. *Racemes* 10-15-flowered, bracteate, corymbose above. *Flowers* about 5 mm. in diameter, white, often with violet tinge at the bases; pedicels 1-2(-4) mm., increasing more than twice their length in fruit. *Sepals* 2.8-3 × 1-1.2 mm., often with purplish colour. *Petals* 4.5-8 × 2-2.5 mm., spatulate, apex sub-emarginate. *Stamens* 2.5-3: 3.2-3.5 mm.;

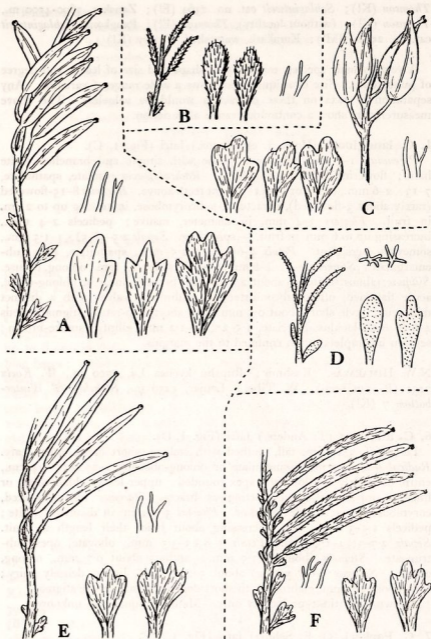


Fig. 1

A, *Christolea crassifolia* Cambess. B, *C. Parkeri* (Schulz) Jafri. C, *C. lanuginosa* (Hook f. & Thoms.) Jafri. D, *C. albiflora* (T. And.) Jafri. E, *C. Stewartii* (T. And.) Jafri. F, *C. himalayensis* (Cambess.) Jafri. For each species the details shown are fruits (X1), leaves (X1), and hairs (X6).

anthers 0.5-0.7 mm., oblong, obtuse. *Siliquae* (young) about 1×0.1 cm., linear, pilose, about 8-ovuled in each loculus; stigma depressed-capitate, shortly bilobed, subsessile or sessile.

N.W. HIMALAYAS. Kashmir: Ladak, Hanupatta, 4350 m., stony sandy slopes, *Osmaston* 55 (Kl). Karakoram: Sat village, 2400 m., *Conway* (with *C. himalayensis*—Kl).



Fig. 2

Christolea scoposa Jafri. A, habit, X1; B, leaf, X2; C, hairs, X8; D, stamens, sepal and petal, X2; E, fruit, X2.

I have not seen the type specimen of this species, but its habit, like *C. albiflora* (T. Anders.) Jafri with simple hairs, is so characteristic that it cannot be confused with any other species. The other two records from Kashmir and Karakoram seen at Kew differ slightly in the size of flowering

shoot and flowers: being slightly larger than indicated in Schulz's original description.

11. *Christolea scaposa* Jafri, sp. nov. Affinis *C. prolifero* (Maxim.) Jafri sed caulibus nudis, racemis flexuosis multifloris, floribus brevibus viridi-lilacinis, sepalis persistentibus, pedicellis in fructu multo longioribus, siliquis angustioribus dense pilosis differt. (Fig. 2.)

Herba perennis dense pilosa circa 10 cm. alta violacea, pilis simplicibus rarius furcatis albis obsita. *Radix* elongatus circa 2 mm. crassus. *Caulis* aphylli flexuosi. *Folia* radicalia dense rosulata spatulata, 5-14 × 2.5-8 mm.; lamina petiolum aequans, ± orbiculata saepe 8-10-lobulata, carnosula, pilosa. *Racemus* circa 30-florus, ebracteatus, laxissimus, superne sub-corymbosus, in fructu circa 10 cm. longus. *Flores* breves circa 5 mm. diam., viridi-lilacini. *Pedicelli* 4-6 mm. longi, filiformes, suberecti, in fructu circa 10 mm. longi, pilosi. *Sepala* 3-4 × 1.2-1.7 mm., oblonga, ad apicem rotundata persistentia. *Petala* 5-6.5 × 2 mm., spatulata, ad apicem subtruncata. *Stamina* 3-5 : 4.5-6 mm. longa; antherae circa 1 mm. longae oblongae obtusae. *Siliquae* (immaturae) usque 12 × 2 mm., late lineari-oblongae compressae dense pilosae; valvae uninervosae; stigma bilobatum subsessile vel sessile; semina immatura uniseriata; septum completum.

N.W. HIMALAYAS. Kashmir, Shaksgam valley, 4950 m., 3 July 1926
R. C. Clifford 7 (holo. K!).

Distinguished from *C. prolifero* (Maxim.) Jafri by its aphyllous flowering shoot; flexuose many-flowered raceme, small green-lilac flowers, persistent sepals, elongated pedicels and narrow pilose siliquae.

R. C. Clifford gives the following field note: "Green flowered plant found growing on a gravel and shale slope about 500 ft. above stream level at 16500 ft.; July 3rd 1926; the only specimen seen after prolonged and careful search."

12. *C. Stewartii* (T. Anders.) Jafri (Fig. 1, E).

Perennial, 3-5(-8) cm. tall, spreading or suberect, pilose except the siliquae. *Radical leaves* rosulate, spatulate, 1.2-3 × 0.5-1 cm., bluntly 3-5-toothed; cauline leaves short, narrowly spatulate to linear, 1-3-toothed or entire; all leaves fleshy and pilose with simple and branched hairs. *Racemes* 8-15-flowered, bracteate, increasing up to 6 cm. in fruit. *Flowers* 4-5 mm. in diameter, lilac; pedicels 1-1.5 mm. increasing up to 8 mm. in fruit. *Sepals* 2.5-2.8 × 1 mm., oblong, obtuse, subequal. *Petals* 4.5-5.5 × 1.6-2 mm., spatulate, apex sub-emarginate. *Stamens* about 2 : 2.5 mm.: anthers about 0.5 mm., obtuse. *Siliquae* 2.5-4 × 0.25-0.35 cm., linear, compressed; valves glabrous, with a distinct mid-vein and reticulate venation; stigma depressed, retuse, sessile; seeds many, uniseriate, about 1.5 × 1 mm., ovate-orbicular, brown; septum complete.

N.W. HIMALAYAS. Kashmir: Ladak, ♀. *L. Stewart* (K!); Harnag, upper Lidder valley, 4500 m., *R. Stewart* 9349 (K! R!); Sonmarg, c. 3900 m., *C. B. Clarke* 30814 (K!); (without locality), ♀. *L. Stewart* (E!).

13. *C. himalayensis* (Cambess.) Jafri (Fig. 1, F).

Perennial, 5-15 cm. tall, spreading or suberect, pilose, leafy; hairs simple or furcate, white. *Radical leaves* rosulate, spatulate, 1-3.5 × 0.5-1 cm., bluntly ± 3-toothed; *cauline leaves* spatulate to linear, small; uppermost usually acting as bracts; all leaves ± fleshy, pilose. *Racemes* 15-25-flowered, bracteate, corymbose above, increasing up to 10 cm. in fruits. *Flowers* 4-6 mm. in diameter, lilac; *pedicels* 1-4 mm. long increasing up to 8 mm. in fruit, filiform, rigid, pilose. *Sepals* 2-3.8 × 0.8-1.5 mm., often somewhat persistent. *Petals* 4-6.5 × 1.5-2 mm., spatulate, apex sub-emarginate. *Stamens* 2-2.7 : 3-4 mm.; *anthers* about 0.5 mm., oblong, obtuse. *Siliquae* 1.8-3.6 × 0.15-0.3 cm., linear-oblong, compressed; *valves* ± pilose, with a distinct mid-vein and reticulate venation; *stigma* depressed-capitate, sub-bilobed, sessile; *seeds* uniseriate rarely sub-biseriate, many, about 1.2 × 0.7 mm., ovate, brown; *septum* complete.

W. PAKISTAN. Chitral: Barum Gol, above Jamishi Ghochar, c. 4300 m., *P. Wendelbo* 36713 (BM!).

N.W. HIMALAYAS. Kunawar, *Jacquemont* (K!); (without locality), *J. L. Stewart* (E!). Kashmir: Gilgit, 4650 m., *Tanner* 283 (K!); Tin pass, c. 3900 m., *Giles* (K!); Baltistan, ascent to Deotso, *Winterbottom* 875 (K!); Manpo la, 4650 m., *R. Stewart* 22270 (K!, R!); Burji la, 3600 m., *Clarke* 29891B (K!) and 29891A (BM!); Shaksgam valley, 5100-5400 m., *Clifford* 1 (K!) and 59 (K!); Kizil Lanjar, 4950 m., *Clifford* 54 (K!); Ladak, Karakoram pass, 5250 m., *Ludlow* 471 (BM!); W. Tibet, *Thomson* (K!). Karakoram: Shokha glacier, 4050 m., *R. S. Russell* 1657 (BM!); Crevasse glacier, 4500 m., *Spender* (BM!); Karakoram, *Clarke* 30250A (K!) and 30250B. (BM!); 4800 m., *Clarke* 30462 (K!); near Daranshi camp, 4620, *Conway* (K!); found up to about 4950 m., *Conway* 139 (K!).

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