

## THE GENUS *CIMINALIS* (GENTIANACEAE) IN PAKISTAN AND KASHMIR

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The genus *Ciminalis* Adans. is being revised from Pakistan and Kashmir. The present investigation has revealed the presence of one new species: *C. baltistanica* Omer. Three specific combinations are made: *C. harwanensis* (G. Singh) Omer; *C. karelinii* (Griseb.) Omer and *C. capitata* (Buch.-Ham. ex D. Don) Omer and two infraspecific combinations are made: *C. capitata* (Buch.-Ham. ex D. Don) Omer var. *strobiliformis* (Clarke) Omer and *C. capitata* (Buch.-Ham. ex D. Don) Omer var. *andersonii* (Clarke) Omer. A key to the taxa, geographical distribution, specimens examined and notes on typification are also provided.

### INTRODUCTION

In our recent publication (Omer & Qaiser, 1992), it was demonstrated that there exist in Pakistan and Kashmir nine genera viz., *Ciminalis* Adans., *Gentianodes* Löve & Löve, *Qaisera* Omer, *Aliopsis* Omer & Qaiser, *Gentianopsis* Ma, *Aloitis* Rafin., *Comastoma* Toyok., *Jaeschkea* Kurz, and *Kurramiana* Omer & Qaiser. The genus *Gentiana* L. (s. str.) does not occur in the area under question. Some of the genera were long forgotten like *Aloitis* Rafin. and *Ciminalis* Adans. The genus *Aloitis* Rafin. has already been revised from Pakistan (Omer *et al.*, 1988).

Löve & Löve (1975) resurrected the lost genus *Ciminalis* Adans., and transferred to it *Gentiana prostrata* Haenke. Later on, Zuyev (1985) adopted it more comprehensively and proposed several new combinations for taxa from Siberia. *Ciminalis* differs from the other segregate genera on the basis of its very distinct prostrate habit, plicate corolla, basifixed stamens, naked corolla throat and the nectaries situated at the base of the ovary. Furthermore, the chromosome number differs from that of the other segregate genera ( $2n = 36$ ). It differs from *Gentiana* L. (s. str.) by its annual and prostrate habit, prominent corolla plicae, corolla tube longer than lobes, whereas in *Gentiana* L. (s. str.), the habit is perennial and erect, the corolla lacks plicae and the corolla tube is shorter than the lobes.

The character of corolla tube smaller than lobes is not present in any of the segregate genera from the area. In *Gentiana* L. s. str., the lobes are parted almost to the base.

*Ciminalis* is a difficult genus with regard to the delimitation and identification of its species. For correct determinations, a large number of specimens should be examined. Characters such as the shape, apex and margins of plicae, inflorescence and calyx, as well as corolla, should be thoroughly investigated.

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**1. *Ciminalis*** Adans., Fam. 2: 504 (1763); Löve & Löve in Bot. Not. 128: 517 (1975); V. Zuyev in Bot. Zhurn. 70: 920 (1985).

*Gentiana* L., Sp. Pl. 227 (1753) p.p.; Gen. Pl. 285 (1754); Griseb., Gen. et Sp. Gent. 210 (1839) p.p.; in A. DC., Prodr. 9: 86 (1845) p.p.; Clarke in Hook. f., Fl. Brit. Ind. 4: 108 (1883) p.p.; Kusn. in Act Horti Petrop. 15: 1–507 (1896–1904) p.p.; Schiman-Czeika in Rech. f., Fl. Iran. 41: 8 (1967) p.p.; Garg, Gent. N.W. Himal. 80 (1987) p.p.

Annual (rarely perennial) herbs, mostly forming branched creeping mats with several shoots from each rootstock. *Leaves* basal and cauline; arranged variously: mostly imbricately arranged on shoots, sometimes not so in opposite phyllotaxy, petiolate or sessile or subsessile; variously shaped: linear, lanceolate, elliptic, ovate, obovate, oblanceolate; basal leaves usually longer than cauline leaves, lax to densely rosulate. Inflorescence a raceme or of fascicles or cymes. *Flowers* bisexual, actinomorphic or zygomorphic, 4–5(–9) merous. *Calyx* divided, united at base, lobes joined by an inner membrane (or inner membrane absent), tube conspicuous, persistent. *Corolla* campanulate to infundibuliform or hypocrateriform, mostly in shades of blue, violet, purple, reddish, pink, yellow, cream or white; provided with subsidiary lobes or plicae, plicae shorter than and alternating with corolla lobes; corolla throat naked inside (i.e. fimbriae absent). *Stamens* equalling the number of petals. *Anthers* as a rule basifixed with filaments inserted deep within corolla tube and alternate to corolla lobes or opposing the subsidiary lobes (plicae). *Ovary* superior, unilocular, placentation parietal, style short or absent, stigmas two, persistent, mostly coiled. Nectaries present at the base of the ovary. *Capsule* elliptic-oblong, long- or short-stalked or subsessile, dehiscing septicidally from apex. *Seeds* brownish or dark brownish, ellipsoidal, ovoid or rounded, reticulate.

A genus of 200–300 species, distributed in cold and alpine regions of both the hemispheres. In Pakistan, represented by 10 species, distributed in NW Pakistan (Chitral, Gilgit, Baltistan, Hazara, Potohar, and N.W.F.P.) and Kashmir.

#### KEY TO THE SPECIES

1. Stamens apiculate; calyx tube with dark coloured spots at base \_\_\_\_ **8. *C. baltistanica***  
+ Stamens not apiculate; calyx tube without basal spots \_\_\_\_\_ 2
2. Plants glandular-pubescent, at least the stem \_\_\_\_\_ 3  
+ Plants completely glabrous, rarely puberulent, but never glandular \_\_\_\_\_ 4
3. Flowers solitary; calyx lobes mucronate, white margined; plicae bilobed  
**9. *C. squarrosa***  
+ Flowers in fascicles; calyx lobes minute, margin cartilaginous; plicae crenulate  
**10. *C. capitata***
4. Calyx lobes cartilaginous \_\_\_\_\_ 5  
+ Calyx lobes membranous \_\_\_\_\_ 9

5. Flowers in terminal fascicles, campanulate \_\_\_\_\_ 4. *C. harwanensis*  
 + Flowers solitary, infundibular-tubular \_\_\_\_\_ 6
6. Plicae bilobed, obovate \_\_\_\_\_ 6. *C. pseudoaquatica*  
 + Plicae unlobed, lanceolate \_\_\_\_\_ 7
7. Plants branched from middle or above; leaves orbicular \_\_\_\_\_ 3. *C. riparia*  
 + Plants branched from base; leaves ovate-obovate (spathulate) \_\_\_\_\_ 8
8. Leaves lax; plants fleshy \_\_\_\_\_ 2. *C. prostrata*  
 + Leaves imbricately arranged; plants not fleshy \_\_\_\_\_ 5. *C. karelinii*
9. Plicae unilobed; flowers up to 1.5cm; corolla lobes lanceolate; basal leaves  
 obtuse-subacute \_\_\_\_\_ 1. *C. aquatica*  
 + Plicae bilobed; flowers up to 1.0cm; corolla lobes ovate-obovate; basal leaves  
 acuminate \_\_\_\_\_ 7. *C. leucomelaena*

**1. *Ciminalis aquatica* (L.) Zuyev in Bot. Zhurn. 70: 921 (1985).**

*Gentiana aquatica* L., Sp. Pl. 229 (1753); Griseb., Gen. sp. Gent. 271 (1839); in A. DC., Prodr., 9: 106 (1845); Clarke in Hook. f., Fl. Brit. Ind. 4: 110 (1883); Grossh. in Shish. & Babrov. Fl. U.R.S.S. 18: 579 (1952); Schiman-Czeika in Rech. f., Fl. Iran. 41: 16 (1967); Stewart in Nasir & Ali (eds.), Ann. Cat. Vas. Pl. Pak. Kashm. 553 (1972); Pritchard in Davis, Fl. Turk. 6: 183 (1978); Agrawal in J. Econ. Tax. Bot. 5: 436 (1984); Garg (née Agrawal), Gent. N.W. Himal. 119 (1987); Ho in Fl. Repub. Sin. 62: 215 (1988).

*Chondrophylla aquatica* (L.) Weber in Phytologia 58: 383 (1985).  
 Type: 'Habitat in Siberia. *D. Amman*'. Lectotype (designated here): Illustration from Amman (Published in *Stirpium Rariorum in Imperio Ruttenu Sponte Provenientium Icones et Descriptiones collectae AB Joanne Ammano*, table I, fig. 1. For details, see notes below.

*Gentiana humilis* Stev. in Mem. Soc. Nat. Mosc. 3: 258 (1812).  
 Type: In albis circa Chinalug Junis. Eadem etiam in Siberia provenit (holo. LE-photo!).

*Gentiana prostrata* auct. non Haenke: Boiss., Fl. Or. 4: 72 (1879).

**Specimens examined:**

Chitral: Upper Yarkhun Valley, 12000–14000ft, 22–27 viii 1954, *F. Schmid* s.n. (RAW); Baroghil pass, 12000ft, 23 vii 1958, *Stainton* 2976 (BM); Pamir region, 13000–14000ft, *Alcock* 17739 (BM); Kurram Valley: Hariab district, 8000ft, 19 vii 1880, *Aitchison* 881 (K).

**Distribution:** Central Asia, Iran, Afghanistan, Pakistan, and Turkey. An Irano-Turanian (Central Asian) element, which extends from Soviet Central Asia westward to Turkey, eastward into Iran, Afghanistan, and Pakistan (Chitral, Kurram Valley). Chitral and

Kurram Valley seems to be its easternmost limit. It does not extend further into Kashmir and Nepal (Agrawal, 1984; Garg, 1987).

*Ciminalis aquatica* has been confused with *C. prostrata*. Boissier (1879) also confused it with *C. prostrata*, overlooking the key characters of *C. aquatica* which has sessile to subsessile flowers, green calyx lobes and an unfleshy habit. *C. prostrata*, however, has rusty brown calyx lobes, distinctly pedicellate flowers and a fleshy habit.

Pritchard (1978) cited a specimen of Gmelin [Herb. Linn. 328.17!] as the type of *Gentiana aquatica* L. However, Linnaeus (1753) indicated only one specimen, collected by Amman. The Gmelin specimen is definitely not *C. aquatica* (L.) Zuyev as it differs in having cartilaginous calyx lobes and a pubescent stem. The description of *G. aquatica* L. in *Species Plantarum* (1753) states that the calyx lobes are membranous and there are no indications of pubescence. Dr C. E. Jarvis (pers. comm.) also agrees that Herb. Linn. 328.17! is not the type specimen and suggested that an illustration from Amman (Published in *Stirpium Rariorum in Imperio Rutteno Sponte Provenientium Icones et Descriptiones collectae AB Joanne Ammano*, tab. I, fig. 1, 1739) may be considered as type.

*Fl. Per.*: July–September.

**2. *Ciminalis prostrata*** (Haenke) Löve & Löve in Bot. Not. 128: 517 (1975); Zuyev, l.c.

*Gentiana prostrata* Haenke in Jacq., Collect. 2: 66 (1788); Griseb. in A. DC., Prodr. 9: 106; Grossh., op. cit. 576; Tutin in Tutin *et al.*, Fl. Europ. 3: 61 (1972); Schiman-Czeika in Rech. f., op. cit. 17; Stewart, op. cit. 557; Agrawal in J. Econ. Tax. Bot. 5: 433 (1984); Garg, Gent. N.W. Himal. 116 (1987). Type: 'Nullam Plantulae in scriptis veterum repario mentionem, neque ulli recentiorum ad hunc diem usque innotuisse constat. Rara habitat in jugis nivosis alpium Kartal & Frosnitz principatus Salisburgensis, longe supra glacialis valles cum Laserpitio simplici, Astragalo compestri, Swertia carianthiaca & Cynofuro sphaerocephalo: nec in sa albi' (PR-n.v.).

**Specimens examined:**

Gilgit: Imit near Ishkoman, 3600m, high dry pasture, 3 viii 1954, Schmid 2079 (RAW); Kashmir: Mt Kolahoi, 12500ft, 18–20 viii 1927, R. R. Stewart 9396 (K, NY, RAW); Baltistan: Thalle La, 10000ft, 14 viii 1940, R. R. Stewart 20673 (RAW).

**Distribution:** Austria, Hungary, Siberia, Central Asia, Afghanistan, Iran(?), Chinese Turkestan, Pakistan, Tibet, Sikkim, and Bhutan. A biregional element belonging to the Euro-Siberian and Irano-Turanian regions.

*Ciminalis prostrata* is a variable species as it has a wide range of distribution. The true limits between *C. aquatica* and *C. prostrata* are very confusing. The latter can be separated from *C. aquatica* only on the basis of its more fleshy habit and obtuse calyx lobes.

**3. *Ciminalis riparia* (Kar. & Kir.) Zuyev in Bot. Zhurn. 70: 921 (1985).**

*Gentiana riparia* Kar. & Kir., Bull. Soc. Nat. Mosc. 14: 706 (1841); Grossh., op. cit. 581; Schiman-Czeika in Rech. f., loc. cit. Type: 'In herbidis deserti Soongoro-Kirghisici ad rivulum Tonsyk prope Ajagus; nec non ad torrentum Karakal circa montes Tarbagetai, *Karelin et Kiriloff* a. 1840' (holo. MOSC, n.v.; iso. BM!).

## Specimens examined:

Chitral: c.15km from Mastuj on way to Laspur and Shandur pass, c.2400m, 26 vi 1987, *Ghafoor & Omer* 3099 p.p. (KUH).

Very closely related to *C. aquatica*, *C. prostrata* and *C. harwanensis*, but differs from these on the basis of shape of leaves and branching pattern; the flowers are solitary though appearing fasciculate.

Distribution: Central Asia (Soongaria, Pamir, S China), Afghanistan and Pakistan. An Irano-Turanian element, which ends its limits into Chitral and N.W.F.P. of Pakistan. It does not extend further east.

A new record for Pakistan.

*Fl. & Fr. Per.*: June–July.

**4. *Ciminalis harwanensis* (G. Singh) Omer, comb. nov.**

Basionym: *Gentiana harwanensis* G. Singh in For. Fl. Srin. Pl. Neighb. 126 (1976); Sunita in Ind. J. For. 4: 236–238 (1980); Garg in Gent. N.W. Himal. 106 (1987). Type: Harwan, Kashmir, alt. 1700m. *Gurcharan Singh* 1524 (holo. KASH, n.v.).

*Gentiana amblyophylla* H. Smith in Herb. Kew (nom. nud.).

## Specimens examined:

Kashmir: Gulmarg, 8500ft, 8 v 1894, *Aitchison* 16 (K).

Allied to *C. aquatica* and *C. prostrata*, but differs from both in its fasciculate, campanulate flowers, and ovate to spatulate cauline leaves. It is also very close to *C. riparia* but differs from it in having a fasciculate inflorescence, although *C. riparia* has very dense solitary flowers in a cluster.

We have not seen the type specimen, but the illustration (G. Singh, loc. cit.) is good enough to match our specimens.

Distribution: Endemic to Kashmir.

**5. *Ciminalis karelinii* (Griseb.) Omer, comb. nov.**

Basionym: *Gentiana karelinii* Grisebach in A. DC., Prodr. 9: 106 (1845); Grossh., op. cit. 578; Ho, op. cit. 162.

*Gentiana aquatica* L. var. *karelinii* (Griseb.) Clarke in Hook. f., op. cit. 110 (1883).

*Gentiana prostrata* Haenke var. *karelinii* (Griseb.) Kusn. in Acta Horti Petrop. 15: 368 (1904). [Note: this combination may have appeared earlier in a work by Kusnezow entitled 'Etude Monogr. sous-genre *Eugentiana*', apparently published in 1884; unfortunately no copy of this work has been traced.] Type: 'In herbasis alpium Alatau ad fl. Lepoa et Sarchan, 1841, *Karelin & Kirilov* 1710' (holo. G!; iso. BM!).

*Gentiana prostrata* auct. non Haenke: Fedtsch., Rast. Turk. 649 (1915).

Specimens examined:

Karakorum: Baltistan, La Blak, 3780m, 11 viii 1962, *H. Hartmann* 1080 (RAW); Karakorum, 13500ft, 9 viii 1876, *Clarke* 30236 (K); *ibid.*, 10 viii 1876, *Clarke* 30338 (K).

Distribution: Soviet Central Asia, Pakistan, China, Tibet, Nepal, Sikkim. An Eastern Irano-Turanian element ranging from Soviet Central Asia eastwards to Pakistan, Nepal and Sikkim.

Clarke (loc. cit.) reduced this taxon to a variety of *C. aquatica*. However, *C. karelinii* has cartilaginous calyx lobes and margins with rusty brown or dark coloured margins, and its corolla lobes are acuminate. *C. aquatica* differs in having membranous calyx lobes that are green throughout, and subacute corolla lobes. Later, Kusnezow (loc. cit.) regarded this taxon as a variety of *C. prostrata* as they are closely allied. However, in *C. prostrata* rusty brown calycine lobes and distinctly pedicellate flowers are present; whereas in *C. karelinii* and *C. aquatica*, neither are the calycine lobes rusty brown, nor are the flowers distinctly pedicellate.

**6. *Ciminalis pseudoaquatica* (Kusn.) Zuyev in Bot. Zhurn. 70: 921 (1985).**

*Gentiana pseudoaquatica* Kusn. in Acta Horti Petrop. 13: 63 (1893); Grossh., op. cit. 580; Stewart, op. cit. 557; Ma in Fl. IntraMongolica 5: 70 (1980); Ho, op. cit. 221. Type: Described from numerous syntype specimens from Siberia, Mongolia, China boreali, Thibet and Himalaya collected by *Martjanow, Turczaninow, Karo, Vlassow, Radde, Maximowicz* (LE-photo!), *Czekanowsky* (LE-photo!), *Potanin* (isosyntype K!), *Przewalsky* (isosyntype K!), *Stoliczka, Schlagintweit, Hooker et Thomson* (isosyntype K!).

*Gentiana aquatica* L. var. *pseudoaquatica* (Kusn.) Agrawal in J. Tax. Econ. Bot. 5: 437 (1984); Garg (nec Agrawal), Gent. N.W. Himal. 120 (1987).

*Gentiana aquatica* auct. non L.: Ledeb., Fl. Ross. 3: 62 (1847).

*Gentiana sczewaldiana* Prodan in Bull. Inform. Cluj. 4: 113 (1926).

Specimens examined:

W Tibet: from Hemis, Ladakh (?) Srabru?, 10/42, *Comm. Dr Brandis* s.n. (K); Hemis nullah, 12500ft, 4 vii 1941, *Ludlow & Sherriff* 8462 (BM); Kashmir: Hemis, Ladakh in meadow along stream, 11000ft, 8 viii 1931, *Koelz* 2552 (NY, RAW); Rhizong river, Indus tributary, between Leh & Khalatse, Ladakh, *Billiet & Leonard* 6886 (K); Rungdum, 50m of Zuildo, Ladakh,

1980, *Southampton University* 131 (K); Zasker, 11000ft, 17 vii 1981, *Southampton University botanical expedition* 65 (BM); Baltistan: Ghondkoro glacier, 13500ft, 14 vii 1955, *E. Nasir & Webster* 6119 (RAW); Satpara lake, 10000ft, 25 vi 1955, *Nasir & Webster* (RAW); Ladak: Teggur, Nubra valley, 10400ft, 13 vii 1929, *Ludlow* 534a (BM); Warshi, 11500ft, 24 vii 1947, *Schomberg* 11 (BM).

Distribution: Siberia, Central Asia, Pakistan (Himalaya, Karakorum), Kashmir, India, Nepal, Tibet and China. A western Irano-Turanian element, which penetrates into the Sino-Japanese region and extends up to Nepal.

Grossheim (loc. cit.) erroneously stated that the type of *Gentiana pseudoaquatica* is a specimen from Siberia present in LE. As is evident from the original protologue, the species is not based on a single specimen but on several specimens (12 syntypes) from Siberia, Mongolia, China, Thibet (Tibet), and Himalayas present in LE. There is no indication that Grossheim had designated a lectotype.

#### 7. *Ciminalis leucomelaena* (Maxim.) Zuyev in Bot. Zhurn. 70: 920 (1985).

*Gentiana leucomelaena* Maxim., *Diagn. Pl. Nov. Asiat.* 8: 33 (1893); Kusn. in *Acta Horti Petrop.* 15: 376 (1904); Grossh., op. cit. 578; Stewart, op. cit. 556; Chater in Hara *et al.*, *Enum. Fl. Pl. Nep.* 3: 92 (1982); Garg, op. cit. 118; Ho, op. cit. 212. Type: Described from several syntype specimens collected from Kansu, Tibet, Ladak, Thein-Shan, collected by *Przewalski* (isosyntype K!), *Schlagintweit* 6536, *Stoliczka* (LE).

*Gentiana prostrata* auct. non Haenke: Clarke in *J. Linn. Soc.* 14: 434 (1875).

*Gentiana aquatica* auct. non L.: Clarke, loc. cit.

#### Specimens examined:

Chitral: c.15km from Mastuj on way to Shandur pass, c.2600m, 26 vi 1987, *Ghafoor & Omer* 3105 (KUH); Barum, SE of Tirich Mir, 10000ft, 29 vi 1958, *Stainton* 2782 (E); Kashmir: Cashmere-Ladakh, Shey Gompa monastery after Leh, Indus Valley, Ladakh, 3300m, 8 vii 1976, *Billiet & Leonard* 6846 (K, KUH); Ladakh: Rungdum, 200m W of Zuildo, 1980, *Southampton University* 92 (K); Karakorum, 7 viii 1876., *Clarke* 30151 (K); Tsarup valley, 16100ft, *Stockley* s.n. (K); Tsakzun tso, 23 vii 1931, *Koelz* 2413 (E, K); Hanle, Rupshu, 14300ft, 13 vii 1931, *Koelz* 2305d (E, K); Hemis, *Brandis* s.n. (K); Thuji, Tso Kar, Rupshu, Ladakh, 15000ft, 23 vii 1941, *Ludlow & Sherriff* 8516 (E); Spitok, Treaty Road, 10500ft, 11 vi 1941, *Ludlow & Sherriff* 8394 (E); Baltistan: Satpara lake, c.10000ft, 25 vi 1955, *E. Nasir & Webster* 5816 (RAW); Balghar, along river Shyok, 20 v 1983, *Omer, Nazimuddin & Wahid* 919 (KUH); Thalle La, 15–16000ft, 15 viii 1940, *Stewart* s.n. (RAW); Matyan, 11000ft, 12 viii 1946, *Stewart* 22356 (K).

Distribution: Central Asia, Afghanistan, Chitral, Kashmir-Nepal, China. An Irano-Turanian element extending eastwards to Nepal.

Grossheim (loc. cit.) pointed out that Turczaninow had described a form of *C. leucomelaena* (Maxim.) Zuyev as forma *alba* Turcz. on the basis of its white flowers. The type forma *leucomelaena* exhibits bluish flowers. Most of the specimens from our region belong to *C. leucomelaena* Maxim. forma *alba* Turcz.

Grossheim (loc. cit.) indicated that the type specimen is in LE, but the Head Curator of LE pointed out to us (pers. comm.) that no type of *Gentiana leucomelaena* is present

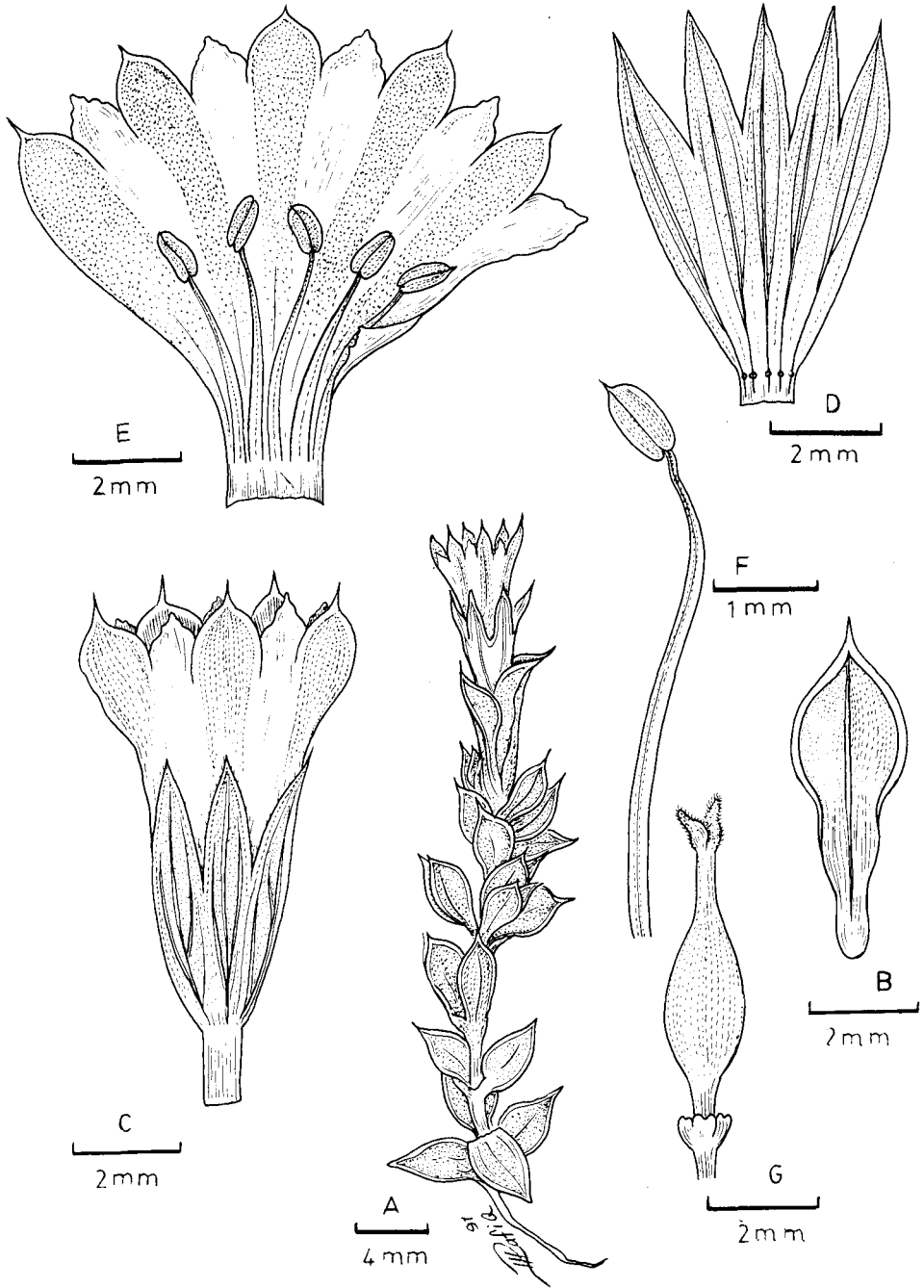


FIG. 1. *Ciminalis baltistanica*: A, habit; B, leaf; C, flower; D, calyx; E, corolla; F, stamen; G, ovary (Omer et al. 1018, KUH).



in LE. We have seen only the specimen from Kansu collected by *Przewalski* (K!) which is an isosytype. It was not indicated by Grossheim (loc. cit.) that a lectotype was selected there. For the time being, we are delaying formal lectotypification.

*Fl. Per.*: May–August.

### 8. *Ciminalis baltistanica* Omer, sp. nov. Fig. 1

Type: Baltistan, Satpara lake, circa 3.0cm high, blue flowers with light blue neck and throat, 24 v 1983, *S. Omer, S. Nazimuddin and A. Wahid* 1018 (holo. KUH!).

Herba annua, 1.2–3.5cm alta, simplex vel ramosa, viridis. *Caulis* a basi et interdum ex foliorum axillis ramosus, flore singulo terminatus, pubescens. *Folia* basalia et caulina evoluta; folia basalia 0.3–0.5 x 0.15–0.2cm, ovata, margine cartilaginea, dentata, aristato-apiculata, carinata, indistincte trinervia; folia caulina imbricata, 0.3–0.5 x 0.15–0.2cm, ovato-spatulata, basi connata, margine cartilaginea, basi subintegra vel dentata, cuspidata, carinata. *Flores* solitarii, 0.7–0.9cm longi, infundibuliformes, erecti, sessiles. *Calyx* 0.5–0.65cm longus,  $\frac{2}{3}$  vel magis floris longitudinis attingens, tubus quam lobi, longior, 0.2–0.35(–0.4)cm longus, alatus vel carinatus; lobi 0.175–0.25 x 0.05–0.075cm longi, lanceolati, hyaline marginati, integri, longi acuminati, carinati, ad basin cuiusque lobi macula atrobrunnea notati, sinibus inter lobos obtusis. Membrana intercalycina evoluta. *Corolla* 0.6–0.9cm longa, coerulea, collo et fauce pallidioribus; tubus quam lobi longior, lobi 0.1–0.2 x 0.075–0.1cm, in medio atrocoerulei, obovati vel ovati, integri, apiculati; plicae 0.075–0.1 x 0.005–0.075cm, oblanceolatae, bilobae vel integrae, planae vel undulatae, pallide coloratae. *Stamens* 5, inserta, medium corollae attingentes; filamenta filiforma, basi alata, usque ad  $\frac{1}{3}$  longitudinis libera; antherae basifixae, apiculatae, ovatae. *Ovarium* 0.2–0.4 x 0.05–0.1cm, lanceolatum; stylus non longus; stigma bilobum, papillosum; nectaria ad basin ovarii sitae.

Specimens examined:

BHUTAN: Gyetsa, 9800ft, 7 vi 1938, *B. J. Gould* 414 (K).

Distribution: Baltistan, Bhutan. The distribution pattern of this species is rather strange. It seems that either it is not collected from the rest of the Himalayas or this is a case of disjunct distribution.

Closely related to *C. pseudoaquatica* on the basis of being pubescent, and with similar type of leaves, calycine lobes and corolla; but easily distinguished by its apiculate anthers, simple rather than glandular pubescence, and dark brown spots present at the base of each calyx lobe.

### 9. *Ciminalis squarrosa* (Ledeb.) Zuyev in Bot. Zhurn. 70: 921 (1985).

*Gentiana squarrosa* Ledeb. in Mem. Acad. Petersb. 5: 520 (1815); Griseb. in A. DC., Prodr. 9: 107 (1845); Clarke in Hook. f., op. cit. 111; Kusn. in Acta Horti Petrop. 15: 410 (1904); Grossh., op. cit. 581; Stewart, op. cit. 557; Ma in Fl. IntraMong. 5: 70 (1980); Ho, op. cit. 197. Type: Transbaikalia, *Ledebour* (holo. LE, n.v.; iso. B!).

*Gentiana aquatica* auct. non L.: M. Bieb., Fl. Taur.-Cauc. 3: 192.

Specimens examined:

Chitral: village Passum, 8km E of Mastuj, c.2500m, 25 vi 1987, *Ghafoor & Omer* 3037 (KUH); c.15km from Mastuj on way to Laspur & Shandur pass, c.2400m, 26 vi 1987, *Ghafoor & Omer* 3099 p.p. (KUH); Laspur Gol, village Harchin, c.20km from Mastuj on way to Laspur, c.2600m, 26 vi 1987, *Ghafoor & Omer* 3129 (KUH); Yarkhun Gol, c.16km from Mastuj on way to Brep, c.2700m, *Ghafoor & Omer* 3216 (KUH); Mastuj, 7500ft, 18 v 1958, *Stainton* 2475 (BM, E); Chitral-Mastuj track, Sanoghar, 7000ft, 17 v 1958, *Stainton* 2466 (BM, E); Gilgit: N of Hindukush, *Giles* s.n. (E); Nalter, c.9800ft, 3 vi 1982, *Omer* 46 (KUH); in immediate neighbourhood of Nagyr town, 7700ft, *Conway* 64, 66 (K); Bhagroa, c.25 miles from Gilgit, 27 v 1983, *Omer, Nazimuddin & Wahid* 1072 (KUH); Baltistan: Skardo, 7650ft, 2 viii 1876, *Clarke* 29941 (K); Kachura lake, 25 v 1983, *Omer, Nazimuddin & Wahid* 1030, 1048 (KUH); along river Indus, Mehdiabad on way to Parkutta, 23 v 1983, *Omer, Nazimuddin & Wahid* 861 (KUH); Thalle, 20 v 1983, *Omer, Nazimuddin & Wahid* 925, 930 (KUH); Chongo, 2800m, 7 v 1952, *Hartmann* 1076 (RAW); Turmih nullah, 9000ft, 23 v 1928, *Ludlow* 301 (BM); Ladak, Taggur, Nubra valley, 10400ft, 13 vii 1929, *Ludlow* 534 (BM); Ladakh, Stok, 3352m, 1976, *Maxwell* 45 (E).

Distribution: Central Asia (Mongolia), Pakistan (Chitral-Baltistan, Kashmir), China-Tibet. An Irano-Turanian element, which extends northwards to Mongolia and eastwards to China.

For typification, see Edmondson & Lack (1977) and Lack (1978).

*Ciminalis squarrosa* is one of the few taxa in the genus which has glandular hairs. The only other species possessing glandular hairs is *C. capitata* which differs from *C. squarrosa* in general habit and inflorescence (see key).

**10. *Ciminalis capitata* (Buch.-Ham. ex D. Don) Omer, comb. nov.**

Basionym: *Gentiana capitata* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 128 (1825); Griseb., Gent. 275 (1830); & in A. DC., Prodr., 107 (1845); Clarke in Hook. f., op. cit. 113; Stewart, op. cit. 554; Chater in Hara *et al.*, Enum. Fl. Pl. Nep. 3: 92 (1982); Agrawal & Bhatt., J. Econ. Tax. Bot. 3: 995 (1982) p.p.; Garg, op. cit. 103 p.p.; Ho, op. cit. 228.

*Ericala capitata* (Buch.-Ham. ex D. Don) D. Don in London Edinburgh Philos. Mag. & J. Sci. 8: 76 (1836).

*Gentiana cephalodes* Edgeworth in Thomson, London J. Bot. 4: 637 (1845); in Trans. Linn. Soc. 20: 84 (1846). Type: Nepal, Dr Bacon (syntype K!); Himalaya, 4-5000 ped., Edgeworth 80 (syntype K!).

KEY TO VARIETIES

1. Stem leafy at the time of flowering \_\_\_\_\_ 2  
+ Stem leafless at the time of flowering \_\_\_\_\_ var. *andersonii*
2. Leaves laxly arranged on stem \_\_\_\_\_ var. *capitata*  
+ Leaves imbricately arranged on stem \_\_\_\_\_ var. *strobiliformis*

**var. capitata**

Type: ad Nairain hetty Nepalensium, 3rd Feb. 1803, *Hamilton* (holo. Herb. LINN 476.5!; iso. BM!).

## Specimens examined:

Kashmir: Poonch District. Dhuli Bagh Tehsil, 5000ft, 18 iv 1952, *Stewart* 23734 (BM); Serinmarg, 6000ft, 20 iv 1953, *Rashid, E. Nasir and Stewart* 25492 (RAW); Hazara: Gulaira Gali-Bunn Road, 5600ft, Murree Hills, 14 iv 1978, *Y. & I. Nasir* 8732 (RAW).

Distribution: Kashmir, India, Nepal, Sikkim, Bhutan. A Sino-Japanese element which is endemic to Himalayas, a case of *partim* endemic.

Chater (1982) did not report *C. capitata* from Pakistan, probably upon the authority of H. Smith, who determined our specimens as *Gentiana hugelii* Griseb. [= *Qaisera hugelii* (Griseb.) Omer]. However, two taxa are entirely different.

**var. strobiliformis** (Clarke) Omer, **comb. nov.**

Basionym: *Gentiana capitata* var. *strobiliformis* Clarke in Hook. f., Fl. Brit. Ind. 4: 113 (1883); Stewart, op. cit. 554. Syntypes: Himalaya, alt. 10–12000ft., from Kumaon to Bhotan, *Griffith & others* (K!).

No specimens from our area have been located. Previous reports by Stewart (loc. cit.) were mainly based upon misidentifications, as most of the specimens are *Gentianodes huxleyi* (Kusn.) Omer et al.

**var. andersonii** (Clarke) Omer, **comb. nov.**

Basionym: *Gentiana andersoni* Clarke in J. Linn. Soc. 14: 436 (1875). Syntypes: From Kumaon to Bhotan, alt. 5–8000ft, *J. D. Hooker & T. Anderson* (K!); Khasia, *Simons* (?).

No specimen from our area has been found. This variety is known from Bhutan, Sikkim, and Nepal.

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