Names and Types in Cajophora K.Presl s.str. (Loasaceae)

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Summary:
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A preliminary synopsis of the species of *Cajophora* K.Presl sensu strictu is here presented. The extant names are typified, where possible, and a key to the species and species groups in *Cajophora* is provided. 34 of the 92 names are accepted as circumscribing good species. Crucial characters and growth habits of some species are illustrated.

Zusammenfassung:
Der Artikel bietet eine vorläufige Übersicht über die Arten der Gattung *Cajophora* K.Presl sensu strictu. Die verfügbaren Namen werden typifiziert und ein Schlüssel zu den Arten und Artgruppen in *Cajophora* angeboten. 34 der 92 verfügbaren Namen werden als gute Arten umschreibend übernommen. Einige wichtige Merkmale und einige Arten werden illustriert.

Introduction

Our current research on tropical South American Loasaceae has reveiled that in the genus *Cajophora*, especially Urban & Gilg's sections I–III (*Orthcarpae, Dolichocarpae* and *Platypetalae*, see URBAN & GILG 1900: 269, GILG 1894: 119–121) there is a great deal of taxonomical confusion. These three sections in *Cajophora* are undoubtedly a closely related group: This is borne out by morphology and, moreover, by cytology (BRÜCHER 1986, POSTON & THOMPSON 1977). They include the type species, *C. contorta* (Desr.) K.Presl and are therefore in the following refered to as *Cajophora* sensu strictu. The type species has recently been redefined (WEIGEND 1996: 290/291). The other three sections of *Cajophora* sensu Urb. & Gilg, the sections *Angulatae* Urb. & Gilg, *Bialatae* Urb. & Gilg and *Bicallosae* Urb. & Gilg are more isolated and the first two are no close relatives of *Cajophora* s.str. The *Angulatae* are restricted to temperate South America and are currently being revised by J. Grau. The other two sections are restricted to Eastern South America and are discussed in WEIGEND (1997).

Macbride set out to revise the Peruvian Loasaceae in 1941, but - unable to have a look at the type material - he ended up thoroughly confused by the Urban & Gilg concepts. Thus Macbride accepted 31 species of *Cajophora* for Peru alone without having seen any material of most taxa. Having revised much of the type material only 18 of these 31 Peruvian names seem to correspond to good species to me. *Cajophora* s.str. consists of a maximum of 34 described species. The Argentinian taxa were revised by SLEUMER (1955). He saw vast amounts of material including much of the type material, both in Berlin and in Argentinian herbaria and

did some thorough field studies in Argentina. He thus produced a very valuable revision of the group: His conclusions are here adopted with very few exceptions.

The preliminary synopsis of *Cajophora* s.str. here presented is based on the herbarium collections of most major European and US herbaria. It is thus based on numerous recent collections and a few taxa cultivated at Munich Botanical Gardens and all the type material I could get hold of [A considerable number of types has been on loan to a colleague in the US for some time. These could therefore not be studied]. The types of the Argentinian herbaria are quoted from Sleumer, but have not been consulted. In some critical groups species delimitation on the basis of dried material alone is not possible, and these will hopefully be clarified in field studies projected for 1997.

The 92 extant names can now be reduced to the relatively small number of only 34 good species. Many of the currently used names have to be reduced to synonymy and some more may have to follow once the group is better known.

Most importantly this study is supposed to provide the taxonomical basis for a complete redefinition of generic limits in Loasoideae, which is in preparation.

Characters in *Cajophora*

The adequate taxonomic level of many species proposed by previous authors is here reevaluated on the basis of a critical character comparison and phytogeographical considerations. Whereas Urban & Gilg had only very scanty material at their disposal, numerous recent collections are now available, enabling us to judge more reliably which are constant and which are variable characters in the group. Thus the presence or absence of dorsal filaments and the number of flowers per inflorescence, characters extensively used by Urban & Gilg, can be shown to be highly dubious. Most species based on these characters alone have to fall (e.g. the supposedly single-flowered *C. mandoniana*, which is simply based on a poorly developed specimen in the type collection of *C. andina*). The shape of floral scales and their appendages (if present!), on the other hand, is highly conservative and provides a reliable basis for species delimitation. Similarly, the winding or erect habit is a rather good character and constant within species and species groups, but it is of limited use in determining herbarium material, as many specimens can not be clearly recognized as decumbent or winding.

Flower colour and perianth merosity are highly problematic characters. There are species groups in *Cajophora* where they are constant and there are others where they are highly variable. Thus many orange or red flowered *Cajophoras* seem to occasionally produce yellow or white flowered morphs within the normal populations (*C. chuquitensis*) and vice versa (*C. coronata*). In some species there is a distinct geographical cline in flower colour: *C. rosulata* has deeply red flowers in Peru and Bolivia and mostly yellow ones in Argentina. Occasional specimens with six or seven instead of five petals are found not only in *Cajophora* but also in other Loaseae and are usually of little taxonomic importance. In the *C. chuquitensis* goup, on the other hand, perianth merosity seems to be a rather constant and good character.

The evaluation of characters is further complicated by the fact that extensive hybridisation is taking place in *Cajophora* s.str. Well known examples are *C. boliviana* × *C. macrocarpa* in Tarija, *C. clavata* × *C. coronata* in Argentina and *C. canarinoides* × *C. buraevaii* in Cochabamba. This may be leading to introgression which may in turn be the reason for the variability of characters in some groups which are stable in others.

Fortunately many of the names can be clarified with the help of phytogeographic considerations: Rarely do more than two species of any group of *Cajophora* coexist in any given area. By carefully investigating the type localities conclusions from the morphological analyses can often be supported from distributional data. In many cases the more numeorus and more complete recent collections show that there is a perfectly continuous character cline

between the morphs represented by the respective type specimens, thereby justifying a reduction of the more recent name to synonymy.

Key to species and species groups in *Cajophora* sensu strictu

The members of *Cajophora* s.str. are differentiated from all other Loasoideae by the possession of:
- fruits with longitudinal dehiscence and a (usually) coherent apex
- straight or twisted fruit, if twisted there is a strict sequence of clockwise and anticlockwise twisting within the inflorescence.
- flowers borne in elongated, twining anthocladia or (more rarely) in dense, terminal inflorescences or singly in the leaf axils of a rosette or on decumbent stems.

1 Plants rosulate, flowers subsessile in the rosette or borne singly on elongated stalk (Fig. 4 a) 2
– Plants with well developed stem more than 10 cm long (Fig. 2 a, 3 a) 4
2 Flower subglobose to campanulate, pendent on elongated stalk, orange red, rarely yellow or white (S Peru–Argentina) 29. ***C. rosulata***
– Flowers with spreading petals, sessile or subsessile, erect, petals cream coloured 3
3 One flower per rosette, sessile; well developed underground rhizome present (N Argentina) 30. ***C. nivalis***
– More than one flower per rosette, peduncle to 3 cm long; no underground rhizome present (Argentina: Mendoza) 31. ***C. pulchella***
4 Stems stiffly erect from carnose rhizome; flowers in dense, terminal dichasia (Fig. 3 a, *C. chuquitensis* group) 5
– Stems weak, decumbent, or winding, if ± erect flowers apparently axillary (Fig 2 a) 11
5 Petals 3.5–4.5 cm long; fruit elliptical to cylindrical, 4–5 cm long, 2 cm wide 6
– Petals 2(2.5) cm long; fruit subglobose, 4–4.5 cm long, 2.5–3 cm wide 7
6 Petals orange; plant densely setose (Bolivia: Cochabamba) 25. ***C. rusbyana***
– Petals yellow; plant sparsely setose (Bolivia: Tarija, Argentina: Salta) 26. ***C. boliviana***
7 Plants nearly esetulose, but very densely covered with scabrid trichomes, thus appearing white (Argentina) 28. ***C. mollis***
– Plants densely setose, green 8
8 Flowers 5-merous (S Bolivia, N Argentina) 27. ***C. macrocarpa***
– Flowers 6–7-merous 9
9 Leaves pinnatisect to pinnate, pinnae widely lanceolate to ovate, margin serrate (Peru, N Bolivia) 24. ***C. andina***
– Leaves pinnatisect to pinnate, pinnae narrowly lanceolate, pinnatisect 10
10 Lamina lanceolate, pinnae narrow, subequal, 3–4 times as long as wide (Peru W of Titicaca to N Chile and NW Bolivia) 23. ***C. superba***
– Lamina widely lanceolate to ovate, pinnae rather irregular, 1.5–2.5 times as long as wide (Peru: E of Titicaca, Bolivia, Argentina) 22. ***C. chuquitensis***
11 Plants with decumbent stems, leaves stiffly erect; flowers borne singly in leaf axils and remaining very close to the ground (*C. coronata* group) 12
– Plants with winding stems, leaves spreading; flowers borne higher up on plant 13
12 Leaves pinnatisect to pinnate, pinnae widely ovate, coarsely serrate, petals red, to 2 cm long (S Peru) 33. ***C. pentlandii*** & 34. ***C. scarlatina***
– Leaves bipinnatisect, pinnae narrow, nearly laciniately divided, petals white (rarely yellow or red), 3–5 cm long (S Peru, Bolivia, Chile, Argentina) 32. ***C. coronata***
13 Floral scales narrowly rectangular, with distinctive arch-shaped dorsal calli between the

three carinae (Fig. 1 a–d) 14
– Floral scales ovate, without destinct arch-shaped dorsal calli between the three carinae (Fig. 1 e–q) 16
14 Fruits more than twice as long as wide, narrowly twisteds (Argentina) 4. ***C. cernua*** & 5. ***C. spegazzinii*** [***C. arechavaletae***]
– Fruits about twice as long as wide, straight or nearly straight, opening with longitudinal sutures and apical valves, i.e. parting from base into three free segments (Fig. 2 a, central Peru) 15
15 Threads on the back of floral scales flaglike (Fig. 2 d) 3. ***C. smithii***
– Threads on the back of the scales absent (Fig. 1 c, d) 2. ***C. stenocarpa***
16 Flowers subglobose with small opening only 1/2 to 1/3 of diameter (Ecuador) 1. ***C. contorta***
– Flowers campanulate or petals spreading, never subglobose (only Peru to Argentina) 17
17 Leaves with 3(–5) free leaflets; flowers greyish-red, campanulate (S Bolivia, N Argentina) 20. ***C. hibiscifolia***
– Leaves without free leaflets or more or less pinnate, flowers yellow, white or orange, never greyish red 18
18 Flowers campanulate, petals erect (i.e. not spreading), always yellow or orange, more or less tongue-shaped (*C. canarinoides* group. Peru: Cuzco, Bolivia: Cochabamba) 19
– Petals spreading 22
19 Petals (fully developed) (3.5–)4–5 cm long, sepals serrate (Peru: Puno, N Bolivia) 15. ***C. canarinoides***
– Petals 2–3 cm long. sepals serrate or with filiform teeth 20
20 Sepals linear, 4–6 times as long as wide, entire or with filiform teeth, leaves triangular-lancolate, 10–15 cm long and 5–7 cm wide (Peru: Cuzco) 16. ***C. madrequisa***
– Sepals triangular, 1.5–2.5 times as long as wide 21
21 Leaves narrowly lanceolate, up to 7.5 cm long and 2.5–3 cm wide, petals 2 cm long (N Bolivia) 18. ***C. pedicularifolia***
– Leaves widely lanceolate to ovate lanceolate, up to 16 cm long and 5 cm wide, petals 2.5–3 cm long (Peru: Cuzco, Apurimac) 17. ***C. vargasii***
22 Fruit narrowly cylindrical, narrowly 2–5 x twisted; scales with conspicuously flattended or widened dorsal appendages (*C. lateritia* group) 23
– Fruit clavate, 1 x twisted; scales with filiform or without dorsal appendages (*C. carduifolia* & *C. cirsiifolia* group) 24
23 Floral scales with short, rectangular appendages barely exceeding scale neck, petals brick red (S Bolivia, N Argentina) 19. ***C. lateritia***
– Floral scales with long lanceolate appendages, much exceeding scale neck; petals white (Argentina) 21. ***C. aconquijae***
24 Floral scales deeply emarginate at tip 25
– Floral scales shallowly or not emarginate at tip 26
25 Floral scales with three dorsal, filiform appendages which are pale orange at base and dark red at their tips (Peru: Puno–Bolivia) 8. ***C. buraeavii*** & 9. ***C. chuquisacana***
– Floral scales without threads (central Peru–N Chile) 6. ***C. carduifolia***
26 Petals orange or red (central Peru) 27
– Petals white (S Bolivia–Argentina) 28
27 Floral scales with three threads on back, threads apically thickened (central Peru) 7. ***C. pterosperma***
– Floral scales with or without three threads, if threads present not apically thickened, scale cymbiform 12. ***C. cirsiifolia*** & 13. ***C. macrantha*** & 14. ***C. tenuis***
28 Floral scales white (southern Bolivia, northern Argentina) 11. ***C. dumetorum***
– Floral scales red (Argentina) 10. ***C. clavata***

Formal taxonomy

Cajophora K.Presl, Reliq. Haenk. 2: 41, t. 42. 1836 ≡ Loaseae sect. *Helicteroides* DC., Prodr. 3: 340. 1828. Type: *Cajophora contorta* (Desr.) K.Presl.
= *Raphisanthe* Lilja, Linnaea 15: 263. 1841. Type species: *Raphisanthe lateritia* (Hook.) Lilja, Linnaea 15: 263. 1841
= *Illairea* Lenné & C.Koch, Verh. Vereins Beförd. Gartenbaus Königl. Preuss. Staaten, N.R. 1: 397. 1853. Type species: *Illairea canarinoides* Lenné & C.Koch.

Cajophora s.str. (sections 1 through 4 of GILG 1894: 119–120) is restricted to Andean South America and is absent from Patagonia and the extreme north, i.e. northern Ecuador, Colombia and Venezuela.

Subgeneric entities:

1. ***Cajophora*** K.Presl sect. ***Cajophora*** ≡ *Cajophora* K.Presl sect. *Dolichocarpae* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.: 303. 1900 ≡ *Loasa* Adans. sect. *Helicteroides* DC., Prodr. Syst. 3: 340. 1828. Type species: *Cajophora contorta* (Desr.) K.Presl.
2. ***Cajophora*** K.Presl sect. ***Orthocarpae*** (Meyen) Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.: 270. 1900. Type species (here designated): *Cajophora chuquitensis* (Meyen) Urb. & Gilg.
   Cajophora K.Presl sect. *Orthocarpae* Urb. & Gilg ser. *Pentamerae* Urb. & Gilg. Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.: 270. 1900. Type species (here designated): *Cajophora coronata* (Arn.) Hook. & Arn.
   Cajophora K.Presl sect. *Orthocarpae* Urb. & Gilg ser. *Pleiomerae* Urb. & Gilg. Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.: 271. 1900. Type species (here designated): *Cajophora chuquitensis* (Meyen) Urb. & Gilg.
3. ***Cajophora*** K.Presl sect. ***Platypetalae*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur.: 326. 1900 ≡ *Cajophora canarinoides* (Lenné & C.Koch) Urb. & Gilg ≡ *Illairea* Lenné & C.Koch, Verh. Vereins Beförd. Gartenbaus Königl. Preuss. Staaten, N.R. 1: 397. 1853. Type species (here designated): *Cajophora canarinoides* (Lenné & C.Koch) Urb. & Gilg.

C. buraeavii is the only other species of this section. That, however, is a severly misinterpreted taxon and has to be redefined below. It does not show the key character of the section, the flat, linguiform petals. *C. canarinoides* is therefore selected as type species.

Species 1–5: Isolated taxa

1. ***Cajophora contorta*** (Desr.) K.Presl, Reliq. Haenk. 2: 41, t.42. 1836 ≡ *Blumenbachia contorta* (Desr.) Hieron., Pl. Diaphor.: 120. 1882 ≡ *Cajophora preslii* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76. 1900: 307. ≡ *Cajophora contorta* (Desr.) Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76. 1900: 323. Basionym: *Loasa contorta* Desr. In Lamarck, Encyc. 3: 579. 1789, illustrated in Lamarck, Tab. Encyc. Bot.: 379, t. 426, f.2. 1793. Holotype: [Ecuador] "Herb. de Perou", *J. de Jussieu s.n.* (P-JUSS! Photo F!, neg. nr. 38502).
= *Cajophora aequatoriana* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76. 1900: 313. Lectotype (WEIGEND 1996: 292): [Ecuador] "In Andibus Ecuatoriensibus" *Spruce 5885* (OXF!; iso: W!).

non *Cajophora contorta* auct. non J.F.Macbr., Publ. Field Mus. Nat. Hist., Bot Ser. 13: 172. 1941 (= *Cajophora carduifolia* K.Presl).

Illustration: WEIGEND 1996: 290, Fig. 23.

C. contorta, while evidently closest to the *C. carduifolia* group, does not bear close resemblance to any particular taxon of the group.

Ecuador: Cotopaxi, Chimborazo, Tunguragua, Azuay.

2. ***Cajophora stenocarpa*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76 296. 1900. Holotype: [Peru. Huancavelica] *MacLean s.n.* (K).

The type collection has no locality, but there is one more recent collection of the taxon which has (Tovar 147, US). This is a good and rather isolated species.

Peru: Huancavelica, Cuzco (*C. stenocarpa* s.l.).

3. ***Cajophora smithii*** Killip, J. Wash. Ac. Sci. 24: 51. 1934. Holotype: Peru. Junin. Carpapata above Huacapistana, 3000 m, *Killip & Smith 24419* (US!; iso: F!).

Fig. 1.

Apparently narrowly endemic as both the type and the only other known collection come from precisely the same area. This is the only species of *Cajophora* with little flag-like processes on the filaments on the back of its scales and thereby easily differentiated from any other species of the genus. Incidentally this is a character otherwise known only in *Loasa* s. str. (e.g. *L. nitida* Desr. from Peru).

Peru: Junin.

4. ***Cajophora cernua*** (Griseb.) Urb. & Gilg ex Kurtz, Revista del Museo de La Plata 5: 829. 1893. Basionym: *Blumenbachia cernua* Griseb., Pl. Lorentz: 104. 1874. Lectotype (here designated): Argentina. Córdoba. Punilla: Near Las Penas & San Francisco, *Lorentz 172* (GOET; iso: K).

= *Cajophora joergensenii* Johnst., Contr. Gray Herb. N.S. 70: 80. 1924. Holotype: Argentina. Catamarca. Belén: El Candado, *Joergensen 1163* (US!; iso: GH).

= *Cajophora saltensis* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 317. 1900. Holotype: Argentina. Prov. Salta. Depto. Guachipas: Pampa Grande, Pirrhua del Sol, Campo de las Vacas, *Spegazzini 103526* (B+, photo F, neg. nr 10166; iso: LPS).

Northern Argentina.

5. ***Cajophora spegazzinii*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 312. 1900. Holotype: Argentina. Salta. Guachipas: Pampa grande, in meadows near the foot of Pirrhua del Sol, 3500 m, *Spegazzini 103 249* (B+, photo F!, neg. nr. 10168; iso: LPS 18743).

I have not seen any material of this species so far and can not decide on the suggestion of

BRÜCHER (1986: 374–375) that this is a mere synonym of *C. cernua*.
Argentina: Salta.

Species 6–11: *C. carduifolia* group

A problematical group of winding plants with relatively short fruits and usually deep red flowers. The precise species limits and the affinities of the taxa among each other will only be clarified by field studies. The inclusion of *C. clavata* and *C. dumetorum* follows exclusively pragmatical reasons: It is unlikely that they are really closely related to the central Peruvian species, but differentiating characters remain to be discovered. This group is linked to the following group (*C. cirsiifolia*) via *C. pterosperma*, which is a poorly understood and rarely collected species of central Peru.

6. ***Cajophora carduifolia*** K.Presl, Rel. Haenk. 2: 43 1831 ≡ *Blumenbachia carduifolia* Ball, J. Linn. Soc. Bot. 82: 39. 1885. Holotype: Peru. [Huánuco. Cerro Pasco]: *Haenke s.n.* (PRC, photo PRC!, neg. nr. 921).
= *Cajophora sepiaria* (Ruiz & Pav. ex G.Don) Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 13: 178. Basionym: *Blumenbachia sepiaria* Ruiz & Pav. ex G.Don, Gen. Syst. 3: 62. 1834. Lectotype (here designated): Plate 449 ("*Loasa sepiaria*") in Ruiz & Pavón, Fl. peruv. 5. 1958. Epitype: [Lima. Huacho: near Juncal] Mayo bamba, *Ruiz & Pavón s.n.* (MA, photo M!, fragment F!).
= *Loasa sepiaria* Ruiz & Pav., Fl. peruv. 5: 420, plate 449. 1958. Lectotype (here designated): [Lima. Huacho: near Juncal] Mayo bamba, *Ruiz & Pavón s.n.* (MA, photo M!, fragment F!)
= *Cajophora pauciseta* Killip, J. Wash. Ac. Sci. 18: 93. 1928. Holotype: Junin. La Oroya, 3300 m, *Kalenborn 48* (US!; iso: F!)
= *Cajophora contorta* Desr. sensu K.Presl, Rel Haenk. 2: 42. 1831 excl. typo.

Haenke, who collected the type of *C. carduifolia*, travelled over the Cerro Pasco during his trip. The material collected in that area by Matthews corresponds so closely to the Haenke collections that I believe both must have come from the same area.

C. carduifolia and *C. cirsiifolia* have overlapping distributions (and pathetically similar names) and have been consistently confused. The numerous species described were based on modifications in leaf shape or growth habit, both of which are extremely variable in this and other groups of *Cajophora*. *C. carduifolia* and *C. cirsiifolia* can actually be separated rather well on the basis of their floral scales: *C. carduifolia* has yellow, deeply emarginate scales with three dorsal carinae and *C. cirsiifolia* has dark (probably dark green) and apically thickened and entire scales with a rounded back.

Peru: Ancash, Huánuco, Lima, Junin, also (s.l.) Tacna, Arequipa and northern Chile.

7. ***Cajophora pterosperma*** (Ruiz & Pav. ex G.Don) Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 324. 1900. Basionym: *Blumenbachia pterosperma* Ruiz & Pav. ex G.Don, Gen. Syst. 3: 62. 1834. Lectotype (here designated): Plate 448 ("*Loasa pterosperma*"), l.c. Epitype: Junin. Huassahuassi, *Ruiz & Pavón s.n.* anno 1794 (MA, photo M!).
= *Loasa pterosperma* Ruiz & Pav., Fl. peruv. 5: 419, plate 448. 1958. Lectotype (here designated): Junin. Huassahuassi, *Ruiz & Pavón s.n.* anno 1794 (MA, photo M!).
= *Loasa physopetala* Ruiz & Pav., Fl. peruv. 5: 418, plate 447. 1958. Lectotype (here desig-

nated): [Junin. Tarma:] Plate 447, l.c.
= *Blumenbachia grandiflora* G.Don, Gen. Syst. 3: 62. 1834. Lectotype (here designated): Plate 447 ("*Loasa physopetala*") in Ruiz & Pavón, Fl. peruv. 5. 1958.
= *Cajophora serropetala* Macbr., Publ. Field Mus. Nat. Hist., Bot. Ser. 13. 180. Holotype: Peru. Junin. Huassahuassi, *Woytkowski 39* (US!).

C. pterosperma is rather poorly collected and the types for all 5 names came from the same area, representing only two collections. The presence of apically thickened dorsal filaments on the floral scales and the serrate petal margins make it a well defined species.

Junin: Huassahuassi.

8. ***Cajophora buraeavii*** Urb. & Gilg, Mem. Torrey Bot. Club 3(3): 37. 1893. Syntypes: Bolivia. La Paz. Cochabamba: *Bang 1156* (M!, E!, NY!), *Mandon 618* (P!, W!), Peru. Huánuco. Cerro Pasco, *Stuebel 35a* (B+), Cumalca, *Matthews* (B+) Lectotype (here designated): *Bang 1156* (M!; iso: E!, NY!).
= *C. kuntzei* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 314. 1900. Holotype: Bolivia. 3600 m, *Kuntze s.n.* (B+, photo F!, neg. nr. 10153). Neotype (here designated): Bolivia. La Paz. Cochabamba: *Bang 1156* (M!; iso: E!, NY!).

C. buraeavii was very poorly delimited by the authors of the specis. The material they cite belongs to a minimum of two, probably of three different taxa. Mandon 618 and Bang 1156 are clearly conspecific and seem to represent what Urban & Gilg meant when describing the taxon. However, some aspects of their decription are not matched by any of the material: *C. buraeavii* is supposed to always lack filaments on the back of its scale: All the extant material seems to have dorsal filaments. So the definition is here modified. This modification eliminates the only differentiating character of *C. kuntzei*, the presence of dorsal filaments, and thus that species also has to be redefined: It is here neotypified on the lectotype of *C. buraeavii*.

C. buraeavii shows another peculiarity: It is very difficult to separate from *C. canarinoides*, with which its distribution overlaps. While typical material of the taxa is vastly different in shape and dimensions of the petals and leaves, there are numerous collections which can not be attributed to either taxon. From what SLEUMER (1955) describes from Argentina, extensive hybridization is taking place in these – comparatively young – southern groups of the genus.

Peru: Puno–northern Bolivia.

9. ***Cajophora chuquisacana*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 322. 1900. Holotype: Bolivia. Depto Chuquisaca: Near Chuquisaca, *D'Orbigny 1242* (P!; iso: W!).

C. chuquisacana is a good though rarely collected species. The flowers of this species are very small (less than 2 cm in diameter) and pale yellow. The fruits are scarcely twisted and the inflorescences are comparatively dense and many-flowered, very much reminiscent of *C. cernua*. Central Bolivia and the Yungas are still very poorly known and for the moment I will suggest an affinity with its geographical neighbour *C. buraevii*: A a lot more data will be required before *Cajophora* can be formally subdivided.

10. ***Cajophora clavata*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 308. 1900. Lectotype (here designated): Argentina. Tucumán. Tafí: La Ciénaga, *Lorentz 694* pro parte (GOET; iso: CORD, B+, G, K).

= *Cajophora tucumana* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 315. 1900. Lectotype (here designated): Argentina. Tucumán. Tafí: La Ciénaga, *Lorentz & Hieronymus 728* (K; iso: B+, photo F!, neg. nr. 10169; CORD).

Argentina: Salta, Tucuman.

11. ***Cajophora dumetorum*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 309. 1900. Holotype: Argentina. Salta. Cafayate: Cuesta del Arca, 2200 m, *Spegazzini 102168* (B+, photo F!, neg. nr. 10149; iso: LPS 18739).

SLEUMER (1955: 452) only recognizes this taxon at variety level under *C. clavata*, but from the material I have seen (including photographs kindly provided by C. Schlindwein, Bonn) it may well represent a good species, differing from *C. clavata* by its white versus red floral scales. It also seems to be a much weaker plant. Critical field studies would be required to clarify matters and I prefer to retain the species status as proposed by Urban and Gilg for the time being.

Bolivia: Tarija; Argentina: Salta

Species 12–14: *C. cirsiifolia* group

This group of species is partially sympatric with the previous group. It is easily recognized by its structurally much simpler floral scales. The three species here recognized are at present insufficiently understood and this will only change once living material of species 13 and 14 can be studied.

12. ***Cajophora cirsiifolia*** K.Presl, Rel. Haenk. 2:.42, plate 56. 1831. Holotype: Peru. [Junin. Tarma?]: *Haenke s.n.* (PR, photo PR!, neg. nr. 919).

= *Blumenbachia punicea* Ruiz & Pav. ex G.Don, Gen. Syst. 3: 62. 1834. Lectotype (here designated) : Plate 446 ("*Loasa punicea*") in Ruiz & Pavón, Fl. peruv. 5. 1958. Epitype: Peru. [Prov. Tarma?], *Ruiz & Pavón s.n.* (MA, photo F!, neg. nr. 29437).

= *Loasa punicea* Ruiz & Pav., Fl. peruv. 5: 416. pl. 446, l.c. 1958. Lectotype (here designated): Peru. [Prov. Tarma?], *Ruiz & Pavón s.n.* (MA, photo F!, neg. nr. 29437).

= *Cajophora pachylepis* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 288. 1900. Syntypes: Peru. Junin. Prov. Huancayo: Quebrada de Bilcacota, *Matthews 893* (BM!, E!, OXF!), "Andes de Perou", *Castelnau s.n.* anno 1847 (P!, photo F!, neg. nr. 402). Lectotype (here designated): *Matthews 893* (BM!; iso: E!, OXF!).

= *Cajophora cinerea* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 321. 1900. Holotype: Peru. Junin. Prov. Tarma: Palca, *D' Orbigny 287* (P!, photo F!, neg. nr. 32587; iso: W!))

= *Cajophora cymbifera* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 281. 1900. Holotype: [Certainly from Peru!] "Columbia", *Lobb s.n.* [K, photo F!, neg. nr. 493).

– *Blumenbachia contorta* (Desr.) J.D.Hook. sensu Hooker excl. typo. Bot. Mag. 100: Tab. 6134. 1874.

The types of all the taxa which are here placed under *C. cirsiifolia* came from a rather narrow region in Junin. This very strongly supports the notion that we are dealing with but one, variable taxon. The characteristical scale shape has arisen via paedomorphosis and

reversions are comparatively frequent, which makes the taxon somewhat heterogeneous at first glance.

Peru: Junin, Huancavelica.

13. ***Cajophora macrantha*** Killip, J. Wash. Ac. Sci. 18: 94. 1928. Holotype: Junin. Tambo de Vaca, 3600 m, *Macbride 4468* (US!).

This seems to be a segregate of the *C. cirsiifolia* and could be included in *C. cirsiifolia* in the wider sense. Currently there is insufficient material of the species available. Correct taxonomic status of this species therefore remains doubtful.

14. ***Cajophora tenuis*** Killip, J. Wash. Ac. Sci. 18: 93. 1928. Holotype: Huánuco. María del Valle, 2200 m, *Macbride 3560* (US!; iso: F, photo F, neg. nr. 50216).

This seems to be another segregate of the *C. cirsiifolia*. Currently there is insufficient material of the species available. Correct taxonomic status of this species therefore remains doubtful, but unlike *C. macrantha C. tenuis* is at least geographically isolated.

Species 15–18: *C. canarinoides* group

Diverse floral shapes have been realised within *Cajophora*. Starting from the spreading corolla typical of most Loasoideae balloon-shaped and campanulate corollas have been invented. The *C. canarinoides* group, as here defined, has more or less campanulate corollas with ± linguiform, parallel petals. These flowers are deep orange and clearly ornithophilic. *C. buraeavii* presents a transitional type to the more open flowers typical of the *C. carduifolia* group. The fruits of the *C. canarinoides* group are widely cylindrical, and not as long nor as narrow as those of the *C. lateritia* group.

The *C. canarinoides* group is probably natural but it is still insufficiently known. Whereas *C. canarinoides* and *C. madrequisa* have been collected freuquently, *C. pedicularifolia* and *C. vargasii* are still rather poorly known.

15. ***Cajophora canarinoides*** (Lenné & C.Koch) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 3(6a): 119. 1894 ≡ *Loasa canarinoides* (Lenné & C.Koch) Britton, Bull. Torrey Bot. Club 17: 281. 1890. Basionym: *Illairea canarinoides* Lenné & C.Koch, Verh. Vereins Beförd. Gartenbaus Königl. Preuss. Staaten, N.R. 1: 397. 1853. Holotype: Not localized.

= *Cajophora macrophylla* Rusby, Phytologia 1: 7. 1934. Holotype: Bolivia. Pongo in the Cordillera Real, *Tate 185* (NY!).

Illustration: PLANCHON, Curtis Bot. Mag. 83: tab. 5022.

The plant was cultivated at Berlin Botanical Gardens and PLANCHON (1853) emphasizes that he had only seen sketches and description by the authors and a single pressed flower. Thus there is probably no original material available for typification. If there was a specimen at B, then it almost certainly perished in the Berlin fire. Nevertheless this is one of the most well-known species and there is absolutely no urgent need for neotypification.

Peru: Puno; northern Bolivia.

16. ***Cajophora madrequisa*** Killip, J. Wash. Ac. Sci. 18: 94. 1928. Holotype: Cuzco. Lucumayo Valley, 1800–3600 m, *Cook & Gilbert 294* (US!; iso: F!, US!).

Peru: Cuzco.

17. ***Cajophora vargasii*** Standl. & F.A.Barker, Bull. Torrey Bot. Club 74(1): 81. 1947. Holotype: Peru. Depto Cuzco. Prov. Paruro, *Vargas 2393* (F!).

C. vargasii is here accepted as a good species, but it is anything but sure that it is really specifically distinct of *C. madrequisa*. More collections and critical field studies will be required to clarify this.

Peru: Apurimac,Cuzco.

18. ***Cajophora pedicularifolia*** Killip, J. Wash. Ac. Sci. 18(4): 95. 1928. Holotype: Bolivia. La Paz. Nor Yungas: Near Unduavi, 3300 m, *Buchtien 2898* (US!; iso: NY!).

C. pedicularifolia is undoubtedly a good species and very easily recognized because of its small size and its comparatively narrow leaves. A number of possibly closely related species from Bolivia have yet to be described.

Northern Bolivia.

Species 19–21: *C. lateritia* group

Within this group there is again a transition from spreading to campanulate corollas and it is also ornithophilic (C. Schlindwein & D. Wittman, pers. com.). Yet distribution and fruit shape indicate that this and the *C. canarinoides* group are two more or less separate lines and the similarities may be entirely convergent. All three species here included are easy to key out.

19. ***Cajophora lateritia*** Klotzsch. In Otto & Dietrich, Allg. Gartenzeitg. 6: 329. 1838. ≡ *Raphisanthe lateritia* (Hook.) Lilja, Linnaea 15: 263. 1841 ≡ *Blumenbachia lateritia* (Hook.) Griseb., Pl. Lorentz: 104. 1874. Basionym: *Loasa lateritia* Hook., Bot. Mag. 65: Tab. 3632. 1838. Nom. illeg. Lectotype (SLEUMER 1955: 450): "*Loasa lateritia*, cult. at K, semina coll. *Tweedie*" (K!).

= *Cajophora platyphylla* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 317. 1900. Lectotype (SLEUMER 1955: 450): Argentina. Tucumán. Tafi: Near Anfama, *Lorentz 376* (GOET; iso: B+, photo F!, neg. nr. 10160, CORD).

– *Loasa coccinea* Hort. ex. Loudon, Encycl. Pl. Suppl. 2: 1246. 1855. Nomen nudum.

Illustration: HOOKER, Bot. Mag. 65: Tab. 3632.

C. lateritia is the most frequently cultivated and the most frequently illustrated species of *Cajophora*. Its floral scales with dark red, short and rectangular appendages make it easy to recognize. *Loasa herbertii* Paxt. (Paxt. Bot. Mag. 9: 269. 1842) has reduced to synonymy under *C. lateritia* by Urban & Gilg. Paxton, however, states that this taxon is a hybrid *C. pentlandii* × *C. lateritia* and this claim is supported by the icon accompanying the description. This is the only horticultural hybrid we know in Loasaceae.

Southern Bolivia, northern Argentina.

20. ***Cajophora hibiscifolia*** (Griseb.) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam 3(6a): 119. 1894. Basionym: *Loasa hibiscifolia* Griseb., Symb. Fl. Argentinae: 138. 1879. Lectotype (here designated): Argentina. Tucumán. Tafí: Between Siambón & Juntas, *Lorentz & Hieronymus 1028* (GOET; iso: B+, photo F!, neg. nr. 10152, CORD).

Southern Bolivia; northern Argentina.

21. ***Cajophora aconquijae*** Sleumer, Bot. Jahrb. Syst. 76(4): 454. 1955. Holotype: Argentina. Catamarca. Depto Andalgalá: Mesada de Las Rosas, in the road bend towards the Instituto Fitotécnica, 1600 m, *Sleumer 2162* (LIL; iso: P!, BA, LP, SI, W!, US!).

Argentina: Catamarca.

Species 22–28: *C. chuquitensis* group

This is a very natural complex of species which ranges from southern central Peru down into northern Argentina. Species delimitation here follows Sleumer, who accepted flower merosity and colour as good characters at species level. There is good reason to question this, at least as far as *C. chuqitensis*/*C. macrocarpa* are concerned. *C. superba* and *C. andina* are very close to *C. chuquitensis* and of doubtful value. And the species pair *C. boliviana* – *C. rusbyana* might best be treated as but one species. A subspecies concept might be adequate for this very natural complex, but detailed field studies will be required to establish the exact extent of infra- and interspecific variation. The delimitation here presented should at least enable everybody to name material with moderate confidence.

22. ***Cajophora chuquitensis*** (Meyen) Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 301. 1900 ≡ *Blumenbachia chuquitensis* Hook.f., Bot. Mag. 51: Tab. 6143. 1875. Basionym: *Loasa chuquitensis* Meyen, Reise 1: 483. 1834. Lectotype (URBAN & GILG, 1900: 302): Peru. Puno. Lake Titicaca, *Meyen s.n.* (B+, photo F!, neg. nr. 10145)

= *Cajophora heptamera* (Wedd.) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 6a: 119. 1894. Basionym: *Loasa heptamera* Wedd., Chlor. Andinae 2: 218. 1857. Holotype: Bolivia. Potosí, *Weddell 4095* (P!, photo F!, neg. nr. 38479).

= *Cajophora sphaerocarpa* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 296. 1900. Holotype: Bolivia. Larecaja: Near Sorata, Arrilaya, Chuchu, 3800–4200 m, *Mandon 619 p.p.* (P!, photo F!, neg. nr. 38498).

= *Cajophora orbignyana* Urb. & Gilg. Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 302 1900. Holotype: Bolivia. Potosí, *D'Orbigny 1436* (BR!; iso: P, G, photo F!, neg. nr 24169).

= *Cajophora angustisecta* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 300. 1900. Holotype: Argentina. Salta. Cafayate, Cuesta del Arca, 3090 m, *Spegazzini 102321* (B+, photo F!, neg. nr. 10142; iso: LPS).

= *Cajophora horrida* Urb. & Gilg, Mem. Torrey Bot. Club 3(3): 36. 1893. Syntypes: Bolivia. Larecaja: Near Sorata, Arrilaya, Chuchu, *Mandon 619 p.p.* (P!, W!), Near La Paz, *Bang 171* (E!, MO, US!, NY!, W!). Lectotype (here designated): *Bang 171* (NY!; iso: E!, MO, US!, W!).

= *Cajophora albiflora* (Griseb.) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 3(6a): 119. 1894. Basionym: *Cajophora heptamera* Wedd. var. *albiflora* Griseb., Symb. Fl. Arg.:

139. 1879. Lectotype (here designated): Argentina. Catamarca. Andalgalá: near Negrilla, *Schickendantz 149* (GOET; iso: B+, photo F, neg.nr. 10140, CORD).

Illustration: HOOKER 1875: Tab. 6143.

23. ***Cajophora superba*** Phil., Anales Mus. Nac. Chile, Bot.: 23. 1891. Holotype: Chile. Tarapacá: Tarapacá, *F. Philippi s.n.* (SGO?, iso: WU!, K!).

I have not seen type proper, but the material at WU and K matches the (rather basic) description well enough for them to be accepted as isotypes. This species is very close to *C. chuquitensis* and may be little more than a form with more narrowly dissected leaves.

Peru and Chile west of Lake Titicaca, north-western Bolivia.

24. ***Cajophora andina*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 287. 1900. Lectotype (here designated): Bolivia. Larecaja: Sorata, Gualata, 4100 m, *Mandon 620 p.p.* (G!; iso: S!, P!, NY!).

= *Cajophora mandoniana* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 299. 1900. Lectotype (here designated): Bolivia. Larecaja: Sorata, Gualata, 4100 m, *Mandon 620 p.p.* (G!; iso: S!, P!).

= *Loasa heptamera* var. *chelidoniifolia* Wedd., Chlor. Andinae 2: 218. 1855. Holotype: Bolivia. La Paz. La Lancha, *Weddell s.n.* anno 1851 (P!).

– *Loasa horrida* Britton, Bull. Torrey Bot. Club 17: 281. 1890. Nomen nudum.

Urban and Gilg number "*Loasa horrida* Britton" under the synonyms for their *Cajophora horrida* (= *C. chuquitensis*). But Britton in the original text actually writes "*L. horrida* Britt. mss." and clearly refers the specimen quoted to *Loasa heptamera* Wedd. without any intention of validly publishing the name. *Loasa horrida* is therefore a nomen nudum and Urban & Gilg are the original authors of the taxon. The only specimen quoted in Britton is Rusby 663, which Urban & Gilg apparently never saw and which corresponds to their *Cajophora andina*, if two taxa are accepted.

C. andina is very close to *C. chuquitensis*, but having seen quite a large number of herbarium collections and having cultivated both species for a number of years in Munich Botanical Gardens (from seeds kindly provided by Robert Krauss), it would seem that the differences in leaf shape are sufficiently stable to recognize two different species. *C. chuqitensis* is by far the more wide ranging of the two with *C. andina* being restricted to a relatively narrow area in northern Bolivia.

25. ***Cajophora rusbyana*** Urb. & Gilg, Mem. Torrey Bot. Club 3: 35. 1893. Syntypes: Bolivia. La Paz: Cochabamba, *Bang 1142* (B+, E!, K!, MO!, NY!, US!); Between Cochabamba & Santa Rosa, *Kuntze s.n.* (B+). Lectotype (here designated): *Bang 1142* (E!; iso: K!, B+, MO!, NY!, US!).

This and the following taxon are close relatives. But *C. boliviana* always has yellow flowers and *C. rusbyana* orange ones.

26. ***Cajophora boliviana*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 282. 1900. Syntypes: Bolivia. Tarija. [Southernmost Bolivia]: Mecoya, *Pearce*

s.n. (K!). Depto Chuqisaca. Prov. Cinti, *Weddell 3964* (P!). Lectotype (SLEUMER 1955: 440): *Pearce s.n.* (K!).

C. boliviana and the following species, *C. macrocarpa*, are well differentiated species, but they do hybridize in southern Bolivia and I have seen a few collections from what clearly are hybrid populations [e.g.: Depto Tarija, Quebrada Honda near Villazon, 3200 m, Balls 6140 (E, K)].

27. *Cajophora macrocarpa* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 285. 1900. Syntypes: Argentina. Salta. Caldera: Near Nevado del Castillo, *Lorentz & Hieronymus 49* (B+, photo F, neg. nr. 10156; GOET, K!, G). Lectotype (here designated): *Lorentz & Hieronymus 49* (K!; iso: B+, photo F!, neg. nr. 10156, GOET, G).

= *Cajophora fiebrigii* Urb. & Gilg, Bot. Jahrb. Syst. 45: 470. 1911. Syntypes: Bolivia. Depto. Tarija. Prov. Avilez: Puna Patanca, 3800 m, *Fiebrig 2603* (B+, photo F!, neg. nr. 10151; BM!, E!, G, HBG!, K!, L, M!, P!, U, US!, W!). Escayache, *Fiebrig 3346* (E!, K!, M!). Dito, *Fiebrig 3347* (K!). Lectotype (here designated): *Fiebrig 2603* (BM!; iso: B+, photo F!, neg. nr. 10151; E!, G, HBG!, K!, L, M!, P!, U, US!, W!).

= *Cajophora lorentziana* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 289. 1900. Holotype: Argentina. Salta. Caldera: near Nevado del Castillo, *Lorentz & Hieronymus 187* (B+, photo F!, neg. nr. 10155). Dito, *Lorentz & Hieronymus s.n.* (WU). Lectotype (here designated): *Lorentz & Hieronymus s.n.* (WU!).

28. *Cajophora mollis* (Griseb.) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 3(6a): 119. 1894. Basionym: *Cajophora heptamera* var. *mollis* Griseb., Pl. Lorentz.:139. 1874. Lectotype: Argentina. Catamarca. Belén: "in alpinis Vayas prope Belén, alt. 3000–3500 m" *Lorentz 594* (GOET; iso: B+, photo F, neg. nr. 10157, CORD).

Species 29–31: *Cajophora rosulata* group

Evidently not a closely related group of species. These three species share a rosulate growth habit and are restricted to high andean habitats. *C. rosulata* is widespread from Cuzco/ Peru into northern Argentina. The other two species are Argentinian endemics, and share some features such as erect, subsessile flowers and linguiform petals, while *C. rosulata* has pendent, long pedunculate flowers and deeply cymbiform petals.

29. *Cajophora rosulata* (Wedd.) Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 3(6a): 119. 1894. Basionym: *Loasa rosulata* Wedd., Chlor. andina II: 219. 1857. Holotype: Peru. Tacna: Tacora plateau, 4300 m, *Weddell s.n.* (P!, photo F!, neg. nr. 38497).

= *Cajophora acanthoides* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 286. 1900. Lectotype (here designated): Argentina. Catamarca. Andalgalá: Campo Grande, below Cerro Yutuyaco, *Schickendantz 142* (GOET!; iso: B+, photo F!, neg. nr. 10139; CORD).

= *Cajophora taraxacoides* Killip, J. Wash. Ac. Sci. 18: 92. 1928. Holotype: Argentina. Catamarca. Andalgalá: Cerro Yutuyaco, *Joergensen 1158* (US!; iso: BA, LIL, SI).

= *Cajophora anemonoides* Urban & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 277. 1900. Holotypus: Chile. Atacama: *Steinmann s.n.* (B+, photo F!, neg. nr. 10141).

Fig. 2.

Leaf characters are rather variable in this species and flowers can be either yellow or red, as in so many species of *Cajophora*. This has led to the recognition of numerous species. The collections from one and the same locality, however, encompass just as much variability as represented by the taxa proposed. SLEUMER (1955: 437) was the first to recognize this and I follow his treatment of this taxon.

30. ***Cajophora nivalis*** Lillo, Resena fitogeogr. Prov. de Tucumán, Act. Prim. Reun. Nac. Soc. Arg. Cienc. Nat. Tucuman 1916: 229. 1919. Holotype: Argentina. Tucumán. Tafi: Cumbres Cachalquies, Lagunas, 4300–4400 m, *Lillo 3090* (LIL).

Fig. 2.

31. ***Cajophora pulchella*** Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 272. 1900. Holotype: Argentina. Mendoza. Malargue. Pass between the Valley of Río Salado and the Valle Hermoso de Río Grande, *Kurtz 5865* (B+, Photo F, neg. nr. 10163).

Species 32–35: *C. coronata* group

These three species are decumbent plants with weak stems and (apparently) axillary flowers which are borne close to the ground. The leaves are strictly erect from the horizontal stems.

32. ***Cajophora coronata*** (Gillies ex. Arn.) Hooker & Arn., Bot. Misc. 3: 327. 1833. Basionym: *Loasa coronata* Gillies ex Arn., Edinburgh J. Nat. Geogr. Sci. 3: 274. 1831. Lectotype (here designated): Argentina. [Mendoza.] Andes of Mendoza. Above Puente del Inga, Aguas del Cerro Pelado, *Gillies s.n.* anno 1821 (E!; iso: BM!,).

= *Cajophora pycnophylla* Urb. & Gilg, Nova Acta Acad. Caes. Leop.-Carol. German. Nat. Cur. 76: 274. Holotype: Argentina. La Rioja. Famatina: Cueva de Perez, 3700 m, *Hieronymus & Niederlein 388* (B+, photo F!, neg. nr. 10164; iso: CORD).

= *Cajophora absinthiifolia* K.Presl, Rel. Haenk.: 43, plate 57. 1831. Holotype: [Chile] *Haenke s.n.* (PRC?).

33. ***Cajophora pentlandii*** (Paxt. ex Graham) G.Don ex Loudon, Encycl. pl. Suppl. 2: 1438. 1855. Basionym: *Loasa pentlandii* Paxt. ex Graham, Bot. Mag. 70: Tab. 4095. 1844. Lectotype (here designated): Tab. 4095, l.c. Epitype: Peru. Depto Puno. Prov. Puno: Mountains near Puno. *Pentland s.n.* anno 1828 (P!).

– *Cajophora lechleri* Urb. & Gilg. In Engler & Prantl, Nat. Pflanzenfam. 3, 6a: 119. 1894. Nomen nudum.

– *Loasa pentlándica* Paxt., Paxton's Mag. Bot. 9: 7. 1842. Nomen nudum.

Illustration: GRAHAM 1844: Tab. 4095.

The first publication concerning this taxon was that of the name *L. pentlandica* by PAXTON

in 1842. It was based on plants cultivated at Glasgow Botanical Gardens. This is a nomen nudum as it includes neither a diagnostic illustration nor a description. The only informations given are comparisons to *Loasa* (*Cajophora*) *lateritia*. I prefer to consider Graham as the original author, as he gives both a detailed, analytical illustration and a complete (latin) diagnosis. The Pentland collection, from which the seeds ultimately came, is selected as an epitype. There also is a lot of cultivated material evidently going back to the same seed source in diverse herbaria, but it remains unclear whether Graham himself prepared a specimen which could be considered for lectotypification.

34. ***Cajophora scarlatina*** Urb. & Gilg. Bot. Jahrb. Syst. 45: 470. 1911. Holotype: Peru. Depto Puno. Prov. Sandia: Cuyocuyo, 3400 m, *Weberbauer 392* (B+, photo F!, neg. nr. 10167).

I have been unable to locate an isotype of this species, but refrain from nominating a neotype until I have seen the collections held at USM, which might include some of the original material of Weberbauer.

At this stage it is very doubtful whether *C. scarlatina* is a good species or really but a form of *C. pentlandii*, which is a very poorly understood and highly variable species itself. There is only one collection available from the area [Depto Puno. Prov. Carabaya (= Macusani): Between Macusani & Ollaechea, 3400 m, Hoogte & Roersch 8561 (F)], which is insufficient for a sound decision on the matter.

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List of names:

Blumenbachia cernua Griseb. = *C. cernua* (Griseb.) Urb. & Gilg ex Kurtz
Blumenbachia chuquitensis (Meyen) J.D.Hook. = *C. chuquitensis* (Meyen) Urb. & Gilg
Blumenbachia carduifolia Ball = *C. carduifolia* K.Presl
Blumenbachia contorta (Desr.) Hook. = *C. contorta* (Desr.) K.Presl
Blumenbachia coronata (Arn.) Hieron. = *C. coronata* (Arn.) Hook & Arn.
Blumenbachia grandiflora G.Don = *C. pterosperma* (G.Don) Urb. & Gilg
Blumenbachia lateritia (Hook.) Griseb = *C. lateritia* (Hook.) Klotzsch
Blumenbachia pterosperma Ruiz & Pav. ex G.Don = *C. pterosperma* (G.Don) Urb. & Gilg
Blumenbachia punicea Ruiz & Pav. ex G.Don = *C. cirsiifolia* K.Presl
Blumenbachia sepiaria Ruiz & Pav. ex G. Don = *C. carduifolia* K.Presl
Cajophora absinthiifolia K.Presl = *C. coronata* (Arn.) Hook.. & Arn.
Cajophora acanthoides Urb. & Gilg = *C. rosulata* (Wedd.) Urb. & Gilg
Cajophora aconquijae Sleumer
Cajophora aequatoriana Urb. & Gilg = *C. contorta* (Desr.) Urb. & Gilg
Cajophora albiflora (Griseb.) Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg

Cajophora andina Urb. & Gilg
Cajophora anemonoides Urb. & Gilg = *C. rosulata* (Wedd.) Urb. & Gilg
Cajophora angustisecta Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora boliviana Urb. & Gilg
Cajophora buraeavii Urb. & Gilg
Cajophora canarinoides (Lenné & *C.*Koch) Urb. & Gilg
Cajophora carduifolia K.Presl
Cajophora cernua (Griseb.) Urb. & Gilg,
Cajophora chuquisacana Urb. & Gilg
Cajophora chuquitensis (Meyen) Urb. & Gilg,
Cajophora cinerea Urb. & Gilg = *C. cirsiifolia* K.Presl
Cajophora cirsiifolia K.Presl
Cajophora clavata Urb. & Gilg
Cajophora contorta (Desr.) K.Presl
Cajophora contorta (Desr.) Urb. & Gilg = *C. contorta* (Desr.) K.Presl
Cajophora coronata (Arn.) Hook. & Arn.
Cajophora cymbifera Urb. & Gilg = *C. cirsiifolia* K.Presl
Cajophora dumetorum Urb. & Gilg
Cajophora fiebrigii Urb. & Gilg = *C. macrocarpa* Urb. & Gilg
Cajophora heptamera (Wedd.) Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora heptamera var. *mollis* Griseb. = *C. mollis* (Griseb.) Urb. & Gilg
Cajophora heptamera Wedd. var. *albiflora* Griseb. = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora heptamera Wedd. var. *chelidoniifolia* Wedd. = *C. andina* Urb. & Gilg
Cajophora hibiscifolia (Griseb.) Urb. & Gilg
Cajophora horrida Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora joergensenii Johnst. = *C. cernua* (Griseb.) Urb. & Gilg ex Kurtz
Cajophora kuntzei Urb. & Gilg = *C. buraeavii* Urb. & Gilg
Cajophora lateritia Klotzsch
Cajophora lechleri Urb. & Gilg = *C. pentlandii* (Paxt.) Loudon
Cajophora lorentziana Urb. & Gilg = *C. macrocarpa* Urb. & Gilg
Cajophora macrantha Killip
Cajophora macrocarpa Urb. & Gilg
Cajophora macrophylla Rusby = *C. canarinoides* (Lenné & *C.*Koch) Urb. & Gilg
Cajophora madrequisa Killip
Cajophora mandoniana Urb. & Gilg = *C. andina* Urb. & Gilg
Cajophora mollis (Griseb.) Urb. & Gilg
Cajophora nivalis Lillo
Cajophora orbignyana Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora pachylepis Urb. & Gilg = *C. cirsiifolia* K.Presl
Cajophora pauciseta Killip = *C. carduifolia* K.Presl
Cajophora pedicularifolia Killip
Cajophora pentlandii (Graham) Loudon
Cajophora platyphylla Urb. & Gilg = *C. lateritia* (Hook). Klotzsch
Cajophora preslii Urb. & Gilg = *C. contorta* (Desr.) K.Presl
Cajophora pterosperma (G. Don) Urb. & Gilg
Cajophora pulchella Urb. & Gilg
Cajophora pycnophylla Urb. & Gilg = *C. coronata* (Arn.) Hook. & Arn.
Cajophora rosulata (Wedd.) Urb. & Gilg,
Cajophora rusbyana Urb. & Gilg
Cajophora saltensis Urb. & Gilg = *C. lateritia* (Hook.) Klotzsch
Cajophora scarlatina Urb. & Gilg
Cajophora sepiaria (Ruiz & Pav. ex G.Don) Macbr. = *C. carduifolia* K.Presl
Cajophora serropetala Macbr. = *C. pterosperma* (G.Don) Urb. & Gilg
Cajophora smithii Killip
Cajophora spegazzinii Urb. & Gilg
Cajophora sphaerocarpa Urb. & Gilg = *C. chuquitensis* (Meyen) Urb. & Gilg
Cajophora stenocarpa Urb. & Gilg,
Cajophora superba Phil.
Cajophora taraxacoides Killip = *C. rosulata* (Wedd.) Urb. & Gilg

Cajophora tenuis Killip
Cajophora tucumana Urb. & Gilg = *C. clavata* Urb. & Gilg
Cajophora vargasii Standl. & F.A.Barker
Illairea canarinoides Lenné & C.Koch = *C. canarinoides* (Lenné & C.Koch) Urb. & Gilg
Loasa canarinoides (Lenné & C.Koch) Britton = *C. canarinoides* (Lenné & C.Koch) Urb. & Gilg
Loasa coccinea Hort. ex Loud. = *C. lateritia* (Hook.) Klotzsch
Loasa chuquitensis Meyen = *C. chuquitensis* (Meyen) Urb. & Gilg
Loasa heptamera var. *chelidoniifolia* Wedd = *C. andina* Urb. & Gilg
Loasa heptamera Wedd = *C. chuquitensis* (Meyen) Urb. & Gilg
Loasa herberti Paxt. = *C. pentlandii* × *C. lateritia*
Loasa hibiscifolia Griseb. = *C. hibiscifolia* (Griseb.) Urb. & Gilg
Loasa horrida Britton = *C. andina* Urb. Gilg
Loasa lateritia Hook. = *C. lateritia* Klotzsch
Loasa pentlandii Graham. = *C. pentlandii* (Graham) Loudon
Loasa physopetala Ruiz & Pav. = *C. pterosperma* (G.Don) Urb. & Gilg
Loasa pterosperma Ruiz & Pav. = *C. pterosperma* (G.Don) Urb. & Gilg
Loasa punicea Ruiz & Pav. = *C. cirsiifolia* K.Presl
Loasa rosulata Wedd. = *C. rosulata* (Wedd.) Urb. & Gilg
Loasa sepiaria Ruiz & Pav. = *C. carduifolia* K.Presl

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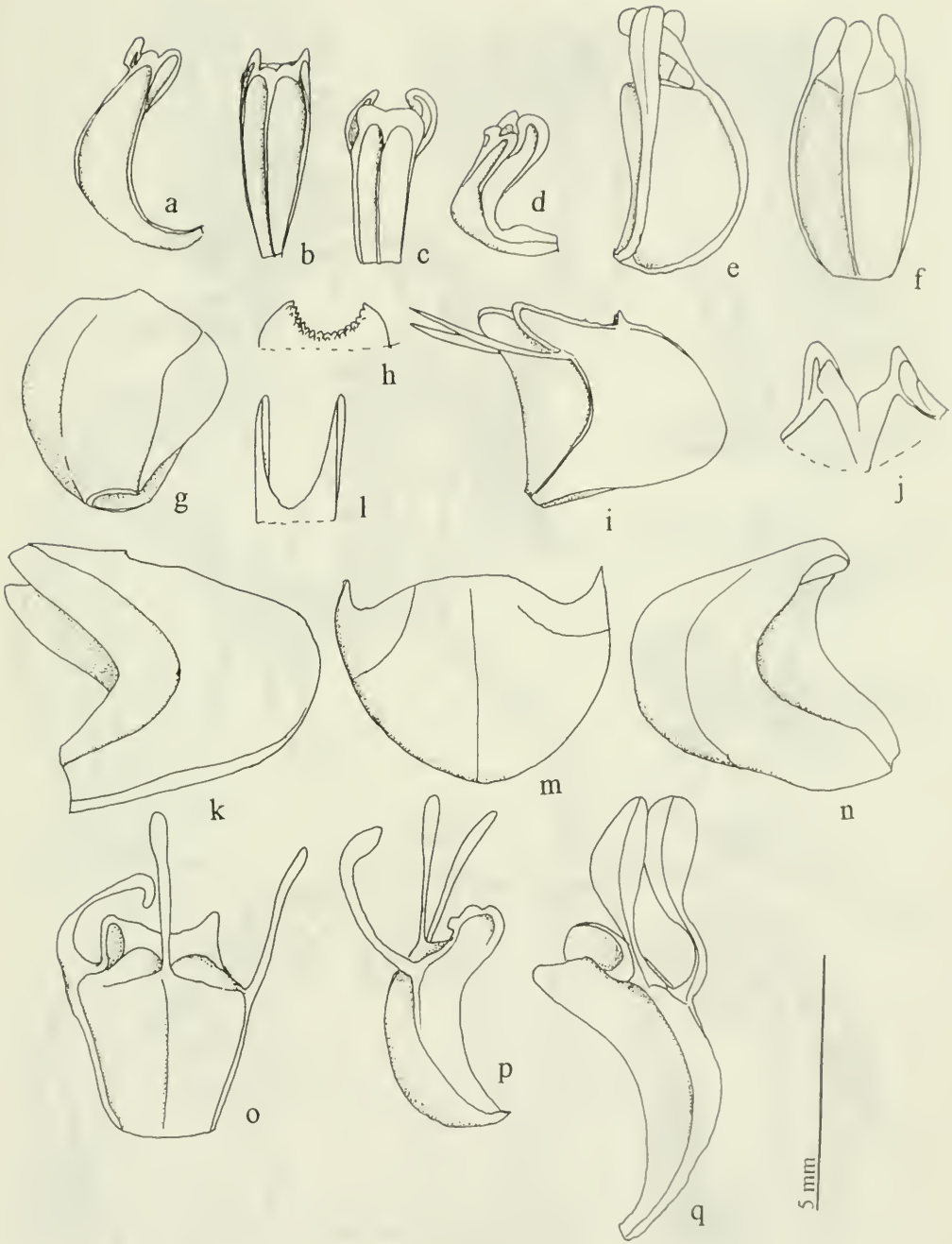

Fig. 1: Floral scales in *Cajophora*: *C. cernua* (*Sleumer 2440*): a lateral, b dorsal. *C. stenocarpa* (*Tovar 147*): c dorsal, d lateral. *C. lateritia*, cult at M: e lateral, f dorsal. *C. cirsiifolia* (*Smith 1190*): g lateral, h apex. *C. dumetorum* (*Ehrich 435*): i lateral, j apex. *C. carduifolia* (*Sandeman 191*): k lateral, l apex. *C. pentlandii*, cult at BR 1828: m apical view, n lateral. *C. pterosperma* (*Woytkowski 6676*): o dorsal, p lateral. *C. aconquijae* (*Sleumer 2440*): q lateral.

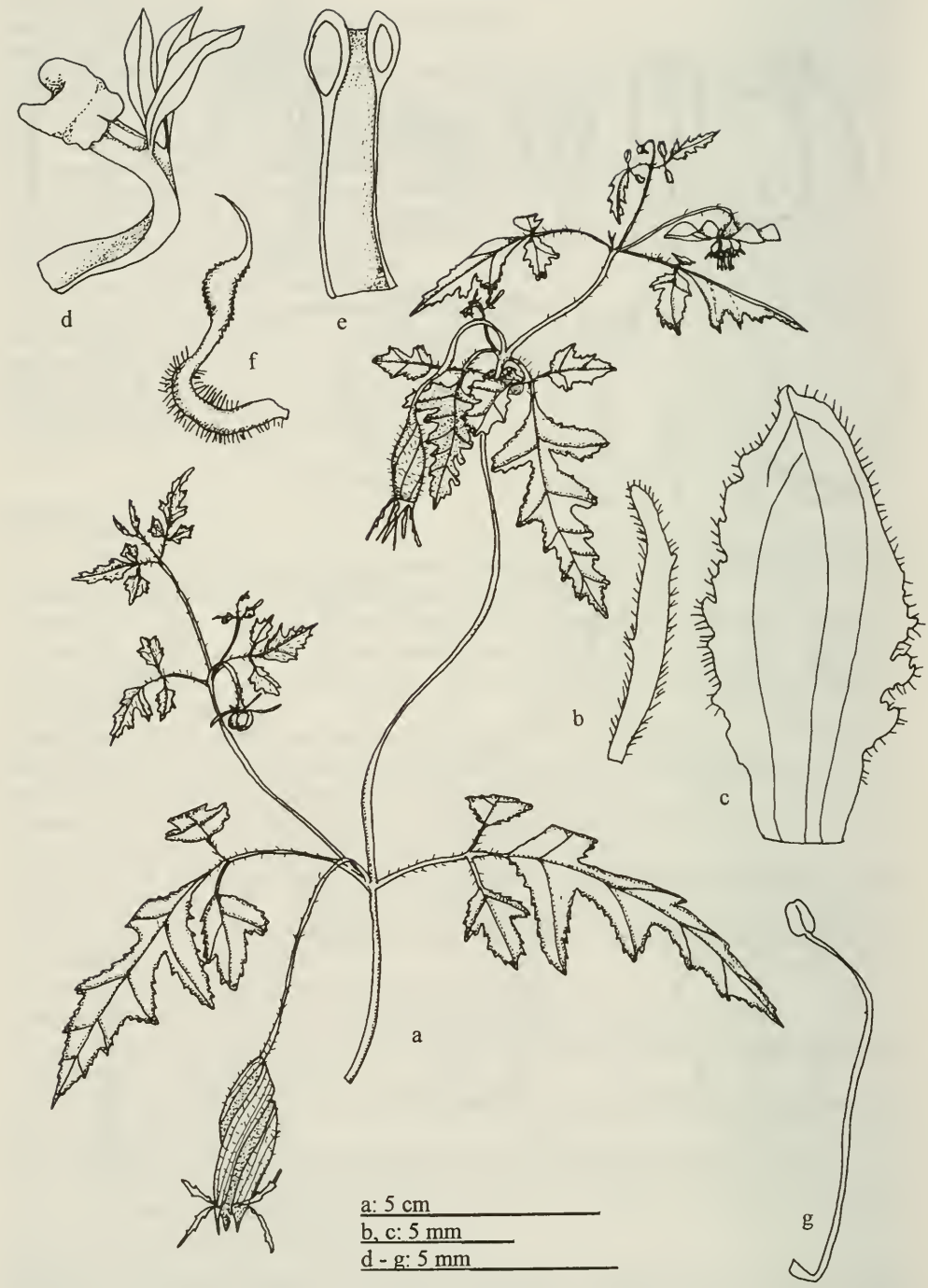

Fig. 2: *Cajophora smithii* (*Sandeman 4533*): a habit; b sepal; c petal; d floral scale, lateral; e ventral; f staminode; g stamen.

Fig. 3: *Cajophora chuquitensis*, cult. at Munich: a habit; b flower; c sepal; d petal; e floral scale, lateral; f staminode.

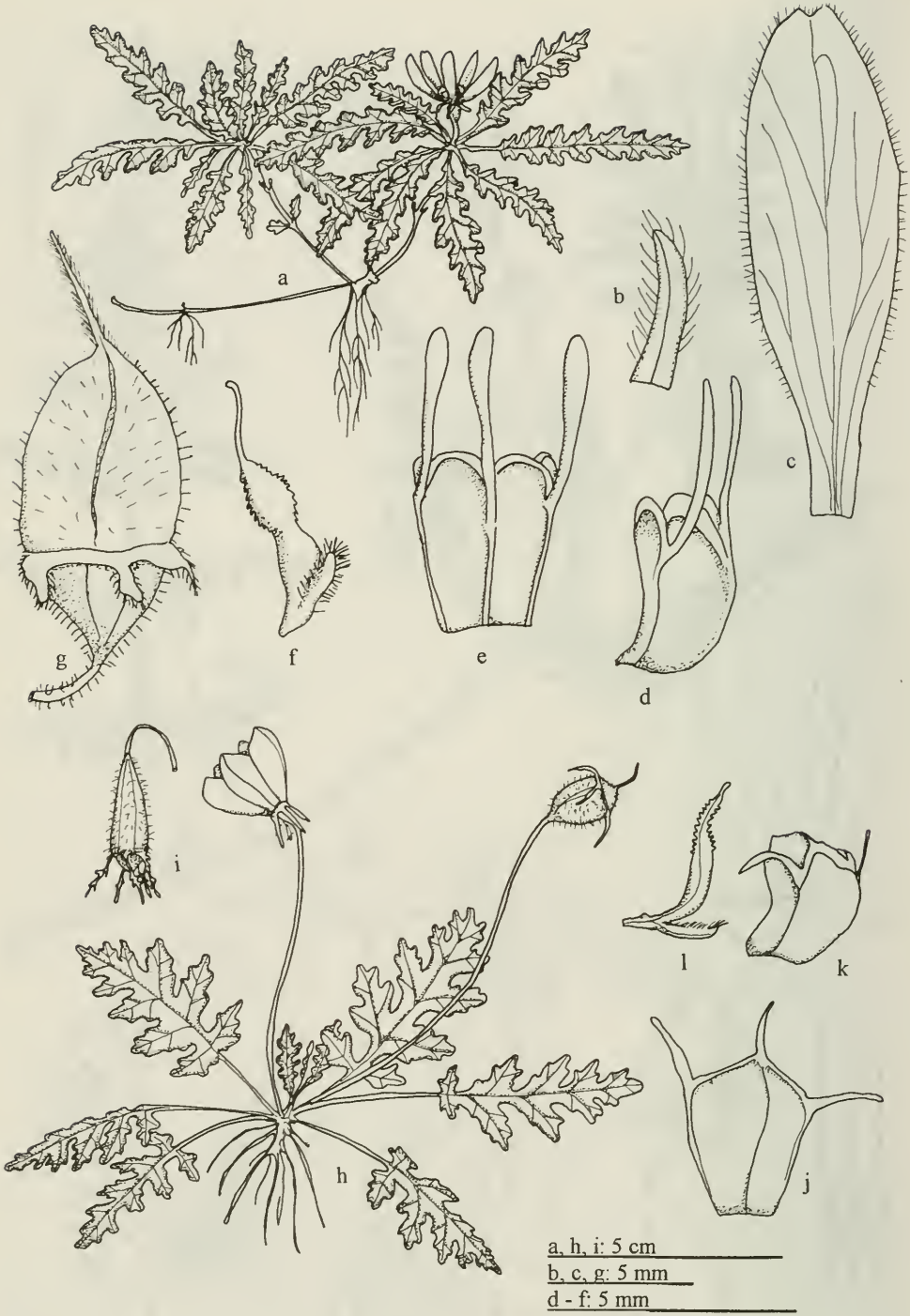

Fig. 4: *Cajophora nivalis* (*Sleumer 2723*): a habit; b sepal; c petal; d floral scale lateral; e dorsal; f staminode. *C. pulchella* (*Sleumer 11692*): g fruit. - *C. rosulata* (*Stafford 650*): h habit; i fruit (*Joergensen 1158*); j floral scale, dorsal; k lateral; l staminode.