

## Two new species of *Cineraria* (Senecioneae, Asteraceae) from KwaZulu-Natal, South Africa

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### Abstract

Two new species of *Cineraria* L. (Senecioneae) are described: *C. glandulosa* Cron, endemic to KwaZulu-Natal and *C. dryogeton* Cron from the Umtamvuna Nature Reserve on the border of KwaZulu-Natal and the Eastern Cape. Both species are narrow endemics, restricted to specific habitats and geological formations, and are therefore vulnerable to human-induced disturbance and the threat of extinction. However both species occur in nature reserves, which reduces the threat of extinction.

### Introduction

*Cineraria* L. (Senecioneae, Asteraceae) comprises mainly perennial herbs and subshrubs with heterogamous, radiate capitula with yellow florets. As the name suggests (from ‘*cinereus*’ meaning ash-coloured), many of the species have grey leaves and stems due to a tomentose or cobwebby indumentum. The genus is distinguished by its obovate, compressed cypselae with narrow wings or margins, and palmately veined, commonly auriculate leaves (Hilliard 1977, Cron 1991, Bremer 1994). The capitula have a uniseriate, calyculate involucre and the cypselae have a distinct carpopodium. As a senecioid member of the Senecioneae, *Cineraria* has balusterform (dilated) filament collars in its anthers and discrete stigmatic areas (Nordenstam, 1978; Bremer, 1994). The style apex is obtuse, usually fringed with sweeping hairs.

*Cineraria* is essentially an African genus, ranging from the Cape Peninsula and mountains of South Africa along the eastern highlands of Africa to Ethiopia. In the west it occurs in the mountainous areas of Namibia and southern Angola. One species, *C. abyssinica* Sch.Bip. ex A.Rich extends from Ethiopia into Yemen and Saudi Arabia and another, *C. anampoza* (Baker) Baker, is endemic to Madagascar. *Cineraria* has an afroalpine (to afroalpine) affinity, occurring at 1600–4300 m in the mountains of tropical East Africa (Hedberg 1957), and 1200–3300 m in the Drakensberg range in South Africa (Hilliard 1977, Cron 1991), but also reaches sea-level in the Western Cape, a pattern consistent with the biogeographic relationship of altitude and latitude.

Of the 35 species of *Cineraria*, 31 (89%) occur in southern Africa (South Africa and/or one or more of its immediate neighbours), and 17 (49%) occur only in South Africa. Thirteen of these southern African species are restricted to a single province, mountain or coastal region. Only six species are widespread: *C. aspera* Thunb., *C. deltoidea* Sond., *C. erodioides* DC., *C. geraniifolia* DC., *C. lobata* L'Hér. and *C. lyratiformis* Cron.

Narrow endemic species in southern Africa include *Cineraria cyanomontana* Cron from the Blouberg mountain (Limpopo Province), *C. longipes* S.Moore from southern Gauteng, *C. pinnata* O.Hoffm. from Maputaland (southern Mozambique and northern KwaZulu-Natal), *C. atriplicifolia* DC. from the coastal to inland regions of KwaZulu-Natal, *C. vagans* Hilliard from the Amatole Mountains in the Eastern Cape, *C. saxifraga* DC. from the Albany region in the Eastern Cape and *C. humifusa* L'Hér. from the Saldanha region in the Western Cape. In most cases, each species is associated with a specific substrate, e.g. *C. humifusa* with granites and *C. longipes* with basalts. Included in this tally of local endemic species are the species described here. They are narrow endemics in KwaZulu-Natal and are also associated with specific geologies.

1. ***Cineraria glandulosa*** Cron, sp. nov., *formae foliorum et auricularum C. erodioides simile, sed folia et caules pilis glandulosis densis vestita, quoque involucrium squames pilis glandulosis interdum vestita.*

TYPE: South Africa, KwaZulu-Natal, Mphendle District, Farm Tillietudlem, 1640 m [5000'], 6 April 1947, *Huntley 154* (NH, holo.!, NU, iso.!).

Perennial (?) herb, to about 0.5 m tall. *Stems* woody, branching towards base, green with reddish-brown lines, or brown, hairy. *Leaves* deltoid-reniform to reniform, occasionally with one or two lateral pinnae; lamina 10–24 × 12–26 mm, green, densely pilose glandular; apex obtuse; margin dentate; base subcordate to cordate; petiole 6–32 mm long, densely covered with glandular hairs; auricles conspicuous, decurrent on petiole, rarely absent. *Capitula* heterogamous, radiate, few (2–10) (–46) per stem, in a lax panicle; peduncles 7–35 mm long, glabrous to densely hairy, bracteate; bracts 2.0–3.5 mm long. *Involucre* campanulate, calyculate; calyculus bracts with glandular hairs, phyllaries 8–10, 4.0–5.0 (–7.0) mm long, glabrous or hairy; margins scarious. *Ray florets* female, 5, rarely 7, 6.0–8.5 mm long; limb narrowly elliptic to oblanceolate, 3.0–6.0 × 1.1–2.2 mm, 4-veined, sparsely villous at base with biseriate glandular hairs. *Disc florets* 18–24; corolla tubular below, narrowly campanulate above, ca. 4.0 mm long, glabrous; lobes 0.5–1.0 mm long. *Cypselae* obovate, compressed, median midrib sometimes pronounced, narrowly margined, brown, 2.0–3.0 × 0.9–1.2 mm, glabrous. *Pappus* to base of disc corolla lobes (ca. 3.5 mm).

PHENOLOGY. Flowering in March and April.

DISTRIBUTION. South Africa, KwaZulu-Natal: in the Mphendle, Umlazi and New Hanover Districts, as well as near Murchison (Figure 1).

HABITAT. Amongst grass and rocks on slopes of river valleys, or at base of cliffs above river gorges, on Natal Group Sandstones. Altitude: (630–)1400–1800 m.

CONSERVATION STATUS. Rare and vulnerable, known from few localities and restricted in distribution with small populations. This species has been collected twice from Loteni Nature Reserve, where it is protected. Classified as “Near threatened” as its habitat is not very prone to destruction by humans.

NOTES. *Cineraria glandulosa* resembles *C. erodioides* in the decurrent auricles on the petiole and reniform leaves (Figure 2a, 3a, b), but differs in the dense glandular indumentum of the leaves and stem and calyculus bracts (and sometimes the involucre bracts) and the generally smaller capitula (five ray florets and 18–24 disc florets). *C. erodioides* is a very variable species with 5–8 (–13) ray florets and (20–) 25–40 (–80) disc florets, but the populations with smaller capitula mainly occur at low altitude in the Eastern Cape.

Hilliard (1977) recognised this entity as a potentially distinct species (no. 6, p. 379–380), but included in her description *Moll 3037* (K, NU) from Richmond District, matched by *Cron & Scott-Shaw 9* (J, K, MO) from the same district. Although these specimens have a glandular indumentum (Figure 2b), the leaves resemble those of *Cineraria atriplicifolia* in their deltoid shape and dissection, especially of the uppermost leaves (Figures 3c, d; Hilliard, 1977: Figure 15Da). The auricles are not decurrent and also differ in being sharply toothed and dissected. The specimens have many more capitula on shorter peduncles and their growth form resembles *C. atriplicifolia* more closely than *C. glandulosa*. *C. atriplicifolia* also has small capitula in a compact synflorescence, but has caducous auricles and has glandular hairs only in the angles of the lobes of its leaves. The striate patterning of the epicarp of the cypselae (Figure 2c) also matches *C. atriplicifolia* (Cron 1991). We suggest that these specimens are the result of reticulate evolution between *C. glandulosa* and *C. atriplicifolia*. The manuscript name of ‘*C. collina*’ Hutch & Taylor ined. is indicated on the *Medley Wood 1898* specimens (NH, K), but the name has never been published.

*Balkwill 9509a* (J) from Horseshoe Valley, north of Port St. Johns in the Eastern Cape also matches *Cineraria glandulosa* in having glandular hairs and decurrent auricles on the petioles, but its cypselae are hairy and the ray cypselae are unusually broad-winged. Its

leaf shape is more deltoid like *C. decipiens*, which also has hairy cypselae. Tomentum of the cypselae is a variable character in some species of *Cineraria* (e.g. *C. deltoidea*, *C. albicans* N.E.Br. and *C. erodioides*). The affinity of this specimen needs to be confirmed.

#### Specimens examined

South Africa, KwaZulu-Natal:

—**2929** (Underburg): Loteni Nature Reserve (–BC), *Phelan 366* (NU); *ibidem*, *Cron & Goodman 586* (J); Mpendhle, "Tillietudlem" (–BD), *Huntley 154* (NH, NU).

—**2930** (Pietermaritzburg): New Hanover District, Little Noodsberg, Laager Farm (–BD), *Hilliard & Burt 14512* (K, NU); Hills above Illovo River (–CC), *Medley Wood 1898* (BOL, K, NH).

—**3030** (Port Shepstone): Murchison (–CA), *Medley Wood 3074* (NH).

Putative hybrids between *C. glandulosa* and *C. atriplicifolia*

—**2930** (Pietermaritzburg): Richmond, Tala Farm (–CD), *Moll 3037* (NH, NU); Richmond District, on Farm Wingfield (–DC), *Cron & Scott-Shaw 9* (J, K, MO).

**2. *Cineraria dryogeton*** Cron, sp. nov., *affinis C. geraniifolia sed folia et caules pilis densis vestita, folia et auriculae lobis profundis dentatis acutis, quoque auriculis magniores. Differt capitulis minoribus plerumque quinque flosculis radiis et cypselis anguste obovatis.*

TYPE: South Africa, KwaZulu-Natal, Umtamvuna Nature Reserve, near Umfafa Falls, 8 March 2001, *Abbott 7809* (PRU, holo.!, J, K, NH, iso.!).

Annual or short-lived perennial herb, up to 1.0 m tall. *Stems* herbaceous, slender, very densely hairy, rarely branched near base; base slightly woody, ca. 2.0 mm in diameter. *Leaves* sagittate to reniform, distinctly 3- or 5-lobed, occasionally with a pair of lateral pinnae; lamina 10–19 × (7–) 17–32 mm, green, densely hairy; apex acute; margin with sharply acute, large teeth; base sagittate to cordate; petiole (3–) 8–25 mm long, densely hairy; auricles conspicuous, sharply toothed. *Capitula* heterogamous, radiate, lax, 2–8 per corymb; terminal peduncles 24–60 (–90) mm long, glabrous; bracts sparse, 1.5–2.0 (–4.0) mm long. *Involucre* campanulate, calyculate; phyllaries 8, 5.0–5.5 mm long, glabrous, margins scarious. *Ray florets* 5 or 6 (rarely 7 or 8), 7.0–9.0 mm long; limb narrowly elliptic to oblanceolate, 5.0–7.0 × 2.2 mm, 4-veined, sparsely villous at base with biseriate glandular hairs. *Disc florets* ca. 18–20; corolla tubular below, narrowly campanulate above, 4.5–5.0 mm long, glabrous; lobes 1.0 mm long. *Cypselae* narrowly obovate, compressed, brown with paler margins, 2.0 × 0.5–0.8 mm, glabrous. *Pappus* to base of lobes of disc floret corolla (3.5–4.0 mm long).

Flowering in March and April.

**DISTRIBUTION.** Known only from the Umtamvuna Nature Reserve in southern KwaZulu-Natal, South Africa (Figure 1), bordering the Eastern cape. This area forms part of the Pondoland Centre of Plant Endemism, a region with many restricted-range plant species associated with sandstone of the Msikaba Formation (VanWyk and Smith 2001). Botanists should look for this species in other sandstone gorges near this area.

**HABITAT.** In grasslands near forest margins, and forest margins near waterfalls, in sandy-loam soil overlying sandstone rocks of the Msikaba Formation. Altitude: 300–400 m.

**CONSERVATION STATUS.** Rare, possibly endangered due to its limited distribution, very likely restricted to this forest and similar forests in the region. EN B2ab(iii); D.

**NOTES.** *Cineraria dryogeton* shows an affinity with *C. geraniifolia* in its growth form and leaf shape, but differs markedly in the dense indumentum of its stems and leaves (Figure 3). *C. geraniifolia* is typically a multi-stemmed, slender, perennial herb with reniform, lobed leaves and two or three fairly large capitula on long peduncles, with 12 or 13 involucre bracts and 8–13 rays. In contrast, *C. dryogeton* is usually a single-stemmed trailing annual or biennial herb, bearing smaller capitula with 8 involucre bracts and 5 (rarely 7 or 8) rays. It is difficult to ascertain whether *C. dryogeton* is annual or a short-lived perennial as its habitat is dense, tall grassland along forest margins subject to regular burning (A. Abbott and A.E. van Wyk, *pers. com.*). This may also account for the long, unbranched stem of *C. dryogeton* (Figure 2d) that enables it to compete with the tall grass, which in turn serves to support it. The cypselae of both species are glabrous with a distinct pale narrow wing or margin, but are broadly obovate in *C. geraniifolia* and narrowly-obovate in *C. dryogeton* (Figure 2f). Occasionally, the lobing of the leaves of *C. geraniifolia* is deeper than usual, but then the lobes are not as large nor as sharply acute (Figure 3 h, i, j) as in *C. dryogeton* (Figures 3e, f, g). The auricles also differ, being much more sharply toothed and deeply dissected and conspicuous in *C. dryogeton* than in *C. geraniifolia*.

*Cineraria geraniifolia* is a widespread and quite variable species, extending from East London in the Eastern Cape through KwaZulu-Natal to Graskop in Mpumalanga. It occurs mainly at higher altitudes (1200–2500 m) than *C. dryogeton* and is found in the Amatole and Great Winterhoek Mountains in the Eastern Cape, and in the Drakensberg of KwaZulu-Natal. Some of the lower-altitude, coastal specimens from Gonubie in the Eastern Cape are unusual, having very elongate leaves and growing in marshy areas (Cron

1991). Another odd form of *C. geraniifolia* grows in grazed fields of the Hogsback, and has extremely dissected leaves, with very narrow lobes (e.g. *Johnson 1187*, *Phillipson 1276*, *Cron & Goodman 563*). Allied forms of *C. geraniifolia* in the mountains near Maclear in the Eastern Cape [e.g. *Bester 2459* (PRU)] have smaller capitula with 8 involucre bracts and 5 rays. These forms differ from *C. dryogeton* in their degree of lamina dissection and shape of the leaf lobes, indumentum, and the very small or absent auricles.

Specimens examined:

South Africa, KwaZulu-Natal:

—**3130** (Port Edward): Umtamvuna Nature Reserve, near Umfazo Falls (–AA) *Abbott 1885* (NH, PRU); *ibidem*, *Abbott 7809* (J, K, NH, PRU); Umtamvuna Nature Reserve, Chestnut Grove, *Abbott 1874* (UNR).

## Discussion

### *Endemic regions and conservation status.*

A considerable proportion (22%) of species in *Cineraria* are narrowly endemic. Most of them are associated with centres of plant endemism (Van Wyk and Smith 2001), as are the two species described here.

#### *KwaZulu-Natal Midlands*

The KwaZulu-Natal Midlands are the centre of diversity for *Cineraria* within southern Africa: 34% (12/35) of the species occur in the province with the largest number in degree grid squares 2929 and 3029. This centre of diversity is part of the larger Maputaland Pondoland Phytogeographic Region (Van Wyk and Smith 2001). The area is dissected by river gorges and the altitudinal range is considerable (600–1500 m). Grasslands predominate with pockets of forest in areas protected from fire. The Midlands merge into the foothills of the Drakensberg escarpment. All these factors contribute to a varied landscape which can accommodate a wide diversity of plants.

In KwaZulu-Natal, the Asteraceae outnumber other families of flowering plants: 551 indigenous species in 113 genera, with 30% endemic to the province (Hilliard 1978). Hilliard (1978) described two minor centres of endemism in KwaZulu-Natal, one associated with the Natal Group and Msikaba Formation sandstone (where about 4% of the Asteraceae endemic to KwaZulu-Natal occur); the other on the sandy Maputaland (= Tongaland) coastal plain. *Cineraria* occurs in five of the twelve associations/groups of Asteraceae in KwaZulu-Natal recognised by Hilliard (1978). *C. glandulosa* and *C. dryogeton* both appear to fall into Group 3, viz. KwaZulu-Natal endemics not confined to the Drakensberg, and some in the “Table Mountain Sandstone” outcrops and gorges, as

they were previously known.

*Cineraria glandulosa* grows at the base of cliffs above river gorges or on the slopes of river valleys, at altitudes ranging from 1000 to 1800 m in Mphendle, Umlazi and New Hanover Districts and at lower altitude on the Oribi Flats near Murchison (Port Shepstone District). The populations resulting from putative hybridization between *C. glandulosa* and *C. atriplicifolia* occur in grassland or scrub associated with river gorges in the Richmond District. *C. atriplicifolia* is also rare with a scattered distribution and is classified at a “lower risk” level of threat (Scott-Shaw 1999). *C. glandulosa* is certainly also rare with small, scattered populations, with a relatively small range (estimated at less than 20 000 km<sup>2</sup>). Its habitat is restricted, but the threat by expansion of rural communities is limited due to its location on river banks and at the base of cliffs and its occurrence in the Loteni Nature Reserve provides some protection. It is therefore classified as “near threatened”.

#### *Pondoland*

*Cineraria dryogeton* is thus far known only from the Umtamvuna Nature Reserve on the border between KwaZulu-Natal and the Eastern Cape, an important conservation area in the Pondoland Centre of Plant Endemism (Abbott *et al.* 2000). This area is rich in palaeoendemics and also neoendemics with a strong Cape and Afromontane affinity (Van Wyk and Smith 2001). The predominant rock type in the Pondoland Centre is sandstone of the Msikaba Formation with a quartz content of 70–96%, with potassium feldspar and mica next most abundant (Hobday and Mathew 1974). The sandstone islands are surrounded by sediments of the Karoo Supergroup and basement rocks (granites, gneisses, schists) of the Natal Metamorphic and Structural Province. The Msikaba Formation sandstones show more similarity to the Table Mountain Group sandstone of the Cape than to the Natal Group sandstone (Van Wyk and Smith 2001). The Umtamvuna River Gorge is one of the narrow river gorges with forest on the steep sides and a grassland plateau above that characterise the Pondoland sandstone region. A large number of plant species are endemic or largely confined to these sandstone areas, including at least 17 endemic/near-endemic herbs and shrublets occurring inside forests or on forest margins, three of which are Asteraceae (Van Wyk 1990).

Van Wyk and Smith (2001) noted that there is a clear path of migration between the Pondoland Centre and KwaZulu-Natal Drakensberg via the Ngeli range. This might have been the migration route for *C. dryogeton* if, as suggested here, it is closely related to *C. geraniifolia*, which occurs in the Drakensberg and the Eastern Cape mountains. *C. albicans*, a near-endemic to the region, also occurs in the adjacent mountains of the Eastern Cape and the KwaZulu-Natal Midlands (Hilliard 1977, Cron 1991).

Much of the grassland in the Pondoland Centre has been floristically depleted or destroyed by anthropogenic activities and the remaining small patches of forest are under intense human pressure (Van Wyk 1993, Abbott *et al.* 2000). *C. dryogeton*, although protected in the Umtamvuna Nature Reserve, is known only from a few small populations in the reserve, and would be under considerable threat of extirpation in similar habitats outside the reserve where it might occur. It is therefore considered endangered.

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## Figures

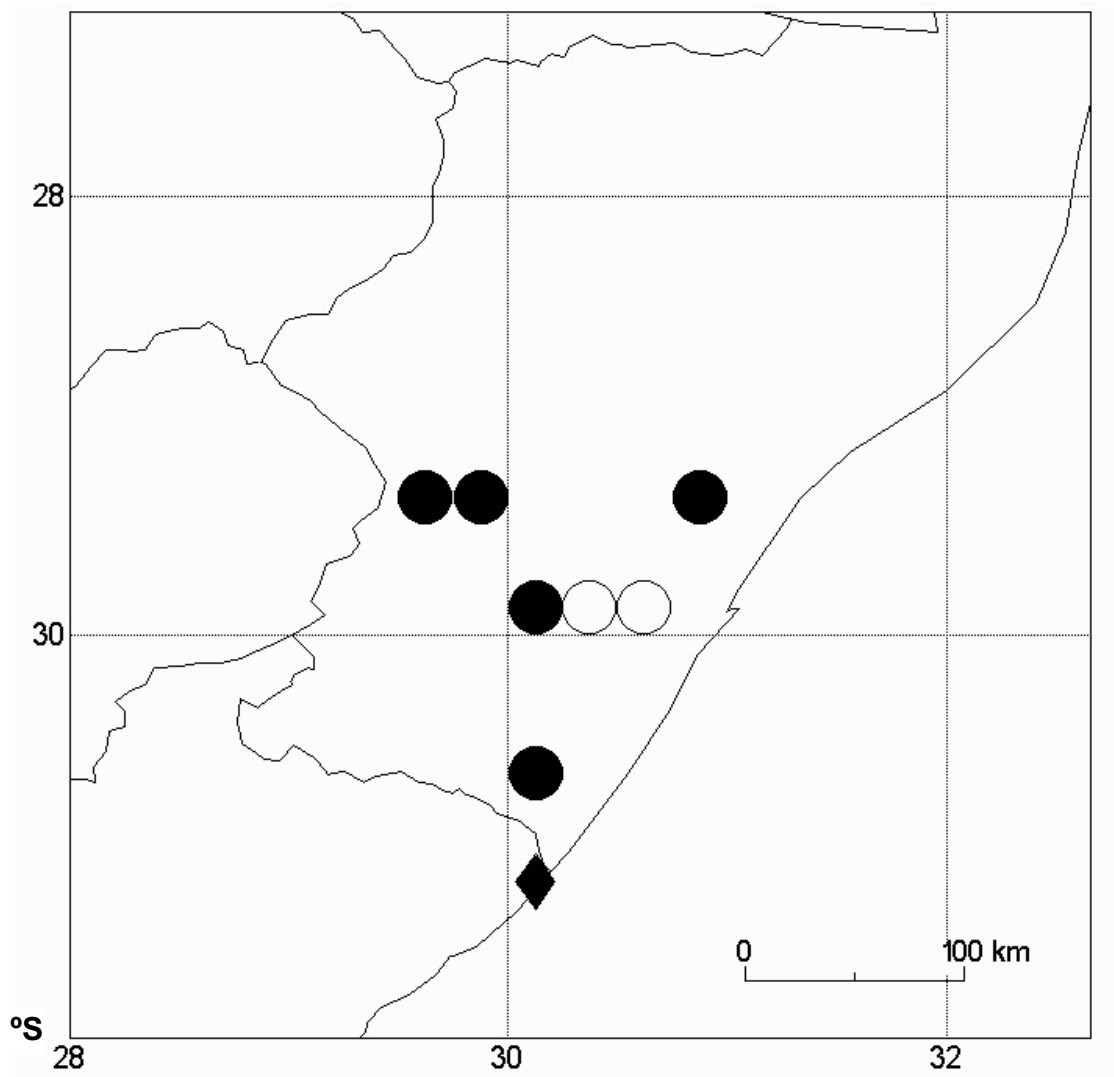


Figure 1. Known distribution of *Cineraria glandulosa* ● (filled circle) and its potential hybrid with *C. atriplicifolia* ○ (open circle), and *C. dryogeton* ◆ (diamond).

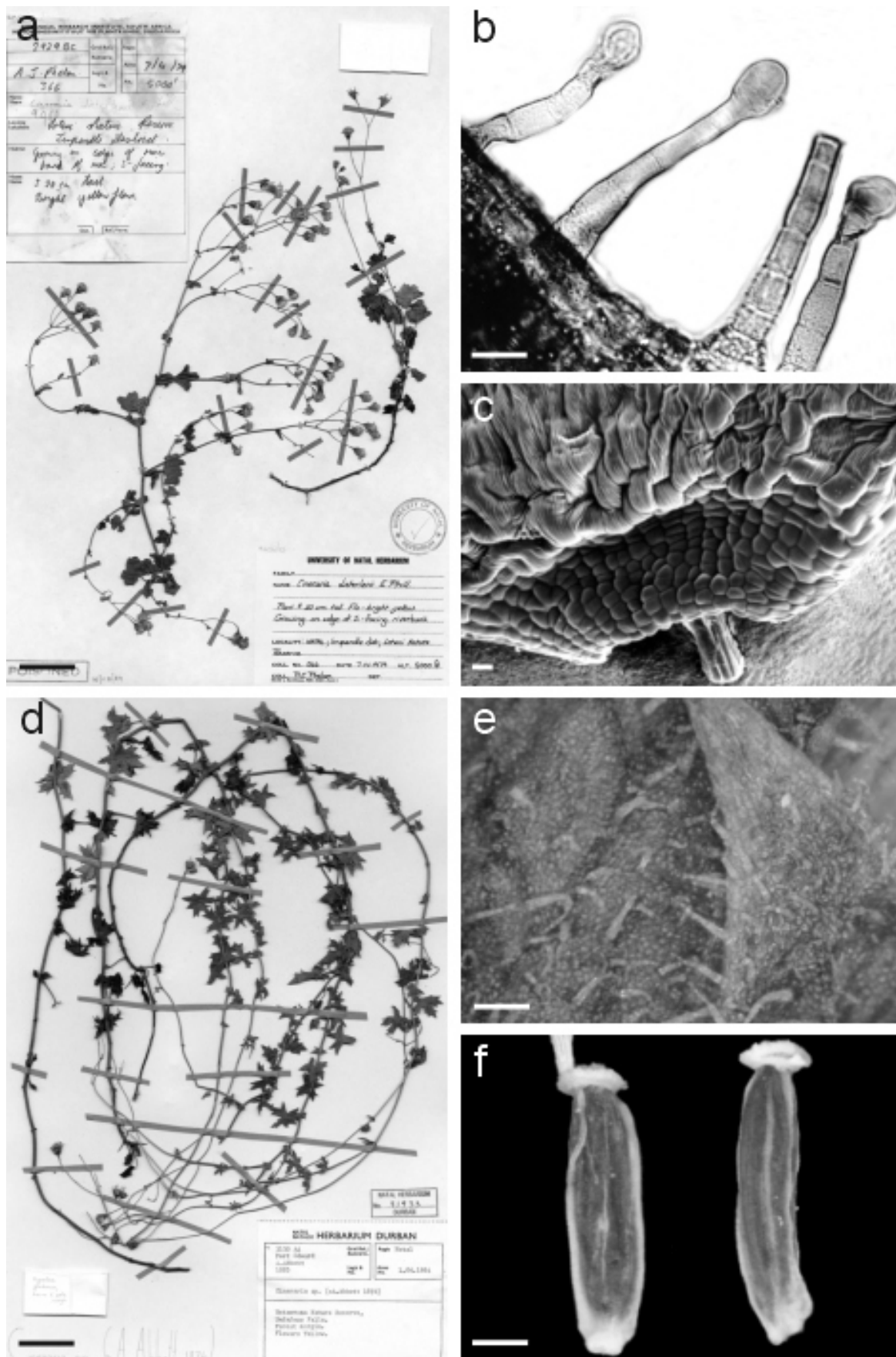


Figure 2. Morphological and micromorphological characters of *Cineraria*: (a) *C. glandulosa*: (Phelan 366), bar = 30 mm. (b) Glandular trichomes (Cron & Scott-Shaw 9), bar = 15 µm. (c) Carpopodium and base of cypsela of putative hybrid between *C. atriplicifolia* and *C. glandulosa* (Cron & Scott-Shaw 9), bar = 10 µm. (d) *C. dryogeton* (Abbott 1885), bar = 32.4 mm. (e) Hairs on ventral surface of leaf of *C. dryogeton* (Abbott 1885), bar = 250 µm. (f) Glabrous cypselae of *C. dryogeton* (Abbott 1885), bar = 315 µm.

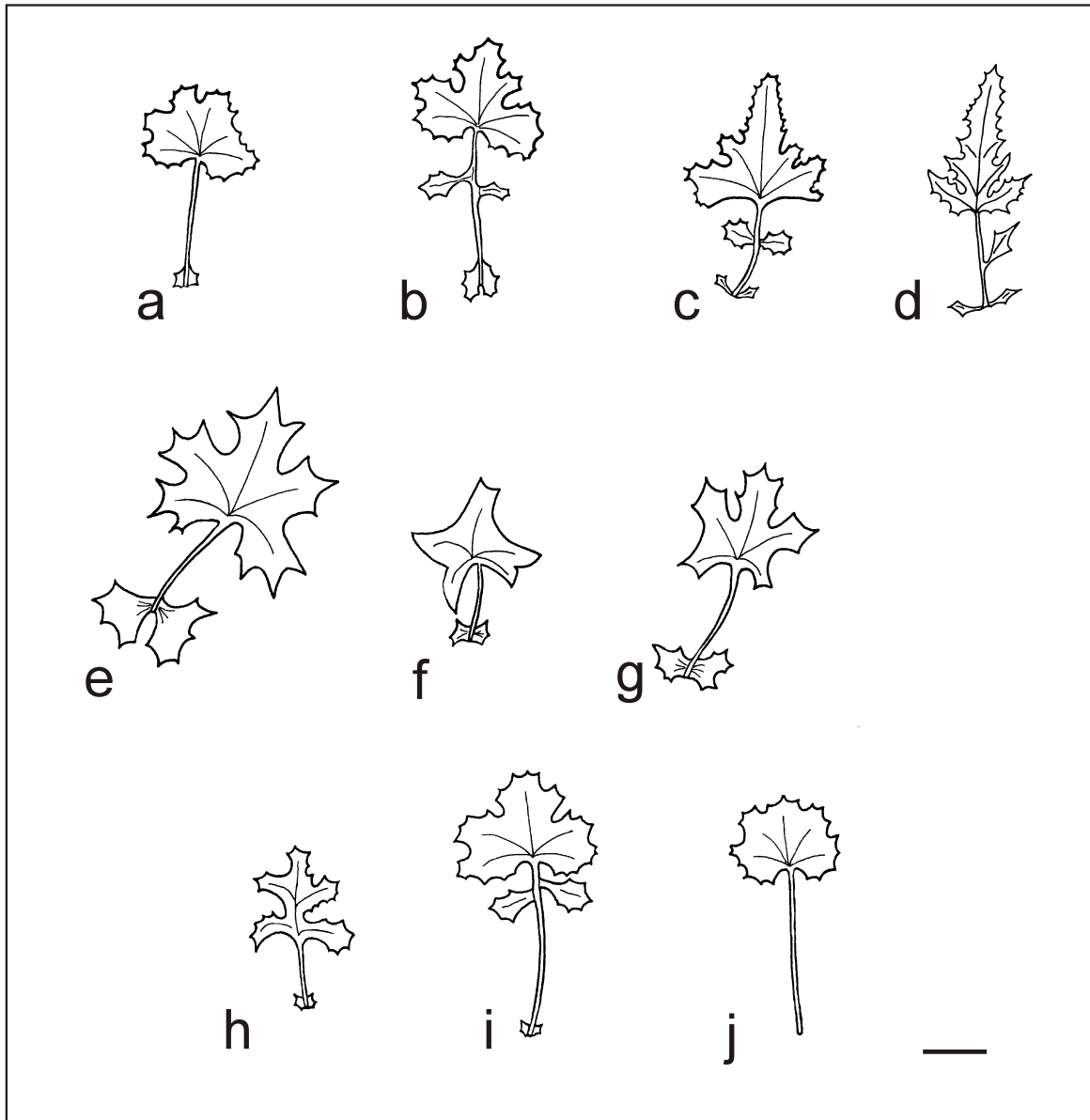


Figure 3. Diagrams illustrating variation in leaf shape and auricles of: (a–b) *Cineraria glandulosa* [Huntley 154 (NU)]; (c) Putative hybrid between *C. atriplicifolia* and *C. glandulosa* [Cron & Scott-Shaw 9 (J)]; (d) *C. atriplicifolia* [Cron 7 (J)]; (e–g) *C. dryogeton* (e) Abbott 7809 (PRU), (f,g) Abbott 1885 (NH); (h–j) *C. geraniifolia* (h) Balkwill, Manning & Cadman 1323 (NU), (i) Hilliard & Burt 9739 (MO), (j) Drège 5902 (K). Scale bar = 10 mm.