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Nomenclatural changes and typifications of *Arctotis* species (*Asteraceae*, *Arctotideae*) from the Western Cape and Eastern Cape provinces of South Africa

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Abstract: In preparation for the treatment of *Arctotis* L. (*Asteraceae*) in the *e-Flora of South Africa* project, the correct names, typifications and synonymies are clarified for 24 *Arctotis* species and two varieties indigenous to the Western Cape and Eastern Cape provinces of South Africa. Lectotypes are designated for 36 names and neotypes for two names. The names *A. glabrata* Jacq., *A. paniculata* Jacq. and *A. spinulosa* Jacq. are resurrected for poorly known, apparently geographically restricted species. *Arctotis roodae* Hutch. is the correct name at specific rank for the taxon previously known as *A. campanulata* var. *puberula* DC. *Arctotis laciniata* Lam. is the earliest legitimate name for an element of the *A. aspera* species complex, to which the name *A. revoluta* Jacq. has often been applied. The name *A. revoluta* Jacq. correctly applies to a distinct, unrelated species, for which a revised synonymy is presented. A lectotype is designated for the illegitimate name *A. undulata* Jacq., the earliest legitimate name for which is *A. acaulis* var. *undulata* Less.

Key words: *Arctotideae*, *Arctotidinae*, *Arctotis*, *Asteraceae*, *Compositae*, nomenclature, South Africa, typification

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Introduction

Arctotis L. is the largest genus in the *Asteraceae* subtribe *Arctotidinae*, comprising an estimated 70 species, and is widely distributed in southern Africa (Karis & al. 2009). The main centre of taxonomic diversity of the genus is in the winter-rainfall region of southern Africa. The genus was described by Linnaeus (1753), but the taxonomy has long been in a chaotic state and is the focus of an ongoing revision. Previous publications have resolved some of the taxonomic and nomenclatural problems in the genus (e.g. McKenzie & al. 2006; McKenzie & Barker 2007; McKenzie & al. 2008a, 2008b, 2010; McKenzie & Barker 2010, 2013), but more than 70 validly published names require typification, predominantly those relating to species indigenous to the Western Cape and Eastern Cape provinces of South Africa. Delimitation of

taxa in certain species groups (e.g. the *A. aspera* species complex) is complicated by phenotypic variability and uncertainty over morphological discontinuities. In addition, variable application of published names by previous authors and in herbaria has been pervasive. A monograph of the genus presenting a revised taxonomy and full descriptive accounts of all taxa will be published on completion of the revision. An essential prerequisite is typification and resolution of the correct application of validly published names. In preparation for the treatment of *Arctotis* in the *e-Flora of South Africa* (Le Roux & al. 2017), the correct names, typifications and synonymies of 24 *Arctotis* species and two varieties indigenous to the Western Cape and Eastern Cape provinces of South Africa are here clarified. Members of *A. sect. Austro-orientales* K. Lewin will be treated separately in an upcoming publication.

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Material and methods

Herbarium material (including types) from the following herbaria was examined: BM, BOL, G, G-DC, G-PREL, GRA, K, MEL, NBG, NH, NU, P, P-LA, PRE, PRU, S, SAM, SBT, TCD, UPS-THUNB and W. High-resolution digital images of herbarium specimens lodged in B-W, BR, E, GH, HBG, KW, LINN, LY, MO, TUB and Z were examined. Herbaria are referred to by the standard codes used in Index Herbariorum (<http://sweetgum.nybg.org/science/ih/>). In addition, all relevant taxonomic literature was consulted. Types are cited or designated for the names of all taxa recognized here, and for all confirmed synonyms of those names wherever possible. When the original author of a taxon name specified in the protologue a single specimen and the herbarium in which it is lodged, that specimen is considered here to be the holotype (although it could be a syntype if it was not definitely expressed that it was the type and there existed other original material). A lectotype or neotype is designated in accordance with the relevant articles of the *International Code of Nomenclature for algae, fungi, and plants* (ICN; McNeill & al. 2012). Examination of herbarium material was supplemented with extensive field work in South Africa undertaken from 2003 to the present.

Results and Discussion

Arctotis acaulis var. *undulata*

The species described by Jacquin (1797) as *Arctotis undulata* Jacq. has been accepted, in the majority of subsequent treatments, either as a distinct species under Jacquin's proposed name or as an infraspecific taxon of the morphologically similar *A. acaulis* L. (e.g. Lessing 1832; Candolle 1838; Voss 1894; Beyers 2000). However, some authors have treated the name *A. undulata* as a synonym of *A. acaulis* (e.g. Harvey 1865). The name *A. undulata* Jacq. is an illegitimate later homonym of *A. undulata* (P. J. Bergius) Gaertn. (Gaertner 1791), which applies to an unrelated element of the *A. aspera* species complex. Therefore, the epithet *undulata* cannot be used at specific rank for the taxon described by Jacquin, although under ICN Art. 58.1 the epithet can be re-used at infraspecific rank under *A. acaulis*. Resolution of the uncertainty in the taxonomic status of *A. undulata* Jacq. will therefore also determine the correct epithet in the name of the taxon.

The earliest legitimate name for the taxon is *Arctotis acaulis* var. *undulata* Less. (Lessing 1832), which is a replacement name for, and therefore homotypic with (ICN Art. 7.4), *A. undulata* Jacq. The latter name, although illegitimate, is validly published and may be lectotypified. One sheet formerly in the Jacquin Herbarium (W 0006641) is annotated with the name "*Arctotis undulata* Jacqu!" The sheet consists of seven detached leaves (and a single detached leaf of a species of *Pelargonium* L'Hér. ex Aiton that was erroneously mounted on the same sheet) and two

detached capitula taken from a plant or plants grown in the royal Schönbrunn garden near Vienna. The rootstock is not represented. No indication is given on the sheet label of the year in which the specimens were collected. The specimens are consistent with the illustration and description provided by Jacquin (1797), and therefore the sheet is designated here as the lectotype of *A. undulata* Jacq.

On the basis of strong morphological similarities, *Arctotis acaulis* var. *undulata* is undoubtedly closely related to *A. acaulis*, although corroborating molecular data are currently lacking. The gross morphology of *A. acaulis* var. *undulata* is well represented in the illustration in Jacquin (1797). Young plants are acaulescent with the leaves forming a basal rosette and capitula borne on solitary peduncles (Fig. 1A). The achene shares the distinctive features of those of *A. acaulis* (see McKenzie & al. 2005). However, certain other, consistently and obviously caulescent species (e.g. the currently unnamed *A. "sp. 2"*; McKenzie 2012) also possess an *acaulis*-type achene, thus achene morphology is an indicator of evolutionary relationship but not necessarily of taxonomic distinctness. As depicted in Jacquin (1797), the leaves of *A. acaulis* var. *undulata* are usually ascending, the lamina usually has undulate (to varying degrees) margins and is somewhat canaliculate-carinate in transverse section. In addition, specimens of older plants of *A. undulata* Jacq. have been collected that have very short, but clearly distinct stems, emanating from the swollen rootstock. A further consideration is the possible contribution of interspecific hybridization and introgression to possession of a weakly caulescent habit in individuals of *A. undulata* Jacq. A polymorphic hybrid swarm between *A. undulata* Jacq. and the species recognized here as *A. formosa* Thunb. (see typification of this name and comments, below) has been noted at Wolesley Commonage. Additional field work is needed to test the consistency of morphological differences and the possible contribution of introgression. The natural habitat of the species has been extensively transformed for agriculture and horticulture, but efforts are ongoing to locate additional "pure" populations that are spatially isolated from potential gene flow with other species of *Arctotis*.

McKenzie (2012) retained the taxon at species rank (as *Arctotis* "sp. 1"), largely on account of the shortly caulescent habit. Pending resolution of its taxonomic status, it is here recognized under the earliest legitimate name.

Arctotis undulata Jacq., Pl. Hort. Schoenbr. 2: 17. 1797, nom. illeg. (Art. 53.1) [non *Arctotis undulata* (P. J. Bergius) Gaertn., Fruct. Sem. Pl. 2: 438. 1791] ≡ *Arctotis acaulis* var. *undulata* Less., Syn. Gen. Compos.: 18. 1832 ≡ *Arctotis acaulis* f. *undulata* (Less.) Voss in Siebert & Voss, Vilm. Blumengärtn., ed. 3, 1: 541. 1894. – **Lectotype (designated here)**: Hort. Schönbr. [Hortus Schoenbrunnensis], ex Promontorio bonae spei (W 0006641!).



Fig. 1. Habit of *Arctotis* taxa included in the study – A: *A. acaulis* var. *undulata*; B: *A. aspera*; C: *A. formosa*; D: *A. glabrata*; E: *A. elongata*; F: *A. glandulosa*; G: *A. laciniata*, green- (left) and tomentose- (right) leaved forms; H: *A. lanceolata*; I: *A. paniculata*; J: *A. revoluta*; K: *A. scabra*; L: *A. spinulosa*. – Photographs by R. J. McKenzie.

Arctotis adpressa

The name *Arctotis adpressa* DC. (Candolle 1838) applies to a species with a restricted distribution at high altitudes (at least 900–1150 m) on the Cederberg and Pakhuisberge

mountain ranges in Western Cape province. The species was described from the gathering *J. F. Drège 2750* from the Cederberg. Duplicates of this gathering are known in G-DC and P. The duplicate sheet in G-DC comprises two specimens each bearing capitula, and illustrates the

main combination of distinctive features of the species – a shortly caulescent, clump-forming habit, lyrate-pinnatisect leaves densely tomentose on both surfaces, often tinged orange-brown due to adhering soil particles and, in one of the specimens, the conical involucre with appressed outer bracts. The sheet in G-DC would certainly have been seen by Candolle and is designated here as the lectotype.

Arctotis adpressa DC., Prodr. 6: 485. 1838. – **Lectotype (designated here):** South Africa, Western Cape, Zeederbergen [Cederberg], s.d., *J. F. Drège 2750* (G-DC 00498478!; isolectotype: P 00138353!).

Arctotis angustifolia and var. *latifolia*

The name *Arctotis angustifolia* L. (Linnaeus 1753) was lectotypified by Nordenstam in Jarvis & al. (1993). Two synonyms of that name were discussed and typified by McKenzie & al. (2008b), namely *A. plantaginea* L. and *A. decumbens* Jacq. The type of *A. decumbens* was regarded as the holotype by McKenzie & al. (2008b), but in fact it must be designated as the lectotype because no specimen was cited by Jacquin (1798).

A form of *Arctotis angustifolia* with the leaves broader, elliptic to ovate or obovate, and occasionally weakly lyrate-pinnatifid was given the varietal name *A. angustifolia* var. *latifolia* Harv. Harvey (1865) specified its distribution as “Groot Howhoek and the Klein Riviersberge” east of the Cape Flats. Populations with comparable leaf morphology also occur on the Cape Peninsula. The typical variety predominated among early collections from the Cape, and was indicated to have been collected from Table Mountain and locations now within the Cape Town metropolitan area, but more recent collections are extremely rare. *Arctotis angustifolia* var. *latifolia* is indicated to differ from the typical variety primarily in leaf shape and dimensions, which are simple and lanceolate to lanceolate-elliptic in the typical variety. The only gathering of var. *latifolia* cited by Harvey is *Zeyher 3007*, duplicates of which are known in five herbaria. Harvey cited examining material in the Trinity College, Dublin herbarium (TCD). The duplicate of *Zeyher 3007* lodged in TCD is representative of the gathering and is designated here as the lectotype.

Schultz Bipontinus (1844) published the name *Arctotis kraussii* Sch. Bip. based on the gathering *Krauss 576*, which comprised specimens of *A. angustifolia* var. *latifolia* collected from mountain slopes near the Kleinrivier. Two duplicates of the gathering are known in P and TUB, each comprising a single stem. The specimen in P was formerly in the Schultz Bipontinus Herbarium and bears a label with the name *A. kraussii* and an extended morphological description of the proposed species. The specimen is in excellent condition with an intact, complete capitulum and is representative of the gathering and of the variety. Therefore, the sheet P 00138372 is designated the lectotype of *A. kraussii*.

Arctotis angustifolia L., Sp. Pl. 2: 923. 1753. – Lectotype (designated by Nordenstam in Jarvis & al. 1993: 20): Herb. Clifford: 412, *Arctotis 2*, s.d. & s.coll. (BM 000647143 [digital image!]).

= *Arctotis plantaginea* L., Sp. Pl., ed. 2, 2: 1306. 1763
 ≡ *Arctotis plantaginifolia* Salisb., Prodr. Stirp. Chap. Allerton: 210. 1796, nom. illeg. (Art. 52.1) ≡ *Venidium plantagineum* (L.) Less., Syn. Gen. Compos.: 30. 1832 ≡ *Venidium semipapposum* var. *plantagineum* (L.) Harv., in Harvey & Sonder, Fl. Cap. 3: 460. 1865 ≡ *Arctotis semipapposa* var. *plantaginea* (L.) K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 74. 1922. – Neotype (designated by McKenzie & al. 2008b: 1344): Hort. Lugdb. [Hortus lugduno-batavensis], s.d. & s.coll. (BM 000896897!).
 = *Arctotis decumbens* Jacq., Pl. Hort. Schoenbr. 3: 68. 1798. – **Lectotype (designated here):** Hort. Schönbr. [Hortus Schoenbrunnensis], s.d. & s.coll., ex Herb. Jacquin (W 0006639!).

Arctotis angustifolia var. *latifolia* Harv. in Harvey & Sonder, Fl. Cap. 3: 452. 1865. – **Lectotype (designated here):** South Africa, Western Cape, Groot Howhoek and Klein Riviersberge, s.d., *C. L. P. Zeyher 3007* (TCD!; isolectotypes: G 00402292!, LY, P 00153552, P 00153553!, S 08-11138!).

= *Arctotis kraussii* Sch. Bip. in Flora 27: 771. 1844. – **Lectotype (designated here):** South Africa, Western Cape, in solo arenoso ad latera mont. prope fl. Kleine [Klein River], Zwellendam [Swellendam], Dec 1838, *C. F. F. Krauss 576* (P 00138372!; isolectotype: TUB 005870 [digital image]).

Arctotis aspera

The *Arctotis aspera* L. (Linnaeus 1753) species complex, comprising the shrubby forms of *Arctotis*, is perhaps the most challenging group in the genus to resolve taxonomically. The polymorphy within the group has been noted previously (e.g. Lewin 1922). Considerable geographic variation, especially in pubescence of the leaf and involucre, and dissection and margin curvature of the leaves, has motivated publication of a plethora of species names for different forms. However, recognition of the different forms as distinct taxa is problematic owing to within-population variation and expression of different combinations of phenotypes in different populations. Research on the complex is ongoing and a detailed treatment will be published in the future. In the interim, *A. aspera* is here considered to represent the white-rayed, shrubby to sprawling form present on Table Mountain and the Cape Peninsula (Fig. 1B). This circumscription may well change in the future.

The name *Arctotis aspera* was lectotypified by Wijnands (1983) with a specimen in the Linnaean Herbarium (no. 1039.10 in LINN). The sheet has no accompanying locality information, and Linnaeus (1753) specified the provenance as “Habitat in Æthiopia”. The name

has frequently been misapplied to a number of other species, especially by early authors following Linnaeus.

The name *Arctotis aspera* var. *scabra* P. J. Bergius (Bergius 1767) was published with an unusually full and detailed description (for that era). Bergius did not cite a herbarium specimen in the protologue. Following the diagnosis “*Arctotis foliis pinnato-sinuatis, laciniis oblongis dentatis*”, Bergius cited publications by Linnaeus (1737: 412; 1748: 275), Royen (1740: 178) and Kniphof (1757: fig. s.n.). Each of these references listed the same polynomial used by Bergius, which was seemingly first published by Linnaeus (1737). Both Linnaeus (1737) and Royen (1740) cited as a synonym the polynomial “*Anemonospermum afra, folio jacobiae tenuiter laciniato, flore aurantio pulcherrimo*” (Boerhaave 1719: 100, t. 100). Linnaeus (1748) listed in synonymy the polynomial “*Anemonospermum africana foliis cardui benedicti florum radiis intus albicantibus*” published by Commelin (1701: 45, t. 23). The illustrations accompanying these polynomials in Commelin (1701) and Boerhaave (1719) are certainly consistent in habit and leaf and involucre morphology with the typical form of *A. aspera*. Commelin’s polynomial was also cited as synonymous with *A. carduiifolia* Burm. f., which in turn is a synonym of *A. aspera* (Wijnands 1983). Linnaeus (1737, 1748) also cited as a synonym the polynomial “*Arctotheca jacobiae folio, flore aurantio pulcherrimo*” attributed to S. Vaillant (“*Vaill. act. 1720. p. 428*”), but no specimen or publication using this polynomial has been traced as yet, so the application of the polynomial remains uncertain. The illustration in Kniphof (1757) cited by Bergius, although labelled also with the binomial *A. aspera* by the author, is of an entirely different species, possibly *A. subacaulis* (DC.) Beauverd.

A sheet in the Bergius Herbarium attributed to E. Tuvé (SBT 4.3.6.58) is annotated “*Arctotis* Linn. *aspera* variet. mihi *scabra*”. On the sheet is mounted the upper portion of a flowering shoot bearing four leaves, the basal portion of a fifth leaf, and a single capitulum. In all accessible features, especially leaf morphology, the specimen conforms with typical *A. aspera* and shows no differences that justify its recognition as a distinct variety. Bergius did not describe a typical variety, and the description of var. *scabra* is consistent with the typical form of *A. aspera*.

Therefore, the available information indicates that Bergius based *Arctotis aspera* var. *scabra* largely on material of the typical form of *A. aspera*. The description of *A. aspera* var. *scabra* would partly have been based on the sheet SBT 4.3.6.58 and it is designated here as the lectotype of *A. aspera* var. *scabra*, which is placed in the synonymy of *A. aspera*.

Arctotis arborescens Jacq. (Jacquin 1797) was described from plants grown in the royal Schönbrunn garden near Vienna. The illustration in Jacquin (1797: t. 171) suggests that the leaf adaxial surface was slightly more tomentose than is typical for *A. aspera*, but the published description and the leaf and involucre morphology and floret coloration depicted in the illustration are other-

wise consistent with that of *A. aspera*. A sheet formerly in the Jacquin Herbarium and annotated by Jacquin with the name *A. arborescens* (W 0006636) was designated the lectotype of the name on the sheet by T. Norlindh in 1980, but the typification was never published. The sheet bears two flowering shoots each bearing a single capitulum, with one capitulum partially insect-damaged. In all accessible characters the specimen is consistent with those of *A. aspera*. The sheet W 0006636 is designated here as the lectotype of *A. arborescens* and the name is confirmed to be a synonym of *A. aspera*.

The name *Arctotis leucantha* Hoffmanns. (Hoffmannsegg 1824) was published among a list of species cultivated in Dresden and Rammenau in Germany. Hoffmannsegg specified as synonyms “n. – *laciniata* β Enc., – *aspera* var. LW, – *superba* fl. alb. Wendl.!” The abbreviation “n.” was defined as indicating that the name provided was new but was given to a species already known by a different name (cf. the abbreviation “N.” indicated a name that was provided for a previously unknown species). Thus, Hoffmannsegg applied the name *A. leucantha* to a plant previously referred to as “*Arctotis laciniata* β” by Lamarck (1783), as “*Arctotis aspera* var.” by Willdenow (1803) and as “*Arctotis superba* fl. alba” by Wendland. Although Hoffmannsegg did not provide a description or diagnosis for *A. leucantha*, diagnostic phrases indicating the features that distinguished the plant in question were published in the cited works by Lamarck and Willdenow. The requirement under ICN Art. 38.1 for a description or diagnosis was therefore satisfied, and the name *A. leucantha* was validly published and may be lectotypified.

Lamarck (1783) validly published the name *Arctotis laciniata* Lam. (which is further discussed below) and followed the protologue with “β. Eadem foliis virescentibus, semiflosculis interne alba, subtus purpureis”. No specimen or previously published work linked to this description was cited. Examination of material in the Herbar de Lamarck (P-LA) revealed two sheets annotated with “*arctotis laciniata* enc.”. One sheet is annotated with “*arctotis aspera*. β. Lin.” and subsequently with “*arctotis laciniata* enc.” (see under *A. laciniata*, below). The second sheet (P-LA 00342589), consisting of a flowering shoot, four separate leaves and a capitulum in an attached envelope, was originally labelled with the polynomial “*Anemonospermum africana, foliis cardui benedicti, florum radii, intus albicantibus*. hort. amst. 2. P. 45” and was subsequently annotated with “*arctotis laciniata* β. enc. *flos alba, subtus purpurascens*”. The specimen conforms closely in morphology with that of *A. aspera*. Lamarck noted the variety “β” to be hardly cottony, with leaves greenish, a little less finely cut, almost crispate, and less soft to the touch, and noted the ray floret limb to be white adaxially and purple-violet abaxially. It was stated to be cultivated in the Jardin du Roi. The description is consistent with the morphology of *A. aspera* and it is concluded that the name “*Arctotis laciniata* β” applied to a specimen of *A. aspera* taken from material cultivated in Paris.

Willdenow (1803: 23) provided a brief description of what he considered were the essential vegetative and floral characters that distinguish *Arctotis aspera* and appended the description with “Variat radio alba”. The general description, by reference to the yellow ray floret limb, likely applied to the species treated here as *A. laciniata*. The unnamed variety with a white ray floret limb is interpreted as referring to *A. aspera* as conceived here.

The identity of Wendland’s “*Arctotis superba fl. alba*” remains uncertain. Wendland (1798) briefly discussed a taxon “*Arctotis calenducea superba*” but made no reference to a plant with white florets. It is possible that Hoffmannsegg was referring to a specimen in J. C. Wendland’s herbarium (now in GOET), but it has not yet been possible to examine material formerly in Wendland’s herbarium.

This discussion indicates that Hoffmannsegg applied the name *Arctotis leucantha* to material of *A. aspera* in cultivation in European gardens. The sheet in P-LA annotated “*Arctotis laciniata* β Enc.” is designated here as the lectotype of *A. leucantha* and the name is here placed in the synonymy of *A. aspera*.

Arctotis aspera L., Sp. Pl. 2: 922. 1753 ≡ *Arctotis sulphurea* Salisb., Prodr. Stirp. Chap. Allerton: 210. 1796, nom. illeg. (Art. 52.2) – “*Arctotis aspera f. typica*” Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 62. 1922, nom. inval. (Art. 24.3). – Lectotype (designated by Wijnands 1983: 67); Herb. Linn. No. 1036.10 (LINN [digital image!]).

= *Arctotis aspera* var. *scabra* P. J. Bergius, Descr. Pl. Cap.: 315. 1767 ≡ *Arctotis aspera f. scabra* (P. J. Bergius) Voss in Siebert & Voss, Vilm. Blumengärtn., ed. 3, 1: 541. 1894. – **Lectotype (designated here):** s.loc. & s.d., *E. Tuvén s.n.* (SBT 4.3.6.58!).

= *Arctotis carduifolia* Burm. f., Prodr. Fl. Cap.: 28. 1768. – Lectotype (designated by Wijnands 1983: 68): “*Anemonospermos Africana Taraxaci foliis angustus subincanis*”, ex Herb. Delessert, s.loc., s.d. & s.coll. (G-PREL 005458!).

= *Arctotis arborescens* Jacq., Pl. Hort. Schoenbr. 2: 23. 1797. ≡ *Arctotis aspera* var. *arborescens* (Jacq.) DC., Prodr. 6: 488. 1838 ≡ *Arctotis aspera f. arborescens* (Jacq.) Voss in Siebert & Voss, Vilm. Blumengärtn., ed. 3, 1: 541. 1894. – **Lectotype (designated here):** Hort. Schönbr. [Hortus Schoenbrunnensis], ex Promontorio bonae spei, s.d. & s.coll. (W 0006636!).

= *Arctotis leucantha* Hoffmanns., Verz. Pfl.-Kult.: 40. 1824, syn. nov. – **Lectotype (designated here):** s.loc., s.d. & s.coll., ex Herb. Lamarck (P-LA 00342589!).

Arctotis bellidifolia

Arctotis bellidifolia P. J. Bergius (Bergius 1767) is a common species found on mountain ranges in the Western Cape province from Piketberg and the Cederberg south to Tulbagh. Bergius (1767) did not cite any specimens

in the protologue when publishing the name. However, a specimen in the Bergius Herbarium (SBT), but currently lodged in S (S G-9721), is annotated with “*Arctotis bellidifolia* Berg Typus!” by T. Norlindh. The gathering is attributed to Michael Grubb, whose personal herbarium formed the basis of the treatment by Bergius. The specimen conforms to Bergius’s description of *A. bellidifolia* and is designated here as the lectotype of the name *A. bellidifolia*.

Lessing (1832) conceived *Arctotis bellidifolia* to include the respective types for *A. bellidifolia*, *A. muricata* Thunb. and *A. paniculata* Jacq. as well as the sheet B-W 16706. These four specimens correspond with Lessing’s statement that he saw in total four specimens (“v. sp. s. 4”) that he determined as *A. bellidifolia*. Lessing validly published names for two varieties of *A. bellidifolia*, namely var. *integrifolia* Less. and var. *incisa* Less. Although the corresponding autonym (*A. bellidifolia* var. *bellidifolia*) was not cited, valid publication of the two varieties automatically established the autonym under ICN Art. 26.3. Lessing did not cite any specimen(s) as specifically belonging to either variety, therefore lectotypes for the varietal names must be selected from among the above-mentioned four specimens. Of the cited specimens, Lessing’s description of *A. bellidifolia* var. *integrifolia* is consistent only with the specimen designated here as the lectotype of *A. bellidifolia* P. J. Bergius (S G-9721), which therefore is designated here as the lectotype of *A. bellidifolia* var. *integrifolia*. Consequently, the name *A. bellidifolia* var. *integrifolia* becomes a homotypic synonym of *A. bellidifolia* P. J. Bergius.

The species *Arctotis stephensae* Hutch. (Hutchinson & Pearson 1917) was described from a specimen collected from the Olifants River Mountains. Examination of the holotype and other collections from the same mountain range, combined with field work, proved that this name is conspecific with *A. bellidifolia*. Therefore, *A. stephensae* Hutch. is confirmed to be a synonym of *A. bellidifolia*.

Arctotis bellidifolia P. J. Bergius, Descr. Pl. Cap.: 318. 1767 ≡ *Arctotis bellidifolia* var. *integrifolia* Less., Syn. Gen. Compos.: 22. 1832, syn. nov. – **Lectotype (designated here):** South Africa, Cap. b. sp. [Caput bonae spei], *M. Grubb s.n.* (S G-9721!).

= *Arctotis stephensae* Hutch. in Ann. S. African Mus. 9: 422. 1917. – Holotype: South Africa, Western Cape, Olifants River Mountains, road to Modderfontein, 27 Sep 1911, *E. L. Stephens 6990* (K 000250010!).

Arctotis elongata

The name *Arctotis elongata* Thunb. (Thunberg 1799) has been misapplied to a number of species by other authors. Similarly, the species that is correctly named *A. elongata* has been misidentified in herbaria as *A. argentea* Aiton and *A. virgata* Jacq. The species that Thunberg collected has a

restricted coastal lowland distribution in the Eastern Cape province from at least Oyster Bay to Alexandria, and possibly as far west as George in the Western Cape province (*vide* Beyers 2000). The species is closely allied to and questionably separable from *A. lanceolata* Harv. Discrimination of the two species requires further investigation.

A single sheet in the Thunberg Herbarium (UPS-THUNB 20770) annotated with the name *Arctotis elongata* bears two flowering shoots. The shoots are from a robust plant and illustrate well the elongate peduncles, involucre and leaf morphology of the species (cf. Fig. 1E). The sheet is designated here as the lectotype of *A. elongata* Thunb.

Candolle (1838) published the name *Arctotis virgata* var. *obtusifolia* DC. for the gathering *W. J. Burchell 4320*. The specimens are clearly conspecific with *A. elongata* and depict the decumbent habit. The duplicate specimen in G-DC, which would certainly have been seen by Candolle, is designated here as the lectotype of *A. virgata* var. *obtusifolia*, and the name is confirmed to be a synonym of *A. elongata*. The collection locality and date for the lectotype are derived from McKay (1943).

***Arctotis elongata* Thunb., Arctotis: 9. 1799. – Lectotype (designated here):** South Africa, Cap. b. Spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20770!).

= *Arctotis virgata* var. *obtusifolia* DC., Prodr. 6: 489. 1838. – **Lectotype (designated here):** South Africa, Eastern Cape, Port Elizabeth, near the burying-ground, 13 Nov 1813, *W. J. Burchell 4320* (G-DC 00498384!; isolectotype: GH 00002327 [digital image!]).

Arctotis formosa

Arctotis formosa Thunb. (Thunberg 1799) is another name in the genus that has been variably applied and confused. Application of the name has no doubt been complicated because the only sheet in the Thunberg Herbarium annotated with this name (UPS-THUNB 20771) bears two morphologically disparate shoots that are interpreted to be heterospecific (Fig. 2). There is no indication on the sheet or in a publication by Thunberg whether the two shoots were part of the same gathering or different gatherings. Therefore, for the purpose of typification the two specimens are treated as a single gathering and application of the name *A. formosa* is dependent on which of the two specimens is selected as the lectotype.

The right-hand specimen bears pinnatisect leaves that are not at all lyrate (i.e. the terminal lobe is similar in dimensions to the lateral lobes), the lateral lobes are oblong-lanceolate with an acute apex and recurved, dentate margins. Some of the lateral lobes on the largest leaf are secondarily pinnatifid. The abaxial surface is densely tomentose but the adaxial surface is only sparsely to moderately tomentose. Some of the petioles have short basal lobes. The stem is densely tomentose and indicated

to be shortly decumbent at the base. The specimen has two flowering shoots, one of which is terminated in a long, naked peduncle. The outer involucral bracts have a long, linear apical appendage 0.5–1.2 mm long, which is densely tomentose and with biseriate, multiseptate trichomes, whereas the outer bract base is usually more sparsely tomentose. The capitula were indicated to be moderate in size (pressed involucre 3–3.5 cm in diam.).

The leaf shape on the left-hand specimen differs notably and is more variable. The outline of the basalmost leaves is elliptic-lanceolate with comparatively short to moderately incised lateral lobes (i.e. not incised almost to the midrib as in the right-hand specimen). The leaves in the mid-lower portion of the stem are lyrate-pinnatisect, with the lateral lobes dissected to up to c. 80% of the lamina width. The lamina margin is dentate and recurved, but the lateral lobes are not secondarily pinnatifid. The leaf outline becomes increasingly lanceolate-linear upwards on the stem. The leaf abaxial surface is densely tomentose with biseriate, multiseptate trichomes, and the upper surface of young leaves is densely tomentose with dense, biseriate, multiseptate trichomes, with both trichome types more sparse on older leaves. The petiole is not obviously auriculate. The lower stem is lacking, so the growth habit and rootstock are unknown. The morphology of the outer involucral bracts is not dissimilar to the right-hand specimen, but the apical appendage is notably shorter (up to c. 0.5 cm). The capitulum was a little smaller (pressed involucre c. 2.5 cm in diam.) than those of the right-hand specimen.

Even allowing for phenotypic variability, it is concluded the two specimens are not conspecific. All accessible characters of the right-hand specimen conform with the morphology of *Arctotis revoluta* Jacq. The features of the left-hand specimen are consistent with those of a rhizomatous species mainly found on lowland flats in the Swartland region of the Western Cape province eastward to about Wolseley (Fig. 1C). Dissection of the lower leaves is variable in this species, and the stems are variably decumbent to ascending, possibly influenced by the growing conditions, but usually with adventitiously rooting, rhizomatous stems. Specimens of this species are often incorrectly identified in herbaria as *A. incisa* Thunb. and *A. petiolata* Thunb.

The protologue for *Arctotis formosa* could apply to either specimen. Selection of the right-hand specimen as the lectotype of *A. formosa* would render the name a synonym of the earlier name *A. revoluta* described by Jacquin (1797). Selection of the left-hand specimen would link the name to the rhizomatous Swartland species, for which an earlier legitimate name has not been ascertained. Therefore, the left-hand specimen on the sheet UPS-THUNB 20771 is designated here as the lectotype of *A. formosa*, which is therefore the earliest legitimate name known to apply to the rhizomatous Swartland species.

Thunberg (1823) specified that he collected specimens of *Arctotis formosa* from the “Roggeveld”, but



Fig. 2. Lectotype of *Arctotis formosa* Thunb. (UPS-THUNB 20771). – Reproduced by kind permission, © Museum of Evolution, Uppsala University.

based on current knowledge this may be a mistake. The region currently termed the Roggeveld, which was so named during Thunberg's time in South Africa (Karstens 1939), is the plateau along the Great Escarpment from south of Calvinia to east of Sutherland, approximately 100 km inland from the nearest known locality of the rhizomatous Swartland species. No *Arctotis* specimen of similar morphology to Thunberg's *A. formosa* specimens has been seen in the Roggeveld region during extensive field work or among herbarium material of known provenance.

Arctotis formosa Thunb., *Arctotis*: 11. 1799. – **Lectotype (designated here)**: South Africa, Cap. b. spei [Caput bonae spei], Roggeveld, s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20771! – left-hand stem only [Fig. 2]).

Arctotis glabrata

Jacquin (1797) published the name *Arctotis glabrata* Jacq. based on cultivated material from the royal Schönbrunn garden near Vienna. A single sheet formerly in the Jacquin Herbarium (W 0006624) is annotated with this name and conforms with the description and illustration of the species in Jacquin (1797), and was designated the lectotype of *A. glabrata* by McKenzie & Barker (2010).

Application of the name *Arctotis glabrata* in subsequent treatments of the genus has varied. The name has usually been considered a synonym of *A. laevis* Thunb. (Lessing 1832; Candolle 1838; Harvey 1865; Lewin 1922) and was incorrectly treated as a synonym of the misapplied name *A. revoluta* by McKenzie & Barker (2010) (see discussion of *A. revoluta* below). The leaf lamina of the types of *A. glabrata* and *A. laevis* is similar in lacking woolly tomentum on either surface of mature leaves and is typically secondarily pinnatisect. The involucre of the two types is generally similar. However, the type of *A. glabrata* differs in that the lower leaves on the stem are more distinctly lyrate-pinnatisect (i.e. the terminal lobe is somewhat broader than the lateral lobes), and the upper leaves gradually become lanceolate-lobate up the stem. In the type of *A. laevis* the uppermost leaves are pinnatisect with narrow, distinct lateral pinnae and the three lower leaves on the stem are not at all lyrate. Immature leaves on the right-hand shoot of the *A. glabrata* type sheet are moderately to densely tomentose, but the tomentum is lost on mature leaves on the stem.

Jacquin (1797) also published the name *Arctotis squarrosa* Jacq., of which the type is morphologically comparable and interpreted as conspecific with *A. laevis*. Comparison of the illustrations of *A. glabrata* and *A. squarrosa* in Jacquin (1797), and of the types of *A. glabrata* (W 0006624) and *A. squarrosa* (W 0006642), highlights the differences in leaf morphology of the two plants. Examination of extensive herbarium material in combination with field work indicates that the names *A. laevis* and *A. squarrosa* apply to a shrubby element of the

A. aspera species complex treated here under the name *A. laciniata*. The type of *A. glabrata* conforms in morphology with a poorly collected taxon with a decumbent to sprawling growth habit currently known from the Montagu district in the Western Cape province (informally designated as *A. "sp. 7"* in McKenzie 2012) (Fig. 1D). Present knowledge indicates that *A. glabrata* is the legitimate name for this taxon and it is here recognized as a distinct species.

Arctotis glabrata Jacq., *Pl. Hort. Schoenbr.* 2: 25. 1797. – Lectotype (designated by McKenzie & Barker 2010: 301): Hort. Schönbr. [Hortus Schoenbrunnensis], ex Promontorium bonae Spei, s.d. & *s.coll.*, ex Herb. Jacquin (W 0006624!).

Arctotis glandulosa

The name *Arctotis glandulosa* Thunb. (Thunberg 1799) has often been applied to forms of the *A. aspera* species complex by other authors. The name was based on specimens collected near Piketberg. Examination of herbarium material and fresh collections in combination with field work has indicated that the name applies to a poorly collected species presently known from the Aurora and Engelsman se Baken areas, west and south of Piketberg, in the Swartland region of the Western Cape province (Fig. 1F). The sole sheet in the Thunberg Herbarium annotated with the name *A. glandulosa* (UPS-THUNB 20772) is designated here as the lectotype of the name.

As the epithet implies, the stems, leaves and involucre of the lectotype are densely glandular and not tomentose. Collections examined from the Aurora area agree in morphology with the lectotype of *Arctotis glandulosa*. Plants in the Hopefield area have tomentose stems, leaves and involucre, but are otherwise consistent with the lectotype and may be conspecific. Further collections are needed to determine the full range of morphological variation and geographic distribution.

Arctotis glandulosa Thunb., *Arctotis*: 8. 1799. – **Lectotype (designated here)**: South Africa, Western Cape, Cap. b. Spei [Caput bonae spei], prope Piketberg, s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20772!).

Arctotis laciniata

The shrubby yellow- and orange-flowered forms of the *Arctotis aspera* species complex with highly pinnatisect, usually narrowly laminate, undulate leaves are here, somewhat arbitrarily, treated as a single variable species (Fig. 1G). Numerous names have been published for different forms of this species complex. It should be noted that the circumscription of taxa in this complex may change once the revision is completed. Previously, these forms were collectively treated under the name *A. revoluta* (McKenzie & Barker 2010; McKenzie 2012; McKenzie & Herman

2013), but subsequent examination of herbarium material established that this name applies to an unrelated species (see discussion under *A. revoluta* below). The long-forgotten name *A. laciniata* Lam. (Lamarck (1783) is the earliest legitimate name applicable to this species.

Following the diagnosis, Lamarck cited the polynomial “*Anemonospermos afra, folio jacobiae tenuiter laciniato, flore aurantio pulcherrimo*” (Boerhaave 1719: 100, t. 100), but the cited illustration most likely depicts *Arctotis aspera*. Two sheets in the Lamarck Herbarium (P-LA) are annotated with “*arctotis laciniata* enc.” Of these, the sheet P-LA 342589 is designated here as the lectotype of *A. leucantha* Hoffmanns. (see discussion under *A. aspera*, above). The second sheet (P-LA 342598) is also annotated with “*Arctotis aspera* β Lin.” The sheet comprises four shoots (three flowering and one sterile) and one detached leaf. All leaves are tomentose (but less densely so on the adaxial surface of the lower leaves). The leaves of the upper right-hand specimen are not pressed flat but are more narrowly laminate and at least secondarily pinnatisect. The other three shoots bear somewhat more broadly laminate, simply pinnatisect leaves and might have been taken from cultivated plants of the same species. The upper right-hand stem is consistent with field-collected specimens of the form to which the name *A. cuprea* Jacq. applies, and is designated here as the lectotype of *A. laciniata*.

The diagnosis and description of *Arctotis aspera* var. *undulata* P. J. Bergius are consistent with a specimen in the Bergius Herbarium (SBT 4.3.6.38) attributed to A. Kallström and originally annotated “*Arctotis* Linn. *aspera* variet. mihi *undulata*”. This specimen is a form of *A. laciniata* with leaves sparsely tomentose adaxially and densely tomentose abaxially. In the protologue, Bergius cited the above-mentioned polynomial and illustration of Boerhaave (1719), as well as the polynomials “*Arctotheca foliis pinnatis, pinnis undulatis, semipinnatis, subtus tomentosus*” (Haller 1753: 406; Zinn 1757: 416) and “*Arctotheca Jacobaeae folio, flore aurantio pulcherrimo*” (Vaillant 1754: 604). Each of the latter authors cited the Boerhaave polynomial as a synonym. In the absence of cited herbarium material, it is interpreted that these authors referred to material of *A. aspera*. Therefore, the sheet SBT 4.3.6.38 is designated here as the lectotype of *A. aspera* var. *undulata* P. J. Bergius and the name is placed in the synonymy of *A. laciniata*.

When publishing the name *Arctotis aureola* Ker Gawl., which was based on a specimen cultivated in the Cambridge Botanic Garden (K 000250017), Ker Gawler (1815) cited the earlier validly published names *A. aspera* var. *undulata* P. J. Bergius (1767) and *A. undulata* (P. J. Bergius) Gaertn. (Gaertner 1791) in synonymy, thereby rendering *A. aureola* nomenclaturally superfluous, illegitimate under ICN Art. 52.1, and automatically homotypic with *A. aspera* var. *undulata* because Ker Gawler did not designate or definitely indicate a different type (ICN Art. 7.5). The name *A. aureola* is sometimes

attributed to S. T. Edwards, who was the editor of the first volume of *The Botanical Register*, in which the name was published. No author is indicated in the published article or volume index, but Ker Gawler is cited as the author in an annotation on the sheet K 000250017 and by previous authors (Candolle 1838; Spach 1841; Hooker 1885).

The names *Arctotis crispata* Hutch. (Hutchinson 1946) and *A. cuprea* (Jacquin 1797) apply to glandular and tomentose forms of *A. laciniata*. The names *A. laevis* and *A. squarrosa* apply to the same form of *A. laciniata* with narrowly laminate, glandular, non-tomentose leaves. A single sheet formerly in the Jacquin Herbarium (W 0006642) annotated with the name *A. squarrosa* contains a single shoot taken from a plant grown in the royal Schönbrunn garden. This sheet is designated here as the lectotype of *A. squarrosa*.

***Arctotis laciniata* Lam., Encycl. 1: 237. 1783. – Lectotype (designated here):** s.loc., s.d. & s.coll., ex Herb. Lamarck (P-LA 00342598! – upper right-hand stem only).

= *Arctotis aspera* var. *undulata* P. J. Bergius, Descr. Pl. Cap.: 317. 1767, syn. nov. \equiv *Arctotis undulata* (P. J. Bergius) Gaertn., Fruct. Sem. Pl. 2: 438. 1791 \equiv *Arctotis aureola* Ker Gawl. in Bot. Reg. 1: t. 32. 1815, nom. illeg. (Art. 52.1) \equiv *Arctotis aspera* var. *aureola* DC., Prodr. 6: 488. 1838, nom. illeg. (Art. 52.1) \equiv *Arctotis aspera* f. *undulata* (P. J. Bergius) Voss in Siebert & Voss, Vilm. Blumengärt., ed. 3, 1: 541. 1894. – **Lectotype (designated here):** s.loc. & s.d., *A. Kallström s.n.* (SBT 4.3.6.38!).

= *Arctotis cuprea* Jacq., Pl. Hort. Schoenbr. 2: 25. 1797, syn. nov. \equiv *Arctotis aspera* var. *cuprea* (Jacq.) DC., Prodr. 6: 488. 1838. – Lectotype (designated by McKenzie & Barker 2010: 301): Hort. Schönbr. [Hortus Schoenbrunnensis], s.d. & s.coll., ex Herb. Jacquin [lectotype (W 0006631!).

= *Arctotis squarrosa* Jacq., Pl. Hort. Schoenbr. 2: 25. 1797, syn. nov. – Lectotype (designated by McKenzie & Barker 2010: 301): Hort. Schönbr. [Hortus Schoenbrunnensis], s.d. & s.coll., ex Herb. Jacquin (W 0006642!).

= *Arctotis laevis* Thunb., Arctotis: 10. 1799, syn. nov. – Lectotype (designated by McKenzie & Barker 2010: 301): South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20777!).

= *Arctotis crispata* Hutch., Botanist S. Africa: 158. 1946, syn. nov. – Holotype: South Africa, Northern Cape, Kamieskroon, 14 Nov 1928, *J. Hutchinson 845* (K 000250016!; isotypes: BOL 63019!, PRE 0213659!).

Arctotis lanceolata

The name *Arctotis lanceolata* Harv. (Harvey 1865) is here applied to a species predominantly distributed in the Klein Karoo of the Western Cape province extending to mountain ranges east of Baviaanskloof in the

Eastern Cape province (Fig. 1H). The species has often been misidentified as *A. argentea* Aiton or *A. linearis* Thunb. When publishing the name, Harvey (1865) cited only the gathering *C. F. Ecklon & C. L. P. Zeyher 108.5* from an unspecified location lodged in the herbarium of O. Sonder. Material previously in Sonder's herbarium is now held by LY, MEL and S. Each of these herbaria holds a sheet of the gathering *Ecklon & Zeyher 108.5* determined as *A. lanceolata*, and these three sheets are original material. The sheet S 08-11129, which has three flowering shoots in the best condition among the duplicates and is representative of both the gathering and the species, is designated here as the lectotype of *A. lanceolata* Harv. The type locality details are as specified by Glen & Germishuizen (2010).

Arctotis lanceolata Harv. in Harvey & Sonder, Fl. Cap. 3: 455. 1865. – **Lectotype (designated here):** South Africa, Eastern Cape, Uitenhage, at Grootrivier and Trompeterspoort and Beervlei, 2000–3000 ft, May 1836, *C. F. Ecklon & C. L. P. Zeyher 108.5* (S 08-11129!; isolectotypes: LY [digital image!], MEL 2318380!).

Arctotis linearis

The name *Arctotis linearis* Thunb. (Thunberg 1799) has been variably applied in previous treatments of the genus. As conceived here, the name is applied to a range-restricted and poorly collected species currently known from the Karooport, Witteberg and Anysberg areas of the Western Cape province. In morphology it is generally intermediate between *A. argentea* and *A. lanceolata*, but is distinguishable by the combination of linear-lanceolate leaves with short lateral lobes, small capitula containing comparatively few florets, and appressed outer involucre bracts usually lacking an apical appendage. A single sheet annotated with the name *A. linearis* is lodged in the Thunberg Herbarium (UPS-THUNB 20782) and is designated here as the lectotype of *A. linearis*.

Arctotis linearis Thunb., *Arctotis*: 7. 1799. – **Lectotype (designated here):** South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20782!).

Arctotis muricata

Thunberg (1799) published the name *Arctotis muricata* Thunb. for a species that he subsequently (Thunberg 1823) stated occurred “in campis arenosis vere inundatis Swartlandiae et alibi”. The sole sheet in the Thunberg Herbarium annotated with the name *A. muricata* (UPS-THUNB 20784) is designated here as the lectotype of the name. Examination of herbarium material and field work indicate that the species is currently known from the western and eastern slopes of the Olifantsrivierberge and the Elands-kloofrivier valley east of the Olifants Riv-

er. No other collection examined or extant population is currently known from the Swartland plain, which suggests that if the species did once occur on that plain, it has been extirpated as a result of the extensive transformation into cultivated lands.

As discussed above under *Arctotis bellidifolia*, Lessing (1832) conceived *A. bellidifolia* to include the respective types for *A. bellidifolia* (S G-9721), *A. muricata* and *A. paniculata* as well as the sheet B-W 16706. The sheet S G-9721 is designated here as the lectotype of the names *A. bellidifolia* P. J. Bergius and *A. bellidifolia* var. *integrifolia* Less. (see discussion under *A. bellidifolia*, above). The sheet B-W 16706 is morphologically consistent and is therefore considered to be conspecific with the specimen designated here as the lectotype of *A. paniculata* (W 0006520) (see discussion under *A. paniculata*, below). The lectotype of *A. muricata* fits Lessing's description of *A. bellidifolia* var. *incisa* Less. Accordingly, the sheet UPS-THUNB 20784 is designated here as the lectotype of *A. bellidifolia* var. *incisa*, which consequently becomes a homotypic synonym of *A. muricata*.

Arctotis muricata Thunb., *Arctotis*: 10. 1799 \equiv *Arctotis bellidifolia* var. *incisa* Less., *Syn. Gen. Compos.*: 22. 1832, syn. nov. – **Lectotype (designated here):** South Africa, Western Cape, in campis arenosis vere inundatis Swartlandiae et alibi, s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20784!).

Arctotis paniculata

The name *Arctotis paniculata* Jacq. (Jacquin 1798) was based on material grown in the royal Schönbrunn garden near Vienna. The illustration in Jacquin (1798: t. 380) depicts a somewhat wiry-stemmed plant with long internodes, lanceolate-linear leaves with shortly lobed to dentate margins, an involucre with outer bracts with a shortly recurved apical appendage, ray florets in which the limb adaxial surface was white with a dark reddish purple basal blotch and the abaxial surface was striped reddish-purple, and disc florets with a black corolla. The stems and leaf surfaces are indicated to be densely covered with short erect hairs, and the leaf abaxial surface covered with dense tomentum.

A single sheet formerly in the Jacquin Herbarium, now lodged in W (W 0006620), is annotated with the name “*Arctotis paniculata* Jacqu.!” The specimen corresponds closely with the illustration in Jacquin (1798) except that the leaf adaxial surface and stem are sparsely tomentose. However, the label was also annotated by Jacquin with “Hort. Schönbr. 1799”. A specimen in the Willdenow Herbarium (B-W 16706) is identifiable as *A. paniculata*; the sheet bears a label with the name “Jacquin”, and the folder is annotated with “Jacq. hort. Schönbr.” but no date is provided. The sheet W 0006620, which is the only known specimen unequivocally formerly in Jacquin's

herbarium, is designated here as the neotype of *A. paniculata*, because the specimen was indicated to have been prepared after the name was published.

The neotype corresponds with a species presently known only on the northern slope of the Riviersonderendberge. Plants growing in cultivation and favourable situations can be long-stemmed as in W 0006620, whereas plants growing in harsher, exposed sites and heavily grazed plants are compact (Fig. 1I) and rarely mat-like in habit. The ray limb colour in the species may be white, pink or yellow with a small black or purplish black blotch at the base.

Arctotis paniculata Jacq., Pl. Hort. Schoenbr. 3: 68. 1798. – **Neotype (designated here):** Hort. Schönbr. [Hortus Schoenbrunnensis], ex Promontorium bonae Spei, 1799, *s.coll.*, ex Herb. Jacquin (W 0006620!).

Arctotis pinnatifida

Arctotis pinnatifida Thunb. (Thunberg 1799) was described by Thunberg from material collected by him at “Caput bonae spei”. Thunberg (1823) did not provide more precise information on the provenance of the gathering. A single sheet in the Thunberg Herbarium (UPS-THUNB 20797) is annotated with the name *A. pinnatifida* and is designated here as the lectotype of the name. The sheet bears two flowering shoots, presumably from the same gathering, with obovate to linear leaves with crenate to pinnatifid margins and tomentose on both surfaces (more densely so abaxially). Candolle (1838), who placed only Thunberg’s specimen under this name, considered that the epithet was deceptive, but did not appreciate the geographic variation in leaf morphology of the species. In the western and more arid inland parts of its distribution the leaves are relatively linear in shape, whereas in the eastern part the leaves are broadly obovate. Candolle considered the latter form to be a distinct species, which he named *A. cuneata* DC.

Lewin (1922) partly recognized this geographic variation; he considered that the name *Arctotis linearis* var. *denticulata* DC., based on a gathering from the Swellendam district, applied to an impoverished form (“Kümmersform”) of *A. cuneata*, which was based on multiple specimens collected from the Western Cape and Eastern Cape provinces. However, Lewin misinterpreted *A. pinnatifida*, placing the species in *A. sect. Revolutae* K. Lewin on the basis of the original material possessing involute leaf margins (this was an artefact of the pressing process on some leaves of Thunberg’s gathering). The name *A. pinnatifida* applies to a relatively linear-leaved form of Lewin’s concept of *A. cuneata* and has nomenclatural priority over the latter name.

Candolle (1838) based *Arctotis cuneata* on gatherings by Ecklon and Drège from “Cap. Aghillas”, “Zneeuobergen”, Uitenhage and Stellenbosch. A sheet in G-DC bears specimens from four gatherings by Ecklon (*Ecklon*

385, 563 and 1479 from Uitenhage, *Ecklon* 996 from Stellenbosch) and an additional sheet bears two gatherings by Drège (*Drège* 6174 from “Cap Aghillas” and 6175 from “Zuureberg”). These sheets are considered to represent the original material on which Candolle based the name *A. cuneata* and from which a lectotype must be selected.

The gathering *Ecklon* 996 is a specimen of *Arctotis scabra* Thunb. Although the achenes of this species differ markedly from those of the other syntypes, Candolle did not describe the achenes of *A. cuneata* and therefore *Ecklon* 996 must be considered as a possible lectotype. The other five syntypes represent forms of *A. pinnatifida* with obovate leaves. Candolle listed *A. cuneata* immediately before *A. pinnatifida* in his treatment of the genus, and described a number of forms of *A. scabra* as distinct taxa in the genus *Venidium* Less. (see McKenzie & al. 2008b), so it is here interpreted that Candolle inadvertently misidentified *Ecklon* 996. Therefore a lectotype is selected from the other syntypes.

Each specimen of the gatherings *Ecklon* 385, 563 and 1479 and *Drège* 6174 and 6175 is represented by detached flowering shoots (two shoots for *Ecklon* 385). The capitula of the Drège specimens are empty and partially disintegrated, so neither specimen is considered as a suitable lectotype. The capitula of *Ecklon* 385 are complete and the shoots well illustrate the leaf and involucre morphology, and so the specimen is designated as the lectotype of *Arctotis cuneata*.

Arctotis linearis var. *denticulata* DC. (Candolle 1838) was described from an unnumbered *Ecklon* gathering from “Zwellendam”. A single sheet in G-DC, bearing two flowering shoots collected by Ecklon from Swellendam, is annotated with this name. The sheet is designated here as the lectotype of *A. linearis* var. *denticulata*. The specimen represents a relatively linear-leaved form of *A. pinnatifida*, so the name is here placed in the synonymy of *A. pinnatifida*.

Arctotis pinnatifida Thunb., *Arctotis*: 7. 1799. – **Lectotype (designated here):** South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20797!).

= *Arctotis cuneata* DC., *Prodr.* 6: 489. 1838 ≡ *Arctotis stoechadifolia* var. *discolor* Harv. in Harvey & Sonder, *Fl. Cap.* 3: 455. 1865. – **Lectotype (designated here):** South Africa, Eastern Cape, Uitenhage, s.d., *C. F. Ecklon* 385 (G-DC 00498377!).

= *Arctotis linearis* var. *denticulata* DC., *Prodr.* 6: 489. 1838, syn. nov. – **Lectotype (designated here):** South Africa, Western Cape, Swellendam, s.d., *C. F. Ecklon s.n.* (G-DC 00498422!).

Arctotis reptans

Arctotis reptans Jacq. (Jacquin 1798) is a distinctive well-named species that grows in sandveld in the Western

Cape province. From a stout rootstock the plant produces long, prostrate, adventitiously rooting, leafy stems that with time become buried by sand and then deceptively resemble stolons. The terminal flower-bearing portion of the shoot is erect. The name was based on material grown at Schönbrunn near Vienna. The only specimen formerly in the Jacquin Herbarium (W 0006618) that is annotated with the name *A. reptans* is indicated on the label to have been prepared in 1799, after publication of the name. This specimen, together with the illustration in Jacquin (1798: t. 382), well illustrate the elongate stems, long internodes, and variably lyrate-pinnatifid to lanceolate-linear upper leaves, but do not show the rootstock or adventitiously rooting portion of the stem. The lower leaves are distinctly petiolate (not depicted in the illustration). Given that the original description could not have been based on this specimen, and in the absence of any material known to have been seen by Jacquin prior to description of *A. reptans*, the sheet W 0006618 is designated here as the neotype of *A. reptans*.

The name *Arctotis petiolata* Thunb. was based on material collected by C. P. Thunberg at the Cape from an unspecified location. A single sheet in Thunberg's Herbarium (UPS-THUNB 20793) is annotated with the name *A. petiolata* and is designated here as the lectotype of the name. The specimen illustrates the petiolate lyrate-pinnatifid leaves and adventitiously rooting prostrate stem with long internodes characteristic of *A. reptans*. The name *A. reptans* has nomenclatural priority over the name *A. petiolata*.

Arctotis reptans Jacq., Pl. Hort. Schoenbr. 3: 69. 1798. – **Neotype (designated here):** Hort. Schönbr. [Hortus Schoenbrunnensis], 1799, *s.coll.*, ex Herb. Jacquin (W 0006618!).

= *Arctotis petiolata* Thunb., Arctotis: 10. 1799. – **Lectotype (designated here):** South Africa, Cap. b. spei [Caput bonae spei], s.d., C. P. Thunberg s.n. (UPS-THUNB 20793!).

Arctotis revoluta

Arctotis revoluta Jacq. (Jacquin 1797) was described from material grown in the royal Schönbrunn garden near Vienna. A single sheet formerly in the Jacquin Herbarium (W 0006617) is annotated with the name *A. revoluta* and is consistent with the illustration and, in most regards, the description in Jacquin (1797). The sheet was designated the lectotype of *A. revoluta* by McKenzie & Barker (2010).

In recent taxonomic treatments (e.g. McKenzie & Barker 2010; McKenzie 2012; McKenzie & Herman 2013) and in recent wildflower guides (e.g. Goldblatt & Manning 2000; Manning 2007, 2009; Le Roux 2015) the name has been applied to a form of the species treated here as *Arctotis laciniata* with tomentose, highly pinnatisect and narrowly laminate leaves. However, close

scrutiny of the leaf morphology does not support this interpretation. In such forms of *A. laciniata*, the leaves tend to be \pm elliptic in outline (i.e. there is marked difference in lateral lobe length along the midrib), the terminal lobe is of similar width to the lateral lobes, and the lateral lobes are typically secondarily or tertiarily pinnatisect. The degree to which the lamina margin is recurved varies markedly among forms of *A. laciniata*, but in forms with tomentose leaves the margin is usually strongly recurved.

The illustration of *Arctotis revoluta* in Jacquin (1797) suggests the plant was an erect, comparatively shortly caulescent perennial with mainly basal branches, rather than a genuinely erect, shrubby plant. Mysteriously, the protologue states “Radix annua”, implying that the plant was annual. The basal leaves are depicted as obovate-elliptic, gradually transitioning to lyrate-pinnatifid and pinnatisect up the stem towards the terminal capitulum. The lateral lobes of the upper leaves are linear-lanceolate, acute, and the margin is dentate or secondarily pinnatifid. Both the lectotype and the illustration indicate that the base of the upper leaves was auriculate. The lamina is tomentose on both surfaces, more densely so on the abaxial surface.

Lewin (1922) interpreted *Arctotis revoluta* correctly and placed the name in the synonymy of *A. candida* Thunb. I concur that the two names are conspecific, but the name *A. revoluta* has nomenclatural priority and is the earliest legitimate name for the species. Lewin classified the shrubby, tomentose, pinnatisect-leaved form of *A. laciniata* as *A. cuprea*, which is consistent with Jacquin's concept of the latter species and which Jacquin described as frutescent.

Arctotis revoluta is here conceived to be a perennial with decumbent or rhizomatous stems mainly distributed in the Breërivier, Hexrivier and Bokkerivier valleys in the Ceres, Worcester and Robertson districts in the Western Cape province (Fig. 1J).

The name *Arctotis cineraria* Jacq., which was lectotypified by McKenzie & Barker (2010) with the illustration in Jacquin (1797) because no other original material could be traced, represents a slightly more narrowly laminate form of *A. revoluta* and is retained in the synonymy of the latter name.

A single sheet annotated with the name *Arctotis candida* Thunb. is lodged in Thunberg's Herbarium (UPS-THUNB 20760). The sheet comprises a single specimen with a long, woody basal stem with adventitious roots, which appears to be rhizomatous rather than a rootstock because it is indicated to be branched and to have nodes. The leaves and involucre are consistent with the lectotype of *A. revoluta*. The sheet UPS-THUNB 20760 is designated here as the lectotype of *A. candida* and the name is placed in the synonymy of *A. revoluta*.

Jacquin (1798) described and illustrated a species under the name *Arctotis grandiflora* Jacq. No material formerly in Jacquin's herbarium annotated with this name has been traced. The illustration includes only the upper-

most portion of a flowering shoot and gives no indication of the habit or rootstock. Jacquin (1798) described the stem as suffruticose. The leaves are comparable in morphology to those of *A. revoluta* except that the adaxial surface is depicted as non-tomentose, as also are the outer involucral bracts. In the absence of original material, the plant is interpreted as conspecific with *A. revoluta*.

The name *Arctotis grandiflora* Jacq. (1798) is an illegitimate later homonym of *A. grandiflora* Aiton (1789). A sheet annotated with the latter name that is interpreted as representing original material (BM 000895058) bears shoots of possibly two distinct species, but neither is similar in leaf or involucre morphology to *A. revoluta*. Application of the name *A. grandiflora* Aiton remains uncertain and the name will be lectotypified elsewhere.

Sprengel (1827) published *Arctotis massoniana* Spreng. as a replacement name for *A. grandiflora* Jacq. The illustration labelled as “*Arctotis grandiflora*” in Jacquin (1798) is designated here as the lectotype of that name. Consistent with the present identification of *A. grandiflora*, the name *A. massoniana* is placed in the synonymy of *A. revoluta*.

The enigmatic name *Arctotis aenea* J. Jacq. (Jacquin 1811) has been variably applied by previous authors and in herbaria, including to specimens of *A. reptans* and *A. “sp. 2”* (sensu McKenzie 2012). A single sheet formerly in the Jacquin Herbarium (W 0002133) annotated with the name “*Arctotis aenea* Jacq. fil.” was prepared from material cultivated in the royal Schönbrunn garden in 1799. The specimen is generally consistent with the description of *A. aenea* by Jacquin (1811). In the illustration of *A. aenea* in Jacquin (1811: t. 52), the leaves are depicted as distinctly lyrate-pinnatifid, whereas the specimens on the sheet W 0002133 bear leaves that range from obovate-lanceolate with marginal lobes to lyrate-pinnatisect. As the only known material annotated with this name that was formerly in the Jacquin Herbarium, the sheet W 0002133 is designated here as the lectotype of *A. aenea* J. Jacq. The lectotype and the illustration of *A. aenea* in Jacquin (1811) are morphologically consistent with young, cultivated plants of *A. revoluta*, which produce obovate-lanceolate basal leaves that grade to lyrate-pinnatisect or pinnatisect leaves towards the capitulum. The name *A. aenea* is therefore placed in the synonymy of *A. revoluta*.

Candolle (1838) described *Arctotis revoluta* var. *fruticosa* DC. based on a gathering by Drège from the “Breedrivier”. A sheet in G-DC annotated with this name bears a single flowering specimen from the gathering Drège 1717 from the Breederivier. The specimen is clearly conspecific with *A. candida* and is consistent with the lectotype of *A. revoluta*. Under the typical form of *A. revoluta*, Candolle cited only Jacquin (1797) and noted Jacquin’s reference to the species being annual. It is concluded that Candolle described var. *fruticosa* on account of the clearly perennial habit of the specimen Drège 1717. Field work and cultivation of *A. revoluta*

in the Western Cape province indicate that the species is soundly perennial, so the plant might behave as an annual when cultivated in a climate with cold winters. There is no evidence to support recognition of *A. revoluta* var. *fruticosa*, and the name is here placed in the synonymy of *A. revoluta*.

Arctotis revoluta Jacq., Pl. Hort. Schoenbr. 2: 24. 1797. – Lectotype (designated by McKenzie & Barker 2010: 301): Hort. Schönbr. [Hortus Schoenbrunnensis], s.d. & s.coll., ex Herb. Jacquin (W 0006617!).

= *Arctotis cineraria* Jacq., Pl. Hort. Schoenbr. 2: 24. 1797. – Lectotype (designated by McKenzie & Barker 2010: 301): [icon] “*Arctotis cineraria*” in Jacquin, Pl. Hort. Schoenbr. 2: t. 174. 1797.

= *Arctotis grandiflora* Jacq., Pl. Hort. Schoenbr. 3: 67. 1798, nom. illeg. (Art. 53.1), syn. nov. [non *Arctotis grandiflora* Aiton, Hort. Kew. 3: 272. 1789] ≡ *Arctotis massoniana* Spreng., Syst. Veg. 4(2): 304. 1827, ‘*Massonianam*’ ≡ *Arctotis laevis* f. *grandiflora* Voss in Siebert & Voss, Vilm. Blumengärtn., ed. 3, 1: 541. 1894. – **Lectotype (designated here)**: [icon] “*Arctotis grandiflora*” in Jacquin, Pl. Hort. Schoenbr. 3: t. 378. 1798.

= *Arctotis candida* Thunb., Arctotis: 14. 1799, syn. nov. – **Lectotype (designated here)**: South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20760!).

= *Arctotis aenea* J. Jacq., Ecl. Pl. Rar. 1: 77. 1813, syn. nov. – **Lectotype (designated here)**: Hort. Schönbr. [Hortus Schoenbrunnensis], 1799, ex Herb. Jacquin (W 0002133!).

= *Arctotis revoluta* var. *fruticosa* DC., Prodr. 6: 488. 1838, syn. nov. – **Lectotype (designated here)**: South Africa, Western Cape, Worcester, 23 Oct 1828, *J. F. Drège 1717* (G-DC 00498448!; isolectotype: P 00138495!).

Arctotis roodae

Arctotis campanulata var. *puberula* DC. (Candolle 1838) was described from specimens collected from southwest of Bitterfontein in the Western Cape province. The name was lectotypified by McKenzie & Barker (2010). This taxon is specifically distinct from typical *A. campanulata* DC., which is restricted to Namaqualand (McKenzie & Barker 2010).

The name *Arctotis roodae* Hutch. was based on material cultivated at the Royal Botanic Gardens, Kew, from achenes collected near Vanrhynsdorp in the Western Cape province (Anonymous 1924). The rootstock is not represented, and the single flowering shoot on the sheet is indicated to be extremely shortly caulescent. The six detached leaves mounted on the sheet are pinnatisect, the lamina lanceolate to ovate in outline, with oblong lateral lobes, moderately tomentose on both surfaces, and with a long, distinct petiole. Hutchinson described the adaxial

surface of the ray floret limb as “rubri” with a dark purple base. Following the description, Hutchinson considered that *A. roodae* appeared to show the closest affinity with *A. gumbletonii* Hook. f., an enigmatic species of uncertain status grown from achenes collected in Namaqualand (Hooker 1901). The name *A. roodae* was rarely taken up and has largely been forgotten.

The holotype of *Arctotis roodae* is strongly consistent in morphology, particularly in the narrow pinnatisect leaf shape, with specimens (*Schlechter* 8228, 8282; GRA, S) collected from “Karee Bergen” (Kareeberg farm) on the northwestern fringe of the Knersvlakte north of Vanrhynsdorp. The Kareeberg plants, in turn, are morphologically consistent with the lectotype of *A. campanulata* var. *puberula* and other collections of this taxon predominantly from the Bitterfontein district and northern fringe of the Knersvlakte, but which differ mainly in that the leaves are typically lyrate-pinnatifid or ± obovate-elliptic, and the ray floret limb is usually pale yellow above. The present interpretation is that the two names apply to different forms of the same taxon, which shows variation in leaf shape, degree of lamina dissection and ray floret colour. The name *A. roodae* is resurrected for the taxon, and the name *A. campanulata* var. *puberula* is here placed in its synonymy.

Arctotis roodae Hutch. in Bull. Misc. Inform. Kew 1924: 257. 1924. – Holotype: South Africa, Western Cape, hort. ex near Vanrhynsdorp, 27 Sep 1922, *N. E. Brown s.n.* (K 000250011!).
= *Arctotis campanulata* var. *puberula* DC., Prodr. 6: 485. 1838, syn. nov. – Lectotype (designated by McKenzie & Barker 2010: 299): South Africa, Western Cape, bei Mierenkasteel [Meerhofkasteel farm], karrooartige equal on Höhe, 1000–2000 ft, 6 Aug 1830, *J. F. Drège* 2749 (G-DC 00498456!; isolectotype: P 00138480!).

Arctotis rotundifolia

Arctotis rotundifolia K. Lewin (Lewin 1922) is a distinctive species that superficially resembles *A. scabra* and broad-leaved forms of *A. angustifolia*, but is immediately distinguishable from those species in possessing an achene with a pappus of scales longer than the achene and with a basal whorl of persistent twin hairs, and an involucre with appressed outer bracts lacking a recurved apical appendage. *Arctotis rotundifolia* is restricted to high altitudes in the Franschhoekberge and Stettynsberge mountain ranges. Lewin (1922) described the species from two independent gatherings from Franschhoek (*Schlechter* 9249 and *Bolus* 1192). Duplicates of both gatherings are lodged in multiple herbaria. Lewin revised the *Arctotidinae* while based in Berlin, but if a duplicate of either gathering was lodged in B it is presumed to have been destroyed during the Second World War. A sheet from the gathering *Schlechter* 9249 (P 00153530) is representative of the species and is here selected as the lectotype of *A. rotundifolia* K. Lewin, as it illustrates the growth form

with shortly decumbent, basally rooting stems, and leaf and involucre morphology.

Arctotis rotundifolia K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 67. 1922. – **Lectotype (designated here):** South Africa, Western Cape, French Hoek [Franschhoek], in montibus, 3600 ft, 18 Nov 1896, *R. Schlechter* 9249 (P 00153530!; isolectotypes: BM 000924696 [digital image!], BOL 111690!, E 00102211 [digital image!], G 00015703!, Z 000003023 [digital image!]).

Arctotis scabra

Resolution of the correct name for *Arctotis scabra* Thunb. (Thunberg 1799) (Fig. 1K) and typification of six synonyms were published previously (McKenzie & Barker 2007; McKenzie & al. 2008; see also Brummitt 2010). It is only noted here that the types of the names *A. scabra* and *Venidium subcalvum* var. *ambiguum* DC. were referred to as holotypes by McKenzie & Barker (2007) and McKenzie & al. (2008b), but in fact the types are lectotypes because no specimen was specified by Thunberg (1799) and Candolle (1838) when publishing the respective names. The types are correctly designated here.

Subsequent to the above-mentioned publications, the identity of *Arctotis sessilifolia* K. Lewin was resolved. The name “*Venidium auriculatum*” was listed, but not validly published, by Drège (1843), and in the index to that work “*Venidium auriculato* aff.” was cited. The name was not published by Candolle (1838), but a specimen collected from the northern Cederberg by Drège lodged in G-DC (*Drège* 2747) was annotated by Candolle as “an *Venidio auriculato* affine”. Lewin (1922) validly published the name *A. sessilifolia* based on a single gathering cited as “Cederberge (Drège! 2741 „an *auriculato* affine? a Candollio ob statum imperfectum omissum”)”. However, the specified collection number “2741” appears to be an error. A specimen from the gathering *Drège* 2741 lodged in G-DC is clearly an element of *A. laciniata* and does not conform to Lewin’s morphological description of *A. sessilifolia*. The specimen label gives the provenance as “Langevaley”. Lewin also cited the gathering *Drège* 2741 under his treatment of *A. cuprea*. The specimen of *Drège* 2747 lodged in G-DC is consistent with Lewin’s description of *A. sessilifolia* and was annotated as the lectotype of *A. sessilifolia* by T. Norlindh in 1966, although this typification was never published. I concur with Norlindh’s determination and treat the citation of *Drège* 2741 by Lewin (1922) in the protologue of *A. sessilifolia* as an error. Consequently, *Drège* 2747 is designated as the lectotype of *A. sessilifolia*. The specimen is a form of *A. scabra*, and therefore *A. sessilifolia* is here placed in the synonymy of *A. scabra*.

Arctotis scabra Thunb., *Arctotis*: 9. 1799 ≡ *Venidium scabrum* (Thunb.) Less., *Syn. Gen. Compos.*: 29. 1832 ≡ *Venidium semipapposum* var. *scabrum* (Thunb.) Harv., in

- Harvey & Sonder, Fl. Cap. 3: 460. 1865 ≡ *Arctotis semipapposa* var. *scabra* (Thunb.) K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 74. 1922. – **Lectotype (designated here):** South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20800!).
- = *Venidium semipapposum* DC., Prodr. 6: 491. 1838 ≡ *Arctotis semipapposa* (DC.) Beauverd in Bull. Soc. Bot. Genève, ser. 2, 7: 49. 1915. – Lectotype (designated by McKenzie & Barker 2007: 1300): South Africa, Western Cape, Dutoitskloof, 1000–2000 ft, 7 Jan 1828, *J. F. Drège 6145* (G-DC 00134346!; isolectotype: P 00153545!).
- = *Venidium angustifolium* DC., Prodr. 6: 492. 1838 ≡ *Arctotis semipapposa* var. *angustifolia* (DC.) K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 74. 1922. – Lectotype (designated by McKenzie & al. 2008b: 1345): South Africa, Western Cape, Bergrivier, 24 Jan 1828, *J. F. Drège 6146* (G-DC 00135183!).
- = *Venidium macrospermum* DC., Prodr. 6: 492. 1838 ≡ *Arctotis macrosperma* (DC.) Beauverd in Bull. Soc. Bot. Genève, ser. 2, 7: 47. 1915. – Lectotype (designated by McKenzie & al. 2008b: 1345): South Africa, Western Cape, Dutoitskloof, 8 Feb 1828, *J. F. Drège 1718* (G-DC 00134692!; isolectotypes: P 00153560!, P 00153561!).
- = *Venidium plantagineum* var. *angustius* DC., Prodr. 6: 492. 1838. – Lectotype (designated by McKenzie & al. 2008b: 1345): South Africa, collection locality uncertain [Swartland?], 1828, *J. F. Drège 6148* (G-DC 00135242!; isolectotype: P 00153540!).
- = *Venidium subcalvum* DC., Prodr. 6: 492. 1838. – Lectotype (designated by McKenzie & al. 2008b: 1345): South Africa, Western Cape, Simonsberg, in den Kränzen bei dem Wasserfall, 2000 ft, 6 Apr 1830, *J. F. Drège 6147* (G-DC 00135192!; isolectotype: P 00153536!).
- = *Venidium subcalvum* var. *ambiguum* DC., Prodr. 6: 492. 1838. – **Lectotype (designated here):** South Africa, Western Cape, Caledon, s.d., *C. F. Ecklon 477* (G-DC 00135188!).
- = *Arctotis sessilifolia* K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 73. 1922, syn. nov. – “*Venidium auriculatum*” Drège, Zwei Pflanzengeogr. Docum.: 73. 1843, nom. inval., nom. nud. (Art. 38.1(a)). – **Lectotype (designated here):** South Africa, Western Cape, Zeederbergen, bei Honigvlei [Heuningvlei] und auf Kaudeberg, 3000–4000 Fuss, 11 Dec 1830, *J. F. Drège 2747* [in protologue “2741” in error] (G-DC 00135248!; isolectotype: P 017100 [digital image!]).

Arctotis schlechteri

Arctotis schlechteri K. Lewin (Lewin 1922) was described from the gathering *F. R. R. Schlechter 7609* from the Kleinrivier southwest of Caledon. Plants morphologically consistent with this gathering are distributed on the

Agulhas Plain. The species shows a close affinity to *A. pinatifida*, but usually bears obovate to spatulate-obovate leaves that lack lateral lobes. Duplicates of *Schlechter 7609* are known in BOL, G and GRA. The specimen in BOL best illustrates the decumbent, adventitiously rooting stems, the petiolate, discolorous, entire leaves, and the appressed outer involucral bracts with short apical appendages. In the BOL specimen the leaf lamina is elliptic to lanceolate, but in other collections of the species the leaves may be spatulate or obovate, and rarely pinnatifid. The duplicate of *Schlechter 7609* in BOL is representative of the gathering and Lewin’s description of *A. schlechteri*, and is designated here as the lectotype of *A. schlechteri* K. Lewin.

Arctotis schlechteri K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 68. 1922. – **Lectotype (designated here):** South Africa, Western Cape, Kleen River [Kleinrivier], 1000 ft, 18 Apr 1896, *F. R. R. Schlechter 7609* (BOL 63012!; isolectotypes: G 00015701!, G 00015702!, GRA 0003153-0!).

Arctotis spinulosa

Arctotis spinulosa Jacq. (Jacquin 1797) was described from material cultivated in the royal Schönbrunn garden near Vienna. Subsequent authors were uncertain of the correct application of the name and so it was applied variably. Jacquin (1797) stated “*Radix annua*” in the description of *A. spinulosa*, which presumably led Candolle (1838) to treat the name as a variety of *A. fastuosa* Jacq. However, the latter species differs substantially in leaf and achene morphology from the type of *A. spinulosa*. Subsequently, the name *A. spinulosa* fell out of use.

A single sheet formerly in the Jacquin Herbarium (W 0006643) is annotated with the name *Arctotis spinulosa* and agrees with Jacquin’s published description of that species. The sheet is designated here as the lectotype of the name *A. spinulosa*.

Plants conforming to the lectotype and the illustration of *Arctotis spinulosa* are known from the Vanrhynsdorp, Klaver and Oorlogskloof areas (Fig. 1L). These plants characteristically bear dimorphic leaves: the basal leaves are tomentose on both surfaces and typically obovate, ± entire with a lobed margin, whereas the upper leaves are lanceolate-oblong, serrate and densely glandular and aromatic (sometimes also tomentose). However, these plants are perennial rather than annual and not what I would term “spinulose”. Further field work and examination of herbarium material are needed to clarify application of the name *A. spinulosa*.

Arctotis spinulosa Jacq., Pl. Hort. Schoenbr. 2: 21. 1797 ≡ *Arctotis fastuosa* var. *spinulosa* (Jacq.) DC., Prodr. 6: 487. 1838. – **Lectotype (designated here):** Hort. Schönbr. [Hortus Schoenbrunnensis], s.d. & s.coll., ex Herb. Jacquin (W 0006643!).



Fig. 3. Lectotype of *Centaurea incana* Burm. f. (\equiv *Arctotis stoechadifolia* P. J. Bergius) (G-PREL 00803829). – Reproduced by kind permission, © Conservatoire et Jardin botaniques de la Ville de Genève.

Type of
Centaurea incana Burm. f.
 Prodr. Fl. Cap. (1768), p. 218
 = *Arctotis stoechadifolia* Berg.
 Zentr. Plant. Cap. (1767), p.
 Determinavit: Tycho Norlindh.
 1966

TYPUS

HERBIER DELESSERT
 COLLECTION BURMANN
 Up. austr.: Cap. bonae Spei

Arctotis
Centaurea incana

LECTOTYPE (publ. in prep.) of: (s.c./s.n.)
Centaurea incana Burm. f.
 Fl. Ind. (Prodr. Fl. Cap.): 28. 1768
 = *Arctotis stoechadifolia* P. J. Bergius
 det./rev. R. McKenzie (RUH/GRA) 04.12.2017 (pers. comm.)

COLL. PRELINNEENNE (G-PREL)
 G00803829

Arctotis stoechadifolia

Norlindh (1964) resolved the correct application of the name *Arctotis stoechadifolia* P. J. Bergius and placed under it, as synonyms, *A. grandis* Thunb. and *A. decumbens* Thunb. non Jacq. Norlindh referred to particular specimens lodged in SBT and UPS-THUNB as the “type” of each of the three names, which served as lectotypifications. The name *A. decumbens* Thunb. (Thunberg 1799) is an illegitimate later homonym of the earlier *A. decumbens* Jacq. (Jacquin 1798), which is a synonym of *A. angustifolia* L. *Arctotis stoechadifolia* var. *decumbens* Less. was published by Lessing (1832) as a replacement name for *A. decumbens* Thunb. In agreement with Norlindh’s (1964) account, the specimens SBT 4.3.6.57, UPS-THUNB 20773 and UPS-THUNB 20763 are here listed as the lectotypes for *A. stoechadifolia*, *A. grandis* and *A. decumbens*, respectively.

A name not considered by Norlindh (1964) in his assessment of *Arctotis stoechadifolia* was *Centaurea incana* Burm. f. (Burman 1768). The name was accompanied by the diagnosis “calycibus inermibus, foliis oblongis dentatis tomentosus, caule frutescentes”, but no indication of the material examined was provided by Burman. In the Burman collection (incorporated in G as the Prelinnean collection: G-PREL), three sheets are annotated with the name “*Centaurea incana*”, and the provenance of each is specified to be “Cap. bonae Spei”. Each sheet was determined as *A. stoechadifolia* by T. Norlindh in 1966. I concur with Norlindh’s identifications, and the sheet that Norlindh selected as the “type” for *C. incana*, which was formerly in the Delessert Herbarium and is representative of the three specimens, is designated here as the lectotype of that name (Fig. 3). Consequently, *C. incana* is here placed in the synonymy of *A. stoechadifolia*.

When publishing the name *Arctotis stoechadifolia* var. *bergii* DC., Candolle (1838) provided the description “foliis lyrato-dentatis utrinque subaequaliter tomentosus” and cited “Less. l. c. sub. var. γ ”, i.e. *A. stoechadifolia* var. [γ] *stoechadifolia* (Lessing 1832: 26). The absence of the abbreviation “v.s.” indicates that Candolle did not examine any material of this variety and his description was identical to that of Lessing’s var. *stoechadifolia* but with the omission of “disco 3''' alto”. Under ICN Art. 26.2, Candolle’s var. *bergii* was not validly published because it explicitly included the nomenclaturally typical element of *A. stoechadifolia*.

Arctotis stoechadifolia P. J. Bergius, Descr. Pl. Cap.: 324. 1767 – “*Arctotis stoechadifolia* var. *bergii*” Candolle, Prodr. 6: 488. 1838, nom. inval. (Art. 26.2). – Lectotype (designated by Norlindh 1964: 201): South Africa, Cap. b. sp. [Caput bonae spei], *M. Grubb s.n.* (SBT 4.3.6.57!). = *Centaurea incana* Burm. f., Fl. Indica, Prodr. Fl. Cap.: 28. 1768, syn. nov. – **Lectotype (designated here):** South Africa, Cap. [Caput] bonae spei, s.d. & s.coll., ex Herb. Delessert (G-PREL 00803829! [Fig. 3]).

= *Arctotis grandis* Thunb., Arctotis: 4. 1799 \equiv *Arctotis stoechadifolia* var. *grandis* (Thunb.) Less., Syn. Gen. Compos.: 26. 1832. – Lectotype (designated by Norlindh 1964: 201): South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20773!).

= *Arctotis decumbens* Thunb., Arctotis: 9. 1799, nom. illeg. (Art. 53.1) [non *Arctotis decumbens* Jacq., Pl. Hort. Schoenbr. 3: 68. 1798] \equiv *Arctotis stoechadifolia* var. *decumbens* Less., Syn. Gen. Compos.: 26. 1832. – Lectotype (designated by Norlindh 1964: 201): South Africa, Cap. b. spei [Caput bonae spei], s.d., *C. P. Thunberg s.n.* (UPS-THUNB 20763!).

Arctotis verbascifolia

Arctotis verbascifolia Harv. (Harvey 1865) is morphologically similar to *A. acaulis*, but has cordate leaves densely tomentose on both surfaces and outer involucre bracts with short, appressed apical appendages (cf. long, linear, recurved apical appendages in *A. acaulis*). In the protologue Harvey cited only an unnumbered gathering from “Skurfdeberg” by C. L. P. Zeyher with specimens lodged in the Hooker and Sonder herbaria. Specimens formerly in these herbaria are now housed in K, LY, MEL and S. Sheets in K and S of *A. verbascifolia* collected by Zeyher from “Skurdeberg” are annotated with the collection number “964”. Additional duplicates of Zeyher 964 are known from P and SAM. The sheet K 000250008 formerly in the Herbarium Hookerianum contains a single flowering shoot with a single capitulum. Although the rootstock is not represented, the specimen well illustrates the leaf, involucre and achene morphology of the species, and is designated here as the lectotype of *A. verbascifolia*.

Arctotis verbascifolia Harv. in Harvey & Sonder, Fl. Cap. 3: 452. 1865. – **Lectotype (designated here):** South Africa, Western Cape, Skurfdeberg [Skurweberge], s.d., *C. L. P. Zeyher 964* (K 000250009!; isolectotypes: P 00138494!, S G-10674!, SAM 0039939-2!).

Arctotis virgata

Arctotis virgata Jacq. (Jacquin 1798) was described from material cultivated in the royal Schönbrunn garden near Vienna. No specimen formerly lodged in the Jacquin Herbarium is extant in W, nor has one been traced in any other herbarium. Description of the species was accompanied by an illustration (Jacquin 1798: t. 307), which is consistent with the morphological description. In the absence of any known original material on which Jacquin would unequivocally have based the description, the illustration of “*Arctotis virgata*” in Jacquin (1798) is designated here as the lectotype of *A. virgata*.

The name *Arctotis graminea* K. Lewin was based on the gathering *H. Bolus 11308* from near Riversdale. A sheet of this gathering in K bears a branched stem with

two flowering shoots. It agrees with Lewin's description and is designated here as the lectotype of *A. graminea* K. Lewin. The specimen conforms in stem, leaf and involucre morphology with the illustration of *A. virgata* in Jacquin (1798), except that the outer involucral bracts are appressed, whereas *A. virgata* is depicted as having outer bracts with shortly recurved apical appendages. All material of *A. graminea* that I have examined in herbaria and in the field has appressed outer bracts, but in all other important features it is consistent with the illustration of *A. virgata*. Therefore, the names *A. virgata* and *A. graminea* are interpreted as applying to different forms of the same species, and *A. graminea* is here placed in the synonymy of *A. virgata*.

Arctotis virgata Jacq. Pl. Hort. Schoenbr. 3: 32. 1798. – **Lectotype (designated here):** [icon] “*Arctotis virgata*” in Jacquin, Pl. Hort. Schoenbr. 3: t. 307. 1798.
= *Arctotis graminea* K. Lewin in Repert. Spec. Nov. Regni Veg. Beih. 11: 64. 1922, syn. nov. – **Lectotype (designated here):** South Africa, Western Cape, prope Riversdale, Oct 1904, *H. Bolus 11308* [K 000307403 [digital image!]].

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Willdenowia

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