

The genus *Anvillea* (Compositae)

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The genus *Anvillea* (Compositae-Inuleae-Inulinae) is found to contain two species which occur in N Africa and the Middle East. *Anvilleina* Maire is reduced to a synonym of *Anvillea* and the following two new combinations are made: *A. platycarpa* (Maire) A. Anderb. and *A. garcinii* (Burm. f.) DC. ssp. *radiata* (Coss. & Dur.) A. Anderb. The chromosome number $2n = 14$ of *A. garcinii* ssp. *radiata* is reported.

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Introduction

The genus *Anvillea* belongs to the tribe Inuleae subtribe Inulinae as defined by Merxmüller et al. (1977). The large variability in the diagnostic characters of the *Anvillea* species has led to a quite confused taxonomy. In this paper I have treated the four formerly described *Anvillea* species (*A. garcinii*, *A. radiata*, *A. australis*, and *A. faurei*) as belonging to one widely distributed species with a range from Morocco and western Sahara to Iran. The single species of the former genus *Anvilleina* from Morocco is transferred to *Anvillea*, which thus now comprises two species.

Material and methods

I have studied material from the following herbaria, abbreviated as in Holmgren & Keuken (1974): B, BM, C, CAI, G, G–DC (only microfiches), GB, GOET, HBG, HUJ, K, LD, LY, MPU, M, P, PR, S, SUNIV (Univ. of Stockholm), TEH, UPS and W. On my travels in Algeria April–May 1980 I was able to study one of the species (*A. garcinii*) in the field. Seeds and plants were collected. Plants raised from seeds have been grown in greenhouses at the University of Stockholm.

Floral parts from herbarium material were boiled in water and mounted in Hoyer's solution for light microscope studies. Leaf-glands and hairs have been examined

in cross-sections of leaves taken from cultivated living plants. Chromosome counts were made on root-tips from cultivated plants, treated with 0.2% colchicine for 2 h in refrigerator, fixed in Carnoy's solution (i.e. 99% ethanol: glacial acetic acid 3:1) for 1 h, and kept in 70% ethanol in a freezer overnight. The root-tips were stained in aceto-orcein for 30 min and then squashed.

The drawings were made by myself from herbarium material and from cultivated living plants.

A complete list of examined collections is kept at the Swedish Museum of Natural History, Section for Botany (S).

Morphology

Growth habit. The *Anvillea* species are small to medium sized subshrubs. Branching is most prominent in *A. garcinii* which shows regional variation in this character. In the eastern ssp. *garcinii* the branches protrude more or less horizontally, while in the western ssp. *radiata* they are erect – ascending.

A. platycarpa is almost unbranched except for the short capitulum-carrying branches. Hence it is a species of compact habit.

Capitula. The capitula of *A. garcinii* vary in both size and shape. The size of the capitula is correlated to the number of disc-florets. In ssp. *radiata* the capitulum size

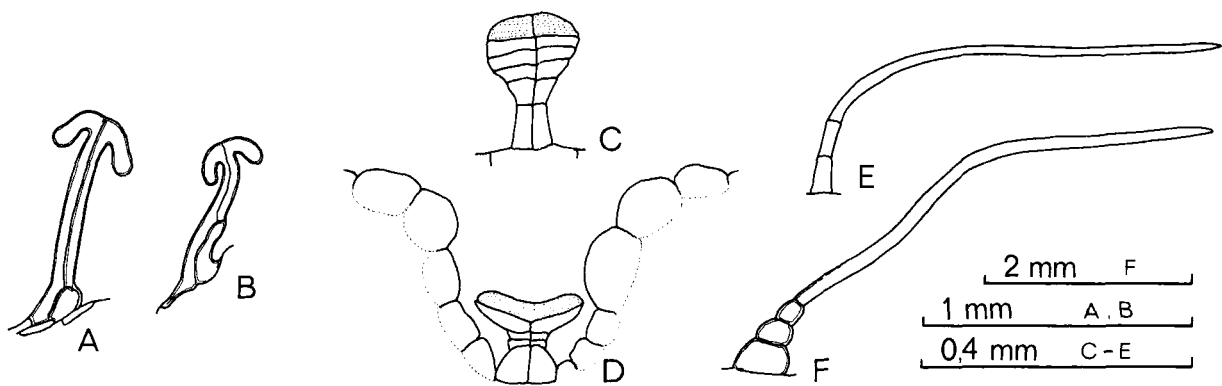


Fig. 1. Hairs and glands. – A: *A. garcinii*, anchor-shaped twin hair of achene wall. – B: *A. platycarpa*, anchor-shaped twin hair of achene wall. – C: *A. garcinii*, corolla gland. – D: *A. garcinii*, immersed leaf gland. – E: *A. garcinii*, hair of leaf lamina. – F: *A. garcinii*, hair of leaf midrib. – A: Anderberg 567 (S). – B: Ollivier 301 (MPU). – C–F: Anderberg 519 (S).

and disc-floret number are diminishing towards the south of Algeria. This also holds for the size of the ray-florets. In Morocco and northern Algeria all plants have capitula more or less campanulate in outline with well developed ray-florets. The length and width of the ray-florets gradually decreases towards the south of Algeria and eventually only plants with fully discoid and cyathiform-urceolate capitula are found. These plants of southern Algeria, southern Morocco, Mauretania, and Libya have been described as *Anvillea australis*.

The eastern ssp. *garcinii* is also variable in size and shape of the capitula which, however, are mainly campanulate-cyathiform in outline and generally discoid. In Saudi Arabia there are plants with well developed ray-florets but these plants have the same habit, leaf-shape, and palea characters as the discoid plants from the same region. Thus the eastern radiate plants belong to ssp. *garcinii*, and not to the generally radiate but otherwise different ssp. *radiata*.

A. platycarpa has broadly cupulate, radiate capitula.

Leaves. The alternate leaves vary considerably in length and shape. In *A. garcinii* ssp. *garcinii* the leaves are auriculate and generally semiamplexicaul, characters not detectable in typical specimens of ssp. *radiata*. The leaves of ssp. *garcinii* are shorter and with a more spatulate outline than in ssp. *radiata*, which has almost cuneate leaves. Furthermore, the leaves in ssp. *garcinii* are often clothed with a more or less dense tomentum of long hairs (Fig. 1E, F), an uncommon feature in ssp. *radiata*. The leaf surface has immersed glands (Fig. 1D).

The leaves of *A. platycarpa* differ from those of *A. garcinii* in being more than 5 times longer than wide, elongate-ligulate in outline, entire, and with indistinctly serrate margins apically. The lamina is densely clothed with a white tomentum of the same type as in *A. garcinii*.

Involucre. The involucre of *Anvillea* differs from all other members of Inuleae-Inulinae. The inner involucre bracts are free apically, but basally fused into a

cup-shaped, more or less woody, hygroscopic unit. This is a derived character state probably evolved as an adaptation to hygrochasy (Zohary 1950). The leaf-like, long outer bracts harden with age forming long, straight or slightly arched, more or less pungent spines.

Receptacle. The receptacle of *Anvillea* is strongly concave. This is another derived character state unique within Inuleae-Inulinae. The concave receptacle is probably derived from the slightly convex receptacle types that occur in the closely related genus *Asteriscus* Mill. Both paleae and achenes are firmly attached to the receptacle.

Paleae. The paleae have a more or less rectangular, dorsally ridged and ventrally furrowed basal part, and a long slender apical seta. The form of the paleae is very variable in different specimens and a certain variation also occurs within the same receptacle. The paleae provide a character for determining and separating the two subspecies of *A. garcinii*. When the ratio between the length of the seta and the total palea length is calculated and compared between populations of ssp. *garcinii* and ssp. *radiata* there is a significant difference between the sample mean values (Fig. 3).

The paleae of *A. platycarpa* are very similar to those of *A. garcinii* but they are not ridged and furrowed basally.

Florets. The ray-florets vary considerably in size, but they are always sterile with poorly developed achenes. The perfect disc-florets vary in number and size but they are rather uniform in shape, with corollas more or less gradually tapering towards the base. Ray-florets and disc-florets are dotted with glands of the same type (Fig. 1C).

The anthers have long, more or less branched tails and the filaments have collars of collenchymatous cells (Fig. 2A, B). In *A. platycarpa* the margins of the filament collar are slightly involute. The endothelial tissue also varies between the species but it is mainly polarized, i.e. with collenchymatous wall thickenings

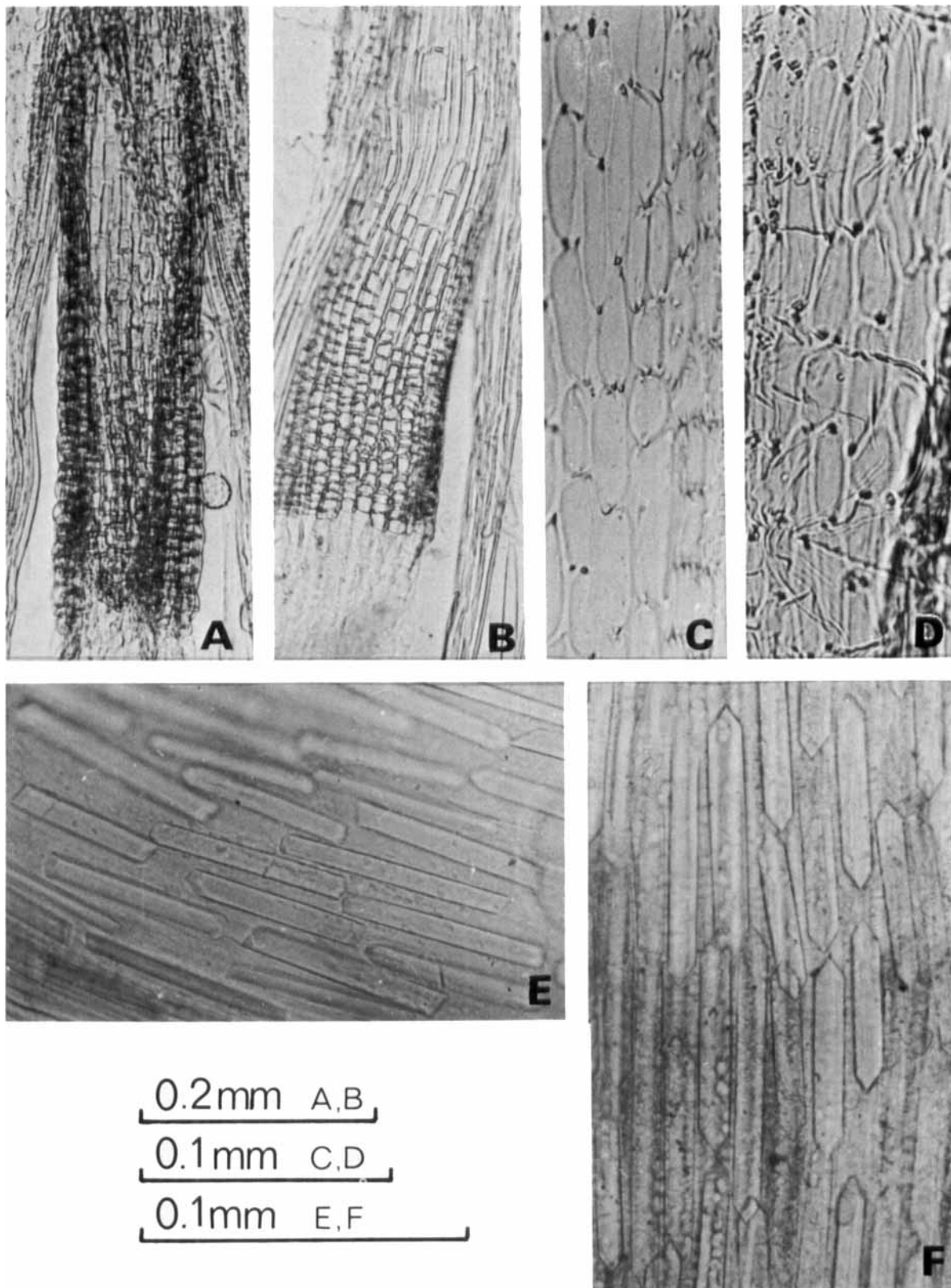


Fig. 2. Floral microcharacters. – A: *A. platycarpa*, filament collar. – B: *A. garcinii*, filament collar. – C: *A. garcinii*, endothelial tissue. – D: *A. platycarpa*, endothelial tissue. – E: *A. garcinii*, crystals of ovary wall. – F: *A. platycarpa*, crystals of ovary wall. – A, D, F: Ollivier 301 (MPU). – B, C, E: Anderberg 567 (S).

confined to the horizontal walls of the endothelial cells (Fig. 2C, D, cf. Nordenstam 1978).

The ripe achenes in *A. garcinii* are generally quadrangular but sometimes vary in shape being more or less triquetrous. In *A. platycarpa* the ripe achenes are dorsiventrally compressed. In both species the achenes carry peculiar anchor-shaped twin hairs which are unique in the tribe Inuleae (Fig. 1A, B). The hairs are derived from common Compositae twin hairs (Hess 1938), and occur scattered over the surface of the achenes, but mostly on the edges. The pappus is entirely missing, an unusual feature in the tribe. The crystals of the ovary wall are homomorphic but differ slightly between the two species (Fig. 2E, F).

Pollen. Leins (1971: 104) gives a description of the pollen of *Anvillea garcinii* s. str. and *A. radiata*. Both have the pollen type common to the major part of the subtribe Inulinae, but with somewhat shorter spines.

Chromosome number. The chromosome number $2n = 14$ was found in *A. garcinii* ssp. *radiata* (voucher: Anderberg 519 in S). This is the first chromosome count in the genus *Anvillea*. The chromosome numbers common to the majority of species in Inuleae-Inulinae are $2n = 18$ and 20 . As in *Anvillea*, low chromosome numbers are present in the related genus *Asteriscus* ($2n = 12, 14$).

Taxonomy

The genus *Anvillea* was described in 1836 by A. P. De Candolle. Pomel (1874) misunderstood the morphology of *A. garcinii* s. str. and then unnecessarily placed *A. radiata* in the new genus *Sycodium*. When Maire 1939 described the genus *Anvilleina* he stated that it differed from *Anvillea* in having dorsiventrally compressed achenes (Maire 1939b).

The joint possession of three unique characters, viz. a concave receptacle, a concrescent involucre, and anchor-shaped twin hairs, by the former genus *Anvilleina* and the genus *Anvillea* s.str., indicates that these genera are the only extant descendants of a common ancestor and thus form a monophyletic group in the sense of Hennig (1966). Both *Anvillea* and *Anvilleina* are monotypic and there is no reason to keep them as separate genera, thus concealing their close relationship. Consequently I have united them.

The species *A. garcinii* formerly consisted of three recognized species, viz. *A. radiata* of Morocco, Algeria, and Mauretania with well developed ray-florets, *A. australis* of southern Algeria, southern Morocco, and Libya without rays, and *A. garcinii* s. str. of the Middle East, also without ray-florets. As mentioned in the section Morphology, the ray-florets of ssp. *radiata* (*A. radiata*) vary considerably from northern to southern Algeria, from long and well developed in the north to very short or absent in the south. The southern discoid plants were formerly called *A. australis*, but they are

indistinguishable from typical ssp. *radiata* (*A. radiata*) plants except for the absence of ray-florets. There is no clear-cut geographical delimitation between radiate and discoid *Anvillea*, since plants with long ray-florets occur sympatrically with discoid ones. A possible explanation of the loss of ray-florets in the plants of southern Algeria and southern Morocco is a loss mutation of the genes controlling the development of ray-florets. Since there is no geographical delimitation between the dif-

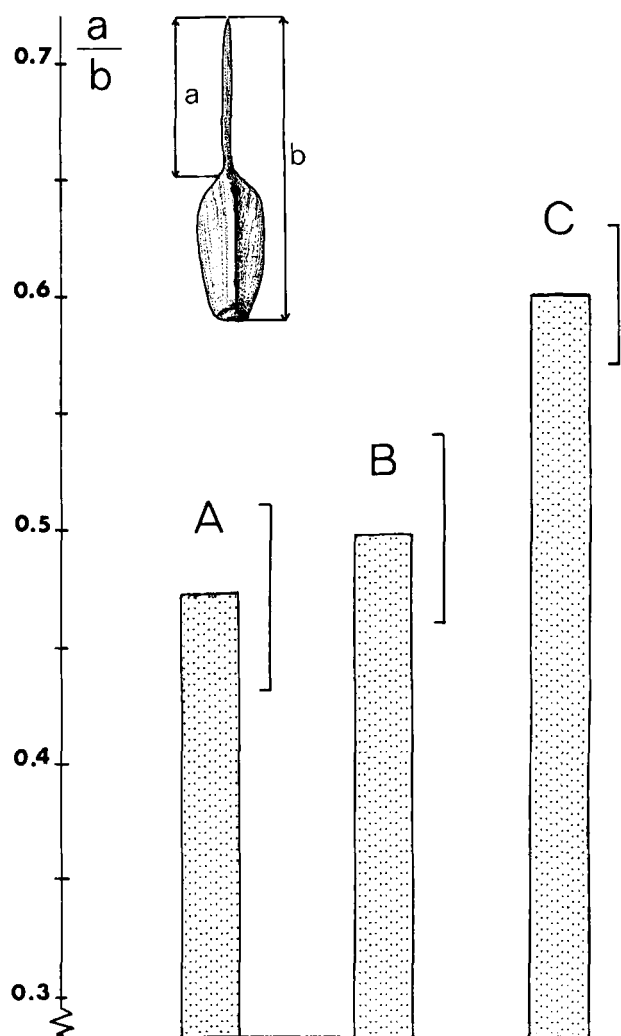


Fig. 3. Histogram showing mean values of the ratio between the length of the seta of the palea and the total palea length in *A. garcinii*. The brackets indicate 95% confidence intervals for mean values of the samples.

In a t-test no significant difference between the means of samples A and B is detectable, while the mean value of sample C differs on a 0.5% significance level from the means of samples A and B respectively. - A: *A. garcinii* ssp. *radiata*. - B: Specimens from Libya. - C: *A. garcinii* ssp. *garcinii*. - $\bar{X}_A = 0.47$, $n_A = 28$, $S_{\bar{X}_A} = 0.018$. - $\bar{X}_B = 0.49$, $n_B = 5$, $S_{\bar{X}_B} = 0.014$. - $\bar{X}_C = 0.60$, $n_C = 16$, $S_{\bar{X}_C} = 0.016$. - \bar{X} = sample mean, n = sample size, $S_{\bar{X}}$ = sample standard error of the mean.

ferent morphs, I have not recognized them taxonomically.

As a result of a comparison between the western plants formerly called *A. radiata* and *A. australis*, and the eastern *A. garcinii* s. str., I have recognized one species only, *A. garcinii*, with two subspecies. Although there is no way of separating these two regional populations with respect to presence or absence of ray-florets (both have radiate and discoid representatives), there is a significant difference in palea morphology (Fig. 3) between the western ssp. *radiata* and the eastern ssp. *garcinii* which also differ in leaf characters, branching habit, and frequency of ray-florets.

In Libya, more or less intermediate specimens occur (Fig. 3B). In the herbaria these have been classified as *A. radiata* if radiate but otherwise as *A. garcinii*. As seen in Fig. 3, the intermediates from Libya (B) have paleae more similar to those of ssp. *radiata* (A) than to ssp. *garcinii* (C). Libya is closer to Algeria and Morocco than to Arabia and Iran, and it is not surprising to find that the Libyan plants hardly differ from ssp. *radiata* but clearly differ from ssp. *garcinii*. The plants from Egypt west of the Nile, have paleae ratios well within the variation of ssp. *radiata*. Consequently the Egyptian and Libyan plants belong to ssp. *radiata*. The variation in palea morphology correlated to the differences in ray-floret frequency, foliage, and branching habit justifies the uniting of *A. radiata*, *A. australis*, and *A. garcinii* s. str. into one widely distributed species, *A. garcinii* s. lat., consisting of the two geographically more or less distinct ssp. *radiata* and ssp. *garcinii*.

Anvillea DC.

De Candolle 1836: 487. – Type species: *Anvillea garcinii* (Burm. f.) DC.

Sycodium Pomel 1874: 39. – Type species: *Sycodium radiatum* (Coss. & Dur.) Pomel (= *Anvillea garcinii* (Burm. f.) DC. ssp. *radiata* (Coss. & Dur.) A. Anderb.).

Anvilleina Maire 1939b: 346. – Type species: *Anvilleina platycarpa* Maire (= *Anvillea platycarpa* (Maire) A. Anderb.).

Compact, woody perennials or subshrubs, sparsely – much branched. Branches rigid, leafy. Cortex on old branches cracked, brown – white, with fine white tomentum, or glabrous. Leaves alternate, elongate-cuneate – spatulate or elongate-ligulate, gradually attenuate towards the base or auriculate, semiamplexicaul, entire and indistinctly serrate, or lobed – grossly dentate. Lamina midribbed, with obscure lateral venation, lanate to almost glabrous. Capitula discoid or radiate, solitary, sessile. Inner involucre bracts imbricate, scale-like, triangular, striate. Outer involucre bracts long, leaf-like, midribbed, hardening into more or less pungent spines with age. Outer and inner involucre bracts fused, forming a hard, woody, hygroscopic unit after anthesis. Receptacle strongly concave, paleate. Paleae subequal, apically

abruptly narrowed into a long, slender, glandular seta, persistent and after anthesis apically thickened below the seta and covering the achenes. Ray-florets sterile, uniseriate. Tube short, glandular. Lamina yellow, glandular, narrowly elliptic or linear, 3–5-veined. Achenes flattened – slightly triquetrous, subcordate or reniform in outline, with anchor-shaped twin hairs. Crystals of achene wall elongate-rectangular or elongate-rhomboid. Pappus missing. Disc-florets perfect. Corolla yellow, 5-lobed; lobes dorsally glandular. Style terete, bifid. Style-branches erecto-patent, linear, semiterete with acute apex and minute collecting-hairs dorsally in the upper half. Anthers linear, with a flat, sterile, acutely triangular apical appendage and long, slightly branched tails basally; tails ca. $\frac{1}{4}$ of the total anther-length. Endothecial tissue polarized. Filament collar of collenchymatous cells, linear, flat or somewhat involute laterally. Achenes quadrangular or dorsiventrally compressed, with anchor-shaped twin hairs. Crystals of achene wall as in ray-florets. Pappus missing.

Key to the taxa

1. Subshrub with \pm long branches. Achenes of disc-florets quadrangular, rectangular in outline 2
1. Compact woody perennial with very short branches. Achenes of disc-florets dorsiventrally compressed, ovate in outline *A. platycarpa*
2. Radiate or rarely discoid. Leaves almost glabrous, elongate-cuneate, evenly attenuate towards base. Branches erect – ascending. Palea seta ca. $\frac{1}{2}$ of total palea length. North Africa *A. garcinii* ssp. *radiata*
2. Discoid or very rarely radiate. Leaves almost lanate, \pm spatulate, auriculate, semiamplexicaul. Branches spreading. Palea seta ca. $\frac{3}{5}$ of total palea length. Middle East *A. garcinii* ssp. *garcinii*

Anvillea garcinii (Burm. f.) DC.

De Candolle 1836: 487. – *Anthemis garcini* Burman 1768: 183. – *Buphthalmum garcini* Burman 1768: T. 60 sphalm. – *Buphthalmum persicum* Garcin ex Burman 1768: 183 pro syn. – *Acmella garcini* (Burm. f.) Sprengel 1826: 591. – Type: *Garcin* s.n., Persia, in Herb. Burman (G holotype).

Buphthalmum flosculosum Ventenat 1801: T. 25. – *Asteriscus flosculosus* (Vent.) Decaisne 1835: 202. – Type: Ex hort. Cels, in Herb. Ventenat (G lectotype selected here).

Buphthalmum arabicum Delile 1830: 84. – Type: L. de Laborde s.n., Arabia petraea (G holotype).

Anvillea radiata Cosson & Durieu de Maisonneuve 1856: 742; Cosson 1855: 284 sine descr. – *Sycodium radiatum* (Coss. & Dur.) Pomel 1874: 39. – *Anvillea radiata* Coss. & Dur. var. *genuina* Maire 1934: 757 nom. non rite publ. – Type: B. Balansa 964, Pl. Algérie, Gravières de l'Oued Biskra à Biskra, 25 Mar 1853 (P lectotype selected here, duplicates in BM, C, G, GOET, K, LY, MPU, W).

Anvillea australis Chevallier 1903: 771. – *Anvillea radiata* Coss. & Dur. var. *australis* (Chev.) Diels 1917: 120. – Type: L. Chevallier 434, Inter El Golea et Inifel, frequens ad Sahab-es-Ser et Daia-Saret, in glareosis, 17 et 20 Apr 1902 (P lectotype selected here, duplicates in GB, LD, LY, MPU).

Anvillea faurei Gandoger 1913: 23. – Type: A. Faure s.n. Oran, Ain Sefra, 20 May 1911 (LY holotype, isotypes in B, MPU).

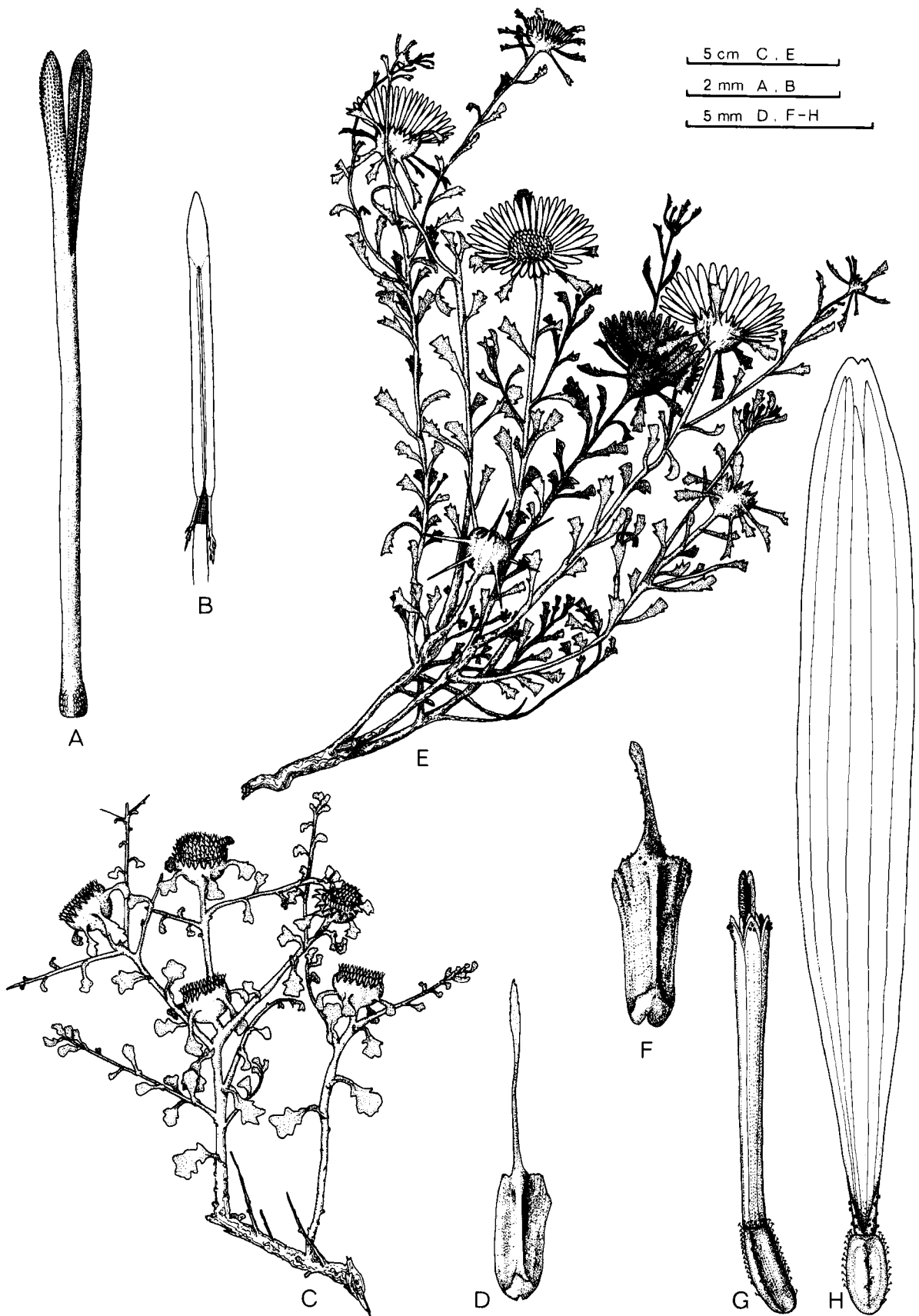


Fig. 4. *Anvillea garcinii*. - A: Style. - B: Stamen. - C: Habit, *ssp. garcinii*. - D: Palea of *ssp. garcinii*. - E: Portion of plant, *ssp. radiata*. - F: Palea of *ssp. radiata*. - G: Disc-floret. - H: Ray-floret. - A, B, E-H: Anderberg 567 (S). - C, D: Remaudière 33 (G).

Nomenclatural note. The specific epithet in *Anvillea garcinii* is derived from the surname of Laurent Garcin, and should be spelt "garcinii". Hence in this paper I have adjusted the incorrect spelling "garcini" used by Burman (1768) and later adopted by others.

Venténat based his description of *Buphthalmum flosculosum* on several specimens collected in Syria by Olivier & Bruguière. Plants from the original collection were grown in greenhouses in the garden of J. M. Cels. I have examined one specimen from Paris (P), collected in Syria by Olivier & Bruguière and another, from Herb. Venténat in Geneva (G), labelled "ex hort. Cels". Rechinger 1980: 129 erroneously cited an Olivier & Bruguière collection in G-DC as the type of *Anvillea garcinii* (Burm. f.) DC. I have seen a microfiche of this specimen and it is obvious that, together with the two specimens I have examined, it belongs to the original collection of *Buphthalmum flosculosum* Vent. I have selected the specimen in herb. Venténat as lectotype of *Buphthalmum flosculosum*.

The illustration of *Buphthalmum arabicum* given by Delile 1830 agrees entirely with the de Laborde specimen in Geneva (G). There is no doubt that this very sheet was in front of Delile when he described the taxon. Thus it is the holotype of *Buphthalmum arabicum* Del.

Illustrations. Fig. 4. – Burman 1768: T. 60. – Venténat 1801: T. 25. – Delile 1830: Fig. 4. – Rechinger 1980: T. 104.

Subshrub up to 0.5 m high, pseudodichotomously – irregularly branched; branches ascending – erect – spreading. Leaves elongate-cuneate – almost spatulate; margin entire – grossly dentate; lamina pubescent – almost glabrous, with immersed glands, 0.4–6.0 cm long, up to 1 cm wide; leaf base evenly attenuate or auriculate, semiamplexicaul. Capitula radiate or discoid. Involucre obconical – broadly campanulate – urceolate, 0.7–2.5 cm wide. Inner involucre bracts 10–30, subbiseriate, brown – purplish laterally; outer 5–10, straight–slightly arched, spreading – ascending – erect. Paleae rectangular – almost triangular, canaliculate, 3.5–9.0 mm long, embracing the florets basally; seta 1.6–6.0 mm long, ca. $\frac{1}{2}$ –ca. $\frac{3}{5}$ of the total palea length, slightly spatulate apically. Ray-florets 10–30, narrowly elliptic, 10–40 mm long, 0.5–4 mm wide, indistinctly 3–5-veined, apically 2–3-denticulate. Achenes white, flattened – slightly triquetrous, subcordate in outline. 0.5–1.5 mm long, 0.3–0.6 mm wide, with colourless anchor-shaped twin hairs. Crystals of ovary wall linear-rectangular in outline. Disc-florets 20–ca. 200. Corolla 3.5–8.0 mm long, gradually narrowing towards base; lobes erect, triangular. Style 3.5–9.0 mm long; style-branches 0.6–2.2 mm long. Anthers 1.7–5.9 mm long. Achenes rounded-quadrangular, almost rectangular in outline but sometimes more or less distorted in shape, slightly ridged with a rough surface, 0.7–2.2 mm long,

0.3–0.8 mm wide, with colourless anchor-shaped twin hairs. Crystals of ovary wall as in ray-florets.

Flowering period. November to June but mainly in March–May.

Distribution (Fig. 6). *A. garcinii* occupies a vast area from Morocco and Mauretania in the west to the Arabian peninsula and Iran in the east. It inhabits steppes with sparse vegetation and stony, gravelly deserts on plains, mountain slopes, and in riverbeds. It grows at various altitudes up to ca. 2600 m.

***Anvillea garcinii* (Burm. f.) DC. ssp. garcinii**

Basionym: *Anthemis garcini* Burman 1768: 183. – *Buphthalmum garcini* Burm. f. – *Buphthalmum persicum* Garcin ex Burm. f. – *Acmella garcini* (Burm. f.) Spreng. *Buphthalmum flosculosum* Vent. – *Asteriscus flosculosus* (Vent.) Decne. *Buphthalmum arabicum* Del.

Usually discoid, in central Saudi Arabia sometimes with prominent ray-florets. Branches spreading. Leaves usually lanate; margin indistinctly lobed, more or less spatulate in outline; leaf base usually auriculate, semiamplexicaul. Seta of palea ca. $\frac{3}{5}$ of total palea length.

Material examined: 154 collections.

***Anvillea garcinii* (Burm. f.) DC. ssp. radiata (Coss. & Dur.)**

A. Anderb. stat. nov.

Basionym: *Anvillea radiata* Cosson & Durieu de Maisonneuve 1856: 742; Cosson 1855: 284 sine descr. – *Sycodium radiatum* (Coss. & Dur.) Pomel – *Anvillea radiata* Coss. & Dur. var. *genuina* Maire. *Anvillea australis* Chev. – *Anvillea radiata* Coss. & Dur. var. *australis* (Chev.) Diels. *Anvillea faurei* Gdgr.

Usually radiate but plants from southern Algeria, southern Morocco, Egypt, Mauretania and Libya are sometimes discoid. Branches erect – ascending. Leaves almost glabrous; margin grossly dentate, elongate-cuneate in outline; leaf base evenly attenuate. Seta of palea ca. $\frac{1}{2}$ of total palea length.

Material examined: 253 collections.

***Anvillea platycarpa* (Maire) A. Anderb. comb. nov.**

Basionym: *Anvilleina platycarpa* Maire 1939b: 346 – *Anvillea platycarpa* Maire 1939a: 8 nom. non rite publ. – Type: Ollivier 301, Maroc meridional, rocailles gréseuses des ravins vers El Aioun du Draa au S de Goulimine, printemps 1938 (MPU holotype).

Nomenclatural note. Maire (1939a: 8) announced a new species of *Anvillea* and gave the diagnostic characters in French only. Later (Maire 1939b: 346) he published the

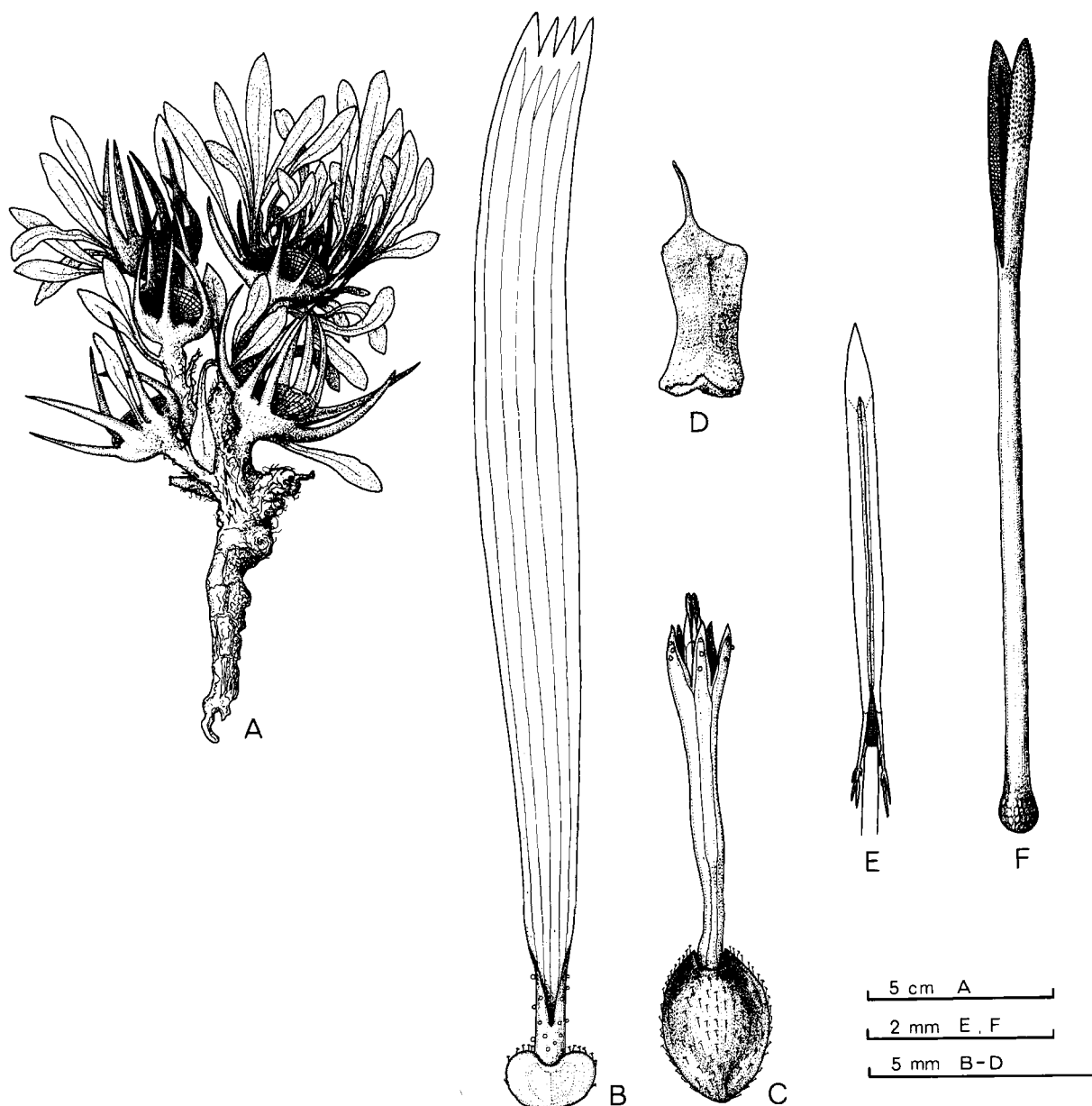


Fig. 5. *Anvillea platycarpa*. – A: Habit. – B: Ray-floret. – C: Disc-floret. – D: Palea. – E: Stamen. – F: Style. – A–F: Ollivier 301 (MPU).

plant as a new genus with a Latin diagnosis. The name *Anvillea platycarpa* was thus not validly published by Maire and a new combination is necessary.

Illustration. Fig. 5.

Compact woody perennial with very short branches. Leaves elongate-ligulate; margin entire or indistinctly serrate apically; lamina lanate, 3.5–8.0 cm long, up to 0.7 cm wide; leaf base slightly amplexicaul. Capitula radiate. Involucre broadly cupulate, ca. 2.5 cm wide. Outer involucral bracts erect, slightly arched. Paleae

rectangular, almost flat and slightly curved, ca. 5 mm long; seta ca. 2 mm long, ca. $\frac{1}{3}$ of the total palea length. Ray-florets linear, up to 25 mm long and 2 mm wide, 3–5-veined, apically 3–5-dentate. Achenes brownish, broadly cordate – reniform in outline, ca. 1.5 mm long and 2.5 mm wide, with red anchor-shaped twin hairs. Crystals of achene wall elongate-rhomboid in outline. Disc-florets. Corolla ca. 7 mm long, narrowing below the middle of the tube; lobes erect-spreading, elongate-triangular. Style ca. 10 mm long; style-branches ca. 2 mm long. Anthers ca. 5 mm long. Achenes dorsiventrally compressed, somewhat alate with a minute keel



Fig. 6. Distribution of *A. garcinii* (●) and *A. platycarpa* (▼). *Anvillea garcinii* ssp. *garcinii* occurs in the Middle East and ssp. *radiata* in North Africa.

basally; broadly ovate in outline, 4–4.5 mm long, 3.5–4.0 mm wide, with red anchor-shaped twin hairs. Crystals of achene wall as in ray-florets.

Flowering period. April (fide coll.).

Distribution (Fig. 6). This species is endemic to the southernmost part of Morocco where it grows in mountain ravines in the desert (fide coll.).

Material examined: 2 collections from Morocco.

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