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Arcyna*, a new genus segregated from *Cynara* (*Compositae*)*Abstract**

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Cynara tournefortii, an endemic of Spain and Portugal that had been excluded from *Cynara* in a recent revision of that genus, is placed in the newly described, unispecific genus *Arcyna*. A full description, with illustrations, and a distribution map are presented. Within the subtribe *Carduinae*, the closest relatives of *Arcyna* appear to be *Silybum* and *Cynara*.

Introduction

In a recent revision of *Cynara* (*Compositae: Cardueae, Carduinae*) I excluded *C. tournefortii* from that genus so as to make it homogenous and clearly defined (Wiklund in Bot. J. Linn. Soc. 109: 75-123. 1992). The distinctive morphological features of *C. tournefortii* had previously induced Willkomm (in Linnaea 25: 39. 1852) to place it in the genus *Bourgaea* Coss., originally based on the similarly distinctive but quite different *C. humilis* L., whereas Franco (in Bot. J. Linn. Soc. 71: 47. 1975) assigned it to the unispecific *C. sect. Acaulon* Franco. It is here made the type of a separate, unispecific genus.

The present note is based on the study of herbarium material from the following herbaria (for abbreviations see Holmgren & al. in Regnum Veg. 120. 1990): BM, COI, G, K, LISE, LISU, MA, MAF, P and W. A list of specimens seen is available from the author on request. The methods used were those outlined in Wiklund (l.c.).

Taxonomy

Arcyna Wiklund, **gen. nov.** – Type: *A. tournefortii* (Boiss. & Reut.) Wiklund – The new generic name is an anagram of *Cynara*.

Herba acaulis. Involucrum magnum, anguste cyathiforme, strobilaceum; appendices bractearum involucralium mediarum reflexae, ovatae, interdum rimosae, margine apicali denticulato, costa saltem in parte apicali obvia. Cypselae obovoideae, subteretes.



Fig. 1. *Arcyna tournefortii*, habit. – Drawn by J. Pizarro Domínguez from a specimen collected in 1966 near Cerro de los Angeles, Madrid (Borja, MAF).

Arcyna tournefortii (Boiss. & Reut.) Wiklund, **comb. nova** \equiv *Cynara tournefortii* Boiss. & Reut. in Biblioth. Universelle Genève, ser. 2, 38: 210. 1842 \equiv *Bourgaea tournefortii* (Boiss. & Reut.) Willk. in Linnaea 25: 39. 1852. – Lectotype (designated by Burdet & al. in Candollea 38: 780. 1983): [Spain], “dans un ravin entre des champs près du Cerro Negro aux environs de Madrid”, 6.1841, Reuter (G). – Fig. 1-2.

Perennial(?) herb to 16 cm high, unbranched or sparingly branched, subcaulescent. *Stem* 5-12 mm thick, slightly hairy, glandular, c. 13-18-ribbed. *Leaves* rosulate, pinnatifid with a \pm pinnate base, with 17-33 segments, somewhat folded along midrib and along veins of segments, broadly lanceolate to lanceolate in outline, 22-44 \times 10-20 cm, not decurrent; base to 22 mm wide, entire; rachis 4-15 mm wide; leaf segments narrowly ovate to ovate in outline, compound serrate-dentate to triangular-lobed with entire to slightly serrate, acute lobes, 5.7-11.5 \times 2.9-5 cm, each ending in a 3-7 mm long yellowish spine; margins \pm distinctly revolute; dorsal side greyish green, moderately woolly, slightly scabrid along veins, densely glandular; ventral side green, slightly short-woolly to glabrescent, sometimes slightly scabrid, very sparingly glandular. *Leaf venation* pinnate, with major veins of leaf segments laxly reticulate; midrib ventrally grooved proximally, flat and ribbed distally; veins dorsally prominent, ventrally flat, slightly thickened when excurrent into spines. *Capitula* solitary, terminal, \pm sessile, homogamous. *Involucre*s \pm narrowly cyathiform, 65-86 \times 53-72 mm. *Involucral bracts* c. 60-120, imbricate in 5-8 layers, squarrose to subsquarrose, spine-tipped; outer bracts narrowly triangular to broadly transverse-elliptic with an ovate to transverse-elliptic appendage, entire or apically denticulate, shortly acuminate, 15-19 \times 5-11 mm, thinly coriaceous, pale green becoming brownish, dorsally subglabrous, eglandular; middle bracts protruding by 6-18 mm, narrowly oblong, with a ventrally concave, ovate, shortly and abruptly acuminate apical appendage, entire or with cracked apical margins, 53-68 \times 8-13 mm, with a 3-8 mm long spine, pale green, becoming brownish with a straw-coloured base, subglabrous or with scattered minute dorsal glands; inner bracts linear to narrowly linear distally, sometimes with an ovate appendage, acute, 32-57 \times 2-5 mm, subcoriaceous with scarious margins, pale straw-coloured, sometimes with a brownish to reddish apex, glabrous and eglandular, apically ciliate with minute acute hairs. *Receptacle* 4-8 mm thick, flat to slightly convex, smooth, beset with dorsiventrally flattened, entire, acute, 11-41 mm long bristles. *Florets* bisexual, c. 50-120, \pm curved to straight, 48-72 \times 1.1-2.6 mm, glabrous, eglandular; tube subterete, filiform, distinctly 5-veined, with cells containing oxalate crystals; limb narrowly cyathiform to narrowly funnel-shaped, with one corolla lobe more deeply set off than the other four, 14.8-18 mm long, lilac, epidermal cells with straight lateral walls; corolla lobes ventrally canaliculate, entire, acute to subacute. *Anthers* linear to narrowly linear, acute to rounded, 6.8-8.8 mm long; filaments dorsally with papillae; filament collar with smaller basal cells; tails conspicuous and fimbriate; endothelial tissue polarised; apical appendage sterile and stiff. *Style* bifid, tapering towards base, with a basally flattened and apically terete, 55-78 mm long shaft, lilac, with \pm long sweeping hairs below bifurcation; style branches separating apically, 9.5-14 mm long, semiterete to flattened, linear, rounded to subacute, dorsally covered with minute acute sweeping-hairs. *Cypselas* obovoid, subterete, 6-8 \times 4-5 mm, with rounded basal scar, apically flat, hard, straw-coloured to pale brown with short pale yellow and dark brown longitudinal lines, smooth to faintly striate, \pm distinctly 4-ribbed. *Pappus* of 81-133 flat bristles in 3-6 rows, deciduous in ring, pale straw-coloured; bristles subequal, 35-59 mm long, flattened, filiform, tapering to a point, plumose with a barbellate apex, the outer 0.24-0.48 mm and the inner ones 0.34-0.48 mm wide. – Flowering June to July.

Arcyna tournefortii is easily recognised by its almost stemless habit and its peculiar large, cone-like involucre. In addition it may be distinguished by the denticulate rim and easily cracked margins of the middle involucral bracts.

Geographical distribution and habitat. – *Arcyna tournefortii* occurs at moderate altitudes in the eastern part of the Alentejo region in south-eastern Portugal and in the Madrid area in Spain. In

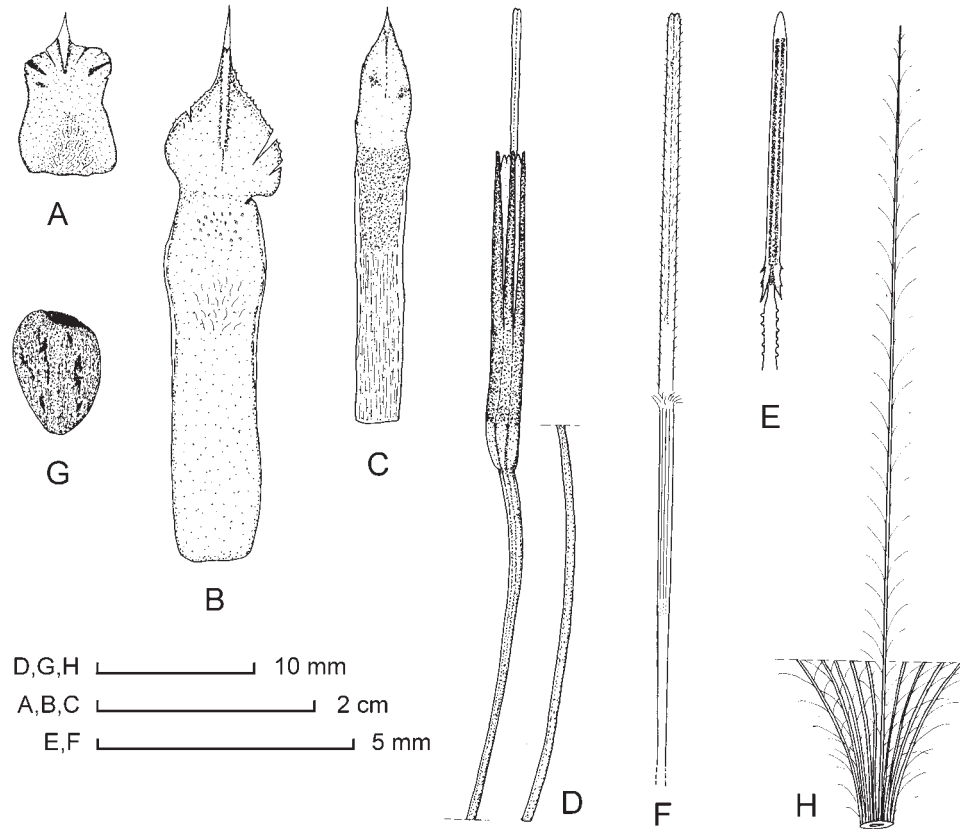


Fig. 2. *Arcyna tournefortii* – A-C: involucral bracts; D: corolla; E: stamen; F: style; G: cypsela. – Drawn by J. Pizarro Domínguez from the same specimen as Fig. 1.

addition one collection from the mountain regions of southern Spain was seen (Fig. 3). I have seen no North African material but note two records from NW Morocco (region of Rabat) by Maire (in Bull. Soc. Hist. Nat. Afrique N. 29: 424. 1938) and Gattefossé (in Bull. Soc. Hist. Nat. Afrique N. 31: 206-220. 1938). The species is reported to occur in fallow fields on clayey soils.

Discussion

Arcyna tournefortii has stems with secretory canals or ducts filled with a resin-like substance, adjacent to 1-3 layers of vascular bundles. They possibly correspond to the secretory canals found in the stems of other *Carduinae* such as *Cynara cardunculus* L., *Cirsium* Mill. spp., *Cousinia* Cass. spp., *Ptilostemon* Cass. and *Saussurea* DC. spp. (Greuter in Boissiera 13: 21-23. 1973; Meinheit, Anat. Bau Stengels Cynareae. 1907). Secretory canals are of general occurrence in *Cardueae* roots, and they sometimes continue into the stem (Col in J. Bot. (Morot) 13: 234-153, 15: 166-168, 17: 252-318, 18: 153-175. 1899-1904), which makes it difficult to interpret their presence in the reduced stem of *A. tournefortii*.

Leaf indumentum mainly consists of soft woolly hairs with a 1-2-cellular uniseriate base and a very long unicellular apex. Larger, short and stiff scabrid hairs of few uniseriate thick-walled cells were also found on the veins and scattered on the leaf surface. The woolly hairs are similar to those generally found in the *Carduinae*. Scabrid hairs are uncommon in this subtribe: I found



Fig. 3. Known European distribution of *Arcyna tournefortii*, based on available specimens.

them only in *Arctium* L., *Cynara* spp. and *Ptilostemon stellatus* (L.) Greuter (Greuter, l.c.: 29-30). They appear to be reduced forms of the whip-like hairs that are common throughout the *Asteraceae* (Solereder, Syst. Anat. Dicotyledons 1. 1908).

The involucre in *Arcyna* are \pm narrowly cyathiform, cone-like, with the broad and ventrally concave appendices of the outer and middle involucre bracts reflexed. The middle bracts consist of an oblong lower part and a wider, ovate and acuminate upper part with a minute denticulate rim and easily cracked margins. Neither of these features were found in *Cynara*. Elsewhere in the *Carduinae*, *Carduus nutans* L. and *Silybum* have outer involucre bracts with broad apical appendages, and in *Silybum* the apical margin of the involucre bracts has a conspicuous dentate rim. The fleshy receptacles and very broad middle involucre bracts encountered in *A. tournefortii* are also present in *Cynara*, *Hypacanthium* Juz., *Onopordum* L. and *Silybum*. However, secretory canals, as found in *Cynara cardunculus*, are lacking in the involucre bracts of *Arcyna*.

The anthers of *Arcyna* have long fimbriate tails. The apical sterile part is normally acute, only exceptionally rounded. The rounded anther tips are considered as one of the fundamental synapomorphies that characterise *Cynara* (Wiklund, l.c.: 77).

Arcyna cypselas are distinguished by their subterete shape. An apical crown or apical body of parenchymatous tissue (Dittrich in Candollea 25: 45-67. 1970) is lacking. Within the *Cardueae* laterally compressed cypselas prevail and have been suggested to be one of the features defining the whole tribe (Bremer in Cladistics 3: 210-253. 1987). Terete cypselas occur but occasionally, e.g. in *Ptilostemon*, where they are almost globose, and in *Saussurea*.

The pollen grains of *Arcyna tournefortii* are spiny and correspond in general to the type commonly found in the *Cardueae* (Dittrich 1977). Notable features are the reduction of the inner layer of columellae and the central constriction of the lens-shaped inner aperture (Gutiérrez, pers. comm.). According to Dittrich (in Heywood & al., Biol. Chem. Compositae: 999-1038.

1977) and Belmonte (unpubl. thesis, Univ. Complut. Madrid 1989), *A. tournefortii* shares reduced inner columellae of the pollen grains with *Carduus* L. spp., *Cirsium* spp., *Cynara*, *Galactites* Moench, *Lamyropsis* (Charadze) Dittrich, *Myopordon* Boiss., *Notobasis* (Cass.) Cass., *Picnomon* Adans. and *Silybum* Adans., whereas the other *Carduinae* genera investigated by Belmonte had unreduced inner columellae.

In general terms, it appears that some characteristic features are restricted, within the *Carduinae*, to *Arcyna* and some or all of a group of genera, including *Cynara*, *Galactites*, *Lamyropsis*, *Myopordon*, *Notobasis*, *Picnomon*, *Ptilostemon* and *Silybum*. From the above data, a fairly close relationship between *Arcyna* and *Silybum* may be inferred. However, *Silybum* is a distinct genus, well defined, e.g. by the shape of its florets. It also differs from *Arcyna* in its cypselae characters (shape, presence of apical parenchymatous body and apical crown, shape of basal scar) and through the sticking together of the anther filaments (Briquet in Vierteljahrsschr. Naturf. Ges. Zürich 73, Beibl. 15: 719-743. 1928). Recent morphology-based cladistic analyses of the *Carduinae* (Petit, Contr. Evol. Carduées Lactucées: 86-100. 1990; Häffner in Englera 21: 84-91. 2000) place *Silybum* and *Cynara* far apart – but unfortunately, neither did take *Arcyna* into consideration.

Because of the distinctive features described here, *Cynara tournefortii*, whose inclusion in genera such as *Cynara* and *Silybum* would seriously affect their homogeneity, is best placed its own unispecific genus as here proposed.

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