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Local endemism in European annual *Bupleurum* (*Umbelliferae*)

Abstract

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Six European local endemics are presented with short notes on their taxonomic affinities and distribution maps. The species treated are *Bupleurum greuteri*, *B. aira*, *B. capillare*, *B. gaudianum*, *B. gussonei*, and *B. rollii*. Randomly originated genetic barriers are suggested as a driving force in the evolution of these species.

Introduction

In a just published revision of the European annuals in the genus *Bupleurum* (Snogerup & Snogerup 2001), we recognise 33 species. The distribution areas are of various sizes, but for most of the species they amount to at least several hundreds of kilometres. A few species of section *Aristata*, however, stand out from the rest by being local endemics with very restricted areas. This phenomenon is not unique for the European species, but was equally recognised in the Anatolian area and in other parts of SW Asia.

The local endemics present a special problem for several reasons. They seem to be adapted to an effective dispersal just as well as their more widespread relatives. The most striking example of this is *Bupleurum sintenisii* Huter on Cyprus, which is the only species in the genus with hooked hairs on the fruits, but still has an area not exceeding 10 kilometres. Several more of the local species also show such unusual or unique characters, which make them appear taxonomically isolated. It seems therefore probable that most of them are palaeoendemics, proving that southeast Europe is part of an old centre of variation for section *Aristata*. But their peculiar morphology may also at least in some cases be explained by founder effect and following genetic drift caused by a critical event in their history. The latter explanation would allow for considerable variation in age without full correlation to the degree of morphological distinction. An inspection of the known cases may lead to a better understanding of the problems.

Results

THE EUROPEAN LOCAL ENDEMIC SPECIES

B. greuteri S. Snog. occurs in Greece, part of southernmost Peloponnisos and the island

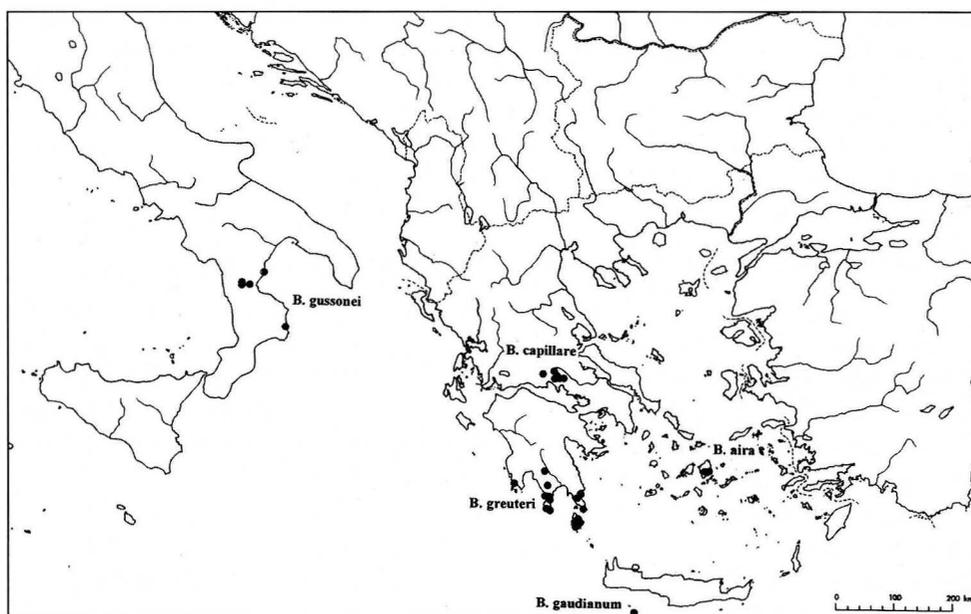


Fig. 1. Distribution of *B. gussonei*, *B. greuteri*, *B. gaudianum*, *B. capillare* and *B. airt* according to material revised. From Willdenowia 31(2).

of Kithira (Fig. 1), an area about 125 km wide. It shares with the widespread *B. glumaceum* Sm. two independent characters. In both these species the bractlet is herbaceous between its three veins, in sharp contrast to a broad scarious part outside them. The inflexed lobe of their petals is narrow and straight, not broadly bifid as in other related species. At present, the two species occur as closely sympatric in a considerable part of *B. greuteri*'s area without intermediates. *B. greuteri* grows in associations of annuals in open spots of limestone slopes, often in scree of particles sized from gravel to pebbles. Such sites are frequent in most of the southern Balkans. The species is apparently not rare within its area and occurs in large numbers of individuals.

B. airt S. Snog. has until now been found only in two localities c. 5 km apart on the island of Naxos, Kikladhes, Greece (Fig. 1). The surrounding areas have been carefully studied, so this species is certainly not only local but also rare within its area. It seems at first glance much unlike all other species of subsect. *Aristata*, having thin, spreading branches and small, narrow bracts and bractlets. But it shares with the sympatric *B. gracile* D'Urv. both translucent bractlets, a smooth petal with a large inflexed lobe and a set of $x = 7$ very similar chromosomes. It may therefore be presumed to be a sister taxon of the more widespread *B. gracile*. *B. airt* grows in vegetation of annuals in open spots of grazed phrygana or manmade garigue. Such vegetation occupies a considerable part of Naxos as well as neighbouring islands and mainland.

B. capillare Boiss. & Heldr. has been found in several places on the lower S slopes of Mt Parnassos and one similar site on the neighbouring Mt Giona, Greece (Fig. 1). Its distribution extends over an area about 40 km wide, including the outlying Giona locality,

the area near Arachova on Parnassos is less than 10 km. *B. capillare* deviates from all other species of *Bupleurum* by the peculiar inflorescence, with each umbel consisting of two bracts placed immediately below the single umbellule. In other respects, it is most like two other, more widespread Balkan endemics, *B. flavicans* Boiss. & Heldr. and *B. karglii* Vis., and occurs close to the area of the former. *B. capillare* has probably its original localities in fine limestone scree, and is presently most found in similar spots of road slopes and southexposed vineyards. Quite similar places are frequent in other parts of the large and continuous neighbouring mountain area.

B. gaudianum S. Snog. occurs in part of the island of Gavdos S of Kriti (Fig. 1), an island about 10 km in its longest extension. We place this species with some hesitation in subsect. *Aristata*, but it has several characters of its own, e.g. the short, narrow and pointed inflexed lobe of the petal, the very short and narrow bractlet and the presence of only four bractlets. It is therefore difficult to point out any very closely related species (Snogerup 1984). It is probably a very old isolate on the island of Gavdos. *B. gaudianum* grows in open spots of grazed, probably to a large extent manmade phrygana.

B. gussonei (Arcang.) S. Snog. & B. Snog., occurs in the province of Calabria, Italy (Fig. 1), in an area from near Castrovillari and Trebisacce in the northwest to Crotona in the southeast, with about 100 km between the most distant localities. It is definitely most like the more northern and widespread *B. veronense* Turra, though deviating by long and narrow bracts and partly scarious bractlets without conspicuous veinlets. The size of its present area indicates that it is not a very recently formed vicariant of *B. veronense*.

B. rollii (Montelucci) Pignatti is an endemic of the provinces of Lazio and Calabria, Italy (Fig. 2). It was before the congress known from a group of rocky localities E of Rome and has recently been found near Papisidero in NW Calabria, this isolated locality being about 350 km distant from the rest. It is certainly most closely related to *B. asperuloides* Heldr. of the middle to NE Balkans and W Anatolia and *B. pauciradiatum* Fenzl of SE Anatolia. *B. rollii* is a tall, thin plant with only short branches and few-flowered umbels, and its bractlets have a broad white margin in contradiction to all similar species. Its distance from the two closest relatives and its own somewhat disjunct occurrences indicate that it is of ancient origin.

During the post-congress excursion to Monte Nebrodi, *B. rollii* was shown to us by S. Brullo at the well-known locality of Catafurco. Similar plants are said to occur in other limestone localities in Sicily. So this late-flowering and not very showy plant may be overlooked in many places, and will have to be excluded from the list of local endemics.

THE GENETIC BARRIERS

Investigations of the kinds of genetic difference between the local endemics and their relatives might best be performed in the cases where a close, widespread relative can be pointed out. There are three such cases among the European ones, namely the species pairs of *B. aira* – *B. gracile*, *B. greuteri* – *B. glumaceum*, and *B. gussonei* – *B. veronense*. We have had *B. aira* and *B. gracile* in cultivation together, and we also tried to produce hybrids but without any success. In the case of *B. greuteri* we hesitated to accept it as a species separate from *B. glumaceum*, waiting for intermediates to appear. But instead, with more material at hand there proved to be a definite morphological discontinuity. In spite of partly overlapping



Fig. 2. European distribution of *B. asperuloides* (dots) and *B. rollii* (triangles) according to material revised. For *B. rollii* are also included localities given by Montelucci (1949). From Willdenowia 31(2).

distributions no hybrids or intermediates could be found. For the third case no such experience is yet available.

The mentioned results of artificial and natural tests of crossability seem not at all astonishing. We have namely until now failed to find any documented case of hybridisation among European or SW Asiatic annuals of *Bupleurum*. It seems therefore likely that absolute and rapidly formed crossing barriers have played an important role during the evolution of these plants.

Discussion

PROBABLE EVOLUTIONARY PATHWAYS

With interspecific hybrids lacking even between very similar species, it must be presumed that absolute barriers towards crossing are fastly and easily formed. Such effects may then occur as soon as two parts of a species become spatially isolated from each other.

A special genetic constitution may most easily become rapidly established in a small isolated population, and may then form a barrier towards future crossings and gene exchange with the rest of the founding species. Such an event would mean that a random genetic change acts as the isolating factor promoting speciation. If the isolate remains small for a long period of time, it may also suffer dramatic changes leading to the unusual characters found in some of the local endemics. Against this explanation speaks, that such

a series of changes would risk to constitute a serious inbreeding depression, causing extinction of the isolate. But many such extinctions may have occurred, leaving as survivors only the comparatively few existing local endemics. It would then not be astonishing if a majority of them have developed a dangerously narrow ecological specialisation or lost much of their ability to establish new populations.

References

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