

Cochlearia pyrenaica DC., a species new to Scotland

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ABSTRACT

Cochlearia pyrenaica DC. (Cruciferae), with a chromosome number $n = 6$ bivalents and 0-2B, has been collected on the Isle of Skye, v.c. 104, N. Ebudes. This is the first record of the species from Scotland.

INTRODUCTION

Hultén (1970) stated that *Cochlearia officinalis* is "a very complicated complex treated differently by practically all students of the group". The difficulties are especially due to two factors: (a) considerable cytological evolution has taken place without corresponding morphological evolution (Saunté 1955; Gill 1965, 1971a, b, 1973, 1976; Gill *et al.* 1978), and (b) much of the variation that has been given taxonomic weight is undoubtedly of environmental origin, as the complex is very plastic in its reaction to the environment (Elkington 1984).

Due especially to the extensive studies by Gill the genus is fairly well understood and mapped in the British Isles. In Great Britain, the mainly southern and Central European species, *C. pyrenaica* DC., has been recorded only from England (v.c. 57, 59, 64, 65, 66, 69) according to Gill *et al.* (1978).

In connection with field studies in Great Britain in July and August 1984, living material of *Cochlearia* was brought to the University of Oslo and examined morphologically and cytologically in order to compare British and northern Scandinavian taxa.

MATERIALS AND METHODS

A few living plants of what was supposed to be an inland ecotype of *Cochlearia officinalis* L. were collected at the following locality:

Scotland, v.c. 104, N. Ebudes, Isle of Skye, Beinn Edra, above Loch Corcasgil, 450 m, GR 18/452.634, 30th July 1984. (Voucher specimen *I. Nordal 1367, O.*)

The plants had unripe seeds that later matured in a greenhouse at the University of Oslo. The seeds were harvested and kept cool for some months. They were then sown and grown under similar conditions in a phytotron chamber at 16°C day temperature and 8°C night temperature with 16 hours light and 8 hours darkness. The plants produced leaf rosettes and three months after sowing five of the plants were moved to a completely dark chamber at 0°C for three months to simulate winter conditions. Then they were returned to the original growth conditions to stimulate flowering.

Meiotic preparations were made after fixation of young flower buds in Carnoy's fluid. They were kept at -20°C for about 24 hours, and then squashed in aceto-orcein. The preparations were made permanent in euparal.

RESULTS

ECOLOGY OF THE SITE

The plants were collected in small crevices on a fairly steep, flushed rock. Species dominating in

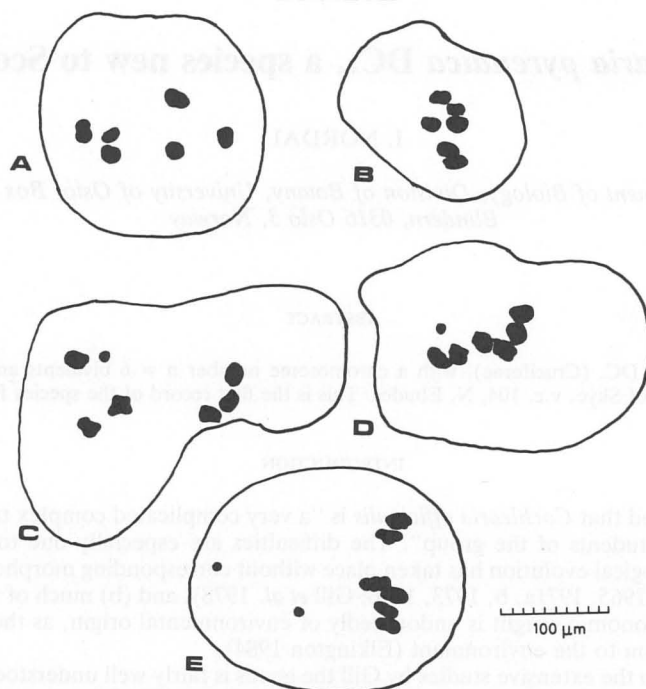


FIGURE 1. Meiotic configurations in pollen mother cells of three different specimens of *Cochlearia pyrenaica* DC. from Scotland. A, B. Metaphase I with 6 bivalents and 0 B-chromosomes. C, D. Metaphase I with $n = 6$ bivalents and 1 B-chromosome. E. Metaphase I with 6 bivalents and 2 B-chromosomes.

the habitat together with *Cochlearia* were: *Oxyria digyna* (L.) Hill, *Rumex acetosa* L., *Sedum rosea* (L.) Scop., *Chrysosplenium oppositifolium* L., *Saxifraga hypnoides* L., *S. stellaris* L., *Geum rivale* L., *Angelica sylvestris* L., *Luzula sylvatica* (Hudson) Gaudin, *Anthoxanthum odoratum* L., *Deschampsia cespitosa* (L.) Beauv., *Festuca rubra* L., and several bryophyte species.

MORPHOLOGY

The cultivated first-year plants branched very early and formed several rosettes joined by more or less supra-terrestrial rhizomes. The rosette leaves were long-petiolate and reniform with a cordate base, glossy and rather dark green in colour. The lower cauline leaves were short-stalked and truncate, whilst the mid- and upper-leaves were sessile and coarsely toothed with more or less amplexicaul bases. The flowering stems were much branched and up to 40 cm tall. The white flowers had petals about 4 mm long and 1.5 mm wide. The siliculae were elliptical, tapering at both ends, $6-7 \times 3-4$ mm and contained, on average, eight seeds.

CYTOLOGY

Of the five plants analyzed cytologically, one showed six bivalents with two B-chromosomes, two showed six bivalents with one B-chromosome and two showed six bivalents without B-chromosomes (Fig. 1). The meioses of all plants were regular. Only in a few cases were bridges and fragments observed in anaphase I, indicating inversions.

DISCUSSION

Taxa belonging to the *Cochlearia officinalis* group cannot be identified with certainty without knowing their chromosome number. The chromosome number $2n = 12$ is, in Britain, only found in *C. pyrenaica* (Gill *et al.* 1978). The morphological features of the plants examined here correspond



FIGURE 2. Localities of cytologically examined *C. pyrenaica* from Great Britain. Triangles, after Gill *et al.* (1978); circle, the population studied here.

closely with those of this species. The plants from this study were compared with living plant material of *C. pyrenaica* from Yorkshire (Malham Tarn Field Centre, coll. J. J. B. Gill). Representatives of the two populations looked very similar except for the lighter colour of the leaves of the latter. The identification of the Scottish material thus seemed to be unequivocal.

The distribution of *C. pyrenaica* in Great Britain is given in Fig. 2.

Only one representative of a $2n=12$ cytotype of *Cochlearia* has earlier been recorded north of the population studied here, and that is from south-eastern Iceland (Gill 1971a). Although Gill did not specifically name his $2n=12$ plant *C. pyrenaica*, he did state that it was morphologically distinct from the common Icelandic taxon *C. groenlandica* with $2n=14$. He only had the opportunity to study the first year's rosettes, and that description is compatible with its being *C. pyrenaica*.

C. pyrenaica in Europe has long been recognized as a plant of base-rich habitats (Hegi 1919; Hiemans 1971; Gill *et al.* 1978). The base-status of the habitat of the Scottish population has not been determined, but the species composition would indicate medium eutrophic conditions.

According to Gill (1973) and Gill *et al.* (1978), *C. pyrenaica* is supposed to be the diploid ancestor of the autotetraploid *C. officinalis*. The diploid parent of any autotetraploid will often compete with its tetraploid offspring. *C. pyrenaica* probably survived the last glaciation in southern England (Gill *et al.* 1978). It might have followed the ice withdrawal towards the north, but has now been largely replaced by the more successful tetraploid. In this light the Scottish population may be interpreted as a relict population from periods of early deglaciation of the area.

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