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## The Occurrence of seeds of *PAPAVER* sect. *Scapiflora* in a Scottish Late-glacial site

By ANN CONOLLY, Leicester

Five seeds belonging to the *Scapiflora* section of the genus *Papaver* have been recovered from a Scottish Late-glacial site at Whitrig Bog.

The section *Scapiflora* of the genus *Papaver* are all perennial species with usually white or yellow flowers, which grow today in open habitats, for example screes, especially on limestone at high altitudes in the Alps and Pyrenees (1900—2900 m.), in Scandinavia, and in the Arctic regions.

None occurs today in the British Isles: the nearest locality being the Faröes.

There have been no previous Late-glacial records for the British Isles but there is a single Full-glacial record from Barnwell, Cambridge, assigned to *P. alpinum* (CHANDLER, 1921). This is therefore the first definite evidence for the former occurrence of a member of these arctic-alpine Papavers in Scotland.

The Late-glacial site at Whitrig Bog is located in Southern Scotland near to the River Tweed, at an altitude of just under 140 m. The site lies within the area of the so-called «Scottish Re-Advance» moraines.

Boulder Clay belonging to this «Scottish Re-Advance» stage covers the valley bottom over which Late-glacial clays, marls and lake muds, and subsequently post-glacial peats, have accumulated. The Late-glacial sequence, as seen in a two metre deep excavation consists of an Upper and Lower red silty clay with an intervening Brown Lake-mud and marl. The Upper clay is overlain by a post-glacial Marl and elsewhere by several feet of post-glacial peat. Pollen analysis (by Dr. GODWIN) confirms that this three-fold sequence of clay-mud-clay represents the Late-glacial zonation I—III.

The *Papaver* seeds came from near the base of the Upper Clay (Zone III) from a leafy layer very rich in organic material. They were associated with abundant leaves of *Salix herbacea* and numerous seeds and mosses, including such species as:

*Oxyria digyna*, *Thalictrum alpinum*, *Draba incana*, *Saxifraga* cf. *rosacea*, *Timmia norvegica* and *Scorpidium turgescens*.

The *Papaver* seeds from their shape and surface pattern clearly belong to the section *Scapiflora* but the problem remains as to whether the determination can be carried further. The section *Scapiflora* consists of a large complex of forms each occurring today in geographically isolated areas. They fall into three main groups:

an «*alpinum*»-complex in the Alps, Pyrenees and mountains of Central and Southern Europe;  
a «*radicatum*»-complex in Scandinavia, Iceland, Faröes, Greenland, Arctic Canada and N. Siberia;  
and a «*nudicaule*»-complex in mainly mountainous regions of Siberia and the Far East.

The «*alpinum*» complex consists (MARKGRAF, 1958) of two main species *P. alpinum* and *P. suaveolens*; with *P. alpinum* sub-divided into several sub-species as well as minor variants.

All are diploids as are the Siberian members of the «*nudicaule*»-complex.

The «*radicatum*»-complex on the other hand are all polyploids. In Scandinavia, Iceland and the Faröes, NORDHAGEN (1931, 1940) and LÖVE (1955) have distinguished one main species (*P. radicatum* Rottb. according to Nordhagen or *P. nordhagenianum* Löve) and six closely allied species. The main species is differentiated into four sub-species found in Norway (three northern and one southern) and two further sub-species in the Faröes and Iceland. Of the allied species two are endemic in Norway, two endemic in Iceland and two species are found in Norway but which also extend to Greenland and Arctic Canada and, in one case, to Siberia. *P. radicatum* is also widespread in the Canadian Eastern Arctic and in Greenland and, in the broad sense, extends west to the Mackenzie, re-appearing in a multitude of races in the Alaska-Yukon area where it meets with races of «*nudicaule*».

The identification of the Whitrig seeds would on geographical grounds belong to the Scandinavian or the Alpine-Pyrenean species rather than to the Siberian «*nudicaule*», and an attempt has been made to see whether these two groups may be distinguished on seed characters such as size.

Measurements of seed size have been made from collections of some of the sub-species in each group, and graphs have been made of the variation in seed length. Two sub-species of Norwegian «*radicatum*»: sub. sp. *ovatilobum* and sub. sp. *hyperboreum*, gave mean values of 1.01 mm. and 1.03 mm. respectively, with a range of 0.8—1.23 and 0.83—1.14 mm. This compares with the Whitrig specimens the longest of which measures 1.14 mm. and the shortest (of the fully formed specimens) 0.83 mm.

Comparison with seeds of the «*alpinum*»-complex has not been satisfactory as adequate quantities from authoritatively determined material has not so far been available. On the whole they indicate a smaller size: one collection labelled «*P. rhaeticum*» (a sub. species of *P. alpinum*) gave a mean length of c. 0.7 mm., but another collection of doubtful identification gave a mean of nearly 1.0 mm.

No conclusion can yet be drawn from seed length measurement as to whether the Whitrig material is closer to the northern «*radicatum*» or to the Alpine «*alpinum*», but it is interesting to note that the specimen from Barnwell measures nearly 1.3 mm. which is well above the maximum found among the «*radicatum*»-group.

NORDHAGEN has supposed that at least some of the Norwegian endemics had differentiated prior to the last glaciation and survived this glaciation in ice-free areas not far from their present stations. But whether the former occurrence in Scotland of a member of this section of *Papaver* indicates yet a further relict station of glacial survival, or a survival of a widespread Late-glacial distribution with extinction in Post-glacial times, cannot be said from a single find.

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