INTRODUCTION AND METHODS

Calcareous fens provide suitable sediments with good conditions for macrofossil and pollen preservation. However, only a few palaeoecological studies have dealt with these sediments. We analyzed sediments of 47 well-preserved calcareous fens (Fig. 1) to study their age and development using a radiocarbon dating and analyses of pollen, plant macrofossils and molluscs.

In the deepest part of each fen, we took the samples from the bottom of the sediment and, if wooded developmental stage was present at the bottom, also from the transition between forested and open fen that was indicated in the field by a disappearance of wood and an appearance of light-demanding mollusc species (mainly Vallonia spp., Vertigo pygmaea). All sediment samples (n = 75) were dated and calibrated 14C data were used for ecological interpretations.

RESULTS

The age of studied sites varied from 16,975 calibrated yrs BP (13,810 uncal. yrs BP) to 250 cal. and uncal. yrs BP. We found regionally clustered distribution of sites with the Late-Glacial and Early-Holocene age. Seeneven sites in the Inner Western Carpathians were dated back to the Late-Glacial and Early-Holocene (16,975-10433 cal. yrs BP). In contrast, site situated in the Outer part of the region were younger than 2,294 cal. yrs BP, except two sites (6,620 and 8,878 cal. yrs BP). These differences in historical development fit well to the distributional pattern of species with presumably relictual distribution in the study region (e.g. snail Vertigo geyeri and Pupilla alpicola, and plants Triglochin maritimum and Primula farinosa). All these species inhabit open sites, which perfectly matches with the obtained results based on fossil material from bottom layers (Figs 2 and 3). All those seven old sites in the Inner part stared as open fens or semi-open fen woodlands and have supported the occurrence of heliophilous species. In contrast, all older sites in the Outer part started as woody fens and were deforested by humans during recent centuries (mostly only 700 years ago). Originally open fens in this area developed due to human impact to the landscape, such as tree cutting and burning, which has increased erosion and decreased forest cover. Due to geomorphologic characteristics of flysh bedrock, many new open spring fens arose in the Outer Western Carpathians after this deforestation.