

CONTRIBUTIONS TO THE EUROPEAN POLLEN DATABASE

6. Peat-bog Begbunar (Osogovo Mountains, south-west Bulgaria): Four millennia of vegetation history

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Site details

The peat-bog Begbunar (42°09' N, 22° 33' E; 1750 m a.s.l.) is located in the central treeless zone of the Osogovo mountains, which are situated at the border between south-western Bulgaria and the north-eastern former Yugoslav Republic of Macedonia. This bog was formed near a freshwater spring on a north-western slope, which continues into a steep, deep ravine where isolated stands of beech (*Fagus sylvatica* L.) exist. The modern mountain vegetation consists of several vegetation belts: the oak-hornbeam belt (up to 1000 m), the compact beech belt (1000 – 1900 m) with fragments of conifers (*Pinus nigra* J. F. Arnold and *Abies alba* Mill.) and the subalpine belt, which is occupied by plant communities of *Juniperus sibirica* Burgsd., *Vaccinium myrtillus* L., *Bruckenthalia spiculifolia* (Salisb.) Rchb., *Chamaecytisus absinthioides* Janka (Kuzm.), *Nardus stricta* L., and scattered groups of *Pinus sylvestris* L., etc. The present-day vegetation composition has been strongly influenced by the long-lasting anthropogenic impact, including ore-mining industry and erosion caused by deforestation (Velčev & Tonkov, 1986; Tonkov, 2003). Geologically, the massif is composed mainly of Palaeozoic metamorphic and intrusive rocks, while geomorphological evidence suggests that small valley glaciers existed in the

highest parts during Quaternary glaciations. The climate above 1000 m is typical montane with a mean annual precipitation of 700–900 mm. The basic soil types are cinnamomic-forest, brown forest and mountainous-meadow (Velčev et al., 1994).

Sediment description

The profile is 105 cm deep and was collected from an open section. The sediments are:

- 0–20 cm – slightly decomposed Cyperaceae peat with fragments of *Sphagnum* sp.;
- 20–70 cm – decomposed Cyperaceae-*Sphagnum* peat;
- 70–105 cm – Cyperaceae peat with sand and small pebbles.

Dating

The radiocarbon age of terrestrial plant macrofossils and charcoal concentrated from three bulk sediment samples was determined in the Radiocarbon Dating Laboratory at the University of Lund, Sweden. The calibration ($\pm 2\sigma$ range) was performed with the OxCal v3.10 program (Bronk Ramsey, 2005). Results are:

- a. Lab. No LuS 6714: depth 20–25 cm (*Carex* fruits), 245 \pm 70 B.P. (490 to –11 cal. B.P.);

Peat-bog BEGBUNAR (Osogovo Mountains, 1750 m)
 SW Bulgaria (42° 09' N; 22° 33' E)

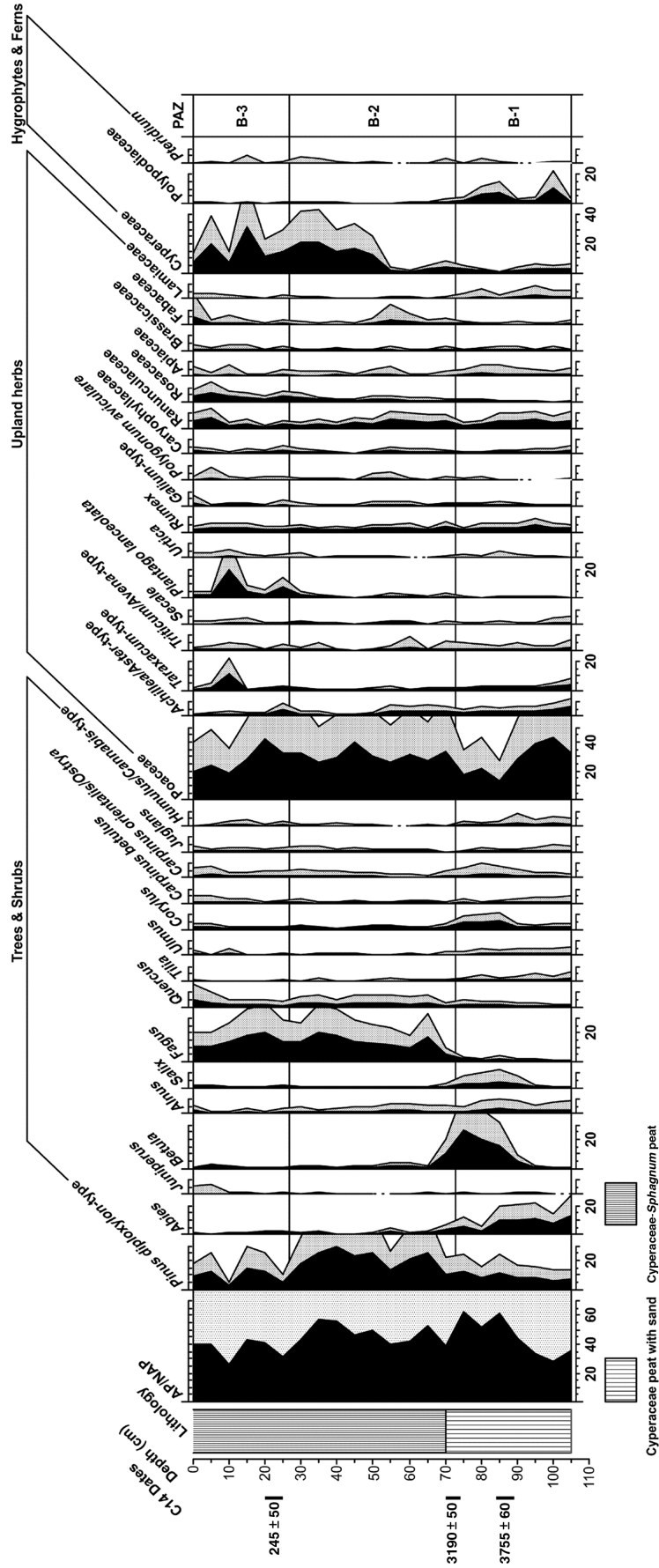


Figure 1. Pollen diagram from peat-bog Begbunar. The pollen sum comprises AP + NAP excluding spore plants, aquatics and Cyperaceae.

- b. Lab. No LuS 6713: depth 70–74 cm, (charcoal),
3 190 ± 50 B.P. (3560 to 3330 cal. B.P.);
- c. Lab. No LuS 6712: depth 84–89 cm, (charcoal),
3 755 ± 60 B.P. (4360 to 3920 cal. B.P.).

Interpretation

The pollen sum (100%) includes all pollen grains except those of Cyperaceae, aquatics and spores of pteridophytes. Selected pollen percentages are shown on Figure 1. Three pollen assemblage zones are recognised:

PAZ B-1, 105–75 cm. Subboreal (SB). – The oldest pollen spectra reveal that ca. 4500 years ago the high mountain slopes and flat ridges were covered by coniferous forests composed of pines (*Pinus sylvestris*, *P. nigra*) and *Abies alba* with an undergrowth of ferns and sciophyllous herbs. The bog was situated within the coniferous belt, which has formed the upper tree-line. In habitats with higher humidity groups of *Fagus sylvatica* grew, while *Alnus* and *Salix* were distributed along streams and brooks. A local expansion phase of *Betula* lasted for ca. 600 years and preceded the beginning of the widespread invasion of beech after ca. 3400 cal. B.P., which is synchronous with the decline of the conifers. The broad-leaved tree vegetation was composed of *Quercus*, *Corylus*, *Carpinus*, *Tilia* and *Ulmus* and was distributed at lower altitudes. The early appearance of *Juglans* pollen and cereals (*Triticum*, *Avena*, *Secale*) testifies to the practice of agriculture in the foothills of the mountains and agrees with the archaeological evidence of prehistoric Bronze Age settlements (Chohadziev et al., 2001).

PAZ B-2, 75–25 cm. Late Subboreal (SB) and Subatlantic (SA). – Important changes in the forest composition took place as *Fagus sylvatica* replaced the dominant conifers (mostly *Abies alba*) on many areas, producing a belt of single dominant or mixed communities. *Pinus sylvestris* was restricted to higher altitudes. The reasons for this replacement were of a complex character, including the change towards a more humid and cooler climate at the transition between the Subboreal and Subatlantic and the human interference

proved by the presence of charcoal fragments and anthropogenic indicators such as *Plantago lanceolata*, *Polygonum aviculare*, *Rumex* and cereal pollen.

PAZ B-3, 25–0 cm. Late Subatlantic (SA). – During the most recent 400–500 years the general trend in the vegetation development, alongside the expansion of *Fagus* shaping the upper tree-line, witnessed a large-scale destruction of the remnants of *Pinus* forests. Tree felling and fire clearances were practiced to obtain new pasture for seasonal cattle-breeding and the tree-line was artificially lowered. The treeless areas were occupied by diverse herbaceous communities composed of Poaceae, Ranunculaceae, Rosaceae, Fabaceae, Apiaceae species, together with ruderals such as *Plantago lanceolata*, *Rumex*, *Urtica*, *Taraxacum* and stands of *Juniperus*. The absence of grazing during the last few decades was the main reason for the partial restoration of *Pinus sylvestris* on some terraces.

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