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Gourd des Aillères (Sauvain). Palynological study of the sequence 260-655 cm

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The palynological record obtained for the Late Glacial period and the beginning of the Holocene can be divided in 7 main zones with 5 subzones (Fig. 1).

LPAZ 1 (depth 656-583 cm, from about 15400 cal. BP to 14600 cal BP): Oldest Dryas, steppic herbs and pioneer shrubs; archaeological period: Palaeolithic.

Two subzones:

LPAZ 1a (depth 656-606 cm; about from 15400 to 14900 cal. BP): Herbs are dominating with Poaceae, *Artemisia*, Chenopodiaceae, *Helianthemum*, *Thalictrum*, *Plantago*, various Asteraceae and Cyperaceae. Some shrubs are also growing: *Ephedra*, *Betula nana*, *Juniperus*. *Salix* appears sporadically. *Pinus* is relatively abundant but doesn't exceed 30%. Some water plants and *Botryococcus* indicate a free water surface around which Cyperaceae developed.

LPAZ 1b (depth 606-583 cm; from about 14900 to 14600 cal. BP): *Pinus* and *Artemisia* decrease significantly, while other herbs increase (Poaceae, Asteraceae, *Plantago*), Cyperaceae develop and *Typha/Sparganium* arises.

The occurrence of *Quercus* pollen as well as mesophilous trees, puts forward the question of the origin of this pollen, incompatible with the climatic conditions of this period. Several assumptions can be considered: regional input of pollen coming from lower altitudes; long way transport of pollen from southern countries; or as often observed, reworking of ancient sediments. This latter interpretation is probable, considering the presence of sand inside the clay deposits (cf. macro remains study, A-M. Dendievel)

LPAZ 2 (depth 583-550 cm; from about 14600 to 14100 cal. BP): Bølling, increase of *Juniperus* and *Betula*; archaeological period: Palaeolithic.

The very rapid arrival of *Juniperus* is closely followed by *Betula* and the decline of *Pinus*. As for the herbs, pollen of *Artemisia* and of the other steppic plants is decreasing. The landscape remains open. Marsh and aquatic vegetation expands, including algae (*Pediastrum*). Between 560 and 570 cm (from 14400 to 14300 cal. BP) *Pinus*, *Betula*, *Juniperus* are rapidly decreasing, which indicates possibly the *Intra Bølling Cold Phase* detected at this time in the ice cores of Greenland (Stuiver et al., 1995).

LPAZ 3 (depth 550-532 cm, from about 14100 to 13800 cal. BP): Dryas II (Older Dryas); archaeological period: Palaeolithic/Epipalaeolithic

Juniperus and *Betula* clearly decrease while *Pinus* progression stops. *Artemisia*, Chenopodiaceae and particularly Apiaceae, *Plantago* and the Cyperaceae do increase. Wet prairies do develop close to the lake. All this clearly demonstrate a cooling corresponding to the Older Dryas.

LPAZ 4 (depth 532-467 cm; from about 13800 to 12800 cal. BP): Allerød; archaeological period: Epipalaeolithic. This LPAZ is subdivided in three subzones.

LPAZ 4a, depth 532 to 492 cm, age about 13800 to 13000 cal. BP: *Pinus* develops slowly and coexists with birch and juniper which remain stable up to depth 500 cm. *Artemisia* and other steppic plants decrease, while tall herbs expand (e.g. Apiaceae).

During the following LPAZ 4b and 4c there are no big changes among the herbs. *Pinus* takes the first place but its percentages remain low (often < 30%). *Betula* and *Juniperus* reduce significantly. During LPAZ 4b (depth 492 to 480 cm age about 13000 to 12900 cal. BP) we can observe two peaks in the curve of *Pinus*. One of these peaks could correspond to the Gerzensee oscillation (*Intra Allerød Cold Phase*).

LPAZ 5 (depth **467-347 cm**, from about 12800 to 11800 cal. BP): **Younger Dryas**; archaeological period: Epipaleolithic.

Artemisia values increase slightly, as well as Apiaceae, and *Plantago*. *Pediastrum* values are strongly reduced pointing to changes in the lake (e.g. a reduced surface). All this suggests climatic conditions cooler than during the LPAZ 4, but without a clear impact on the vegetation environment.

LPAZ 6 (depth **347- 290 cm**; from about 11800 to 9960 cal. BP): **Preboreal**; archaeological period: Mesolithic.

This LPAZ is characterized by the clear increase in AP, particularly *Pinus* and *Betula* and by a continuous curve of *Quercus*, *Corylus* and then *Ulmus*. In the same time *Artemisia*, Poaceae and steppic plants decrease while *Rumex* and the Ranunculaceae expanded around the lake; hydrophytes and algae suggest a free water surface.

LPAZ 7 (depth **290-** ...analysis in progress): **Boreal**. This LPAZ is characterized by the classical rapid and strong expansion of *Corylus*, contemporaneous with the collapse of *Pinus* and the establishment of *Quercus* and *Ulmus*. A marsh, occupied by Cyperaceae and other hygrophilous plants, takes the place of the lake.

References

Stuiver M., Grootes P.M., Braziunas T.T., 1995. The GISO2 $\delta^{18}\text{O}$ climate record of the past 16500 years and the role of the sun, ocean and volcanoes. *Quaternary Research*, vol. **44**, 341-354.

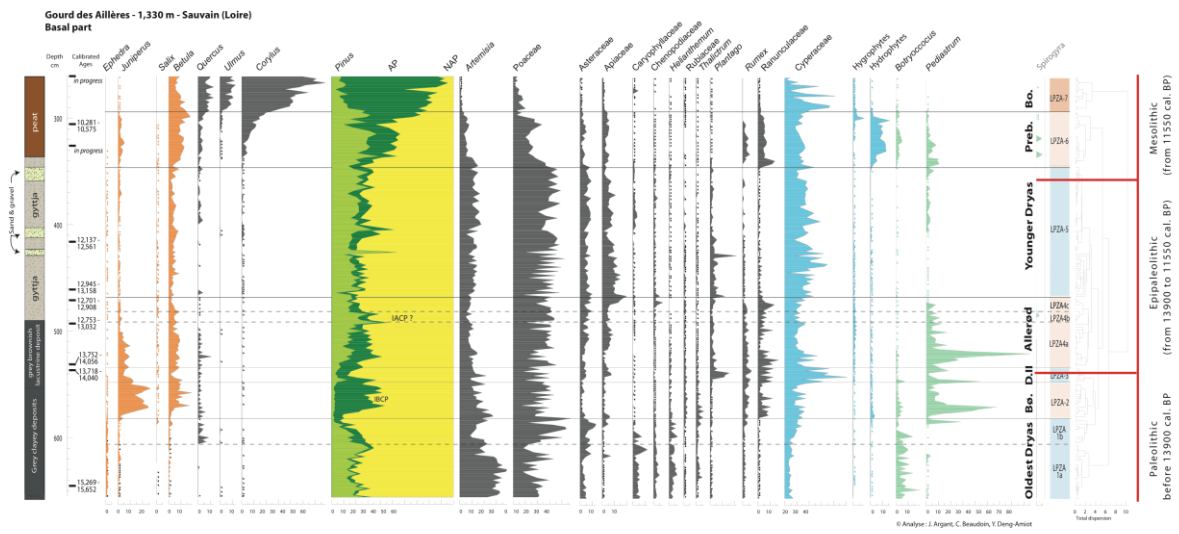


Fig. 1