

PALEOBOTANY, TERRESTRIAL ECOSYSTEMS AND COAL: CASE STUDIES FROM GREENLAND, EUROPE AND ASIA

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A1. Abstract

Paleobotany, terrestrial paleoecology and coal geology represent today complex, highly dynamic research fields well represented in the Earth and Life Sciences around the world. This habilitation thesis approaches these specific fields from three different angles, introduced as case studies: Greenland (Jameson Land), Europe (South Carpathians, Romania) and Asia (Alborz Mountains, Iran). My research activity undertaken between 2000 and 2014 and developed along these specific directions includes field work, historical collections revisions, laboratory work, and it is represented by a series of research articles and books published during the same time interval. I present these results into their historical context, in order to explain the contributions brought in these fields through my postdoctoral research.

Paleobotany research is discussed in terms of systematics, nomenclature, taxonomy and heritage preservation, for Paleozoic and Mesozoic floras. I have addressed Paleozoic Paleobotany of the South Carpathians, for Carboniferous and Permian terrestrial formations of the Getic Nappe (Reșița and Pui basins) and Danubian Units (Sirinia Basin). The Carboniferous plants of the South Carpathians belong to small Variscan molasse basins with intramontane sedimentation (Reșița, Sirinia basins), thus making them highly interesting and significant for plant systematics, stratigraphic correlations, paleoecology and coal genesis. Large foreland basins of the Late Carboniferous occurring in the foreland of the Variscan chain are easier to correlate, while the intramontane basins of the South Carpathians were isolated within the Variscan orogenic belt. The Permian flora of Romania is a drifted flora, sedimented in lacustrine black bituminous shales, especially in the Reșița Basin of the Getic Nappe. These compressive assemblages are dominated by seed-ferns and conifers. The Permian flora of the Reșița Basin shares elements with western European coeval basins such as Autun and Lodeve in France.

Mesozoic Paleobotany of the South Carpathians includes discussions in this thesis related to Early Jurassic (Hettangian – Sinemurian) plants and Late Cretaceous (Maastrichtian) plants from the same tectonic units and basins (sedimentary zones) of the South Carpathians: the Getic Nappe and the Danubian Units. The Romanian Early Jurassic flora of the South Carpathians represents a key flora for the understanding of European and Asian floras in systematic and paleogeographic terms. The most significant Early Jurassic plant locality in Romania is Anina (formerly known as Steierdorf, Caraș-Severin County, Reșița Basin), a Lagerstätte for both diversity and preservation of fossils. Pteridophytes (Sphenopsida, Lycopsida, Filicopsida) and gymnosperms (Pteridospermopsida, Cycadopsida, Ginkgopsida, Coniferopsida) are detailed with taxa lists. Other important Lower Jurassic plant localities occur in the Getic Nappe (Doman) or in the Danubian Units (Cozla, Pregheda, Mehadia, Schela, Crasna, among many others). All localities were surveyed and significant amounts of fossil material were collected. The Maastrichtian flora of the Hațeg and Rusca Montană basins is discussed, with emphasis on the monocotyledonate assemblages with *Sabalites longirhachis*, *Pandanites trinervis* and *P. spinatissimus*.

The Greenlandic Triassic-Jurassic flora of Kap Stewart Group (Jameson Land) is discussed from systematic, paleoecological and stratigraphical points of view. The terrestrial Kap Stewart Group records the floral turnover of the Triassic-Jurassic boundary, marked by the end-Triassic mass extinction. This flora is highly significant in systematic, as well as in phyt stratigraphic and paleoecological terms, therefore updated taxa lists are

essential. The Iranian flora of Alborz Mountains (Iran) is discussed from a systematic point of view.

The paleoecology of fossil plants is detailed in terms of paleophytocoenoses, phytostratigraphy, floral change, paleogeography, as well as plant-insect interactions. Sedimentology of coal bearing formations is approached in several case studies, in order to emphasize the role and significance of correlating sedimentological and paleobotanical high resolution data. Aspects of vertebrate ichnology are discussed as well.

The coal bearing formations yielding Paleozoic and Mesozoic floral assemblages of the South Carpathians are detailed from a sedimentological point of view, addressing also coal genesis mechanisms through geological time. Sedimentological results from Anina are discussed, considering the importance of this key locality from the South Carpathians.