

Field Trip 25th June 2015

Korneuburg Basin, Alpine-Carpathian Foredeep, Bohemian Massif

Guided by Reinhard Roetzel and Stjepan Ćorić (Geological Survey of Austria)

Program

- 08.30 Start at Geological Survey, 1030 Vienna, Neulinggasse 38
- 09.00 **Stop 1:** Stetten - Fossilienwelt; Oyster reef with 15.000 specimen deposited in a shallow water bay during Lower Miocene (Karpatian) in the Korneuburg Basin
- 11.45 **Stop 2:** Zogelsdorf Johannes quarry; Shallow marine Lower Miocene (Eggenburgian-Ottnangian) sediments in the Eggenburg Bay at the westernmost flank of the Molasse Basin
- 13.00 Lunch at a local restaurant in Eggenburg
- 14.30 **Stop 3:** Limberg Hengl quarry; Thaya granite of the crystalline Upper Proterozoic basement and onlap of Lower Miocene (Eggenburgian-Ottnangian) sediments
- 16.30 **Stop 4:** Maissau Amethystwelt; Amethyst dyke in Cadomian Thaya granite
- 18.00 Dinner at a Heurigen in Maissau
- 20.00 Return to Vienna
- 21.00 Arrival at Geological Survey, Vienna

STOP 1: The geotainmentpark “Fossilienwelt Weinviertel”, a crossover between science and entertainment

(MATHIAS HARZHAUSER)

The Korneuburg Basin is located about 20 km NW of the city of Vienna. It is famous for its extraordinary rich fossil record with more than 650 taxa of fossil animals and plants. This enormous dataset allows a relatively detailed reconstruction of the palaeoenvironments and the palaeoclimate. The small basin formed during the latest Early Miocene and is part of the Alpine-Carpathian thrust belt. It originated as a sub-basin of the Vienna Basin during its early piggy-back stage. The coastal mudflats were inhabited by biostromes of the giant oyster *Crassostrea gryphoides*, which formed colonies of several thousands of individuals with shell sizes of up to 80 cm length. One of these biostromes was excavated during 2005–2008 by the Natural History Museum Vienna. In a next step, the construction of a huge geotainmentpark with the oyster-biostrome as central attraction was started. The inauguration of this geotainment park took place in June 2009.

Geological Setting

During the Late Miocene the Alpine-Carpathian thrust belt moved into today's position overthrusting clastic formations of the Molassezone which are underlain by the autochthonous sequence of Upper Cretaceous and Jurassic units. The latest thrust movements are recorded during the Oligocene. With the start of the Karpatian, reactivation of thrusts as strike-slip faults in the Lower Miocene caused a rapidly subsiding pull-apart type basin. The basin margins are formed in its Northern part by the Waschberg Unit and towards the South by the Rhenodanubian Flysch Unit. Consequently, the basement of the Korneuburg Basin is formed by these units.

The asymmetric SSW-NNE-oriented basin is ca. 20 km long and attains a maximum width of 7 km. The basin subsided on its western border along the Schlieberg fault down to 880 m depth. By contrast, the eastern margin of the basin which is also formed by the Flysch Zone lacks faults except for its northernmost part. The considerable increase of sediment thickness towards this Western fault zone witnesses synsedimentary tectonic activity during the Karpatian.



Paleogeographic reconstruction of the Korneuburg Basin during the Karpatian.

Sedimentary history and facies development

In the Korneuburg Basin the main phase of deposition started in Karpatian times. The majority of the Karpatian basin fill is comprised as the Korneuburg Formation. This depositional sequence is represented mainly by grey to yellow marly silt and fine to medium sand. Rarely gravel and boulder may occur close to the Flysch Zone. A second lithological unit is formed by clayey marls with intercalated diatomites ("Diatomeenschiefer mit Fischresten") which crop out in the Northern part of the basin in the vicinity of Großrußbach.

The Karpatian deposits of the Korneuburg Basin are dated into the latest Early Miocene. The correlation of the mammal fauna with paleomagnetic data allowed a dating into the mammal zone MN 5 spanning a time of about 16.5-16.7 my. Magnetostratigraphic and palaeomagnetic data suggest a counter-clockwise rotation of the basin of 20 degrees since the Karpatian. Additionally, a rather southern position of the Korneuburg Basin 16 my ago in 34 degrees palaeolatitude can be deduced.



The oyster reef in Stetten.

During the Karpatian, the basin was nearly cut off from the open Paratethys Sea. In the neighbouring Vienna Basin limnic/fluvial environments of a meandering river system were established. The distinct fluvial input along the Eastern margin of the Korneuburg Basin in the area of the Obergänserndorf - Mollmannsdorf swell suggests that the influence of the meandering river system of the Vienna Basin reached the Korneuburg Basin. This situation is

also reflected in the internal facies patterns. Thus the small, elongated basin was divided into a southern, estuarine part and a northern, predominately marine part. In the latter, shallow marine settings of 20-30 m water depth formed where corals scattered dwelled the silty to sandy bottom. The southern basin, separated from the marine northern basin by the Obergänserndorf - Mollmannsdorf swell, is characterised by estuarine settings. A broad array of coastal-terrestrial habitats became established, ranging from patches of an impoverished *Avicennia* mangrove via Taxodiaceae swamps to riparian forests. Tidal mudflats with extended *Crassostrea* bioherms developed along large parts of the coasts. Small-scale fluctuations of the relative sea-level caused repeated marine floodings in the Southern basin.

A subtropical climate with a minimum value of the mean annual temperature (MAT) of 17° C based on the requirements of crocodiles and cordylid lizards was proposed by Böhme (2002). The winter months were frost free; the minimal cold month temperature (CMT) ranged from at least 3° C to about 8° C.

The Geotainmentpark “Fossilienwelt Weinviertel” (Stetten)

This 5 million Euro project required intense negotiations and co-operations with the federal state “Lower Austria”, the municipal area “10-vor-Wien”, the town Stetten and several private enterprises. The concept was to communicate the scientific results in a modern way by implementing multi-media installations and to avoid classical “museum-approaches”. Visitors



are introduced to the “deep time” of earth history, realising that even the 16.5 million years old fossils are rather young from the view point of a geologist. A huge, roofed cross section through the tilted sediments visualises the rapid shifts of ecological conditions expressed by changes in sedimentology. The mascot, a 12-metre-high *Turritella*-gastropod (left), turns out as watchtower, which offers a view into the Vienna Basin. Finally, the gigantic oyster-biostrome is the highlight of the tour, which ends in a showroom with some of the most spectacular fossils, such as the largest fossil pearl ever found.

Turritella watchtower at the “Fossilienwelt Weinviertel”.