The Late Palaeozoic continental deposits of the Souss basin (High Atlas, Morocco): Palaeoentomology, Palaeobotany, Ichnology, Palaeoecology and Biostratigraphy

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This project focuses on the evolution of fossil arthropod and plant assemblages and their environmental context in Late Palaeozoic continental deposits of Morocco, in particular during the Late Carboniferous (Kasimovian) and the Permian.

The main objective of the research project is the detailed documentation of lithofacies pattern in combination with the analysis and interpretation of fossil insect assemblages in particular, and associated faunas and floras. The expected results of this combination of sedimentological and palaeontological research will contribute significantly to the understanding of the evolution of fossil ecosystems over a large part of the history of life on earth, including the beginning of the accelerated diversification of arthropods and tetrapods. In addition, the results of this study will provide independent biostratigraphic tools for the analysis of sedimentary basins and in the exploration of natural resources.

During the past five years the project has focused on field and laboratory work, in particular the profile documentation of the fluvial-lacustrine deposits of the Late Pennsylvanian (Early Stephanian) Souss basin and the processing of the collected samples (especially insects), at the laboratory and their taxonomical study. In addition, the analysis and writing up of results and their publication have been a priority during the first two years of the project. Field work was conducted in March and April of the years 2012, 2013, 2014, 2015 and 2017, field season along El Menizla road cut at the Ida Ou Zal sub-basin and Oued Issene sub-basin canyon at the Ida Ou Ziki fossil localities in the Souss basin, Southwestern High Atlas Mountains. This work has been in collaboration with Prof. J.W Schneider form the Technical University, Freiberg. The Moroccan working team and Prof. JW Schneider & Diplo-geol Frank Scholze have documented the whole sedimentological profile with a resolution of some metres. This allows a first reconstruction of the depositional conditions but there are still questions concerning litho- and biofacies, taphonomy and environment of the siliciclastic deposits.
Profil documentation at the CDUE 75-AGV locality along the mountain road to Agadir Ou Anzizen Village, JW. Schneider & A. Belahmira

Preparation for the cast of the conifers fornds surface of (conifer pond) locality at the CDUE TaII locality along Oued Issene, near the Tanamert Village, Photo Prof. H. Saber, A. Belahmira & F. Scholze
Results

The sample collected during the 2015 and 2017 field season at insects locality CDUE 80-TaV increased the sample size collected from the Souss by about 40% and now totals more than 400 insect specimens. Approximately 70% are blattoids, 30% are non-blattoids. Fossil insect diversity at CDUE TaV locality is as high as or higher than that known for all of the localities known from the Souss basin. CDUE Tav locality is the first known Late Carboniferous (Stephanian) lagerstätte site in the Souss and provides a unique glimpse into the insect community which inhabited the Souss basin near the end of deposition of the Oued Issene Formation. Individual species sample sizes are approaching the level where biostatistical and taphonomical analyses may be run with confidence in their results.

![Images of the outcrop exposure, insect bed, and preserved specimens.](image)

The research opportunity provided by the grant has been invaluable. I have benefitted from this research in multiple ways. I have learned many new paleontological and sedimentological field and laboratory techniques which are not taught in typical university courses. I have also learned to think as researcher and not just classroom student. Project progress has brought our working team closer to the point where further detailed manuscripts on the Souss entomofauna will be produced.