

## TM R. T. BECKER and the MÜNSTER GROUP

Early in 2011 the German Research Foundation finally approved a new joint three-year research project on “Eovariscan evolution of the southern and northern Prototethys: high-resolution stratigraphy, facies developments, biogeography, and geodynamic interpretation”. It mainly deals with the precise dating of Eifelian to Tournaisian facies changes in the Moroccan Meseteta and in the Rhenish Massif, in order to compare the trends of sea-level changes, subsidence, Eovariscan uplift, and faunas at the northern margin of Gondwana and southern margin of Laurussia. There is some focus on the regionally different reef developments, reworking events (synsedimentary conglomerates), and on the boundary between stable and Variscan deformed Gondwana, just South of the High Atlas. Our main Moroccan counterparts are Ahmed EL HASSANI, Fouad EL KAMEL, El Mostafa BENFRIKA, and Mohammed RAJI. The first field season took place in late October and early November and concentrated on the Rabat-Tiflet and Oued Cherrat Zones, the Coastal Block, and the Ben Ahmed and Oulmes regions. It is planned to hold a workshop in Münster early in July, with informal presentations by all involved, including the many research students, and a field trip along the northern margin of the Rhenish Massif.



Fig. 1. The Kacak Event (shale depression, with hidden Thomas for scale) at Ottara-East (central Tafilalt), also showing the wide local Frasnian depression in the background.

Previously, in spring 2011, another Morocco trip continued the work in the Tafilalt and Maider regions. Complete traverses through the Devonian were sampled in conjunction with the current revised mapping of the southern Tafilalt. This was done in cooperation with Abdelilah FEKKAK, Lahcem BAIDDER and Ahmed. The most complete successions are exposed at the transition from the Tafilalt Platform to the Tafilalt Basin, for example at Hassi Nebech and El Khraouia (Fig. 1), in the NE corner of the Amessouï Syncline. New stratigraphical charts are in preparation for the 2013 field symposium, where only sections that have

never been shown to SDS will be presented. In spring we also completed our sampling for the Lower/Middle Frasnian event stratigraphy of the region, for the conodont dating of the Chotec Event, for the D/C Boundary at Lalla Mimouna, and for the Lower Emsian (e.g., at Jebel Ihrs). As a big surprise, the *Sandbergeroceras* Bed of Seheb-el-Rhassal produced the first large-eyed Middle Frasnian phacopids. The sparse material will be of highest value for our understanding of phacopid evolution in the big record gap between the Frasnes Event and Famennian recovery.

Data from previous trips enabled the finalization of long manuscripts on the famous pharciceratid faunas of Hassi Nebech (BOCKWINKEL et al. in prep.) and on the Lower Carboniferous trilobites of the Anti-Atlas (HAHN et al. in press). The Givetian work shall be continued with Jürgen BOCKWINKEL, probably with the pharciceratids from the northern Maider as the next step. Material from Tafilalt Platform sections and from the old iron mines of Germany (Fig. 2) includes a range of new species.



Fig. 2. The very evolute *Lunupharciceras* n. sp. from the Upper Givetian red iron limestone of the southern Rhenish Massif (Museum für Naturkunde, Berlin, MB.C.3610).

Other current ammonoid studies deal with the Tournaisian faunas of the Tafilalt and Moroccan Meseta and with two new interesting small faunas from the Emsian of Central Victoria (BECKER & EARL in prep.). The description and interpretation of the goniatites from the Middle/Upper Devonian transition of the Rudny Altai (BECKER & BAKHAREV in prep.) will be submitted to the planned “Palaeodiversity and Palaeoenvironments” issue. Alyosha KIM provided some wonderful new goniatites from the Lower Emsian of the Kitab Reserve that shall be part of the planned full description of new findings from the region, perhaps jointly with Kenneth DE BAETS. There are also a few additional goniatites from Bolivia retrieved by Ian TROTH. The first Devonian ammonoids from the *Annulata* Black Shale of Bulgaria will be published jointly with Iliana BONCHEVA and Valerie SACHANSKI. MA Xue-Ping

sent pictures of new and important ammonoid finding from the Junggar Basin of NW China.

Several research students (see below) work on reefal sections, boreholes, or on well-known cephalopod limestone outcrops of the Rhenish Massif. They are jointly supervised with Sven and Sarah, especially when it comes to conodonts and microfacies. High-resolution re-sampling at Martenberg tries to follow the fate/justification of the *jamieae* Zone in its type-section.

The Devonian chapter for the forthcoming second, much more voluminous edition of the Phanerozoic Time Scale was finally completed in autumn 2011. I agreed to write also a Devonian chapter for the planned Encyclopedia of Stratigraphy. After a long delay, the joint publication on the D/C Boundary in the Tafilelt and Maider (KAISER et al. 2011) finally appeared. It was long written before we discovered (independently from S. FRÖHLICH, D. KORN and colleagues) the interesting section Lalla Mimouna North, which is covered in this issue by a preliminary report.

#### Sven HARTNFELS

successfully completed the edition of his very voluminous monograph on the *Annulata* and Dasberg events/crisis for our Münster journal, which is run by a student society (see Devonian Publications section). He is continuing together with H. TRAGELEHN work on a similarly extensive documentation of the Famennian conodont faunas of Franconia. A joint manuscript on the age of the widely quarried *Gonioclymenia* Limestone of the Tafilelt is close to completion. Overlying beds, that were often not kept separate, produced more pre-Hangenberg “siphonodelloids” that are of highest importance for the understanding of siphonodelloid taxonomy and evolution across the Devonian-Carboniferous boundary. In early autumn Sven started to sample various Famennian sections of southern France and the Spanish Pyrenees that may be useful for a cyclostratigraphic evaluation of conodont zone durations.

#### Z. Sarah ABOUSSALAM

runs independently the conodont, microfacies and carbon isotope part of the new joint DFG project. First results proved that many of the Meseta samples are productive. This will allow a precise dating of regional reef growth and of sudden Eovariscan erosional and re-working events of specific structural blocks. A large number of samples was additionally processed for the mapping project of the southern Tafilelt. They resulted in new regional records of taxa and the discovery of restricted Lochkovian and Pragian faunas. A set of conodont and microfacies plates has been prepared for the explanation volumes that will be published together with the maps. One of the basinal Frasnian-Famennian boundary sections, with very calm deposition, yielded surprisingly a last

*Ancyrodella* from the basal Famennian bed. This resembles the (so far unpublished) situation at section Mont Peyroux SE-b of the Montagne Noire, where several ancyrodellids from the basal *Pa. triangularis* Zone have been regarded as potentially reworked although no reworked polygnathids or palmatolepids could be spotted.



Fig. 3. Polymict Eovariscan (upper Famennian?) conglomerate at Oued Tiflet, East of Rabat.

Samples from the Rhenish Massif allow partly a precise dating of reef drowning and transgression in the Wülfrath, Wuppertal, Hagen and Hönne Valley regions. The revision of the Giebringhausen section has been completed and a long manuscript is in preparation. The detailed re-sampling of the Blauer Bruch allowed a precise recognition of the levels of the Taghanic and Frasnes Events. As at Giebringhausen, there are new and rare species both in the Upper Givetian and basal Frasnian.

#### Ph. D. Students

Stephan EICHHOLTZ successfully completed his M.Sc. on the unexpectedly complex taxonomy and phylogeny of Upper Frasnian beloceratids from the Canning Basin. In spring he took the Ph.D. position of the DFG project, with the task to compare the Givetian/Frasnian reef palaeoecology of the northern and southern margins of the western Prototethys. He has started with the reefs of the Oued Cherrat Zone and Oulmes region (Moroccan Meseta), as well with a cored well through the lower half of a reef near Wülfrath.

Stephan HELLING produced a voluminous M.Sc. thesis on various rare trilobites from the Lower and Middle Devonian of the Anti-Atlas. His work should lead to several publications on new proetids (*Gerasostes*) and phacopids. For his Ph.D. he will concentrate on the latter, with the aim to follow with greatest time precision the impact of climatic trends and events on phacopid diversity at the margins of Gondwana and Laurussia. Currently tests are done to evaluate the potential of phacopid calcite to preserve original sea-water isotope chemistry. There are already several new phacopid taxa from the Emsian, Givetian, and Frasnian of the

Tafilalt and from the Eifelian and Frasnian of the Kuznetsk Basin that wait for taxonomic treatment.



Fig. 4. Stephan and Sören sample well-bedded shallow-water limestones below the Givetian biostrome (background) at Douar Zerahna/Oued Targa (Oulad Abbou area, Coastal Block, Morocco).

### M.Sc. Students

A group of master students will take part in a southern Morocco field trip this March/April. Tobias FISCHER will sample Uppermost Famennian ammonoids for a taxonomic and palaeobiogeographic comparison with Germany (Rhenish Massif, Franconia), based on detailed ontogenetic morphometry. Marie-Kristin RYTINA will study the polymict Viséan conglomerates and olistolites near Tinerhir which are composed of Ordovician quarzites and Devonian limestones. The analysis of microfacies and conodont faunas shall allow to reconstruct the depositional history of the later completely eroded Devonian at the northernmost margin of stable Gondwana. Dustin WARD will produce an Arc-GIS correlation of Tafilalt and Maider sections but will also study the northernmost autochthonous Devonian outcrops N of Tinjdad. To complete the regional modeling, Sören STICHLING will concentrate on the shallow-water to biostromal Middle Devonian at the northern margin of the Maider.

Hendrik NOVAK just finished his survey of the upper part of the Wülfraeth reef and the reef extinction, based on a cored well and on a large active quarry. The supposed regional Iberg facies in the upper part of the complex is rather an open, shallow platform facies, with many microbialites and conodont faunas. The F-F boundary falls in an unconformity, with many Frasnian conodonts occurring in a mixed late Lower Famennian fauna. His thesis was part of the very fruitful cooperation with geologists of the Rheinkalk GmbH.

### B.SC. Students

Felix TEMMERSFELD completed his conodont and microfacies study of the famous Ballberg section near Hövel (Sauerland). Conodonts suggest that the locally exposed distinctive black shale is the Upper *Annulata* Shale. There are plans to publish the results jointly, with Sven taking a lead. Klaus

SCHWERMANN studied unusual occurrences of reefal organisms in the deeper-water, shaly Middle Devonian of the eastern Dra Valley (Tata region). He concentrated on the chaetetid sponges, but rare stromatoporoids and colonial Rugosa occur as well. Nikola PUCK is currently mapping the Hofermühle reefal complexes (NW margin of the Rhenish Massif east of the Rhine), where conflicting models were proposed in the past to explain the presence of up to three reefal intervals. Unfortunately, dating with conodonts proved to be difficult.

### References

#### Regular Articles

MYROW, P.M., STRAUSS, J.V., CREVELING, J.R., SICARD, K.R., RIPPERDAN, R., SANDBERG, C.A. & HARTENFELS, S. 2011. A carbon isotopic and sedimentological record of the latest Devonian (Famennian) from the Western U.S. and Germany. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **306**: 147-159.

KAISSER, S.I., BECKER, R.T., STEUBER, T. & ABOUSSALAM, Z.S. 2011. Climate-controlled mass extinctions, facies, and sea-level changes around the Devonian-Carboniferous boundary in the eastern Anti-Atlas (SE Morocco). – *Palaeogeography, Palaeoclimatology, Palaeoecology*, **310**: 340-364.

TRAGELEHN, H. & HARTENFELS, S. 2011. Neue Conodonten-Taxa aus dem höheren Famennium (Oberdevon) des Frankenwalds. – *Münstersche Forschungen zur Geologie und Paläontologie*, **105**: 1-15.

HARTENFELS, S. (2011): Die globalen *Annulata*-Events und die Dasberg-Krise (Famennium, Oberdevon) in Europa und Nord-Afrika – hochauflösende Conodonten-Stratigraphie, Karbonat-Mikrofazies, Paläoökologie und Paläodiversität. – *Münstersche Forschungen zur Geologie und Paläontologie*, **105**: 17-527.

HAHN, G., MÜLLER, P. & BECKER, R.T. 2012 (in press). Unterkarbonische Trilobiten aus dem Anti-Atlas (Marokko). – *Geologica et Palaeontologica*, **44**.

BOCKWINKEL, J., BECKER, R.T. & EBBIGHAUSEN, V. 2012 (in preparation). Upper Givetian ammonoids from Hassi Nebech (Tafilalt Basin, Anti-Atlas, southern Morocco). – Fossil Record.

BECKER, R.T., & GRADSTEIN, F.M. & HAMMER, O. 2012 (in press): The Devonian Period. – In: GRADSTEIN, F.M. & OGG, J.G. (Eds.), *A Geological Time Scale 2012*.

**Abstracts**

PARISH, A., DAY, J., MYERS, R., TAPANILA, L. & BECKER, R.T. 2011 (online). *Comiotoechia* and *Xinshaoella*? (Rhynchonellida-Ladogiidae) from the Middle? and Late Frasnian of the Euramerican tropics (North America) and Germany): First known occurrences outside of the Russian Platform and South China. – *GSA, Northeastern (46<sup>th</sup> Annual) and North-Central (45<sup>th</sup> Annual) Joint Meeting*, 20-22<sup>nd</sup> March, Pittsburgh, Pennsylvania., Abstracts, 1 p.

HELLING, S. & BECKER, R.T. 2011. New trilobite discoveries from Lower and Middle Devonian strata of southern Morocco. – In: WEUG, A. & LEROSEY-AUBRIL, R. (Eds.), *2<sup>nd</sup> German Trilobite Symposium, Programme & Abstracts*, 10-11.

BECKER, R.T. & BAKHAREV, N.K. 2011. Ammonoids from around the Middle/Upper Devonian boundary of the Rudny Altai (Southern Siberia, Russia). – In: OBUT, O.T. & KIPRIYANOVA, T.P. (Eds.), *Biostratigraphy*,

Paleogeography and Events in Devonian and Lower Carboniferous (SDS / IGCP 596 joint field meeting), Contributions of International Conference in memory of Evgeny A. YOLKIN: 34-36 (Novosibirsk Publishing House SB RAS).

DOJEN, C., ABOUSSALAM, S.Z. & BECKER, R.T. 2011. Lowermost Emsian to lower Givetian ostracods from the Western Dra Valley (Morocco): First palaeoecological and event-stratigraphical data. - Joannea Geologie und Paläontologie, **11**: 53-54 [see also: Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 41-42].

DOJEN, C., ABOUSSALAM, S., & BECKER, R.T. 2011. Auswirkungen der Daleje-, Chotec- und Kacák-Events auf benthische Ostrakoden des westlichen Dra-Tals (SW-Marokko): erste Ergebnisse. - 82. Jahrestagung der Paläontologischen Gesellschaft in Wien, Abstract-Volume, Beiträge zur Paläontologie, **32**: p. 50.

BONCHEVA, I., SACHANSKI, V. & BECKER, R.T. 2011. Sedimentary and faunal evidence for the Late Devonian Kellwasser and *Annulata* events in the Balkan Terrane (Bulgaria). - Berichte des Institutes für Erdwissenschaften, Karl-Franzens-Universität Graz, **16**: 26-27.