

THE EARLY CRETACEOUS AGE OF THE KONRADSCHEIM LIMESTONE (GRESTEIN UNIT, AUSTRIA). PRELIMINARY RESULTS

V. HOECK¹, A. ŚLĄCZKA², M. A. GASIŃSKI² and M. BĄK²

¹ *University of Salzburg, Institute of Geology and Paleontology, Hellbrunnstrasse 34, A-5020 Salzburg, Austria*

² *Jagiellonian University, Institute of Geological Sciences, Oleandry Str. 2a, 30-063 Kraków, Poland*

Abstract: Biostratigraphical investigations of pelitic intercalation within the Konradsheim Limestone (Gresten Units) in the area of the Konradsheim and Pechsgraben imply that that Limestone is of the Late Cretaceous age. The clasts represent mainly the Malm deposits but also clasts with radiolaria limestones of the Early Cretaceous age were found. It can have an important influence on geodynamic evolution of the Gresten unit and its relation to other units.

Key words: Alps, Gresten Unit, Late Cretaceous, Konradsheim Limestones

Geological setting

Gresten unit is a one of units situated in front of the Northern Calcareous Alps (Oberhauser, red., 1980). It is build of several klippen mainly composed of calcareous rocks of the Jurassic and the Early Cretaceous age, and the Variegated marls of the Late Cretaceous and Tertiary age. The most characteristic litofacies are Gresten Beds, with arkose sandstones and shales intercalated by coal in the lower part (Hettangian), and calcareous deposits in the upper part (Simemurian-Toarcian). The Gresten facies in the forland of NCA is known only from the Gresten unit, however similar deposits are developed also within the western part of the Pieniny Klippen Belt and in the Apuseni Mts. The Gresten Beds are also known from the basement of the Molasse Zone in the eastern part of the Lower Austria (Janoshek & Matura, 1980).

The Gresten Beds are covered by the Aalenian spotted marls, Posidonia Marls (Bajocian- Callovian) and radiolarites (Oxfordian). The Malmian and Neocomian are represented mainly by siliceous Aptychus limestones and spotted marls similar to deposits from NCA. In the vicinity of village Konradsheim and in Pechsgraben area to the Malmian sediments Konradsheim Limestones were also included. The

Konradsheim limestones are developed usually as thick and very thick self - and matrix supported conglomerates and sedimentary breccia, often displaying gradation. The clasts are represented generally by fragments of limestones up to tens of centimetres in diameters In the Konradsheim area the Konradsheim limestones form a complex of massive conglomerates with thin intercalation of limestone and greenish marls. In Pechsgraben area the name of the Konradsheim Limestones is used to intercalation of turbiditic, calcareous conglomerates within the Malmian sequence. They are intercalated or by greenish marly limestones and marls of thickness up to dozen of centimetres (Scheibbsbach Beds) or by Arzbergkalk Beds (micritic limestones with *Saccocoma* and *Aptychus*, variegated marly limestones, and variegated knollenlimestones) (Widder, 1988, Schnabel, 1970).

The age of the Konradsheim Limestones in the Konradsheim area were established on Malmian (Trauth, 1948) on basis of macrofauna and in Pechsgraben area the age was based on occurrence in conglomerates the Tithonian *Aptychus* and Ammonites (Widder, 1988). Generally the Malmian age of the Konradsheim Limestones is accepted (Oberhauser, edit. 1980). However during our investigation of the Konradsheim Limestones we sampled marly shales and marls intercalation within those limestones and microfauna of the Late Cretaceous age was found.

Area of investigations

Our researches were carried out in three areas: on the Castle hill in Konradsheim village, in Finkengraben west from Konradsheim and in Pechsgraben area.

Near Konradsheim village several samples were taken from the intercalation of greenish marls between the Konradsheim conglomerates layers exposed on the lower bend of the road to the church.

In Finkengraben samples were taken from light pelitic limestones above red marls in the creek and from limestones near ophiolitic type of rocks on the southern slope of valley.

In the Pechsgraben two exposures were sampled. Several samples were taken from marly limestones and marls intercalated the Konradsheim conglomerate layers, exposed in abandoned quarry. The quarry is situated in the area Hohenberg along the road from Stangl to Kohlgraben. Other samples were taken from the area of Arthofer from the big exposure on bend of the road near Dichlberger, There is complex of conglomeratic Konradsheim Limestones above folded Scheibbsbach

Beds. Samples were taken from conglomerates and marly shales, that intercalate conglomerates.

Results of micropalaeontological analysis

a) Foraminiferids

Standard processing methods (Glauber's salt, multiple heating and freezing) have been applied for analyses of foraminiferal content. Dried residuum was sieved, with a final sieve size of 0.063 mm. Some samples due to their hardness have been analysed only as thin sections. Taxa have been identified by using both stereoscope microscope and SEM. In general, samples contain scarce, badly preserved microfauna. However, samples collected from Konradsheim locality contain relatively abundant and well preserve microfauna.

1) Foraminiferal assemblages identified from the **Konradsheim locality** (bend of the road to the church): sample 3A/2000 are relatively abundant and contain taxa such as: *Ammodiscus* / *Glomospira* sp.sp. (they constitute about 90% of the whole assemblage), *Neoflabellina* sp. (fragments), *Caudammia (Hormosina) ovulum* (Grzybowski), *Caudammia (H) cf. gigantea* (Geroch), *Hormosina* sp., *Dorothia cf. oxycona* Reuss, *Rhabdammina* sp. (pitted), *Lenticulina* sp. taxa. Sample 4A/2000 contains less numerous assemblage than sample 3A. Identified foraminiferids are as follow: *Lenticulina* sp. (smooth-walled, unidentified, large specimens), *Dorothia trochus* (Marsson), *Astacolus* / *Marginulina* sp.sp., *Caudammia (H) ovulum*, *Caudammia (H) cf. gigantea*, *Dentalina* sp., *Arenobulimina* indet., *Pleurostomella cf. reussi*, *Hormosina* sp./ *Nodellum* sp., *Reophax* sp. Sample 1A/2001 and sample 2A/2001: contain assemblage with *Lenticulina*, sp and *Caudammia (Hormosina) gigantea* (Geroch) and scarce macrofauna.- *Inoceramus* prisms and redeposited shallow water elements - corals and Bryozoa. All foraminiferal assemblages in studied samples are dominated by agglutinated taxa. For their biostratigraphical classification, the standard zonation of agglutinated foraminifera after Geroch & Nowak (1984) has been used. Some of taxa are index ones for the Late Cretaceous and occurrence of *C. gigantea* indicates zone *Caudammia gigantea* (Campanian-lowermost Paleocene). However, assemblages do not contain index benthic & planktonic foraminifera that allows to determine more precisely the zones within the Late Cretaceous.

2) **Creek Finkengraben**, sample 5A/2001 white limestones contain *Orbulina* sp., *Globotruncana* sp., *Tritaxia* sp., *Pleurostomella* sp., *Dorothia* sp. Prisms of *Inoceramus* sp., that indicates Late Cretaceous age.

3) **Quarry in Kohlgraben**, Konradsheim Limestones, samples 19A/2000 and 6A/2001 contain foraminifera assemblages with *Ammodiscus* / *Glomospira* sp.sp., *Caudammina (Hormosina) ovulum* (Grzybowski) and also fragments of thick-walled *Inoceramus* sp. The age can be estimated as Late Cretaceous.

4) **Road to Arthof**, Konradsheim Limestones sample 10A; (thin section only) from grey-black micrite matrix, contain only fragments of foraminiferal tests: *Dorothia* sp., *Hedbergella* sp. (Cretaceous planktonic) and rich radiolarian (Spumellaria and Nassellaria) as well as echinoid spines. The age has been estimated as Late Cretaceous.

b) Radiolaria

Radiolarian fauna is very abundant component of grey siliceous limestone pebbles (road to Arthof, Konradsheim Limestones). Radiolarian assemblage has been analysed both in thin section and after extraction of skeletons from rock-sample. Standard preparation methods used included the treatment with diluted HF, and sieving with a 63 µm sieve. Separate specimens are abundant but, in general, poorly preserved with small amount of moderately to well-preserved one. In some cases the relatively intense recrystallisation occurs. However well preserved inner structures of the skeletons are visible in thin sections. The poor preservation does not allow a statistical evaluation of the fauna because assemblage composition and differences reflect preservation rather than primary faunal composition. Nevertheless enough specimens are sufficiently preserved for biostratigraphic analysis. The main component of radiolarian assemblage are spumellarians (about 60% of all specimens) and nassellarians belong to the family Sethocapsidae. Multisegmented forms from the families as Archaeodictyomitridae, Theaperidae, Amphipyndacidae and Parvicingulidae are also present. The co-occurrence of *Pseudoaulophacus* (?) *florealis*, *Triactoma luciae*, *Pseudoeucyrtis* (?) *fuscus*, *Sethocapsa leiostraca*, *Podobursa triacantha* and *Parvicingula mashitaensis* indicate early Valanginian age. The described radiolarian assemblage represents low-latitude Tethyan fauna

Discussion

Biostratigraphical investigations of pelitic intercalations within the Konradsheim Limestones, both in the Konradsheim and Pechgraben areas, explicitly show that those limestones are of the Late Cretaceous age and there are contemporaneous with the Variegated marls (Buntmergelserie) and white pelitic limestones from the Finkengraben. The age of the Konradsheim Limestones, younger than previously accepted is also supported by the occurrence of the radiolarian assemblage of the Early Cretaceous age found within the clasts in conglomerates. The age of rounded clasts is generally older than age of host rocks. The similar coexistence of the Malmian and younger pebbles were described from conglomerates of Gresten Unit near Scheibs (Faupl & Schnabel, 1987). The sedimentary structures of conglomerates from the Konradsheim Limestones show that they can represent deposits of high concentration turbidity currents and debris flows, that infilled submarine channels. Occurrence of Konradsheim limestones also as blocks within marly deposits implies that in some cases they can also represent resedimented bodies - olistholithes. The provenience of material is open for discussion, however a source area for a part of the radiolarian limestones was probably connected with the Tethyan realm.

The Late Cretaceous age of a part of the conglomeratic Konradsheim Limestones creates some geotectonic implications, namely the relation between the Limestones and variegated marls, and history and primary position of the Gresten basin. The present work was partly supported by the Lanckoronski Foundation.

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