Schichten. Sie streichen vom Überschiebungsrand NNE Sulzer westwärts und in einem Bogen südwestwärts bis in die schuttbedeckte Talung nördlich des Dursthofer (bereits Blatt Obergrafendorf) und werden begleitet von Opponitzer Kalken und Rauwacken (u.a. Felsrücken mit Kote 740 aus Kalk, umgeben von Rauwacke). Isoliert auf Reiflinger Kalk liegt ein Vorkommen von Lunzer Schichten im Bereich des Pferdehofes WNW der Kote 584. Im Südteil von Lilienfeld reichen sie vom Blatt Obergrafendorf bis zur Landesberufschule, umgeben von Reiflinger Schichten. Der über den Opponitzer Schichten folgende mächtige Hauptdolomit reicht westlich des Taurer bis zur Blattgrenze. Die Überschiebung der Lunzer Decke verläuft mit Hauptdolomit knapp nördlich des Taurer ebenfalls auf Hauptdolomit der unterlagernden Einheit entlang einer ausgeprägten Senke im Wiesengelände über den „Taurer Sattel“ in den Kohlgraben, wo sie durch einen Rest von Karnium an der Deckenbasis markiert ist. Die Lunzer Decke östlich der Traisen ist in ihrem Stirnbereich durch den Hauptdolomit des Wieserspitz vertreten, der überwiegend nach Süden einfällt und die im Vorjahr beschriebenen zwei Rhaetium-Jura-Neokom-Muldenzonen nördlich und südlich des Habernreithtales trägt. Von beiden Mulden wurde nun ein Ausheben im oberen Hangteil des Wiesenbachtales festgestellt. Im unteren Hangteil liegt der Hauptdolomit über Opponitzer und Lunzer Schichten, die östlich des Wiesenbachtales wieder von Mitteltrias unterlagert werden. Diese bildet dort die Stirne der Lunzer Decke. Entlang der Nordgrenze des Hauptdolomites des Wieserspitz ziehen Felszüge aus Rhaetium, Doggerkalk, Tithon und Neokom von der Nordseite des Wieserspitz bis ins Tal bei der Kote 396. Das eine markante Geländefurche bildende Neokom und hangende Mergel und Siltsteine, mikrofaunistisch als Aptium/Albium belegt (östlich des Wiesenbaches erscheinen auch Sandsteine der Losenstein-Formation), sind wohl schon ein Anzeichen für Frankenfelser Decke. Die Felszüge nördlich des Dolomites aus Rhaetium und Jura werden wegen des Auftretens von Spuren von Hierlatzkalk als umgelegte Stirnelemente der Lunzer Decke gedeutet.

Die Lunzer Decke westlich der Traisen unterscheidet sich von der östlich der Traisen dadurch, dass westlich der Traisen nördlich von Lilienfeld an den Rahmen des Traisener Halbfensters tiefere Mitteltrias heranreicht, während östlich der Traisen erst Hauptdolomit bis Neokom vorliegt, es muss also ein kräftiges Abtauchen der Deckenachse der Lunzer Decke über dem Traisental stattgefunden haben.

Blatt 57 Neulengbach

Bericht 2007 über geologische Aufnahmen im Gebiet Klamm–Innerfurth–Forsthof–Schöpfl auf Blatt 57 Neulengbach

ANDRZEJ ŚLĄCZKA

(Auswärtiger Mitarbeiter)

Surveyed area is situated in the western part of the Wienerwald Flysch in Laaben – Brand region north from Schöpfl Mountain. The area is hilly, covered mainly by farms and forests with thick quaternary deposits and older substratum only locally is visible. Therefore majority of geological boundaries between the exposured areas are approximative. The exposures are mainly situated along creeks and Laaben River.

The mapped area belongs to Greifenstein nappe in the northern/central part and to Laab nappe in the southernmost part (compare SCHNABEL, Sammlung Geologischer Führer 59 – Der Wienerwald, 1993; SCHNABEL, Geologie der Österreichischen Bundesländer, Geologische Karte Niederösterreich 1:200.000, 2002). Between them a narrow Hauptklippen zone is located (KÜPPER, Verh. Geol. B.-A., 1962; GOTTSCHLING, Mitt. Geol. Ges, Wien, 58, 1966; PREY, The Flysch Zone near Vienna. – Neogene Basins and sedimentary Units of the Eastern Alps near Vienna. Guide to Excursion 33C, 1968; SCHNABEL, 1993).

During field work dozens of samples were collected to establish age and heavy mineral contents: 41 samples for calcareous nannoplankton, which were kindly identified by Dr. Hans Egger (next several dozens are still waiting); 16 for foraminifera, which were identified by Dr. Holger Gebhardt; 15 for heavy minerals, which were identified by Dr. Wolfgang Schnabel; and additionally 10 samples for thinsections.

It ought to be stressed that without data obtained from mentioned above scientists the map could not be done correctly.

Lithostratigraphy

Greifenstein nappe

Within the Greifenstein nappe following lithostratigraphic units were distinguished:

Zementmergel Beds (Late Santonian–Campanian), Tramsition Zone (Campanian–Maastrichtian), Altlengbach Formation (Maastrichtian–Paleocene), Greifenstein Formation (Paleocene) and Irenental Formation (Late Paleocene–Early Eocene).

Zementmergel

They are represented by grey, green, shales and marly shales, white, pelitic, laminated limestones and medium and thin-bedded, fine and medium-grained, laminated, blue-grey, greenish sandstones, sporadic thick-bedded. Complex of homogenous or laminated, light grey or whitish hard marls and marly limestones in banks from few to tenth of centimeters. Often they are sandy. The marls are intercalated by grey, green, sporadically brown shales and marly shales and grey, laminated, fine to medium-grained, thin to medium-bedded, sometimes thick-bedded sandstones. Observed thickness reaches several dozens of meters. On the basis of the nannoplankton, Zementmergel represents the Late Santonian–Early Campanian and Campanian. Zementmergel are exposed only in a few places: south from Audorf, east from Bramhof and near Kogelhof.

Transitional Zone

To this formation, distinguished west from Laaben River, belongs a succession similar to Zementmergel, but where sandstones prevail, as in a higher part of the succession south of Audorf.

Altlengbach Formation

This formation built a greater part of the mapped area and it altemately consists of complexes of thick-bedded sandstones and complexes of medium-thick-bedded sandstones with intercalations of marls and shales.

Lower-mainly thick-bedded sandstones (AS1 acc. to Schnabel, Jb. Geol. B.-A., 135/3, 683–685, 1992) and higher, mainly medium-bedded sandstones with whitish marly limestones and limestone layers (AS2 acc. to SCHNABEL, 1992) with thick sandstones at the top (AS3 acc. to SCHNABEL, 1992) without limestone intercalations. The uppermost part with frequent pelite layers (AS4 acc. to SCHNABEL, 1992) known in other areas and west from the Laaben River was not found on the mapped area.

Towards the south, the amount of sandstones increases and this division is generally unapplicable. Current structures and cross-bedding show that clastic material was supplied from NE and E.

The main part of this formation belongs to the Maastrichtian although the lowermost part can descend locally to Campanian what is suggested by sample and the highermost part acc. to SCHNABEL (1992) and ŚLĄCZKA (Jb. Geol. B.-A., 147/3, 2007) represents the Early Paleocene.

Complex of thick bedded sandstones

It is represented by thick-bedded sandstones with subordinate intercalations of thin to medium-bedded sandstones and shales. In the lowermost part there are sporadic intercalations of whitish, pelitic marly limestones. Bottom current structures imply that clastic material was derived from NE and E.

Generally, two types of thick bedded sandstones can be distinguished.

The most frequent type is represented by strongly calcareous sandstone beds, which split up into thick laminae up to dozens of centimeters thick. The sandstones are generally medium-grained, gradated in the lowermost part. In some cases, sandstone layer pass upwards into whitish marls. This greywacke contains besides sub-angular and angular, poorly sorted grains of quartz and feldspar (orthoclase and plagioclase), mica, glauconite, chlorite and mudstone clast. Typical is the content of garnet, locally in the southernmost part of the Greifenstein Unit, close to contact with the Main Klippen Zone, sandstones can contain similar amount of the zircon and garnet. Locally, trace fossils are visible.

The second type of sandstones is generally thicker, more coarse-grained with better developed gradation. A poorly sorted greywacke consists of angular to sub-rounded grains of quartz and in smaller amount of feldspar and rock particles. Relatively often bottom of beds are uneven with erosional channels, and sometimes beds are amalgamated. Pelitic intercalations are rare.

Within the thick-bedded complex there are intercalations of up to dozens of meters of medium and thin-bedded sandstones with grey and marly shales, sporadically light grey limestones.

Thickness of the sandy level exceeds 400 meters in the Southern part of the Greifenstein Unit.

Complex of sandstones, marls and shales

This succession is visible, badly exposed, in the upper part of creek west from Hofer hamlet.

It is represented by medium and thin-bedded, fine and medium grained calcareous sandstones intercalated by light to dark grey shales and marly shales. Thick-bedded sandstones are subordinate. Sporadically, thin and medium quartzitic sandstones occur. Characteristic for this part of Altlengbach Formation are layers of medium- and thin layers of white, pelitic limestones and marly limestones.

Greifenstein Formation

This formation is represented by complex of thick and very thick-bedded sandstones, often amalgamated. The sandstones are coarse to medium-grained with visible gradation (ABCD cycles of Bouma), frequently they are of fluxoturbidity type.

The more fine grained sandstones consist mainly of moderately rounded quartz, in fewer amounts of glauconite and small mica. Feldspar is rare. More coarse sandstones are moderately to poorly sorted and consist of quartz, rock particles (fine-grained quartzite, mudstone), rare mica and feldspar. Generally, they display small amount of fine-grained matrix. Sporadically, matrix is calcareous and then sandstones became similar to sandstones from the Altlengbach Formation. However, they still contain abundant zircon, typical for the Greifenstein sandstones. The shales and marly shales create sporadic and thin intercalations.

The Greifenstein Formation reaches a thickness of up to 500 meters near Stephof. Probably the Greifenstain sandstones disappear further to the south, similar as west from Laaben River, as they were practically not found near the Eocene deposits south from Laaben. Nannoplankton data from the top of the Greifenstein sandstones, east from Laaben, shows that the Greifenstein Formation represents, on the mapped area, mainly the Paleocene.

Variegated shales complex (Irenental Formation)

It is represented by light and dark grey shales and marls with sporadic red shales intercalations of thin and medium-bedded, quartzitic, greenish quartzitic sandstones. Red shales are locally developed. More coarse sandstones may contain fragments of gneisses, granites and radiolarian marly limestones. Sporadically, there are layers of medium-bedded whitish marls and marly limestones. Visible thickness is up to tens of meters. These sediments contain nannoplankton of the Early Eocene, foraminifera assemblages of the Late Paleocene and of the Paleogene with nummulites sp. The variegated shales occur along the creek from Laaben to Pamet hamlet as a continuous complex above the Greifenstein sandstones. They also appear locally: west from Kramhof in axis of a local syncline (in this place with pelitic rocks a complex of thick bedded sandstones occur); east from Bramhof, and in creek east of Kogelhof, in axis zone of the syncline built of the Altlengbach Formation.

The age and position of these variegated shales, usually directly above the Altlengbach Formation, suggest that they may replace the upper part of the Greifenstein sandstones towards the south and also represent a lower part of the Irenental Formation. However, it cannot be completely excluded, that some of them may appear in tectonic windows.

Laab nappe

The Laab nappe appears on the mapped area only in its southernmost part. It is represented by the Kaumberg Formation and lower part of the Laab Formation (Hois Sub-

formation). In the lowermost part of the Hois Subformation a sequence with intercalations of marly shales and limestones layers was distinguished (Klamm Beds).

Kaumberg Formation

The Kaumberg Formation is exposed in several creeks on the northern slope of Schöpfl Mountain. This formation is represented by green, grey red shales intercalated by thin to medium, fine-grained, laminated calcareous and greenish, greenish sandstones. In the lower part red shales disappear and green shales prevail. Locally, Kaumberg Formation is strongly folded and brecciated. The contact with the higher Laab Formation is generally sharp, only in one profile, near house No. 18, south of Forsthof, it looks that there is a transition between the Kaumberg- and Laab Formations. In this profile, just above the typical Kaumberg Bed, there are greenish-grey shales weekly calcareous with thin (up to 20 cm) laminated sandstones that contain late Paleocene nannoplancton and show some similarities to the higher Klamm Beds. Thickness of Kaumberg Formation can reach 200 m.

In shales of the Kaumberg Formation, there is an assemblage with mainly arenaceous foraminifera, which is of the Maastrichtian age.

Hois Subformation

In the lower part of the Hois Subformation it is possible to distinguish a complex with occurrences of intercalation of hard, whitish or greenish, pelitic limestones with fiicoids, tentatively named **Klamm Beds** (Ślączka, 2007). Generally grey, dark grey-black, greenish shales and marly shales with intercalations of thin and medium-bedded, laminated calcareous sandstones prevail in lower most part of the profile. Upwards, the number of intercalations of quartzitic sandstone, typical for the Hois Subformation, increase and sporadically also thick-bedded sandstones occur. The upper boundary of the Klamm Beds was placed where limestone intercalations disappear, its exactness, however, depends strongly on quality of exposures. A sporadic, single layer of marly limestones can exist also in higher part of the Hois Subformation.

The Klamm Beds represent generally Paleocene on the basis of foraminiferal assemblages although according to nannoplancton data also late Cretaceous age cannot be excluded.

The Klamm Beds can correspond to the lower part of Svodnice Formation from Bile Karpaty Unit, which is regarded as eastern Prolongation of the Laab nappe (Elias et al., Thirty years of Geological cooperation between Austria and Czechoslovakia, 37–46, 1990); Picha et al., AAPG Memoir, 84, 2006). Previous suggestion of similarity to Antoniek Formation (Ślączka, 2007) is dubious, as here is lack of layers of detritic limestones.

The upper part of Hois Subformation, which built up Schöpfl is represented on the mapped part by thick to medium-bedded, coarse to fine grained, graded, quartzitic sandstones (Pl. III, Fig. 4) intercalated by grey to dark grey and green shales. That part, basing on paleontological data from the lower part of this Subformation represents Late Paleocene–Eocene age.

Hauptklippenzone

This zone, situated between the Laab and Greifenstein nappes, is strongly tectonized. Scarcity of exposures and lack of the continuous profiles does not allow presenting a detailed succession and geological structures.

The oldest, probably late Jurassic sediments are represented by red, radiolaritic limestones found as redeposited gravels in the upper part of the small E tributary of the Laaben River, south of Wöllersdorf. The younger, Campanian–Maastrichtian deposits are represented by a block tens of meters long of grey marly limestones, and limestones up to 1 meter thick exposed in higher part of Wöllersdorf creek. Visible thickness is about 20 meters. The limestones contain late Cretaceous foraminifera *Hedbergella*, *Globerinoides* types as well as *Globotruncanita* cf *stuartiform*/.spre 1 iminary determined from thin-sections by Prof. Adam Gasinski. In several places red, green and grey shales with thin-bedded sandstones and red and green marls are visible in few exposures or in soil. Probably they represent the Late Cretaceous and Paleogene. Late Paleocene microfauna were determined as well from red shales as from grey, green shales. Eocene nannoplankton was found in green, grey marly shales and brown mudstones in south tributaries of upper part of Wöllersdorf creek near Islandpferdezentrum, south from Forsthof. The youngest nannoplankton from these beds represents Late Lutetian–Bartonian. Locally, in the Paleogene shales there are single layers of thick-bedded sandy limestones and conglomerates with granitic fragments. They are exposed in creeks SW from Islandpferdezentrum.

Quaternary

Soil

The most abundant quaternary deposits are soil, which covers practically all mapped area except river beds. Usually, it is the highest A-horizon that consists of mineral layers of maximum organic accumulation underlayed by B-horizon represented by weathered material, and C-horizon represented by unconsolidated, weathered parent material. Unfortunately, the last horizon is outcropping only in small areas usually on the top of hills or steep slopes.

Terraces

They are developed along main river beds (Laabenbach and Wöllersdorf), usually they are built up by fluviatile material (blocks, boulders and sand) underlined by parent rocks and covered by soil where broad terraces are developed. The height of terraces is 2–4 meters. Along tributaries of the main rivers terraces are narrow and lower.

Landslides

Landslides occur mainly in the upper part of creeks near their sources area e.g., landslides east from Hochberg, north and south from Kramhof. Smaller landslides developed locally along steep slopes. Usually landslides, especially bigger ones, embrace both soils and underlying rocks. On upper part of northern slope of the Schöpfl mountain there are locally scree covered areas.

Tectonics

The rocks on mapped area are strongly folded. Two nappes, divided by narrow Hauptklippenzone were distinguished (Schnabel, 2002). From the south, it is the Laab nappe, which is overthrusted on Hauptklippenzone and together with it on the Greifenstein nappe.

The latter is internally folded and several folds and thrust folds can be distinguished. Generally, they are a continuation of folds from the area situated west from Laaben Riv-

er. The boundaries between individual folds in areas without outcrops are assumed.

Laab nappe

This nappe is only represented by a frontal part, monoclinally dipping towards the south and built up by the Kaumberg Formation, Klamm Beds (lower Hois Subformation) and upper Hois Subformation. The lowest, Kaumberg Formation, is usually strongly refolded and locally brecciated and contact with the higher Klamm Beds is sharp probably tectonized, only in one place near house No. 18 south of Forsthof, it looks as transition. However, as it was mentioned above, there is a suggestion (SCHNABEL, 1992) that in reality there exist two imbricated tectonic units: proper Laab nappe represented only by the Hois Subformation, with what I tentatively called "Klamm Beds", and more northern unit built up of the Kaumberg Formation. It needs more detailed studies of the contact between the Hois Subformation and the Kaumberg Formation.

Hauptklippenzone

This zone is exposed in several places between Glashütte and Hochberg Kappelle south from Forsthof. Maximum thickness of 200 meters it reaches east from Rabenhof. It is strongly tectonized. The Hauptklippenzone is cutted by several crossfolds of different amplitudes from few meters (visible in the Wöllersdorf creek) to several dozens of meters.

Greifenstein nappe

The Greifenstein nappe is divided into several imbricated folds built up mainly of the Altlengbach Formation.

In the southernmost part, south from Wöllersdorf-Hochberg, there is imbricated fold with local secondary folds, which represent eastern Prolongation of "Stollberg–Kogelhof fold". This fold is mainly represented by broad syncline. Its axial zone filled up by Eocene deposits show complicated structures north from Kogelhof. Along the Eocene sediments there are narrow bend of Santonian–Campanian sediments representing Zementmergel Formation. Their relation to adjacent younger deposits is not clear east from Laaben River, there is lack of the broad Campanian–Maastrichtian core of this fold, which was found in Laaben River. Probably, it can be effect of a cross-fault hidden below quaternary terraces of the Laaben River. On Prolongation of this core a complex of red and green marls and black shales exists, hitherto of unknown age. The "Stollberg–Kogelhof fold" becomes narrow eastward and probably tapper east from Hochberg hamlet.

The "Stollberg–Kogelhof fold" is overthrusted on "Wöllersdorf scale", which continue towards the Forsthof. It is built up only of the Altlengbach Formation.

The next tectonic unit, "Malenthof–Bramhof fold" becomes strongly tectonized towards the east between Bramhof and Kramhof. In this area, which lays in the Prolongation of the strongly refolded zone exposed along Laaben, two secondary scales are developed and oldest Campanian and youngest Ypresian rocks (?Irenental Formation) are exposed. They probably terminate towards east on cross-fault.

"Malenthof–Bramhod fold" is thrusted on eastern Prolongation of the "Brand scale" developed west from Laaben River. This narrow scale dip monoclinal towards the south and is built up generally of the Altlengbach Formation, only west of Kramhof the Ypresian rocks fill a local syncline.

The next "Laaben (Audorf) fold" represents a broad monocline built up of a sequence from Zementmarl up to Irenental Formation. This fold can be internally imbricated what can be suggested by repetition of complexes of sandstones with limestones.

The "Laaben fold" is overthrusted on a scale built up by Altlengbach Formation. It corresponds to more western stronger tectonized zone north from Audorf.

The more northern unit is represented by the late Paleocene shales, marly shales and thin sandstones exposed in Innerfurth. Their tectonic position is not clear on the mapped area. However, taking into account their age, they can represent an upper part of the Greifenstein Formation of the more northern fold.

Faults

The mapped area is cut by several cross-faults of different ranges from local ones dozens of meters long, up to faults, which cut several tectonic units, as in case of faults, which cross Hauptklippenzone and pass into adjacent nappes – Laab and Greifenstein.

The best documented faults are those, which are exposed in creeks running along boundary of formations, as west from Laaben, or along boundary of tectonic units (e.g., north margin of Hauptklippenzone SW from Forsthof). Some of the faults, especially those, which cut the Laab nappe, are pronounced in morphology. However, some faults or their part are or can be discutable. For example a fault, which was put between Pamet hamlet and Forsthof, which is based on general change of morphology between western and eastern limbs and change of geology or faults west from Stephof.

Springs

Several springs with abundant contents of $CaCo_3$ were found. Usually, they are connected to tectonized zones.