GeoSciEd V

September 17th - 21st, 2006
University Bayreuth, Germany

Geology of the northern Franconian Alb - Excursion to museums and outcrops

September 22nd, 2006

Post-Conference Excursion C1

Impressum

Herausgeber
Organisationskomitee der GeoSciEd V
Universität Bayreuth

Satz und Layout
Ralf Schunk - Mediendesign rms, Bamberg

Druck
Universitätsdruckerei Bayreuth
September 2006

Visitors

After the renovation of the museum between 1989 and 1992 the number of visitors could almost be trebled. At present there are between 25.000 and 30.000 visitors a year. In 2001, during the special exhibition "Panzerfisch, Flugsaurier & Co. – ein Streifzug durch die Evolution der Wirbeltiere", more than 34.000 Persons visited the Naturkunde-Museum Bamberg.

Stop 2: Staffelberg nature trail

The Staffelberg nature trail leads a round trip starting from the cemetery in Bad Staffelstein to the top of the Staffelberg and looping back over its northern flank to the starting point (Fig. 1).

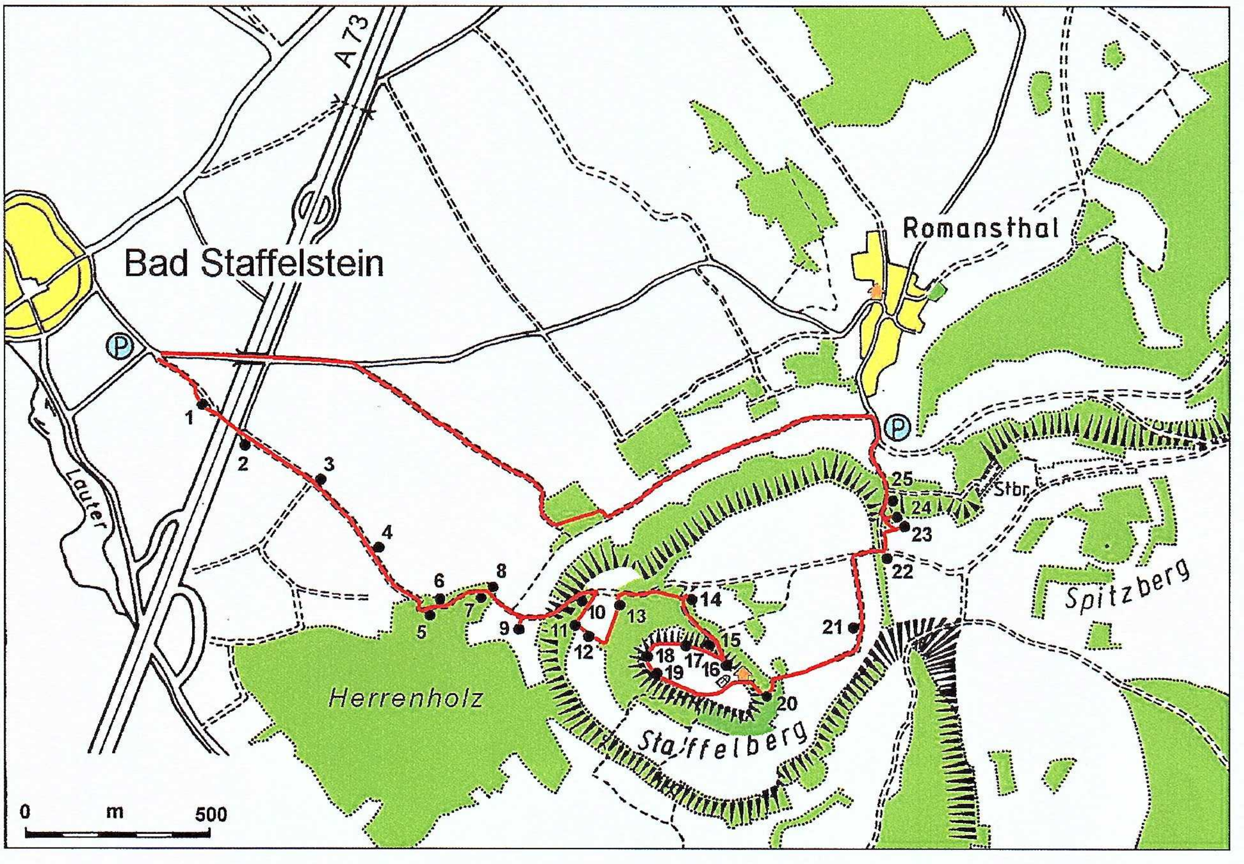

Fig. 1_{Stop2}: Topographical map of the Staffelberg nature trail.
P blue = parking facility; orange house = inn; 1-25 stops along the round trail.

1 Didactical considerations to the Staffelberg nature trail

1. Any self-guided trail should be explained in a clear and simple way by drawings and short texts.

2. Each stop should be equipped by an interpretation sign that is understandable without visiting the whole trail. Thus, a person crossing the trail may become keen to visit the whole trail.

3. The written and drawn explanations should be kept clean and attractive. Old, rotten or unreadable explanations do not attract visitors.

4. The trail marks should guide the way unmistakably. As they are attractive for collectors – as in the case of the Staffelberg nature trail – in case of loss they should be renewed immediately. Colour marks painted directly on posts or trees are better.

5. The Staffelberg nature trail includes three prepared sections in loose rock (2, 4, 6). They have to be cleaned every year best after winter because of frost weathering. It is debatable, whether loose rock sections should be integrated at all. For didactical purposes it seems very essential to do so. Loose rocks form the bulk of the earth's surface. To neglect it does not allow to understand earth and especially landscape in the right way.

6. Stops of the nature trail should only explain features, which are well visible in the landscape and at this place.

7. Content of the nature trail: Contents should cover all features of interest concerning nature and interaction of man and nature.

2 Morphological setting of the Staffelberg nature trail

The Staffelberg is part of the Southern German cuesta landscape (Fig. 2). This landscape is formed from west toward east by the Bunter escarpment, the Muschelkalk escarpment, the Keuper escarpment and finally the Jurassic escarpment (Fig. 3). The Staffelberg is situated on the western rim of the Jurassic escarpment, called the Fränkische Alb (Franconian Alb). The mountain is facing to both the northwestern foreland of the Fränkische Alb and the Main River valley that joins the Jurassic escarpment from Lichtenfels to Bamberg.

At the Staffelberg nature trail the most impressing morphologic feature is the escarpment rim of the Fränkische Alb with a vertical distance of 250 m starting at its foot in Bad Staffelstein at 290 m a.s.l. and rising up to 541 m a.s.l. (Fig. 4).

The Staffelberg is morphologically a mesa, testifying the former continuation of the Upper Jurassic (Kimmeridgium) reef platform that tops both the Staffelberg and its hinterland from which it has been separated by erosion. The preservation of the reef cap of the Staffelberg is due to its position within a tectonic graben, the Staffelberg Graben. Joining the graben towards the north the landscape is capped by Liassic sandstone, towards the south by Oxfordian limestone. Thus, the surface of the graben experienced a relief inversion: The tectonically deepest part became morphologically the highest elevation due to the hard reef cap. The elevation of the Staffelberg of 541 m

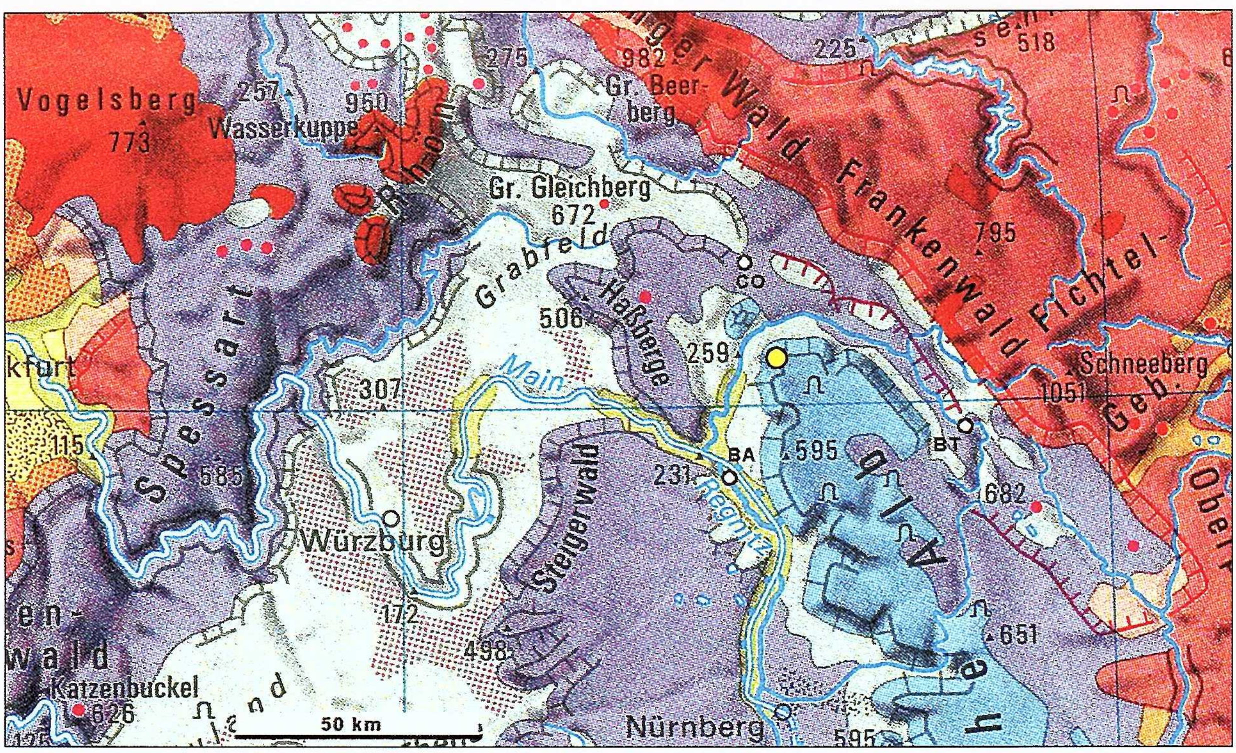

Fig. 2_{Stop2}: Southern German cuesta landscape. Yellow circle = Staffelberg Mountain. BA = Bamberg, BT = Bayreuth, CO = Coburg (from Alexander-Weltatlas 1982: 105, with additions).

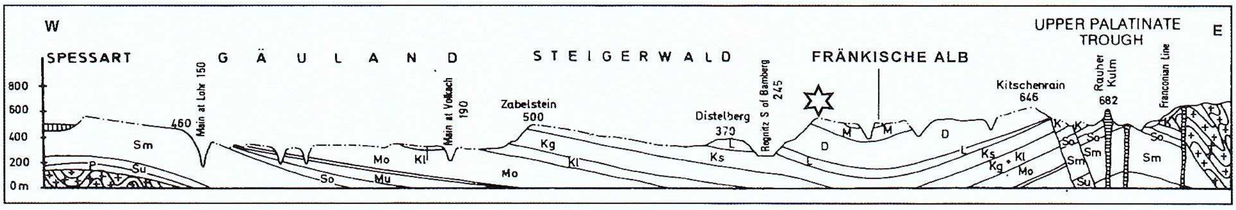

Fig. 3_{Stop2}: West-east cross section through Franconia showing the cuesta landscape (from Büdel 1957).

a. s. l. is flanked beyond the graben rims by 440 m in the north and 509 m in the south.

3 Short earth history of the Jurassic escarpment in the Staffelberg area

The marine and terrestric history of the Staffelberg area starts with shallow sea during the **Dogger epoch**. Clay deposition in its lower part, the Opalinumton (Opalinum Clay with the leading ammonite *Leioceras opalinum*) as well as in its upper part, the Oolithton (Oolite Clay), is interrupted in is middle part by fine-clastic quartz input from the eastern situated Bohemian land, the Eisensandstein ("iron sandstone") (Fig. 5).

During the **Malm epoch** lateral transition between carbonaceous beds und reef deposition points to a progressing marine flattening. It summits during the middle Kimmeridgium by forming a continuous and thick reef platform in this part of the Fränkische Alb (Fig. 6).

During the Tithonium this reef platform merged from the sea and was consequently strongly karstified forming lowland during the Lower **Cretaceous.** During Upper Cretaceous this lowland was covered by sandy terrestric and sandy-clayey thin marine deposits, the latter progressing from the southeast (Fig. 7). During the **Palaeogene** the lowland rose up growing to upland. By uplif-

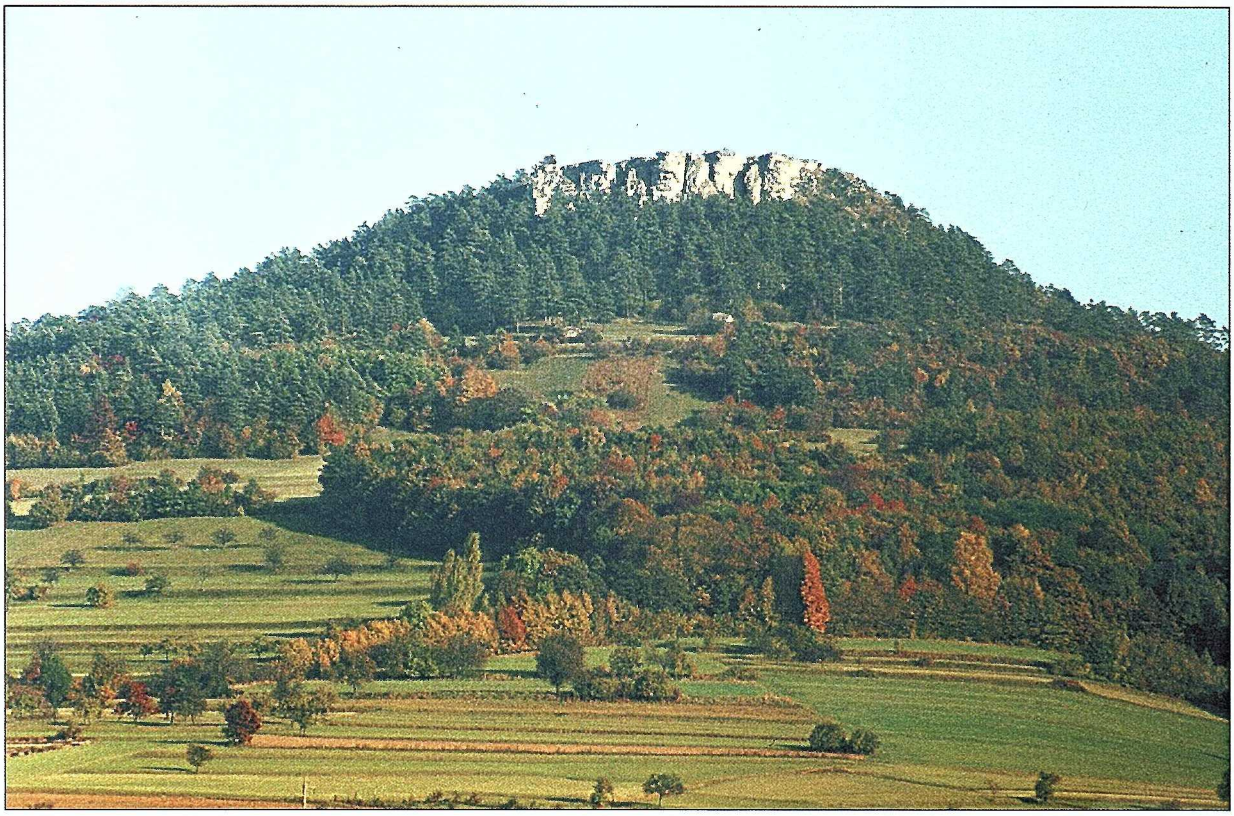

Fig. 4_{Stop2}: Staffelberg Mountain, topped by the reef scarp. W = Werkkalk scarp, E = Eisensandstein scarp.
Foto: Schirmer 14. 10. 1972.

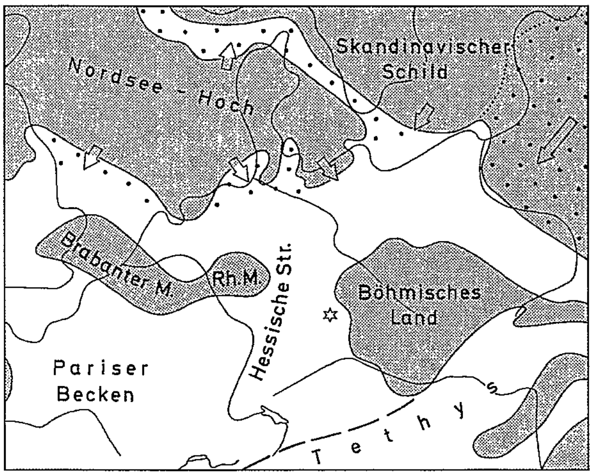

Fig. 5_{Stop2}: Palaeogeographical map of the Dogger epoch. (Meyer & Schmidt-Kaler 1992). Star = Staffelberg location.

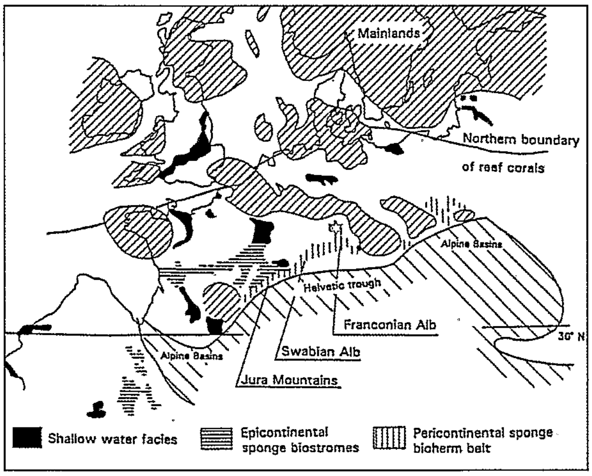

Fig. 6_{Stop2}: Palaeogeographical map of the Malm epoch (Brachert 1992). Star = Staffelberg location.

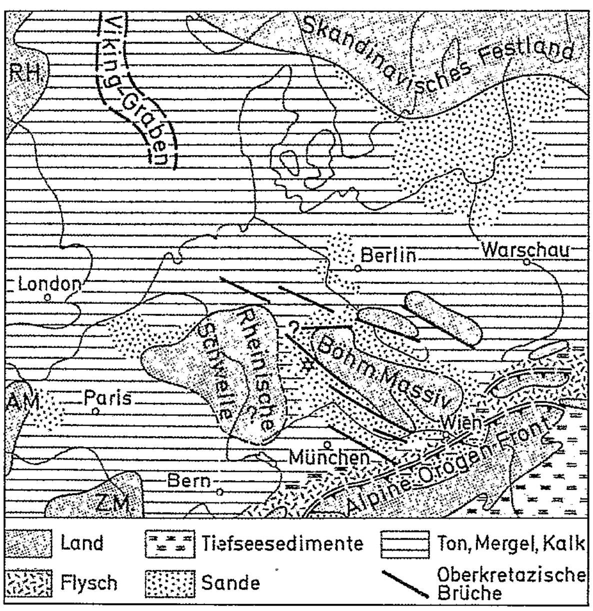

Fig. 7_{Stop2}: Palaeogeographical map of the Upper Cretaceous epoch (Meyer 1996). Star = Staffelberg location.

ting its top was unroofed, the Cretaceous cover was gradually removed. As consequence, the exhumed Lower Cretaceous karst could revive. Since the Upper Cretaceous the Fränkische Alb area was gradually formed to a syncline, in its central part overdeepened by the subsidence of the Staffelstein Graben. The forming of the Fränkische Alb syncline triggered the formation of the escarpment landscape the contours of which are testified at least by **Miocene** (Schröder 1996: 60).

Since late Palaeogene a north-south-orientated river system, the Moenodanuvius River system, is dissecting the Fränkische Alb (Schirmer 1991) including the Staffelberg area (Fig. 8). The river's

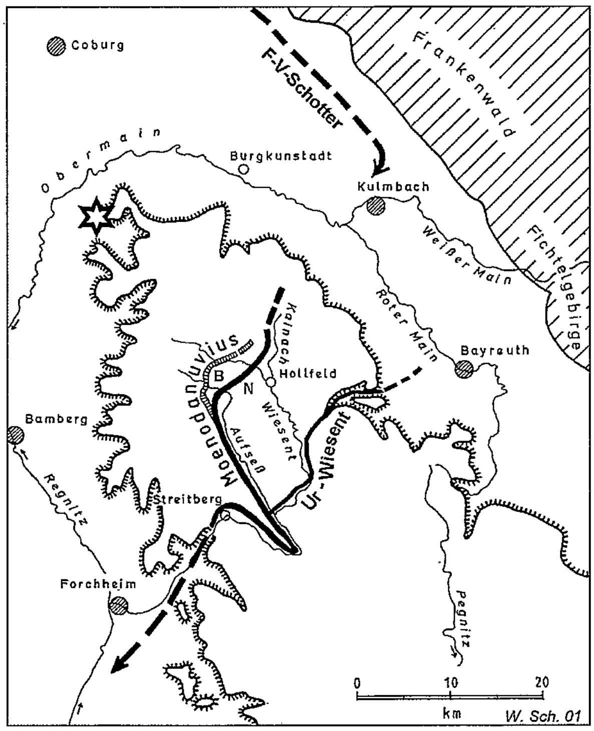

Fig. 8_{Stop2}: Paleo-/Neogene river system of the Moenodanuvius (Schirmer 2002). Star = Staffelberg location.

name points to the fact that this relict river system was running from the recent Main River catchment (Latin: Moenus) to the recent Danube River catchment (Latin: Danuvius). By **Pliocene** the Moenodanuvius could not longer transect the more and more uplifting Fränkische Alb, thus it surrounds it in its north and west hence joining the western escarpment of the Fränkische Alb together with the Staffelberg.

During the Lower **Pleistocene** the Moenodanuvius was captured by the Main River, then sourcing west of Bamberg. Hence the Danubian-orientated Moenodanuvius existed no longer and was transformed to the recent Rhine-orientated Main-Regnitz River system. Continued uplifting of the area caused a deepening of the Main River down to the recent valley base already one billion years ago. The Staffelberg at that time was obviously higher than today. The following strong phase of the ice age should have diminished the mountain by solifluction, soil wash and land sliding. Simultaneously the Main River valley was filled up by a fluvial sedimentary stack up to 40 m high its top levelling the recent Autobahn track at the toe of the Staffelberg. Since then the Main River was dissecting its own old valley fill down to its former base.

During the **Holocene** according to Neolithic finds man visited the Staffelberg prior to the foundation of one of the biggest Celtic settlements in Franconia, which presumably represents the famous *Menosgada* mentioned by the Greek geographer Claudius Ptolemaeus (85-160 AD) from Alexandria.

4 The Staffelberg nature trail

25 stops lead the trail through the loop from the toe to the top and back, 20 to the summit and 5 behind the summit. The stops deal with all striking visible features as morphology, geology, palaeontology, biology, archaeology and history. An interpretation sign marks each stop. Each sign is equipped with the logo of the Staffelberg nature trail (Fig. 9), the topographical map (Fig. 1) and the geological map (Fig. 10) thus giving the possibility to orientate anew at each stop topographically as well as geologically.

Fig. 9_{Stop2}: Logo of the Staffelberg nature trail.

Stop 2/1: Introduction. Overview with maps and a geological cross section

It shows 3 interpretation signs (1a-1c) and 4 rock exhibitions. Sign 1a presents a geological map of the Staffelberg area (Fig. 10), 1c a geological cross section through the Staffelberg (Fig. 11). The 4 rock exhibitions present boulders of the main hard rocks of the mountain – respectively of the Jurassic escarpment of the whole area. These hard rocks form at the surface of the moun-

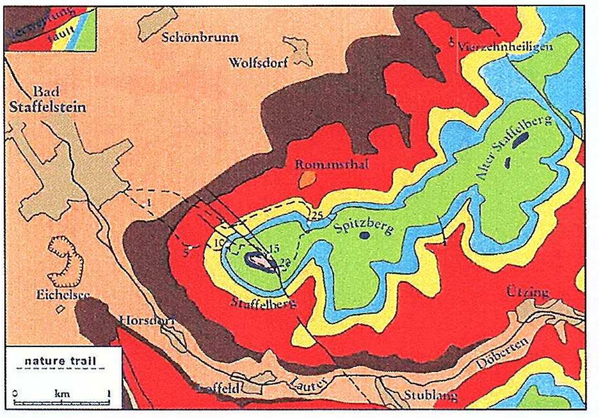

Fig. $10_{Stop2/1}$: Geological map of the Staffelberg area, with nature trail and some of the stops (white dots).

tain steep slopes, scarps, each separated by gentle slopes, which are caused by thick clay or marl strata.

Thus, the Opalinum Clay (clay with the ammonite *Leioceras opalinum*) forms a gentle slope at the toe of the mountain higher up followed by the forested Eisensandstein scarp, the scarp of the "iron sandstone". A next gentle slope is formed by the Oolithton (Oolite Clay) followed by the again forested Werkkalk scarp, the scarp of the "workers' limestone". The next and last gentle slope is formed by the Oberer Mergelkalk (Upper Marl Limestone) followed by the reef scarp with its well visible craggy reef crown that carries the plateau. The rock boulder exhibition shows the Eisensandstein, the Werkkalk and two rock types of the reef rock step: reef limestone and reef dolomite.

Interpretation sign 1b shows the line of the nature trail with its 25 stops:

1 (our place) Introduction with topographical map and geological map and cross section of the Staffelberg Mountain

2 Prepared section with slope deposits

3 Memorial field stele

4 Prepared section with Opalinum Clay and landslide deposits

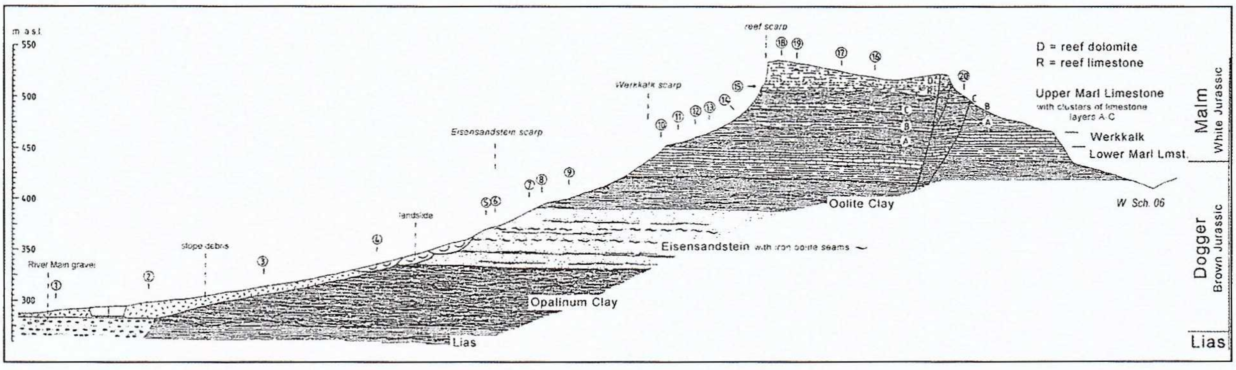

Fig. $11_{Stop2/1}$: Geological cross section of the Staffelberg. ①: stops 1-20 (Schirmer 2000).

5 Forest and trees (with locust tree and horse-chestnut)

6 Root-rock association

7 Sunken road in Eisensandstein

8 Prepared section with the boundary between Eisensandstein and Oolite Clay

9 Escarpment landscape. *View to both scarps the Werkkalk and the reef scarp*

10 Abandoned Werkkalk quarry - Northwest gate of Menosgada.

11 Top of the Werkkalk scarp

12 Field terracing in small-parcelled lots

13 Scheffel monument

14 View to the Jurassic escarpment and to the Jurassic plateau

15 Reef limestone and reef scarp

16 Acropolis Menosgada - introduction

17 Wall reconstruction of Menosgada

18 Staffelberg summit

19 Reef dolomite and the cave "Querkelesloch" ("dwarf cave") with dolomitic arenite

20 Himmelsteich ("pond of heaven") - Celtic cistern

21 Sloe hedge

22 Northeast gate of Menosgada

23 Chalk grassland

24 Old Werkkalk quarry

25 Lower Marl Limestone (Unterer Mergelkalk)

Stop 2/2: Prepared section with slope deposits (Fig. 12)

A Main river terrace is situated with its top at the level of the Autobahn. The cover beds of this terrace consist of slope debris and loess the uppermost parts of which are exposed in section 2 in front of us. The scree (brown Eisensandstein and white Malmian limestone) is a product of downslope soil wash and soil creep. The fine yellow brown loess was inflated under cold climate. Deposit ① belongs to an older glaciation period. Its reddish colour and lack of limestone is due to an inter-

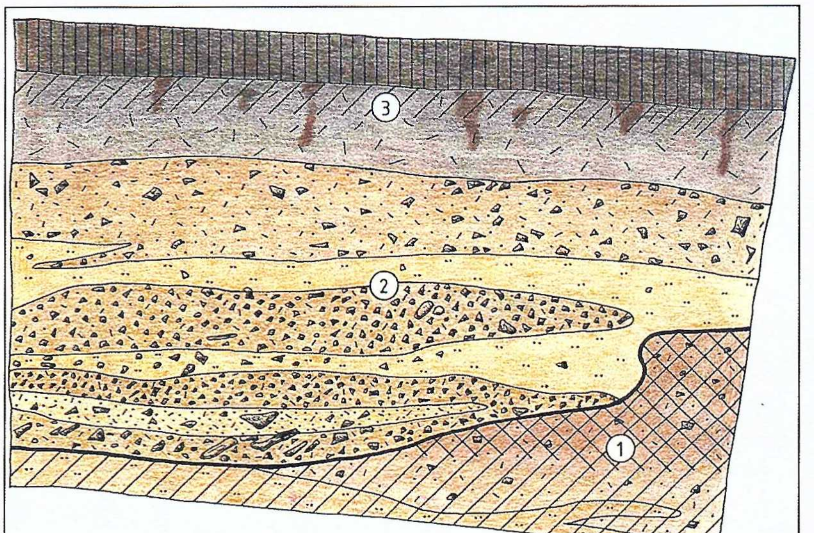

Fig. $12_{Stop\ 2/2}$: Wall drawing. For explanation of the numbered beds see text.

glacial weathering. The yellow calcareous layer ② was deposited during the last ice age (115.000-11.560 y. B. P.). Layer ③ is humus colluvium, humus accumulation by man's tilling activity.

Stop 2/3: Memorial field stele

They remind of an event for which to be thankful for God's help or to honour God. The tendrils of wine indicate former wineyards around the Staffelberg.

Stop 2/4: Prepared section with Opalinum Clay and landslide deposits (Fig. 13)

The section exhibits the following beds:

⑦ humus

⑥ colluvial humus

⑤ unsorted youngest slope scree

④ bedded slope deposits of Eisensandstein and Opalinum Clay

③ similar to ②, but lighter due to lime infiltration from above bedded slope debris: Eisensandstein alternating with Opalinum Clay

① Opalinum Clay (Lower Aalenium), dark blue.

The gentle slope up to now is caused by the soft Opalinum clay ①. Layers ②-⑥ are Quaternary surficial mantle layers. The layers ②-④ are tilted towards the mountain – a result of landsliding.

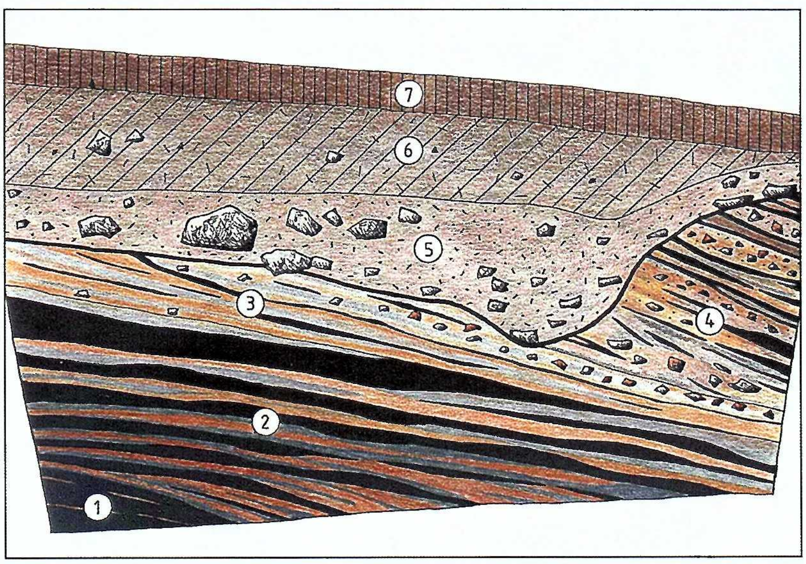

Fig. 13$_{Stop 2/4}$: Wall drawing. For explanation of the numbered beds see text.

75 m uphill there is the toe of the Eisenstandstein scarp. Hereabout cleared landscape changes into forest.

Stop 2/5: Forest and trees (with locust tree and horse-chestnut)

Up to the 18-century forests were extremely exhausted due to expansion of settlements and inhabitants. As consequence planned reforestation was an economic issue. Hence trees from abroad were cultivated, e.g. locust tree *(Robinia pseudoacacia)* from North America or horse-chestnut *(Aesculus hippocastaneus)* from southeastern Europe.

Stop 2/6: Root-rock association

Along the sunken way trees develop vertical roots to get support at the steep sidewalls of the sunken way and in addition develop horizontal roots into the Eisensandstein for their lateral stabilization. Vice versa they protect the Eisensandstein from being eroded.

Stop 2/7: Sunken road in Eisensandstein

For centuries wheel-tracks of carriages cut into the soft and fine-grained arenite, called Eisensandstein (Upper Aalenium), to form eventually these deeply sunken roads. They exist widely within the Eisensandstein scarp. In former times this sandstone was exploited as building stone and ornament stone. An abandoned quarry is some meters uphill in the forest on the right side. The stone imparted its golden brown warm colour to houses, churches (Vierzehnheiligen) and castles (Banz).

The fine quartz arenite was deposited under shallow marine conditions, transported from the eastern situated Bohemian land. Imprints of shells and ammonites in the sandstone give proof of its marine nature. The grains are cemented by clay, limonite and carbonate to form more or less strong sandstone. It alternates with thin marl layers, at certain levels (but not here) also with thin seams of oolitic limonite ore. The ore has been exploited in this area at last until 1940. This iron ore is the reason to impart the name Eisensandstein ("iron sandstone") to this arenite.

Stop 2/8: Prepared section with the boundary between Eisensandstein and Oolite Clay

The section exhibits the following beds:

⑥ humic colluvium

⑤ Pleistocene scree

④ dark lowermost Oolite Clay (Bajocium)

③ Sowerbyi Bed, a loose limonite-oolitic limestone layer

② light sandy clay marl in the lower part, upward dark clay marl in the upper part represent the Discites Beds (lowermost Bajocium)

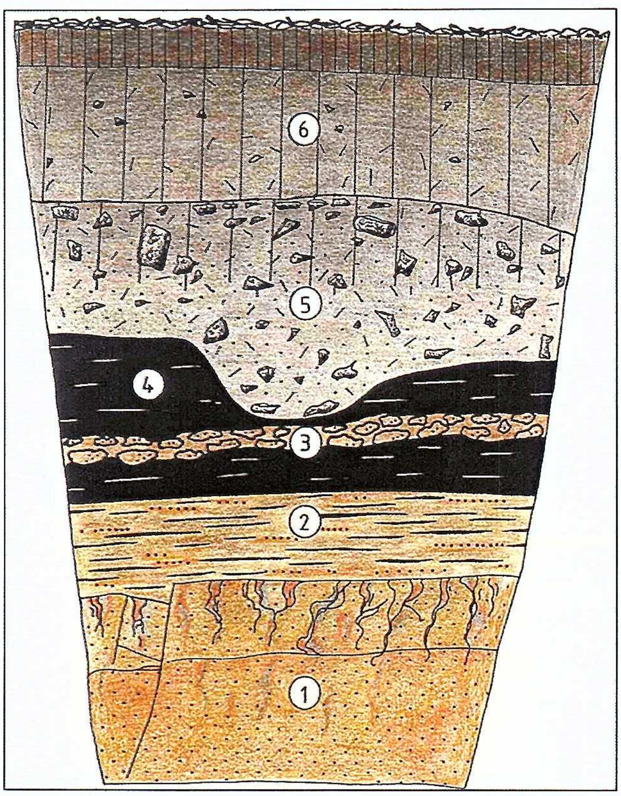

Fig. $14_{Stop\ 2/8}$: Wall drawing. For explanation of the numbered beds see text.

① uppermost Eisensandstein

The vertical change of facies from sand ① through clay ② to limestone ③ refers to a recession of the eastern land or decease of sand supply.

The boundary between sandstone and clay within this outcrop causes the morphologic transition from the Eisensandstein scarp to the gentle slope of the Oolite Clay (Bajocium to Lower Oxfordium).

Stop 2/9: Escarpment landscape

Stop 9 is situated within the gentle slope of the Oolite Clay that forms a meadow strip around the Staffelberg. This clay is famous for its pyritous ammonites that look golden, the so-called "golden ammonites". Through the last century there was intermittent digging activity for these fossils that became famous in the whole world.

Well visible from here is the next scarp, the Werkkalk scarp. Steep and stony it is mostly wooded. Lithostratigraphically it contains the Lower Marl Limestone and the well-bedded limestone of the Werkkalk. The scarp is moulded by the gentle slopes below and above caused by softer rocks, below the Oolite Clay, above the Upper Marl Limestone (Kimmeridgium). The craggy reef scarp crowns the latter.

Stop 2/10: Abandoned Werkkalk quarry – Northwest gate of Menosgada

Stop 10 is situated within the Werkkalk scarp. To the right there is an abandoned and overgrown Werkkalk quarry, better to be studied at stop 24.

In front there is an access to the late-Celtic oppidum Menosgada. The reconstruction shows a passage that starts wide and narrows towards the gate. The lower part of the passage is built of a stonewall, the upper part of a wooden construction. Three of these gates were found along the walls of Menosgada.

Stop 2/11: Top of the Werkkalk scarp

Stop 11 is situated at the upper rim of the Werkkalk scarp and the toe of the gentle slope of the Upper Marl Limestone. The latter constitutes of tiers of alternating marl and more or less marly limestone beds and is widely cleared, used in former times as arable land, recently as grassland.

Stop 2/12: Field terracing in small-parcelled lots

Stop 12 is situated within the gentle slope of the Upper Marl Limestone. It was used until the early 70th of the last century as arable land. The small parcelling of the land is due to the Franconian custom to split the property according to all offsprings. Hedges to prevent soil erosion seam the small terraced lots. The hedges contain sloe *(Prunus spinosa)*, dogwood *(Cornus sanguinea)*, hazle *(Corylus avellana)*, whitethorn *(Crataegus)*, dog rose *(Rosa canina)*, bird cherry *(Sorbus aucuparia)* and spindle-tree *(Euonymus europaeus)*. Also some trees associate as copper beach *(Carpinus betulus)*, maple *(Acer psudo-platanus)*, oak *(Quercus pubescens)* and pear *(Pyrus pyraster)*.

Stop 2/13: Scheffel monument

This monument is dedicated to Victor von Scheffel (1826-1886). This Badenian poet wrote during a two-month's stay at Banz castle in 1859 a famous poem "Wanderfahrt" that hence became a kind of "national" anthem for Franconia.

The big dolomite boulder used for the monument originates in the reef scarp above from where it dropped off (rock fall).

Stop 2/14: View to the Jurassic escarpment and to the Jurassic plateau

All three scarps are visible from here lying side by side, the Eisensandstein scarp, the Werkkalk scarp and the reef scarp, the same scarps that form the Staffelberg in vertical sequence. The reason for that is that the Jurassic sequence is inclined towards southeast. As consequence all scarps crop out nearly at a similar elevation. Moreover this phenomenon shows the pediplain of the Fränkische Alb nearly evenly cutting all the inclined layers regardless of their lithology.

Stop 2/15: Reef limestone and reef scarp

Massive limestone and massive dolomite form the hard-rock cap of the Staffelberg thus representing the uppermost scarp, the reef scarp.

The reef-creating animals are sponges and algae living on the seafloor and growing there in upward direction. Some silica sponges show their cross sections on the wall as white, slightly protruding off-horizontal lines (please do not scratch them).

Stop 2/16: Acropolis Menosgada – introduction

Archaeologic investigations revealed eight periods of settlement on top of the Staffelberg: Three Young Neolithic settlement periods (about 5,000 BC, 3,500 BC, 2,000 BC), a Bronce Age settlement period by 1,300–1,100 BC, three Iron Age settlement periods, Celts (600–480 BC, 480–380 BC, 150–30 BC) and a Germanic settlement by 350–420 AD. The most important town was the late-Celtic oppidum (150-30 BC), probably imparted by the Greek geographer Ptolemaeus as the town of Menosgada.

Stop 2/17: Wall reconstruction of Menosgada

The wall of the late-Celtic settlement during the 1st century BC is still visible as slight stony mound around the rim of the Staffelberg plateau. At stop 17 a short section of the probable wall was reconstructed according to the excavation findings.

Stop 2/18: Staffelberg summit

The summit presents a bright view to northeastern Franconia and southern Thuringia. Striking are the tectonic units running from northwest to southeast: Like a wall the basement rocks fringe the horizon to the north (Thüringer Wald resp. Thuringian Forest), northeast (Frankenwald resp. Franconian Forest) and east (Fichtelgebirge). Their foot line represents the tectonical Franconian Line that has been uplifted over its foreland up to 5 km. Slightly before and parallely to it a track of limestone rips, the Muschelkalk track (Middle Triassic) marks the course of the Kulmbach fault. Back to Lichtenfels extends Upper Triassic sandstone and clay rocks, there cut by the Staffelstein graben in the midst of which the Staffelberg is situated. Beyond the toe of the mountain the wide Main River valley passes from north to south. The opposite rim of the Main River valley shows a good cross section of the Staffelstein graben. This wooded rim is pointed by the scarp of the Posidonienschiefer (*Posidonia* shale) of Toarcian age. From the northern side of the Banz Mountain (Banzer Berg) crowned by the Banz Castle (Schloss Banz) towards south it marks the gentle syncline structure of the beds within the Staffelstein graben. Thus by relief inversion the summits in the graben centre preserve the youngest rocks within the cross section of the graben: these are beyond the Main River valley the Aalenian Eisensandstein (Banzer Berg, Eierberge) and on this side the Middle Kimmeridgian reef rocks of the Staffelberg.

Stop 2/19: Reef dolomite and the cave "Querkelesloch" ("dwarf cave") with dolomitic arenite

Within the cap rock of the Staffelberg reef limestone merges upward into reef dolomite. The dolomite rock feels somewhat sandy, shows a lot of smaller and larger cavities and disintegrates by weathering to glittering dolomitic arenite. Its craggy morphology is a result of water solution, the so-called karstification. The big solution forms like the Querkelesloch (below the wooden railing) refer to a former position of the recent cap rock under groundwater conditions. Of course, at that time the cap rock was part of a continuous reef platform extending to the Fränkische Alb plateau visible towards southeast.

Stop 2/20: Himmelsteich ("pond of heaven") – Celtic cistern

A pond-like form is joining the eastern edge of the Staffelberg roof rock. Its name is Himmelsteich ("pond of heaven"). As recent excavations showed, scree in its interior reveal at least three phases of pond status within this form.

Stop 2/21: Sloe hedge

Sloe *(Prunus spinosa)* is besides dogwood *(Cornus sanguinea)* the most distributed hedge plant around the Staffelberg. In April and Mai it dresses the Staffelberg white with its flowers. After the first frost in autumn its berries taste mild and produce a good marmalade and schnaps or liqueur.

Stop 2/22: Northeast gate of Menosgada

Leaving the lower Staffelberg plateau one has to pass a long and straight dam-like mound. Again, it is the mound of the late-Celtic oppidum Menosgada (150-30 BC) that defended the settlement toward the eastern plateau the only place where natural protection is absent. The recent passage is the very place of the antique gate.

Stop 2/23: Chalk grassland

On top of the well-jointed limestone of the Werkkalk the soil is rather dry and produces vegetation adapted to this dryness, the so-called chalk grassland vegetation.

Stop 2/24: Werkkalk quarry

This old Werkkalk quarry was used for private building stone exploitation. In former times this Werkkalk together with the Eisensandstein was the building stone used most.

The resistant beds of the well-bedded limestone tiers can be followed over many kilometres with the same rhythmicity. Thus each individual bed can be identified at any place in the northern part of the Fränkische Alb. On the left side of the outcrop a normal fault is oblique dipping towards southwest. The vertical displacement is 30 cm.

Stop 2725: Lower Marl Limestone (Unterer Mergelkalk)

Stop 25 is situated in the middle level of the Werkkalk scarp (Oxfordium). This scarp is composed in its lower part of the Lower Marl Limestone (Unterer Mergelkalk), in its upper part of the Werkkalk. The Lower Marl Limestone (Unterer Mergelkalk) exhibits alternating tiers of marly, knobbly weathering, light limestone and thin grey marl beds.

Literature:

Brachert, T. C. (1992): Sequence stratigraphy and paleo-oceanography of the open-marine mixed carbonate/silicilastic succession (Late Jurassic, Southern Germany). - Facies, **27**: 191-216; Erlangen.

BÜDEL, J. (1957): Grundzüge der klimamorphologischen Entwicklung Frankens. - Würzburger Geogr. Arb., **4/5**: 5-46, 7 Abb.; Würzburg.

MEYER, R. K. F. (1996): Regensburg-Hollfelder Kreide (Prä-Obercenoman bis Campan). - In: Erläuterungen zur Geologischen Karte von Bayern 1: 500 000, 4. Aufl.: 112-125, Beil. 4; München.

MEYER, R. K. F. & SCHMIDT-KALER, H. (1992): Wanderungen in die Erdgeschichte, **5**: Durch die Fränkische Schweiz. – 168 S.; München (Pfeil).

SCHIRMER, W. (1991): Die tertiäre Flinzterrasse auf der Nördlichen Frankenalb. - Sonderveröff. Geol. Inst. Univ. Köln, **82**: 231-243; Köln.

SCHIRMER, W. (2000) mit Beiträgen von B.-U. ABELS und E. MÖNNIG: Jura-Geologie und Archäologie am Staffelberg. – Terra nostra, **2000** (4): 143-158; Berlin.

SCHIRMER, W. (2002): In MÄUSER, M., SCHIRMER, W. & SCHMIDT-KALER, H. (2002): Obermain-Alb und Oberfränkisches Bruchschollenland. – Wanderungen in die Erdgeschichte, **12**: 36; München (Pfeil).

SCHRÖDER, B. (1996): Zur känozoischen Morphotektonik des Stufenlandes auf der Süddeutschen Großscholle. - Z. geol. Wiss., **24** (1/2): 55-64; Berlin.

Stop 3: Naturkunde-Museum Coburg (The Coburg Museum of Natural Sciences)

History

Nestled in the city of Coburg (population 40,000), in the Upper Franconian region of Bavaria, is the Museum of Natural Science. With a collection of over 1 million pieces and an exhibition area of 2400 square meters, the Coburg Museum of Natural Science can be considered as grand as any "Landesmuseum", or national museum.

The beginnings of Coburg's present collections of natural science artifacts and specimans were first displayed at the Casimirianum Gynasium in the 18th century. Hermann Gottlieb Hornschuh (1745-1795) accounted a collection of over 2,000 pieces. Several teachers collected fossils and had labeled them as "petrafacta" in the school newspaper. Employed from 1804-1818, Johann Christoph Matthias Reinecke (1770-1818) served as the Casimirianum Gymnasium from 1806 until his death in 1818. He was responsible for drafting the highly noteworthy paleontological publication entitled "Marias protogaei nautilos et argonautas in argo Coburgico et vicinos" in the year 1818. In this work, Reinecke not only systematically described ammonites of the Jurassic period, he even duplicated their likeness with a self-developed lithograph. From his interpretation of the fossils, Reinecke detected long before Darwin, the mechanism of evolution. Reinecke, together with Smith, expressed his beliefs on the fundamental principals of stratigraphy.

The collections of the Naturkunde-Museum Coburg originate from Duke Franz Friedrich Anton von Sachsen-Coburg-Saarfeld (1757-1806). Duke Anton used his spare time to create an extensive collection of natural history specimens, books, coins and copper-plate engravings. As a result of political upheaval in the early 19th century under Napoleon, the fate of the collection remained uncertain. However, not long thereafter, Prince Ernst I (1818-1893) and Prince Albert (1819-1861), who had been collecting natural artifacts and specimens since their childhood, resumed the collection of stuffed birds, fossils and minerals. This collection came to be known as the "Herzogliches Naturaliencabinet", or the Natural History Collection of the Duchy, in the year 1838.

In the year 1840, with only 20 years of age, Prince Albert married his cousin Queen Victoria of Great Britain and Ireland, effectively bringing two royal kingdoms together. From England, Prince Albert supported the museum through monetary funding, as well as through new acquisitions of fossils and minerals. Until 1844 the collection served the eli-