

<b>Jubiläumsschrift 20 Jahre Geologische Zusammenarbeit Österreich – Ungarn</b>			<b>A 20 éves magyar-osztrák földtani együttműködés jubileumi kötete</b>		
Redaktion: Harald Lobitzer, Géza Császár & Albert Daurer			Szerkesztette: Lobitzer Harald, Császár Géza & Daurer Albert		
Teil 2	S. 403–408	Wien, November 1994	2. rész	pp. 403–408	Bécs, 1994. november
ISBN 3-900312-92-3					

## Some Notes Concerning the Correlation of the Jurassic and Lower Cretaceous Successions of the Northern Karavanke and the Transdanubian Central Range

By GÉZA CSÁSZÁR  
With contributions by LAJOS DOSZTÁLY\*)

With 7 Text-Figures

*Österreich  
Ungarn  
Karawanken  
Transdanubisches Mittelgebirge  
Jura  
Kreide  
Paläogeographie*

*Österreichische Karte 1 : 50.000  
Blätter 203, 204*

### Inhalt

Zusammenfassung .....	403
Összefoglalás .....	403
Abstract .....	404
1. Introduction .....	404
2. Jurassic and Cretaceous Formations in the Northern Karavanke .....	404
3. Some Remarks to the Geological Maps .....	408
4. Conclusions .....	408
Acknowledgements .....	408
References .....	408

### Einige Bemerkungen zur Korrelation der Jura- und Kreidefolgen der Nordkarawanken und des Transdanubischen Mittelgebirges

#### Zusammenfassung

Die Resultate einer Exkursion, deren Ziel es war, Ähnlichkeiten zwischen den jungen mesozoischen Folgen in den Nordkarawanken und im Transdanubischen Mittelgebirge festzustellen, werden kurz zusammengefaßt. Besondere Aufmerksamkeit wird der „Alb-Mikrobreccie“ gewidmet, die der Autor gemeinsam mit der Tata-Kalk-Formation (Apt) im Transdanubischen Mittelgebirge fand. Damit wurden aus dieser Region erstmals Mitteltoarcien-Ammoniten und Oxford- bis Kimmeridge-Radiolarien erwähnt. Die tektonische Linie am Nordfuß der Karawanken wird als Gegenstück zur Periadriatischen Linie betrachtet.

### Megjegyzések az Északi Karavankák és a Dunántúli-középhegység jura és alsó-kréta rétegsorának korrelációjához

#### Összefoglalás

A rövid cikk az 1991. évi pár napos karavankai túra eredményeit összegzi. Az út célját az Északi Karavankák és a Dunántúli-középhegység fiatal mezozoos rétegsorának összehasonlítása képezte, kiemelt figyelemmel az „albai mikrobreccsára”, melyet a szerző az apti Tatai Mészkövel rokonít. Első alkalommal kerülnek középső-toarci ammoniteszek és oxfordi és kimmeridgei radioláriák ismertetésre az Északi Karavankákból. A hegység északi lábánál húzódó törésvonalat a szerző a periadriai lineamentum párjának tekinti.

#### Abstract

The result of the Karavanke field trip realized in 1991 is summarized in this short communication. The aim of this trip was to find out and list similarities of the Upper Mesozoic successions of the Northern Karavanke and the Transdanubian Central Range (TCR). Special attention is paid to the "Albian microbreccia" which author found akin to the Tata Limestone Formation of Aptian age in TCR. This is the first time that mid-Toarcian ammonites and Oxfordian and Kimmeridgian radiolarians are mentioned from the region. The tectonic line at northern foot of Karavanke is evaluated as counterpart of the periadriatic line.

\*) Authors' address: Dr. GÉZA CSÁSZÁR, Dr. LAJOS DOSZTÁLY, Geological Institute of Hungary, Stefánia út 14, H-1442 Budapest, Hungary.

## 1. Introduction

Among models on the origin of the Transdanubian Central Range (TCR) the most convincing one is created by KAZMÉR & KOVÁCS (1985). Their model is based upon links of Triassic facies. According to them the escaping movement of the Pelso unit has happened during Oligocene time. According to these facies from the Jurassic till the Eocene of the TCR should fit with those in its original surroundings.

The validity of the model was extended over Jurassic and Early Cretaceous by KAZMÉR (oral communication). No link has been found so far for the Middle Cretaceous and there are serious uncertainties with the following periods as well. VAN HUSEN (1975) reported about Albian microbreccia with a fossil content that suggests certain similarities with TCR sediments. I was induced by this paper to visit N Karawanken (Text-Fig. 1) and try to correlate its Lower Cretaceous with that one in TCR in the frame of the exchange program (Text-Fig. 1). The field trip was realized at the end of August, 1991.

## 2. Jurassic and Cretaceous Formations in the Northern Karavanke

As separated patches Jurassic and Cretaceous formations are shown within a narrow belt of "Karawanken Ostteil" sheet – at the northern foot of the mountains (in a scale of 1 : 25.000 – BAUER et al., 1981). In the maps and explanatory note 8 Jurassic and Cretaceous formations and 3 subunits are distinguished (Text-Fig. 2).

The main reason of my trip was to study Albian beds. Besides visiting the only outcrop of it I extended the study also to the Lower Cretaceous and Jurassic occurrences. This short visit has convinced me that any attention to be paid to this zone will benefit by new discoveries on stratigraphy, structure and paleogeography. Encouraging colleagues to investigate Jurassic and Cretaceous successions there, I put down the results of my field observations knowing that thin-section studies from 78 samples which I collected during the field trip may constrain me to change or specify ideas.

The oldest rock I studied was described by HOLZER & SUETTE (1983) in the explanatory notes of the map as "Rhätoliaskalk" or Kössen beds. Its upper part is oolitic and oncoidic and it is identical with the Kardosrét Limestone Formation in the Bakony Mts. (Text-Fig. 2). It is well outcropped at Wildenstein waterfall, the uppermost beds are seen at Unterort and its large loose pieces are on the surface at Raspotnik and Homelitschach. The bivalve found in the lat-

ter outcrop has been determined by DETRE as *Paramegalodus* aff. *incisus* (FRECH); that verifies the Rhaetian age of the occurrence.

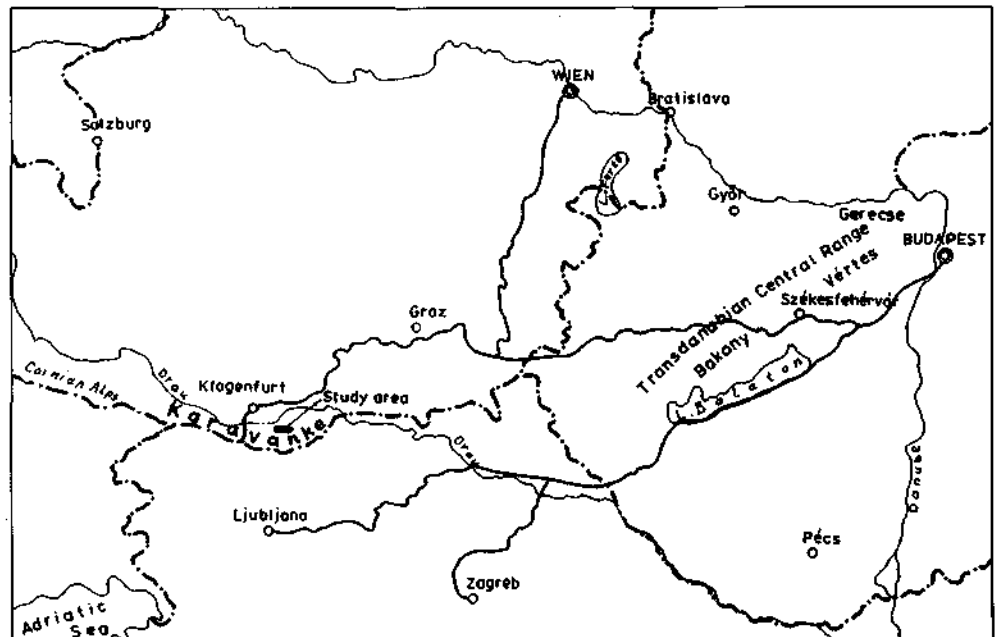
The Hierlatz Formation is a pinky and yellow, sparitic crinoidal limestone with forams (among others *Involutina liasica*), Holothurioids (HOLZER & SUETTE, 1983). This is the only formation of the lower to middle Jurassic succession where ammonites (*Arietites*) have been reported from. The lithologic pattern of this formation is similar to Pisznice and Hierlatz Formations from the TCR, although; the latter ones do contain a large quantity of various Brachiopods. In addition to the Wildenstein waterfall it is found all over the zone.

The transition between Hierlatz Limestone and Adnet Limestone crops out south of Raspotnik. The fine-grained crinoidal limestone of the uppermost part of the Hierlatz Formation has a micritic matrix, nodular pattern and small intraclasts with manganese crusts. One can recognize a few ammonite cross-sections in this bed but they become frequent in the basal bed of the Adnet Limestone Formation. Due to these fossils, collected by my son Gábor and kindly determined by professor GÉCZY, this bed belongs to the Middle Toarcian (*Hildoceras bifrons* zone). According to him the community consists of species as follows: *Phylloceras* sp., *Calliphylloceras* sp., *Lytoceras* sp., *Mercaticeras cf. mercati* (HAUER 1856), *Hildoceras* sp. juv., *Dactylioceras* s.l. sp.

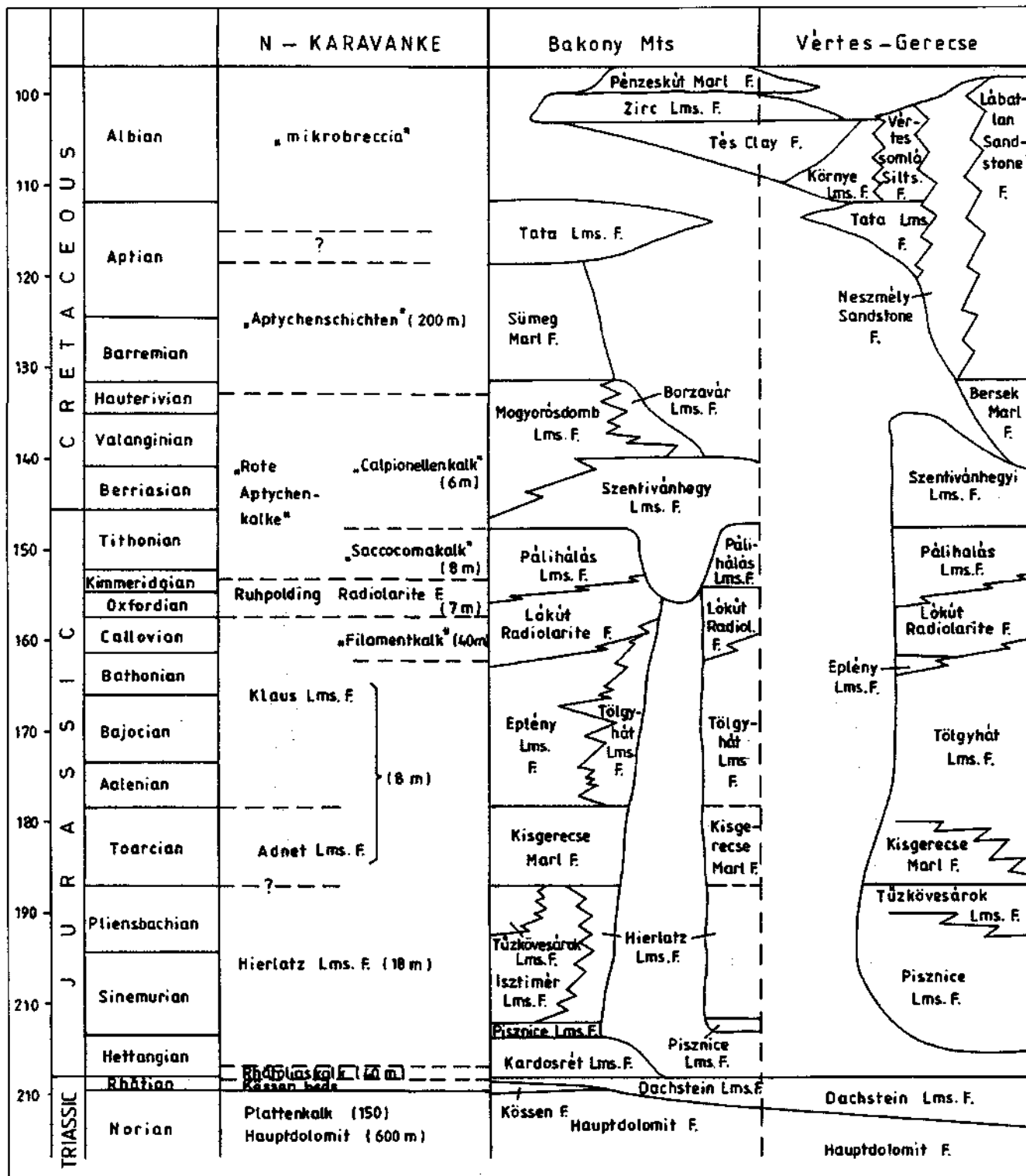
Neither the explanatory notes nor the map has mentioned underlyings of the Ruhpolding Radiolarite at Raspotnik. In addition to the Adnet Formation in a forest road-cut one can find "Saccocoma-Kalk", Klaus and Hierlatz Limestone and two types of "Rhätoliaskalk". The outcrop is promising for marking the Lower/Middle Jurassic boundary after a detailed sampling and depicting (I doubt whether Adnet and Klaus Limestones can be separated at all when it is not a *Bositra* Limestone).

An adequate formation of the Adnet Limestone in the TCR is the Tűzkövesárok Limestone though it is older than that one.

A very special type of Adnet (or Klaus) Limestone is found approximately 100 m above the Wildenstein waterfall. In the red, slightly clayey and nodular limestone of micritic matrix there are angular limestone debris of pale-yellow to white-grey colour. The grain size of limestone



Text-Fig. 1. Location map of Northern Karavanke and Transdanubian Central Range (TCR).



Text-Fig. 2. Correlation chart of the Jurassic and Lower Cretaceous successions of Northern Karavanke and TCR. Modified after BAUER (1984), CSÁSZÁR (1983), GALÁCZ & FÖZY (in press).

clasts ranges from 1–2 cm to 1–2 m. The majority of breccia grains probably came from „Rhätiaskalk“ and minority from Hierlatz Limestone. Traces of infillings of neptunian dykes have been found at Homelitschach where the breccia grains are exclusively Hierlatz Limestone origin.

Lithologically the Klaus Limestone is similar to Tölgyhát Limestone while its upper part („Filamentkalk“) is called Eplény Limestone Formation in TCR. Bositra limestone is reported from the Wildenstein Bach valley and I found its

chert-bearing platy version at Unterort as well. The Klaus Limestone deposited on a hardground of the Adnet Limestone is considered to be condensed (SCHRÖDER, 1988).

The Ruhpolding Radiolarite Formation found at Raspotnik (Text-Fig. 3) and Unterort (Text-Fig. 4), consists of well-bedded siliceous limestone. From the samples collected in the lower part of the Raspotnik section (sample no. 67) the following Radiolarian taxa have been determined by L. DOSZTÁLY:

Text-Fig. 3.  
Sketchy profile through a forest road-cut and a quarry, south of Raspotnik.

*Acanthocircus* cf. *suboblongus* (YAO); *Archaeodictyomitra apiaria* (RÜST), *Cinguloturris carpatica* DUMITRICA, *Emiluvia* sp., *Paronaella* sp., *Parvicingula* sp., *Podobursa triacantha* (FISCHLI), *Praeconocaryomma* sp., *Pseudocrucella* sp., *Tritrabs* sp.

A rich Radiolarian community has been discovered by L. DOSZTÁLY from the Unterort occurrence (sample no. 71): *Acanthocircus suboblongus* (YAO), *Archaeodictyomitra apiaria* (RÜST), *Emiluvia sedecimporata elegans* (WISNIOWSKI), *Emiluvia* sp.,

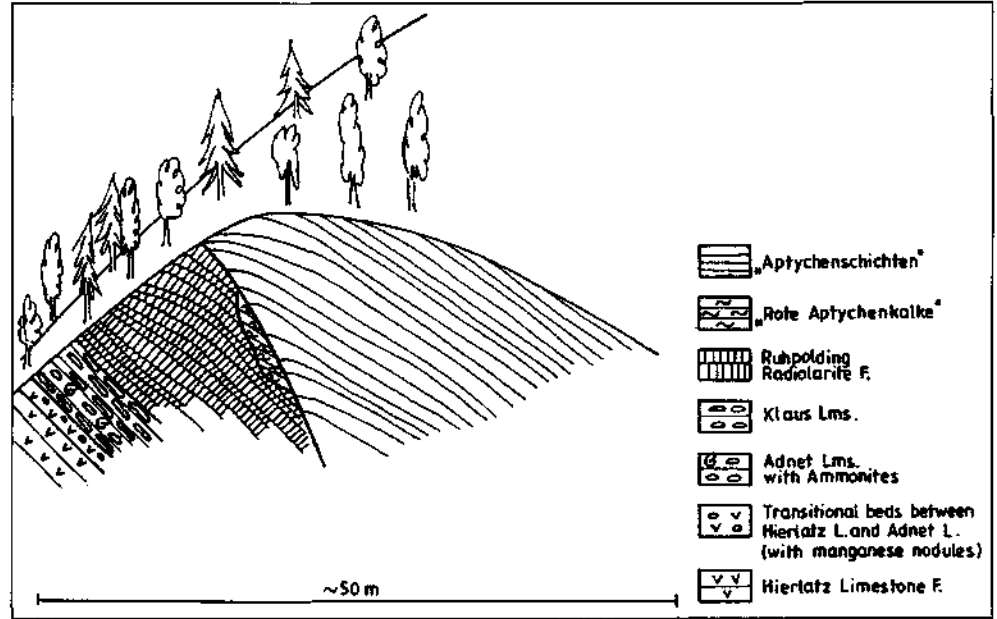
*Eocyrtilis* sp., *Foremanella* sp., *Lychnocanoma* cf. *longicorne* (RÜST), *Lychnocanoma* cf. *xiphophora* (RÜST), *Mirifusus mediodilatatus* (RÜST), *Napora* cf. *bukryi* PESSAGNO, *Obesacapsula* sp., *Paronaella* sp., *Parvicingula* sp., *Podobursa triacantha* (FISCHLI), *Podocapsa amphitrepta* FOREMAN, *Praeconocaryomma* sp., *Pseudocrucella* cf. *adriani* BAUMGARTNER, *Ristola altissima* (RÜST), *Thanarla* sp., *Triacloma lithonianum* RÜST, *Tritrabs* sp.

*Lamellaptychus lamellosus* and Belemnite fragments have been reported by SCHRÖDER (1988) from the marly intercalations of the formation.

According to the results (Text-Figs. 5 and 6) the age of the Ruhpolding Radiolarite Formation is Oxfordian (Raspotnik) to Kimmeridgian (Unterort).

The Ruhpolding Radiolarite in the Karavanke, just as the Lókút Radiolarite Formation in the TCR, represents the deepest basin of the Jurassic sequence ("bathyal Stillwasserraum" by HOLZER & SUETTE, 1983).

The lower part of the overlying is going by the name of "Rote Aptychenkalke" that is differentiated from "Aptychenschichten". The former unit consists of two lithofacies. The red clayey *Saccocoma* limestone that corresponds with Pálhálás Limestone Formation in the TCR are known to occur in Wildenstein Bach valley with relatively rich fossil content (SUETTE, 1978 and SCHRÖDER, 1988) and also at Raspotnik along the fault line separating Ruhpolding Radiolarite and "Aptychenschichten".



SUETTE (1987), OBERHAUSER (in HOLZER, 1966) and SCHRÖDER (1988) revealed all *Calpionella* zones at Abtei and in Wildenstein Bach valley, respectively. The latter succession consists of clayey and platy limestone of red and greenish-grey colour. The limestone is less clayey at Unterort (Text-Fig. 4) and Raspotnik (Text-Fig. 3), its colour is white or pale grey and it contains a few chert nodules as well. This red and violet limestone resembles Szentiván-hegy Limestone Formation and the white cherty limestone underlain by the previous one is more or less identical with Mogyorósdomb Limestone Formation (Maiolica facies) in the TCR.

The transition between "Roter Aptychenkalk" and "Aptychenschichten" (HOLZER & SUETTE in BAUER et al., 1983) is gradual. The clay content is increasing upward within the latter one and the uppermost beds known from Wildenstein Bach valley are represented by the alternation of dark grey claymarl and clayey limestone and called "Schrambachschichten" by SCHRÖDER (1988). It can be considered as counterpart of Sümeg Marl Formation in Bakony Mts.

The "microbreccia" (VAN HUSEN, 1975) occurs as fine- to coarse-grained biotrital (crinoids and sea urchins) limestone of grey, pinky or greenish colour with white and pale grey limestone clasts; there are dark grey Radiolaria marl or claymarl pebbles of the same size. The latter ones probably came from the upper part of the Aptychus beds. According to VAN HUSEN (1975) the microfossil content of the Radiolaria marl is as follows: sponge spicules, *Hedbergella* sp., *Ticinella* sp. and "*Globigerina*". He considers these marls as Albian age. The "microbreccia" is rich in various size of bioclasts from Ostreids, Echinoderms, Inocerams, Bryozoan, *Lithothamnium* and Forams like *Vidalina* sp. and *Orbitolina* cf. *conoidea* (after PAPP & TURNOVSKY, 1970).

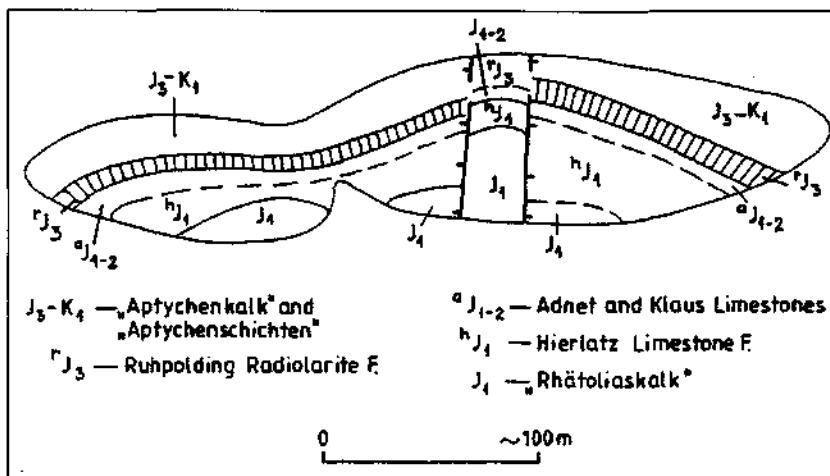


Fig. 4.  
Geological sketch-map of a forested hill, west of Unterort.

Sample no 67	bathonian		callovian			oxfordian			kimmeridgian	tithonian	ber.
	1	2	3	4	5	6	7	8	9	10	
Unitary Associations Baumgartner /1987/											
<i>Acanthocircus cf. suboblongus</i> /YAO/	←									→	
<i>Archaeodictyomitra apiaria</i> /RÜST/							←				→
<i>Cinguloturris carpatica</i> DUMITRICA			←								→
<i>Podobursa triacantha</i> /FISCHLI/			←								→

Text-Fig. 5.  
Stratigraphic range of Radiolarians found at Raspotnik.

VAN HUSEN's conclusion is that the age of "microbreccia" is Albian. According to SCHLAGINTWEIT (1991) *Orbitolina conoidea* is a synonym of *Palorbitolina lenticularis* as it was stated by SCHRÖDER (1988), therefore the age of the microbreccia is Late Barremian to Early Aptian. VAN HUSEN stated that the material of the "microbreccia" was transported from a beach environment by turbidity currents. SCHLAGINTWEIT (1991) compares the allodapic Urganian microbreccia with similar occurrences at the Thiersee-Mulde in the Northern Calcareous Alps. The sedimentation was continuous at least until the latest Early Cretaceous as it was supposed by OBERHAUSER (1963).

This biotrital limestone resembles the Tata Limestone Formation of Late Aptian age in the TCR and the basal beds of Környe Limestone Formation of Early to Middle Albian age in Vértes Forland. The resemblance can only be specified after thin-section studies.

### 3. Some Remarks on the Geological Maps

At three outcrops from among four ones I visited, recent circumstances gave an opportunity to recognize certain

differences that are shown partly in sketch-maps (Text-Figs. 4 and 7) partly in generalized sketchy profile (Text-Fig. 3). The geological setting of the forested hill to the west of Unterort is especially interesting where the sequence does contain all units of Jurassic succession together with the lowermost Cretaceous in an overturned position with minor faults.

The high mountain chain of Karavanke consists of Triassic formations. At the northern margin of the chain, along an east-west oriented line, a remarkable morphological change can be detected. This change coincides with the zone of thin Jurassic and a bit thicker lower Cretaceous successions that only occasionally crop out from the thick Wetterstein Limestone and Dolomite cover. In contradiction to the general northward dip of Northern Karavanke young Mesozoic (Jurassic and Cretaceous) successions dip to the south either in normal (Rasponik and Wildenstein waterfall) or in overturned position (Unterort).

The profile compiled by BAUER (in BAUER et al., 1983) through Kleinobir and Hochobir shows an incomplete Jurassic and Cretaceous succession. On the base of recent results I suppose the presence of the "microbreccia" just above the clayey "Aptychenschichten". It is not in

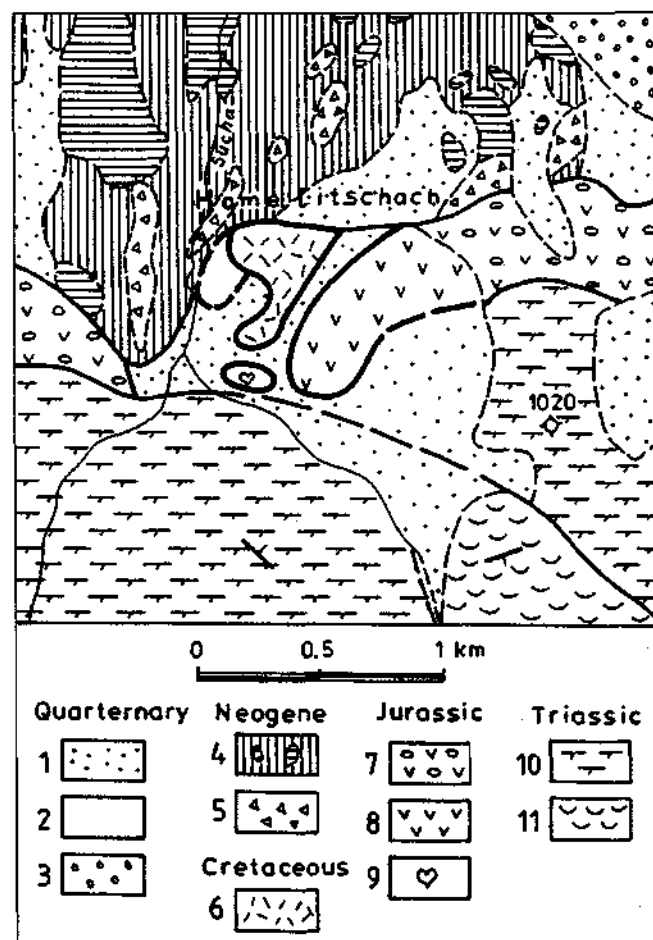
Sample no71	bathonian		callovian			oxfordian			kimmeridgian	tithonian	ber.
	1	2	3	4	5	6	7	8	9	10	
Unitary Associations Baumgartner /1987/											
<i>Acanthocircus suboblongus</i> /YAO/	←									→	
<i>Archaeodictyomitra apiaria</i> /RÜST/							←				→
<i>Emiluvia sedecimporata elegans</i> /WISNIOWSKI/	←									→	
<i>Foremanella</i> sp.							←				→
<i>Lychnocanoma cf. longicorne</i> /RÜST/								←		→	
<i>Lychnocanoma cf. xiphophora</i> /RÜST/								←		→	
<i>Mirifusus mediodilatatus</i> /RÜST/							←				→
<i>Napora cf. bukryi</i> PESSAGNO			←								→
<i>Podobursa triacantha</i> /FISCHLI/			←								→
<i>Podocapsa amphitreptera</i> FOREMAN								←			→
<i>Pseudocrucella cf. adriani</i> BAUMGARTNER	←									→	
<i>Ristola altissima</i> /RÜST/		←								→	
<i>Triactoma tithonianum</i> /RÜST/	←										→

Text-Fig. 6.  
Stratigraphic range of Radiolarians found at Unterort.

dedicated but cannot be excluded that the succession below the Wetterstein Formation contains younger Cretaceous beds as well. The age of the overthrust is supposed to be Miocene (BAUER et al., 1983). According to J. STINI (1938) the Obir area also has nappe structures. Rocks are highly tectonized and the stratification is often unrecognizable. All of these features refer to an obscure tectonic line at the northern margin of the Karawanken separating the Northern and Southern Karavanke, that may have a similar importance in the tectonic history of the region like the Periadriatic Line, even if it is not reflected in the printed geological maps. The overthrust was estimated by TOLLMANN (1977) 4 km as a maximum. SCHRÖDER (1988) indicated three overthrust lines in his sketch-map in the Freibachtal area. According to him Mesozoic rock bodies have overthrust the Upper Miocene conglomerate.

#### 4. Conclusions

Jurassic and Lower Cretaceous successions of the Northern Karavanke and the Transdanubian Central Range strikingly resemble each other. It is a new element (aspect) in the similarity that Mid-Cretaceous biotrital (crinoidal) limestones of the TCR first time could be correlated with a formation in the Karavanke. The presence of Toarcian



Text-Fig. 7. Geological sketch-map of the eastern slope of Sucha creek near Homelitschach.

1 = Scree, undifferentiated; 2 = Scree with Upper Jurassic limestone debris; 3 = Periglacial debris flow; 4 = Coarse-grained gravel (mainly quartz); 5 = Coarse-grained carbonate gravel; 6 = "Microbreccia"; 7 = Adnet Limestone Formation; 8 = Hierlatz Limestone Formation; 9 = "Rhatoliakalk"; 10 = Hauptdolomit; 11 = Carditaschichten.

and Oxfordian to Kimmeridgian is the first time proved by ammonites and Radiolarians respectively. The aim of this paper is to emphasize the necessity of a detailed comparative study of this subject.

At the northern foot of Karavanke an important tectonic line runs that can be considered as a counterpart of the Periadriatic line.

#### Acknowledgements

First of all I have to thank R. OBERHAUSER for drawing my attention to the Albian "microbreccia" in the Karavanke and then H. LOBITZER for arranging my trip rapidly and F. BAUER who was helpful to show me the neighborhood of the outcrop in advance.

I am indebted to professor GÉCZY for his kind Ammonite determination and L. DOSZTALY for Radiolaria studies.

#### References

- BAUER, F.K. (1981): Geologische Karte der Karawanken 1 : 25.000, Ostteil, Blatt 1,2. - Wien (Geol. B.-A.).
- BAUER, F.K., CERNY, I., EXNER, Ch., HOLZER, H.-L. VAN HUSEN, D., LOESCHKE, I., SUETTE, G. & TESSENHORN, F. (1983): Erläuterungen zur geologischen Karte der Karawanken 1 : 25.000, Ostteil. - 86 S., Wien (Geol. B.-A.).
- HAGN (1982): Neue Beobachtungen in der Unterkreide der Nördlichen Kalkalpen (Thierseer Mulde SE Landl, Kalkalpine Randschuppe SW Bad Wiessee). - Mitt. Bayer. Staatslg. Paläont. hist. Geol., 22, 117-135, München.
- HOLZER, H.-L. (1978): Eine stratigraphische Tabelle der Malmvorkommen Österreichs (mit erläuternden Bemerkungen und einem Schichtnamenverzeichnis). - Schriftenreihe Erdwiss. Komm. Österr. Akad. Wiss., 4, 219-242, Wien.
- HOLZER, H.-L. & POLTING, W. (1980): Erster Nachweis einer radialplatten Fossilagerstätte der Schwebecrinoide *Saccocoma* im oberostalpinen Malm (Ostkarawanken, Kärnten - Carinthia II, 170, 201-216, Klagenfurt).
- HOLZER, H.L. & SUETTE, G. (1978): Jura und Kreide. - In: BAUER, F.K. et al.: Erläuterungen zur Geologischen Karte der Karawanken 1 : 25.000, Ostteil. - 86 S., Wien (Geol. B.-A.).
- KÁZMÉR, M. & KOVÁCS, S. (1985): Permian-Paleogene paleogeography along the eastern part of the Insubric-Periadriatic lineament system: evidence for continental escape of the Bakony-Drauzug unit. - Acta Geol. Hung., 28, 71-84, Budapest.
- MIOČ, P. & SRIBAR, L. (1975): The Jurassic beds in the North Karawanken Mountains. - Geologija, 18, 87-97, Ljubljana.
- OBERHAUSER, R. (1963): Die Kreide im Ostalpenraum Österreichs in mikropaläontologischer Sicht. - Jb. Geol. B.-A., 106, Wien.
- OBERHAUSER, R. (1980): Der Geologische Aufbau Österreichs. - 699 S., Wien (Springer).
- PAPP, A. & TURNOVSKY, K. (1970): Anleitung zur biostratigraphischen Auswertung von Gesteinsschiffen. - Mikrofazies Austriaca, Jb. Geol. B.-A., Sb. 1b, Wien.
- SCHLAGINTWEIT, F. (1991): Allochthone Urgonkalke im Mittleren Abschnitt der Nördlichen Kalkalpen: Fazies, Paläontologie und Paläogeographie. - Münch. Geowiss. Abh., Reihe A, Geologie und Paläontologie, 120. S., München.
- SCHRÖDER, R. (1964): Communication préalable sur l'origine des Orbitolines. - C.R. Soc. géol. France, 3, 411-413, Paris.
- SCHRÖDER, M.: (1988): Stratigraphische und fazielle Untersuchungen der Obertrias bis Unterkreide am Nordrand der Karawanken zwischen St. Margareten im Rosental und Abtei (Kärnten). - Jb. Geol. B.-A., 131/1, 133-151, Wien.
- SUETTE, G. (1978): Litho- und biostratigraphische Gliederung des Jura und Neokom der Nordkarawanken. - Unveröff. Diss. Univ. Graz.
- VAN HUSEN, D. (1975): Ein Unterkreidevorkommen in den östlichen Karawanken (Kärnten). - Verh. Geol. B.-A., 1975, 297-299, Wien.