

Alticola-Kalk / Alticola Limestone

THOMAS J. SUTTNER, HANS P. SCHÖNLAUB

Validity: Invalid; first described by FRECH (1887: p. 684, 701, 706) as “Zone des *Orthoceras alticola*”; well described by GAERTNER (1931); biostratigraphic and sedimentological investigations were carried out by WALLISER (1964) and SCHÖNLAUB (1985a); a summary on this unit is provided by KREUTZER (1992b) and later by BRETT et al. (2009).

Type area: ÖK50-UTM, map sheets 3109 Oberdrauburg, 3110 Kötschach-Mauthen, 3111 Spittal an der Drau, 3116 Sonnenalpe Naßfeld, 3117 Nötsch im Gailtal, 3118 Arnoldstein, 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 197 Kötschach, 198 Weißbriach, 199 Hermagor, 200 Arnoldstein, 201-210 Villach-Assling, 212 Vellach, 213 Bad Eisenkappel).

Type section: -

Reference section(s): Cellon avalanche gully (WALLISER, 1964), N 46°36'32" / E 12°56'23"; Rauchkofel Boden section, Valentintörl section, near Pessendellach, south of Arnoldstein, near Agoritschach, Monte Cocco II section (BRETT et al., 2009); Kokra- and Korpitschgraben, Feisritzgraben below Illitsch, Worounitzagraben, Trögern and Seeberg (KUPSCH et al., 1971).

Derivation of name: After the nauloid species *Orthoceras alticola* BARRANDE (FRECH, 1887).

Synonyms: Untersilurische Schichten [partim] (STACHE, 1874); Unterer rother Orthoceren Kalk, wechsellagernd mit grauem Kalke (FRECH, 1887: p. 684); Zone des *Orthoceras alticola* (FRECH, 1887: p. 684, 701); Bunte Flaser- oder Bänderkalke und Kalkphyllite des Obersilur [partim] (GEYER, 1899); Calcari reticolati – facies a Cefalopodi (GORTANI & VINASSA DE REGNY, 1909); Orthoceren-(*alticola*-) Kalke (GAERTNER, 1931); Orthocerenkalk (HABERFELNER & HERITSCH, 1932b); Alticola Limestone (SCHÖNLAUB, 1970); Calcarea ad Alticola (SPALLETTA et al., 1982); Alticola Formation (KREUTZER, 1992b).

Lithology: Grey to red bedded orthocerid limestone with interbedded layers of coarse fossil debris yielding brachiopod valves.

Fossils: Acritarchs (PRIEWALDER, 1987), bivalves (KRIZ, 1979, 1999), brachiopods (PŁODOWSKI, 1971, 1973), cephalopods (RISTEDT, 1968; BOGOLEPOVA, 1998; HISTON, 1999), chitinozoans (PRIEWALDER, 1997), conodonts (WALLISER, 1964; SCHÖNLAUB, 1979), echinoderms, foraminifers (LANGER, 1969), graptolites (JAEGER, 1975), rugose corals (PICKETT, 2007), scyphocritinids (FERRETTI et al., 1999: p. 60), trace fossils (HISTON & SCHÖNLAUB, 1999), trilobites (HAAS, 1969; SANTEL, 1999).

Origin, facies: Marine limestone, pelagic unit (Plöcken Facies).

Chronostratigraphic age: Ludlow–Pridoli.

Biostratigraphy: *latialatus* and *eosteinhornensis* conodont zones (WALLISER, 1964).

Thickness: 20 m.

Lithostratigraphically higher rank unit: Plöcken Facies (informal).

Lithostratigraphic subdivision: -

Underlying unit(s): Cardiola Formation (conformable contact).

Overlying unit(s): Megaerella Limestone (conformable contact).

Lateral unit(s): Nölbling Formation.

Geographic distribution: Carnic Alps, Karavanke Mountains (Eisenkappel and Seeberg area).

Remarks: -

Complementary references: GEYER (1894), SPITZ (1909), HERITSCH (1929, 1943), WALLISER (1957), FLÜGEL (1965), PÖLSLER (1967), HAAS (1969), MANARA & VAI (1970), SCHÖNLAUB (1971a, 1980b, 1982c, 1982d, 1991, 1997), TIETZ (1976), SIEWERT (1984), MOSHAMMER (1987, 1990), KREUTZER (1994), SCHÖNLAUB et al. (1997, 2004), WENZEL (1997), VAI (1998, 1999), HISTON et al. (1999), PASAVA & SCHÖNLAUB (1999), SCHÖNLAUB & HISTON (1999, 2000), PRIEWALDER (2000), BRETT et al. (2009), CORRIGA & CORRADINI (2009).

Megaerella-Kalk / Megaerella Limestone

THOMAS J. SUTTNER, ERIKA KIDO, HANS P. SCHÖNLAUB

Validity: Invalid; discriminated by FRECH (1887: p. 687, 700, 714) as “Zone der *Rhynchonella Megaera*”; well described by GAERTNER (1931); biostratigraphic and sedimentologic investigations were carried out by WALLISER (1964) and SCHÖNLAUB (1980b, 1985a); a summary of this unit is provided by KREUTZER (1992b) and BRETT et al. (2009).

Type area: ÖK50-UTM, map sheets 3109 Oberdrauburg, 3110 Kötschach-Mauthen, 3111 Spittal an der Drau, 3116 Sonnenalpe Naßfeld, 3117 Nötsch im Gailtal (ÖK50-BMN, map sheets 197 Kötschach, 198 Weißbriach (?), 199 Hermagor).

Type section: -

Reference section(s): Cellon avalanche gully (WALLISER, 1964), N 46°36'31" / E 12°56'22"; Seewarte, Valentintörl (SCHÖNLAUB, 1980b).

Derivation of name: After the brachiopod *Rhynchonella megaera* (FRECH, 1887: p. 687).

Synonyms: Zone der *Rhynchonella Megaera* (FRECH, 1887); Calcari reticolati – facies a Brachiopodi (GORTANI & VINASSA DE REGNY, 1909); *Rhynchonella megaera*-Schichten (GAERTNER, 1931); *Rh. megaera*-Schichten (WALLISER, 1957); Kalk mit *H. megaera* (PÖLSLER, 1967); Black nodular Limestones (SCHÖNLAUB, 1980b); Megaerella Beds (SCHÖNLAUB, 1980b); Strati a Megaerella (SPALLETTA et al., 1982); Megaerella Formation (KREUTZER, 1992b).

Lithology: Bright, greyish, bioclastic limestones (BRETT et al., 2009).

Fossils: Acritarchs (PRIEWALDER, 1987), bivalves (KRIZ, 1979, 1999), brachiopods (PŁODOWSKI, 1971, 1973), bryozoans, cephalopods (RISTEDT, 1968; BOGOLEPOVA, 1998; HISTON, 1999), chitinozoans (PRIEWALDER, 1997), conodonts (WALLISER, 1964; SCHÖNLAUB, 1979), echinoderms, foraminifers (LANGER, 1969), graptolites (JAEGER, 1975), scyphocritinids (SCHÖNLAUB, 1970, 1985a; HISTON et al., 1999: p. 51), trace fossils (HISTON & SCHÖNLAUB, 1999), trilobites (HAAS, 1969; SANTEL, 1999).

Origin, facies: Marine limestone, shallow to moderately deep shelf (Plöcken Facies).

Chronostratigraphic age: Pridoli.

Biostratigraphy: *eosteinhornensis* conodont zone.

Thickness: 8 m.

Lithostratigraphically higher rank unit: Plöcken Facies (informal).

Lithostratigraphic subdivision: -

Underlying unit(s): Alticola Limestone (conformable contact).

Overlying unit(s): Rauchkofel Limestone (conformable contact).

Lateral unit(s): Nölbling Formation.

Geographic distribution: Carnic Alps.

Remarks: -

Complementary references: FRECH (1894b), HERITSCH (1929), VAI (1963, 1998, 1999), FLÜGEL (1965), RISTEDT (1969), SCHÖNLAUB (1970, 1971a, 1985a, 1997), TIETZ (1976), KREUTZER (1994), SCHÖNLAUB & KREUTZER (1994a), WENZEL (1997), FERRETTI et al. (1999), PASAVA & SCHÖNLAUB (1999), SCHÖNLAUB & HISTON (1999, 2000), PRIEWALDER (2000), SCHÖNLAUB et al. (2004), CORRADINI et al. (2005), SUTTNER (2007b).

Bodenkalk / Boden Limestone

THOMAS J. SUTTNER, ERIKA KIDO

Validity: Invalid; lithological characters and conodont biostratigraphy provided by SCHÖNLAUB (1980b, 1985a); facies described by KREUTZER (1992a); included within the summary of the Variscan carbonate sequences in the Carnic Alps (KREUTZER, 1992b).

Type area: ÖK50-UTM, map sheets 3109 Oberdrauburg, 3110 Kötschach-Mauthen, 3116 Sonnenalpe Naßfeld (ÖK50-BMN, map sheet 197 Kötschach).

Type section: -

Reference section(s): Rauchkofel Boden section (SCHÖNLAUB, 1985a), N 46°36'54" / E 12°52'40".

Derivation of name: after the Rauchkofel Boden on Mount Rauchkofel (SCHÖNLAUB, 1985a: p. 43).

Synonyms: *Orthoceras* Lst. (SCHÖNLAUB, 1980b).

Lithology: Light flaser limestone (KREUTZER, 1992b).

Fossils: Cephalopods (orthoconic and coiled nautiloids), conodonts, tentaculites (dacryoconarids).

Origin, facies: Marine limestone, following KREUTZER (1992a) this unit belongs to the Pelagic Carbonate Facies (compare Fig. 10 in SCHÖNLAUB, 1985a). Wrongly illustrated as shallow neritic unit in the ASC 2004.

Chronostratigraphic age: Lochkovian.

Biostratigraphy: *delta* and *pesavis* conodont zones (SCHÖNLAUB, 1980b).

Thickness: 20 m.

Lithostratigraphically higher rank unit: -

Lithostratigraphic subdivision: -

Underlying unit(s): Rauchkofel Limestone (conformable contact).

Overlying unit(s): Findenig Limestone (conformable contact).

Lateral unit(s): Rauchkofel Limestone.

Geographic distribution: Carnic Alps.

Remarks: -

Complementary references: SCHÖNLAUB (1991, 1992), FERRETTI et al. (1999), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), SCHÖNLAUB et al. (2004), CORRIGA & CORRADINI (2009).

Rauchkofel-Kalk / Rauchkofel Limestone

THOMAS J. SUTTNER, ERIKA KIDO

Validity: Invalid; known since FRECH (1887); two different facies of limestone are discriminated, i.e., neritic Rauchkofel Limestone and pelagic Rauchkofel Limestone (SCHÖNLAUB, 1980b: Fig. 3; SCHÖNLAUB, 1985a: Fig. 10); a detailed study on the facies of the neritic unit at Mount Seewarte has been done by BANDEL (1969), POHLER (1982) and additional conodont-biostratigraphy by SUTTNER (2007b); the pelagic unit was well described by SCHÖNLAUB (1985a: p. 42–43); a summary of lithostratigraphic characters of this formation is provided by KREUTZER (1992b: p. 25–26).

Type area: ÖK50-UTM, map sheets 3109 Oberdrauburg, 3110 Kötschach-Mauthen, 3111 Spittal an der Drau, 3112 Villach, 3116 Sonnenalpe Naßfeld, 3117 Nötsch im Gailtal, 3118 Arnoldstein (ÖK50-BMN, map sheets 197 Kötschach, 198 Weissbriach, 199 Hermagor, 200 Arnoldstein).

Type section: -

Reference section(s): Section at the footwall of Mount Seewarte (BANDEL, 1969; neritic Rauchkofel Limestone), N 46°36'40" / E 12°52'24"; Rauchkofel South section (SCHÖNLAUB, 1985a; pelagic Rauchkofel Limestone).

Derivation of name: After Mount Rauchkofel.

Synonyms: Korallenriffkalk am Wolayer- u. Seekopf-Thörl [partim] (FRECH, 1887: p. 700); unterdevonischer Riffkalk [partim] (FRECH, 1894b: p. 229); Schwarze Plattenkalke (GAERTNER, 1931); ey-Plattenkalke (GAERTNER, 1931); ey-Schichten (GAERTNER, 1931); Schwarze Kalke der Einheiten 0b, 0d, 0f, 0g (BANDEL, 1969); ey limestone (SCHÖNLAUB, 1980b: Fig. 3); Conjugula Lst. (SCHÖNLAUB, 1980b: Fig. 3); Neritic Rauchkofel Limestone (KREUTZER, 1992b sensu SCHÖNLAUB, 1985a); Pelagic Rauchkofel Limestone (KREUTZER, 1992b sensu SCHÖNLAUB, 1985a); Rauchkofel Formation (SUTTNER, 2007b; informal).

Lithology: Dark, platy limestone, lithoclastic limestone, dark nodular limestone, mega-conglomerate horizon (only neritic unit), well bedded dark grey crinoidal limestone.

Fossils: Acritarchs, brachiopods, chitinozoans, conodonts, crinoids, gastropods.

Origin, facies: Marine limestone, neritic and pelagic units are discriminated (Southern shallow-water Facies and Transitional to Pelagic Carbonate Facies).

Chronostratigraphic age: Lochkovian–Pragian.

Biostratigraphy: *?woschmidti*, *delta*, *pesavis* and *steinachensis* conodont zones (conodont zones within the neritic unit at Mount Seewarte; SUTTNER, 2007b); *woschmidti* Zone (conodont zone within the pelagic unit of the Rauchkofel Boden section; SCHÖNLAUB, 1980b: p. 39).

Thickness: About 180 m (neritic unit), 80–120 m (pelagic unit).

Lithostratigraphically higher rank unit: -

Austrian Stratigraphic Chart 2004 - Paleozoic

(sedimentary successions)

Austrian Stratigraphic Commission



ERA	SYSTEM / PERIOD / SERIES / EPOCH	STAGE / AGE	DURATION Ma	Global Classification					
				ERATHM / ERA	SYSTEM / PERIOD / SERIES / EPOCH				
PALEOZOIC	PERMIAN	CHANGHSINGIAN / Dorashanian	251	PERMIAN	MID PERMIAN / GUADALUPIAN / LOPINGIAN				
		WUCHIAPINGIAN / Dufuflian	255						
		CAPITANIAN	260						
		WORDIAN	265						
		ROADIAN	270						
		PERMIAN	LOWER PERMIAN / CISURALIAN			KUNGURIAN	275		
						ARTINSKIAN	280		
						SAKMARIAN	285		
						ASSELIAN	290		
		PERMIAN	UPPER PERMIAN / CARBONIFEROUS / PENNSYLVANIAN			GZHELIAN	295	PERMIAN	LOWER PERMIAN / CISURALIAN
KASIMOVIAN	300								
MOSKOVIAN	305								
BASHKIRIAN	310								
PERMIAN	UPPER PERMIAN / CARBONIFEROUS / PENNSYLVANIAN			SERPUKHOVIAN	315				
				VISEAN	320				
					325				
PERMIAN	LOWER PERMIAN / MISSISSIPPIAN			TOURNAISIAN	330	PERMIAN	LOWER PERMIAN / MISSISSIPPIAN		
				335					
				340					
		345							
		350							
		355							
		359.2							
		365							
		370							
		375							
PERMIAN	UPPER DEVONIAN	FAMENNIAN	380	PERMIAN	UPPER DEVONIAN				
		FRASNIAN	385						
		GIVETIAN	390						
		EIFELIAN	395						
		PERMIAN	MIDDLE DEVONIAN			Dalejian	400		
						405			
		PERMIAN	LOWER DEVONIAN			EMSIAN	410		
						PRAGIAN	415		
						LOCHKOVIAN	420		
		PERMIAN	SILURIAN			LUDFORDIAN / GORSTIAN	425	PERMIAN	SILURIAN
HOMERIAN / SHEINWOOD	430								
TELYCHIAN	435								
AERONIAN	440								
LLANDOVERY	443.7								
RHUDDANIAN	445								
HIRNANTIAN	447								
448.3									
449									
450									
PERMIAN	UPPER ORDOVICIAN	PAIBIAN	455	PERMIAN	UPPER ORDOVICIAN				
		460							
		465							
		470							
		475							
		480							
		485							
		488.3							
		490							
		495							
PERMIAN	MIDDLE ORDOVICIAN	DARRIWILIAN	500	PERMIAN	MIDDLE ORDOVICIAN				
		505							
		510							
		515							
		520							
		525							
		530							
		535							
		540							
		542							
PERMIAN	LOWER ORDOVICIAN	TREMA-DOCICAN	545	PERMIAN	LOWER ORDOVICIAN				
		550							
		555							
		560							
		565							
		570							
		575							
		580							
		585							
		590							
PERMIAN	UPPER CAMBRIAN	495	PERMIAN	UPPER CAMBRIAN					
		500							
		505							
		510							
		515							
		520							
		525							
		530							
		535							
		540							
PERMIAN	MIDDLE CAMBRIAN	505	PERMIAN	MIDDLE CAMBRIAN					
		510							
		515							
		520							
		525							
		530							
		535							
		540							
		542							
		PERMIAN			LOWER CAMBRIAN	545	PERMIAN	LOWER CAMBRIAN	
550									
555									
560									
565									
570									
575									
580									
585									
590									



- Legend**
- pelagic, offshore, siliciclastic
 - pelagic, nearshore, calcareous
 - shallow marin, neritic
 - terrestrial-continental, coarse clastic
 - terrestrial-continental, fine clastic
 - evaporite (chloride, sulphate)
 - rhyolite, dacite
 - (basaltic) andesite, trachyandesite
 - basalt
 - phyllite
 - mixed-facies (in corresponding colors)
 - coal (may include several seams)
 - ? position/age doubtful/controversial
 - | equal units
 - \ older unit left \ younger unit right
 - hiatus
 - unconformity
 - GSSP
 - Fm. Formation
 - Ls. Limestone

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Cutout and English adaptation of the "Die Stratigraphische Tabelle von Österreich 2004": Geological Survey of Austria

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