

lished by SCHULZE (1968); Trögen Klamm section-group B (N 46°28'00" / E 14°30'24"), D (N 46°28'03" / E 14°30'33"), F1 (N 46°28'02" / E 14°30'12") published by MOSHAMMER (1989, 1990).

**Derivation of name:** After the generic name of the trilobite *Bronteus transversus* (BARRANDE) (Suess, 1858).

**Synonyms:** Gailthaler Kalk (LIPOLD, 1856b: p. 350); rötlich-graue bis fleischrote Oolith-Marmore (TELLER, 1886a); fleischrote Kalke des unt. Unterdevon (F 2) (SCHÖNENBERG, 1965: Fig. 2, p. 31); rotgeflammt Kalk (SCHULZE, 1968); fleischroter Kalk (SCHULZE, 1968); Rote Flaserkalke ("F2") (TESSENSOHN, 1974a); Bunter Bronteus-Kalk (SCHÖNLAUB, 1979); "dehiscens"-Kalk (MOSHAMMER, 1989).

**Lithology:** Red flaser limestone with interbedded crinoidal limestones.

**Fossils:** Bivalves, brachiopods, cephalopods, corals (rare), conodonts, crinoids, gastropods, ostracods, tentaculites, trilobites.

**Origin, facies:** Marine limestone, pelagic unit.

**Chronostratigraphic age:** Pragian–Emsian.

**Biostratigraphy:** *kitabicus* and *gronbergi* conodont zones (SCHULZE, 1968; MOSHAMMER, 1989).

**Thickness:** Approx. 30 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Platy Limestone (conformable contact), Orthoceratid Limestone (conformable contact).

**Overlying unit(s):** Reef Limestone (conformable contact); Seeland Crinoidal Limestone (conformable contact); Seeberg Coral-Crinoidal Limestone (conformable contact); Limestone, Lydites (conformable contact).

**Lateral unit(s):** Seeberg Shale.

**Geographic distribution:** Karavanke Mountains (Eisenkappel and Seeberg area).

**Remarks:** -

**Complementary references:** TIETZE (1870), TELLER (1886b), PENECKE (1887), SCHULZE (1964), SCHÖNENBERG (1965, 1967), KUPSCH et al. (1971), TESSENSOHN (1974b), SCHÖNLAUB (1979), MOSHAMMER (1987), RANTITSCH (1990, 1992b), RAMOVŠ (1999), SCHÖNLAUB & HISTON (1999, 2000).

### Seeberg-Schiefer / Seeberg Shale

THOMAS J. SUTTNER

**Validity:** Invalid; lithological characters and biostratigraphic implications provided by LOESCHKE & ROLSER (1971); name first mentioned by TESSENSOHN (1974a).

**Type area:** ÖK50-UTM, map sheet 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 212 Vellach, 213 Bad Eisenkappel).

**Type section:** -

**Reference section(s):** About 1 km southwest of Sadonig Höhe (LOESCHKE & ROLSER, 1971: p. 154), N 46°25'57" / E 14°35'10".

**Derivation of name:** After Seeberg Pass (TESSENSOHN, 1974a: p. 113).

**Synonyms:** Devonische Vulkanite in Vellach (LOESCHKE & ROLSER, 1971: p. 154).

**Lithology:** Greywacke, shale with interbeds of siliceous shale and volcanites, bedded limestone.

**Fossils:** Conodonts.

**Origin, facies:** Pelagic marine deposits dominated by shales, siliceous shales, tuffs and volcanites; note wrong color code in the ASC 2004.

**Chronostratigraphic age:** According to LOESCHKE & ROLSER (1971: Fig. 4, p. 154) Emsian–Famennian age is concluded based on conodonts that were obtained from limestone intercalations at the base of the sequence at the village of Vellach.

**Biostratigraphy:** -

**Thickness:** Few cm to 20 m (following LOESCHKE & ROLSER, 1971).

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Bronteus Limestone (conformable contact).

**Overlying unit(s):** Bronteus Limestone (conformable contact).

**Lateral unit(s):** Bronteus Limestone.

**Geographic distribution:** Karavanke Mountains (Eisenkappel and Seeberg area).

**Remarks:** -

**Complementary references:** ROLSER (1968), KUPSCH et al. (1971), SCHÖNLAUB (1979), TESSENSOHN (1983), SCHÖNLAUB & HISTON (1999, 2000).

### Riffkalk / Reef Limestone

THOMAS J. SUTTNER

**Validity:** Invalid; first observed by TIETZE (1873); general lithological description by KUPSCH et al. (1971); biostratigraphy by SCHULZE (1968); facies and biostratigraphy of an equivalent, but more distally deposited unit within the Trögen Group by MOSHAMMER (1989, 1990).

**Type area:** ÖK50-UTM, map sheet 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 212 Vellach, 213 Bad Eisenkappel).

**Type section:** -

**Reference section(s):** Christophorus-Fels (SCHÖNENBERG, 1965: Fig. 2, p. 32), N 46°26'08" / E 14°33'30"; Grosser Pasterk (N 46°26'25" / E 14°32'29"), Rapold (N 46°26'16" / E 14°33'13") published by SCHULZE (1968); Trögen Klamm section-group B (N 46°28'00" / E 14°30'24"), C (N 46°27'59" / E 14°35'03"), E (N 46°28'00" / E 14°30'30"), F1 (N 46°28'02" / E 14°30'12"), F2 (N 46°28'01" / E 14°30'18") published by MOSHAMMER (1989, 1990).

**Derivation of name:** After facies characters.

**Synonyms:** Durch Corallen ausgezeichnete obersilurische Kalke (TIETZE, 1873: p. 183–184); Rapoldriff (SCHULZE, 1968); Devonkalke ungegl. (SCHÖNENBERG, 1965: Fig. 2, p. 31); Riff- und Riffschuttkalk (KUPSCH et al., 1971); massive Riffschuttbrekzie (MOSHAMMER, 1990: Fig. 2).

**Lithology:** Bioclastic limestone.

**Fossils:** Brachiopods, calcareous algae, conodonts, corals, ostracods, stromatoporoids.

**Origin, facies:** Marine limestone, neritic unit.

**Chronostratigraphic age:** Emsian–Famennian.

**Biostratigraphy:** *australis*, *ensensis*, *triangularis* and *crepida* conodont zones (SCHULZE, 1968; MOSHAMMER, 1989: Fig. 10).

**Thickness:** Approx. 250 m (according to KUPSCH et al., 1971).

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Bronteus Limestone (conformable contact).

**Overlying unit(s):** Limestones (unconformable contact).

**Lateral unit(s):** Seeland Crinoidal Limestone.

**Geographic distribution:** Karavanke Mountains (Eisenkappel and Seeberg area).

**Remarks:** -

**Complementary references:** PENECKE (1887), TESSENSOHN (1974a), SCHÖNLAUB (1979), MOSHAMMER (1987), RANTITSCH (1990, 1992b), FENNINGER & HUBMANN (1994), SCHÖNLAUB & HISTON (1999, 2000), HUBMANN et al. (2003).

### Seeland Crinoidenkalk / Seeland Crinoidal Limestone

THOMAS J. SUTTNER

**Validity:** Invalid; first recognized by LIPOLD (1856a); named by FRECH (1894a); lithological and biostratigraphic investigations by SCHULZE (1968), TESSENSOHN (1974b) and MOSHAMMER (1989, 1990).

**Type area:** ÖK50-UTM, map sheet 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 212 Vellach, 213 Bad Eisenkappel).

**Type section:** -

**Reference section(s):** Grosser Pasterk (N 46°26'24" / E 14°32'31"), Kleiner Pasterk-Pasterkhube (N 46°26'12" / E 14°32'45"), Paulitsch Wand (N 46°25'10" / E 14°34'40"), Plasnik (N 46°26'05" / E 14°34'54"), Sadonig Höhe (N 46°26'12" / E 14°35'42"), Storschitz (N 46°25'46" / E 14°31'33") published by TESSENSOHN (1974b); Trögen Klamm section-group B (N 46°28'00" / E 14°30'24"), C (N 46°27'59" / E 14°35'03"), E (N 46°28'00" / E 14°30'30"), F1 (N 46°28'02" / E 14°30'12"), F2 (N 46°28'01" / E 14°30'18") published by MOSHAMMER (1989, 1990).

**Derivation of name:** After lithological characters of the unit at the Seeland section (FRECH, 1894a).

**Synonyms:** Gailthaler Schichten [partim] (LIPOLD, 1856a); Seeländer Storžič (TELLER, 1886b); Seeländer Krinoidenbrekzie (FRECH, 1894a); graublaue Krinoidenbrekzienkalke und graublaue splitterige Kalke (HERITSCH, 1927d); Krinoiden- und Korallenkalk (SCHULZE, 1968); grauer Riffkalk (mit Krinoiden und Korallen) (SCHULZE, 1968); Crinoidenkalke (TESSENSOHN, 1974b); Seeländer Crinoidenbreccie (SCHÖNLAUB, 1979); Slump aus Flaserkalk und sparitischen Schuttkalk (MOSHAMMER, 1990: Fig. 2).

**Lithology:** Bioclastic limestone.

**Fossils:** Conodonts, crinoids, corals, stromatoporoids.

**Origin, facies:** Marine limestone, neritic unit, fore reef facies (SIEWERT, 1984).

**Chronostratigraphic age:** Emsian–Frasnian.

**Biostratigraphy:** *serotinus* and *patulus* conodont zones (MOSHAMMER, 1989).

**Thickness:** Approx. 200 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Bronteus Limestone (conformable contact).

**Overlying unit(s):** Limestones (unconformable contact).

**Lateral unit(s):** Reef Limestone; Seeberg Coral-Crinoidal Limestone.

**Geographic distribution:** Karavanke Mountains (Eisenkappel and Seeberg area).

**Remarks:** -

**Complementary references:** PENECKE (1887), TESSENSOHN (1974a), SCHÖNLAUB (1979), MOSHAMMER (1987), RANTITSCH (1990, 1992b), SCHÖNLAUB & HISTON (1999, 2000).

### Seeberger Korallen-Crinoidenkalk / Seeberg Coral-Crinoidal Limestone

THOMAS J. SUTTNER

**Validity:** Invalid; first recognized by LIPOLD (1856b); named by STACHE (1884); lithological and biostratigraphic investigations by SCHULZE (1968), TESSENSOHN (1974b) and MOSHAMMER (1989, 1990).

**Type area:** ÖK50-UTM, map sheet 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 212 Vellach, 213 Bad Eisenkappel).

**Type section:** -

**Reference section(s):** Grosser Pasterk (N 46°26'19" / E 14°32'29"), Jeritsch-Felsen (N 46°24'52" / E 14°32'37"), south of Storschitz (N 46°25'29" / E 14°31'24") published by TESSENSOHN (1974b); Trögen Klamm section-group B (N 46°28'00" / E 14°30'24"), C (N 46°27'59" / E 14°35'03"), E (N 46°28'00" / E 14°30'30"), F1 (N 46°28'02" / E 14°30'12"), F2 (N 46°28'01" / E 14°30'18") published by MOSHAMMER (1989, 1990).

**Derivation of name:** After coral and crinoid bearing limestones in the surroundings of Seeberg Pass (STACHE, 1884).

**Synonyms:** Gailthaler Kalk (LIPOLD, 1856b: p. 350); Seeberger Korallen- und Crinoidenkalk (STACHE, 1884: Tab. at end of publication); Crinoiden- und Korallenkalke (TELLER, 1886a); Korallenkalke und Crinoidenkalkbreccien (TELLER, 1886b); Seeberger Riffkalke (TELLER, 1886b); Riffkalke des Seeberges (TELLER, 1886c); grauer spätiger Kalk des Mitteldevon (SCHULZE, 1968); Riff- und Riffschuttkalk (KUPSCH et al., 1971); Korallenkalke (TESSENSOHN, 1974b); "Riff-Rudstone" (MOSHAMMER, 1990: p. 574).

**Lithology:** Coral limestone with crinoidal limestone interbedded.

**Fossils:** Brachiopods, conodonts, corals, crinoids, ostracods, stromatoporoids.

**Origin, facies:** Marine limestone, neritic unit, reef core facies (compare SIEWERT, 1984).

**Chronostratigraphic age:** Emsian–Famennian.

**Biostratigraphy:** *australis* and *ensensis* conodont zones (MOSHAMMER, 1989).

**Thickness:** Approx. 250 m (following KUPSCH et al., 1971).

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

# 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						
		WUCHIAPINGIAN / Dzhulfian	255								
		CAPITANIAN	260								
		WORDIAN	265								
		ROADIAN	270								
		PERMIAN	LOWER PERMIAN / CISURALIAN			KUNGURIAN	275				
						ARTINSKIAN	280				
						SAKMARIAN	285				
						ASSELIAN	290				
		PERMIAN	UPPER PERMIAN / ZEPHYRIAN			GZHELIAN	295	PERMIAN	UPPER PERMIAN / ZEPHYRIAN		
KASIMOVIAN	300										
MOSKOVIAN	305										
BASHKIRIAN	310										
PERMIAN	LOWER PERMIAN / CISURALIAN			SERPUKHOVIAN	315						
				VISEAN	320						
				TOURNAISIAN	325						
PERMIAN	UPPER PERMIAN / ZEPHYRIAN			FAMENNIAN	330	PERMIAN	UPPER PERMIAN / ZEPHYRIAN				
				FRASNIAN	335						
				GIVETIAN	340						
		EIFELIAN	345								
		PERMIAN	LOWER PERMIAN / CISURALIAN	EMSIAN	350						
				LOCHKOVIAN	355						
		PERMIAN	UPPER PERMIAN / ZEPHYRIAN	LUDFORDIAN / GORSTIAN	359.2			PERMIAN	UPPER PERMIAN / ZEPHYRIAN		
				HOMERIAN / SHEINWOOD	365						
				TELYCHIAN	370						
				AERONIAN	375						
RHUDDANIAN	380										
PERMIAN	LOWER PERMIAN / CISURALIAN			HIRNANTIAN	385						
				ORDOVICIAN	390						
PERMIAN	UPPER PERMIAN / ZEPHYRIAN			WEN-LUD-LOCK	395	PERMIAN	UPPER PERMIAN / ZEPHYRIAN				
				PRAGIAN	400						
				LOCHKOVIAN	405						
		LUDFORDIAN / GORSTIAN	410								
		HOMERIAN / SHEINWOOD	415								
		TELYCHIAN	420								
		AERONIAN	425								
		RHUDDANIAN	430								
		PERMIAN	LOWER PERMIAN / CISURALIAN	HIRNANTIAN	435						
				ORDOVICIAN	440						
PERMIAN	UPPER PERMIAN / ZEPHYRIAN	WOLYER	443.7	PERMIAN	UPPER PERMIAN / ZEPHYRIAN						
		UGWA	445								
		BISCHOLAIM	450								
		VAL VISDENSE	455								
		PERMIAN	LOWER PERMIAN / CISURALIAN			TRIMA-DOCIAN	460				
						DARRIWILIAN	465				
		PERMIAN	UPPER PERMIAN / ZEPHYRIAN			PAIBIAN	470	PERMIAN	UPPER PERMIAN / ZEPHYRIAN		
						UPPER CAMBRIAN	475				
						MIDDLE CAMBRIAN	480				
						LOWER CAMBRIAN	485				
PERMIAN	LOWER PERMIAN / CISURALIAN			PAIBIAN	490						
				UPPER CAMBRIAN	495						
PERMIAN	UPPER PERMIAN / ZEPHYRIAN			UPPER CAMBRIAN	500	PERMIAN	UPPER PERMIAN / ZEPHYRIAN				
				MIDDLE CAMBRIAN	505						
				LOWER CAMBRIAN	510						
				PERMIAN	LOWER PERMIAN / CISURALIAN					UPPER CAMBRIAN	515
		MIDDLE CAMBRIAN	520								
		PERMIAN	UPPER PERMIAN / ZEPHYRIAN	UPPER CAMBRIAN	525			PERMIAN	UPPER PERMIAN / ZEPHYRIAN		
				MIDDLE CAMBRIAN	530						
				LOWER CAMBRIAN	535						
				PERMIAN	LOWER PERMIAN / CISURALIAN					UPPER CAMBRIAN	540
										MIDDLE CAMBRIAN	542



- 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

The Austrian Stratigraphic Chart 2004 - Paleozoic is a supplement of:  
 Hubmann, B., Ebner, F., Ferretti, A., Kido, E., Krainer, K., Neubauer, F., Schönlaub, H.-P. & Suttner, T.J. (2014): The Paleozoic Era (them), 2<sup>nd</sup> edition. - In: Piller, W.E. (Ed.): The lithostratigraphic units of the Austrian Stratigraphic Chart 2004 (sedimentary successions) - Vol. 1 - Abhandlungen der Geologischen Bundesanstalt, 66, 9-133, Wien.

Printing: Grasl Druck & Neue Medien GmbH, Bad Vöslau 2014

