

**Type area:** ÖK50-UTM, map sheets 3108 Sillian, 3109 Oberdrauburg, 3110 Kötschach-Mauthen, 3116 Sonnenalpe Naßfeld (ÖK50-BMN, map sheets 196 Obertilliach, 197 Kötschach).

**Type section:** -

**Reference section(s):** Section near Rifugio Lambertenghi e Romanin at the base of Seewarte – Cima Lastrons del Lago (KREUTZER, 1992a: p. 270), N 46°36'30" / E 12°52'14".

**Derivation of name:** After Mount Seewarte.

**Synonyms:** Riffkalk-Facies der Stockwerke H-G-H [partim] (STACHE, 1884: p. 339); schwarzer Gastropodenkalk (GAERTNER, 1931: p. 144); schwarze Kalke mit ihrem reichlichen Vorkommen von Hercynellen (GAERTNER, 1931: p. 144); Hercynellenkalk-Niveau (KREUTZER, 1990).

**Lithology:** Black bituminous limestone.

**Fossils:** Calcareous algae, bivalves, corals, crinoids, gastropods, ostracods (JHAVERI, 1969; KREUTZER, 1992b: p. 28).

**Origin, facies:** Marine limestone, neritic unit within the Southern Shallow-water Facies (SCHÖNLAUB et al., 2004: p. 19).

**Chronostratigraphic age:** Lower Emsian (ERBEN et al., 1962; KREUTZER, 1990: p. 295; SCHÖNLAUB et al., 2004: p. 12).

**Biostratigraphy:** -

**Thickness:** 40 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Hohe Warte Limestone (conformable contact).

**Overlying unit(s):** Lambertenghi Limestone (conformable contact), Eiskar Limestone (conformable contact).

**Lateral unit(s):** Gamskofel Limestone, Kellerwand Limestone, Vinz Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** PÖLSLER (1967), SCHÖNLAUB (1971–1973, 1984b, 1985a, 1991), KREUTZER et al. (1997, 2000), SCHÖNLAUB & KREUTZER (1997), VAI (1998), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), CARULLI (2006).

### Vinz-Kalk / Vinz Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; documented by SCHÖNLAUB (1969a); mapped by KREUTZER & SCHÖNLAUB (1984); name of the unit was first used by KREUTZER (1992a: p. 271).

**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):** Eiskar cavern (N 46°36'53" / E 12°54'36") southwest of Eiskar Hut and northwest of Eiskar glacier, upper part of Cellon avalanche gully (KREUTZER, 1992a; SCHÖNLAUB et al., 2004).

**Derivation of name:** After the Vinz peak at the lower Kellerwand (KREUTZER, 1992a: p. 271).

**Synonyms:** Dunkler Plattenkalk (SCHÖNLAUB, 1969a: p. 288); Dunkelgrauer, geflaserter Plattenkalk im Wechsel

mit Schuttbrekzien (KREUTZER & SCHÖNLAUB, 1984); Plattenkalke der Unteren Kellerwand [partim] (KREUTZER, 1990: p. 286); calcari stratificati giallastrì [partim] (SPALLETTA et al., 1982); yellow bedded limestone [partim] (SPALLETTA & VENTURINI, 1989).

**Lithology:** Dark grey platy limestone with debris layers (KREUTZER, 1992b: p. 29).

**Fossils:** Bivalves, cephalopods, corals, conodonts, ecinoderms, foraminifers, ostracods, tentaculites.

**Origin, facies:** Marine limestone, following KREUTZER (1992a) the depositional environment corresponds with the Transitional Facies.

**Chronostratigraphic age:** Emsian (KREUTZER, 1990).

**Biostratigraphy:** -

**Thickness:** 120 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

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

**Overlying unit(s):** Cellon Limestone (conformable contact), Freikofel Limestone (conformable contact).

**Lateral unit(s):** Seewarte Limestone, Eiskar Limestone, Findenig Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** KREUTZER (1990), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003).

### Lambertenghi-Kalk / Lambertenghi Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; known since STACHE (1884); facies described by POHLER (1982), KREUTZER (1990, 1992a) and SCHÖNLAUB et al. (2004); the name of this unit was first used by KREUTZER (1992a: p. 270, 1992b: p. 29) and SCHÖNLAUB (1992), as Lambertenghi-Kalk and Lambertenghi Limestone, respectively.

**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):** Area of Rifugio Lambertenghi e Romanin, South of Lake Wolayer (western walls of Mount Seewarte and opposite side, N 46°36'22" / E 12°52'15"), section along Seekopf (SCHÖNLAUB, 1971–1973; KREUTZER, 1992a: p. 270).

**Derivation of name:** After Rifugio Lambertenghi e Romanin.

**Synonyms:** Riffkalk-Facies der Stockwerke H-G-H [partim] (STACHE, 1884: p. 339); Riffkalk mit *Karpinskya consuelo* (GAERTNER, 1931); Schichten mit *K. consuelo* (PÖLSLER, 1967); Gebankter Laminitkalk mit *Karpinskia consuelo* (SCHÖNLAUB, 1971–1973); Consuelo Lst. (SCHÖNLAUB, 1980: Fig. 3); Consuelo-Laminit-Kalk (SCHÖNLAUB, 1985a: Fig. 10); Gebankter Laminitkalk (SCHÖNLAUB, 1985a: p. 42); gebankte Laminitkalke (KREUTZER, 1990); Laminit-Kalk (SCHÖNLAUB, 1991: p. 105); Laminierte geschichtete Kalke und Dolomite (SCHÖNLAUB, 1991: p. 105); Laminierte Kalke

(SCHÖNLAUB, 1991: p. 119); Consuelo-Laminite (KREUTZER, 1992a: p. 270).

**Lithology:** Well bedded laminated limestone, birdseye limestone, crinoidal debris limestone.

**Fossils:** Calcareous algae, bivalves, brachiopods (e.g., *Karpinskia consuelo*), corals, echinoderms, foraminifers, gastropods, ostracods, stromatoporoids (KREUTZER, 1992b: p. 29).

**Origin, facies:** Marine limestone, neritic unit belonging to the Southern Shallow-water Facies (KREUTZER, 1990).

**Chronostratigraphic age:** Emsian (KREUTZER, 1992a: p. 270; SCHÖNLAUB et al., 2004: p. 19).

**Biostratigraphy:** -

**Thickness:** 130 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

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

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

**Lateral unit(s):** Gamskofel Limestone, Eiskar Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** BANDEL (1972), SCHÖNLAUB (1984b), VAI (1998), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), SCHÖNLAUB et al. (2004), SUTTNER & KIDO (2011).

### Spinotti-Kalk / Spinotti Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; first observed by STACHE (1884) and later by GAERTNER (1931); facies described by POHLER (1982) and KREUTZER (1990, 1992a); name of this unit first mentioned by KREUTZER (1992b: p. 30).

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

**Type section:** -

**Reference section(s):** Trail along Sentiero Spinotti between Rifugio Lambertenghi e Romanin and Rifugio Giovanni e Olinto Marinelle (N 46°36'06" / E 12°52'26"), Hohe Warte (KREUTZER, 1992a).

**Derivation of name:** After Sentiero Spinotti.

**Synonyms:** Riffkalk-Facies der Stockwerke H-G-H [partim] (STACHE, 1884: p. 339); Pentamerenkalk (GAERTNER, 1931: p. 148); Riffkalk mit *Pentamerus* aff. *pseudobaschkiricus* (GAERTNER, 1931: p. 147); La serie calcarea di M. Zermula [partim] (FERRARI & VAI, 1966); Stromatoporen-Korallen-Crinoidenkalk (SCHÖNLAUB, 1971–1973); Gebankter Birdseye-Amphiporen-Brachiopodenkalk (SCHÖNLAUB, 1971–1973); Pentamerus Lst. (SCHÖNLAUB, 1980: Fig. 3); Amphipora Lst. (SCHÖNLAUB, 1980b: Fig. 3); Korallen/Crinoiden-K. (SCHÖNLAUB, 1985a: Fig. 10); Amphipora-Kalk (SCHÖNLAUB, 1985a: Fig. 10); Stromatoporen-Korallen-Crinoidenschutt-kalk (SCHÖNLAUB, 1985a: p. 42); Gebankter Birdseye-Amphiporen-Brachiopoden-Kalk (SCHÖNLAUB, 1985a: p. 42); Crinoiden-Kalk and Birdseye-Kalk (KREUTZER, 1990); Korallen-Crinoidenkalk (SCHÖNLAUB, 1991: p. 105); Amphiporenkalk (SCHÖNLAUB, 1991: p. 105); Fossilschutt-kalke (SCHÖNLAUB, 1991: p. 119); "Birdseye"-Kalke (SCHÖNLAUB, 1991: p. 119); Geschichtete "Birdseye"-kalke (SCHÖNLAUB, 1991: p. 119).

**Lithology:** Massive limestone, layers of crinoidal debris and *Amphipora* limestone, birdseye limestone.

**Fossils:** Calcareous algae, bivalves, brachiopods, corals (rugose and tabulate), echinoderms, gastropods, stromatoporoids.

**Origin, facies:** Marine limestone, neritic unit (Southern Shallow-water Facies).

**Chronostratigraphic age:** Eifelian–lower Givetian (VAI, 1963; BANDEL, 1972; SCHÖNLAUB et al., 2004: p. 15–16).

**Biostratigraphy:** -

**Thickness:** 220 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** Spinotti A–D and Amphipora Limestone; see remarks.

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

**Overlying unit(s):** Kellergrat Reef Limestone (conformable contact); Kronhof Limestone (unconformable contact; SCHÖNLAUB & KREUTZER, 1993: Fig. 5).

**Lateral unit(s):** Gamskofel Limestone, Eiskar Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** According to the lithostratigraphic subdivision, the Spinotti Limestone is composed of crinoidal and bioclastic limestones (subdivided into four units based on its facies characters: Spinotti A–D) and "birdseye limestone" with *Amphipora* (SCHÖNLAUB et al., 2004: p. 13–16).

**Complementary references:** VAI (1967, 1998), SCHÖNLAUB (1984b), HUBMANN & FENNINGER (1993), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), VENTURINI (2006).

### Eiskar-Kalk / Eiskar Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; the name of this limestone was first used on the map of KREUTZER & SCHÖNLAUB (1984); well described by SCHÖNLAUB (1985a: Fig. 10, p. 43) and revised by KREUTZER (1990: p. 306, 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):** Between Kellerwarte and Plöckenpass (KREUTZER & SCHÖNLAUB, 1984).

**Derivation of name:** After the Eiskar at the Kellerspitzen in the area of the upper Kellerwand cliff (SCHÖNLAUB, 1991: p. 118).

**Synonyms:** Emsium-Kalk; Eifelium-Kalk; Givetium-Kalk der Kellerspitzen (cf. KREUTZER 1990: p. 306).

**Lithology:** Bioclastic limestone, birdseye limestone.

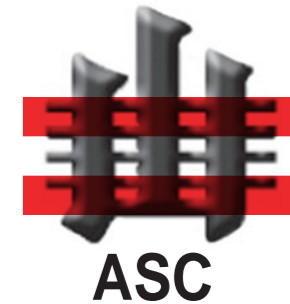
**Fossils:** Calcareous algae, bivalves, corals, echinoderms, gastropods (KREUTZER, 1992b: p. 29).

**Origin, facies:** Marine limestone, neritic unit of the Southern Shallow-water Facies (KREUTZER, 1990).

# 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 / Dzhulfian	255						
		CAPITANIAN	260						
		WORDIAN	265						
		ROADIAN	270						
		PERMIAN	LOWER PERMIAN / CISURALIAN			KUNGURIAN	275		
						ARTINSKIAN	280		
						SAKMARIAN	285		
						ASSELIAN	290		
		PERMIAN	TRIAS			GZHELIAN	295	TRIAS	U. CARBONIFEROUS / PENNSYLVANIAN
KASIMOVIAN	300								
MOSKOVIAN	305								
BASHKIRIAN	310								
TRIAS	LOWER CARBONIFEROUS / MISSISSIPPIAN			SERPUKHOVIAN	315				
				VISEAN	320				
				TOURNAISIAN	325				
PERMIAN	DEVONIAN			FAMENNIAN	350	DEVONIAN	UPPER DEVONIAN		
				FRASNIAN	355				
				GIVETIAN	360				
		EIFELIAN	365						
		DEVONIAN	LOWER DEVONIAN	EMSIAN	370				
				LOCHKOVIAN	375				
		PERMIAN	DEVONIAN	LUDFORDIAN / GORSTIAN	380			DEVONIAN	MIDDLE DEVONIAN
				HOMERIAN / SHEINWOOD	385				
				TELYCHIAN	390				
				AERONIAN	395				
RHUDDANIAN	400								
DEVONIAN	LOWER DEVONIAN			PRAGIAN	405				
				LOCHKOVIAN	410				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	415	DEVONIAN	LOWER DEVONIAN		
				HIRNANTIAN	420				
				LLANDOVERY	425				
		AERONIAN	430						
		RHUDDANIAN	435						
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	440				
				LOCHKOVIAN	445				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	450			DEVONIAN	UPPER ORDOVICIAN
				LLANDOVERY	455				
				AERONIAN	460				
RHUDDANIAN	465								
DEVONIAN	LOWER DEVONIAN			PRAGIAN	470				
				LOCHKOVIAN	475				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	480	DEVONIAN	MIDDLE ORDOVICIAN		
				LLANDOVERY	485				
				AERONIAN	490				
				RHUDDANIAN	495				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	500				
				LOCHKOVIAN	505				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	510			DEVONIAN	LOWER ORDOVICIAN
				LLANDOVERY	515				
				AERONIAN	520				
				RHUDDANIAN	525				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	530				
				LOCHKOVIAN	535				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	540	DEVONIAN	UPPER CAMBRIAN		
				LLANDOVERY	545				
				AERONIAN	550				
				RHUDDANIAN	555				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	560				
				LOCHKOVIAN	565				
		PERMIAN	DEVONIAN	WEN-LOCK / LOW	570			DEVONIAN	MIDDLE CAMBRIAN
				LLANDOVERY	575				
				AERONIAN	580				
				RHUDDANIAN	585				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	590				
				LOCHKOVIAN	595				
PERMIAN	DEVONIAN			WEN-LOCK / LOW	600	DEVONIAN	LOWER CAMBRIAN		
				LLANDOVERY	605				
				AERONIAN	610				
				RHUDDANIAN	615				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	620				
				LOCHKOVIAN	625				



- 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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