

**Thickness:** > 330 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

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

**Overlying unit(s):** Plotta Lydite (unconformable contact).

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

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** SCHÖNLAUB (1985a), RAN-TITSCH (1992a), SCHÖNLAUB & HISTON (2000), SCHÖNLAUB et al. (2004).

### Kellergrat-Riffkalk / Kellergrat Reef Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; facies described by KREUTZER (1990, 1992a); summary of unit is provided by KREUTZER (1992b: p. 31); the formation name Kellergrat-Riffkalk was first mentioned by KREUTZER (1992a: p. 271); later it has been continuously used, e.g., by FLÜGEL & HUBMANN (1994), KREUTZER et al. (1997) and SCHÖNLAUB (1992).

**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):** Kellergrat (located between the Kellerspitzen to the West and the Kollinkofel to the East, N 46°36'39" / E 12°54'04") and Hohe Warte (KREUTZER, 1990); abandoned trail #149 to Rifugio Marinelli (SCHÖNLAUB et al., 2004: p. 46); Monte Zermula and Monte Zuc della Guardia (Canson di Lanza pass) (FERRARI & VAI, 1966).

**Derivation of name:** After the Kellergrat which is located between the Kellerspitzen and Kollinkofel (KREUTZER, 1990: p. 295).

**Synonyms:** La serie calcarea di M. Zermula [partim] (FERRARI & VAI, 1966); Stromatoporen-Korallen-Riffkalk im Gipfelbereich der Hohen Warte (SCHÖNLAUB, 1971–1973); Phillipsastrea Lst. (SCHÖNLAUB, 1980b: Fig. 3); Phillipsastrea-Kalk (KREUTZER & SCHÖNLAUB, 1984); Stromatoporen/Korallenschutt-K. (SCHÖNLAUB, 1985a: Fig. 10); Phillipsastrea/Brachiop.-K. (SCHÖNLAUB, 1985a: Fig. 10); Riff-Kalk (KREUTZER, 1990); Korallenkalk (SCHÖNLAUB, 1991: p. 119); Korallen-Stromatoporen-Kalk und Phillipsastrea-Kalk (KREUTZER, 1992a: p. 271); Riffkalke im Gipfelbereich der Hohen Warte und der Kellerwände (OEKENTORP-KÜSTER & OEKENTORP, 1992: p. 237); Givetische Rindenkoralkalke der Hohen Warte und des Kollinkofels (OEKENTORP-KÜSTER & OEKENTORP, 1992: p. 238); Rindenkoralkalke im Bereich der Hohen Warte, der Kellerspitzen und des Kollinkofel (OEKENTORP-KÜSTER & OEKENTORP, 1992: p. 238); Rindenkoralkalke des Kollinkofels (OEKENTORP-KÜSTER & OEKENTORP, 1992: p. 239, 240); Rindenkoralkalke des Ober-Givetiums der Kellerwände und des Kollinkofels (OEKENTORP-KÜSTER & OEKENTORP, 1992: p. 240).

**Lithology:** Massive reef limestone (KREUTZER, 1992b: p. 31).

**Fossils:** Brachiopods, calcareous algae, calcispheres, conodonts, corals, ecinoderms, gastropods, stromatopoids (KREUTZER, 1992b: p. 31; OEKENTORP-KÜSTER & OEKENTORP, 1992).

**Origin, facies:** Marine limestone, neritic unit belonging to the Southern Shallow-water Facies (SCHÖNLAUB, 1985a: p. 42).

**Chronostratigraphic age:** Lower Givetian–Frasnian (SCHÖNLAUB, 1985a: p. 43; SCHÖNLAUB et al., 2004: p. 16).

**Biostratigraphy:** *gigas* conodont zone (KREUTZER, 1990).

**Thickness:** > 180 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Spinotti Limestone (conformable contact), Eiskar Limestone (conformable contact).

**Overlying unit(s):** Marinelli Limestone (conformable contact), Kollinkofel Limestone (conformable contact).

**Lateral unit(s):** Gamskofel Limestone, Cellon Limestone, Pal Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** FLÜGEL (1956, 1958), VAI (1963, 1967, 1971, 1998), PÖLSLER (1967), FERRARI (1968), BANDEL (1972), GALLI (1985), SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), VENTURINI (2006).

### Pal-Kalk / Pal Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; known since FRECH (1887); described by GAERTNER (1931); facies analysis by KREUTZER (1992a); included within the summary of the Variscan carbonate sequences in the Carnic Alps (KREUTZER, 1992b); well studied for conodonts by PERRI & SPALLETTA (1998a, b).

**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 Herma-gor).

**Type section:** -

**Reference section(s):** Grosser Pal (Pal Grande), 3.6 km east of the Plöckenpass (N 46°35'56" / E 12°59'26"), Kleiner Pal, Cellon, section west of the Valentintörl near southern slope of Mount Rauchkofel, Grüne Schneid (Cresta Verde), Kronhofgraben, Casera Pramosio Alta, Malga Poccis, Cava Canteoniera, Casera Malpasso, Collinetta di sotto section near Plöckenpass (all localities summarized by PERRI & SPALLETTA, 1998a, b).

**Derivation of name:** After Mount Pal (FRECH, 1887).

**Synonyms:** Clymenienkalk am Gross-Pal (FRECH, 1887: p. 700); Clymenienkalk (PÖLSLER, 1967); 'Kalk mit phosphatischen Knollen' (BANDEL, 1974: p. 97); 'Goniatiten-Flaserkalk' (BANDEL, 1974: p. 97); Goniatite Flaser-Ist. (SCHÖNLAUB, 1980b: Fig. 3); Pramosio calcirudite and clymenid- and goniatid-bearing pelagic limestone (SPALLETTA & PERRI, 1998c); Pal Limestone Formation (HÜNEKE, 2006).

**Lithology:** Limestone beds (mudstone and wackestone), thin biosparitic and quartz-rich layers, black shale.

**Fossils:** Bivalves, clymeniids, conodonts, corals (rare), echinoderms, goniatites, ostracods, styliolinids, trilobites.

**Origin, facies:** Open marine limestone, pelagic unit (Transitional Facies and Pelagic Carbonate Facies).

**Chronostratigraphic age:** Frasnian–Famennian.

**Biostratigraphy:** Ammonoid zones (*acuticostata* and *piriformis Clymenia* zones; upper *paradoxa* and *prorsum Woeklumeria* zones); upper *hassi* to *praesulcata* conodont zones.

**Thickness:** > 100 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Cellon Limestone (conformable contact), Freikofel Limestone (conformable contact), Hohe Trieb Formation (unconformable contact), Valentin Limestone (unconformable contact).

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

**Lateral unit(s):** Kellergrat Reef Limestone, Kollinkofel Limestone, Hohe Trieb Formation, Valentin Limestone, Zollner Formation.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** FRECH (1894b, 1902), GAERTNER (1927, 1931), PÖLSLER (1967, 1969a, b), LANGER (1969), SCHÖNLAUB (1969b, 1985a, b, 1999), VAI (1971, 1998), BANDEL & BECKER (1975), PERRI & SPALLETTA (1981, 1991, 1998c, d, e, f), KREUTZER (1990), DREESEN (1992), FEIST (1992), KORN (1992, 1999), RANTITSCH (1992a), SCHÖNLAUB et al. (1992, 2004), JOACHIMSKI et al. (1994), PERRI et al. (1998), SPALLETTA & PERRI (1998b, 1998d), SPALLETTA et al. (1998a, b), SCHÖNLAUB & HISTON (1999, 2000), SCHÖNLAUB & KORN (1999), KAISER et al. (2006), VENTURINI (2006), BRIME et al. (2008).

#### Marinelli-Kalk / Marinelli Limestone

THOMAS J. SUTTNER

**Validity:** Invalid; name was introduced by KREUTZER (1992a: p. 271); 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 (Italian side)).

**Type section:** -

**Reference section(s):** Southern slope of Kellerspitzen east of Rifugio Giovanni e Olinto Marinelli (KREUTZER, 1992b).

**Derivation of name:** After Rifugio Giovanni e Olinto Marinelli (KREUTZER, 1992a: p. 271).

**Synonyms:** -

**Lithology:** Indistinctly bedded loferites and crinoidal debris limestone (KREUTZER, 1992b).

**Fossils:** Calcareous algae, conodonts, echinoderms, gastropods.

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

**Chronostratigraphic age:** Uppermost Frasnian–Tournaisian.

**Biostratigraphy:** -

**Thickness:** 10–20 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Kellergrat Reef Limestone (conformable contact).

**Overlying unit(s):** Plotta Lydite (unconformable contact); Kronhof Limestone (KREUTZER, 1992a: p. 271).

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

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** SCHÖNLAUB & HISTON (2000), HUBMANN et al. (2003), SCHÖNLAUB et al. (2004).

#### Kollinkofel-Kalk / Kollinkofel Limestone

THOMAS J. SUTTNER

**Validity:** Invalid; known since FRECH (1887); facies described by KREUTZER (1990); name was introduced by KREUTZER (1992a: p. 271); 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):** North-eastern mountain cliffs and southern wall of the Kollinkofel (KREUTZER, 1992a), N 46°36'26" / E 12°54'19".

**Derivation of name:** After Mount Kollinkofel (KREUTZER, 1992a: p. 271).

**Synonyms:** Unteres Oberdevon am Kollinkofel (FRECH, 1887: p. 700); dunkle Rhynchonellenkalke (KREUTZER, 1992a).

**Lithology:** Dark brachiopod-rich limestone (rhynchonellids) with sparry lithoclastic layers (KREUTZER, 1992b: p. 32).

**Fossils:** Brachiopods, conodonts, echinoderms.

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

**Chronostratigraphic age:** Uppermost Frasnian–Famennian.

**Biostratigraphy:** *gigas* to *postera* conodont zones (KREUTZER, 1990, 1992a).

**Thickness:** > 40 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Kellergrat Reef Limestone (conformable contact).

**Overlying unit(s):** -

**Lateral unit(s):** Marinelli Limestone, Pal Limestone.

**Geographic distribution:** Carnic Alps.

**Remarks:** -

**Complementary references:** VAI (1998), SCHÖNLAUB & HISTON (2000), SCHÖNLAUB et al. (2004).

#### Kronhof-Kalk / Kronhof Limestone

THOMAS J. SUTTNER, ERIKA KIDO

**Validity:** Invalid; first described by SCHÖNLAUB (1969b, 1985a); mapped by KREUTZER & SCHÖNLAUB (1984); includ-

# 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-LUD-LOCK / LOW	415	DEVONIAN	LOWER DEVONIAN		
				HOMERIAN / SHEINWOOD	420				
				TELYCHIAN	425				
		AERONIAN	430						
		RHUDDANIAN	435						
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	440				
				LOCHKOVIAN	445				
		PERMIAN	DEVONIAN	HIRNANTIAN	447			DEVONIAN	UPPER ORDOVICIAN
				WOLYER	450				
				DARRIWILIAN	455				
TREMA-DOCIAN	460								
DEVONIAN	LOWER DEVONIAN			PRAGIAN	465				
				LOCHKOVIAN	470				
PERMIAN	DEVONIAN			PAIBIAN	475	DEVONIAN	MIDDLE ORDOVICIAN		
				WOLYER	480				
				DARRIWILIAN	485				
				TREMA-DOCIAN	490				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	495				
				LOCHKOVIAN	500				
		PERMIAN	DEVONIAN	PAIBIAN	505			DEVONIAN	UPPER CAMBRIAN
				WOLYER	510				
				DARRIWILIAN	515				
				TREMA-DOCIAN	520				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	525				
				LOCHKOVIAN	530				
PERMIAN	DEVONIAN			PAIBIAN	535	DEVONIAN	MIDDLE CAMBRIAN		
				WOLYER	540				
				DARRIWILIAN	545				
				TREMA-DOCIAN	550				
		DEVONIAN	LOWER DEVONIAN	PRAGIAN	555				
				LOCHKOVIAN	560				
		PERMIAN	DEVONIAN	PAIBIAN	565			DEVONIAN	LOWER CAMBRIAN
				WOLYER	570				
				DARRIWILIAN	575				
				TREMA-DOCIAN	580				
DEVONIAN	LOWER DEVONIAN			PRAGIAN	585				
				LOCHKOVIAN	590				



**Legend**

- pelagic, offshore, siliciclastic
- pelagic, nearshore, calcareous
- shallow marine, 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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