1867; VACEK, 1907); Kramenzelkalk (HERITSCH, 1917b), Manticoceraskalk (HERITSCH, 1927c), Kalkschiefer der Rannachwiese (CLAR, 1933), Oberdevonische Flaserkalke (KUNTSCHNIG, 1937), Bunte Flaserkalke (SCHÄFER, 1937), oberer Clymenienkalk (WAAGEN, 1937).

Lithology: Monotonous, well-bedded flaser limestones of variable colors.

Fossils: Conodonts and rare macrofossils (goniatites and clymeniids; solitary rugose corals).

Origin, facies: Depositions of a deeper shelf margin.

Chronostratigraphic age: Frasnian–Famennian (also may contain uppermost Givetian).

Biostratigraphy: *asymmetricus* to *praesulcata* conodont zones.

Thickness: Approximately 70 m.

Lithostratigraphically higher rank unit: Rannach Group.

Lithostratigraphic subdivision: FLÜGEL (2000) affiliates the "Flaserkalke des Höllerer-Kogel" of EBNER et al. (1979, 1980a) as a member to the Steinberg Formation. The Höllererkogel member comprises 20 to 30 m thick thin-bedded, yellow micritic flaser limestones that are developed at the base of the formation.

Underlying unit(s): Kollerkogel Formation, Hochlantsch Formation (conformable contact).

Overlying unit(s): Sanzenkogel Formation.

Lateral unit(s): Hochlantsch Formation.

Geographic distribution: Styria, highland in the surroundings of Graz; ÖK50-BMN, map sheets 134 Passail, 163 Voitsberg, and 164 Graz.

Remarks: -

Complementary references: EBNER (1978a), SURENIAN (1978), EBNER & HUBMANN (2012).

Sanzenkogel-Formation / Sanzenkogel Formation

BERNHARD HUBMANN

Validity: Valid; first description by NÖSSING (1975: Sanzenkogel-Schichten); formalized by FLÜGEL (2000: p. 29; Sanzenkogel-Formation).

Type area: ÖK50-UTM, map sheet 4228 Voitsberg (ÖK50-BMN, map sheet 163 Voitsberg).

Type section: At Sanzenkogel west of village Steinberg, 15 km west of Graz (ÖK50-BMN, map sheet 163 Voitsberg) (N 47°04'07" / E 15°19'18"); the type section is now within the abandoned quarry "Trolp" (NÖSSING, 1975).

Reference section(s): Eichkogel at Rein (NÖSSING et al., 1977) (N 47°07'17" / E 15°16'22") and section "Hartbauer" (N 47°07'22" / E 15°21'58") southeast of Gratkorn (EBNER et al., 1980b).

Derivation of name: After the hill Sanzenkogel 15 km west of Graz.

Synonyms: Partly: Clymenienkalk (PETERS, 1867; VACEK, 1907); Kramenzelkalk (HERITSCH, 1917b); Manticoceraskalk (HERITSCH, 1927c); Kalkschiefer der Rannachwiese (CLAR, 1933); Oberdevonische Flaserkalke (KUNTSCHNIG, 1937); Bunte Flaserkalke (SCHÄFER, 1937); oberer Clymenienkalk (WAAGEN, 1937); *Gnathodus*-Kalk (FLÜGEL & ZIEGLER, 1957); Steinberg-Kalk (H. FLÜGEL, 1975).

Lithology: Monotonous, well-bedded flaser limestones of variable colors, mostly greyish; lydites.

Fossils: Conodonts.

Origin, facies: Depositions of a deeper shelf margin.

Chronostratigraphic age: Tournaisian–Serpukhovian.

Biostratigraphy: *sulcata* to *bilineatus bollandensis* conodont zones.

Thickness: Up to 35 m.

Lithostratigraphically higher rank unit: Forstkogel Group.

Lithostratigraphic subdivision: Within the Sanzenkogel Formation FLÜGEL (2000) distinguishd two beds, Hart Bed and Trolp Bed.
Hart Bed: Well-bedded grey-yellowish lydites; variable in thickness (half a meter to 2 meters).
Trolp Bed: Dark grey marly limestones with phosphoritic nodules (diameters up to 5 cm); about 20 cm in thickness.

Underlying unit(s): Steinberg Formation.

Overlying unit(s): Höchkogel Formation.

Lateral unit(s): -

Geographic distribution: Styria, highland in the surroundings of Graz; ÖK50-BMN, map sheets 163 Voitsberg, 164 Graz.

Remarks: Distinguishing lithological features between rocks of the Sanzenkogel Formation and the underlying Steinberg Formation are rather meagre. Furthermore, the subdivision of a "lower Sanzenkogel Formation" with its type section at Sanzenkogel (abandoned quarry "Trolp"; see NÖSSING, 1975) and the "upper Sanzenkogel Formation" (FLÜGEL, 2000) with its type section at the roadcut "Hartbauer" (see EBNER, 1978a) is only a biostratigraphic not a lithostratigraphic one.

Complementary references: BOŠIČ (1998), EBNER & HUBMANN (2012).

Dornerkogel-Formation / Dornerkogel Formation

BERNHARD HUBMANN

Validity: Valid; first description by SY (1957: "Sandsteine des Dorner-Kogels"); formalization by FLÜGEL (2000: p. 13; Dornerkogel-Formation).

Type area: ÖK50-UTM, map sheet 4223 Weiz (ÖK50-BMN, map sheet 134 Passail).

Type section: No type section defined, but FLÜGEL (2000) proposed a type region at Dornerkogel, a mountain near St. Erhard (Breitenau), ÖK50-BMN, map sheet 134 Passail (N 47°21'11" / E 15°22'58").

Reference section(s): -

Derivation of name: After the mountain Dornerkogel (1,336 m) north St. Erhard (Breitenau), approx. 60 km north of Graz.

Synonyms: Sandsteine des Dorner-Kogels (SY, 1957); Dornerkogel-Folge (H. FLÜGEL, 1975); Dornerkogelfolge (FLÜGEL & NEUBAUER, 1984); partly: Karbon der Breitenau (FLÜGEL, 1953a).

Lithology: Greenish-grey arkoses, greywackes and sandstones.

Fossils: Undeterminable fragmental plant remains.

Origin, facies: Shallow marine environment.

Chronostratigraphic age: Carboniferous (?)
Remarks: The age of the formation is unknown but due to the presence of undeterminable fragmental plant remains a Carboniferous age is proposed (HASENHÜTTL, 1994).

Biostratigraphy: -

Thickness: Probably several hundreds of meters.

Lithostratigraphically higher rank unit: Laufnitzdorf Group (FLÜGEL, 2000).

Lithostratigraphic subdivision: -

Underlying unit(s): Tectonic boundary to the Schattleitner Member (St. Jakob Formation).

Overlying unit(s): ?

Lateral unit(s): -

Geographic distribution: Styria, highland in the surroundings of Graz; ÖK50-BMN, map sheet 134 Passail.

Remarks: -

Complementary references: -

Bärenschütz-Formation / Bärenschütz Formation

BERNHARD HUBMANN

Validity: Valid; first description by ZIER (1981: "Karbonkalke", "Mixnitzer Karbon"); formalized by FLÜGEL (2000: p. 37; Bärenschütz-Formation).

Type area: ÖK50-UTM, map sheet 4223 Weiz (ÖK50-BMN, map sheet 134 Passail).

Type section: No type section selected, although ZIER (1981) described four sections in the area of the Rote Wand (Hochlantsch region) ÖK50-BMN, map sheet 134 Passail (N 47°21'54" / E 15°25'47").

Reference section(s): See above.

Derivation of name: After "Bärenschützklamm", a gorge west of Mixnitz, approx. 45 km north of Graz.

Synonyms: Partly Hochlautschkalk [sic!] (CLAR, 1874), Hochlantsch-Kalk (H. FLÜGEL, 1975).

Lithology: Reddish to yellow and grey cephalopod limestones with cherts.

Fossils: Conodonts, cephalopods.

Origin, facies: Open marine environment with pelagic organisms.

Chronostratigraphic age: Tournaisian–Serpukhovian ("Namurian B"); not Moskovian as indicated in the ASC 2004.

Biostratigraphy: *declinognathodus noduliferus* conodont zone.

Thickness: About 100 m.

Lithostratigraphically higher rank unit: Mixnitz Group (FLÜGEL, 2000).

Lithostratigraphic subdivision: At the base of the Bärenschütz Formation red-brown brecciated limestones and dolostones are developed following an erosional relief. This breccia horizon is integrated into the Nadelspitz Bed (FLÜGEL, 2000).

Underlying unit(s): Hochlantsch Formation.

Overlying unit(s): -

Lateral unit(s): -

Geographic distribution: Styria, highland in the surroundings of Graz; ÖK50-BMN, map sheet 134 Passail.

Remarks: -

Complementary references: -

Höchkogel-Formation / Höchkogel Formation

BERNHARD HUBMANN

Validity: Valid; first nomination and description by CLAR (1933: "Kalkschiefer vom Höchkogel"); formalized and redescribed by FLÜGEL (2000: p. 30–31; Höchkogel-Formation).

Type area: ÖK50-UTM, map sheet 4229 Graz (ÖK50-BMN, map sheet 164 Graz).

Type section: No type section defined, but FLÜGEL (2000) proposed a type region at Höchkogel near Gratkorn (elevation spot 643 m on ÖK50-BMN, map sheet 164 Graz) (N 47°09'22" / E 15°22'36") 16 km northwest of Graz.

Reference section(s): -
Remarks: CLAR's (1933) conception of the "Kalkschiefer vom Höchkogel" integrated different stratigraphic units (see FLÜGEL, 2000) and therefore the term was re-interpreted by FLÜGEL (2000). EBNER (1978a) summarized those units following the Steinberg and Sanzenkogel Formations to the "Folge der Dult" which he subdivided into two lithologically different parts. Limestones of the lower part which are developed upon an erosional surface (i.e., "Kalke der Dult" sensu EBNER, 1978a = Höchkögel Formation) are overlain by shales (i.e., "Schiefer der Dult" sensu EBNER, 1978a = Hahngraben Formation).

Derivation of name: After the hill Höchkogel 16 km northwest of Graz.

Synonyms: Kalke der Dult (EBNER, 1978a); partly: Kalke mit *Cladochonus* (HERITSCH, 1930b); Kalkschiefer vom Höchkogel (CLAR, 1933).

Lithology: Dark grey-brownish to black micritic limestones.

Fossils: Conodonts

Origin, facies: Shallow marine deposits.

Chronostratigraphic age: Bashkirian.

Biostratigraphy: Conodonts of the *Declinognathodus-Idiognathoiodes* group indicate an early Bashkirian age (EBNER, 1977, 1980a).

Thickness: Up to 20 m in thickness.

Lithostratigraphically higher rank unit: Dult Group.

Lithostratigraphic subdivision: FLÜGEL (2000) distinguished two members:

Hartbauer Member (= Typ II-Kalk, EBNER, 1975a = Basiskalk, EBNER 1978a): Black massive limestones with crusts of hematite; locally dolostones, breccias and shales; maximum thickness of 20 m.
Schrausbauer Member (= Typ III-Kalk, EBNER, 1975a): Black argillaceous shales and oolithic limestones with birdseye-structures; some few meters in thickness.

Underlying unit(s): Sanzenkogel Formation (erosional contact).

Overlying unit(s): Hahngraben Formation.

Lateral unit(s): -

Austrian Stratigraphic Chart 2004 - Paleozoic

(sedimentary successions)

Austrian Stratigraphic Commission

ASC

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

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