

# Spinotti Formation

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Österreichische Karte 1:50.000

Blatt BMN 197 Kötschach

Blatt BMN 198 Weißbriach

Blatt UTM 3109 Oberdrauburg

Blatt UTM 3116 Sonnenalpe Naßfeld

Carta Topografica d'Italia 1:50.000

Foglio 018 Passo di Monte Croce Carnico

Foglio 031 Ampezzo

Foglio 032 Tolmezzo

## Definition

A heterogenic unit characterized by basal bioclastic stromatoporoid rudite succeeded by peloid- and cortoid-rich grainstone intercalated with birdseye limestone and *Amphipora* limestone. Dolomite-rich algal laminites occur infrequently (POHLER, 1982).

## Description

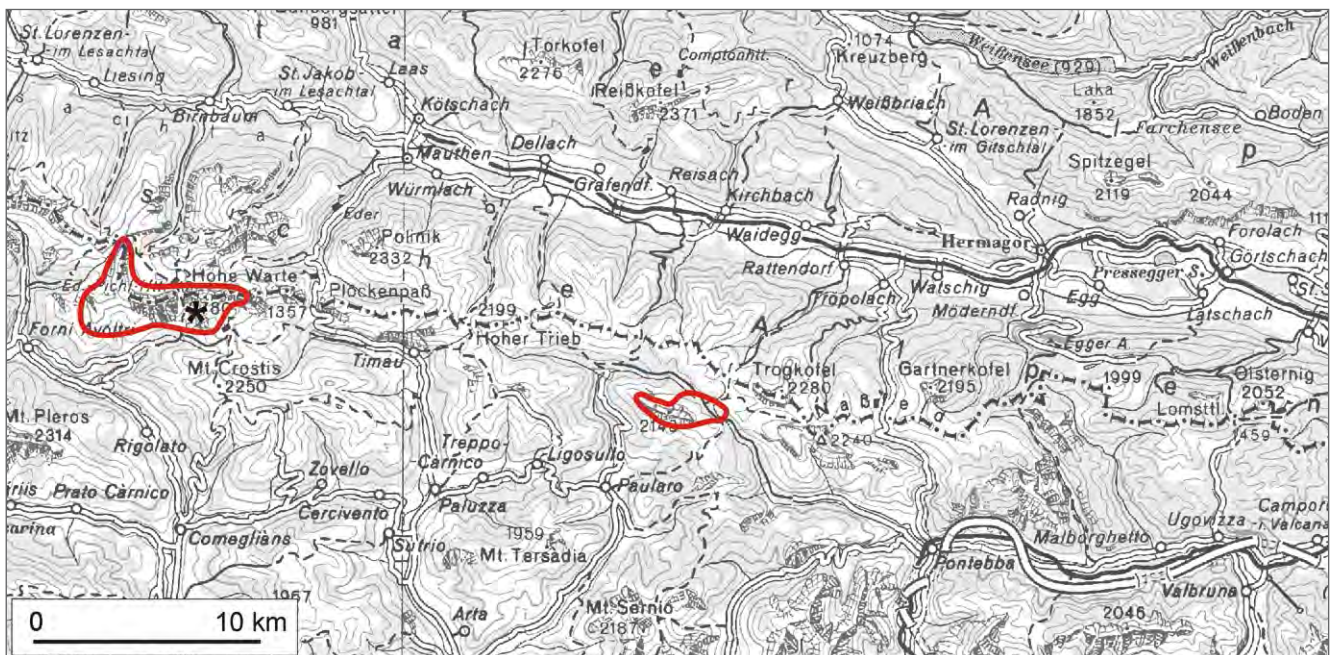
The Spinotti Formation can be subdivided into three units: Unit 1, a lower massive stromatoporoid and crinoid-rich bioclastic limestone (from the onset of massive limestone below the ladder at 1880 m to elevation 1970 m at Sentiero Spinotti; elevation 1840-1860 m at Seekopf base), followed by Unit 2, a thick-bedded to massive light gray grainstone to rudstone. Beds are two to three meters thick with thin (25-30 cm) dolomitic interbeds. Higher up section the bed thickness decreases to 0.5-1 m and dolomite beds become more prevalent. Components are largely peloids and intraclasts comparable to the Eiskar Limestone described by KREUTZER (1990, 1992a). Unit 3 is characterized by bedded limestone with well-developed birdseye structures from elevation 2020 m to 2200 m. Dark limestones with *Amphipora* become more common in this upper part. Above the trail at 2120 m are bedded limestones with *Stringocephalus* exposed. This unit also contains many gastropods and amphipores. BANDEL (1972: 30) observed stringocephalids in the area called "dolines" beyond Costone Stella at elevation 2180 m. These cannot be correlated with the ones at 2120 m and must belong to a higher stratigraphic unit, suggesting that the Eifelian-Givetian boundary is located approximately in the middle of the section.

Seewarte base: At elevation 1680 m Birdseye limestones begin with dolomitic laminite beds.

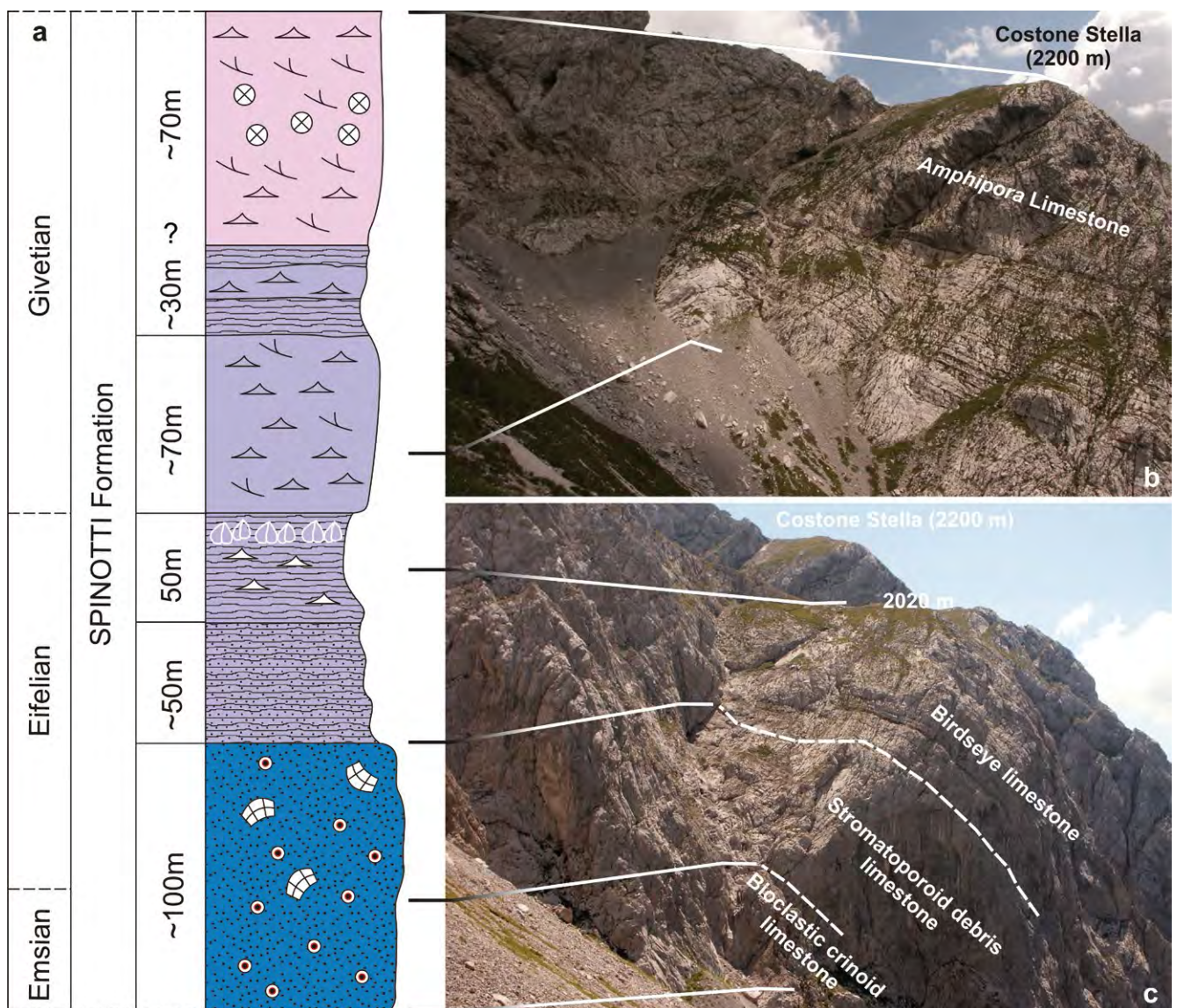
Seekopf base/ Rio Landri: Birdseye limestones set in at elevation 1820 m.

Trail to Collina: Birdseye limestones set in at elevation 1530 m.

*Amphipora*-rich limestones occur at the crossing between road and trail to Rifugio Marinelli at elevation 1400 m.



Areas of outcrop of the Spinotti Formation with indication of the stratotype (asterisk).



The Sentiero Spinotti Section. a) simplified log of type section (modified after POHLER, 1982); b-c) the formation is subdivided into three units and starts with the onset of massive limestone below the ladder at elevation 1880 m to estimated termination of the section at fault contact with the Hochwipfel Formation (photos H.P. SCHÖNLAUB).

## Fossil content

Unit 1: Brachiopods, rugose and tabulate corals, stromatoporoids.

Unit 2: Bivalves, brachiopods, bryozoans, calcareous algae, calcispheres, rugose and tabulate corals, foraminifers, gastropods, ostracods, radiospheres, massive and branching stromatoporoids.

Unit 3: Algae, bivalves, brachiopods, bryozoans, calcispheres, rugose and tabulate corals, foraminifers, gastropods, ostracods, radiospheres, stromatoporoids.

## Depositional environment

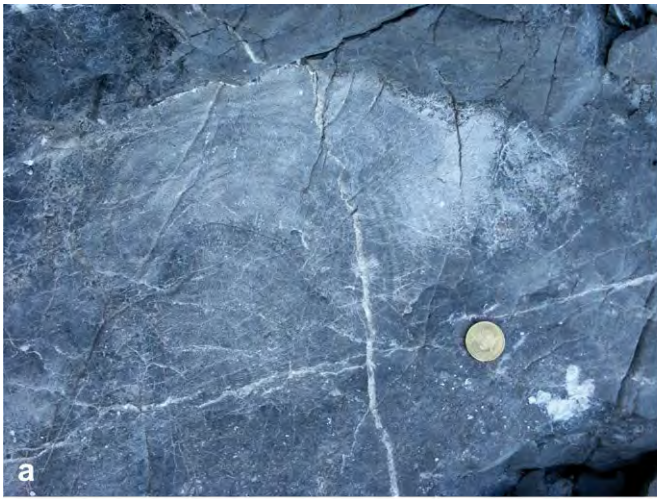
Unit 1 was deposited in a near-reef environment as it contains bioclasts of reef-building organisms.

Unit 2 is a shelf edge or outer ramp deposit similar to the peloid-cortoid rich grainstones known from the Eiskar section (KREUTZER, 1990; 1992b).

Unit 3 is characteristic of intertidal to shallow subtidal conditions with limited water energy.

## Stratotype

Trail along Sentiero Spinotti (Hoher Gang) between Rifugio Lambertenghi-Romanin and Rifugio Marinelli at coordinates N 46°36'06", E 12°52'26" (POHLER, 1982; KREUTZER, 1992a).



Views of the Spinotti Formation in the field. a-c) Sentiero Spinotti Section (photos H.P. SCHÖNLAUB). a) massive limestone with large colonies of corals and stromatoporoids from the base of the formation. b) beds with *Stringocephalus*; c) rock surface with abundant *Amphipora*; d-f) *Amphipora* Limestone at Cason di Lanza (photos T.J. SUTTNER). e-f) detailed view on rock surface with abundant *Amphipora* and rugose corals.

## Reference sections -

### Type area

Carnic Alps.

### Main outcrop areas

The Spinotti Formation crops out mainly in Central Carnic Alps (Mt. Hohe Warte, Kellerwand, Seewarte, Seekopf and Biegegebirge). It is well developed at Monte Zermula (FERRARI & VAI, 1966), Cason di Lanza (CORRADINI et al., 2012) and Cima Ombladet (GALLI, 1985).

### Thickness

Variable from 210 m at Mt. Hohe Warte to about 370 m at Mt. Seewarte.

### Boundaries

*Underlying units* – Lambertenghi Formation (conformable contact).

*Overlying units* – Kellergrat Formation (conformable, gradual contact).

*Lateral units* – Kellergrat Formation, Polinik Formation, Vinz Formation, Cellon Formation.

### Derivation of name

After Sentiero Spinotti, a trail that traverses outcrops of the limestone succession (KREUTZER, 1992a).

### Synonymy

Riffkalk-Facies der Stockwerke H-G-H [partim]: STACHE (1884).

Calcari con *Pentamerus* aff. *Pseudo-baschkiricus*: GORTANI (1913).

Pentamerenkalk, Riffkalk mit *Pentamerus* aff. *pseudobaschkiricus*: GAERTNER (1931).

Strati (o Calcari) a *Pentamerus* cfr. *pseudo-baschkiricus*: DAL PIAZ & TREVISAN (1956).

ZONA A *PENTAMERUS*: SELLI (1963).

ZONA A *STRINGOCEPHALUS burtini*: SELLI (1963).

La serie calcarea di M. Zermula [partim]: FERRARI & VAI (1966).

*Pentamerus* Limestone (Eifelian) and *Stringocephalus* Limestone (Givetian): FLÜGEL (1967).

Stromatoporen-Korallen-Crinoidenkalk: SCHÖNLAUB (1971–1973).

Gebankter Birdseye-Amphiporen-Brachiopoden-Kalk: SCHÖNLAUB (1971–1973); SCHÖNLAUB (1985).

*Pentamerus* Lst.: SCHÖNLAUB (1980).

*Amphipora* Lst.: SCHÖNLAUB (1980).

*Amphipora*-Kalk: SCHÖNLAUB (1985).

Korallen/Crinoiden-K.: SCHÖNLAUB (1985); SCHÖNLAUB (1991).

Stromatoporen-Korallen-Crinoidenschuttkalk: SCHÖNLAUB (1985).

Crinoiden-Kalk and Birdseye-Kalk: KREUTZER (1990).

Amphiporenkalk: SCHÖNLAUB (1991).

Fossilschuttkalke: SCHÖNLAUB (1991).

Geschichtete „Birdseye“-Kalke: SCHÖNLAUB (1991).

Eiskar Limestone [partim]: KREUTZER (1992b).

Calcari a *Pentamerus*: CARULLI (2006).

Calcari ad *Amphipora*: CARULLI (2006).

Calcari a *Stringocephalus*: CARULLI (2006).

### Chronostratigraphic age

Devonian: Emsian to Givetian (VAI, 1963; BANDEL, 1972; SCHÖNLAUB et al., 2004: 15–16).

### Biostratigraphy

*Brachiopods*. – *Stringocephalus burtini* (BANDEL, 1972; POHLER, 1982).

### Complementary references -

## Remarks

SCHÖNLAUB & FLAJS (1975) noted the different thickness of the Spinotti Formation at Seewarte and Hohe Warte where the Eifelian-Givetian boundary is located at about 2760 m (here beds with *Stringocephalus burtini*) suggesting a thickness of 210 m for the Spinotti Formation. At Seewarte up to the yellow Bank where the *Stringocephalus* crops out the section measures about 200 m, which is in good agreement with the Hohe Warte succession. At Hohe Warte, reef limestones are exposed at the peak of the mountain and are also encountered along the track down south, whereas at the southern massif of Seewarte (Costone Stella down to Rio Moraret) the entire section is still composed of *Amphipora* and Birdseye Limestone with no trace of the reefal Kellergrat Formation. It has to be concluded that the Spinotti Formation is in part a lateral equivalent of the Kellergrat Formation.

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Jahr/Year: 2015

Band/Volume: [69](#)

Autor(en)/Author(s): Pohler Susanne M.L., Corradini Carlo, Kido Erika, Pondrelli Monica, Schönlaub Hans-Peter, Simonetto Luca, Spalletta Claudia, Suttner Thomas

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