Hohe Warte Formation

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Österreichische Karte 1:50.000
Blatt BMN 197 Kötschach

Carta Topografica d'Italia 1:50.000
Foglio 018 Passo di Monte Croce Carnico

Blatt UTM 3109 Oberdrauburg

Definition

Massive light-gray limestones with common crinoid bioclasts and reef debris (grainstone, rudstone, framestone).

Description

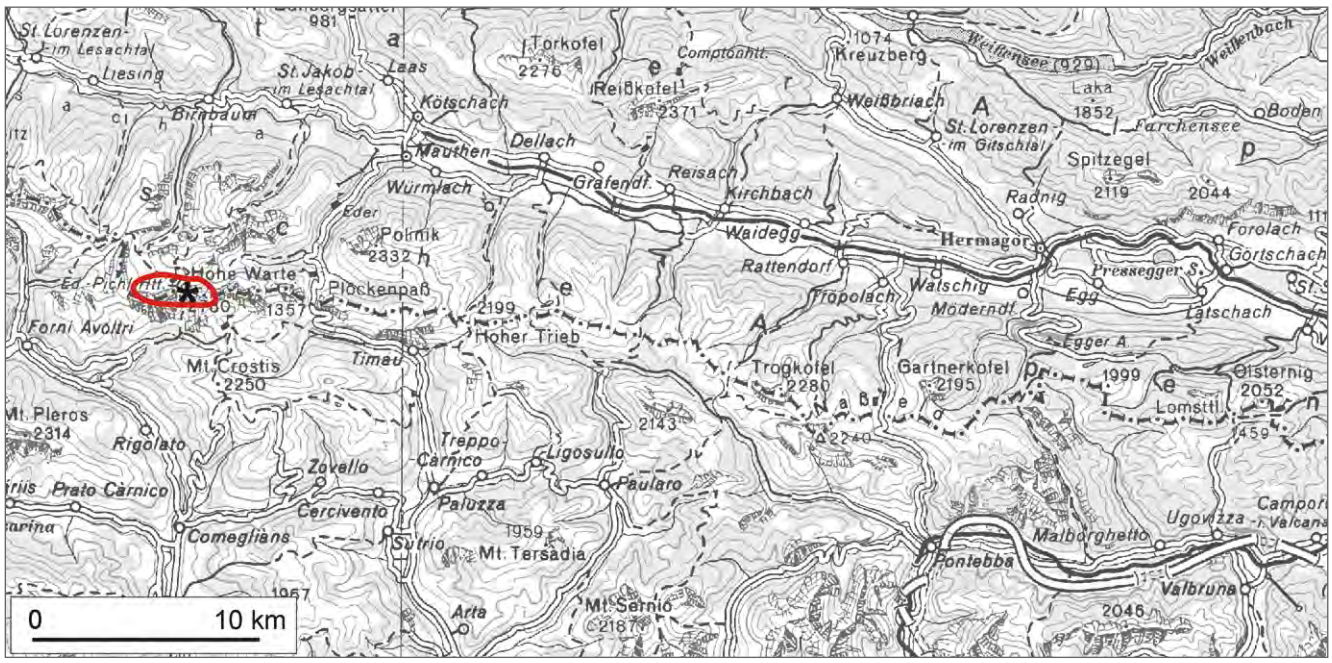
The Hohe Warte Formation consists of thick-bedded echinoderm-rich grainstone and rudstone in the lower part and massive reefal limestone interbedded with crinoid grainstone and rudstone in the upper part. Large crinoid fragments are rock-forming in the lower part of the unit; tabulate and rugose corals along with stromatoporoids characterize the massive upper part.

Fossil content

Brachiopods, bryozoans, calcareous algae, calcimicrobes, conodonts, rugose and tabulate corals, crinoids, dacryoconarids, gastropods, lamellibranchiates, stromatoporoids, trilobites.

Depositional environment

The depositional environment was reconstructed by BANDEL (1969). It was characterized by dense forests of crinoids with small coral thickets and stromatoporoid growths between them. The paleoenvironment was shallow water with strong currents and fresh sea-water rich in planktonic life. Some reefs composed of stromatoporoids, corals and calcareous green algae grew on the platform as well. The water was shallow throughout deposition of the Hohe Warte Formation.



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

The Seewarte Section. a) simplified log of the succession on the SW flank of Mt. Seewarte (adopted from SUTTNER, 2007). Numbers included in the lithological column correspond to BANDEL (1969) and are still visible in field; b) panoramic view of the Lower Devonian units at Mt. Seewarte (photo C. CORRADINI). The dark gray band of the Seewarte Formation separates the Hohe Warte Formation below from the Lambertenghi Formation above.

Stratotype

Seewarte section (VAI, 1963; BANDEL, 1969; SUTTNER, 2007), located at the base of Mt. Seewarte, near Lake Wolayer at coordinates N 46°36'44.5", E 12°52'21.4".

Reference sections -

Type area

Central Carnic Alps.

Main outcrop areas

The Hohe Warte Formation crops out mainly in the Central Carnic Alps. It is present at the southern continuation of Mt. Seekopf, Biegengebirge (BANDEL, 1969; KREUTZER, 1992; SCHÖNLAUB et al., 2004), and base of Gamskofel (KREUTZER, 1992).

Thickness

263 m at Seewarte (BANDEL 1969) to 300 m at Mt. Hohe Warte (SCHÖNLAUB & FLAJS, 1975).

Boundaries

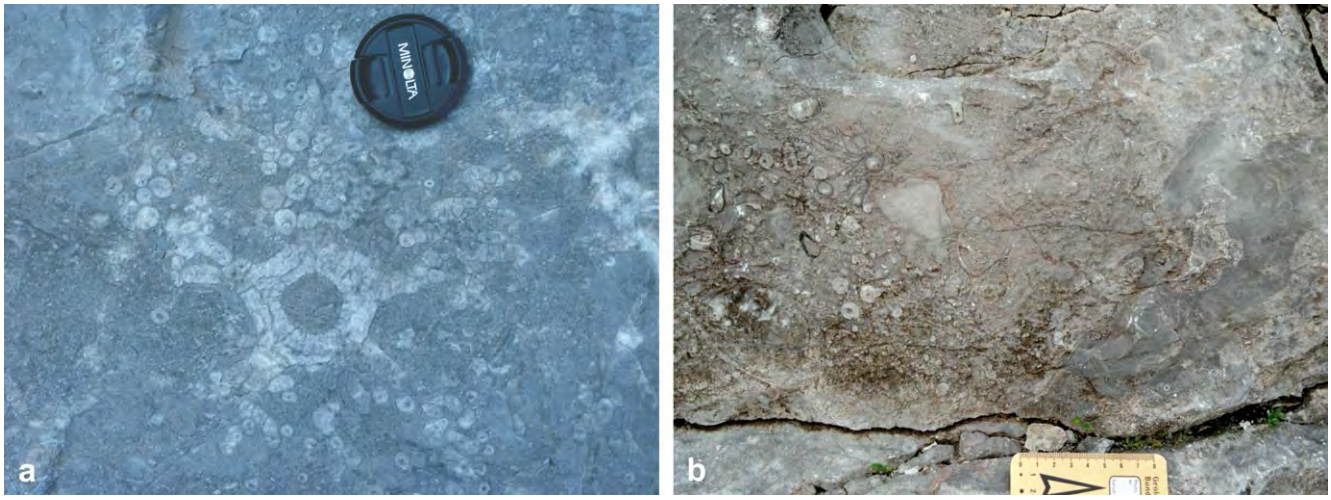
Underlying units – Seekopf Formation (unconformable/paraconformable contact).

Overlying units – Seewarte Formation (conformable gradual contact).

Lateral units – Kellerwand Formation, Polinik Formation.

Derivation of name

Suggested by KREUTZER (1992: 270) after Mt. Hohe Warte, the highest mountain in the Central Carnic Alps.



Typical macrofacies of the Hohe Warte Formation. a) at base of Mt. Hohe Warte are large boulders from the Hohe Warte Formation accumulated which show cross-sections of crinoid calyces (photo H.P. Schönlaub); b) crinoid stem plates, brachiopods and large stromatoporoid colonies overgrowing tabulate corals are common bioclasts in the Hohe Warte Formation (photo T.J. Suttner).

Synonymy

Riffkalk-Facies der Stockwerke H-G-H [partim]: Stache (1884).
Korallenriffkalk am Wolayer u. Seekopf-Thörl [partim]: Frech (1887).
Unterdevonischer Riffkalk [partim]: Frech (1894).
Calcari con *Karpinskya conjugula*: Gortani (1913).
Riffkalk mit *Karpinskya conjugula*: Gaertner (1931).
Graue, organo-detritische Kalke: Erben et al. (1962).
ZONA A *KARPINSKYA conjugula*: Selli (1963).
Schichten mit *K. conjugula*: Pölsler (1967).
Liegende graue Kalke: Jhaveri (1969).
Helle Crinoiden-Kalke: Bandel (1969).
Helle Crinoidenschuttkalke mit *Karpinskya conjugula* und Riffkalk: Bandel (1969), Schönlaub (1971–1973).
Bioclastic lst.: Schönlaub (1980).
Heller Crinoidenschuttkalk mit *Karpinskia conjugula*: Schönlaub (1985).
Riffkalke des Prag: Schönlaub (1985).
Heller Crinoidenschuttkalk: Kreutzer (1990).
Riffkalk: Kreutzer (1990).
Hohe Warte Formation: Suttner (2007).

Chronostratigraphic age

Devonian: Pragian; possibly to earliest Emsian.

Biostratigraphy

Brachiopods. – Scupin (1906), Plodowski (1971), Latz (1989).

Typical Pragian species are: *Kyrtatrypa canalibalda*, cf. *Linguopugnoides remissus*, *Oglu havan*, *Punctatrypa (Fossatrypa) paradoxa*.

Conodonts. – From the ? *P. serratus* to the *I. celtibericus* Zones (Suttner, 2007).

Dacryoconarids. – Vai (1973) found *Nowakia acuaria*.

Trilobites. – Erben et al. (1962), Ellermann (1989).

Many species of trilobites found in the Hohe Warte Formation are not suitable for precise biostratigraphy, because of their long range. However, some are indicative of Pragian age: *e.g. Acanthopyge parva parva*, *Coniproetus eurysthenes obscurus*, *Lioharpes venulosus venulosus*, *Otarion (Otarion) convexum*, *Otarion (Cyphaspis) hydrocephalum barrandei*.

Complementary references

Paleontology. – May & Pohler (2009).

Sedimentology. – Pohler et al. (2007).

Remarks

BANDEL (1969) measured the section in detail beginning with the Lochkovian Seekopf Formation (his units 0a-0g and 1, 2). SUTTNER (2007: 6) shows the base of the Hohe Warte Formation above a dolomitized fault zone, consequently the Hohe Warte Formation begins at the base of Bandel's unit 3. BANDEL (1972: 31) noted the similarity of lower Devonian crinoidal limestones at western flank of Mt. Polinik to those of Hohe Warte and Seewarte.

The Hohe Warte Formation was assigned to the Pragian already by VAI (in SCHÖNLAUB, 1980).

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