

# Conclusions

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the smallest recorded cycle generation has not a 20 ky period but one of hitherto unrecognized shorter duration (around 5000–8000 y).

Additional high-quality age determinations are clearly required to resolve the discrepancies. Stratigraphically controlled rocks which are potentially suitable for radiometric age dating occur at various levels throughout the Anisian to Carnian stratigraphy of the Southern Alps! Our future efforts shall therefore address these problems.

## 7. Conclusions

South Alpine Anisian/Ladinian boundary sections in basinal and platform settings are correlatable in detail by means of macrofossils and characteristic volcanoclastic layers. The projections are the basis for the following conclusions of bio- and chronostratigraphical interest:

- (1) Clear relative positions are ascertained for ammonoids and Daonellas in the Anisian/Ladinian boundary interval. Key ammonoids include species of *Judicarites*, *Paraceratites*, *Kellnerites*, *Hungarites*, *Reitziites*, *Parakellnerites*, *Aplococeras*, *Ticinites*, *Halilucites*, *Stoppaniceras*, *Nevadites*, *Chieseiceras*, *Eoprotrachyceras*, *Arpadites* and *Protrachyceras*. In the Southern Alps most of the recognized ammonoid levels are documented in the Bagolino section.
- (2) The ammonoid succession between the *Trinodosus* and the *Curionii* Zones is split into two zones of presumably similar duration. The terms “*Reitzi/Kellnerites* Zone” and “*Nevadites* Zone” are suggested for the older and younger interval respectively.
- (3) Within this zonal scheme the Anisian/Ladinian boundary can be suitably located at the boundary between the *Nevadites* and *Curionii* Zones. This is equivalent to the top of the “*Chiesense groove*” in the continuous pelagic successions of the Brescian Prealps and Giudicarie. This time marker can be pinpointed or approximated in a number of sections in the Southern Alps and further afield. Moreover it corresponds most closely to the widely accepted position of the stage boundary in North America.
- (4) Radiometric age data of stratigraphically controlled Middle Triassic magmatic rocks in the Southern Alps suggest an age of some 232 Ma for the base of the Ladinian Stage. However, this age and the duration of 7 My for this stage (*Curionii* to *Regoledanus* Zone) is in conflict with other recent estimates.
- (5) The time scale and resulting rates of sedimentation suggest that the smallest recorded cycle generation of the Latemar platform interior facies has a period that is significantly shorter than 20 ky. A corroboration of this conclusion has to await more high quality radiometric age data, however.

Clear geometrical relationships and the positions of equivalent macrofossils (ammonoids and Daonellas) in basinal sediments and adjacent carbonate platforms in the Dolomites constrain the timing and reconstruction of the platform to basin evolution:

- (6) In the western Dolomites, a long lasting phase (*Reitzi/Kellnerites*- to *Gredleri* Zone) of platform up- and equivalent outbuilding (Latemar, Rosengarten) was followed by a short period of rapid lateral accretion (Rosengarten). The latter stage corresponds to only a small stratigraphic interval of the uppermost “*Buchenstein Beds*.”
- (7) At Latemar and Cerneria, platform aggradation was fastest during parts of the *Reitzi/Kellnerites*- and *Nevadites* Zones. However, the net carbonate accumulation

rates were not uniform. The higher rate of creation of accommodation space at Cenera resulted in a inbuilding geometry with little clinof orm progradation prior to the drowning of the platform.

- (8) The fossil finds support the correlation of the rapid initial aggradation at Latemar with the deposition of starved, organic rich mudstones at the base of the "Buchenstein Beds" (i.e. the "Lower Plattenkalke"). On a larger scale, however, the origin and significance of strata rich in organic matter is less clear. The stratigraphic range of an interval with discrete bituminous layers at Monte San Giorgio overlaps only marginally with the range of the "Lower Plattenkalke" in the Dolomites.
- (9) The drowning of carbonate platforms in the eastern Dolomites and Carnia started somewhat earlier than the Anisian/Ladinian boundary. The demonstrably variable ages of pelagic sediments on top of different platform portions suggest an important role of tectonic subsidence in these phases of drowning.

## 8. Systematic descriptions

**Classification:** Except for the genus *Nevadites* the sequence of the ammonoid genera followed in the description is based on the classification by Tozer (1981 a, b). However, it is supposed that a detailed study of the suture line may better elucidate the relationships between genera than does the present classification which is based mainly on the ornamentation and the cross section as taxonomic characteristics. Because of its relatively simple suture line the new genus *Latemarites* is affiliated to the Danubitidae.

**Numeration and keeping:** The ammonoid and bivalve material dealt with in this paper is kept in the collection of the Palaeontological Institute and Museum of the University of Zurich (PIMUZ). The specimens are labelled with the prefix "PIMUZ" followed by a number (e.g. PIMUZ 7102). In the text and in tables but not in their legends the prefix is omitted.

Standard abbreviations used in tables are: D: diameter, H: whorl height, Hr: relative whorl height (in % of the diameter), MN: number of marginal nodes per half turn, LN: number of lateral nodes per half turn, P: primary ribs per half turn, U: umbilical width, UN: umbilical nodes per half turn, Ur: relative umbilical width (in % of the diameter), W: whorl width, Wr: relative whorl width (in % of the diameter).

### 8.1. Class Cephalopoda

Order **Ceratitida** HYATT, 1884

Superfamily **Ceratitaceae** MOJSISOVICS, 1879

#### 8.1.1. Family **Hungaritidae** WAAGEN, 1895

#### ***Hungarites*** MOJSISOVICS, 1879

#### **Remarks on *Hungarites* and *Parakellnerites* sensu lato:**

In several levels of the "Buchenstein Beds" as well as in Latemar Limestone and in a condensed interval on the northern paleoslope of the Cenera platform ceratitids occur which are characterized by a distinct external keel (at least on inner whorls) and prominent and sometimes elongated marginal tubercles. The umbilical wall of these ceratitids