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Aptian and Albian ammonites in the Western Carpathians (the Czech and Slovak Republics)

Ammoniti aptiane ed albiane nei Carpazi occidentali (Repubbliche Ceca e Slovacca)

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ABSTRACT - Deposits of the Aptian and Albian age in the Western Carpathians reflect the tectonic disturbance heralding the gradual development of palaeoalpine orogenesis at the end of the Lower Cretaceous. With few exceptions, the Aptian and Albian successions in both the Outer and the Central Western Carpathians are macrofaunistically much poorer than the deposits in the lower part of the Lower Cretaceous. Fossiliferous deposits from the Outer Carpathians are known from the Silesian Unit (the upper part of the Tešín-Hradište Formation). They belong almost excusively to the lowermost Aptian (*Prochelonicerasalbrechtiaustriae*), exceptionally to the Upper Aptian (*Acanthohoplites nolani*). From the Klippen Belt only sporadically occurring Lower Albian ammonites are known. Quite new relatively abundant ammonite finds from the Upper Albian flysch deposits in the Klape Unit of the Klippen Zone include the subzonal species *Dipoloceras cristatum* and *Hysteroceras orbignyi*. In the Central Carpathians ammonites occur sporadically in the marly deposits of the Párnica Formation in the Lower Aptian (probably Deshayesi Zone), in a tectonic unit of higher order called Fatric. The base of the Zabijak Formation in the Tatric Unit has an exceptional position. From this condensed horizon came PASSENDORFER's collection, from which MARCINOWSKI & WIEDMANN described approximately 60 species corresponding to the ammonite zones of Floridum up to Altonense (the middle part of the Lower Albian up to the higher part of the Upper Albian). From the palaeobiogeographical point of view, the bulk of the Aptian and Albian deposits in the Western Carpathians contains only ammonites of the Mediterranean faunal province. MARCINOWSKI & WIEDMANN stated that there were boreal hoplitides that penetrated into the Tatric during the Middle Albian.

KEY WORDS: Czech and Slovak Republics, Western Carpathians, Aptian, Albian, ammonites.

RIASSUNTO - I depositi dell' Aptiano e dell'Albiano nei Carpazi occidentali riflettono l'attività tettonica che annuncia il graduale sviluppo dell'orogenesi paleoalpina alla fine del Cretaceo inferiore. Tranne poche eccezioni, le successioni aptiane ed albiane, sia nel Carpazi occidentali esterni che centrali, sono macrofaunisticamente molto più povere dei depositi della parte più bassa del Cretaceo inferiore. Si conoscono depositi fossiliferi dei Carpazi esterni dall'Unità Silesiaca (parte superiore della FormazioneTešín-Hradište). Essi appartengono quasi esclusivamente all'Aptiano basale (*Prochelonicerasalbrechtiaustriae*), eccezionalmente all'Aptiano superiore (*Acanthohoplites nolani*). Dal "Klippen Belt" sono solo sporadicamente segnalate ammoniti dell'Aptiano inferiore. Ritrovamenti relativamente recenti, e frequenti, di ammoniti nel flysch dell'Albiano superiore nell'Unità Klape, nella zona dei Klippen, include gli indici subzonali *Dipoloceras cristatum* e *Hysteroceras orbignyi*. Nei Carpazi centrali si trovano sporadicamente ammoniti nei depositi marnosi della Formazione Pàrnica dell'Aptiano inferiore (probabilmente Zona a Deshayesi), in un'unità tettonica di ordine più alto, chiamata Fatricum. La base della Formazione Zabijak

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nell'Unità Tatrica è in una posizione eccezionale. Da questo orizzonte condensato proviene la collezione PASSENDORFER, da cui MARCINOWSKI & WIEDMANN descrissero approssimativamente 60 specie corrispondenti ad un intervallo che va dalla Zone a Floridum fino alla Zona a Altonense (parte media dell'Albiano inferiore fino alla parte più alta dell'Albiano superiore). Dal punto di vista paleobiogeografico, la massa dei depositi Aptiani ed Albiani nei Carpazi occidentali contiene solo ammoniti della provincia faunistica mediterranea. MARCINOWSKI & WIEDMANN stabilirono l'esistenza di hoplitidi boreali che penetrarono nel dominioTatrico durante l'Albiano medio.

PAROLE CHIAVE: Repubbliche Ceca e Slovacca, Carpazi occidentali, Aptiano, Albiano, ammoniti.

1. - INTRODUCTION

The Western Carpathians extend mainly over the territory of the Slovak Republic and reach the neighbouring territory of the Czech and Polish Republics (Fig. 1). They belong to the Middle-European Alpine mountain belt with a complicated nappe structure. The one from supposed palinspastic situation of sedimentary basins at the end of the Lower Cretaceous (before Alpine movement and nappe shifting) is illustrated in Fig. 2. The present surface structure, with the basic divisions of the Western Carpathians including the position of the Aptian and Albian ammonite localities discussed here, are shown in Fig. 3.

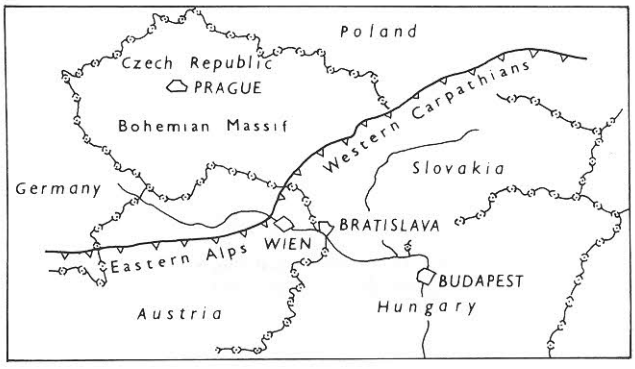

Fig. 1 - The geographical position of the Western Carpathians in the Central Europe.
- *La posizione geografica dei Carpazi occidentali nell'Europa centrale.*

It was the concurrent tectonic rearrangement of the complex system of Carpathian sedimentary basins which influenced the development of the Aptian and Albian stages in the whole Western Carpathians (VAŠÍCEK *et alii*, 1994). This is seen outstandingly both in the character of the sedimentation and in ammonite occurrences and preservation. Generally it may be stated that in the Western Carpathians continuous sequences of strata do occur, but there is a shortage of fossiliferous deposits that could be utilized at least as type profiles supported minimally by two or three biozones of ammonites occurring immediately one after another.

2. - AMMONITE ASSOCIATIONS

In the Outer (Flysch) Western Carpathians the Aptian and Albian period is best documented in the Silesian Unit and in the Klippen Belt. In the former unit sedimentation occurred in an increasingly deep basin, while the previous tendency towards deposition of dark coloured, predominantly pelitic rocks continued (MENCÍK *et alii*, 1983, VAŠÍCEK *et alii*, 1994). With the gradual loss of carbonate content also ammonites disappeared very quickly from these deposits. The lowermost Aptian is the best known here, with the index species *Procheloniceras albrechtiaustriae* (UHLIG), the rare occurrence of hitherto only imperfectly known representants of *Prodeshayesites* Casey and *Costidiscus microcostatus* (SIMONOVICH, BACEVICH & SOROKIN), *Procheloniceras pachystephanum* (UHLIG), *Cheloniceras* aff. *seminodosum* (SINZOW), *Deshayesites borowae* (UHLIG), *Acrioceras karsteni* (UHLIG) etc. (localities Verovice, Kuncice, Kozlovice, Ostravice, Hradište etc. - VAŠÍCEK, 1972, 1973). One locality (below the Pindula saddle) has yielded the Upper Aptian ammonites *Acanthohoplites nolani exiquecostatus* EGOIAN, *Tetragonites duvalianus* (D'ORBIGNY), *Nodosohoplites moravicus* VAŠÍCEK and *N. difficilis* VAŠÍCEK (VAŠÍCEK, 1981). The specimen of *Acanthohoplites* ex gr. *bigoureti* (SEUNES) recorded by LIEBUS & UHLIG (1902) no longer exist in the collections. Albian ammonites are still not known in the Silesian Unit.

In the Klippen Belt, deposition of Aptian-Albian pelagic carbonates periodically gave way to that of pelitic sediments and later of flysch. In the last few decades there have been no new discoveries of Aptian and Lower Albian ammonites. STÚR (1860, 1868) recorded *Leymeriella tardefurcata* (LEYMERIE) and *Douvilleiceras mammillatum* (SCHLOTHEIM) from the Lower Albian at one or two localities (Tvrdošín) of the Klippen Belt in the Orava valley. These too have since disappeared from the collections.

Upper Albian ammonites have been recently in found the flysch of the Klape Unit of the Klippen Belt, at Považský Chlmec (VAŠÍCEK & RAKÚS, 1993). The prevailing species here is *Puzosia* ex gr. *mayoriana* (D'ORBIGNY). Other species include *Phylloceras (Hypophylloceras)* ex gr. *velledae* (MICHELIN), *Kossmatella* cf. *muhlenbecki* (FALLOT), *K. schindewolfi* WIEDMANN & DIENI, *Hamites (H.) compressus* SOWERBY, *H. (Metahamites) passendorferi* MARCINOWSKI & WIEDMANN, *Hemiptychoceras* ex gr. *gaultinum* (PICTET), *Hysteroceras carinatum* SPATH, *Prohysteroceras (Goodhalites)* cf. *delabechei* SPATH and stratigraphically important forms such as *Dipoloceras (D.) cristatum* (DELUC) and *Hysteroceras*

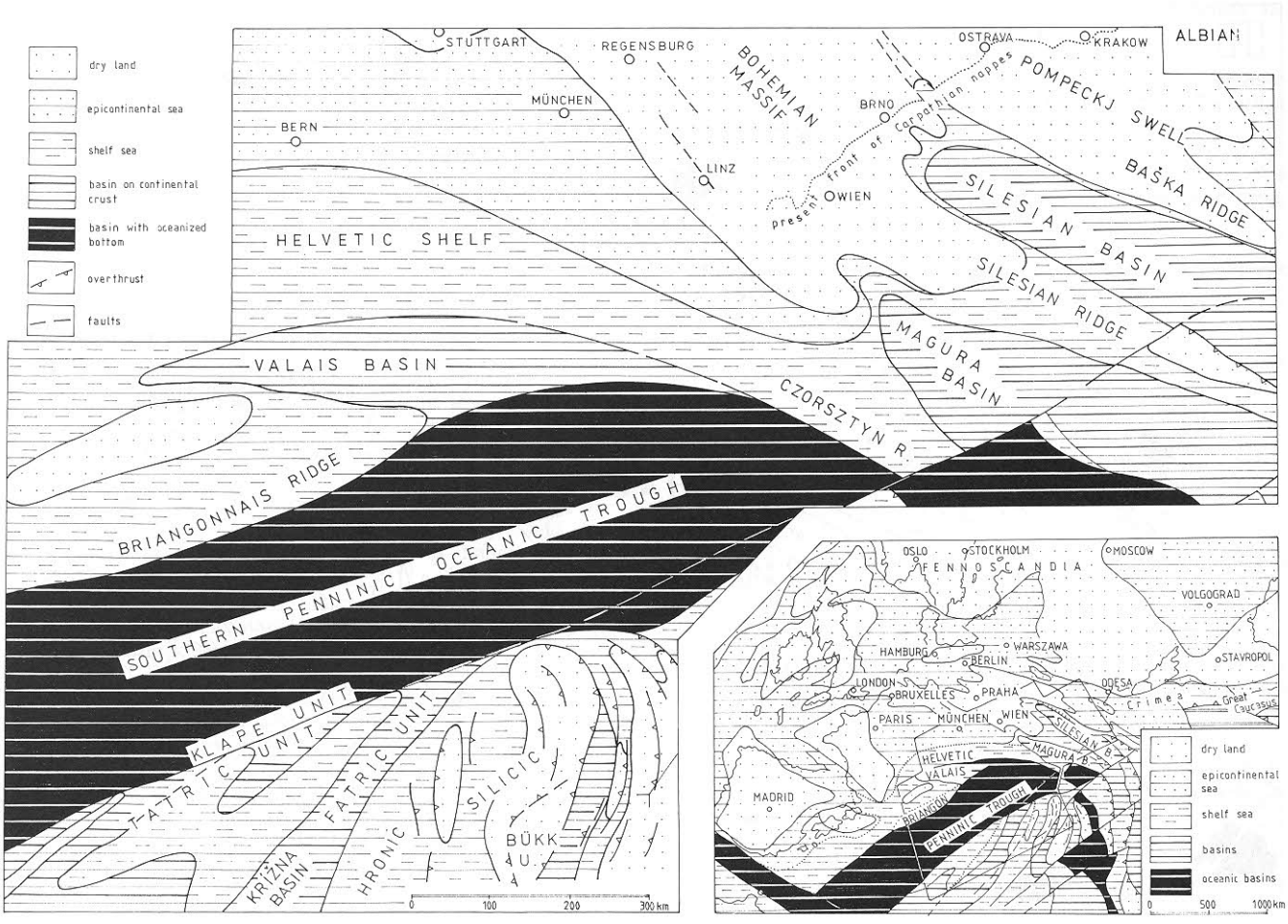

Fig. 2 - The supposed palinspastic situation of Carpathian sedimentary basins during the Albian stage (after VAŠÍCEK *et alii*, 1994).
- La presunta collocazione palinspastica dei bacini sedimentari dei Carpazi nell'Albiano (VAŠÍCEK et alii, 1994).

orbignyi (SPATH). These prove the lower part of the Upper Albian (Inflatum Zone).

At Skalica, sporadic fragments of ammonite molds have been collected from a conglomeratic breccia consisting predominantly of limestone pebbles and fragments of Urgonian type with glauconitic sandy marl matrix (the slope deposits of the Manín Unit in the zone passing between the Klippen Belt and the Central Carpathians in the Váh valley).

Acanthohoplites SINZOW indicates the Upper Aptian, while the sole mold of *Phylloceras (Hypophylloceras) moreti* (MAHMOUD) is of Albian age (MICHALÍK & VAŠÍCEK, 1984).

During the Aptian-Albian interval the Central Western Carpathians were more affected by the reconstruction of sedimentary basins then the Outer Carpathians. Usually already during the Barremian massive limestone of Urgonian type developed on newly occurring carbonate platforms, instead of the former marly limestone facies (Neocomian) which may also be replaced by marly and later by flysch deposits in the deeper zones. In these facies ammonites are lacking or only very rarely seen. Aptian marly deposits in the Fatric Unit at Medziholie may be regarded as an exception, for from here ANDRUSOV (1931) recorded minute pyritized ammonites, now lost. During the last survey HAŠKO & POLÁK (1979) rediscovered the horizon but found only a few fragments of ammonites, among which VAŠÍCEK & RAKÚS (*this volume*) determined the following species: *Phylloceras (Hypophylloceras) cypris cypris* (FALLOT & TERMIER), *Macroscaphites striatisulcatus* (D'ORBIGNY), *Costidiscus tenuistriatus* (REPELIN), *Deshayesites* sp., *Melchiorites* cf. *emerici* (RASPAIL) and *Toxoceratoides* sp. However, they could not confirm ANDRUSOV's (1931) record of *Cheloniceras cornuelianum* (D'ORBIGNY).

Nevertheless, his identification can be accepted, especially as VAŠÍCEK *et alii* (1994) found *Cheloniceras* cf. *cornuelianum* in a similar set of deposits at another locality in the Zázrivka valley, near Zázrivá. So the Medziholie locality belongs to the Lower Aptian, most probably to the Deshayesi Zone.

In the High Tatra region of the Central Western Carpathians, at the Slovak-Polish border, grey-green glauconitic limestones form the base of the Zabijak

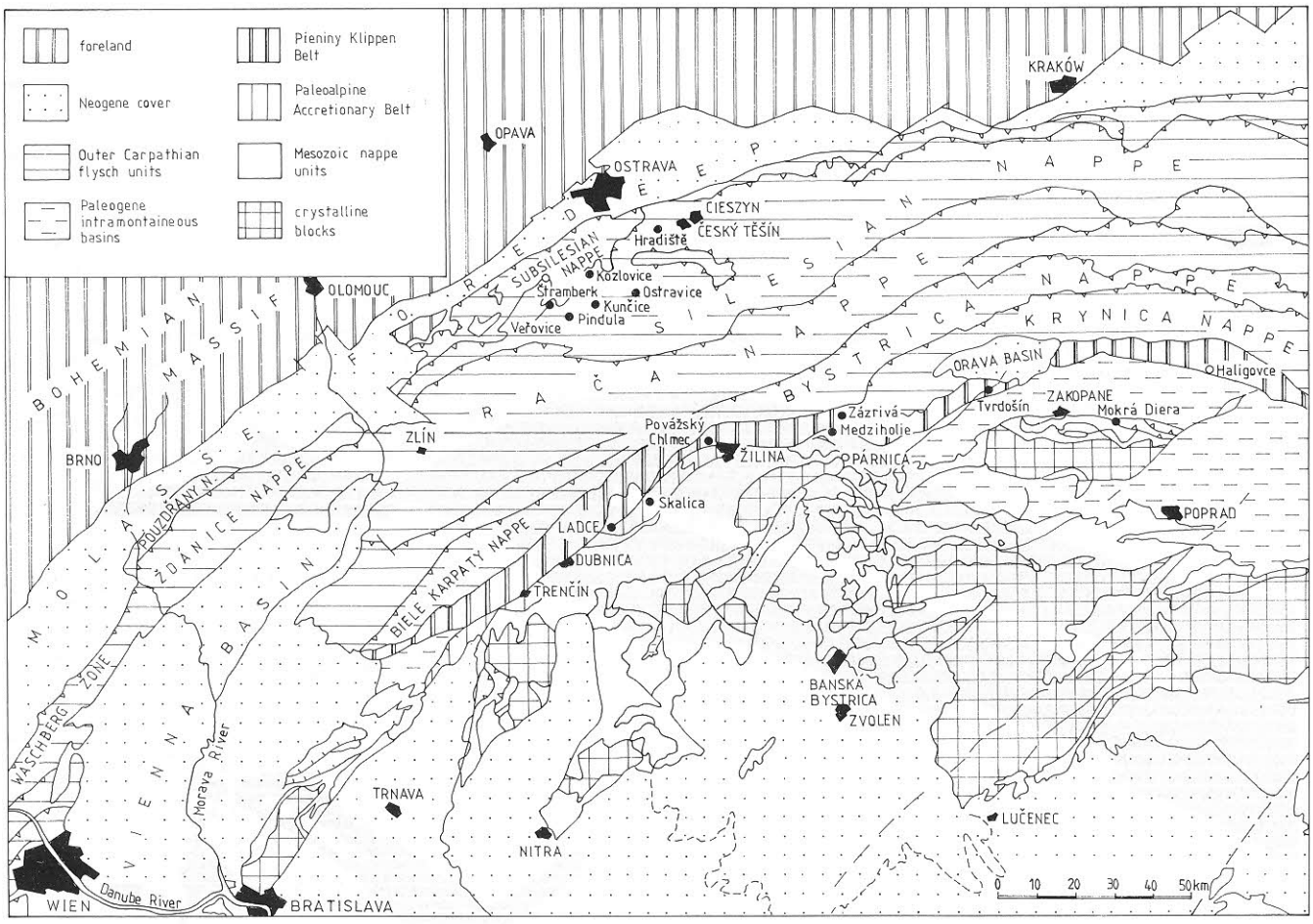

Fig. 3 - The present structure of the Western Carpathians. The position of the main Aptian and Albian ammonite localities is shown by the black circles. - *L'attuale struttura dei Carpazi occidentali. La posizione delle principali località ad ammoniti aptiane ed albiane è evidenziata dai cerchi neri.*

Formation (Tatric Unit). From a condensed horizon characterized among others by phosphatisation of organic remains, based on Passendorfer made a collection, from which MARCINOWSKI & WIEDMANN (1990) described about 60 ammonite species indicating the Floridum to Altonense Zones (the middle part of the Lower Albian up to the higher part of Upper Albian).

The stratigraphically most important species in the fauna are: *Douvilleiceras mammillatum* (SCHLOTHEIM) from the Lower Albian, *Hoplites (H.) dentatus* (SOWERBY) and *Anahoplites splendens* (SOWERBY) from the Middle Albian, and *Dipoloceras cristatum* (DELUC) and *Hysteroceras orbignyi* (SPATH) from the Upper Albian. New collections from Mokrá Diera Cave in Slovakia (RAKÚS *et alii*, in press) have added the species *Tegoceras gladiator* (BAYLE), *Sonneratia* cf.*dutempleana* (D'ORBIGNY) and *?Rossalites* sp.

Especially from the palaeobiogeographical point of view it is interesting to note that together with Mediterranean ammonites also hoplitids occur in the Middle Albian of the High Tatra area while in other Aptian and Albian Carpathian deposits only Mediterranean ammonites are known. This shows that boreal elements penetrated the Tatric region of the Central Carpathians in the Middle Albian for a short period.

According to the data and the sketch by MARCINOWSKI & WIEDMANN (1985, 1988, 1990 - Fig. 1) during the Middle Albian the hoplitids migrated from Western Europe through the platform areas of Poland (from the north and northwest to the southeast) through the Danish-Polish Trough to the Russian Platform and via Lwow area into the Carpathian region.

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