

## *Phylloceras (Hypophylloceras) (Ammonoidea) from the Turonian of North Germany*

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With 3 figures

**Kurzfassung:** Aus dem norddeutschen Turon werden erstmals Vertreter der Phyllocerata beschrieben. Sie können *Phylloceras (Hypophylloceras)* sp. zugeordnet werden. Eine Auflistung der wenigen bislang in der Literatur angeführten Phylloceraten aus der borealen Oberkreide Westeuropas wird gegeben. Diese zeigt, daß die Neufunde helfen, eine Lücke in der Überlieferung der Gruppe zwischen Cenoman und Santon dieser Region zu schließen. Möglicherweise hängt das Vorkommen der für tethyale Faunen typischen Phylloceraten in der tieferen Oberkreide Westeuropas mit Paläoströmungen zusammen, die von der Tethys in das europäische Boreal gerichtet waren.

**Abstract:** Representatives of the Phyllocerata are described from the Turonian of North Germany for the first time. The specimens are referred to *Phylloceras (Hypophylloceras)* sp. All phylloceratids reported in the literature from the Boreal Upper Cretaceous of western Europe are mentioned. The new material helps to fill the gap in the record of this group between the Cenomanian and the Santonian of this realm, where they are generally very rare. It is assumed that the occurrence of Cenomanian and Turonian phylloceratids, ammonites regarded as typical for Tethyan faunas, is connected with the Middle Cretaceous palaeocurrents directed from the Tethyan realm to the European Boreal.

### Introduction

Phylloceratids are typical for the Tethyan realm (e.g. JELETZKY 1970, 1971; MATSUMOTO 1973; WIEDMANN 1979); however, representatives of this group are very rare in the Boreal Cretaceous (e.g. JELETZKY 1971; KENNEDY & COBBAN 1976; KENNEDY & KLINGER 1977; KLINGER & WIEDMANN 1983; WRIGHT & BAYLISS 1982). Concerning the Upper Cretaceous of western Europe there are only few records from the Cenomanian and Santonian-Maastrichtian. Recently two specimens of phylloceratid ammonites were found in the Turonian of Westphalia. The material represents the first record of phylloceratids in the Turonian of western Europe. Both specimens are distorted to some degree but are clearly referable to *Phylloceras (Hypophylloceras)* sp.

The better preserved specimen (GPIT 1769/1) is from the *Subprionocyclus neptuni* Zone (*Hyphantoceras* event), Upper Turonian. It was found in the quarry Foerth, northwest of Halle/Westphalia (Fig. 1). For detailed section of this locality see KAPLAN (1986: Fig. 2). Specimen GPIT 1769/2 is from the upper part of the *Collignonicerias woollgari* Zone, Middle Turonian. It was collected at the building-site of the goods station Rheine, at the southern margin of the city of Rheine/Westphalia (Fig. 1). Repository of the two specimens: Geologisch-Paläontologisches Institut und Museum, Universität Tübingen (publication-number: 1769).

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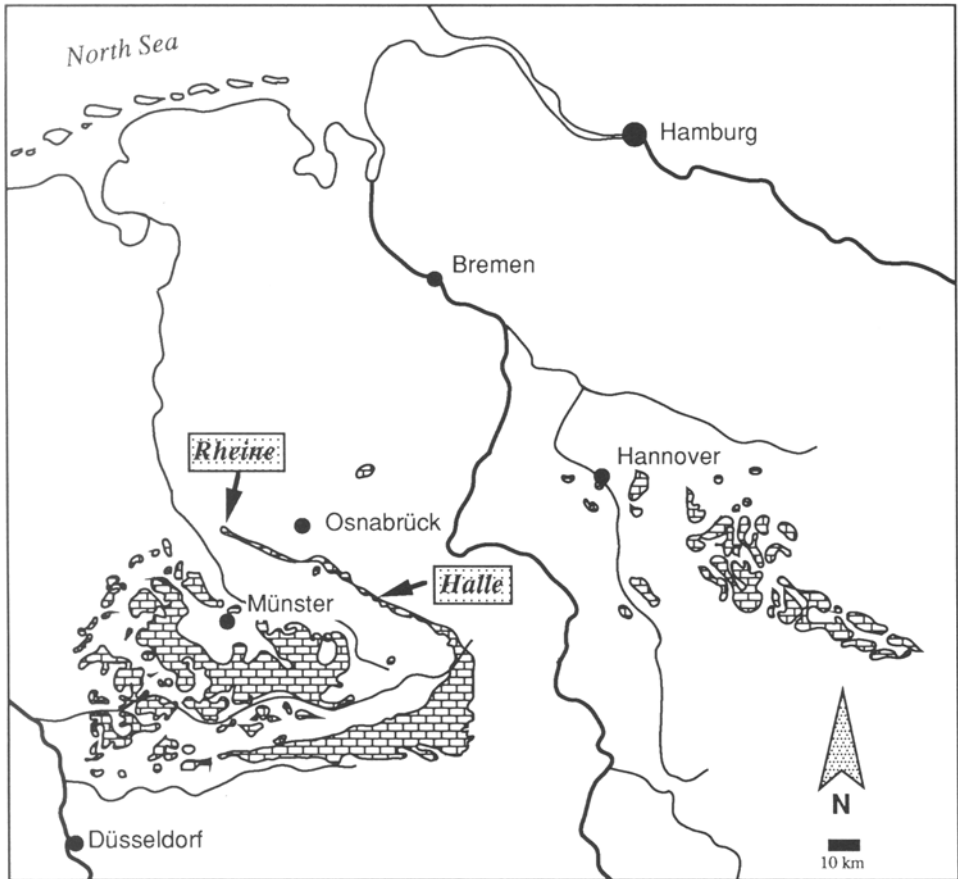


Fig. 1. Upper Cretaceous outcrops in North Germany (limestone pattern) with localities of the described specimens of *Phylloceras* (*Hypophylloceras*) sp.

### Systematic palaeontology

Order Phylloceratida ARKELL 1950

Suborder Phylloceratina ARKELL 1950

Family Phylloceratidae ZITTEL 1884

Genus *Phylloceras* SUESS 1865

Subgenus *Hypophylloceras* SALFELD 1924

Type species: *Phylloceras onoense* STANTON 1895.

Subgeneric diagnosis: See WIEDMANN (1962: 257) and KENNEDY & KLINGER (1977: 354, translated from WIEDMANN 1964: 173).

*Phylloceras* (*Hypophylloceras*) sp.

Figs. 2-3

Material: Two more or less distorted specimens, from Halle and Rheine/Westphalia.

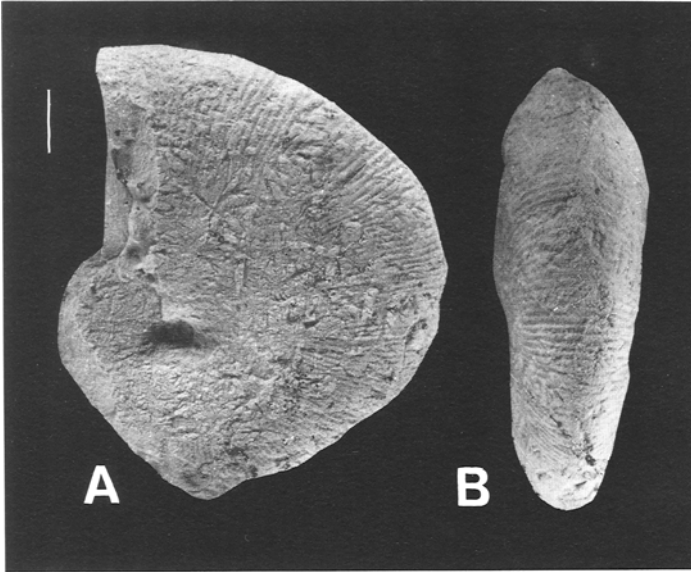


Fig. 2. *Phylloceras (Hypophylloceras)* sp. from the Upper Turonian (*S. neptuni* Zone, *Hyphantoceras* event) of Halle/Westphalia; GPIT 1769/1. A: Lateral view; B: Ventral view. Scale bar 5 mm.

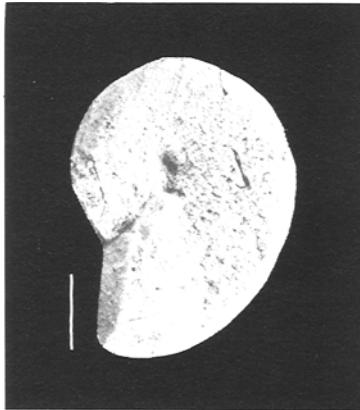


Fig. 3. *Phylloceras (Hypophylloceras)* sp. from the Middle Turonian (upper *C. woollgari* Zone) of Rheine/Westphalia; GPIT 1769/2. Lateral view. Scale bar 5 mm.

**Description:** The specimens show a narrow umbilicus and a clearly compressed whorl section. Fine ribs are visible.

GPIT 1769/1 (Fig. 2) is a steinkern of a phragmocone. The ventral side is preserved in only about half of the last whorl, and is laterally distorted. The maximum diameter of the phragmocone is estimated at 45 mm. The whorl section is highly compressed, even allowing for distortion of the specimen. The flanks are nearly parallel and flat. The umbilicus is narrow (about 6% of the diameter). There are fine, rather convex than concave curved ribs, visible only

at the outer flank where they are as broad as the intercostal spaces. On a quarter of a whorl 47 ribs can be counted. The suture line is badly preserved and shows no diagnostic features.

GPIT 1769/2 (Fig. 3) is a badly preserved steinkern that is flattened by compaction. The preserved diameter is about 20 mm. The umbilicus is very narrow. A very fine ribbing is present, visible only around the venter.

Comparison: GPIT 1769/1, with non-inflated, more or less parallel flanks, bears much resemblance to *Ph. (H.) seresitense* PERVINQUIÈRE, a nearly cosmopolitan species ranging from the Upper Aptian to Middle Cenomanian. The lack of additional features unfortunately prevents a detailed comparison. The Westphalian specimens are clearly separated from all phylloceratid material described from the Santonian to Maastrichtian of Europe by their more depressed whorl section. GPIT 1769/1 shows little similarities with *Hyporbulites masiaposensis*, a phylloceratid described by COLLIGNON (1956) from Turonian and Coniacian beds of Madagascar. The specimen figured by COLLIGNON (pl. 1, fig. 7, 7a) is a large phragmocone from the Turonian. It has a diameter of about 120 mm, showing a compressed whorl section like GPIT 1769/1 but a wider umbilicus and inflated, non-parallel flanks.

GPIT 1769/2 is too badly preserved for a comparison.

Discussion: Comparing a specimen of *Phylloceras (Hypophylloceras)* sp. from the Campanian of Austria with other *Phylloceras (H.)* spp. material described from the same stage and the Maastrichtian of Europe, KENNEDY & SUMMESBERGER (1984) regard the feature of rather convex or concave bending of the flexuous ribs as diagnostic. Considering the lack of almost all other taxonomic valuable features as a consequence of the often very poor preservation of ammonites in the European Upper Cretaceous, this is an interesting attempt to solve the problem of distinguishing the *Phylloceras (Hypophylloceras)* material on the specific level. In my opinion this feature is unfortunately of too little diagnostic importance. KENNEDY & KLINGER (1977: 368) previously pointed out, that the ornamentation is subject to intraspecific variation within the higher Upper Cretaceous group around *Ph. (H.) nera* MARSHALL, thus the different suture lines remain as distinctive characters of these phylloceratids. However, with "better collections, it may be possible to show that all these species are junior subjective synonyms of *Ph. (Hypophylloceras) nera*" (KENNEDY & KLINGER 1977: 368). In the Middle Cretaceous phylloceratids, for example, within the group of *Phylloceras (Hypophylloceras) velleidae* (MICHELIN), the ribbing is clearly variable, too. The ribs can be rather convex or rather concave with obviously no preference of direction. Consequently, the ribbing will not be treated here for comparison.

COLLIGNON (1956: 17) mentioned a single specimen of *Hyporbulites seresitense* PERVINQUIÈRE from the Upper Turonian of Madagascar. He did not figure and describe the ammonite so that it remains unclear whether or not it is really a representative of *Phylloceras (Hypophylloceras) seresitense* PERVINQUIÈRE. The species is recorded with certainty from the Upper Aptian to the Middle Cenomanian.

## Fossil record of Phylloceratida in the Boreal Upper Cretaceous of western Europe

Ammonites of the order Phylloceratida are generally very rare in the Boreal realm of the Upper Cretaceous, also in the relatively well investigated realm of western Europe.

*Ammonites velleidae* SHARPE non MICHELIN was described by SHARPE (1856) from the Cenomanian of southern England and was reidentified by WRIGHT & WRIGHT (1951) as *Phylloceras* cf. *seresitense* PERVINQUIÈRE. Later additional material referred to *Phylloceras (Hypophylloceras)* cf. *seresitense* PERVINQUIÈRE was described by KENNEDY (1971) and WRIGHT & KENNEDY (1984). Material also from England, referred to a further species, *Ph. (H.) ellipticum* KOSSMAT 1895, was described by WRIGHT & BAYLISS (1982) and WRIGHT & KENNEDY (1984).

*Ph. (H.) seresitense* was mentioned by KAPLAN et al. (1984) and WIEDMANN et al. (1989) from the Cenomanian of North Germany.

Only one species of the subgenus was reported from the Santonian; it is *Ph. (H.) velledaeforme* (SCHLÜTER) from Austria (IMMEL et al. 1982).

*Ammonites velledae* was described from Campanian strata of England by SHARPE (1856). This specimen was assigned to *Ph. pergensi* (DE GROSSOUVRE) by WRIGHT & WRIGHT 1951, and to *Ph. (H.) pergensi* by KENNEDY & SUMMESBERGER (1984). TATE (1865) described *Ammonites oclusus* from northern Ireland, that is *Phyllopachyceras oclusum* (TATE) according to revision by WRIGHT & WRIGHT (1951).

In North Germany *Ammonites velledaeformis* was described by SCHLÜTER (1872: pl. 18, figs. 4–6) from most probably the Maastrichtian. Probably only pl. 18, figs. 4, 5 are undoubted *Ph. (H.) velledaeforme* (SCHLÜTER). The specimen figured by SCHLÜTER on pl. 10, fig. 6 was assigned to *Partschiceras forbesianum* (D'ORBIGNY) by KLINGER & WIEDMANN 1983. RAVN (1902) reported *Ph. velledaeforme* from the Campanian of Denmark, that is *Ph. (H.) velledaeforme* (SCHLÜTER) according to IMMEL et al. (1982). *Schlüteria bodei* MÜLLER & WOLLEMAN (1906) from the Campanian of North Germany may be a junior synonym of *Ph. (H.) velledaeforme*. GIERS (1964) reported *Ph. velledaeformis* also from the Campanian of North Germany. KENNEDY & SUMMESBERGER (1984: 153) pointed out that the type-specimens and the material from Denmark (RAVN 1902) of *Ph. (H.) velledaeformis* (SCHLÜTER) "appears rather in the Maastrichtian". *Phylloceras* sp. was reported by IMKELLER (1901) from the Campanian strata of South Germany (Bavaria).

*Hypophylloceras surya* (FORBES) and *Phyllopachyceras forbesianum* (D'ORBIGNY) were mentioned by KENNEDY (1993) from the Maastrichtian of South France. From the same strata of North Spain WIEDMANN (1988) recorded *Neophylloceras ramosum* (MEEK).

These citations show the great rarity of phylloceratids at all localities of the faunal province discussed above which is the main reason for the scant description compared to those in other parts of the world.

### Palaeogeographic implications

According to recent understanding the phylloceratids are typical for the Tethyan realm (e.g. JELETZKY 1970, 1971, 1971; MATSUMOTO 1973; WIEDMANN 1979). The two specimens described here could have drifted post-mortem or as larval stages from the Tethyan Sea into the Boreal realm or they are rare, random immigrants from this area. The specimens have been found in the Middle and Late Turonian. During the first substage, global transgressions can be assumed; during the second substage, global regressions (e.g. HANCOCK & KAUFFMAN 1979) are postulated. FUTAKAMI & OBATA (1988) assumed a relationship between these eustatic tendencies (connected with changes in palaeocurrents) and distributional patterns of collignoniceratids in the Turonian and Coniacian. Concerning the phylloceratids discussed here one problem is the small quantity of material present so far. Nevertheless the occurrence may reflect the presence of – at least temporary – palaeocurrents from the Tethyan Sea to western Europe during the Middle Cretaceous as assumed by LLOYD (1982). According to this assumption the more common occurrence of phylloceratids in the Cenomanian of North Germany in contrast to the Turonian, could be interpreted as an indication for more continuous and/or stronger Tethyan palaeocurrents into this area during the Cenomanian.

### Conclusions

The two specimens collected in North Germany are the first records of phylloceratids in the Turonian of western Europa. The better preserved specimen shows similarities to *Phylloceras*

(*Hypophylloceras*) *seresitense* PERVINQUIÈRE, recorded so far only up to the Middle Cenomanian, rather than to forms of Santonian to Maastrichtian age. The occurrence of these ammonites of Tethyan origin may indicate palaeocurrents from the Tethyan realm to North Germany during the Turonian that had previously been assumed.

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