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TURONIAN AMMONITES FROM THE EASTERN PART OF THE MOESIAN PLATFORM AND THE FORE-BALKAN (NE BULGARIA)

VELISLAV MINEV

Department of Palaeontology and Stratigraphy, Geological Institute, Bulgarian Academy of Sciences, Acad. G. Bonchev Bl. 24, 1113 Sofia, Bulgaria; minev@geology.bas.bg

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Abstract: About twenty ammonite species of Turonian age were determined from several sections in North-East Bulgaria. Six of them—*Subprionocyclus hitchinensis*, *Mesopuzosia beloensis*, *Tongoboryoceras donovani*, *Tongoboryoceras rhodanicum, Gaudryceras denseplicatum* and *Anagaudryceras sacya* were found for the first time in Bulgaria. The three Turonian substages are biostratigraphically proven. Three "standard ammonite zones" (uppermost Early Turonian —Mammites nodosoides Zone, Middle Turonian—Collignoniceras woollgari Zone and Late Turonian—Subprionocyclus neptuni Zone) are established. The lower-middle and middle-upper Turonian boundaries are estimated by ammonites.

Key words: Upper Cretaceous, Turonian, North-East Bulgaria, biostratigraphy, zonation, ammonites.

Introduction

The Upper Cretaceous stratigraphy in North-East Bulgaria was done mainly by Jolkichev (1988; 1989). He recognized the lithostratigraphic units in this area but did not mention all the ammonite taxa. Some of the Turonian ammonites obtained from the investigated region have been published and illustrated by Tzankov (1982). The objectives of this study are to determine and (or) to revise all ammonite species of Turonian age from this part of the country. It is a part of a larger study on the Upper Cretaceous ammonite fauna in Bulgaria. This paper is made in the framework of the project NZ-707 "Stratigraphy and paleontological content of the Cenomanian-Coniacian sediments in parts of the Srednogorie and the Fore-Balkan", financed by the National Fund for "Scientific Research" and it represents a contribution to the IGCP Project 362 "The Tethyan and Boreal Cretaceous".

Material and methods

The Turonian sequence in the study region is represented by sandstones and sandy limestones (upper parts of the Madara Formation) sandy, slightly silty and chalk-like limestones with extremely abundant carbonate-siliceous and siliceous concretions (Mogila Formation). These sediments are covered by phosphorite bed and glauconite sandstones (Dobrindol Formation), which are laterally replaced by the limestones of the Venchan Formation (Jolkichev 1989).

More than 150 specimens of Turonian ammonites are documented from several sections in the region of the towns Provadiya, Kaspichan and Shoumen, North-East Bulgaria (Fig. 1). They comprise a relatively high species diversity and are very well preserved. The largest part of the ammonite taxa obtained is of Late Turonian age. The whole fauna belongs to three collections stored at the Palaeontological Museum, Sofia University "St. Kliment Ohridski".

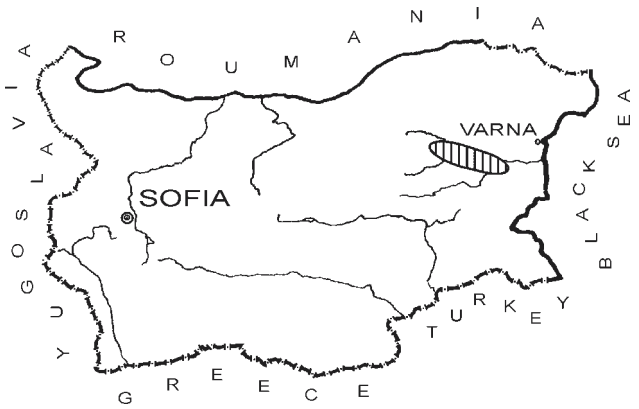

Fig. 1. Sketch map with location of the sections.

Biostratigraphic interpretations

The Early Turonian age is proven by *Inoceramus labiatus* Schlotheim (Tzankov et al. 1952, p. 63). *Lewesiceras peramplum* (Mantell) (Pl. IV: Fig. 4) is a characteristic species for the uppermost Early Turonian ammonite zone (Mammites nodosoides) and the Middle Turonian Collignoniceras woollgari Zone.

The Middle Turonian ammonites in the investigated sections are mainly *Collignoniceras* Breistroffer — *Collignon-*

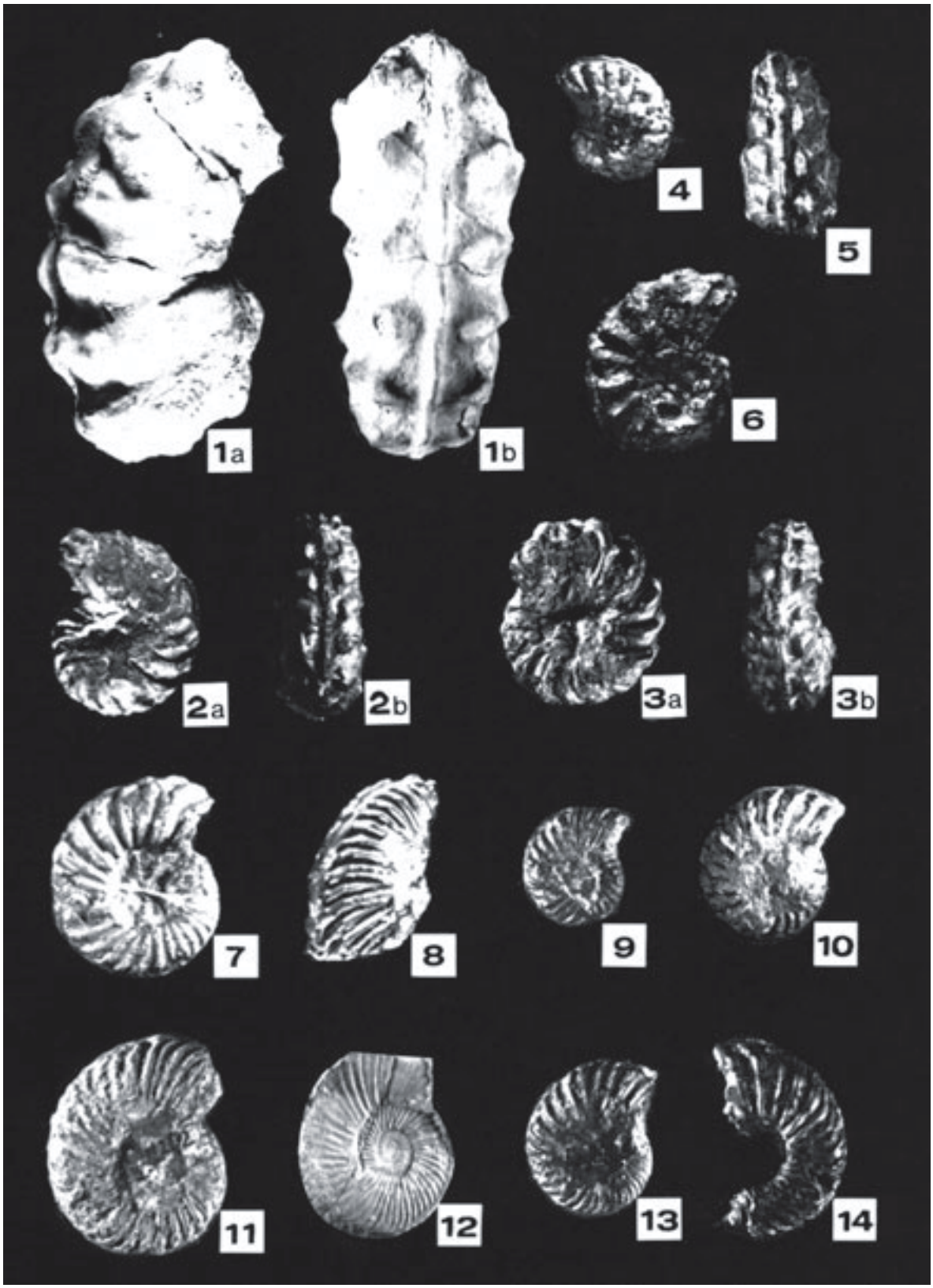

Plate I: Figs. 1–6. *Collignoniceras woollgari* (Mantell) — Middle Turonian; 1 — 2533, 2 — Cr_2 1212, 3 — Cr_2 1211, 4 — Cr_2 1203, 5 — BM 242, 6 — 362. **Figs. 7–9.** *Collignoniceras carolinum* (d'Orbigny) — Middle Turonian; 7 — BM 241, 8 — BM 233, 9 — Cr_2 1209. **Figs. 10–11.** *Collignoniceras bravaisianum* (d'Orbigny) — Middle-Upper Turonian; 10 — 379, 11 — Cr_2 1202. **Fig. 12.** *Subprionocyclus hitchinensis* (Billinghurst) — Upper Turonian; BM 222. **Figs. 13–14.** *Subprionocyclus neptuni* (Geinitz) — Upper Turonian; 13 — Cr_2 1208, 14 — 2235_a. All figures are natural size with the exception of Figs. 7 and 8 — ×2.

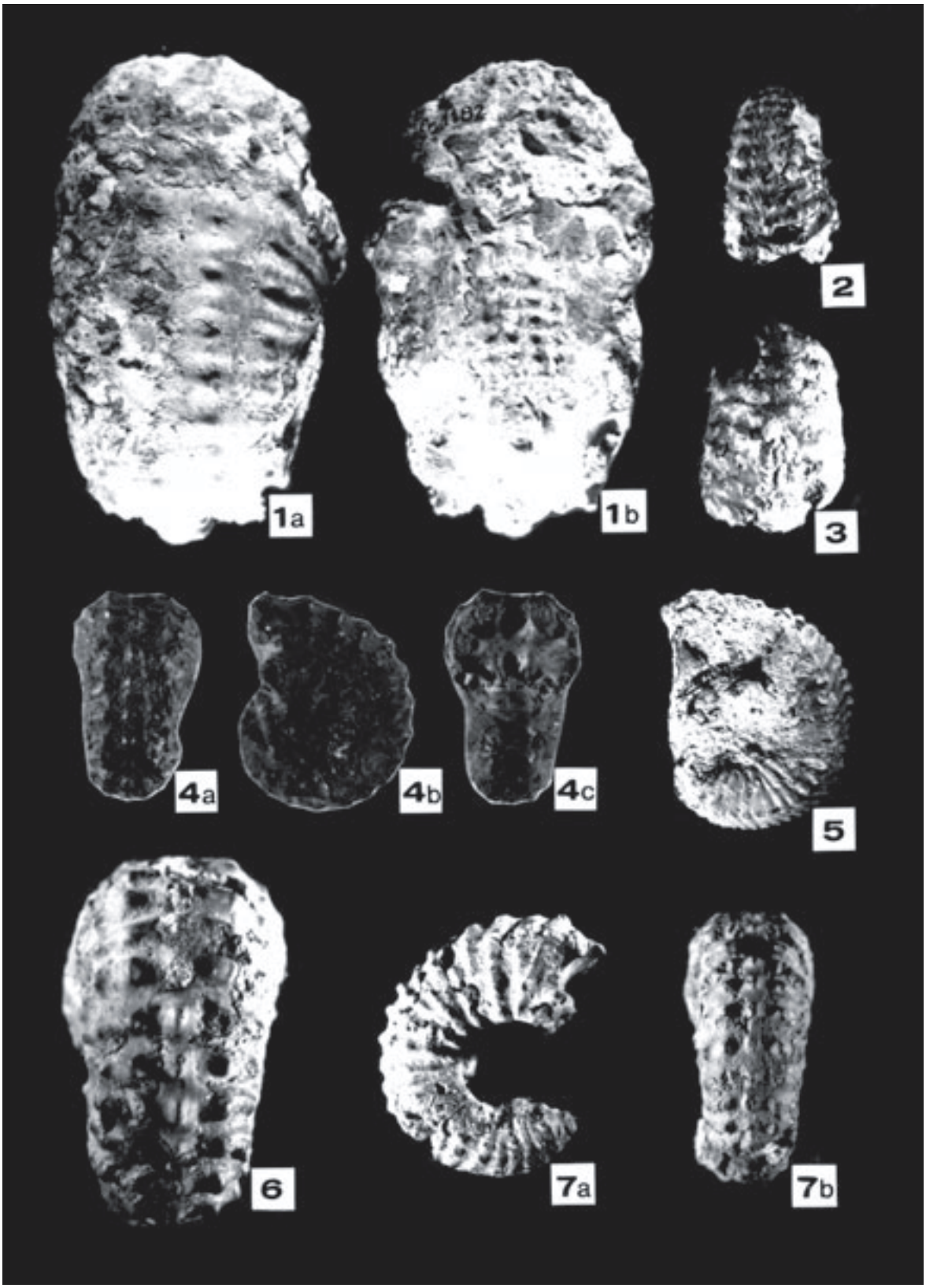

Plate II: Figs. 1–5. *Romaniceras* (*Romaniceras*) *deverianum* (d'Orbigny) — Middle Turonian — lower parts of the Upper Turonian; 1 — Cr_2 1182, 2 — BM 230, 3 — BM 231, 4 — Cr_2 1181, 5 — 3862. **Figs. 6–7.** *Romaniceras* (*Yubariceras*) *ornatissimum* (Stoliczka) — upper parts of the Middle Turonian — Upper Turonian; 6 — Cr_2 1184, 7 — Cr_2 1183. All figures are natural size.

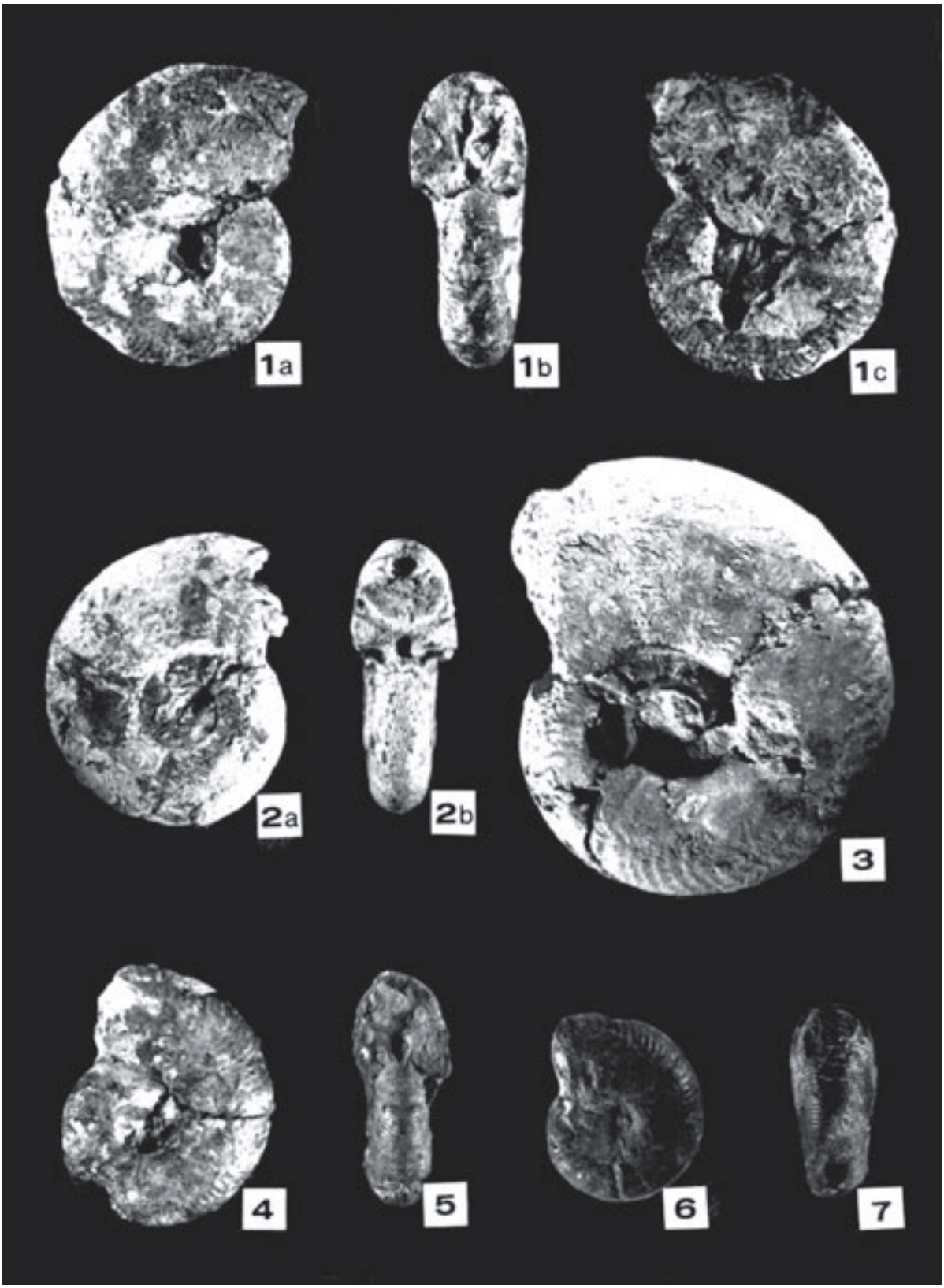

Plate III: Figs. 1–2. *Mesopuzosia beloensis* Collignon — Upper Turonian; 1 — BM 229, 2 — Cr_2 1237. **Fig. 3.** *Puzosia curvatisulcata* (Forbes) (? = *P. gaudama*) — Upper Turonian; Cr_2 1114. **Figs. 4–7.** *Puzosia hernensis* (Schlüter) — Upper Turonian; 4 — 2229, 5 — BM 228, 6 — BM 219, 7 — 378. All figures are natural size.

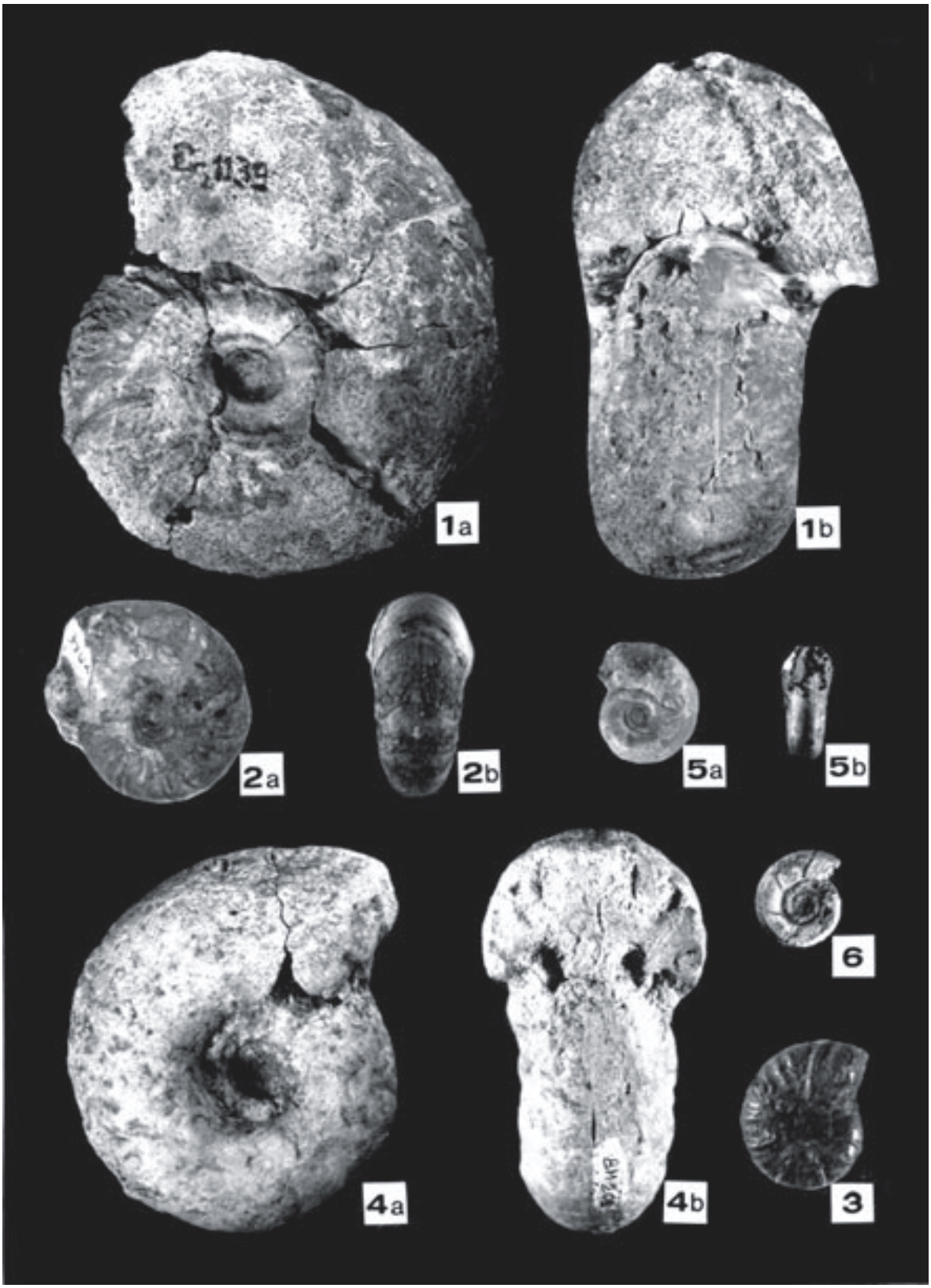

Plate IV: Fig. 1. *Tongoboryoceras rhodanicum* (Roman & Mazeran) — Upper Turonian; Cr_2 1139. **Fig. 2.** *Tongoboryoceras donovani* (Collignon) — Upper Turonian; 3962. **Fig. 3.** *Lewesiceras mantelli* Wright & Wright — Middle-Upper Turonian; Cr_2 1140. **Fig. 4.** *Lewesiceras peramplum* (Mantell) — Lower-Middle Turonian; BM 206. **Fig. 5.** *Gaudryceras denseplicatum* (Jimbo) — uppermost Middle Turonian — Upper Turonian 366. **Fig. 6.** *Anagaudryceras sacya* (Forbes) — Upper Turonian. All figures are natural size. All pictures are made in the photo-laboratory of the Geological Institute.

iceras woollgari (Mantell) (Pl. I: Figs. 1–6), *Collignoniceras carolinum* (d'Orbigny) (Pl. 1, Figs. 7–9) and *Collignoniceras bravaisianum* (d'Orbigny) (Pl. 1: Figs. 10–11). The last one also occurs in the Upper Turonian strata.

Two very important representatives of *Romaniceras* Spath were established. *Romaniceras* (*Yubariceras*) *ornatissimum* (Stoliczka) (Pl. II, Figs. 6–7) is the zonal index of the Middle Turonian homonymous zone, while *Romaniceras* (*Romaniceras*) *deverianum* (d'Orbigny) (Pl. II: Figs. 1–5) — is the zonal index of the lowermost Late Turonian homonymous zone (Kennedy 1984, p. 151 — "gallic view"). The last one occurs in the uppermost Middle Turonian and in the lower parts of the Upper Turonian sequence in the investigated sections.

The following ammonite taxa characterize the Late Turonian substage in the studied area: *Subprionocyclus neptuni* (Geinitz) (Pl. I: Figs. 13–14), *Subprionocyclus normalis* (Anderson), *Subprionocyclus hitchinensis* (Billinghurst) (Pl. I: Fig. 12), *Mesopuzosia beloensis* Collignon (Pl. III: Figs. 1–2), *Puzosia curvatisulcata* (Forbes) (? = *P. gaudama*) (Pl. III: Fig. 3), *Puzosia hernensis* (Schlüter) (Pl. III: Figs. 4–7), *Tongoboryoceras rhodanicum* (Roman & Mazeran) (Pl. IV: Fig. 1), *Tongoboryoceras donovani* (Collignon) (Pl. IV: Fig. 2), *Lewesiceras mantelli* Wright & Wright (Pl. IV: Fig. 3), *Gaudryceras denseplicatum* (Jimbo) (Pl. IV: Fig. 5), *Gaudryceras mite* (Hauer), *Anagaudryceras sacya* (Forbes) (Pl. IV: Fig. 6), *Scaphites geinitzii* d'Orbigny, *Sciponoceras bohemicum* (Fritsch & Schlöbach). The common presence of *Romaniceras (Romaniceras) deverianum* and *Subprionocyclus neptuni* has to be noted, especially when their first occurrences are uncertain in respect to the middle-upper Turonian boundary (Bengtson 1996, p. 77). Unfortunately in our case both species are found in a thin phosphorite bed and it is difficult to correlate their ranges. Middle Turonian ammonites are also documented from the same bed, a fact explained by Jolkichev with condensed sections (1989, p. 99).

Conclusions

The review of previously and newly obtained biostratigraphic data (Fig. 2) gives reason to consider that the three Turonian substages are represented in the investigated area. Several Late Turonian species (*Subprionocyclus hitchinensis*, *Mesopuzosia beloensis*, *Gaudryceras denseplicatum*, *Anagaudryceras sacya, Tongoboryoceras rhodanicum* and *Tongoboryoceras donovani*) are described for the first time in Bulgaria. The boundary between the Lower and the Middle Turonian, as well as the boundary between the Middle and the Upper Turonian are placed by the first occurrences of the species *Collignoniceras woollgari* and *Subprionocyclus neptuni* — zonal indexes of the standard Middle and Late Turonian ammonite zones of the same names.

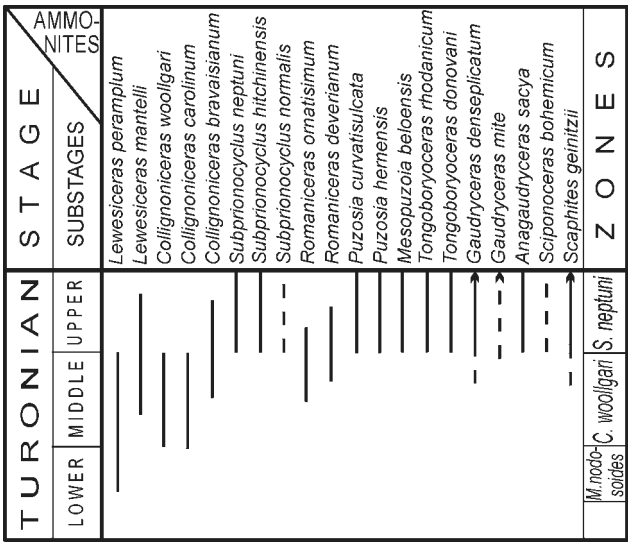

Fig. 2. Ammonite zones and stratigraphic range of the fossils.

References

Bengtson P. (compiler), 1996: The Turonian stage and substage boundaries. *Bull. Inst. Roy. Sci. Nat. Belg.* (*Sci. de la Terre*), 66, 69–79.

Kennedy W.J., 1984: Ammonite faunas and the "standard zones" of the Cenomanian to Maastrichtian stages in their type areas, with some proposals for the definition of the stage boundaries by ammonites. *Bull. Geol. Soc. Denmark*, 33, 1–2, 147–161.

Jolkichev N., 1988: Lithostratigraphic units connected with the Upper Cretaceous in eastern parts of the Moesian Platform. *Rew. Bulg. Geol. Soc.*, XLIX, 1, 11–25 (in Bulgarian with English abstract).

Jolkichev N., 1989: Stratigraphy of the epicontinental type Upper Cretaceous in Bulgaria. *St. Kl. Ochridski Univ. Fress,* Sofia, 1–184 (in Bulgarian with English and Russian abstracts).

Tzankov V., 1982: The fossils of Bulgaria. Va. Upper Cretaceous. *Bulg. Acad. Sci. Press,* Sofia, 136, 50 (in Bulgarian with French abstract).

Tzankov V., Strashimirov B. & Dimitrova N., 1952: Stratigraphical and palaeontological characteristic of the Cretaceous and Lutetian in Provadia region. *Chief Depart. Geol. and Min. Invest.,* A, 5, 59–86 (in Bulgarian).