

VISÉAN-SERPUKHOVIAN (EARLY CARBONIFEROUS) AMMONOIDS FROM THE ALBA FORMATION, ESLA SYNCLINE, CANTABRIAN MOUNTAINS: PRELIMINARY STUDY

ROMÁN RAMÍREZ-MUÑOZ^{1*},
SERGIO RODRÍGUEZ^{1,2,}
EDUARDO MAYORAL^{3,4,}
DIETER KORN⁵

ABSTRACT

The Santa Olaja de la Varga section (León) of the Alba Formation is composed mainly of red or pink, bedded, marly and nodular limestones, and shales of Early Viséan to Early Serpukhovian age. Correlation with other sections in the Esla Syncline, such as Pico Aguasalio or Peña Roscas, shows lithological differences in the stratigraphic succession. In the future, both the ammonoid specimens described by Kullmann (1961, 1963) and unpublished material from the Esla Syncline will be investigated for the purpose of biostratigraphical attribution and global correlation. The potential of the Carboniferous sections in the Cantabrian Zone for ammonoid-based biostratigraphy will be demonstrated.

Keywords: Ammonoidea, Zona Cantábrica, Formación Alba, Viseense, Serpukhoviense.

1. INTRODUCTION

The Cantabrian Zone is the northeasternmost area of the Iberian Massif. Its stratigraphic record includes all Palaeozoic systems from the Cambrian to the Carboniferous (Pérez-Estaún *et al.*, 2004). The folds and thrusts region is the innermost unit of the Cantabrian Zone and forms a series of thrust

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1. Área de Paleontología, Facultad de Ciencias Geológicas, Universidad Complutense de Madrid, Madrid, Spain. * romram01@ucm.es.
 2. Departamento de Geología Sedimentaria y Cambio Medioambiental, Instituto de Geociencias, CSIC, UCM, Madrid, Spain.
 3. Facultad de Ciencias Experimentales, Campus El Carmen, Universidad de Huelva, Huelva, Spain.
 4. CCTH - Centro de Investigación Científico Tecnológico, Universidad de Huelva, Huelva, Spain.
 5. Museum für Naturkunde, Berlin, Berlin, Germany.

units, including the Esla-Valsurvio Unit, the Somiedo-Correcilla Unit and the Sobia-Bodon Unit. The best section of the Esla Unit is the Aguasalio syncline (Fig. 1), where one of the most complete Palaeozoic successions of the Cantabrian Zone is recorded (Heredia *et al.*, 1990).

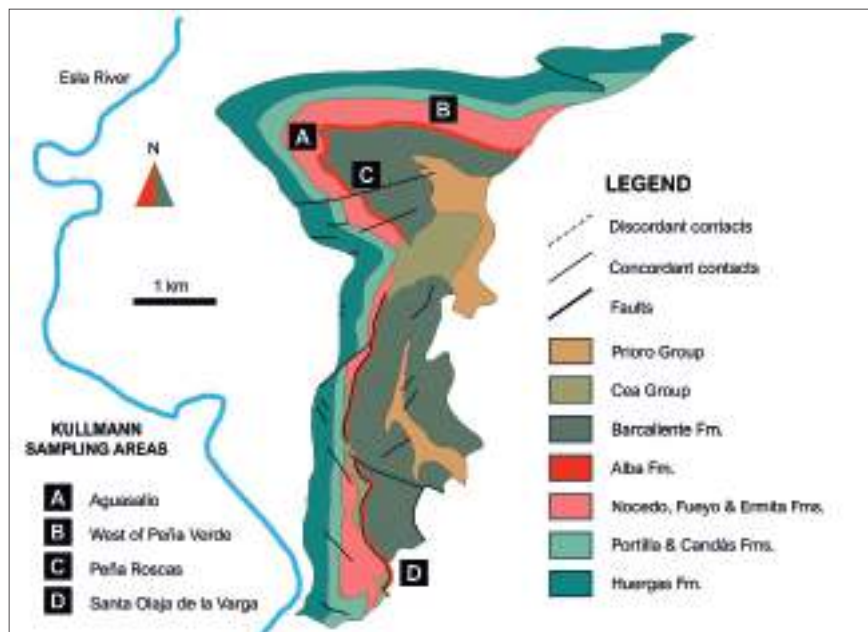


Figure 1. Esla Syncline geological map. All samples collected from the Alba Formation (marked red). The four sampling areas published by Kullmann (1961) are marked with capital letters. Modified from Heredia *et al.* (1990).

The Alba Formation (or Genicera Formation) was described in detail by Van Ginkel (1965). It is a condensed series (Evers, 1968) composed mainly of red or pink, bedded, nodular limestones and shales. The Alba Formation is assigned to the early Viséan to the early Serpukhovian (Early Carboniferous) based on its conodont, radiolarian and ammonoid assemblages (Higgins *et al.* 1964; Kullmann, 1961, 1963, 1979; Menéndez-Álvarez, 1991; Savage & Boschma, 1980; Seibert, 1988; Wagner *et al.*, 1971). It is 18-41 m thick (Braun, 1981) and is divided into four members (Kullmann & Schönberg, 1980; Wagner *et al.*, 1971): (1) Gorgera Member (reddish shales and limestones), (2) Lavandera Member (shales, radiolarites and cherts), (3) Canalón Member (reddish or greyish nodular limestones alternating with calcareous shales) and (4) San Adrián Member (greyish and pink limestones). The overlying Barcaliente Formation (defined by Wagner *et al.* 1971) is 0 to 250 m thick (Evers, 1968) and consists of dark grey, poorly fossiliferous bedded limestones of Serpukhovian to early Bashkirian age (Kullmann, 1962, 1963, 1979).

The first reference for the Alba Formation in Santa Olaja de la Varga section can be found in Mallada (1903), who described the succession in-

cluding the Barcaliente Formation, as follows: “caliza roja marmórea amigdaloides (60 m)” followed by “caliza gris de estructura tabular (400 m)”.

Wagner (1957) studied the Santa Olaja section as: “comienza el Carbonífero con unos metros de mármol grioto de color rojo vinoso, en el que encontramos varios ejemplares de Goniátidos, Crinoides y Braquiópodos”. According to Wagner-Gentis, “representan una mezcla de especies del Viséense superior y del Namuriense inferior más bajo”.

Kullmann (1961, 1963) first described some ammonoids from the Aguasalio syncline. The systematic classification was revised by Korn (1993) in an unpublished diploma thesis. The Alba Formation contains several discontinuities that result in an incomplete ammonoid biostratigraphy or in the development of ammonoids that differ considerably from those of Central Europe and other regions (Korn, 1993).

We re-examined the Santa Olaja de la Varga section of the Alba Formation (Fig. 2) and collected about 20 new specimens of ammonoids in the Canalón Member, but due to their poor state of preservation they have not yet been identified. These are eroded internal casts, only one of them showing a suture line.

We also visited the Palaeontological Collection of the University of Tübingen. There, the specimens collected by Kullmann from the Esla Syncline (published and unpublished) were photographed and described. For further study, 3D models of four representative specimens were made for further study in the office.

2. RESULTS AND DISCUSSION

The Santa Olaja de la Varga section of the Alba Formation is incomplete because the lower Gorgera and Lavandera members are not represented. This can be explained by (1) an unconformity (disconformity or paraconformity), or (2) a mechanical contact where these two members of weaker lithologies have served as a detachment plane on a thrust fault. In other sections, such as Pico Aguasalio or Peña Roscas, the Gorgera Member is also absent. The base of the Alba Formation, where the fossil assemblages may have been reworked, is diachronic. The study of Santa Olaja de la Varga section and the revision of the specimens described by Kullmann (1961, 1963) will raise some questions: (1) How is the succession of the ammonoid assemblages? (2) Which species occur in the layers described by Kullmann? (3) How does the biostratigraphy of the Alba Formation correlate with other places of the world, such as the Rhenish Mountains, the Anti-Atlas of Morocco and the southern Urals?

3. CONCLUSION

The section of Santa Olaja de la Varga was sampled for ammonoids. The specimens from the Esla syncline in the collection of Kullmann (1961,

1963) in Tübingen were photographed and described. For further study, 3D models of some specimens have also been made. The Santa Olaja de la Varga section is incomplete due to the absence of the lower Gorgera and Lavandera members. In other sections of the Alba Fm, such as Pico Agualio or Peña Roscas, the Gorgera Member is also missing. This shows the diachronic nature of the base of the Alba Formation.

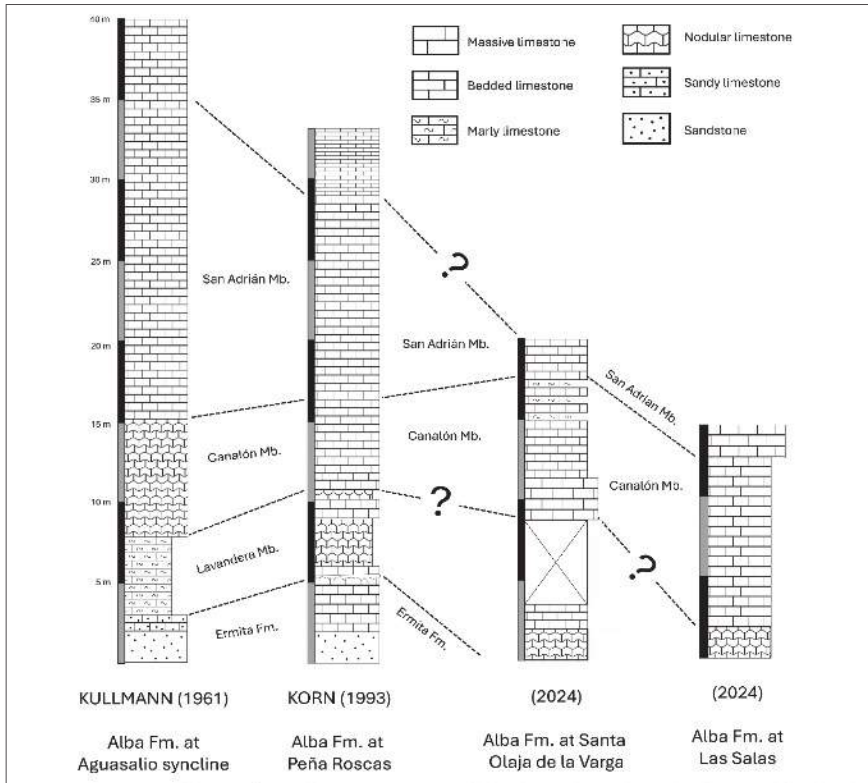


Figure 2. Stratigraphic correlation between sections of the Alba Formation. The Gorgera Member is absent in all sections.

4. ACKNOWLEDGMENTS

We would like to thank Ingmar Werneburg and Henrik Stöhr of the Palaeontological Collection of the University of Tübingen for both a helpful and a charming stay of R.R.M. We would also like to thank Juan Pedro Fraga for helping, doing photogrammetry and photos of the samples.

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