30 THE PRESENCE OF THE FORAMINIFER *ALVEOSEPTA JACCARDI* (SCHRODT) IN THE UPPER JURASSIC LIMESTONES OF PĂDUREA CRAIULUI MOUNTAINS.

Ioan COCIUBA

Geologic Institute of Romania, Cluj branch, P.O. B. 181, Cluj-Napoca

Abstract: The Upper Jurassic succession in the south-western part of the Pădurea Craiului comprises, from bottom to top, the Vad, Farcu, Secătura and Albioara Limestones. The whole succession is well exposed on the right bank of Valea Cutilor. From the collected samples the foraminiferal assemblage has been determined.

The top (the upper 15 metres) of the Farcu Limestone and the bottom (about 4 metres) of the Secătura Limestone bear an association with *Alveosepta jaccardi* (SCHRODT), characteristic of the Upper Oxfordian-Lower Kimmeridgian of Tethyan Realm. It is an important biostratigaphical marker, verified by ammonites in many profiles of the Mediterranean area. Relying on this association, it is concluded that the limit between Farcu and Secătura Limestones corresponds approximately to the Oxfordian/ Kimmeridgian boundary.

Key-words: Foraminifers, Upper Jurassic, West Carpathians, Pădurea Craiului Mountains, Romania

Geological Background

According to Patrulius (in: Ianovici et al., 1976), Săndulescu (1984), Bleahu et al. (1981), and Dragastan et al. (1986, 1988, 1989) in Pădurea Craiului, as a north-western part of the West Carpathians, formations crop out which mostly belong to the Bihor Unit, but also to the Codru Nappe System, on restricted areas in the southern and south-western part (Fig. 1).

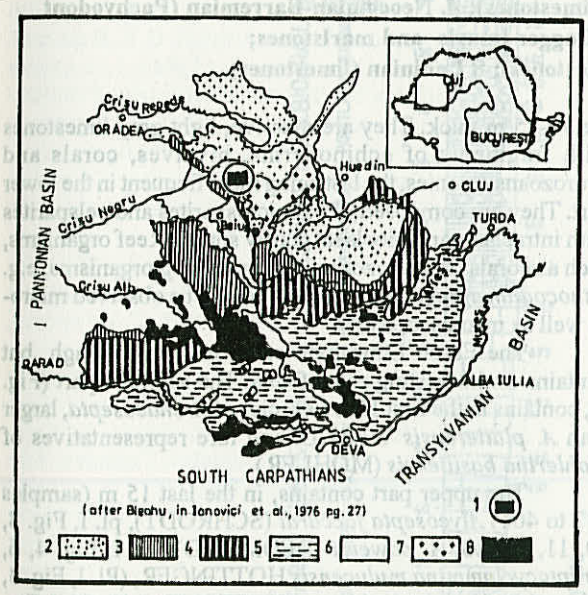

Fig. 1 - Schematic structural map of the West Carpathians: 1. Location of studied area (Fig. 2); 2 - 4 Northern West Carpathian Units (2. Bihor Unit ; 3. Codru Nappe System; 4. Biharia Nappe System); 5. Southern West Carpathians (undifferentiated); 6 Neogene sedimentary formations; 7. Rocks of the bantite suite; 8. Neogene volcanic rocks.

The calcareous formations which are the subject of this paper are a part of the Upper Jurassic succession of Pădurea Craiului (Bihor Unit). The lithostratigraphic units of this area were separated by Patrulius et al. (1974), Patrulius (in Ianovici et al., 1976) and Bordea & Bordea (1985).

We present in this paper the lithologic and micropaleontologic analysis of the Upper Jurassic succession of the southern part of Pădurea Craiului, in a good outcrop near the village of Roşia.

The Valea Cutilor - Dealu Pleşa Profile (Fig. 3)

The sampled profile (Figs. 2 and 3) is located on the right (western) side of the Valea Cutilor stream below Pleşa Hill and below the outcrop of the bauxite lens 79/50 (the Roşia-Albioara Mining Sector). It intersects the Valley at approximately 500 m upstream from its exit of the canyon.

Our goal was the microfacies and biostratigraphic analysis of the Malm limestones. The profile was selected because the succession is continuous and is located not so far from the type localities of the two litostratigraphic units cropping out within it: the Albioara Limestone, described at 3 km north-west and Farcu Limestone described at 2 km towards east-south-east. On the other hand, the place offers, on a relatively small area, a good outcrop of Upper Jurassic deposits.

The 130 samples, collected at intervals of about 1 m, are distributed in two areas. The first one (samples 366 to 381) is located along the Valea Cutilor stream, on both sides, in the upper part of the detritic-glauconitic formation, with a level of ferriferous ooids (Upper Batonian-Lower Callovian), and the first banks of Malm limestones, including in the first decimetres the Middle and Upper Callovian (according to Patrulius, in Ianovici et al., 1976).

The second area (samples 382 to 497) is located at about 70 metres north as against the first one. The collection of the samples was made downwards (starting from the outcrop of the lens 70/50), to approximately 40 m. from the bottom of the valley.

The two areas, together, cover the whole succession of the Upper Jurassic limestones, with a break of 30-35m in the lower third (Fig. 3).

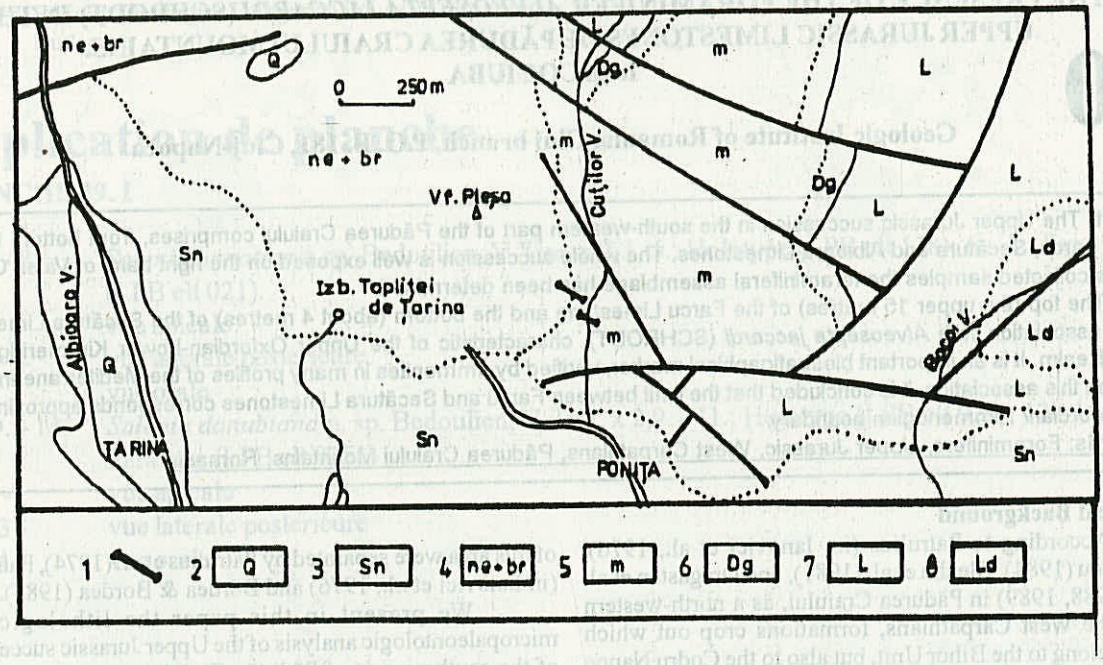

Fig. 2 - Geologic map of the studied area with the location of the sampled profile: 1. location of the profile; 2. Quaternary deposits; 3 Senonian (sandstones, marls, limestones); 4. Neocomian-Barremian (Pachyodont limestones); 5. Malm (limestones); 6. Dogger (marls and marlstones; 7. Liassic (sandstones, shales, marls, limestones); 8 Ladinian (limestones).

Lithofacies and micropaleontologic content.

At the base of the profile appear coarse sandstones with carbonate cement, silghtly argillaceous or ferruginosus, binding, very small rolled fragments of quartz or lithic fragments of metamorphic rocks. There are also biogene fragments (rare foraminifera, echinid plates) and glauconite grains. At the upper part of these rocks, a level 15-20 cm thick contains frequent ferruginous nodules, with a concentric structure and sizes up to a few mm, as well as rare fragments of poorly preserved ammonites.

The age of these deposits is Upper Bathonian-Lower Callovian (Patruliùs, in Ianovici et al., 1976) and they represent a lateral regressive facies of the limestones with brown nodules, dated on the basis of the ammonites (the *Aspidoides* and *Macrocephalus* zones).

After a slight unconformity, dark grey limestones follow, first stratified in decimetric banks, becoming thicker and thicker upwards and passing to massive grey limestones. They are pelsparitic and dark coloured, similar to the Vad Limestone, and also contain a pelagic microfauna devoid of biostratigraphic significance (lenticulines, ostracodes and other rare foraminifera). The basal part (samples 473 to 476), one metre thick, contains ferriferous ooids, *Globochete* and numerous "protoglobigerinids", including *Globigerina oxfordiana* (GRIGELIS), mentioned as frequent in the Callovian-Oxfordian (Wernli & Kindler, 1986). These types of limestones were deposited in an open sea environment, on a continental slope with a slight inclination.

The Farcu Limestones that follow in the succession are 70-75 m thick. They are massive, light grey limestones with fragments of echinoderms, bivalves, corals and hydrozoans colonies, the last being more frequent in the lower part. They are composed of pelmicrosparites and pelsparites with intraclasts and bioclasts poorly sorted. Reef organisms, such as corals or hydrozoans, and incrusting organisms, e.g. *Lithocodiun agregatum* ELLIOTT, could be observed micro- as well as macroscopically.

The Farcu Limestone seem uniform enough, but contains an interesting microfauna. The sampled part (Fig. 3), contains in the first 15m a species of *Archaeosepta*, larger than *A. platierensis* WERNLI and rare representatives of *Mohlerina basiliensis* (MOHLER).

The upper part contains, in the last 15 m (samples 477 to 464) *Alveosepta jaccardi* (SCHRODT), pl. I, Fig. 8, 10, 11, 12, 13, *A. powersi* (REDMOND), Pl. I, Fig. 4, 6, *Streptocyclammina mulucensis* HOTTINGER, (Pl. I, Fig. 3, 14), and *Redmondoides lugeoni* SEPTFONTAINE, (Pl. I, Fig. 2). *Neokilianina rahonensis* (FOURY et VINCENT) (Pl. I, fig 1), appears only in the last samples.

The association mentioned above is characteristic of the Upper Oxfordian and Lower Kimmeridgian, being widely spread all over the Tethys and verified with ammonite associations, several authors separating a biozone with *Alveosepta jaccardi* (ex. Azema et al., 1977, Pélissié et al., 1984, Tasli, 1993). This association exceeds the upper limit of the Farcu Limestone by about 4 metres (samples 465 to 456) in the stratified Secătura Limestone.

The Secătura Limestone is about 18 m thick in this

profile (samples 465 to 427) and is fine, dark grey, micritic or microsparitic, stratified in decimetric banks and with fenestral, sometimes laminitic structures. It presents some oncoidic intercalations, thicker in the basal part (about 4m). Apart from the association already mentioned from the first metres, the micropaleontological content of these limestones is poor. We identified: *Redmondoides lugeoni* (SEPTFONTAINE), *Kurnubia palastiniensis* HENSON, *Neokilianina rahonensis* (FOURY et VICENT) (Pl. I, Fig. 1), *Rectocyclammina sp., Thaumatoporella parvovesiculifera* (REINERI), ostracods, glomospirid and valvulinid foraminifers.

The Albioara Limestone, following in the succession, is grey and dark grey, stratified in metric banks, with centimetric oncoids, and is 25 m thick. The microfacies is dominated by microsparites with or without oncoids, frequent pelmicrosparits (wackestonès) and rare biopelmicro-sparites. The micropaleontological content is very poor, especially immediately under the bauxite lens. The identified forms in the middle and upper part of the Secătura Limestone also appear in these limestones. Other identified forms are: *Siphovalvulina sp., Clypeina jurassica* FAVRE, *Bolivinopsis sp., Bacinella irregularis* RADOICIC, *Giraliarella sp., Earlandia sp., Macroporella lazuriensis* BUCUR and very rare *Lenticulina.*

Almost all the forms mentioned have a wide vertical spread, frequently being in the Tethyan Upper Jurassic. However some of them do not exceed the upper border of the Portlandian (e.g.. *Kurnubia, Parurgonina*) and *Neokilianina rahonensis* is restricted to the Kimmeridgian, possibly the Lower Portlandian (Septfontaine, 1988). Considering that no strictly Portlandian (or Upper Portlandian) species was identified, we can doubt the existence of the Upper Portlandian in the studied profile. This statement is valid when considering

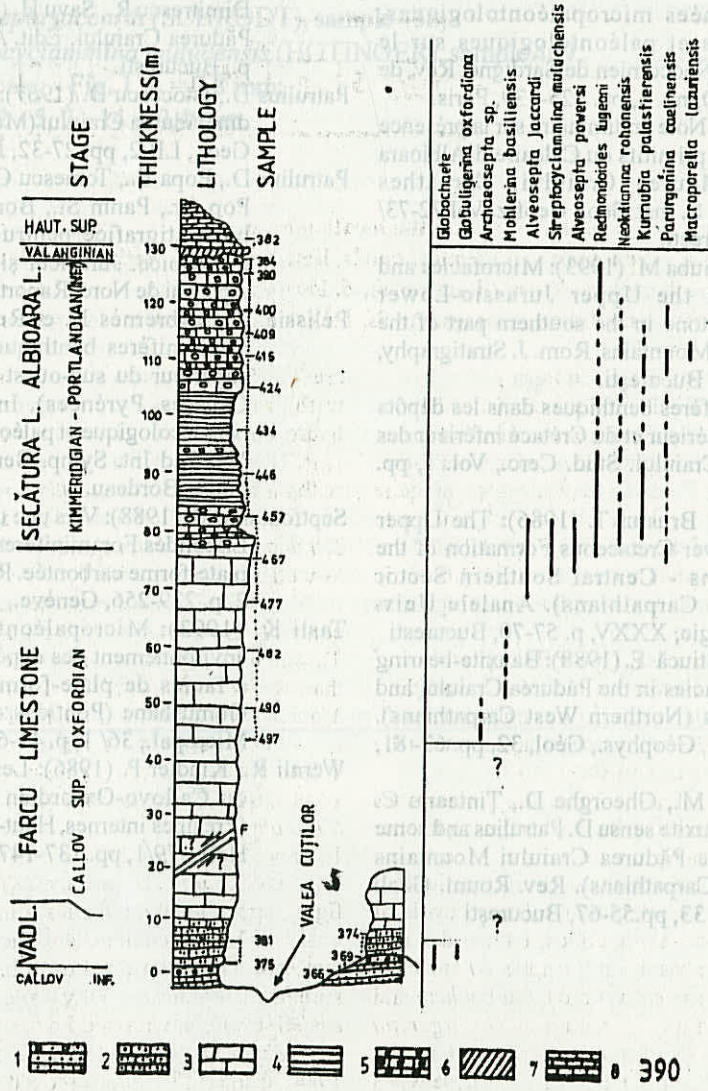

Fig. 3. Lithologic section of the Valea Cutilor profile: 1. Glauconinic sandstone with iron ooids; 2. Layered pelsparitic limestones; 3. Massive limestones; 4. Layered micritic limestones; 5. Microsparitic oncoidic limestones; 6. Bauxite; 7. Micritic Characean limestones; 8. Sample numbers.

the species listed by previous authors (Dragastan et al., 1988).

Conclusions.

1. On the basis of the *Globigerina oxfordiana* (GRIGELIS), the lower limit of the studied limestones is at least Lower Oxfordian, very likely including the Upper Callovian too;

2. The association with *Alveosepta jaccardi* (SCHRODT) present in the upper part of the Farcu Limestone and in the first metres of the Secătura Limestone, is the most important biostratigraphical marker identified in the studied profile. The association is characteristic of the Upper Oxfordian-Lower Kimmeridgian of the Tethyan area and is verified with ammonites in several places (Azema et al., 1977, Pélisié et al., 1984, Tasli, 1993). Consequently, the Oxfordian-Kimmeridgian limit is in this profile situated at the upper part of the Farcu Limestone and probably coincides with the limit between the Farcu and Secătura Limestones.

3. Almost all the forms mentioned of the Secătura and Albioara Limestones have a wide vertical range, being frequent in the Tethyan Upper Jurassic, but some of them do not go beyond the Portlandian (e.g. *Kurnubia, Parurgonina*), and *Neokilianina rahonensis* seems to be restricted to the Kimmeridgian-Lower Portlandian (Septfontaine, 1988). The lack of strictly Upper Portlandian species stress the absence of the Upper Portlandian in the studied profile.

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Caption of Plate

PLATE 30. I

Fig. 1 *Neokilianina rahonensis* (FOURY & VINCENT), sample 455;
Fig. 2 *Parurgonina caelinensis* CUVILLIER et al., sample 467;
Fig. 3 *Streptocyclammina mulucensis* (HOTTINGER), sample 477;
Fig. 4 *Alveosepta powersi* (REDMOND), sample 470;
Fig. 5 *Streptocyclammina sp.*, sample 458;
Fig. 6 *Alveosepta powersi* (REDMOND), sample 457;
Fig. 7 *Redmondoides lugeoni* (SEPTFONTAINE), sample 468;
Fig. 8 *Alveosepta jaccardi* (SCHRODT), sample 464;
Fig. 9 *Streptocyclammina sp.*, sample 464;
Fig. 10 *Alveosepta jaccardi* (SCHRODT), sample 471;
Fig. 11 *Alveosepta jaccardi* (SCHRODT), sample 464;
Fig. 12 *Alveosepta jaccardi* (SCHRODT), sample 478;
Fig. 13 *Alveosepta jaccardi* (SCHRODT), sample 458;
Fig. 14 *Streptocyclammina mulucensis* (HOTINGER), sample 469.

Bar scale: - Fig. 1, 6 = 0,8 mm;
- Fig. 2 - 5, 7 - 14 = 0,4 mm.