

Geological setting

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2. Geological setting

The examined area belongs to the Umbria-Marche Apennine fold and thrust belt and, particularly, to its inner Ridge ("Ruga interna", Scarsella 1951). It consists of a right lateral "en echelon" set of three main anticlines designated, from west to east, as internal, intermediate and external (Fig. 1). The outer limb of each anticline is partially overturned and thrustured (Barchi et al. 1989). Mesozoic and Paleogene pelagic formations, consisting mainly of marls and limestones, are involved in this late Tertiary compressive phase which followed transtensive Jurassic activity responsible for the thinning of the Apulian continental margin.

The Valdorbia section (lat. N 43°25', long. E12°42') is located along the State Road N. 360 which runs between Scheggia and Sassoferrato (Fig. 2), on the left bank of the Sentino Creek, near the Molino delle Ogne (mineral water spring). The outcropping Jurassic stratigraphic units constitute the core of the internal asymmetrical anticline (M. Pettria-M. Cucco), which is cut by the Sentino Creek and characterized by a well extended and slightly deformed axial zone. The western limb of the anticline dips westward while its eastern flank is vertical and partially overturned.

3. Stratigraphy

In the last 20 years many studies concerning the Umbria-Marche Basin (UMB) have revealed the existence of three main kinds of succession of Jurassic open marine or pelagic sediments deposited above the "Calcare Massiccio" carbonate platform: a) "condensed" successions, which are represented by thin, mainly calcareous, sedimentary sequences deposited on submarine elevated areas with slow or no subsidence (morphostructural highs), b) "extended" successions constituted of thick calcareous-clayey sediments, rich in detrital material, deposited in depressed and subsiding areas, c) "intermediate" successions that are very common in the UMB and are formed by sediments of medium thickness (compared to a – b above) without detrital material.

Recently Cresta et al. (1988) and Colacicchi et al. (1988) have distinguished five types and two subtypes of succession on the basis of the occurrence and the vertical extent of the Jurassic formations. These successions show heterogeneous sedimentation in the Early and Middle Jurassic which reflects a diverse paleogeography, inherited from the Liassic break-up of the "Calcare Massiccio". The Valdorbia succession belongs to the "extended" successions (type 1, subtype b) and is characterized by abundant clay (Ortega-Huertás et al., 1993) and calcareous detrital sedimentation during the Toarcian.

The study of the section starts along the road at km 57 below an abandoned quarry, and only the stratigraphic interval from Carixian to the Lower Aalenian has been considered (Fig. 2). The lithostratigraphic units, well known from the literature (Cresta et al. 1988; Farinacci et al. 1978; Farinacci & Elmi (Eds.) 1981), are here briefly described.

- a The "Corniola" unit (COR). The lower part of the section is represented by about 50 m of well-bedded hard limestones (Bathurst 1987), of white-grey colour and 10 – 30 cm thickness. The lower limit of the COR is not exposed. Abundant stylolites (Bathurst 1975) and small amounts of dark chert in lenses and nodules are present. In the middle part of the section fissile pink and nutty brown nodular marly limestones, of 20 – 50 cm in thickness, separated by thin reddish marly-shaley bands, occur. Undulose dissolution seams fit around grains or nodules instead of cutting through them (Bathurst 1987). In the upper part