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Biostratigraphy of the Valongo Formation (Ordovician) of northern Portugal

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The Valongo Formation is a rather homogeneous fossiliferous succession, 300-400 m thick, composed by shales and slates that stratigraphically overlay the Lower Ordovician Armorican Quartzite (= Santa Justa Formation) in the Valongo Anticline. This structure forms a very distinctive Paleozoic inlier in the Central Iberian Zone. The Valongo Formation is disconformably overlain by Hirnantian quartzite and glaciomarine diamictites of the Sobrido Formation (up to 180 m thick).

Paleontological data from the Valongo Formation comprise a diverse record of trilobites, mollusks, brachiopods, graptolites, ostracods, cnidarians, echinoderms and ichnofossils [1], [2], [3], [4], which mainly derive from sites localized in the southwestern flank of the Valongo Anticline. Outstanding Ordovician fossils from the Valongo Formation include the famous giant trilobites (Fig. 1) and the large ichnofossils of the Arouca Global Geopark of UNESCO, as well as diverse taxa exclusive of this formation and unknown in the remaining Middle Ordovician localities of Iberia and SW Europe, such as the trilobites *Valongia wattisoni*, *Dindymene plasi* and *Protolloydolithus*, besides the primitive monobathrid crinoid *Delgadocrinus oportovinum*.



The present biostratigraphical review indicates that the Armorican Quartzite facies stopped its sedimentation here earlier than in other places of the Iberian Massif, as demonstrated by the upper Floian to ?lower Darriwilian graptolite assemblages recorded from the basal 40 m of the Valongo Formation. These beds are followed by middle Darriwilian shales and slates of the *Didymograptus artus* and *D. munchisoni* graptolite biozones, the first of which dates the so-called “Canelas Fossil-Lagerstätte”.

Figure 1: Outstanding giant asaphid trilobites from the Valongo Formation (Middle Ordovician) at Canelas Quarry (Arouca Global Geopark of UNESCO).

The upper 100 m of the formation consist of rich fossiliferous strata, bearing upper Darriwilian assemblages of trilobites and brachiopods from the *Placoparia tournemini* trilobite Biozone. It extends up to the top of the formation (*Morgatia hupei* Subzone) and ends before the *Placoparia borni* Biozone, which spans the Middle to Upper Ordovician boundary.

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References:

- [1] Romano M and Diggins J N (1974) *Comum. Serv. Geol. Port.* 57:23-50
- [2] Romano M (1982) *Geol. J.* 17:89-110.
- [3] Sá A A et al. (2007) *Act. Palaeont. Sinica* 46(Suppl.):434-439.
- [4] Gutiérrez-Marco J C et al. (2009) *Geology* 37(5):443-446.

