GLASSES IN THE D'ORBIGNY ANGRITE M. E. Varela[1], G. Kurat[2], E. Zinner[3] and F. Brandstätter[2] [1]CONICET-UNS, Dpto. Geologia, San Juan 670, 8000, B. Blanca, Argentina. [2]Naturhistorisches Museum, Postfach 417, A-1014, Vienna, Austria. [3]Laboratory for Space Sciences and the Physics Department, Washington University, St. Louis, MO 63130, USA.

Introduction: The angrite D'Orbigny is exceptionally rich in glass, a feature that makes this rock a unique member of the angrite group [e.g., 1-4]. The chemical composition of these glasses is incompatible with a formation by partial melting of a chondritic source rock. Also, there are no indications that glass filling open spaces could have been produced by shock melting or have been incorporated from an external source. Glass in D'Orbigny seems to have a genesis not considered so far for glasses in meteorites.

Results and Discussion The investigated samples are: PTS "D'Orbigny B" and different types of glasses separated from rock specimens and rock debris (all from NHM, Vienna). Glasses fill open spaces, form pockets and occur as inclusions in olivines [1]. Their petrographical occurrence clearly indicates that most of the glasses have been incorporated after the formation of the empty spaces in the rock. However, the lack of interconnected glass veins crosscutting the rock indicates that glasses were not introduced from outside the rock. Glasses in D'Orbigny are as ancient as the rock itself [2], making a shock origin highly improbable but rather indicating that they are of primary origin, having formed contemporaneously with the rock. The chemical composition of the glasses filling pore space and hollow shells resembles that of angrite bulk rocks, in particular that of D'Orbigny, Asuka 881371 and Sahara 99555. The abundances of major refractory elements are about 10 x CI and those of FeO and MnO are similar to those in CI chondrites. The CaO/TiO_2 and FeO/MnO ratios are also close to those in CI chondrites. The contents of C and N in glass inclusions is comparable to that observed in glass inclusions in olivines from carbonaceous chondrites [3]. Trace element abundances in D'Orbigny glasses appear to be governed by volatility. All refractory lithophile elements in the glass have flat abundance patterns, which suggests that the source for the glass had the same CI-normalized refractory elemental abundances. The contents of V, Cr, Mn, Fe and Li are approximately in equilibrium between olivine and its glass inclusions. These elements could have been added to the glass (and rock) in a late metasomatic event [4]. Because the Fe/Mn ratio of the glass (and rock) is close to chondritic, the source of that metasomatic agent likely had chondritic elemental abundances. Because D'Orbigny glasses share many, if not all, of their features with glass inclusions in olivines from carbonaceous chondrites [5] they could be the result of a similar formation process. They could have been formed by vapor-liquid-solid growth or liquid phase epitaxy [5-7] during olivine formation. The precursor liquid of the glass must have been present in small amounts such as a thin film wetting the crystal-vapor interface and interstitial spaces and facilitated growth of large crystals from the vapor. Glass inclusions, as well as glass pockets, could represent a sample of this melt, trapped and subsequently quenched during olivine formation.

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