The behaviour to weathering of the Hyblean limestone in the Baroque architecture of the Val di Noto (SE Sicily): An experimental study on the “calcare a lumachella” stone

M.F. La Russa a, C.M. Belfiore b,* G.V. Ficher a, R. Maniscalco b, C. Calabro b, S.A. Ruffolo a, A. Pezzino b

a Dipartimento di Biologia, Ecologia e Scienze della Terra (DIBEST), Università della Calabria, Via Pietro Bucci, 87036 Arcavacata di Rende (Cs), Italy
b Dipartimento di Scienze Biologiche, Geologiche e Ambientali – Sezione di Scienze della Terra, Università di Catania, Corso Italia 57, 95129 Catania, Italy

Article info
Article history:
Received 30 May 2014
Received in revised form 13 October 2014
Accepted 27 November 2014
Available online 30 December 2014

Keywords:
Limestone
Baroque architecture
SE Sicily
Durability

Abstract
This work focuses on the study of the “calcare a lumachella” stone (Mt. Carrubba Fm.), a carbonate rock widely used as building and decorative material in the Baroque architecture of the Val di Noto (southeastern Sicily). Among all types of limestone outcropping in the area, this lithotype shows higher resistance to weathering. In such a context, the main goal of this study is to correlate the mineralogical–petrographic and physical-mechanical features of the “calcare a lumachella” stone with its excellent response to weathering. For such a purpose, all obtained data were also compared with those from literature concerning other local limestones whose behaviour with respect to weathering is rather different.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction and geological setting

The Hyblean Plateau of southeastern Sicily is composed of several hundred metres thick succession mostly of Miocene age. This succession can be divided into an eastern and a western facies association [1,2]. The eastern Miocene succession consists of massive to thick-bedded carbonates and overlying reeval to lagoonal limestones with intercalated pyroclastic rocks (Mt. Climiti, Palazzolo and Mt. Carrubba Fms., Fig. 1). The western part of the plateau is characterised by well-exposed upper Oligocene–Miocene limestone and marl deposited on a carbonate ramp under neritic to pelagic conditions (Ragusa and Tellaro Fms., Fig. 1). The western part of the plateau is characterised by well-exposed upper Oligocene–Miocene limestone and marl deposited on a carbonate ramp under neritic to pelagic conditions (Ragusa and Tellaro Fms., Fig. 1). Plio–Pleistocene near-shore carbonates are widespread along the margins of the plateau, at places intercalated with mafic volcanics. The Hyblean carbonates have been the subject of several detailed geological, lithological and sedimentological studies [3–5] and their value is enhanced by the large use as building, carving and ornamental stones [e.g., 6–17].

The present paper is part of a wider research project aimed at the characterisation of different typologies of carbonate rocks used in the Baroque architecture of the Val di Noto area (eastern Sicily) and their decay processes [9–19]. After the severe earthquake of 1693, which devastated the entire eastern part of Sicily, the cities were affected by an intense reconstruction activity. In the Hyblean area (Fig. 1), the peculiarity of such a reconstruction in a Baroque style was the wide use of local stones which characterised and defined the urban planning and the architecture of the cities with their whitish colour [20]. Indeed, their easy workability has determined disparate use, both as structural (walls, arches, piers, vaults) and decorative (gargoyles, capitals, balustrades, fountains, stairs) elements.

In this paper, attention has been paid on the “calcare a lumachella” stone, so far still poorly studied though extensively employed in eastern Sicily during the 17th and 18th centuries. This stone, as well as the “calcare oolitico”, belong to the Monte Carrubba
Formation (late Tortonian–early Messinian in age), extensively exposed in the peninsula areas in the vicinity of Syracuse and Augusta (Ortygia, Maddalena Peninsula, Capo S. Croce, Faro S. Croce, Ognina) (Fig. 1). The large number of deep underground limestone quarries in Syracuse, known as “latomie” (Fig. 2), explain the huge amount of material used as building stone. In particular, the beds selected for building (“pietra da murare”, [20]) due to their low workability, were the “calcare oolitico” levels, obtained from quarrying activity in the deep latomie in Ortygia. Conversely, the beds used as carving and ornamental stones (“pietra d’intaglio”, [20]), were the “calcare a lumachella” exploited from quarries located in Maddalena Peninsula and Capo S. Croce. Due to its peculiar features, the latter stone was too expensive and therefore mainly used for decorative motives or for the construction of edifices of great importance, such as the façade of the Cathedral of Syracuse.

Actually, the “calcare a lumachella” stone was employed not only near the exploiting areas in the Syracuse province but also in churches and private buildings of the Catania province. Indeed, as known from literature [20], abundant calcareous rocks from

---

**Fig. 1.** Lithostratigraphic map of south-eastern Sicily showing the distribution of Mt. Carrubba Formation.

**Fig. 2.** Historic underground quarry (latomia) of the “calcare a lumachella” stone (Maddalena Peninsula, Syracuse).
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات