

ETHNOGRAPHY OF STONE

Gathering – Layering – Cementing

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Abstract: This article draws on my ongoing doctoral research on stone and its renewed use as a self-supporting or load-bearing material in architecture today. To complement the existing literature on the subject, which is overwhelmingly quantitative in nature, it discusses the potential, as well as some of the difficulties, of the ethnographic approach I have adopted instead. Focusing on my fieldwork around the construction of a collective housing project in Plan-les-Ouates, Switzerland, one of the case studies in my thesis, it explores the challenges that working with this geo-sourced material poses for the professional practice of actors involved in its production. By taking into account the perspectives of multiple actors across multiple sites, including the stone as found, it aims to contribute to a broader understanding of what its structural use does, and could, imply for architecture.

Keywords: Stone; Geo-sourced; Materials; Actors; Ethnography

Introduction

This article discusses the geological formation of two limestones in Migné-Auxences and Chauvigny in western France and their recent incorporation into a collective housing project for the Swiss municipality of Plan-les-Ouates on the outskirts of Geneva. Structured in three parts that correspond to key phases in the stones' formation, namely those of matter gathering, layering, and cementing, it explores the sedimentary nature of my ongoing doctoral research on the renewed use of stone as a structural, that is to say, self-supporting or load-bearing material in contemporary architecture. In Gathering, I collect historical information and discourses from recent exhibitions. In Layering, I introduce my methodological approach. In Cementing, I reflect on my findings. The paragraphs in italics, which introduce each section, provide descriptions of the material. With reference to existing literature in the fields of social anthropology and oral

history, as well as my own trials with ethnographic methods, I will argue that extending our attention beyond architectural objects to the practice of the actors involved in their making provides a broader understanding of what using — or rather working with — a given material can entail.

My curiosity about what stone does to present-day architectural production arises from the growing enthusiasm among professionals of the built environment for this material in particular, and for »natural« materials in general, which are largely portrayed as more sustainable alternatives to their synthetic counterparts. To define »natural«, the distinction between bio-sourced materials that come from plants and animals, such as timber or wool, and geo-sourced, mineral-based materials, such as earth or stone is made increasingly within the building industry. While stone is not considered a renewable resource, owing to the pace of its reproduction, its durability, potential reuse, and high thermal inertia, are commonly cited as low-carbon, energy-efficient attributes.

In order to observe architectural production with stone at first-hand during my doctoral research, I set out to follow a series of ongoing projects in Switzerland, Spain, and England, that employed the material in its structural capacity. The Plan-les-Ouates collective housing project, designed by the office of the French architect Gilles Perraudin and the Geneva-based Atelier Archiplein as part of Les Sciers, a new residential neighborhood, is one of my three case studies. In terms of budget and timeframe, its construction differed little from the other projects being developed on the site. Its use of stone, carrying all the vertical loads of the building down seven storeys, was however, unprecedented within the Swiss context.

I had gone to Switzerland in early 2020 to do fieldwork around the Plan-les-Ouates project, whose construction was underway at that point. My intention to spend two uninterrupted months at each of my case study sites was partially compromised by the outbreak of the Covid-19 pandemic. In the Swiss case, after an initial period spent in situ, I conducted some remote interviews. Several months after my stay in Geneva, I was able to visit one of the French quarries that had supplied stone for the project, as well as a stone-cutting atelier in Chauvigny. I lack the space in this article to address the tension between the long and sited history held within this stone and the apparent lightness of its displacement from the quarry to the construction site, roughly 500 kilometers overland. It is worth pointing out however, that the definition of stone as a local resource is a contested one in practice, and a subject to which a section of my thesis is dedicated.

Be it at the architects' office in Geneva, the construction site in Plan-les-Ouates, the quarry, or the stone-cutting atelier in Chauvigny, my research was guided by one question: Was the structural use of stone challenging the professional practice of diverse actors such as architects, engineers, clients, quarriers and builders, and if so, in what way?

Gathering: Information

In France, it is commonplace to name stones used for construction by the place where they formed geologically. Hence, the two stones that make up the exposed load-bearing structure of the Plan-les-Ouates housing project – Migné and Brétigny, otherwise known as Chauvigny – are indigenous to the towns of Migné-Auxence and Chauvigny, a few kilometers from the city of Poitiers. Close relatives geographically, the two stones differ somewhat in age. Migné came into being in the Callovian age of the Jurassic period, around 165 million years ago. Brétigny, dated to the Bathonian age, preceded it by a few million years. Like all sedimentary stones, their formation began with existing matter that had been broken up and displaced by air or water. As limestones, the most common of the sedimentary lot in the world of construction, Migné and Brétigny are products of marine environments. Largely composed of the mineral calcite, found in shells, skeletons, and sea water itself, they also contain biological remains of plants and animals that lived therein. The fossil that I would later see in one of the stone blocks on the construction site in Switzerland was thus evidence of life in the warm shallow seas that once covered Poitiers and its hinterlands (fig. 2).

Historically, the structural material of choice for noble buildings and infrastructures, stone saw its place in construction significantly modified with the development of reinforced concrete – and to a lesser extent in Europe, steel frames – in the latter half of the 19th century. Cut into thin slices to finish floors and walls, it became a dressing material. In France, a shortage of energy resources and the difficulty of supplying cement gave stone a new lease of life as a structural material in the aftermath of World War II (Caille 1999). Subject to a mediatic blocus at the time, the vast housing projects developed in load-bearing stone by the architect Fernand Pouillon, predominantly in Marseille and the Paris region, have only recently resurfaced as emblems of an alternative modernism in French architecture (Lucan/Seyler 2003; Caruso/Thomas 2013). An unpublished study of previously undocu-



1.

*A block of Migné limestone being squared at a quarry near Chauvigny (FR).
Photographer: Martin Migeon.*



mented collective housing projects by largely unknown architects that were built in Paris between 1945 and 1973 (Kurtali/Le Drean 2018) nonetheless hints at the persistent absence of the material used structurally in representations of 20th-century French architecture.

In the 1990s and early 2000s, Gilles Perraudin's experimentations with Cyclopean blocks of roughly sawn limestone stacked without mortar in the south of France, most famously his self-built *chai* in Vauvert, brought media attention back to stone's load-bearing capacity. Nevertheless, while both private clients and architects eager to employ stone structurally multiplied in France during this period, the material struggled to gain credibility as an affordable component for projects that were larger and more technically complex than single family dwellings or agricultural stores. To remedy this, the stone sector mobilized itself on a national scale to promote the material: Institutions such as the Bureau de Recherches Géologiques et Minières (BRGM), the Centre Technique de Matériaux Naturels de Construction (CTMNC), as well as numerous cultural and commercial actors including the journal *Pierre Actual* and the Syndicat National des Industries de Roches Ornementales et de Construction (SNROC), collaborated to publish new cartographies of the material and create an online catalog of available stones and their properties, produce construction manuals in line with existing building standards, and establish an annual salon. This concerted effort played into broader societal preoccupations with the depletion of resources, a certain nostalgia for »nature«, notably in urban settings, as well as an aesthetic fascination with geological forms and processes. As a result, in France, the choice of stone as a structural material in architecture has ceased to be the marginal one it was 30 years ago. The exhibition *Pierre: Révéler la ressource, Explorer le matériau*, curated by the architectural practice Barrault Pressacco and held in the autumn of 2018 at the Pavillon de l'Arsenal, a cultural organ of the City of Paris focusing on contemporary issues of the built environment, represents one of the symbolic milestones in this process of normalization. The apparent difficulties of employing stone from the Paris Basin, the geological basin of sedimentary rocks surrounding Paris, of doing so elsewhere than on building facades and without reinforcement were left unaddressed by the exhibition. However, the ongoing or recently completed collective housing projects in and around the French capital that were presented on this occasion, such as those by Eliet et Lehmann in Bry-sur-Marne and Raphaël Gabrion or Jean-Christophe Quinton in the 15th arrondissement for public clients, or those by Vincent Lavergne with Atelier WOA in



2.

A fossil in a block of Brétigny limestone in Plan-les-Ouates (CH), displaced roughly 500 km from its place of deposit. Photographer: Natalia Petkova.



3.

Blocks of Migné and Brétigny limestone awaiting their incorporation into a housing project in Plan-les-Ouates (CH). Photographer: Natalia Petkova.

Rosny-sous-Bois and Trévelo & Viger-Kohler in the 19th arrondissement for private developers, lent weight to the curators' framing of stone as an »ordinary« material for »ordinary« uses.

More recently, this renewed interest in the architectural potential of stone beyond cladding has manifested in other parts of Europe. The title of the exhibition *New Stone Age*, held at the Building Centre in London in 2020, and which regrouped projects employing stone structurally in the UK and beyond, playfully overstates its presence on construction sites relative to other materials such as steel and concrete. Curated by the architect Amin Taha, the stone supplier Polychor, The Stonemasonry Company and Webb Yates Engineers, it echoes the mobilization of diverse actors in the French building industry in the early 2000s to see this proportion increase. In Switzerland, a curiosity about the material has emerged predominantly within academic institutions, where the use, though not exclusively structural, of stone has been the object of numerous semester-long design studios such as *Multiplicity — Building Material and Material Gesture — Stone* respectively led by An Fonteyne and Anne Holtrop at the Swiss Federal Institute of Technology in Zürich (ETH-Z) in 2019/20d as well as *Critical Mass* at the Laboratory of Elementary Architecture and Studies of Types (EAST) in 2020/21 at the École polytechnique fédérale de Lausanne (EPFL).

Layering: Approaches

In the ground, distinct layers of the Migné and Brétigny stones correspond to periodic deposits left by major changes in sea level. Each layer once covered the lithosphere, the mineral outer part of the planet. Weathering and movements within the lithosphere can cause older layers to re-emerge and younger ones to descend. Such is the case with Migné: resulting from a later deposit than Brétigny stone, it is found deeper and extracted today from an underground quarry. The stratified form of sedimentary stone makes it particularly adapted to construction, as each layer has the same characteristics ensuring a relative homogeneity of its aesthetic and mechanical properties. At the same time, a cross section within a quarry can simultaneously give access to layers of varying qualities that meet differing needs of construction. Within the industry, the layers go by the name of »veins« when thin and unexploitable, and »beds« when above 30 centimetres or so. The incorporation of sedimentary stone into buildings for structural purposes reflects this layered quality. To

conserve the stones' strength, blocks are generally stacked on top of one another in the same horizontal orientation that they were formed.

Recent research within and outside academia has addressed the structural use of stone in architecture from an overwhelmingly quantitative perspective. It has sought to measure the availability of the resource in given settings, its thermal performance, or the environmental and economic impact of its extraction, transformation, and transport from quarry to construction site (Zerbi 2011; Ioannidou 2016; Barrault Pressacco 2018). Sensing that the limitations – like the appeal – of using stone in its structural capacity today could not be understood through measurements only, the aim of my research has been to explore it as a social phenomenon, in other words: as a set of practices that result from constantly evolving influences. For methodological guidance, I have looked to ethnography, a form of qualitative research that involves immersing oneself in a particular community or organization to directly observe their behaviour and interactions. With origins in social and cultural anthropology in the early 20th century, the relevance of ethnography for research in architecture has developed significantly in recent decades. Two published ethnographies of architectural practice by Albena Yaneva and Sophie Houdart (with the photographer, film maker, and theorist Minato Chihiro), social anthropologists working in the continuity of the Actor Network Theory (ANT) tradition, in which they follow the day-to-day work of architects at the Office for Metropolitan Architecture in Rotterdam (Yaneva 2009a; Yaneva 2009b) and at the office of Kengo Kuma in Tokyo (Houdart/Chihiro 2009) have proven especially useful in informing my own approach. It is notably Yaneva's sensitivity to the agency of materials used for model making that I tried to develop in relation to the stone in my doctoral research, as well as Houdart's negotiation between the discourses of actors and her own observations. Whereas Yaneva sets out to follow architects »in their daily routines in spite of their interests and theories« (Yaneva 2009: 197), Houdart seeks to gain an understanding of how these operate in practice.

To further investigate the social, collective nature of architectural practice, we might extend our attention to other actors that feature in its making, notably those whose perspectives are often rendered invisible. Research on architecture in the field of oral history offers valuable insights in this regard. Christine Wall's exploration of post-war British brutalism from the perspective of the construction workers who built that style using concrete in un-

precedented ways (Wall 2019: 50–75), was particularly relevant to my research on what using stone structurally implies for masons today. We might also look to spaces of architectural production other than the architect's office and the construction site. In contrast to the foci of Yaneva, Houdart, and Wall on one particular location or group of actors at a time, my doctoral research aims to consider the viewpoints of multiple actors, including engineers, clients, quarriers, and builders gathered across multiple sites like municipal offices, quarries, stone-cutting ateliers, and warehouses.

To facilitate such a multi-actor, multi-site approach, prior to my arrival in Switzerland I had agreed with the Geneva-based architects of the Plan-les-Ouates collective housing project that I could occupy a desk in their office, access related documents, and accompany them to meetings while also being free to organize my fieldwork as I saw fit. Once there, and throughout this residency of sorts, the quantity and variety of potential information available, as well as the organic dimension of the research process was often overwhelming. Sifting through masses of files on the architects' server for instance, how should I decide what to take note of? Sitting in on a construction-site meeting, was I to transcribe the conversations or focus on non-verbal content? My emails asking for interviews were often ignored and questions were dodged, but anecdotes were also shared in unexpected places, and encounters with hitherto unknown people and places were suggested to me. I would argue then, that here lies the primary virtue of using ethnographic methods. By being present in the field and paying attention to what people said or did, alone or when interacting with each other, and the tools and concepts they employed in relation to stone, I gathered fragments of information that I would not otherwise have had access to. Documented as voice recordings, photographs, and observational notes, the significance of these fragments to my inquiry remained unclear to me at this stage. In the final part of this article, I will attempt to demonstrate the passage from a small set of such fragments to a tentative understanding of the professional practices being observed and how they might evolve.

Cementing: Concluding Reflections

Under the weight of new layers piling up above, the particles of matter that had gathered in the geological periods that saw the formation of Migné and Brétigny started to interact. For the sedimentary stones to form, this interaction was necessarily chemical in nature, and the calcite mentioned earlier assures this

process of binding, or cementation as geologists call it. Speaking of cement (a key component of modern concrete) and without entering into a demonstration of the energy-intensive process necessary to obtain it, it is worth bearing in mind the indispensable role of limestone therein. In the formation of sedimentary stones, the quantity and distribution of calcite directly informs their structure and as a consequence, their potential use in construction. Migné and Brétigny are both oolitic limestones, made up of tiny spheres of calcite rolled around eclectic remains of the sea. The uniform nature of oolitic limestones makes them well suited for structural use. Comparatively denser – thus better able to withstand horizontal loads – and less porous – thus less accommodating to water – Brétigny was employed for the ground floor of the Plan-les-Ouates collective housing project, as well as all the protruding elements. Migné, lighter, hence easier to transform and lay, was used for the rest of the load-bearing structure.

Before arriving in Switzerland, I was aware that work on the Plan-les-Ouates construction site had come to a complete halt two months prior due to problems with the stone supply. As I exchanged with various actors involved in the production of the project – informally or as part of one to two hour semi-directive interviews – and observed their interactions in meetings or on site visits, multiple reasons for the costly delay were claimed. Some insisted on the disorganization of the quarry, as it had delivered stones for the upper floors while those necessary to complete the ground floors were missing; some pointed instead to the architects' lack of foresight in allowing the necessary time for the freshly extracted blocks to lose their water and gain in strength; while others hinted at the unrealistic expectations of the construction manager and the general contractor, who were responsible for laying the stone, regarding the consistent quality of the blocks that arrived on site (fig. 3).

Reading between the lines of my observation notes and lengthy interview transcriptions, I sensed the actors' frustration about the losses incurred in revenue and sleepless nights as blame was shifted between the architects, the quarry manager, the construction manager, and the general contractor. Yet, also palpable was a sense of pride and achievement in having collectively overcome certain stone-related hurdles. In contrast to building with concrete, where a deficient supplier can be replaced by another, the specificity of the material and the protracted nature of its extraction would not allow that here. Divorce was not an option, as one of my interlocutors put it. Confronted with the physical reality of Brétigny and Migné stones, the actors

were thrown out of their habitual practices and into dialogue. During the unplanned interruption of work on site, the clients thus visited the quarry to better understand how it operated, namely the way in which producing blocks of identical dimensions in large batches saved time when recalibrating machines. In parallel, the quarry worked more closely with the general contractor to establish packing lists that sequenced the delivery of stones according to their order of assembly, rather than the logic of their transformation.

It was only a few months after my stay in Switzerland, when I visited the quarry where Brétigny is extracted and squared (fig. 1), as well as the stone-cutting atelier where both Brétigny and Migné underwent some of their transformation, that a further explanation for the delay came to my attention. To one side of the beige open-air pit, the quarry manager gestured at the large void that corresponds to all but the ground floor and the protruding stone elements of the Plan-les-Ouates collective housing project. Highlighting the naturally occurring fractures visible in the hillside, he recalled how the extraction of the larger blocks requested by the architects, all the same height and some measuring more than 2.5 meters, had proved challenging and generated considerable waste. As the quarry manager outlined more easily obtainable block dimensions from the quarry – 30 or 40 centimeters deep, between 30 and 70 centimeters high and up to 1 or 2 meters long – I was struck by the apparent discrepancy between the large standard dimensions of the blocks as they were drawn by the architects and the material as it was found in the ground.

The reflex to standardize building components brings to mind a remark that was echoed by several of the actors that I spoke with in relation to the Plan-les-Ouates project. Independently of one another, and in an unmistakably complimentary tone, they claimed that at a distance, the facades of the project appear to be composed of well-executed pre-fabricated concrete panels. They were referring to the regularity of the assemblage and the texture. Unlike prefabricated concrete however, which all the actors who shared the view above are more familiar with in practice, dimensions of stone elements are far more dependent on the material itself than on the intentions of those who draw them. Herein, I believe, lies one of the largely unexplored challenges of building with stone today: How the intrinsic heterogeneity of the material could be incorporated into architectural production.

Out of necessity, the architects of the Plan-les-Ouates project did, once construction had started, partially adapt the stone layout to the dimensions

of the blocks available. The experience showed that using stone in its structural capacity demands a different production process where all of the actors involved – from architects and clients to quarriers and builders – need to invent and abide by new protocols. Drawing on this experience, might the stone layout be designed from the outset according to the formats readily available at a quarry, or provide scope for potential modifications once extraction has begun? Relinquishing this complete control over design a language proper to this material might (re)emerge. It suffices to read Vitruvius' *On Architecture* (Vitruvius 2009 [c.30–15 BC]): 328) or to look at historic stone buildings with alternating course heights and blocks of differing lengths to see that a more accommodating relationship to the material is not a new, but simply a forgotten, idea.

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