



UNIVERSITÀ DEGLI STUDI DI TORINO

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TourInStones: application for mobile on ornamental stones of the city of Torino

TourInStones: un'applicazione multimediale sulle rocce ornamentali della città di Torino

Francesca Gambino ^a, Alessandro Borghi ^a, Anna d'Atri ^a, Lorenzo Mariano Gallo ^b, Luca Ghiraldi ^b, Marco Giardino ^a, Luca Martire ^a, Mauro Palomba ^a, Luigi Perotti ^a

^a Dipartimento di Scienze della Terra, Università di Torino, Via Valperga Caluso 35, Torino, Italia

^b Museo Regionale di Scienze Naturali di Torino, Via Giolitti 36, 10123 Torino

Corresponding Author: A. Borghi: alessandro.borghi@unito.it, tel: 011/670.51.79 Fax: 011/670.53.17K

ABSTRACT

The Piemonte mountains surrounding the city of Torino comprise a wide variety of rocks, characterized by a multitude of minerals, structures and colors. The Alps, for their long and complex history, offer a wide variety of ornamental stone used in the town, over the centuries, for both aesthetic and structural reasons. TourInStones is a geo-touristic application for mobile of the center of Torino, where the visitor can find out which of these rocks have been used in palaces and historical monuments, witnesses and tangible symbols of the city. For the geologist, the naturalist, the curious, the student, the tourist, walk around Torino downtown represents a formidable opportunity to step on and observe granites, porphyries, gneisses, marbles and limestones, a rich collection exhibited in an open-air museum. In the proposed itineraries, you can stop in 25 sites, in each of which you can observe in detail a lot of ornamental stones of historical and scientific interest.

RIASSUNTO

Le Alpi, per la loro lunga e complessa storia, offrono un'ampia varietà di pietre ornamentali impiegate in città, nel corso dei secoli, per esigenze sia estetiche che strutturali. Passeggiare per Torino rappresenta quindi una occasione per calpestare ed osservare graniti, porfidi, gneiss, marmi e calcari, in una ricca collezione esposta in un museo a cielo aperto. TourInStones è un'applicazione per mobile volta a valorizzare il patrimonio geologico urbano nel centro di Torino e allo stesso tempo educare gli studenti di scuole superiori e università allo studio della petrografia e della geologia nella propria città grazie all'unione dell'aspetto culturale e di quello scientifico. L'idea è quella di proporre alcuni itinerari geo-turistici nel centro storico di Torino che raccontino alcuni momenti importanti della storia della città, descritta dai suoi principali palazzi e monumenti, ma anche della storia naturale che, nel corso di centinaia di milioni di anni, ha visto la formazione delle Alpi. All'interno di una mappa della città di Torino vengono visualizzati alcuni siti storici tramite simboli numerati che sono raggruppati in alcuni percorsi tematici preesistenti. Lo scopo è di porre l'attenzione sui materiali in opera, di ampliare l'esperienza culturale e di trasmettere il messaggio che i materiali lapidei fanno parte della storia stessa della città e che la loro scelta d'impiego è tutt'altro che casuale. Ciascun sito, inoltre, dispone di una scheda in cui è riportata la fotografia dell'oggetto di interesse, una breve descrizione storico-culturale, la descrizione dei principali litotipi impiegati e la motivazione dell'utilizzo delle rocce in questione.

KEY WORDS: applied petrography, multimedia application, ornamental stones, cultural heritage, Torino

PAROLE CHIAVE: petrografia applicata, applicazioni multimediali, rocce ornamentali, beni culturali, Torino

INTRODUCTION

Knowledge of stone resources, their mineralogic and petrographic characteristics, and their use can provide a broad overview of the historical relevance of these materials, emphasizing the importance of a significant economic activity that is fundamental to the understanding of the history and the traditions of different Mediterranean cultures (Cooper, 2015).

Piemonte mountains surrounding Torino consist of a wide variety of rocks, characterized by a multitude of minerals, structures, colors and shades. The Alps, for their long and complex history, offer a wide variety of ornamental stone used in town, over the centuries, for employments both aesthetic and structural.

Therefore, the Alpine geological evolution meets history and architecture in the buildings, the churches, the streets and the squares of the city of Torino. The present work witnesses and explores the use of the alpine rocks, and not only, for the ornament and the structure of the most important monuments and buildings of the historic center. The stone materials used for the facades, statues and even for skirting the buildings represent an historic and important geological heritage to be preserved and enhanced (Borghi et al., 2014).

Walking under the arcades of the city, or relaxing on a bench of its squares can become an opportunity to step on and observe granite, porphyry, gneiss, marble and limestone, in a rich collection displayed in an open-air museum, and travel a curious and unexpected journey through time, across geological ages, back millions of years ago.

TourInStones, through a petrographic study of 42 major ornamental rock types used for the city of Torino, creates a petrographic database, detailed and uniform in its content. In the proposed application, you can stop in 25 sites represented by historic buildings of monuments, in each of which you can observe in detail many ornamental stones of historical and

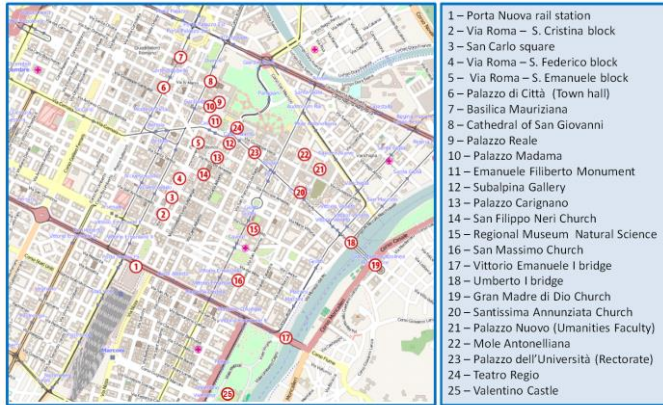


Fig. 1. Location of the 25 sites of interest of the application on the Torino toponomastic map.

Fig. 1. Distribuzione dei 25 siti di interesse della applicazione sulla mappa toponomastica di Torino.

scientific interest (Fig. 1). The development of itineraries and simplified texts for non-experts can build a bridge between the geology of the Alps and the city, its citizens, its students and its tourists.

GEOLOGICAL SETTING

The great variety of ornamental and building stones present in Torino is certainly to be attributed to the extremely different geological nature of this region (Beltrando et al., 2010, and references therein). In Piemonte, in fact, there are very different geological elements together such as the western portion of the Alpine metamorphic chain and, to a lesser extent, the Tertiary Piemonte basin, as well as a limited sector of the northern Apennines. For this reason, in Piemonte stone has always been the most common material for construction, strongly characterizing the architectural identity of the city of Torino (Fiora et al., 2002). Walls, floors, roofs, various architectural elements, statues are often made in the many varieties of rocks coming from the different units of the western Alps. In particular, from Roman times to the end of '700 marbles were the most used rocks in the valuable buildings. Starting from '800, they took more and more over the granite and other silicate rocks, thanks to the development of technologies for their processing and new transport possibilities with the development of the railway network.

On the regional territory many quarrying basins of particular importance for the sector of natural stones can be identified (Fig. 2), some of which are still active (Sandrone et al., 2004). Can be remember, for example, the quarrying district of Dora-Maira Massif, from which the Luserna Stone, the Bargiolina Quartzite and other gneissic stones are exploited, that of the Canavese, from which the Balma Syenite and the Vico diorite come, and the quarrying district of the Verbano-Cusio-Ossola, located in correspondence of the deep geological structures of the Alps, rich in orthogneiss such as "serizzi" and "beole" (Dino & Cavallo, 2015).

In the past also other parts of the Piemonte region were the subject of intense production of stone materials: an example is the quarrying district of "Monregalese", meaning by this name

the territory which constituted the former province of Mondovi, and that included the mountain valleys between Pesio and Tanaro Valleys (Internal Briançonnais Zone). From here the most colored Piemonte marbles came, widely used in churches and palaces throughout the region (Badino et al., 2001). Many other Piemonte white marbles come, generally, from small lenses of different alpine geological units, of different metamorphic grade, such as the Prali marble, the Brossasco marble, the Chianocco and Foresto marbles of the Val di Susa (Dora -Maira Massif), the Pont Canavese marble

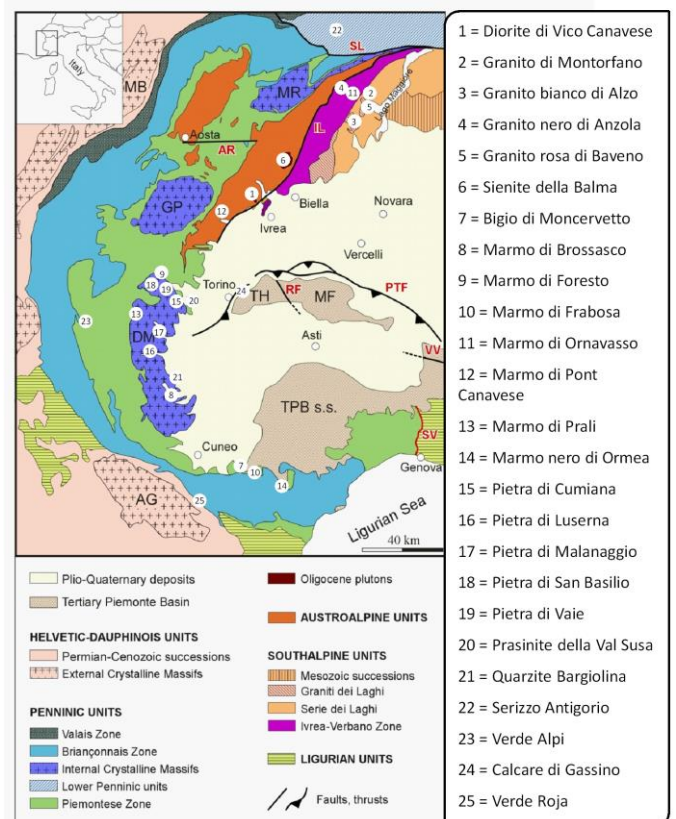


Fig. 2. Geological sketch map of the Western Alps and quarrying sites of the ornamental stone reported in the application.

Fig. 2. Schema geologico delle Alpi occidentali e ubicazione delle cave delle pietre ornamentali riportate nella applicazione.

(Sesia Lanzo Zone), and those from the quarrying district of the Ossola Valley (Candoglia, Ornavasso and Crevola marbles) (Borghi et al., 2009).

THE STRUCTURE OF THE APPLICATION

TourInStones is an application for smartphones and tablets in which are presented twenty-five selected sites in order to provide an overview of the main ornamental stones used in historical buildings, churches and streets of the city center: a petrographic collection in the open air.

It is an innovative instrument to promote, increase and enhance the urban geological heritage, thanks to which the

visitor at the same time can enjoy the cultural aspect and the scientific one. The development of a multimedia application, indeed, provides access to some basic qualities of the web: effectiveness, accessibility, user attention, responsiveness, information management and content.

TourInStones is an application in which the selected sites are part of four thematic itineraries through which the user can add to discover the city by cultural and architectural point of view, through the recognition of the constituent materials of the stone buildings and monuments. Body and soul of the latter are in fact inseparable and will be paid particular attention to the ornamental stone materials, tangible evidence of the city landmarks and the territory.

The target is to propose some geo-touristic walks in the historic center of Torino that tell some important moments in the history of the city, described by its main buildings and monuments, but also the natural history that in times of tens and hundreds of millions of years, saw the formation of the Alps.

The final structure of the application includes the following items: 1) Buildings and Monuments, 2) Rocks, 3) Itineraries, 4) Geological setting, 5) Glossary, 6) Bibliography.

1) Buildings and Monuments: A numbered list allows displaying in alphabetical order all the stops of the routes. The numbering allows you to find sites on the map and clicking on them as the respective form. The board of each monument is


organized according to the fields: name of interest, photos of the site of interest, address, itinerary where it is reported to the site, artistic and historical description. At the bottom of the form there is a list of ornamental stones used for the specific site, from which it can access their descriptions (Fig. 3a).

1) Rocks: By a numbered list of the stones used in all described monuments you can access the specific data of each rock. This list is divided according to the genesis of rocks: igneous intrusive rocks, extrusive igneous rocks, metamorphic rocks and sedimentary rocks. The form of each rock is organized according to the following fields: Scientific classification, Trade name, Quarrying district, Simplified geological map where the quarrying district is indicated, Geological setting, macroscopic description of the rock, main uses: monuments, churches or palaces of greater importance where the rock has been employed, macroscopic photo of the rock (Fig. 3b).

3) Itineraries: There are four proposed itineraries, each with 8 different stops. The choice of stops and itineraries was made primarily on the basis of geographical proximity of interest in the historic center of the city. From the list of itineraries you can, by clicking on them, view the map of the center of Torino with the itineraries traced and numbered (Fig. 4).

4) Geological setting: This item shows a brief description of the geology of the Piemonte and the key to understanding the geological information that are reported in rock forms. There

a) Palazzo Carignano



ADDRESS: Via Accademia delle Scienze 5 – TORINO

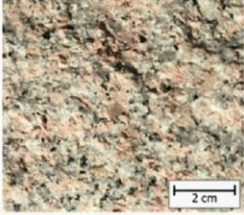
ITINERARY n. 4: Under the Gallery, beyond the river

HISTORICAL DESCRIPTION: Palazzo Carignano is one of the most original buildings of the European Baroque, it was realized between 1679-1684 by Guarino Guarini. The palace was doubled in size from the interior side with the creation of the 19th (1864-1871) century wing. Included in the project was the realization of a new façade overlooking Piazza Carlo Alberto. The Palace was the seat of the first Sub Alpine Parliament and then of the first Italian Parliament. The building hosts the National Museum of the Italian Risorgimento and the Superintendence for the Artistic and Historical Goods of Piedmont.

ORNAMENTAL STONES employed for the XIX century façade are:

Gassino Stone	Prasinite
Baveno Granite	Alzo Granite
Frabosa Marble	Cumiana Stone

b) Baveno Granite



Petrographic name: Monzogranite


Commercial name: Granito di Baveno, Rosa Baveno

Quarry district
The rock outcrops in the eastern side of the Mottarone Mount in the Verbanico-Cusio-Ossola quarry district (northern sector of Piemonte, municipality of Baveno).

Geological setting
The pluton of Baveno belong to a huge batholith of Permian age (290-245 million years) outcropping in the western portion of basement of the Southern Alpine domain.

Main usage in Turin

- The columns, plinths, capitals, architraves and skirting in Via Roma block between Piazza San Carlo and Piazza Castello
- The columns and skirting of Mole Antonelliana
- The columns of San Massimo Church
- The façade of San Carlo Church



- The basement of Vittorio Emanuele I monument in front of Chiesa della Gran Madre di Dio
- The column of the gate of the Castello del Valentino

Macroscopic description
The Baveno granite rose is among the finest Italian granite. It is an intrusive magmatic rock, with granular texture and a medium-fine and homogeneous grain, of pink color due to inclusions of hematite in the K-feldspar. Among the minerals it can be recognized: gray quartz with vitreous luster, white plagioclase and pinkish K-feldspar. Finally, it is present in smaller quantities, black biotite with metallic luster.

Fig. 3 – a) example of description form for the “Palazzo Carignano” building; b) example of description for the “Baveno Granite” rock.

Fig. 3 – a) esempio di scheda descrittiva per il sito “Palazzo Carignano”; b) esempio di scheda descrittiva della roccia “Granito di Baveno”

is also a short introduction of the main geological setting of Italy.

5) Glossary: This section provides definitions, in alphabetical order, of all words highlighted in bold in the stone forms and points of interest.

6) In the references section the quotations that were used in the texts and captions of figures are reported.

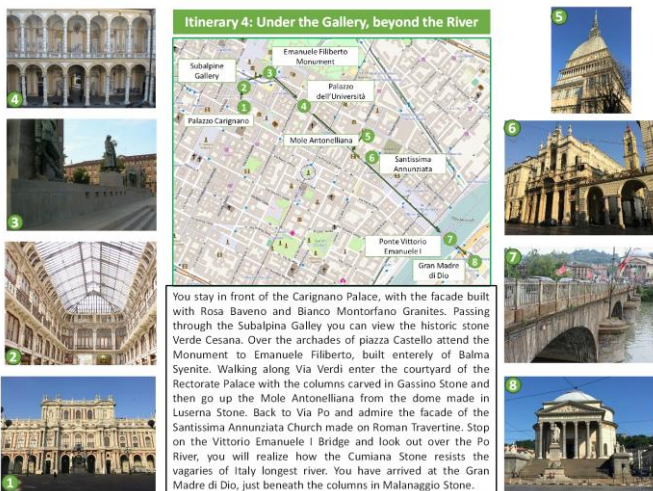


Fig. 4 – Example of Itinerary n. 4: Under the Gallery, beyond the River. The stops are reported on the toponomastic map of Torino.

Fig. 4 – Esempio della scheda per l'itinerario n. 4: Sotto la Galleria, oltre il Fiume. I siti sono riportati sulla carta toponomastica di Torino.

The final result is the mobile application that you can download free from the App Store or Google Play respectively for Apple and Android devices.

CONCLUSIONS

The TourInStones application aims to disseminate knowledge on stones by scientific and educational field to that of the cultural tourism, making available a tool easy to use to those who work in planning territory, and offer the basic knowledge essential to any intervention to the restoration operators. In particular it is aimed at: 1) scientific community in the field of Earth Sciences and Cultural Heritage, 2) institutions dealing with the promotion and preservation of historical and architectural heritage, 3) organizations and Local Authorities.

The identification of these targets would leave the way open for a wider audience, it could affect the Alpine tourism and perhaps broaden the horizons to the cultural one.

The present and future project wants to place in a "conscious disclosure" in which content and omissions are both the result of justified choices.

In Europe, we speak now for a few years of Responsible Research and Innovation (RRI) whose cornerstones are the public engagement and science education. These are intended as innovative ways of doing research and training because they make more effective the impact that science and technology can have on society.

TourInStones is an application of this innovative way to educate and intrigue the young students and the wider public than that of the university. The technical-scientific study of the materials, its simplification and dissemination, the mingling with the cultural aspect and local communities represent a new way of doing research in accordance with the objectives of universities across Europe.

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