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Materials from the local quarries and from the conquered territories

*Les tufs des « Mura Serviane » de Rome : matériaux provenant de carrières locales et de carrières des territoires conquis*

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# The tuffs of the “Servian Wall” in Rome: Materials from the local quarries and from the conquered territories

*Les tufs des « Mura Serviane » de Rome :  
matériaux provenant de carrières locales et de carrières des territoires conquis*

Liliana PANEI\*

**Abstract:** In the context of the current scientific collaboration between the Soprintendenza per i Beni Archeologici di Roma and the Laboratorio di Sperimentazione Mineraria e Petrografica del Ministero dello Sviluppo Economico, a study has been carried out on some tuff blocks recovered during the redecoration of the historic building where our laboratory is located (the building is on Quirinale hill). Archaeological sources affirm that these blocks belong to the first wall that surrounded Rome, the wall named “Mura Serviane”. It was built from the 6<sup>th</sup> to the 4<sup>th</sup> century B.C. An archaeometric study of the tuff blocks has been carried out aiming to identify the kind of raw materials used and to compare the results with the data regarding the tuff banks set in the area of Rome: in the central area and in the north of Rome.

**Résumé :** *Au cours de la collaboration scientifique entreprise avec la Soprintendenza per i Beni Archeologici di Roma, nous avons étudié des blocs de tuf trouvés pendant les travaux pour la restauration du bâtiment où se trouve notre laboratoire; le bâtiment se trouve sur la colline du Quirinal. Les sources archéologiques affirment que ces blocs appartiennent à la première muraille, « Mura Serviane », qui protégeaient la cité de Rome; ces murs ont été construits du sixième au quatrième siècle avant Jésus Christ. Le but de cette étude est l'identifier le matériau utilisé et de rechercher des carrières desquelles ces blocs ont été prélevés.*

**Key words:** “Servian Wall”, tuff, Quirinale hill, XRD.

**Mots clé :** « Mura Serviane », tuf, colline du Quirinal, DRX.

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## INTRODUCTION

The tuff is a volcanic conglomerate that consists of pumice, lithic and scoriaceous lapilli and crystals of sanidine, pyroxene and biotite cementated by finely crystalline zeolite (Rittman, 1972; De Gennaro *et al.*, 1990). Tuff dimension

stone masonry was the primary stone construction material of ancient Rome.

The roman tuffs were erupted as pyroclastic flows from nearby Monti Sabatini and Alban hills volcanic complex belonging to the potassic quaternary volcanites roman comagmatic region (De Rita, 1993). **There are various pyro-**

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clastic flow deposits in the area of Rome: “tufo del Palatino” (so-called “cappellaccio” or “tufo grigio”) and “tufo lionato” (*Rubris Lapidicinis*), both from the Alban hills volcanic complex, in the central area of Rome (Fornaseri & Scherillo, 1963; Funicello, 1995; Penta, 1955; Stoppani & Curti, 1982; Funicello & Giordano, 2005; Funicello *et al.*, 2006; Jackson *et al.*, 2006); “tufo giallo della via Tiberina” (so-called “tufo di Grotta Oscura”) and “tufo rosso a scorie nere” (“tufo di Fidene” – *Pallensibus Lapidicinis*), both from the Sabatini volcanic complex, in the north of Rome as far as “Prima Porta” (De Rita, 1993; Funicello, 1995; Mattias & Ventriglia, 1970; Nappi *et al.*, 1979; Penta, 1955; Stoppani & Curti, 1982; Ministero dell’Industria, 1995). Several authors (Cifani, 1997; Funicello, 1995; Funicello *et al.*, 2006; Ventriglia, 1971; Ventriglia, 2002; Jackson *et al.*, 2006) report that, in the central area of Rome, grey tuff building stones were quarried by Romans. The tuffs from the central area were used in Rome from the 6<sup>th</sup> century B.C. while the tuffs from the north of Rome, “tufo giallo della via Tiberina” and “tufo rosso a scorie nere”, were used in Rome only from the 4<sup>th</sup> century B.C., after the conquest of Veio (Cifani, 1997; Cifani & Fogagnolo, 1998; Cifani, 2004; Cifani, 2008; De Rita *et al.*, 1993; Funicello *et al.*, 2006).

During last years several archaeometric studies have been carried out on Roman tuff building stones (Dell’Orso & Panei, 2008; Giampaolo *et al.*, 2006; Jackson *et al.*, 2005; Karner *et al.*, 2001; Lombardi & Meucci, 2006).

In the context of the current scientific collaboration between the Soprintendenza per i Beni Archeologici di Roma and the Laboratorio di Sperimentazione Mineraria e Petrografica del Ministero dello Sviluppo Economico, an archaeometric study has been carried out on Roman tuff building stones (fig. 1) recovered during the redecoration of the historical building where our laboratory is located (the building is on Quirinale hill).

Archaeological sources state that these tuff building stones belong to the first wall that surrounded Rome, the wall named “Mura Serviane” (Servian Wall). It was built from the 6<sup>th</sup> to the 4<sup>th</sup> century B.C. The topic of the work is the research of the source of the lithic materials used for the tuff building stones recovered in the historic building.

## 1. METHODS

Mineralogical analysis has been performed aiming to characterise:

- 1) the raw material used for the tuff building stones;
- 2) the tuff deposits in the central area and in the north of Rome.



Figure 1: Roman building stones in the building on Quirinale hill.  
*Figure 1 : Moellons romains sur la colline du Quirinal.*

Six samples were analysed:

- one sample from the tuff building stones recovered in the historical building where our laboratory is located (Block-1, fig. 1, block size 27 x 46 x 72 cm);
- one sample from the tuff deposit in the courtyard of the historical building (Bank-1, fig. 2a);
- two samples from the tuff deposits on Palatino hill (Bank-2, “tufo del Palatino” and Bank-3, “tufo lionato” (fig. 2b);
- two samples from the tuff deposits in the north of Rome (Bank-4, “tufo giallo della via Tiberina” (fig. 2c) and Bank-5 “tufo rosso di Fidene” (fig. 2d).

The mineralogical composition has been established by X-Ray Diffraction (XRD – Philips PW 1830 – Operation condition: Generator tension 40 KW – Generator current 30 mA – Tube anode Cu – Filter Ni; Divergence slit 1/2 – Receiving slit 0,2 – Start, end angles 2-70 degree – Step size 0,02 degree – Time per step 1 s).

## 2. RESULTS

- Block-1, Bank-1 and Bank-2: lithified crumbly tuff constituted by grey volcanic welded ashes very rich in white altered leucite and black crystals. The main mineralogical phases (fig. 3, 4 and 5) are: analcime, a stable zeolite from leucite (Quantin & Lorenzoni, 1992), halloysite (an alteration product, found in different amount in the three samples), augite (a piroxene). The diffractograms of Block-1

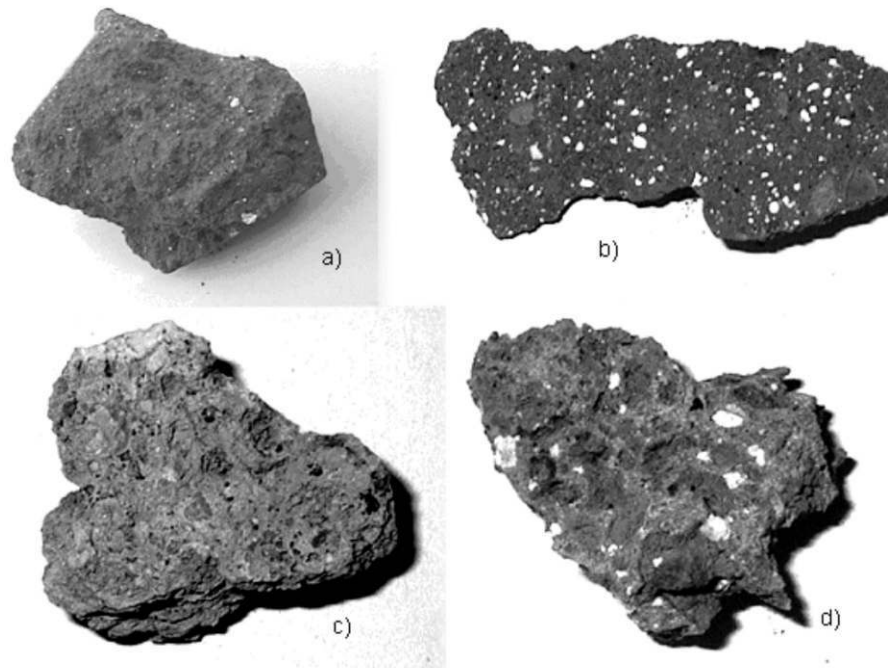


Figure 2: Tuffs from the area of Rome: a) "tufo del Palatino"; b) "tufo lionato"; c) "tufo giallo della via Tiberina"; d) "tufo rosso di Fidene".

Figure 2 : Tufs de la région de Rome : a) « tufo del Palatino »; b) « tufo lionato »; c) « tufo giallo della via Tiberina »; d) « tufo rosso di Fidene ».

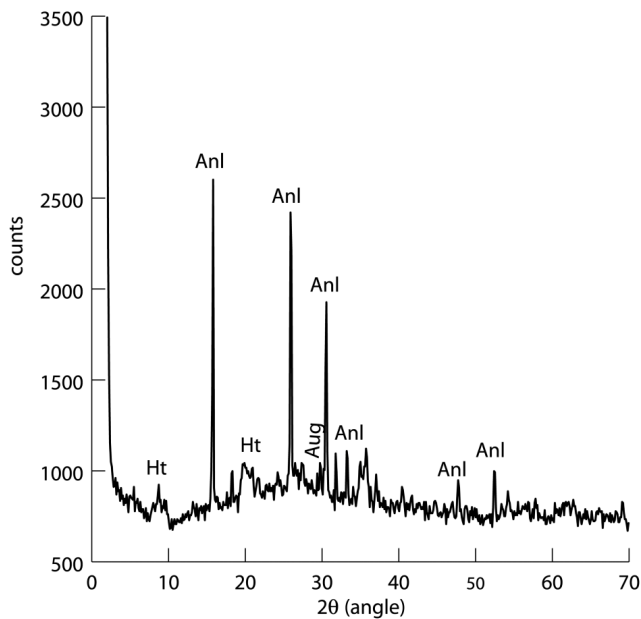


Figure 3: Diffractogram of the Block-1 from the tuff building stone on the Quirinale hill.

Legenda: Ht=halloysite; Anl=analcime; Aug=augite.

Figure 3 : Diffractogramme du block-1 provenant du moellon en tuf de la colline du Quirinal. Légende : Ht = halloysite ; Anl = analcime ; Aug = augite.

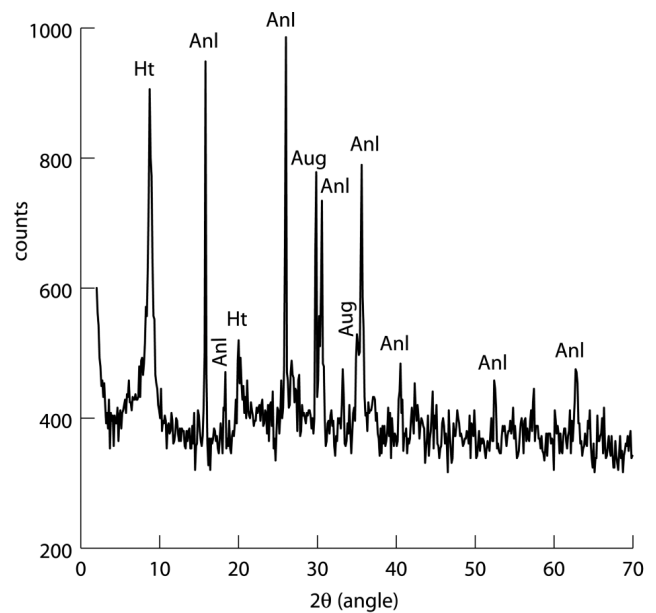


Figure 4: Diffractogram of the Bank-1 from the tuff deposit on the Quirinale hill.

Figure 4 : Diffractogramme du banc-1 provenant du dépôt de tuf de la colline du Quirinal.

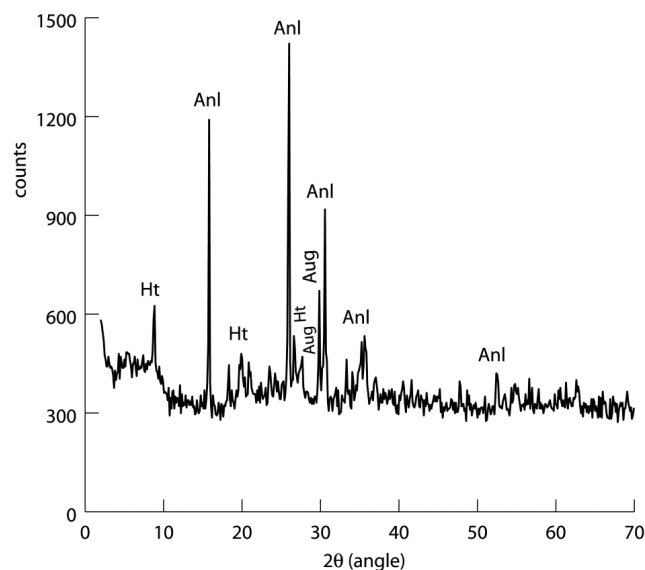


Figure 5: Diffractogram of the Bank-2 from the tuff deposit on the Palatino hill.

Figure 5 : Diffractionnogramme du banc-2 provenant du dépôt de tuf de la colline du Quirinal.

and Bank-2 are quite superimposable. The glass occurrence is defined by a high background. The macroscopic feature and the mineralogical composition enable us to classify the material of the Block-1 as “tufo del Palatino” (“tufo grigio” or “cappellaccio”) belonging to the Palatino unit (Funicello & Giordano, 2005).

– Bank-3 “tufo lionato”: lithified crumbly tuff constituted by yellowish red ashes rich in white and reddish yellow small sized lapilli and black crystals. The main mineralogical phases are: phillipsite and chabasite (two zeolites), biotite, small amounts of augite and leucite (a feldspatoid). The glass occurrence is defined by a high background.

– Bank-4 “tufo giallo della via Tiberina”: lithified tuff constituted by pink ashes rich in altered small sized reddish yellow pumiceous lapilli; the matrix contains a few black crystals. The main mineralogical phases are: chabasite, sanidine (a feldspar) and augite. The glass occurrence is defined by a high background.

– Bank-5 “tufo rosso di Fidene” lithified reddish yellow matrix, rich in white and yellowish red small sized lapilli; the matrix contains a few black crystals. The main mineralogical phases are: chabasite and small amounts of augite and sanidine. The glass occurrence is defined by a high background.

The “tufo del Palatino” is the only tuff deposit in the area of Rome to be characterised by the presence of analcime as the only zeolite (Kostov, 1968).

## CONCLUSION

This preliminary work confirms that the tuff building stones recovered in the historical building where our Laboratory is located (Quirinale hill) are made of “tufo del Palatino” (“tufo grigio”) belonging to the Palatino unit. The raw material used for the tuff building stones was extracted from a quarry located in the central area of Rome, probably next to the building where the blocks have been found.

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