

The Use of Tuff in Roman Monumental Construction

Tuff, or *tuffa* in Italian, is an extremely common building material in the monumental structures of ancient Rome, utilized from the Archaic period through the Imperial age. Tuff stone is formed via the lithification of pyroclastic flow deposits, and it is quite common in central Italy. The Romans quarried tuff from several locations and used it to build their monuments, including the Temple of Jupiter Optimus Maximus, the Tabularium in the Forum Romanum, and the Forum of Augustus. The earliest monuments on the Palatine and Capitoline hills used tuffs quarried from the hills themselves, but as Rome gained more territory the Romans had access to more quarrying locations further afield, and with the wealth acquired from their expansion, they had the means to transport stone to Rome from more distant locations. The Monti Sabatini volcanic district to the north of Rome and the Alban Hills district to the south consist of many tuff formations and thus served as excellent sources for stone building material.

There has been a good amount of geologic and petrographic research conducted relating to the types and provenances of tuff used in Roman construction. D'Ambrosio et al. (2023) examined trace element compositions of samples from the tuff foundations of the Temple of Jupiter Optimus Maximus as well as five other tuff Archaic monuments, and found that all samples likely came from the same quarrying location, in this case, at the base of the Capitoline hill. Farr, Marra, and Terrenato (2015) also used trace element analysis to establish geochemical identification criteria for the common forms of tuff used in Roman construction and applied them to several notable Roman monuments. Jackson et al. (2005) discuss the varieties of tuff used by the Romans chronologically, and how the Romans selected different types of stone to serve different architectural purposes. Additionally, ancient sources can provide insight into the

Romans' knowledge of the properties of tuff and the construction techniques used to build with it. Vitruvius discusses many aspects of stone construction in his *De Architectura*, and Pliny the Elder discusses mining and mineralogy in Books 9 and 10 of his *Natural History*.

This paper will include a general survey of the ancient monuments in the city of Rome constructed using tuff, and provide an analysis of the chronology and provenance of the tuffs used. It will also delve into the question of why the Romans favored tuff to such a degree. One explanation is simply the abundance of tuff in central Italy. However, other stones, such as travertine, were available to the Romans as well. It could also be due to the relative workability of tuff, although different types of tuff have different mechanical properties, as examined by Sappa, Giglio, and De Casa (1995). The Romans continued to use tuff even when they had to accommodate its susceptibility to weathering and (at times) poorly-lithified structure. This paper will investigate whether there was a cultural factor, perhaps a sense of national pride, relating to the use of tuff in the construction of monuments, since tuff had been used since the time of the mythological founding of Rome in the 8th century BCE, or if it was driven by other factors yet to be determined.

Bibliography

D'Ambrosio, Ersilia, Daniel P. Diffendale, Fabrizio Marra, Ortwin Dally, Alberto Danti, and Claudio Parisi Presicce. "Geochemical Proveniencing of the Tuff Used to Build the Temple of Jupiter Optimus Maximus and Other Archaic Monuments (Rome, Italy)." *Journal of Archaeological Science: Reports* 51 (October 2023): Article 104146.

Farr, Jason, Fabrizio Marra, and Nicola Terrenato. "Geochemical Identification Criteria for "Peperino" Stones Employed in Ancient Roman Buildings: A Lapis Gabinus Case Study." *Journal of Archaeological Science: Reports* 3 (September 2015): 41–51.

Jackson, M.D., Fabrizio Marra, R.L. Hay, C. Cawood, and E.M. Winkler. "The Judicious Selection and Preservation of Tuff and Travertine Building Stone in Ancient Rome." *Archaeometry* 47, no.3 (August 2005): 485–510.

Sappa, G., G. Giglio, and G. De Casa. "Material Characteristics of Some Volcanic Tuffs Used in the Buildings of Ancient Rome." *MRS Proceedings* 352, no.1 (1995): 733–744.