The Roman Flour Mill at Barbegal

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Introduction

The Roman flour mill at Barbegal is an example of something that, according to some experts, never existed: a Roman water-powered factory. According to contemporary classicist A. Trevor Hodge (p. 106), "Barbegal is significant because it calls into question what may be termed the 'technology theory' of the decline and fall of the Roman Empire. The theory maintains that the availability of cheap slave labor prevented the Romans from developing alternative sources of power, without which large scale manufacturing is impossible."

Twelve kilometers north of Arles, France, the aqueduct which fed water to the Barbegal mill crosses a local road (see Illustration 1). A colleague and I parked our rental car there and hiked 300 meters along the ruins of a double line of arches (see Photo 1). Soon we arrived at the fork where one aqueduct makes a 90 degree turn (to provide drinking water to Roman community at Arelate, modern-day Arles), but the second proceeds straight, slicing through a solid rock outcrop (see Photo 2). From the top of the outcrop, with a little imagination and a drawing from *Scientific American*, it was possible to interpret the rubble below (see Illustration 2).

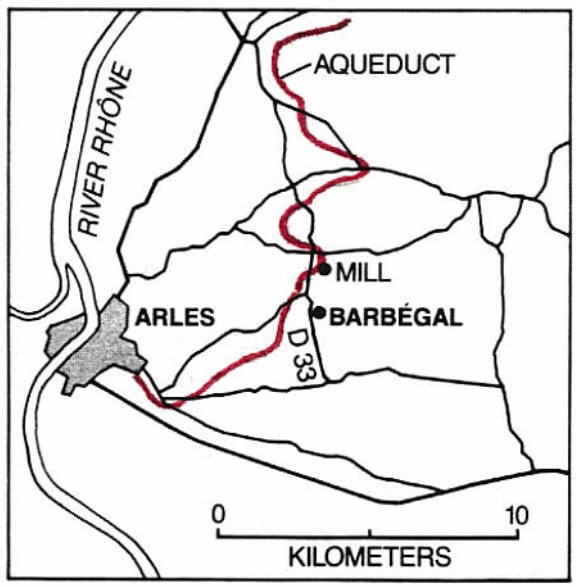

Illustration 1. The mill at Barbegal was built in the fourth century AD near the port of Arles, along an aqueduct that had once supplied water to the city (drawing from Scientific American).

Photo 1. This aqueduct provided water to the Roman mill at Barbegal.

Photo 2. The cut for the channel that delivered water to the mill at Barbegal.

Flour Mill

The concept was simple, but the application is impressive. Barbegal was an immense flour mill, dating from the 4th century A.D. The power to drive the millstones came from 16 waterwheels, arranged in two parallel rows of eight. Each row ran downhill so that the water dropped from one wheel to the next, driving all eight in turn before running into a drain at the foot of the hill.

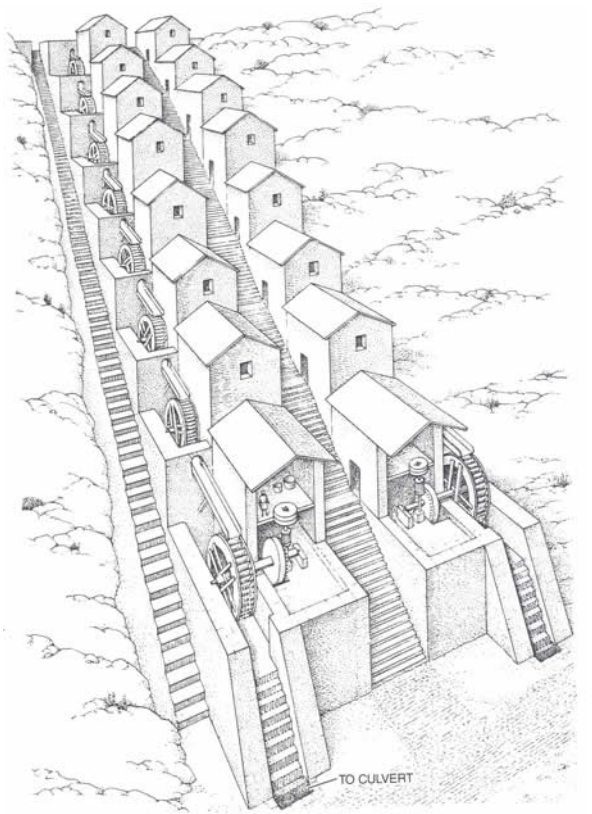

Illustration 2. Overshot waterwheels are conjectured to have driven the 16 mills at Barbegal (drawing from Scientific American).

Near the top of the ridge is a sign dedicated to the man who first investigated the site in 1940, Fernand Benoit: "Thanks to his efforts we have a better understanding of the technological innovation of the Roman Empire." Contemporary evidence of multiple mills during the Roman era is rare.

While looking over the site, several other groups of intrepid travelers arrived at the site. Most struggled to make sense of the rubble dotting the hillside. I lent my *Scientific American* illustration to two of the groups. While one travel book alleges that the site is "well preserved," a healthy imagination is still important (see Photos 3 and 4).

Photo 3. Aside from a few walls and some stairs, there are few remains from the Roman mill at Barbegal.

Photo 4. The general site of the Roman mill at Barbegal. The arrow marks the spot where water entered the industrial complex, through the cut shown in Photo 2

Hodges has made an attempt to estimate the productivity of the 16 flour mills. Using conservative estimates about the flow of water from the aqueduct, and assuming 50 percent downtime (to accommodate interruptions for maintenance, breakdowns, late arriving grain shipments, and other interferences), the mills could still produce enough flour to feed 12,500 individuals, the population of nearby Arelate (present-day Arles) in the 4th century A.D.

Other Roman Mills

There were at least two other multiple Roman mills, but neither was as ambitious as Barbegal. Chemtou in western Tunisia, and the other mill were in Israel on a dam on the Crocodile River near ancient Caesarea. According to Hodges (p. 111): "Neither installation has been fully studied, but together they remain the only known parallels to Barbegal." But he feels strongly that there are probably other Roman mills that remain to be discovered. After all, Barbegal was undiscovered until the twentieth century and it is located in a heavily populated area.

Reference

A. Trevor Hodge, "A Roman Factory," *Scientific American* (November, 1990), pp. 106-111.