

TIBER RIVER BRIDGES AND THE DEVELOPMENT OF THE ANCIENT CITY OF ROME

Rabun Taylor
rmtaylor@fas.harvard.edu

Introduction

Early Rome is usually interpreted as a little ring of hilltop strongholds surrounding the valley that is today the Forum. But Rome has also been, from the very beginnings, a riverside community. No one doubts that the Tiber River introduced a commercial and strategic dimension to life in Rome: towns on navigable rivers, especially if they are near the river's mouth, enjoy obvious advantages. But access to and control of river traffic is only one aspect of riparian power and responsibility. This was not just a river town; it presided over the junction of a river and a highway. Adding to its importance is the fact that the river was a political and military boundary between Etruria and Latium, two cultural domains, which in early times were often at war.

Rome's beginnings were on the east bank of the Tiber River. The town's importance as the crossroads of two highways, one terrestrial and the other nautical, led almost inevitably to an interest in securing and eventually settling the far shore of the river.¹ Until the decline of Etruscan power in the early fourth century BC, however, the *Transtiberim* (modern-day Trastevere, "Across the Tiber") may have been little more than a fortress situated on the Janiculum, the hill that rises imposingly at the river's west bank. Simple farms no doubt were precursors of the great villas that dotted the slopes and crest of the hill from the late Republic onward. Precisely when a truly suburban residential, industrial, and commercial quarter developed in the floodplain between the hill and the river is unknown; but eventually it became a bustling, heavily populated district. The original wooden highway bridge was eventually supplemented by a more permanent structure, and a series of bridges grew up to serve the residents of the metropolitan area. By late antiquity the river could be crossed on more bridges than existed at any other city in the known world.

This article approaches several of Rome's early bridges as markers of urban change. How did bridges influence the flux of humanity within and about the city? Conversely, how did the city's development influence the planning and construction of bridges? The urbanistic implications of these questions are profound, for they concern not only the physical layout of the

urban area, but also the everyday and long-term movements of populations. Much of the subsequent commentary is founded upon published research, both by myself and by others.²

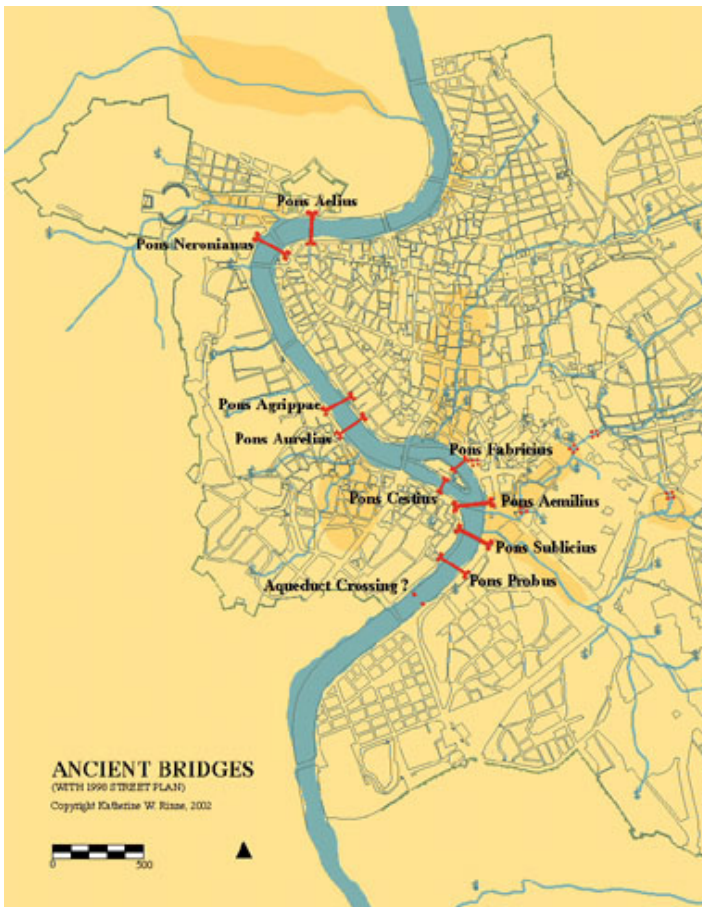
Functionally, the bridges in Rome over the Tiber were of four types. A very few — perhaps only one permanent bridge — were private or quasi-private, and served the purposes of their owners as well as the public. The *Pons Agrippae*, discussed below, may fall into this category; we are even told of a case in the late Republic in which a special bridge was built across the Tiber in order to provide access to the *Transtiberine* tomb of the deceased during the funeral.³ The second type (*Pons Fabricius*, *Pons Cestius*, *Pons Neronianus*, *Pons Aelius*, *Pons Aurelius*, *Pons Probi*) was fully public and served essentially urban functions, such as the comings and goings of day-laborers and worshippers or the distribution of the food supply. A third type was built initially to serve extrurban traffic that entered and exited Rome on the consular highways (*Pons Sublicius*, *Pons Aemilius*, *Pons Mulvius*). The fourth type, of which there may have been only one discernible example in Rome, was a span serving an aqueduct exclusively, the *Pons Traiani*. All bridges were subject to monumentalization for aesthetic and propagandistic purposes, but Romans viewed their bridges as fundamentally utilitarian structures. Except in the case of the *Pons Sublicius*, whose function was obscure enough to excite curiosity, literary references to bridges are rare and casual.⁴ Often the only extant references to a bridge appear in inscriptions or lists. (Map 1)

1. Richter 1882.

2. Taylor 2000. This is the principal study on the urbanism of river crossings in Rome. Short entries with bibliography on the various bridges can be found in Richardson 1992, Platner and Ashby 1929, and (in Italian) in the *Liber Topographicum Urbis Romae* (Rome 1993-). On the design and construction of Roman bridges, including those in Rome and its vicinity, see O'Connor 1993 and Galliazzo 1994.

3. Dio Cassius 48.33.2.

4. The only extended praise of a bridge in Rome appears in Symmachus' panegyric to the emperor Gratian. This commemorates Gratian's restoration of the *Pons Cestius* in 369 AD.



MAP 1. Ancient Bridges with 1998 street plan. Copyright, Katherine W. Rinne 2002.

This paper will briefly examine the bridges in chronological order, then turn to the special problem of aqueduct crossings.⁵ (To see the entry for a specific bridge please use one of the links in the previous paragraph).

The earliest crossing of the Tiber

The rise of Rome may be due as much to the city's domination of the salt trade as to its military prowess. In pre-historic or early historic times Rome seems to have become the main crossroads of trade west of the Apennines. It controlled not only the lower Tiber, but also the road that began at the salt marshes west of the Tiber's mouth and crossed the river at Rome. The Via Salaria ("Salt Road"), which leads northeast out of Rome, was probably a continuation of this highway into the heart of Italy. Rome clearly profited from this route. In Repub-

5. I omit detailed discussion of the Pons Mulvius, or Milvian Bridge. Spanning the Tiber well north of the city, it never constituted a part of Rome's continuum of urban development in antiquity; instead, it served as a particularly important example of a rural bridge, giving transit to one of Rome's most important consular highways, the Via Flaminia.

lican times, on the left bank just south of the Pons Sublicius, along the northern end of the bustling Clivus Publicius, lay the Salinae, a district of saltworks within the city.⁶ The existence of saltworks here, rather than at the salt marshes themselves near the river's mouth (a later development), points to Rome's early concern to control production and distribution. Raw material was apparently brought here from the marshes, processed and stored, and sent up the Via Salaria and down the Tiber for distribution throughout Italy. After the pacification of the region in the fourth and third centuries, Rome was able to monopolize barge traffic bringing the salt up from the river's mouth, while foreign wares, probably confined to pack animals and small vehicles, had to cross the river at a ferry or a bridge, most likely for a price. By about 200 BC the city was employing slave-porters at the Porta Trigemina, near the Salinae district, to move merchandise to and from this convergence of river port, bridgehead, and city entrance.⁷

During various festivals the Vestal Virgins prepared the *mola salsa*, a meal served to the priests consisting of cakes of *far* (a type of wheat) and salt. The ritual preparation of these cakes was laborious, and the waste material from the process was thrown from the Pons Sublicius into the Tiber in the form of straw men.⁸ Although the ritual significance of these actions is entirely lost, the use of salt in this ritual suggests two things. First, the mingling of salt with *far*, an early staple of the Roman diet, confirms its own status as a staple. Second, salt was important enough to the Romans to constitute a crucial element in important annual festivals, and was seen to be worthy of the gods' protection and instrumental in their appeasement. All this in turn implies longstanding access to the salt marshes on the right bank of the lower river.

Where was the first crossing of the river at Rome? The literary sources say nothing of the island's use until it acquired the sanctuary of Aesculapius, the Latin equivalent of the Greek healing god Asklepios, shortly after a plague in 293 BC.⁹ Evidently the Romans did not have a major crossing here, and disregarded the island until the construction of embankments and the draining of the marsh on the east bank made development desirable.¹⁰ Perhaps the island was taboo territory — not because it was outside the ritual boundary of the city (the *pomerium*), but because it lay in the middle of flowing waters,

6. Richardson 1992, "Salinae."

7. Plautus, *Captivi* 90.

8. Servius Auctus, commentary on *Aeneid* 2.135, 4.57, 10.541; Servius, commentary on *Eclagues* 8.82. See Holland 1961 316–17.

9. Livy 10.47.6–7.

10. Le Gall 1953 83 sees another problem with the island theory: the early city did not adjoin the island area, but lay slightly to its east. However, I do not see any disadvantage — either economic or military — to such an arrangement. The Romans could still collect tolls and garrison the bridge.

which the early Italians, like the Greeks, viewed with fear and foreboding.¹¹ The healing cult was founded on this curious site in part, at least, because it required a steady source of flowing water for the ritual bathing of incubants.¹² A ferry must have been in operation at this time.

The most favorable ferry crossing for the early salt road was in the lull of the current just below the island.¹³ A landing at the area between the mouths of the old Cloaca Maxima and Circus Maximus brooks on the east bank would have given the traveler direct access to Rome without a need to cross either brook. Here the ferry also had the advantage of a backwater created by the confluence of the river and the two brooks.¹⁴ A cable ferry with oar power is the most likely configuration: it would have crossed the oblique current at a ninety-degree angle. Raised high enough, the cable would not have obstructed the passage of the small ships and barge tows that plied the river.¹⁵ Corroboration for this siting of the bridge may be found in the nomenclature of a very ancient street leading from the Forum along the northwestern flank of the Palatine hill to this exact part of the east bank of the Tiber. The name of the street was Vicus Tuscus, or “Etruscan Street”; in other words, the access from the center of town to the river crossing, and thereby to Etruria, was along this street.

The Pons Sublicius¹⁶

Livy claims that the Pons Sublicius, downstream from the island and spanning the full width of the river, was the first bridge built between Rome and the west bank of the Tiber.¹⁷ It may have been built to replace the ferry crossing, and in roughly the same area. This bridge is famous both for its religious associations and for the role it played in a legendary episode in the city’s early history. According to numerous sources, during the hostilities attending the overthrow of Rome’s final king (traditionally dated to about 510 BC), the Roman Horatius Cocles singlehandedly defended the western bridgehead against Lars Porsenna’s besieging Etruscan force until his comrades could cut the bridge behind him. Then he leaped from the bridge and swam to safety (or drowned, depending on the source).¹⁸

11. Holland 1961 1–20.

12. Paulus/Festus 98 says, “On the island a temple to Aesculapius had been made, so that the sick could be sustained by physicians, especially with water.” Besnier 1902 170–71 cites several other possible reasons for placing the temple here: 1) As a Hellenistic cult, it had to be outside the *pomerium*; 2) The island was more or less in the shape of a ship, invoking the ship on which the serpent of Aesculapius supposedly arrived; 3) This put it in close proximity to the early Greek cults in the Campus Martius and to the temple of Apollo Medicus; and 4) It was a natural site choice for isolating communicable diseases from the rest of the population.

13. Richardson 1992, “Insula Tiberina.” The modern embankments have obliterated the old diversion that created the lull, but it is quite evident in Lanciani 1893–98, plate 28.

The maintenance and rebuilding of this bridge was the charge of the college of Pontiffs, whose very title (*pontifices*, “bridge makers”) indicates the bridge’s importance in the early priesthood of Rome. For obscure reasons, no metal was used in Pons Sublicius, and wood dominated in its construction.¹⁹ The name “sublicius” itself refers to the wooden piles that supported it.²⁰ The origins of this religious prescription may have been strategic. As the Cocles story suggests, early Rome may have needed a bridge that could be destroyed quickly for defensive reasons; the lack of iron would simply have made the destruction easier.²¹ But even if the original intent of the prohibition was practical, it eventually hardened into ritual; for long after the city of Rome achieved security, the bridge continued to be rebuilt in the same way.

Renaissance tradition erroneously placed the Pons Sublicius squarely west of the Aventine, at the site of the ruins of a row of ancient piers. But these piers could not have belonged to the Pons Sublicius — not only because of the latter’s wooden pilings, but because stone masonry in bridge piers is always bonded with metal clamps, which would have been forbidden on the wooden bridge. Moreover, the story of Horatius Cocles’ defense of the Pons Sublicius indicates that the bridge led directly to the old city circuit known as the Servian Wall, which did not include the Aventine Hill.²² Modern scholars have associated the stone piers by the Aventine with the Pons Probi, and placed the Sublicius much further upstream at the site of the main ferry, which it probably replaced.²³ Though the position of the eastern bridgehead — which probably corresponded to an earlier ferry landing — may be roughly estimated, the bridge’s exact orientation is unknown.

14. Le Gall 1953 85; Holland 1961 159.

15. Cable ferries appear frequently in maps of Rome from the 16th to the 18th centuries. See Frutaz 1962 tav. 275, 276, 314, 319–20, 372–3, 385, 409, etc. Cable ferries did exist in Roman times; see Holland 1961 159. Towpaths, though rarely envisioned by modern topographers, were certainly part of the ancient Tiber waterfront as well, as Propertius 1.14.3–4 attests.

16. Sources and bibliography are cited at length in Coarelli 1999c.

17. Livy 1.33.6.

18. Polybius 6.55.1; Livy 2.10.2–11; Dionysius of Halicarnassus 5.24.1–3.

19. Pliny, Natural History 36.100; Dionysius of Halicarnassus 3.45.2, .24.1; Plut. Numa 9. Varro, De lingua latina 5.83 reports that the pontifices built the Pons Sublicius. According to the songs of the Salii, the very name pontifex was derived from this bridge (Servius, commentary on Aeneid 2.166). But the precise religious connections of the office with the bridge are unknown.

20. Dionysius of Halicarnassus 3.45.2, 9.68.2; Pliny, Natural History 36.100; Servius, commentary on Aeneid 8.646; Festus 374 ed. Lindsay. A depiction of the bridge on an Antonine medallion shows the bridge’s supports as vertical clusters, clearly representing bundled wooden piles. See Mayerhöfer 1883 26.

21. Platner and Ashby 1929, “Pons Sublicius.”

22. Livy 2.10; Polybius 6.55.1. For additional sources see Coarelli 1999c.

23. Richardson 1992, “Pons Sublicius”; Le Gall 1953 84–85.



FIG. 1. Pons Aemilius. (Photo, © Rabun Taylor, 2002)



FIG. 2. Pons Aemilius. (Photo, © Rabun Taylor, 2002)

Although the Pons Sublicius was probably a narrow footbridge (how else could even a mythical Horatius have plausibly defended it?),²⁴ it must have accommodated pack-animals. Vehicular traffic, however, could only have been transported across the river on ferries, which may have continued to function for this very purpose until the Pons Aemilius was built in the second century BC. But even long after it had been superseded as a traffic bridge the Pons Sublicius continued to have an important ritual function into late antiquity.

The Romans regarded rivers and streams as ominous barriers, perhaps separating the living from the dead. Crossing them required a ritual of *auspicia*, most clearly described in crossing the Petronia amnis in the Campus Martius, but evident even when Caesar crossed the Rubicon.²⁵ Certain bridges may have been invested with special magical powers that eliminated the necessity to take the auspices before crossing. The Pons Sublicius was in some sense a “magical” bridge, perhaps because it was the first to cross the daunting Tiber. “Its destruction by floods, which was not infrequent, was always regarded as a *prodigium*..., but it was always repaired and was still standing in the fourth century and listed in the regionary catalogues.”²⁶

The bridge’s associations with both the Vestal virgins and the college of pontifices was unique and mysterious. The providential aspect of the Pons Sublicius — its link to the salt trade and the profitable tolls that could be levied at the bridge — augmented its already profound ritual significance as the Tiber’s first *via peremnia*, or permanent river crossing. The Romans well understood the importance of the crossing to their town’s economic well-being, and the ritual celebration of

bounty on the bridge inevitably merged with the ancient river rites.

The Pons Aemilius

Inevitably, the growth of Rome as an urban center and a world power necessitated systematic improvements in its infrastructure. According to Livy, in 179 BC, M. Fulvius Nobilior (but not his co-censor of that year, M. Aemilius Lepidus) built the stone piers of Rome’s second bridge, the Pons Aemilius.²⁷ Stone arches were added by Scipio Aemilianus and L. Mummius in 142 BC;²⁸ in the interval between these dates, it must be presumed that the piers supported a wooden superstructure. If a Fulvius, not an Aemilius, initiated the bridge, how then did the bridge get its name? Filippo Coarelli suggests that an older Pons Aemilius, built on the same site by an earlier member of the Aemilian family in the same location, would have been necessary to connect the city to the Old Via Aurelia in the third century BC. Livy’s statement that the flood of 192 damaged “the two bridges” in the area of the Porta Flumentana seems to support this hypothesis, since the only other known bridge in Rome at the time was the Pons Sublicius; but it is also possible that Livy simply made a mistake.²⁹ The Pons Aemilius has undergone many incarnations over the centuries, and borne many names.³⁰ Today the bridge, with a travertine facing from 1575, survives in part: it is the Ponte Rotto, or “Broken Bridge,” whose single remaining arch rises forlornly from the Tiber just south of a modern bridge (fig.1) (fig.2) (fig.3). Part of the bridge was swept away in the flood of 1598–99, and additional sections were lost thereafter.³¹

24. Livy 5.40.7–10; Valerius Maximus 1.1.10.

25. On the *auspicia peremnia* see Holland 1961 1–20.

26. Richardson 1992, “Pons Sublicius.”

27. Livy 40.51.4.

28. Livy 40.51.4.

29. Livy 35.21.5. Coarelli 1988 141–47; Coarelli 1999a.

30. De Spirito 1999.

31. Taylor 2000 249.

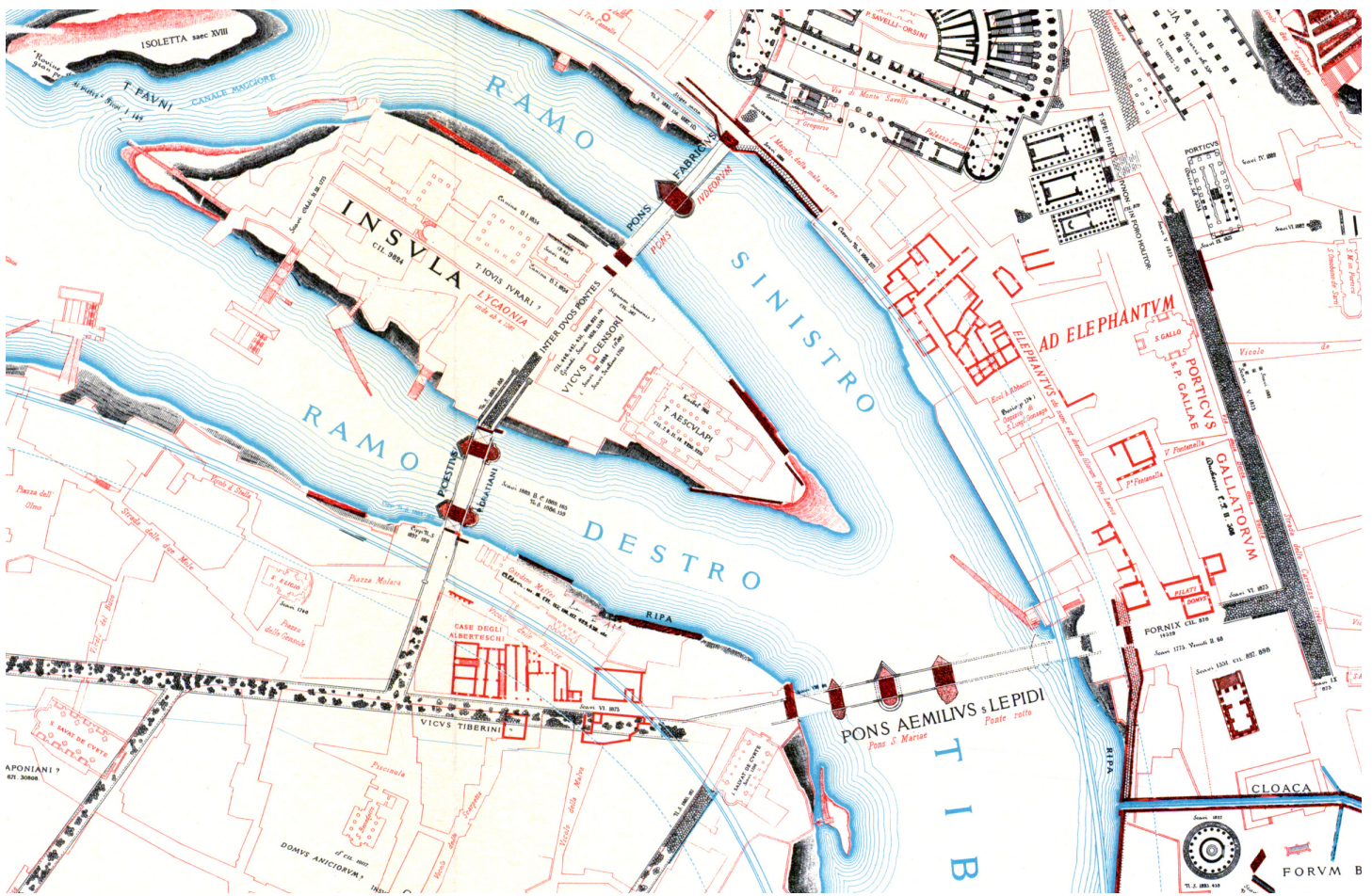


FIG. 3. R. Lanciani, *Forma Urbis Romae* (Milan, 1893-98), Reprint (Rome, 1990), plate 28, detail.

From the start this bridge was designed to divert a growing volume of traffic from the Pons Sublicius. The two bridges evidently stood very close together; the eastern bridgeheads of both are attested adjacent to the Temple of Portunus in the Forum Boarium. The literary evidence also suggests that the mouth of the Cloaca Maxima lay between them in the narrow space called *inter duos pontes* (“between the two bridges”).³²

Some stonework from the second-century structure may still be seen in the surviving pier of the later rebuilding of the bridge.³³ The piers did not lie unused until the arches were built. A roofed structure called the *pons maximus* is attested for the year 156 BC,³⁴ undoubtedly a wooden superstructure built upon Nobilior’s piers. It is probably safe to say, then, that this

bridge, whether of wood or stone, served without serious interruption as the cardinal crossing of the river until the middle ages.³⁵

As Pontifex Maximus (after 12 BC) Augustus seems to have restored the Pons Aemilius; such is the presumption, at least, although the only definitive evidence of his intervention is from the report of an inscription (now lost) belonging to an adjoining bridgehead arch.³⁶ There are two very good reasons why he may have chosen to restore the bridge. First, we know of a number of floods that had beset the city in recent years.³⁷ Second, in 2 BC Augustus dedicated his *naumachia* in the Transtiberim, a gigantic artificial pond for naval spectacles. Events at this venue would have drawn tens of thousands of spectators across the river from the east.

32. Le Gall 1953 84–85. Mayerhöfer and others believed “*inter duos pontes*” referred to the island, as is sometimes the case in literary sources and even on the Severan marble plan (see Richardson 1992, “*Insula Tiberina*”); but Le Gall’s conclusion is generally preferred today.

33. Frank 1924 139–41. Le Gall 1953 79 contends that the entire bridge is Republican.

34. Obsequens 16.

35. Richter 1882 suggests that the bridge’s permanence made Rome more vulnerable to attack from the Janiculum, necessitating the fortification of the Transtiberim. But before the invention of gunpowder, stone bridges were quite easy to defend.

36. *Corpus Inscriptionum Latinarum* 6.878.

37. Dio Cassius 53.20.1; 53.33.5; 54.1.1; 54.25.2. Augustus surveyed the urban riverbanks in 7 BC. This may have been an opportune time to restore the river; see Le Gall 1953 117-18, 301-02.



FIG. 4. Pons Fabricius. (Photo, © Rabun Taylor, 2002)



FIG. 5. Pons Fabricius Inscription. (Photo, © Rabun Taylor, 2002)

The island bridges

The Aemilian and Sublician bridges — and the Pons Mulvius to the north — were all crossings for the growing Italian highway system, and were therefore not originally intended primarily to serve Rome’s physical urban expansion. But the existence of these bridges made possible the development of the Transtiberim district and the subsequent infrastructure binding the new western suburbs to the city.

The island bridges of the first century BC were Rome’s first exclusively urban bridges, in that they did not serve as the river crossing for an important highway. Yet ironically many of their users must have been pilgrims. In their function these bridges are unique, for they did not at first serve to link one side of the Tiber with the other, but to bring the riverbanks into communication with the island. An isolated pleasure of sanctuaries, the island in the first century BC was the terminus for bridge traffic, just as it had been for nearly two centuries by means of ferries.

The first bridge to the island was the Pons Fabricius (fig.3) (fig.4). Its sponsor was the commissioner of roads of 62 BC, L. Fabricius, whose name and title appear conspicuously on the travertine arch inscriptions (fig.5). A smaller inscription records that the bridge was restored after a flood of 23 BC.³⁸ Today it is sheathed in brick and its deck and parapets have been replaced, but otherwise its tufa core is essentially original, as one can discern from the areas on the east end where the brick has been stripped away (fig.6) (fig.7). These zones clearly reveal the level of the original travertine deck, some of which

is still preserved directly above the tufa blocks. Due to the rise of the ground level over time on the east bank, the deck today rests on a wedge of rubble fill above the old surface.

The temple or sanctuary of Aesculapius on the island was rebuilt in the first century BC.³⁹ An inscription attributes this rebuilding to a curule aedile named Valerius Flaccus who “contracted for the construction of a temple of Aesculapius from tithes.”⁴⁰ This Flaccus was most likely the same man whom Cicero defended in his speech *On Behalf of Flaccus*. We have no record of his aedileship, but he was quaestor in 70 BC and praetor in 63. Donatella Degrassi suggests that he had the intermediate post of curule aedile in 66 BC. Here we should note an important fact that has not been entirely appreciated: Flaccus had led an expedition to Crete in 68 BC, and the Cretans were singularly devoted to the healing god. Flaccus was surely familiar with the famous Asklepios cult complexes on that island, particularly at Gortyn and Lebena, and like many conquering generals, he may have tried to appease the gods of the territory he conquered. It is possible, then, that he vowed to build the new temple during his campaign in Crete, although the source of funding — tithes — suggests that the Roman cult personnel themselves were enlisted to underwrite the project, presumably because Flaccus could not summon enough personal wealth or war spoils to fund the project himself.

Combined, three facts suggest that the island cult’s popularity surged in the 60s BC: 1) A bridge to the island was built with public funds by a commissioner of roads; 2) the

38. *Corpus Inscriptionum Latinarum* 1(2).751; Dio Cassius 53.33.5. The four-headed herms set on the left bank near the head of the bridge (two are now embedded in the parapets) may have been deemed auspicious for pilgrims crossing to the island; see Holland 212–19. On the bridge and its bibliography see Taylor 2000 141–42.

39. Degrassi 1987 521–27.

40. Degrassi 525–26.



FIG. 6. Pons Fabricius, detail. (Photo, © Rabun Taylor, 2002)

main sanctuary on the island was entirely refurbished by an aedile; and 3) the new sanctuary was bankrolled by alms from the cult. The new sanctuary was probably designed to accommodate more patients, whose prolonged presence on the island would in turn have required expanded facilities for families and visitors and regular deliveries of food, medicine, and other supplies from the city. By the mid-first century AD, sick or elderly slaves were being abandoned on the island, presumably to the care of the sanctuary staff.⁴¹

C. Cestius Epulo (d. between 18 BC and 12 BC) is the most likely member of his family to have sponsored the bridge on the other side of the island, the Pons Cestius.⁴² (fig.3) (fig.8) His famous pyramid tomb outside the Porta S. Paolo indicates his building ambitions, and his last name (*epulo* is a kind of priest) and tomb inscription indicate that he had ties with the college of pontiffs. He was also a friend of Agrippa, whom he mentioned in his will.⁴³ Agrippa may have encouraged this building scheme, perhaps in anticipation of his own great urban renewal program initiated in 33 BC.

In either case it is quite clear that the Pons Cestius was not conceived as a unit with the Fabricius, but followed after an interval of several decades. During this interval the island was still an urban refuge, not a busy overpass for Transtiberine traffic. With the arrival of the Pons Cestius, suddenly the west-bank suburbanites had easier access not only to the island cults,⁴⁴ but to the pleasures of the Campus Martius, soon to be

41. Suetonius, Claudius 25.2.

42. Taylor 2000 142–45 and bibliography.

43. Pauly-Wissowa 3.2 2005, “Cestius [7]”; Richardson 1992, “Sepulcrum C. Cesti.”

44. An altar inscribed to Aesculapius, dating from 223 AD, was found on the right bank near the island (Corpus Inscriptionum Latinarum 6.13).



FIG. 7. Pons Fabricius, detail. (Photo, © Rabun Taylor, 2002)

splendidly laid out by Agrippa. From then onward, the island was both a goal and a thoroughfare, perhaps for aqueducts as well as traffic.

We hear nothing of the Pons Cestius until its restoration by the emperor Antoninus Pius in 152 AD.⁴⁵ This project is apparently commemorated on a contemporary medallion, which depicts a two-arched bridge to the island and the legendary landing of the snake of Aesculapius in 293 BC. In AD 369–70 the bridge was entirely rebuilt under the co-emperors Valens, Valentinian I, and Gratian,⁴⁶ and it came to be known popularly as the Pons Gratiani. The modern Ponte Cestio, unfortunately, bears little resemblance to the ancient bridge, though about two thirds of its material is drawn from it. The Pons Gratiani was dismantled in the nineteenth century and rebuilt in a completely different form, but with much of the

45. Degrassi 1931–86, vol. 13.1 207, 673.

46. Corpus Inscriptionum Latinarum 6.1175–76.



FIG. 8. Pons Cestius. (Photo, © Rabun Taylor, 2002)



FIG. 9. Pons Cestius, G. B. Piranesi, “Veduta del Ponte Ferrato dagli Antiquari detto Cestio”, from *Le Antichità Romane IV* (Rome, 1784).

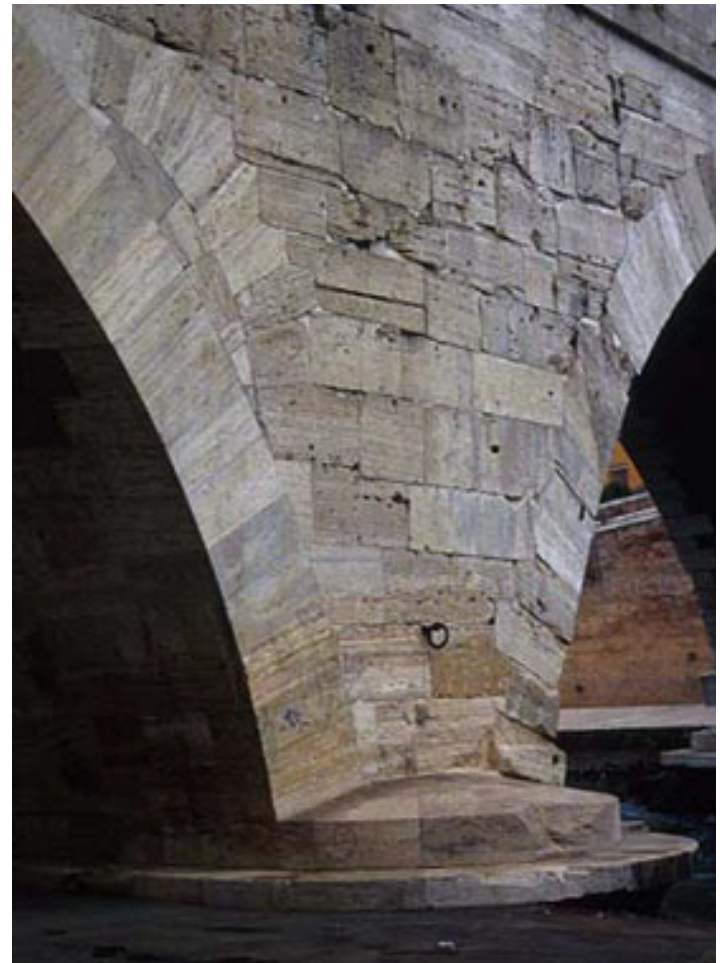


FIG. 9. Pons Cestius, detail. (Photo, © Rabun Taylor, 2002)

original building material. Fortunately, the fourth-century bridge was studied during dismantling,⁴⁷ and we have a number of pictorial representations of it before the intervention, including a spectacular etching by Piranesi. (fig.9) Today some of the original patterns of the stone can still be discerned; the central arch is essentially unchanged in span, and many of its voussoirs are original. Even segments of the small lateral arches, now filled in, still can be discerned in the spandrels next to the modern arches at each end. (fig.8) (fig.10) The bridge was known in the middle ages as the “Iron Bridge” because of its excessively heavy metal clamping. No doubt this conservative engineering contributed to its durability; for there was nothing wrong with the bridge whatsoever when it was dismantled and reconstituted in the 1880s. It was simply a victim of the project to canalize and regularize the riverbanks, which necessitated a broadening of the channel on this side of the island. It is comforting to know that the destruction of the old bridge did not pass without a furious debate.

47. Bonato 1889.

The Pons Agrippae

Augustus and his allies consciously organized the river aesthetically on the model of great Roman boulevards, so that “those approaching Rome by its major thoroughfare [the Tiber] cannot have failed to appreciate with what sort of new urban creation Augustus had transformed the scene.”⁴⁸ The greatest contributions to the new Augustan riverscape were Augustus’ own likely restoration of the Pons Aemilius and the Pons Agrippae, named for the emperor’s faithful general Agrippa. But in fact nobody in modern times even knew that Agrippa had built a bridge until the great exploratory projects of the 1870s and 1880s that accompanied the reengineering of the Tiber in the central part of Rome. These turned up a set of truncated bridge piers just north of the Ponte Sisto⁴⁹ (fig.11) (fig.12), as well as an inscription bearing the bridge’s name inscribed on a boundary stone of Claudian date further upstream. A calendar inscription from Ostia discovered in 1938 provided independent confirmation: it recorded a restoration of the Pons Agrippae

48. Purcell 1987 27.

49. Borsari 1887; Borsari 1888.

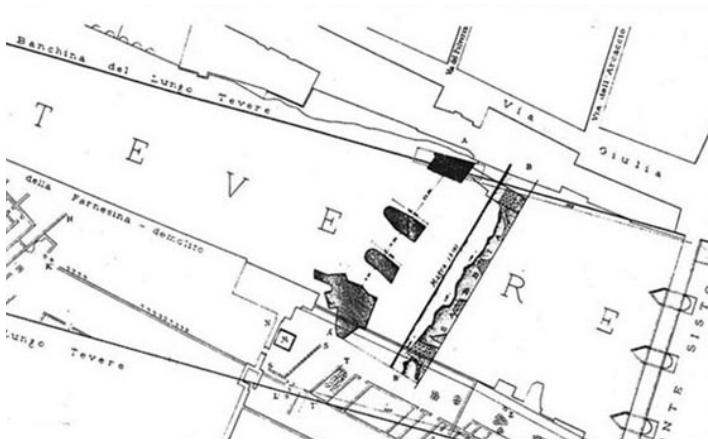


FIG. 11. L. Borsari, *Notizie degli scavi di antichità* (1892) 412–28.

by the emperor Antoninus Pius.⁵⁰ The remains show clearcut evidence that the bridge had encountered serious troubles and ceased to function long before the end of antiquity. The highly irregular western bridgehead excavated by Borsari in the 1880s suggests that the riverbank was receding on this side, requiring an improvisational extension of the bridgehead.⁵¹ (fig.11) Then the river wall of Aurelian, built in the 270s, was built directly over the bridgehead, cutting off the bridge entirely (fig.12). I will discuss the fate of the Pons Agrippae later; for the moment we will focus on its identity, origins, and function.

There has been much disagreement about whether the bridge remains actually correspond to the Pons Agrippae. I believe that they do, and for several reasons. First of all, the piers have not been satisfactorily linked to any other attested bridge. Second, they are better positioned to carry a conduit of Agrippa's aqueduct built in the 20's BC, the Aqua Virgo, after it skirted the Theater of Pompey on its way westward across the river. And third,⁵² it is the closest bridge to the known properties of Agrippa.

Along with the Pons Cestius, this bridge provided the first direct link between the central Campus Martius and the Transtiberim. It gave residents of the city easier communication with the cult sites west of the river and huge spectacles at the *naumachia*, while allowing the freed and artisan class of the floodplain to more easily carry out their duties of employment and patronage across the river.⁵³ As the Transtiberim grew into an important storage and population center, the Pons Agrippae undoubtedly expedited the distribution of food around the

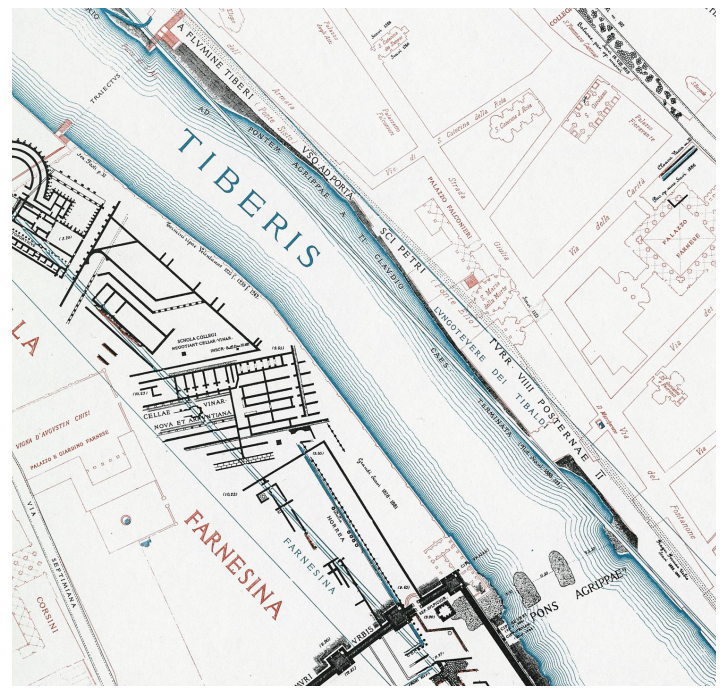


FIG. 12. R. Lanciani, *Forma Urbis Romae* (Milan, 1893–1901), Reprint (Rome, 1990), plate 20 (detail).

city, as the warehouses at its western bridgehead suggest. But the bridge had other functions as well, and during Agrippa's lifetime it may have been his private property. Two inscriptions found in the western Campus Martius indicate that Agrippa owned a huge tract of land along the east bank, including a private road, all made over to the public after his death.⁵⁴ The villa of the Farnesina, just upstream from the bridge on the west bank, was probably his as well, although the attribution is disputed. Beyond the villa to the north were the Gardens of Agrippina, which probably belonged to Agrippa before they passed to his daughter.⁵⁵ Given the general's near-monopolization of the riverbanks in this part of Rome, the ruined bridge discovered in the 1880s seems perfectly positioned at the southern end of his holdings. It may thus have served not only as a crossing for Agrippa personally, his slaves and family, and his many clients, but also as a monumental marker to boaters and bargemen going upstream notifying them that they were entering Agrippa's territory.

In Roman law, privately owned bridges across public rivers were open to the public,⁵⁶ and there can be little doubt that the Pons Agrippae saw heavy public use. But this bridge does not seem to conform to the street pattern on the west bank; no street there was aligned with it. Directly athwart the

50. *Corpus Inscriptionum Latinarum* 6.31545; Coarelli 1999b; Gatti 1887 306–13; Degraffi 1931–86 13.1 207,673.

51. This is confirmed by evidence that the eastern riverbank advanced. See Riemann 1952a.

52. Taylor 2000 146–49; Lloyd 1979 197.

53. On the cults, see Savage 1933.

54. *Corpus Inscriptionum Latinarum* 6.29781, 39087; Coarelli 1977 815–18. See Richardson 1992, "Horti Agrippae."

55. Richardson 1992, "Casa della Farnesina," "Horti Agrippinae."

56. Taylor 2000 83.

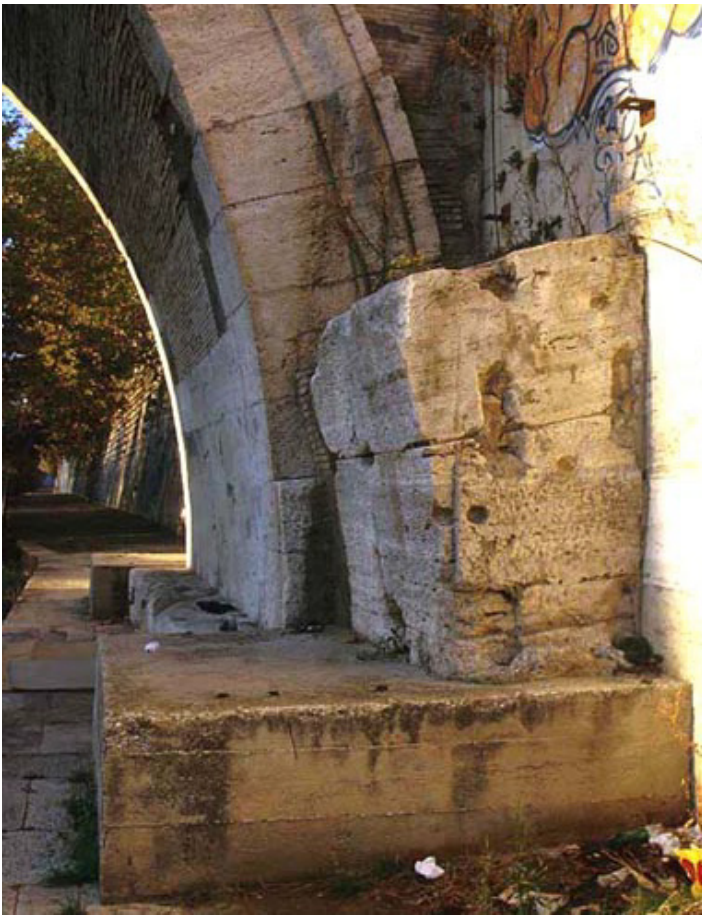


FIG. 13. Pons Auerelius, remains. (Photo, © Rabun Taylor, 2002)

western bridgehead were remains of storage buildings and the late-Augustan tomb of C. Sulpicius Platorinus, which must have gone up after the bridge was in place (the square structure just inside the wall return on (fig.12)).⁵⁷ Apparently the traveler was compelled to make a right-angle turn either left or right at the western end of the bridge.

The date at which Agrippa built his bridge is unknown.⁵⁸ The completion of the Aqua Virgo in 19 BC⁵⁹ provides

57. Taylor 2000 146–49; Borsari 1888 92–98, at 94; Lloyd 1979 202–03.

58. The fact that it does not bear the name of the emperor does not consign it to a pre-imperial date. If in fact the bridge was private during Agrippa's lifetime, as were his baths, the Campus Agrippae in Regio VII, the Horti Agrippae, and his private road, this would explain the name in full. But even if it was a public work — and we must remember that the Aqua Virgo, though public, was funded from Agrippa's own coffers (Dio Cassius 54.11.7) — Augustus was not apt to quarrel with the ascription. The new emperor's calculated modesty, as when he refused to be the dedicatee of Agrippa's Pantheon (Dio Cassius 53.27.2), is well known. The Pons Fabricius was restored in the name of the consuls of 23 BC (Corpus Inscriptionum Latinarum 6.1305), not of the emperor; only after assuming the title of Pontifex Maximus in 12 BC did Augustus restore a bridge in his own name (the Pons Aemilius), a practice followed by later emperors. In neither case, of course, did this affect the name of the bridge itself.

59. Dio Cassius 54.11.7, Frontinus, Aqueducts 10.

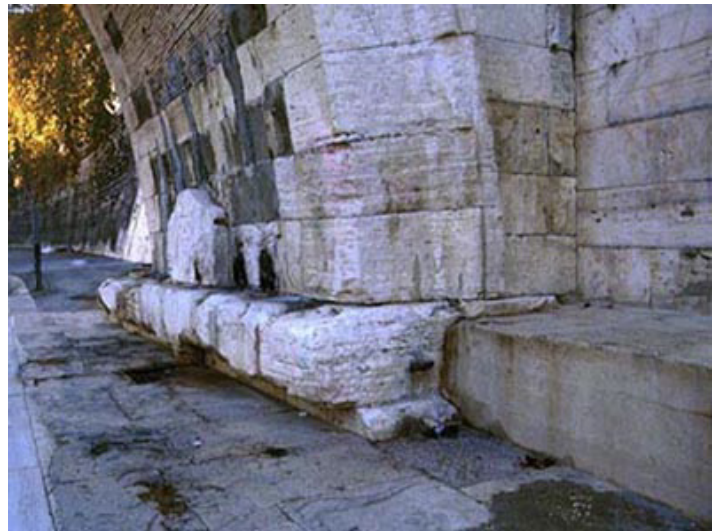


FIG. 14. Pons Auerelius, remains. (Photo, © Rabun Taylor, 2002)

a terminus ante quem, but the bridge may date to Agrippa's frenetic aedileship in 33 when he was in need of river crossings for older aqueducts, which he was restoring (see below).⁶⁰ As the Ostia inscription attests, Antoninus Pius restored the bridge in 147 AD. This year was the 900th anniversary of the founding of the city, an appropriate occasion for a cosmetic restoration. But Antoninus may have had a personal stake in the bridge if, as R.B. Lloyd suggests, it served some of the emperor's family brickyards on either side of the river.⁶¹ A serious flood is said to have occurred during this emperor's reign; it may have set the stage for restoration not only of this bridge, but of the Pons Cestius five years later (see above).⁶²

The Pons Aurelius or Antoninus⁶³

Tentative as the reconstruction of the history of the Pons Agrippae must be, even more can be said about it. Sometime during the high Roman empire, another bridge appeared a mere 160 meters downstream from the site of the Pons Agrippae. Eventually this later bridge too was destroyed, but unlike the earlier bridge, which showed no evidence of fallen rubble in its vicinity, the later one collapsed into the river, probably during a flood.⁶⁴ Its remaining foundations and lower piers were reused in the seventeenth century for the Ponte Sisto. If one looks carefully, some of the ancient stonework can still be seen at the abutments of the later bridge. (fig.13) (fig.14) I am convinced that the second bridge was none other than the old

60. Frontinus, Aqueducts 9.9.

61. Lloyd 1979 201–02.

62. Historia Augusta, Antoninus Pius 9.3.

63. A detailed version of the argument presented below appears in Taylor 2000 154–65.

64. Lanciani 1878.

Pons Agrippae, modified and moved to a more stable position. One thing seems reasonably certain: the two bridges did not coexist, for they are too close together to have served different functions. It would seem that the Pons Agrippae, crippled by the shifting river, was carefully dismantled and reconstituted; indeed, the engineer who investigated its remains commented on how cleanly each pier had been severed, almost to the foundations.⁶⁵ As always happens when a stone bridge is salvaged and moved, it must undergo some modifications — not only in length, but also in the spacing of its piers, and thus in the diameter of its arches.

At the time this bridge was reconstituted, it was no longer known as the Pons Agrippae. The name Pons Antoninus appears in a late-antique martyrology, and then in the *Liber Pontificalis* for the year 791 AD. It is also featured in a number of medieval sources, which roughly confirm its location.⁶⁶ The designation “Antoninus” could refer to any of numerous emperors who took that name as part of their official nomenclature, but if we see this bridge as a functional continuation of the old bridge then Antoninus Pius, who restored the older version in 147 AD, is the most natural choice.

This bridge had another name, Pons Aurelius, which appears in the late-antique lists — namely, the regionary catalogues and Polemius Silvius — and then disappears from the record. As early as the 1830s this apparent double identity led to the conclusion that the bridge was first built by an emperor with both names.⁶⁷ As it happens, there were a number of these. Marcus Aurelius Antoninus Caracalla is the favorite candidate, principally because he is associated with other ambitious building projects. I do not agree with either the premise or the conclusion. As I just suggested, the name Antoninus adhered to the restorer of the Pons Agrippae, Antoninus Pius, even after the bridge was moved. The name Aurelius, on the other hand, was appended to the same bridge by the man who moved it. The most likely emperor to have done this is Marcus Aurelius Probus. As the successor of Aurelian, he completed the circuit of city walls sometime in the early 280s. He was recognized for his engineering projects in the provinces as well.⁶⁸ Moreover, I will argue below that this was not the only bridge in Rome that Probus recycled: the Pons Probi may have had similar origins. The newly positioned Pons Aurelius/Antoninus may have served as the terminus for the river walls on both banks. And the reference in the *Liber Pontificalis* reports that in 791 AD floodwaters entered the city at the Porta Flaminia on the north

end of the Campus Martius and exited by breaching the city wall at the Pons Antoninus.⁶⁹ Probus, then, was probably responsible for the very segment of walls that cut off the western bridgehead of the Pons Agrippae/Antoninus. By moving the old bridge downstream, he not only gave it new life but embedded it deeper in the city’s defenses.⁷⁰

The final incarnation of the ancient bridge came under the direction of the elder Symmachus, urban prefect in 364–65 AD.⁷¹ The inscription, which was installed in multiples both on the bridge itself and on a bridgehead arch at the eastern end, dedicates the project to the co-emperors Valens and Valentinian I. A good deal of decorative sculpture was discovered in the riverbed during the nineteenth-century canalization. For the most part, the sculpture dates to an earlier period, some of it perhaps even the reigns of Augustus and Antoninus Pius; so it is possible that this eclectic late-antique mélange included components of the earlier decorative schemes of the same bridge.⁷²

The Pons Neronianus

The next bridge to the north, the Pons Neronianus, was to be found far upstream at the riverbend delimiting the northwestern Campus Martius (fig. 15). Only one subterranean stump of a pier survives today,⁷³ but in the nineteenth century all the piers were visible above water. The Pons Neronianus does not appear in the classical literary sources or regionary catalogues; it is mentioned only in the medieval *Mirabilia* and *Graphia* as one of the visible ruins of the city. There is no direct evidence that Nero in fact built the bridge. The region on the right bank beyond the bridgehead retained the name “Plain(s) of Nero” well into Medieval times, and it is likely that medieval Romans, not knowing the origins of the ruined bridge, named it after the region rather than the emperor.⁷⁴ Yet the bridge fits well into Nero’s urban scheme. Access to the popular Circus of Gaius Caligula and Nero on the Vatican is often cited as the main reason for the construction of this bridge. The bridge also gave Nero easier access to the Gardens of Agrippina, his mother’s (and once Agrippa’s?) riverside gardens and portico

69. *Liber Pontificalis* 94.

70. Procopius’ sequence (“Having spanned the river with this bridge, they decided to attach the wall to it,” Wars 5.19.10) is probably just guesswork. As Lanciani 1893–98 20, 27 shows, the Pons Aurelius served as the southern terminus for Aurelian’s river walls on both banks, and must be the bridge to which Procopius refers.

71. Ammianus Marcellinus 27.3.3; *Corpus Inscriptionum Latinarum* 6.31402–12. Compiled sources: Lugli 1953 120–21, Nos. 181–91. See Lanciani 1878 243–44; Hülsen 1892 329; Hülsen 1893 320; Gatti 1892 3–74, 366–67; Dehn 1911; Le Gall 1953 299–300.

72. Taylor 2000 161; Dehn 1911.

73. Mocchegiani Carpano 1984b 76.

74. Richardson 1992, “Campus Neronis”; Jordan 1878 416.

65. Borsari 1888.

66. Kummer 8–16.

67. On the literary sources see Piale 1834 19; Jordan 1878 417–18; Zippel 1886 493; Kummer 1889, p. 8–16; Riemann 1952b col. 2473; De Spirito 1999. See also Coarelli 1977 844–45.

68. *Historia Augusta*, Probus 9.3–4, 21.3.

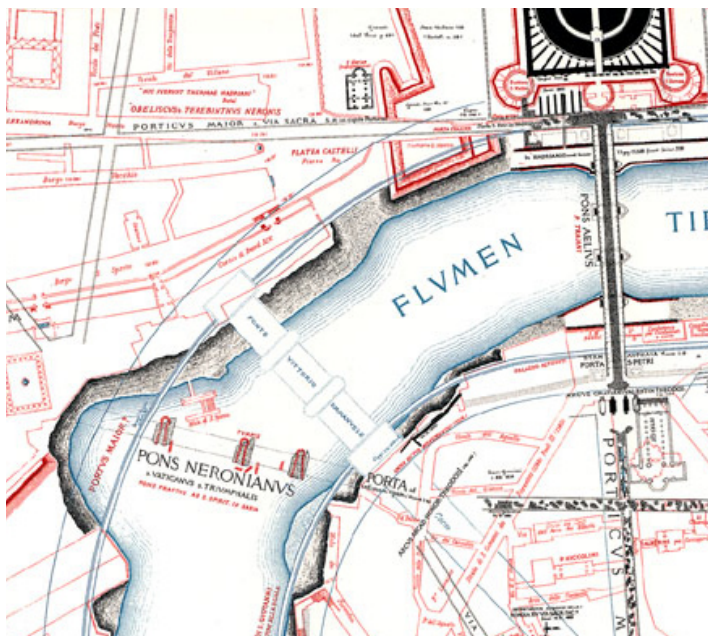


FIG. 15. R. Lanciani, *Forma Urbis Romae* (Milan, 1893-1901), Reprint (Rome 1990), plate 14, detail.

on the right bank just downstream from the bridge.⁷⁵ But it may have had a more fundamental purpose if Nero relocated homeless Romans after the fire of 64 AD. We have no direct evidence that this was so, but we know that many displaced residents were temporarily housed in buildings in the Campus Martius.⁷⁶ Some of these refugees — both rich and poor — must eventually have been forced to reside outside of the city, since Nero appropriated huge tracts of residential and commercial land for his *Domus Aurea*. The valley of the Vatican, still sparsely populated, would have been a tempting site to relocate them. In any case, it is unlikely that the area escaped development until Hadrian built the Pons Aelius nearby (the modern Ponte Sant'Angelo), as some contend.⁷⁷

The hypothetical harbor in the Tiber bend at the northern extremity of Nero's property, and at the western end of his bridge, (fig. 15) may have been for the emperor's pleasure boats or even the craft he used in the *naumachia* of Augustus.⁷⁸ If these details on Lanciani's map are correct, and the bridge crossed directly over a harbor, then it was by far the longest bridge in Rome. Several avenues, including the so-called Via Triumphalis, were made to converge at the western bridgehead.

Nero also built or refurbished the straight avenue leading from the bridge east to his baths in the Campus Martius, often identified as the Via Recta or, more recently, as the Via Tecta.⁷⁹ All of this building may be seen as a concerted plan for a Julio-Claudian corridor: one could walk west from Nero's baths down Nero's street to Nero's bridge; at the bridgehead, one would descry Nero's port and ships at the far end, the riverside portico of Nero's gardens to the left, and beyond the bridge, following the valley between the Vatican and Janiculum hills, the Circus of Gaius and Nero.

The bridge was also called the Ponte Trionfale after the early 16th century, being named for the Via Triumphalis, which led to it from the northwest. How did this street get its name? Coarelli suggests that after Claudius' expansion of the *pomerium*, the ritual boundary of the city, imperial triumphs processed along this route on the way to the Circus Flaminius. The rest of the Campus Martius lay inside the *pomerium*, he contends, but the strip of land from the Pons Neronianus to the Circus Flaminius was excluded so that returning armies could have access to the traditional starting point of the triumph.⁸⁰ But Vespasian and Titus ranged freely across the eastern Campus Martius before their triumph.⁸¹ Clearly Claudius' *pomerium* did not encompass large expanses of the Campus Martius as Aurelian's wall and *pomerium* did later. The practice of beginning the triumphal procession from the west bank must therefore have begun during or after Aurelian's reign. The new Porta Triumphalis must subsequently have been the bridgehead gate of the Pons Neronianus in the wall of Aurelian, as Coarelli recognizes.

The bridge undoubtedly contributed to the flowering of the Vatican. Even after Hadrian built the Pons Aelius, it was the most direct crossing for those visiting the *naumachia* of Trajan or the tombs along the Via Cornelia, including the celebrated tomb of St. Peter. But just as the Pons Aurelius superseded the nearby Pons Agrippae, as the Aemilius did the Sublicius, in time the Pons Aelius assumed the heavy traffic diverted from Nero's bridge.

When did Nero's bridge go out of use? Joël Le Gall is persuaded that it must still have been the triumphal entryway to the city in 405 AD, when the co-emperors Arcadius, Honorius, and Theodosius II dedicated a triumphal arch somewhere in the neighborhood of the bridgehead. Such a monument, naturally envisioned as part of the Via Triumphalis, could have

75. Seneca, *Ira* 3.18; Tacitus, *Annales* 15.44

76. Griffin 129.

77. Boatwright 1987 165–68. The graveyard in which St. Peter was putatively buried was already taking shape in the late first century AD.

78. Lanciani 1893–98 14, labeled "Portus Maior?"

79. Richardson 1992, "Thermae Neronianae"; Palmer 1990 58–59. Palmer claims that the street already existed in Augustan times, although it is first attested by Seneca as the Via Tecta. Perhaps Nero was responsible for adding porticoes, prompting the street to be renamed Tecta.

80. Coarelli 1977 820–22.

81. Josephus, *The Jewish Wars* 7.5.4 [123].

brought a satisfactory closure to Honorius' earlier restoration of the walls.⁸² But the Pons Neronianus does not appear in the regionary catalogues, compiled half a century earlier, or in Polemius Silvius' list compiled a few decades after 405. Nor is it mentioned in Procopius' account of the Gothic siege of the city in 537. Even the name Neronianus, we know, need not imply a continuous memory of the bridge or its founder. The clinching evidence for the bridge's early dilapidation was cited long ago by Henri Jordan and accepted by subsequent scholars, but is sometimes forgotten today.⁸³ It rests upon a brief passage in Prudentius:

We shall cross over where the way of Hadrian's bridge leads, Then let us seek the river's left bank. First the sleepless priest performs the Transtiberine rites, Then he hurries back to this side to repeat his prayers.⁸⁴

Prudentius was still alive when Honorius and Arcadius erected their triumphal arch, and yet it is clear from this poem about a dual ceremony at the basilicas of St. Peter and St. Paul that the standard route to St. Peter's Basilica from the east bank crossed at "Hadrian's bridge," the Pons Aelius upstream. Since the Pons Neronianus would have presented a shorter route to the basilica from any approach on the left bank, we must conclude that it was out of use. The arch of Arcadius, Honorius, and Theodosius was probably a freestanding arch separate from the old bridgehead, but still along the old triumphal way established by Aurelian in the 270s. It was quite possibly a restoration of an older arch.⁸⁵

The remarkably similar pier pattern of the Pons Neronianus and the Pons Probi downstream suggests that Nero's bridge may simply have been moved wholesale from its original location and reestablished as the bridge of Probus in the late 270s or early 280s AD.⁸⁶ Now the recycling of an existing bridge may seem an extreme measure, even in those uncertain times; but we have already seen that the shifting riverbanks along the western side of the Campus Martius caused problems for the Pons Agrippae. The Pons Neronianus may already have been in peril, if not completely out of use, when the decision was made to dismantle it. Probus' engineers and soldiers, like those of Aurelian before him, were occupied with the construction of the great city wall to protect Rome from barbarian invasions. By acting as he did, this emperor achieved three desirable objectives: 1) removing a derelict bridge that was useful to nobody

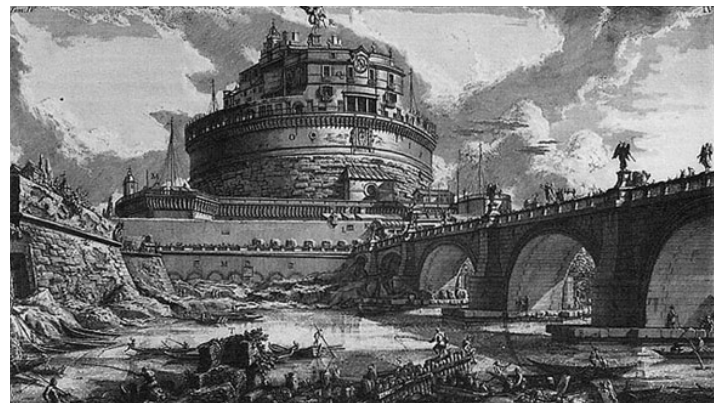


FIG. 16. G. B. Piranesi, "Veduta del Ponte, e del Mausoleo, fabbricati da Elio Adriano Imp.," *Le Antichità Romane IV* (Rome, 1784).

except a besieging army; 2) constructing a new bridge where it was needed (see "Pons Probi" below); and 3) accomplishing all these tasks with a minimum of labor and new materials.

The Pons Aelius⁸⁷

This bridge, now peopled with sculptures by Bernini or his school, has always served as a kind of ceremonial aisle leading to the great monument behind it, the emperor Hadrian's mausoleum (now Castel Sant'Angelo). (fig.15), (fig.16) When it was completed by AD 138, more or less concurrently with the tomb, the Pons Neronianus, just around the riverbend downstream, was still functioning. That bridge, like most in Rome except perhaps the Pons Agrippae, invited the pedestrian into open plazas that in turn led to major transurban arteries. But the new structure led directly and definitively to the emperor's massive mausoleum. There were precedents for a bridgehead mausoleum. We have already mentioned the tomb of Platorinus at the head of the Pons Agrippae. Prior to 40 BC, we will recall, the brother of Salvidienus Rufus had been entombed in the Transtiberim and a bridge built across the river for his funeral (Dio Cass. 48.33.2). Nothing more is known about this bridge, but we can assume it was a temporary structure built for the funeral procession; such gratuitous displays of wealth were commonplace at the time.

The Pons Aelius (Aelius was Hadrian's family name) was a permanent promenade: it invited visitors to approach the mausoleum by a straight and purposeful path. To reach the Vatican valley, a person crossing from Rome had to make a ninety-degree left turn onto the Via Cornelia. Thus Nero's bridge remained the more direct route for people who had business in the thriving Vatican valley or for residents of the valley entering Rome. The Pons Aelius is the one bridge of an-

82. Le Gall 1953 311. On Honorius' restorations, see Richmond 1930 255–62.

83. Jordan 1878 417, n.30.

84. Prudentius, *Peristephanon* 12.61–64

85. La Rocca 1984 68.

86. Taylor 2000 165–68.

87. Le Gall 1953 211–15; Rowland Pierce 1925 95–98; Lanciani 1893; Borsari 1892.

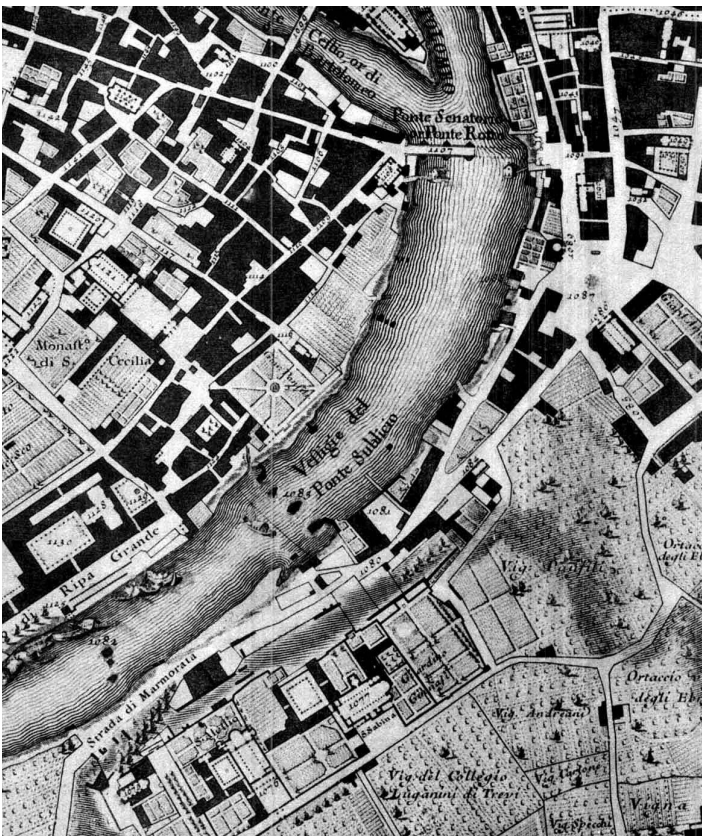


FIG. 17. G. B. Nolli, *La Piana Grande di Roma* (Rome, 1748), Reprint (Highmount, New York, 1984), plate 8, detail.

cient Rome that did not respond to any civic needs at the time of its construction; yet it outlasted its neighbor and by default acquired the utility its designer had scorned. But in the second century it remained a magnificent and inviting sidetrack, as Hadrian had probably intended. Along with the Pons Fabricius, it is the only ancient bridge within Rome that survives more or less intact. Its bridgehead ramps were cut in 1892 during the canalization project, and its deck and parapets have been altered numerous times.⁸⁸

The water mills and the Pons Probi

The aqueduct-powered water mills on the Janiculum Hill in the Transtiberim are essential to our understanding of human and vehicular traffic patterns in Rome and the extent to which the city's bridges served them. They seem to have a direct historical relationship to the Pons Probi, built in the late 270s AD across the river just west of the Aventine Hill. While some scholars argue that the mills were introduced in the mid-fourth century, Örjan Wikander has suggested that they were a part of the emperor Aurelian's reorganization of the urban grain distribution system in the 270s.⁸⁹ His study of the area's topography

88. Borsari 1892; Lanciani 1893; Rowland Pierce 1925-96.

89. Wikander 1979 13 n.4, 23-24, 34.

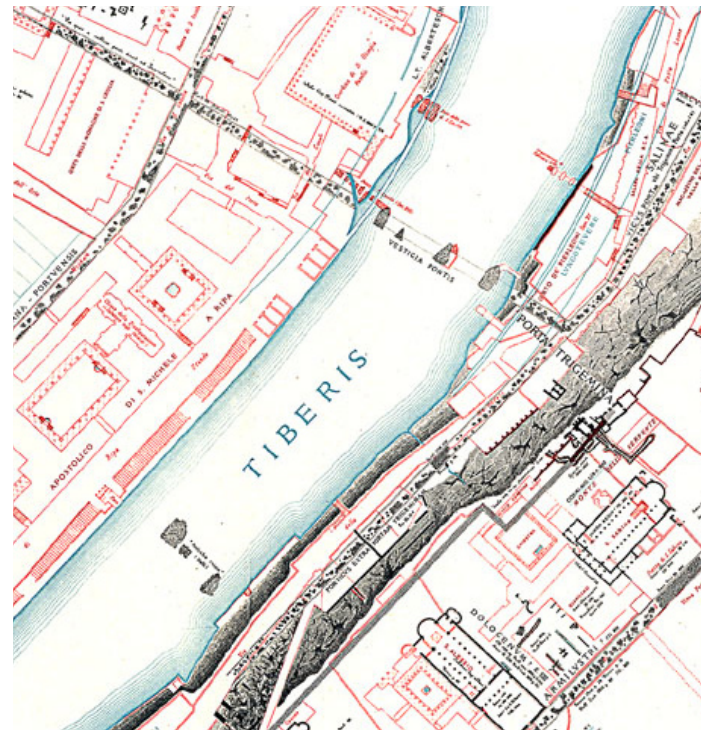


FIG. 18. R. Lanciani, *Forma Urbis Romae* (Milan, 1893-1901), Reprint (Rome, 1990), plate 34, detail.

and the known remains of part of a mill complex discovered on the site of the American Academy⁹⁰ have led him to postulate that the mills were placed "precisely along the southern side of the main road, *clivus qui ducit ad Ianiculum* ["the steep street leading to the Janiculum Hill," Valerius Maximus 1.1.10], which led from Pons Probi roughly parallel to the Via Aurelia and joining it just inside Porta Aurelia-S. Pancrazio." He continues: "That this location is of decisive importance goes without saying. . . . Great quantities of grain must have been carried daily from the store-houses by the Tiber up to the Janiculum and, when ground, distributed to the bakeries. In order to manage such large transports store-houses and mills had to be connected by big roads."⁹¹

Probus, Aurelian's successor after the brief reign of Tacitus, may have built this bridge precisely to expedite the traffic flow that Wikander envisions. Today, all traces of the bridge have disappeared. The stumps of its piers remained in existence until the 1880s, when they were removed as part of the river canalization project. They are recorded on numerous maps (e.g., fig.17, fig.18, often labeled "Ponte Sublicio") and in landscapes depicting the river during periods of low water.⁹²

90. For recent investigations of this mill see Bell 1993; Bell 1994; Wilson 2000.

91. Van Buren and Stevens 1917 59-61; Wikander 1979 21.

92. Erroneously, the bridge was often labeled "Pons Sublicius" before the nineteenth century.

It is the extremely similar pier patterns of this bridge and that of the Pons Neronianus, among other things, that led me to suggest above that the later bridge was essentially a relocation, with slight modifications, of the earlier one.

The identification of this bridge with the emperor Probus is not entirely secure. The name “Pons Probi” appears only in fourth- and fifth-century sources, which do not reveal its location. By the time of the *Mirabilia* and the *Graphia aureae urbis*, high-medieval tour guides which list the Roman bridges in geographical sequence from north to south, the bridge at the Aventine had been dedicated to the co-emperors from 379 to 392 AD, Theodosius I and Valentinian II.⁹³ But by a rigorous process of elimination it was determined in the nineteenth century that the Aventine bridge and the Pons Probi make the best match.

Wikander, as we have seen, wishes to place the imperial mills along the southern avenue leading from the Porta Aurelia to the Pons Probi. But the Einsiedeln Itinerary reports mills along the main northern avenue, which leads from the Porta Aurelia to the *pons maior*, i.e., the Pons Aemilius.⁹⁴ Though these were probably connected with the projects of popes from the seventh to the ninth centuries, they were apparently fed by the old Aqua Traiana.⁹⁵ The two main avenues converged near the Porta S. Pancrazio (the ancient Porta Aurelia); thus we need not speak of two milling districts, but of a single area within this angle.⁹⁶

I am less certain than Wikander that the introduction of the mills corresponds to Aurelian’s reforms of the grain distribution system. Filippo Coarelli has already challenged this hypothesis.⁹⁷ He argues that the reforms began under Alexan-

der Severus, and that the date of the first mills should be set at this time. An intriguing passage in the *Historia Augusta* mentions that Alexander Severus introduced *opera mechanica plurima* (“many mechanical works,” *HA* Alex. 22.4), which Coarelli interprets as the mills. But his evidence is thin, and there is reason to believe that the mills are even older. Beginning in the late second century AD and continuing at least through the reign of Constantine, the responsibilities of the *curator Miniciae* — who oversaw the grain dole in Rome — and the *curator aquarum* — who maintained the city’s aqueducts — were merged into a single office.⁹⁸ The most likely catalyst for this measure was the introduction of water mills and the city’s ensuing dependency upon them for its supply of flour. The mills could not run without functioning aqueducts, and thus the maintenance of the grain distribution system and of the aqueducts was quickly construed as a unified task. We should date the mills, then, no later than the career of M. Valerius Bradua Mauricus, who was the first recorded *curator aquarum et Miniciae*, around the turn of the third century.⁹⁹ With the introduction of mills, grain would have to be supplied to them in great quantities, and the milled flour transported across the river to the traditional point of distribution in the Campus Martius, the Porticus Minucia Frumentaria.¹⁰⁰ The obvious route from the mills to this building was along the main northern avenue to the Pons Aemilius. Since no bridge at this time led directly across the Tiber from the Emporium, the city’s largest wharf district on the left bank, it is likely that the main granaries for the Janiculum were on the west bank. Huge store buildings in this area of the Transtiberim riverfront appear on the Severan marble plan.¹⁰¹

The Porticus Minucia ceased to function when Aurelian — or perhaps Alexander Severus — made the momentous decision to switch the grain allotment from flour to bread.¹⁰² This required a radical decentralization of the allotment to points all around the city with daily rather than monthly ser-

93. The Pons Theodosii and the Pons Valentiniani/-us appear as separate bridges in both sources, but this is probably a later scribal misinterpretation resulting from ambiguous punctuation; see Kummer 1889 9. The *Graphia* apparently interprets the pons felicis Graciani and the pons inter Insulam et Transtiberim as two separate bridges, a similar mistake. The *Mirabilia* refers to the Pons Theodosius as marmoreus, but Richardson 1992 (“Pons Probi”) expresses doubt at a marble bridge. Kummer 1889 10 cites a medieval papal itinerary that describes this bridge as iuxta Marmoratam, “next to the marble-importing district” (i.e., the wharves of the Emporium, which were called the Marmorata). He concludes that the term “marmoreus” was therefore never meant to describe the material of the bridge, but rather to signify its proximity to that district. However, the very same passage mentions a “pons marmoreus” over the Arrone, a stream south of the city; see Urlichs 1870 465. This strongly suggests that marble-revetted bridges did exist, but were rare enough to call attention to their material.

94. Walser 1983 181–83.

95. Liber Pontificalis 72.5–7; 97.59; 103.19 (Duchesne 1886 1.324, 1.503–04, 2.77). See Wikander 1979 33–34; Wilson 2000 239–43.

96. We may surmise from an inscribed pipe found nearby that the aqueduct did enter the city at or near this gate; see Panimolle 1984 235. The significance of these mills diminished in the early middle ages as floating mills were introduced on the Tiber.

97. Coarelli 1987 429–56.

98. Corpus Inscriptionum Latinarum 5.7783; 6.1408, 1532, 31564; 10.4752; 14.3902. For a full chronological list of epigraphic references to this office and its replacement, *consularis aquarum et Miniciae*, see Pauly-Wissowa 4.2.1786–87, “curatores.”

99. Corpus Inscriptionum Latinarum 5.7783. The late second century is precisely when Roman water mills are likely to have been invented. See Wikander 1984 23.

100. Rickman 1983 105–08 believes that in our current state of knowledge the Porticus Minucia Frumentaria cannot be located. He argues that the building labeled MINVCIA on the Severan marble plan is the Porticus Minucia Vetus, and is not designed for the storage and distribution of grain.

101. Rickman 1971 111, 114–17. Wikander 1991 points out that the Janiculum mills were never responsible for the entire output of flour in Rome. Hand- and animal-powered rotary mills continued to be used, particularly by bakeries. A rescript of 364 AD describes the average bakery as “officina cum animalibus servis molis fundis dotalibus” (Codex Theodosianus 14.3.7).

vice to all eligible citizens. The most likely distribution points were bakeries themselves, which must have mushroomed in every region of the city at this time. In the regionary catalogues of the mid-fourth century, the number of bakeries ranges from 15 to 25 per region, the Transtiberim itself having 23.¹⁰³ This fairly even distribution shows that the bread was not baked *en masse* near the mills and then delivered around the city; such a system would in fact be absurd, since bread is much less easy to transport than flour. But flour was required at every bakery at all times, and the need for a new bridge serving the south of the city was acute. The Pons Probi was erected to meet this need.

This bridge, I argued above, was essentially the crippled Pons Neronianus removed and reconstituted on new piers further downstream. Although archaeologists call it the Pons Probi, it was known in the middle ages as the Pons Theodosi. The bridge apparently was rededicated to the co-emperors Valentinian II and Theodosius I between 379 and 392 AD.¹⁰⁴ As so often seems to have been the case, the rededication accompanied a necessary restoration. We know of a serious flood in Rome in 374, and independent archaeological evidence in the Emporium district downstream now suggests that a substantial shift in the riverbanks here was taking place around the turn of the fourth century.¹⁰⁵

The aqueduct siphon crossings¹⁰⁶

Until the mid-second century BC, the metropolitan area of Rome was confined to the east bank of the Tiber. The multiplication of bridges thereafter reflects the growing urbanization of the area. Augustus included the Transtiberim as the fourteenth region in his city of fourteen regions; and seemingly for centuries thereafter, its population continued to grow. The Capitoline Base, an inscription of 136 AD, reveals that at that time it had 22 official neighborhoods, while other regions listed had between 6 and 17 each.¹⁰⁷ By the mid-fourth century the regionary catalogues record that it had 78 neighborhoods, more than twice as many as any other region. Many of the residents undoubtedly had daily business in the city, while others would have crossed westward to partake of various activities and enterprises that were excluded from the city — most notably,

foreign religious cults¹⁰⁸ and industries (potteries, brickyards, tanneries, etc.) which, because of their tendency to pollute the air, were confined to the outskirts of the city.¹⁰⁹ This growing urbanization would have increased the need for bridges — especially to the Forum Holitorium, the Forum Boarium, and the Aventine, across from which the greater part of the population was concentrated.

Concurrent with this growth was an increasing demand for water in the region. Until 109 AD, when the Aqua Traiana was introduced from the west, most of the water in the Transtiberim had to be supplied from the east bank by means of inverted siphons carrying pressurized water in pipes across existing bridges — most notably by Agrippa's Aqua Virgo, and after Nero by the Aqua Claudia-Anio Novus system from the western Caelian Hill.¹¹⁰ When Frontinus was writing ca. 98 AD, three other systems also fed the Transtiberim from the left bank: the Aqua Appia, the Anio Vetus, and the Aqua Marcia. These crossings may initially have been the work of Agrippa, who as aedile in 33 BC had restored and expanded the water supply system throughout the city.¹¹¹ In the following decades numerous new water sources became available, including new "Augustan" branches of the old Aqua Appia and Aqua Marcia; the Aqua Iulia and Aqua Virgo, entirely new aqueducts; and the Aqua Alsietina, a specialized line entering the Transtiberim from the west and serving the *naumachia* exclusively.¹¹² Thus it was the ideal time for consolidating a systematic expansion. When possible the river crossings must have been added to ordinary bridges. The distribution point of the Aqua Appia was at the Porta Trigemina in the Salinae,¹¹³ so its crossing would likely have been on the Pons Aemilius. The crossing sites of the Anio Vetus and the Aqua Marcia are less certain, but the options are few. The Pons Cestius may have been built at Agrippa's behest to help carry his planned load of aqueduct siphon pipes; the funerary inscription of C. Cestius indicates that he was a partisan of Augustus.¹¹⁴ And doubtless Agrippa built his own Pons Agrippae with a similar purpose in mind. Lloyd has demonstrated that the Aqua Virgo, completed in 19 BC, crossed the river on this bridge.¹¹⁵ As for the other aqueducts, we can

102. *Historia Augusta*, Aurelianus 35.1, 47.1, 48.1; Zosimus 1.61. See Rickman 1980 197; Coarelli 1987 452–53.

103. The distribution of warehouses is also surprisingly even. The fourteen regions of the city had from 16 to 27 warehouses each, with the exception of the Palatine (48) and Aventine (35).

104. Taylor 2000 216–20; Jordan 1878 2.8–16; Kummer 1870 9.

105. Ammianus Marcellinus 29.6.17; Mocchegiani Carpano and Meneghini 1985 88.

106. For a more detailed discussion of these issues see Taylor 2000.

107. *Corpus Inscriptionum Latinarum* 6.975.

108. Savage 1940.

109. For example, the Coriaria Septimiana (tanneries), listed in the fourteenth region in the regionary catalogues, and the potteries of the Oppii; see Taylor 2000 198 and bibliography. In his excavation of the mill and channel under the American Academy, Wilson found a dump of wasters associated with other industries as well: metalworking, glass production, bone-working, and so forth; see Wilson 2000 227.

110. Frontinus, *Aqueducts* 76, 84, 86.

111. Pliny, *Natural History* 36.121; Frontinus, *Aqueducts* 9.9, 79, 81.

112. Frontinus, *Aqueducts* 5.6, 9–12, 72.8, 83.2.

113. Frontinus, *Aqueducts* 5.

114. *Corpus Inscriptionum Latinarum* 6.1374.

115. Lloyd 1979 193–204, at 195–96. See also Shipley 1933 33, n. 94.

only guess the bridges on which the crossed; but it is likely that the largest, such as the Claudia-Anio Novus, had multiple crossings on whatever bridges were available.

The Pons Traiani

The reference to a “bridge of Trajan” appears only once, and in a late source.¹¹⁶ It is usually taken as a mistaken reference to the Pons Aelius, the bridge built by Trajan’s successor, the emperor Hadrian. I have argued elsewhere that this bridge not only existed independently, but can be identified with ruins recorded on maps of the early modern period.¹¹⁷ It was exclusively an aqueduct crossing; it offered no transit for traffic. As such, it eluded the lists of traffic bridges in various sources that have come down to us from late antiquity and the middle ages. But because it served as the support for a free-flow channel of water, it would have been much more prominent than its neighbors, rising perhaps as high as 35 meters above the surface of the water. The ruins of the bridge’s piers appear clearly on the 1748 map of G.-B. Nolli, and are reproduced on Lanciani’s map (fig.17, labeled number 1082; fig.18, the southernmost ruins in the river). This is almost certainly the ruin referred to as “the broken bridge by the Marmorata” in letters of Benedict VIII and Leo IX in the eleventh century.¹¹⁸

The Aqua Traiana, the great aqueduct borne across the river on this bridge, was completed in 109 AD. Unlike most of the city’s already existing aqueducts, it arrived from the west. It undoubtedly supplied the Transtiberim and the Vatican generously, but it also supplemented the water supply throughout the city. Later it became the main source of power for the grain mills, which guaranteed the economic and strategic importance of the region for centuries. This was the sixth and last aqueduct to cross the Tiber, but the only one to cross from west to east. Its main destination was the new bath complex of Trajan on the Oppian Hill, but we also know from epigraphic sources that the aqueduct served the entire city.¹¹⁹ Since most of the city’s expanse and population was on the east bank, it is no surprise that Trajan’s engineers chose a free-flow channel across the river instead of the usual siphon pipes: the sheer volume of water demanded it.

116. Duchesne 1886 2.302, 308, n. 33; Valentini and Zucchetti 1940–53 2.335.

117. Taylor 2000 212–25.

118. Dupré Raventos 1999 cites these letters in possible reference to the Pons Probi, but leaves the issue of their identification unresolved. I was unaware of these citations when I published my book in 2000, but they correspond perfectly to the other evidence I compiled there for the aqueduct bridge of Trajan.

119. Bloch 1944.

Bridges and the development of the city

Now we may summarize some of the ways in which bridges in Rome responded to and helped to shape the neighborhoods of the city. The earliest bridges in Rome (Pons Sublicius, Pons Aemilius) were not principally engaged with the city’s urban development, at least not initially. Instead, they gave easier access to and from the city to those in transit. There can be little doubt, however, that they eventually encouraged the development and defense of the Transtiberim. The island bridges offered a slightly more direct route between the heart of this western district and the busy markets on the east bank, but they were not essential to the city’s development. The proximity of the Pons Aemilius had ensured easy transit for most of the previous century. Instead, these two bridges, built perhaps as much as four decades apart, seem to point to the importance of the island itself as a cult center. As one would expect, permanent access to the island was first made available to those dwelling on the east bank, by way of the Pons Fabricius; only later was access from the Transtiberim made equally convenient with the introduction of the Pons Cestius.

Two factors — the rapid development of the central and southern Campus Martius into an entertainment district and the likely presence of Agrippa’s residence directly across the river from this district — doubtless fueled the construction of the Pons Agrippae. This great adjutant of Augustus achieved so much power, and acquired so much property in Rome, that we cannot discount the presence of a continuous Agrippan program of development and iconographic self-promotion extending south and southwest from the Pantheon all the way across the river to the villa of the Farnesina. Extending throughout, and well beyond, Agrippa’s “theme park” was a venous web of newly supplied water, compliments of the Aqua Virgo. By the time Agrippa’s bridge was restored and subsequently moved in the following centuries, its purpose and meaning had changed. Structures on the west bank were suffering badly from floods and the shifting riverbed; Agrippa’s villa, it seems, was abandoned. We know little about this neighborhood on the west bank, but the emergence of such industrial complexes as the Cellae Vinariae Novae et Arruntianae in the vicinity suggests that the area immediately adjacent to the river lost value as prime real estate and gained importance as an industrial district. Transfluvial water delivery to this area continued to be in high demand, and the Pons Aurelius/Antoninus was maintained in order to provide it.

The Pons Neronianus, another eventual victim of the shifting riverbed, brings into high relief the great expansion of the city’s developed areas. Now the Vatican could be reached easily from the northern Campus Martius. The bridge was partly Nero’s answer to Agrippa: this emperor created a new entertainment district in the Vatican valley with the Circus of

Gaius and Nero at its center. Nero too may have sponsored a continuous armature of self-referential architecture extending from the Baths of Nero, just west of the Pantheon, westward across the river. The Roman remains in large portions of the Vatican are highly regularized on a rectilinear grid. Could this development have begun directly after the fire of 64 in order to accommodate those displaced from the city? If so, then Nero's bridge may have filled a most compelling urban need; for it would have become the sole access to the city of an entirely new suburban district. Situated at a sharp bend in the river, this bridge was the most vulnerable of them all; it may have been showing signs of dilapidation as early as Hadrian's reign, when that emperor built the Pons Aelius immediately upstream, but in a much more secure position. Hadrian's bridge, then, may have served both to relieve traffic on the failing Neronian bridge and to function as a grand promenade leading to his imperial tomb. The tomb, and thus the bridge, follow the orientation of the Neronian street grid — as does the *naumachia* of Trajan, Hadrian's adoptive father.

The Pons Traiani, a bridge introduced exclusively to carry the Aqua Traiana's waters eastward across the Tiber, undoubtedly had a profound influence on the urban development of the city as a whole. But the most clearcut evidence of change in its footprint is a cause rather than an effect: the bridge's alignment suggests that the approach marched directly across the old *naumachia* of Augustus, which by this time had ceased to function. Trajan's new *naumachia*, hard by Nero's suburb in the Vatican, was supplied by the vast new water network provided by the Aqua Traiana; but the principal target of the aqueduct was the Baths of Trajan, the grand new imperial bathing complex on the Oppian Hill in the heart of the old city. The Pons Neronianus was dismantled in the third century and reconstituted downriver. This time, though, the new crossing reflects not a shift in demography, but instead a shift in technology and public policy. The introduction of aqueduct-powered grain mills along the upper Aqua Traiana had created a shift in the food distribution patterns in the city, necessitating a more direct link between the mills on the Janiculum and the southern districts of the city across the Tiber.

The symbolism of Rome's bridges

The bridges in the city of Rome were not the longest, largest, or highest in the Empire. It might even be argued that they left only a modest impression on the residents of Rome themselves, as they are so rarely mentioned in the literary sources. Yet Rome was unique in the extent to which it commanded both banks. In Hadrian's day, seven bridges crossed the Tiber from the northern Campus Martius to the Forum Boarium. A comparable number of bridges remained in use at least until the late fourth century, when the younger Symmachus praised Gratian for rebuilding the Pons Cestius, proclaiming that the Tiber was bridged "for eternity."¹²⁰

In a sense, the Tiber was the greatest of all Rome's consular highways. Its course through the city shared much of the architectural symbolism of Roman roads. The grain ships and commercial barges plying to port and military craft heading to and from the naval docks followed a sort of armature, punctuated by the iterative patterns of warehouses and porticoes, some hundreds of meters long. In imperial times, parts of the river may have been lined with tombs, much like the highways leading out of Rome.¹²¹ The bridges were landmarks by which sailors could tabulate their progress. Several bridges — the Aemilius, the island bridges, the Neronianus, and the Aelius — articulated bends in the river, and became gateways to new prospects. Echoing the usage of commemorative arches, bridge inscriptions appeared on the sides, below the parapets, where they could be read most clearly by those passing under the arches. Just as most urban thoroughfares led to a forum, the civic heart of the city, so this road led to Rome's commercial heart, the Forum Boarium. The bridges in Rome thus took on a significance all their own; they became distinctly urban structures emphasizing not so much the accomplishment of a mechanical goal, such as crossing a magical barrier, as the continuity of urban schemes both on land and on water.

120. Symmachus, Panegyric for Gratian 9.

121. Purcell 1987 32, 35

BIBLIOGRAPHY

- Ashby, T. 1935. *The Aqueducts of Ancient Rome*. Ed. I.A. Richmond. Oxford.
- Besnier, M. 1902. *L'île tiberine dans l'antiquité*. Paris.
- Bell, M. 1993. "Mulini ad acqua sul Gianicolo." *Archeologia laziale* 11, 65–72.
- Bell, M. 1994. "An Imperial Flour Mill on the Janiculum." In *L'Italie méridionale et le ravitaillement en blé de Rome et des centres urbains des débuts de la République jusqu'au Haut Empire*. Naples and Rome, 73–89.
- Bloch, H. 1944. "Aqua Traiana." *American Journal of Archaeology* 48, 337–41.
- Boatwright, M.T. 1987. *Hadrian and the City of Rome*. Princeton.
- Bonato, P. 1889. "La demolizione del Ponte Cestio." *Annali della Società degli Ingegneri e degli Architetti Italiani* 4, 139–51.
- Borsari, L. 1892. Report in *Notizie degli scavi di antichità* 412–28.
- Borsari, L. 1888. "Del Pons Agrippae sul Tevere tra le regioni IX e XIII." *Bullettino della Commissione archeologica comunale di Roma* 16, 92–98.
- Borsari, L. 1887. "Regione IX. Di un cippo spettante alla terminazione delle sponde del Tevere." *Notizie degli scavi di antichità* 322–27.
- Castagnoli, F. 1951–52. "Note di topografia romana." *Bullettino della Commissione archeologica comunale di Roma* 74, 49–56.
- Coarelli, F. 1999a. "Pons Aemilius." *Lexicon topographicum urbis Romae* 4.106–07.
- Coarelli, F. 1999b. "Pons Agrippae; Pons Aurelius; Pons Valentiniani." *Lexicon topographicum urbis Romae* 4.107–08.
- Coarelli, F. 1999c. "Pons Sublicius." *Lexicon topographicum urbis Romae* 4.112–13.
- Coarelli, F. 1988. *Il Foro Boario dalle origini alla fine della Repubblica*. Rome.
- Coarelli, F. 1987. "La situazione edilizia di Roma sotto Severo Alessandro." In *L'urbs: espace urbain et histoire (Ier siècle av. J.C. – IIIe siècle ap. J.C.)*. Rome, 429–56.
- Coarelli, F. 1977. "Il Campo Marzio occidentale: Storia e topografia." *Mélanges de l'Ecole française de Rome (Antiquité)* 89, 807–46.
- Degrassi, A., ed. 1931–86. *Inscriptiones Italiae*. 13 vols. Rome.
- Degrassi, D. 1987. "Interventi edilizi sull'Isola Tiberiana nel I sec. A.C.: nota sulle testimonianze letterarie, epigrafiche ed archeologiche." *Athenaeum* 75, n.s. 65, 521–27.
- Dehn, G. 1911. "Die Bronzefunde bei Ponte Sisto." *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 26, 238–59.
- Delbrück, R. 1907–12. *Hellenistische Bauten in Latium*. 2 vols. Strasbourg.
- De Spirito, G. 1999. "Pons Lapideus." *Lexicon topographicum urbis Romae* 4.110.
- D'Onofrio, C. 1970. *Il Tevere e Roma*. Rome.
- Duchesne, L. 1886. *Le Liber pontificalis*. Paris.
- Dupré Raventos, J. 1999. "Pons Probi." *Lexicon topographicum urbis Romae* 4. 111–12.
- Frank, T. 1924. *Roman Buildings of the Republic: An Attempt to Date Them from Their Materials*. Rome.
- Frutaz, A., ed. 1962. *Le Piante di Roma*. 3 vols. Rome.
- Galliazzo, V. 1994. *I ponti romani*. 2 vols. Treviso.
- Gatti, G. 1892. "Notizie di trovamenti riguardanti l'epigrafia urbana." *Bullettino della Commissione archeologica comunale di Roma* 20, 54–80, 361–75.
- Gatti, G. 1887. "Di un nuovo cippo terminale delle ripe del Tevere." *Bullettino della Commissione archeologica comunale di Roma* 15, 306–13.
- Gazzola, P. 1963. *Ponti Romani*. Florence.
- Griffin, M. 1984. *Nero: The End of a Dynasty*. New Haven.
- Hodge, A.T. 1992. *Roman Aqueducts and Water Supply*. London.
- Holland, L. 1961. *Janus and the Bridge*. Rome.
- Hülsen, C. 1891. "Jahresbericht über Topographie der Stadt Rom: Der Tiber und die Brücken." *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 6, 130–36.
- Hülsen, C. 1892. "Der Tiber und die Brücken: Das rechte Tiberufer." *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 7, 328–31.
- Hülsen, C. 1893. "Der Tiber und die Brücken: Das rechte Tiberufer." *Mitteilungen des Deutschen Archäologischen Instituts, Römische Abteilung* 8, 319–25.
- Jordan, H. 1878. *Topographie der Stadt Rom im Alterthum*. Vol. 1.1. Berlin.

- Kummer, T. 1889. *De urbis Romae pontibus antiquis*. Schalke.
- Lanciani, R. 1893–98. *Forma urbis Romae*. Milan. Reprint Rome, 1990.
- Lanciani, R. 1893. Report in *Bullettino della Commissione archeologica comunale di Roma* 14–26.
- Lanciani, R. 1878. “Monumenti rinvenuti nell’alveo del Tevere sotto il ponte sisto.” *Bullettino della Commissione archeologica comunale di Roma* 6, 241–48.
- La Rocca, E. 1984. *La riva mezzaluna: Culti, agoni, monumenti funerari presso il Tevere nel Campo Marzio occidentale*. Rome.
- Le Gall, J. 1953. *Le Tibre: Fleuve de Rome dans l’antiquité*. Paris.
- Lloyd, R.B. “The Aqua Virgo, Euripus and Pons Agrippae.” *American Journal of Archaeology* 83 (1979) 193–204.
- Lugli, G. 1953. *Fontes ad topographiam veteris urbis Romae*. Vol. 2, libri 5–7. Rome.
- Mayerhöfer, A. 1883. *Die Brücken im alten Rom*. 2d ed. Erlangen.
- Mocchegiani Carpano, C. and R. Meneghini. 1985. “Lungotevere Testaccio.” *Bullettino della Commissione archeologica comunale di Roma* 90, 86–95.
- O’Connor, C. 1993. *Roman Bridges*. Cambridge.
- Palmer, R.E.A. 1990. *Studies in the Northern Campus Martius in Ancient Rome*. Philadelphia.
- Panimolle, G. 1984. *Gli acquedotti di Roma antica*. 2 vols. Rome.
- Parker, J.H. 1876. *The Aqueducts of Ancient Rome*. Vol. 8 of *The Archaeology of Rome*. Oxford.
- Pauly-Wissowa. *Paulys Real-Encyclopädie der classischen Altertumswissenschaft*. xx.
- Piale, S. 1834. *Degli antichi ponti di Roma al tempo del secolo V*. Rome.
- Platner, S.B. and T. Ashby. *A Topographical Dictionary of Ancient Rome*. London and Oxford, 1929.
- Purcell, N. 1987. “Tomb and Suburb.” In *Römische Gräberstraßen*. Ed. H. von Hesberg and P. Zanker. Munich, 25–41.
- Quilici, L. 1983. “Il Campo Marzio occidentale.” In *Città e architettura nella Roma imperiale*. Rome, 59–85.
- Richardson, L. jr. 1992. *A New Topographical Dictionary of Ancient Rome*. Baltimore and London.
- Richmond, I.A. *The City Walls of Ancient Rome*. Oxford, 1930.
- Richter, O. 1882. *Die Befestigung des Janiculum: Ein Beitrag zur Topographie der Stadt Rom*. Berlin.
- Rickman, G. 1980 *The Corn Supply of Ancient Rome*. Oxford.
- Rickman, G. 1983. “Porticus Minucia.” In *Città e architettura nella Roma imperiale*. Rome, 105–08.
- Rickman, G. 1971. *Roman Granaries and Store Buildings*. Cambridge.
- Riemann, H. 1952a. “Pons Agrippae.” In *Pauly-Wissowa* 21.2 2455–61.
- Riemann, H. 1952b. “Pons Valentiniani.” In *Pauly-Wissowa* 21.2 2469–82.
- Ronna, A. 1898a. “Le Tibre.” *Bulletin de la Société d’encouragement pour l’industrie nationale* 5,3 (Sept.) 1125–1218.
- Ronna, A. 1898b. “Les travaux du Tibre.” *Bulletin de la Société d’encouragement pour l’industrie nationale* 5,3 (Nov.) 1401–80.
- Rowland Pierce, S. 1925. “The Mausoleum of Hadrian and the pons Aelius.” *Journal of Roman Studies* 15, 75–103.
- Savage, S. 1940. “The Cults of Ancient Trastevere.” *Memoirs of the American Academy in Rome* 17, 26–56.
- Shiple, F.W. 1933. *Agrippa’s Building Activities in Rome*. St. Louis.
- Ulrichs, L. 1870. *Studien zur römischen Topographie*. I.: *Die Brücken des alten Roms*. Munich.
- Valentini, R. and G. Zucchetti, eds. 1940–53. *Codice topografico della città di Roma*. 4 vols. Rome.
- Van Buren, A.W. and G.P. Stevens. 1917. “The Aqua Traiana and the Mills on the Janiculum.” *Memoirs of the American Academy in Rome* 1, 59–61.
- Walser, G., ed. 1987. *Die Einsiedler Inschriftensammlung und der Pilgerführer durch Rom (Codex Einsidlensis 326)*. Stuttgart.
- Wikander, O. 1991. “Water Mills and Aqueducts.” In *Future Currents in Aqueduct Studies*, ed. A.T. Hodge. Leeds 1991, 141–48.
- Wikander, O. 1984. *Exploitation of Water Power or Technological Stagnation? A Reappraisal of the Productive Forces of the Roman Empire*. Lund.
- Wikander, O. 1979. “Water Mills in Ancient Rome.” *Opuscula romana* 12, 13–36.
- Wilson, A. 2001. *Janiculum Mills Excavations*.
- Wilson, A. 2000. “The Water-Mills on the Janiculum.” *Memoirs of the American Academy in Rome* 45, 219–46.
- Zippel, G. 1886. “Die Brücken im alten Rom.” *Neue Jahrbücher für Philologie und Pädagogik: Jahrbücher für klassische Philologie*, 481–93.