

## WATER-MILLS AT AMIDA: AMMIANUS MARCELLINUS 18.8.11\*

In recounting the preliminaries to Sapor's siege of Amida (Diyarbakır in eastern Turkey) in A.D. 359, Ammianus Marcellinus (18.8.11) records an account of a skirmish in which he was involved near the banks of the Tigris below the city. An incidental detail in this account has proved puzzling to successive editors, translators, and commentators; this paper proposes a straightforward solution that makes sense of the text, and also casts some light on the diffusion of water-power in the Roman east by the fourth century A.D.

In A.D. 359 the Persian king Sapor invaded northern Mesopotamia. Bypassing a Roman detachment near Amida, the vanguard of his army encountered a force, which included Ammianus himself, at dusk by the banks of the Tigris below the city. A skirmish ensued, in which the Romans were scattered. Ammianus headed for the safety of Amida by a narrow ascent which was thronged by other fugitives and pursuing Persians; amid gruesome and chaotic scenes of slaughter their progress was brought to a standstill because there was so little room to move. Eventually Ammianus gained the safety of the city, and his account of the ensuing seventy-three-day siege, culminating in Amida's capture by Sapor, is one of his most colourful pieces of writing.<sup>1</sup>

The passage describing the route up to Amida from the Tigris has caused serious difficulties of interpretation; syntactically convoluted, it mirrors the action described in its breathlessness and complexity:

mihi dum avius ab itinere comitum quid agerem circumspicio, Verennianus domesticus protector occurrit, femur sagitta confixus, quam dum avellere obtestante collega conarer, cinctus undique antecedentibus Persis, civitatem petebam, anhelu cursu rependo, ex eo latere quo incessebamus in arduo sitam, unoque ascensu perangusto meabilem, quem scissis collibus molinae ad calles artandas aedificatae densius constringebant.

*molinae* V; *moli*<*mi*>*na* . . . *aedificata* Mommsen. *artandas* V; *aptandas* Clark.

The problem lies in knowing precisely what Ammianus means by the phrase that describes the approach: *quem scissis collibus molinae ad calles artandas aedificatae densius constringebant*. The way in which the grammar is naturally construed ('which, where the hills were cleft, was densely crowded by mills built in order to narrow the paths') makes very little logical sense: it is hard to see how *molinae* ('mills') could have been deliberately intended to make the paths narrow. Two basic approaches have been tried by editors and commentators: emending the text, or forcing a meaning from *molinae* which it seems highly unlikely to have carried.

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<sup>1</sup> Ammianus Marcellinus 18.6–19.8; cf. J. F. Matthews, *The Roman Empire of Ammianus* (London, 1989), 39–47.

The Loeb translation adopts Clark's emendation of *aptandas* for the manuscripts' *artandas*, and runs:<sup>2</sup>

I myself, having taken a direction apart from that of my comrades, was looking around to see what to do, when Verennianus, one of the guard, came up with an arrow in his thigh; and while at the earnest request of my colleague I was trying to pull it out, finding myself surrounded on all sides by the advancing Persians, I made up for the delay by breathless speed and aimed for the city, which from the point where we were attacked lay high up and could be approached only by a single very narrow ascent; and this was made still narrower by mills which had been built on the cliffs for the purpose of making the paths.

But Clark's emendation of *artandas* to *aptandas* is unconvincing,<sup>3</sup> and does not yield any better sense—it is equally hard to see how the mills would have assisted in preparing the paths (*calles* implies trails or tracks, unlikely to have been paved), and in any case the overall point of the passage is about making the paths narrower (*artare*).

Mommsen thought that *molinae* ('mills') were inappropriate in the context, and wanted to emend to *molimina* ('devices', for obstructing the paths);<sup>4</sup> but this requires a change also to the participle *aedificatae* to make it agree in gender, which seems unnecessarily contrived, and has not been followed by other editors or translators.

In the Budé edition of Ammianus, G. Sabbah's note on the passage is clearly the product of desperation:

*Molina* a un sens technique et semble désigner les piles, c'est-à-dire des pierres, ayant la dimension et la forme des meules, taillées dans les collines environnant Amida et dressées, comme des obstacles, pour rétrécir les passages et gêner notablement les assauts de la cavalerie.<sup>5</sup>

There are several problems with Sabbah's interpretation. First, it is unclear why the blocks should have looked like millstones when any large quarried blocks would have served the same purpose. Secondly, *aedificatae* should imply built structures, not simply stones placed on the path. Thirdly, and more seriously, *molina* is always used of the structure or mechanism of a mechanically powered mill, usually a water-mill, and not of a millstone, unlike *mola*, which can mean the millstone, the whole mechanical assemblage (in the plural), or—usually qualified with an adjective such as *aquaria* or *asinaria*—the mill and its structure. *Molina* and its cognates, *molinus* and *molinum*, seem to be relatively late coinages derived from *mola*, expressing specifically the concept of a mechanically powered mill as opposed to any other kind of mill.<sup>6</sup> The

<sup>2</sup> J. C. Rolfe, *Ammianus Marcellinus* 1, Loeb Classical Library (London and Cambridge, MA, 1935), 461–3; C. U. Clark (ed.), *Ammiani Marcellini Rerum Gestarum libri qui supersunt* 1: *Libri XIV–XXV* (Berlin, 1913).

<sup>3</sup> Matthews (n. 1), 485, n. 21.

<sup>4</sup> Mommsen, unpublished notes cited by Clark (n. 2) in his apparatus criticus, 153.

<sup>5</sup> G. Sabbah, *Ammien Marcellin. Histoire* 2 (Paris, 1970), 205, n. 214; followed by Matthews (n. 1), 45 and 485, n. 21. The Penguin translation (W. Hamilton, *Ammianus Marcellinus: The Later Roman Empire (A.D. 354–378)*, with an introduction and notes by Andrew Wallace-Hadrill [London, 1986]) follows this idea, but italicizes the passage as hopelessly corrupt: 'a single narrow passage, which was further constricted by large blocks quarried from the hills and set in close order to reduce the width of the path'.

<sup>6</sup> Cf. Ö. Wikander, *Vattenmøllor och möllare i det romerska riket* (Lund, 1980), 74 and 94, n. 13, and id., *Exploitation of Water-power or Technological Stagnation? A Reappraisal of the Productive Forces in the Roman Empire* (Lund, 1984), 33. Wikander suggests that the group *molina*, *molinum*, *molinus*, *molendinum* is used indiscriminately of animal-powered mills and water-mills; however, I cannot find instances of *molina*, *molinum*, or *molinus* being used to denote animal mills before the ninth century. By contrast, *molendinum* seems to be used more generally at an earlier date for a mechanized mill (often animal-driven), or a place where milling is done (*TLL* s.v. *molendinum*). In

earliest surviving example of a word derived from this group seems to be the dedication of an altar to Neptune in the second or third century A.D. by a group of *molin[arii]* on tributaries of the river Günz at Günzburg in Bavaria;<sup>7</sup> this is followed by an occurrence of the adjective *molinum* in Tertullian; the other instances are fourth-century or later. The usages of *molina* as a noun cited in *TLL*, apart from the Ammianus reference, all clearly refer to water-mills;<sup>8</sup> likewise the instances of the nouns *molinus*, *molinum*, and the adjectives *molinarius* and *molinus/-al-um* until the early Middle Ages all evidently relate to water-powered mills, with the exception of the adjectival use in Tertullian, where the type of mill envisaged is unclear.<sup>9</sup> There is a single occurrence of *molinus* in the ninth century used as an adjective in the context of an animal-powered mill,<sup>10</sup> and around the same period St Benedict of Aniane had a *molinus* or *molinum* driven by an *asellus*.<sup>11</sup> From the late twelfth century onwards the group *molina*, etc., also starts to be used to designate other kinds of mills (fulling stocks, windmills, etc.), and as a noun *molina* is occasionally used of hand-mills, but not before the twelfth century.<sup>12</sup> But *molina* as a noun is never used to mean a millstone, and Sabbah's 'sens technique', requiring it to mean obstacles shaped like millstones, is fantasy.

In the fourth century, then, *molina* meant a mechanical, usually water-powered, mill, and Ammianus' *molinae* in a gorge outside the town must be water-mills—the built structures, not the grinding stones. But it is hard to regard water-mills as deliberate obstacles; their constriction of the path must be incidental. The problem is most elegantly and convincingly solved by emending *artandas* to *artatas* (used in an absolute sense, with the same meaning as *artas*, 'narrow'): the paths were narrow anyway, and further constricted by the building of the mills.<sup>13</sup> *Artatas* was later changed to *artandas*

any case, as far as the passage of Ammianus under discussion is concerned, animal-driven mills would hardly have been located in a steep and narrow ravine when they could be much more conveniently sited within the city itself.

<sup>7</sup> *CIL* 3.5866; see Wikander (n. 6, 1980), 17.

<sup>8</sup> Glossaria s.v. *ὄδραλέσια*; Reg. Urb. 19N; Curiosum 16N; Cassiodorus, *Inst.* 1.21.1; Gregory of Tours, *History of the Franks* 3.19, 7.14, 7.25; *Vitae patrum Iurensium* 1.17 (= *Vita S. Romani abbatis* 17, a text of c. A.D. 520 referring to events c. 450; see F. Martine, *Vie des pères du Jura* [Paris, 1968], 14–57 and 296).

<sup>9</sup> Tertullian, *Adversus Marcionem* 4.35: *si molino saxo ad collum deligato praecipitatus esset in profundum*—a translation of Luke 17.2.

<sup>10</sup> Agobard, *MGH Epist.* V, ed. E. Dümmler (1898–9), 163, line 5: *si duo pro uno asino molino, aut quicquid sit etiam vilis, contendat*.

<sup>11</sup> *S. Ardonis vita Benedicti abbatis Anianensis* 4 (= *MGH SS.* XV, ed. G. Waitz [1887], 203), written c. A.D. 830. I owe this reference to Örjan Wikander.

<sup>12</sup> *Novum Glossarium Mediae Latinitatis* (1963), cols. 725–6 (*molina*, *molinum*, *molinus*—all references before the ninth century where the context is clear are to water-mills); cf. cols. 709–15 (*molendarius*, used of water-mills until the late eleventh century when its usage becomes diversified to include fulling mills, and, in the twelfth century, windmills, animal-driven mills, tanning mills, etc.). On the use of *molina*, etc., in early medieval charters, see P. Aebischer, 'Les dénominations du «moulin» dans les chartes italiennes du moyen âge', *Archivum Latinitatis Medii Aevi* 7 (1932), 49–109.

<sup>13</sup> This reading was first proposed by L. Dillemann, *Haute Mésopotamie orientale et les pays adjacents* (Paris 1962), 132: 'Il vaut mieux laisser à *molinae* son sens habituel et lire *molinae ad calles artatas aedificatae*, «des moulins construits sur des chemins resserrés», en donnant à *ad* son sens de proximité, de lieux précis, sans idée de mouvement ou de but.' I thank Michael Winterbottom for independently suggesting the same reading to me. Dillemann's solution, in a work on the topography of Mesopotamia, went unnoticed by later commentators on Ammianus, with the exception of P. de Jonge (*Philological and Historical Commentary on Ammianus Marcellinus XVIII* [Groningen, 1980], 274–5) who rejected it as he could not understand why corn

by a scribe who did not see that *ad calles* meant 'next to the paths'. We can therefore restore the corrupted clause as: *quem scissis collibus molinae ad calles artatas aedificatae densius constringebant*, and translate the whole passage as:

I was off the road which my comrades were taking, and was looking around to see what to do when Verennianus, one of the guard, came up with an arrow in his thigh; and while at my colleague's earnest request I was trying to pull it out, I was surrounded on all sides by the advancing Persians. Creeping at a breathless run, I headed for the city, which from the side where we were attacked lay high up, accessible only by a single very narrow ascent, which was densely constricted, where the hills were cleft, by water-mills built beside the narrow paths.

The interpretation of Ammianus' *molinae* as water-powered mills fits the topographical context. In the following section (18.9.2) Ammianus describes Amida as being in a well-watered area, with the Tigris running nearby to the south (in fact, it loops round to the east and south<sup>14</sup>) and the Nymphaeus to the north, and a copious hot spring rising in the city itself at the foot of the citadel. Steep cliffs overlook the Tigris, by whose banks Ammianus was attacked (18.8.9), and from where he describes the narrow and difficult approach to the city running up through the cliffs to a postern gate in the walls. Such a path might naturally follow a gorge or watercourse in a cleft in the cliffs (*scissis collibus*). Later accounts confirm the impression given by Ammianus' description,<sup>15</sup> and travellers from the Middle Ages onward mention mills within the city driven by the spring.<sup>16</sup> The Turkish traveller Ewliya, describing the city in 1655, said that the spring at the foot of the citadel turned mills before passing through a grille in the walls and cascading down to the Tigris.<sup>17</sup> It is presumably the course of this stream that was Ammianus' approach to the city, and there is no difficulty in seeing his *molinae* as water-mills along it (although outside the walls, in contrast to the later mills). The mills could easily have had the effect of narrowing the paths along the watercourse, not only by the structures themselves, but possibly also by associated derivation channels, dams, and so on, which would have proved an encumbrance to the throng of fugitives heading up towards Amida.

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The history of the water-mill probably begins in the eastern Mediterranean, possibly at Byzantium in the third century B.C.,<sup>18</sup> and literary and epigraphic sources give a sketchy picture of its diffusion in Asia Minor. One of the earliest references to water-mills mentions a mill in the grounds of Mithridates' palace at Cabeira (Strabo, *Geography* 12.3.30), in the first century B.C. The water-mill came into increasingly widespread use throughout the empire in the first two centuries A.D.:<sup>19</sup> a recently

mills should have been placed along the only approach to the city, but the reason is obvious if the mills concerned were water-mills built along a gorge. For *artatas* in an absolute sense see *TLL* 2 col. 708 s.v. *arto*, lines 60–5. It is possible that the manuscript reading was originally *artas*, but the scribal error is even more natural if the reading was *artatas*. The sense is the same in either case.

<sup>14</sup> See the plan in A. Gabriel, *Voyages archéologiques dans la Turquie orientale* (Paris, 1940), 90, fig. 68.

<sup>15</sup> For a description of the topographic setting of Amida, see Gabriel (n. 14), 90–2 and figs. 68–9; M. Van Berchem, J. Strzygowski, and G. L. Bell, *Amida* (Heidelberg, 1910).

<sup>16</sup> Gabriel (n. 14), 92, n. 1.

<sup>17</sup> Cited in Van Berchem *et al.* (n. 15), 10.

<sup>18</sup> See most recently M. J. T. Lewis, *Millstone and Hammer: The Origins of Water Power* (Hull, 1997).

<sup>19</sup> See for examples the two works by Wikander cited in n. 6, which also collect many of the literary and archaeological references; also J.-P. Brun and M. Borréani, 'Deux moulins hydrauliques du Haut Empire romain en Narbonnaise. Villae des Mescians à La Crau et de Saint-Pierre/Les Laurons aux Arcs (Var)', *Gallia* 55 (1998), 279–326.

published second-century decree from Beroea in Macedonia refers to tax revenue from water-mills (ὕδρομηχανή),<sup>20</sup> and by c. A.D. 200 the city of Hierapolis in Phrygia had a guild of water-millers (σύντεχνα τῶν ὑδραλέτων).<sup>21</sup> In the mid-320s Orkistos in Phrygia petitioned Constantine to be raised to the status of an autonomous *civitas*, and the imperial rescript of 329/331 granting the request cited among the city's other amenities *pr[aeter]ea ex decursibus praeterfluentium [a]quarum aquim(o)lin[a]rum numerum copiosum*<sup>22</sup>—a succession of mills along a watercourse near the city, very reminiscent of the situation I am proposing for Amida. In the fourth century the water-mill moved further east still: a story in the Byzantine historian Cedrenus, based probably on a lost passage of Ammianus Marcellinus, credits the Persian Metrodorus with having introduced water-mills and baths to India during the reign of Constantine.<sup>23</sup> Libanius in the late 380s (*Or.* 4.29) refers to bakers at Antioch unjustly taxed for the use of water-mills, and a fourth- or fifth-century gravestone from Sardis commemorates a water-mill engineer.<sup>24</sup> At Ephesus a series of early seventh-century water-mills have been discovered in the so-called Hanghaus 2, including a sawmill.<sup>25</sup>

By contrast with the situation in the western empire, where excavations in recent years have rapidly increased the number of water-mills known from the Roman period,<sup>26</sup> few discoveries of ancient water-powered installations have been made in Asia Minor, with the exception of the Byzantine mills at Ephesus mentioned above, and a mill-structure with seven channels driving horizontal wheels, on the Lamas-Su river in Cilicia, which is undated but apparently late antique, on the basis of its masonry and an associated early Christian inscription.<sup>27</sup> The paucity of known ancient water-mills in the east is probably largely due to a lack of fieldwork aimed at the question; but as a result we still rely heavily on literary and epigraphic evidence for our knowledge of the use of water-power in the eastern empire. The passage of

<sup>20</sup> L. Gounaropoulou and M. B. Hatzopoulos, *Επιγραφές Κάτω Μακεδονίας 1: Επιγραφές Βέροιας* (Athens, 1998), no. 7, lines A 28, 50, 85 and Γ 17, [20]. The second-century date is derived from the lettering style of the inscription (p. 108).

<sup>21</sup> H. W. Pleket, 'Greek epigraphy and comparative ancient history: two case studies', *Epigraphica Anatolica. Zeitschrift für Epigraphik und historische Geographie Anatoliens* 12 (1988), 25–37, at 27–8.

<sup>22</sup> A. Chastagnol, 'L'inscription constantinienne d'Orkistos', *Mélanges de l'École française de Rome, Antiquité* 93 (1981), 381–416, esp. 393–8 (dating) and 407–9 (mills). Earlier editions of the text in W. M. Calder (ed.), *Monumenta Asiae Minoris Antiqua 7: Monuments from Eastern Phrygia* (Manchester, 1956), 70, no. 305, lines 29–31; and *CIL* 3.7000 = 352.

<sup>23</sup> Cedrenus 1516 Bonn *et seqq.* The story of Metrodorus' visit to India probably goes back to Ammianus Marcellinus, who says (25.4.23) he has related it fully already, no doubt in a lost book.

<sup>24</sup> W. H. Buckler and D. M. Robinson, *Sardis 7*, part 1: *Greek and Latin Inscriptions* (Leiden, 1932), 138–9, no. 169: *μημόριον διαφέρον Εὐχρωμείου τοῦ καὶ Λεοντείου μανγαναρείου ὑδραλέτα.*

<sup>25</sup> H. Vettters, 'Ephesos, Vorläufiger Grabungsbericht 1980', *Anzeiger. Österreichische Akademie der Wissenschaften, Wien, Philologisch-historische Klasse* 118 (1981), 137–68; id., 'Ephesos, Vorläufiger Grabungsbericht 1981', *ibid.* 119 (1982), 62–101; id., 'Ephesos. Vorläufiger Grabungsbericht 1983', *ibid.* 121 (1984), 209–32; Ö. Wikander, 'The water-mill', in Ö. Wikander (ed.), *Ancient Water Technology* (Leiden, 2000), 371–400.

<sup>26</sup> See the comments in Wikander (n. 25) on the pace of discovery; cf. also Wikander (n. 6) and id., 'Archaeological evidence for early water-mills—an interim report', *History of Technology* 10 (1985), 151–79.

<sup>27</sup> R. Heberdey and A. Wilhelm, 'Reisen in Kilikien, ausgeführt 1891 und 1892 im Auftrage der kaiserlichen Akademie der Wissenschaften', *Denkschriften der Kaiserlichen Akademie der Wissenschaften, Wien. Philosophisch-historische Classe* 44.6 (1896), 47–8; P. Roos, 'Zu antiken Wassermühlen in Kleinasien', in N. Baslegen and M. Lugal (edd.), *Festschrift für Jale İnan* (Istanbul, 1989), 1.495–499 and 2.189–90 Abb. 1–4.

Ammianus, allowing a glimpse of the use of water-powered mills near Amida in northern Mesopotamia in the mid fourth century A.D., is therefore a welcome addition to the picture. If my reading of Ammianus' topographical information is correct, the course of the stream from the spring rising in Diyarbakır down through the cliffs to the Tigris would be a prime place to seek surviving archaeological remains of late Roman water-mills.

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