

NOTES AND DISCUSSIONS

THE RANGE OF THE ANCIENT BOW: ADDENDA

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I

A PREVIOUS ARTICLE reviewed the evidence for the range of the ancient bow, and concluded

“that bowmen were quite accurate up to 55–60 metres; that their effective range extended at least 160–175 metres, but not so far as 350–450 metres; and that 500 metres was an exceptional flight shot.”¹

It inadvertently omitted certain data which have since been brought to the writer’s attention. They are presented herewith. First is a *testimonium* which, to avoid disrupting the chronological sequence, we may call

T 6a. Polybius 6.31.10–14 (writing about 150 B.C., on the arrangement of the Roman camp):

(10) τούτων δ’ οὕτως ἐχόντων τὸ μὲν σύμπαν σχῆμα γίνεται τῆς στρατοπεδείας τετράγωνον ἰσόπλευρον. . . . (11) τὸν δὲ χάρακα τῶν σκηνῶν ἀφιστᾶσι κατὰ πάσας τὰς ἐπιφανείας διακοσίους πόδας. τοῦτο δὲ τὸ κένωμα πολλὰς καὶ δοκίμους αὐτοῖς παρέχεται χρείας. . . . (It serves, firstly, as a convenient marshalling and circulation area; secondly, as a depository for plunder.) . . . (14) τὸ δὲ μέγιστον, ἐν ταῖς ἐπιθέσεσι ταῖς νυκτεριναῖς οὔτε πῦρ οὔτε βέλος ἐξικνεῖται πρὸς αὐτοὺς πλὴν τελείως ὀλίγων· γίνεται δὲ καὶ ταῦτα σχεδὸν ἀβλαβῇ διὰ τε τὸ μέγεθος τῆς ἀποστάσεως καὶ διὰ τὴν τῶν σκηνῶν περίστασιν.

The generic word βέλος can on occasion denote every variety of missile. But not here. To judge from ancient documents and modern performance, two hundred feet (59.2 metres) is unthinkable short for arrows, sling-bullets, or mechanical artillery; all outreached this limit at least threefold.²

¹*Phoenix* 19 (1965) 1–14; the quotation is from page 8; cf. *JHS* 90 (1970) 197–198. The present notes were compiled while the writer was holding a Canada Council Leave Fellowship in Athens. He further acknowledges his debt to Eugene Borza, Anthony Cutler, and Eugene Vanderpool, for illuminating discussions.

²On the arrow range in general, see *Phoenix* 19.1–14. How can one establish the minimum credible extreme range? In the nature of things, such statistics are not normally recorded. With a child’s wooden bow from Athens (length, 38 inches; weight when drawn 16 inches, 11 pounds), the writer shot 212 feet 6 inches (64.8 metres) through the air, using a standard 26½-inch arrow drawn 16 inches. (He expresses his gratitude to the bow’s owner, John E. McLeod, for filling the perilous and responsible post of observer.) Years ago Saxton T. Pope carried out tests in which twenty-nine bows from Californian anthropological collections were shot. Only two failed to attain 100 yards (91.4 metres):

Polybius must have been thinking of javelin, spear, or stone, not of the bow at all.³

Archaeological evidence? Commentators cite the Republican camps at Numantia in Spain—where the maximum *intervalla* are only half the Polybian prescription.⁴ Nor are they fully apposite to his text, for they are semi-permanent, whereas he is describing “marching camps.” Conceivably the presence of stone buildings, and a solid outer wall, or the existence of a scarp in front, made protection against missiles less urgent.⁵ Yet whether a camp was *diurna* or *stativa* the other arguments in favour of

an Osage bow, of Osage orange, which reached 92 yards (“a pleasant bow to shoot, but weak;” Pope, *Bows and Arrows* [1923, revised 1930; reprinted Berkeley 1962] 18); and a South American bow of *palma brava*, which shot 98 yards (“speaks of a lack of intelligence on the part of the maker;” *ibid.* 21). On the sling, see *Phoenix* 19.14; and add A. V. M. Hubrecht, “The Use of the Sling in the Balearic Isles,” *Bulletin van de Vereeniging tot Bevordering der Kennis van de Antieke Beschaving te 's-Gravenhage* 39 (1964) 92–93; on Ibiza, “a trained slinger could hit an object a square meter in size at a distance of 200 m.” In 1970 in England a slingbullet was hurled 1147 feet (349.6 metres): *Guinness Book of World Records* (10th edition, revised and enlarged by Norris and Ross McWhirter, Bantam Books, April 1971) 417. On the artillery, see E. W. Marsden, *Greek and Roman Artillery: Historical Development* (Oxford 1969), Chapter 4, “Range and Effects,” esp. 91: “arrow-shooting and stone-throwing catapults could operate normally up to 400 yards.”

³For the javelin or throwing spear, W. Rüstow and H. Köchly, *Geschichte des griechischen Kriegswesens von der ältesten Zeit bis auf Pyrrhos* (Aarau 1852) 131, posit a range of 30–40 paces (= 24–32 metres); F. E. Adcock, *The Greek and Macedonian Art of War* (Sather Classical Lectures 30 [Berkeley 1957]) 15, opines 20 yards. E. Norman Gardiner, *JHS* 27 (1907) 258, mentions casts of 20 m., 25 m., 53.90 m., and 55 m. (all without *amentum*), and 80 m. and 65 m. (both with *amentum*). H. A. Harris, *G&R* 2nd s., 10 (1963) 30–34, records his own amateur throws of 54 feet without *amentum* and about 68 feet with *amentum*; cf. *Greek Athletes and Athletics* (London 1964) 93–97; see also Julius Jüthner, *Die athletischen Leibesübungen der Griechen* 2.1 (*SBWien* [Phil.-Hist. Kl.] 249.2, 1968) 343, n. 116. The present record for the athletic javelin seems to be 304 feet 1 inch (92.70 metres): *Guinness Book of World Records*¹⁰ 552. Evidently the javelin was out-ranged by the bow (Thuc. 3.98.1) and by the sling (Xen. *Anab.* 3.3.7). No doubt a stone large enough to be a nuisance could be thrown as far as a modern baseball—say 200 feet. A small fire-pot, if such a thing existed, could not be lobbed so far.

⁴Camp I at Renieblas, associated with the campaign of Cato, 195 B.C.: *intervallum* at northwest corner, 17–20 metres; in the southwest part, 14–15 metres (= 50 feet); Adolf Schulten, *Numantia: Die Ergebnisse der Ausgrabungen 1905–1912*, 4: *Die Lager bei Renieblas* (Munich 1929) 36. Camp at Aguilar, either Catonian or from the war of 181–179 B.C.: *intervallum* along north wall, 20 metres (= 70 feet); *ibid.* 4.195. Camp III at Renieblas, of Nobilior, 153 B.C.: *intervallum* on west, north, and the north half of east, 23–29 metres (= 100 feet); elsewhere, less; *ibid.* 4.59. Camp at Peña Redonda, from Scipio’s campaign, 133 B.C.: *intervallum* in the front part, 23 metres (= 80 feet); in the rear third, 14 metres (= 50 feet); *ibid.* 3: *Die Lager des Scipio* (Munich 1927) 106. Camp at Castillejo, likewise Scipionic, *intervallum*, 100 feet; *ibid.* 3.193.

⁵So Schulten, *Numantia* 4.59; Veith in Johannes Kromayer and Georg Veith, *Heerwesen und Kriegführung der Griechen und Römer* (Müller’s *Handbuch der Altertumswissenschaft* 4.3.2 [Munich 1928]) 343.

a wide *intervallum* would be equally valid. Much later, intervals of less than one hundred feet are well attested in Imperial "permanent camps" (i.e., legionary fortresses), semi-permanent camps, and temporary camps.⁶ We cannot convict Polybius of error; there is simply no overlap. But we may conclude that, for the *gromatici* as for the historian, the bowshot played no role in determining the width of the *intervallum*.

II

T 7a. Statius, *Thebaid* 6.351–354 (writing probably between A.D. 80 and 92; on the course for the chariot race at the first celebration of the Nemean Games):

*metarum instar erant hinc nudo robore quercus,
olim omnis exuta comas, hinc saxeus umbo
arbiter agricolis; finem iacet inter utrumque,
quale quater iaculo spatium, ter harundine vincas.*

How long was the track? No smaller, we are told, than the hippodrome at Lepcis Magna; for there must always be "a first leg . . . long enough to enable the field to spread out before the first turn."⁷ Here the line joining the *metae*, the *spina*, is 220 metres long; the corresponding bowshot would be 73.3 metres, and the javelin cast 55 metres. But perhaps Statius intended his Roman audience to visualize the Circus Maximus, with its *spina* of 344 metres. The bowshot then rises to 114.7 metres; still unexpectedly short. Was the Nemean arena of even more heroic extent? Who is to say? Better to beware this expert witness, whose credentials are unverified, whose scruples are unproven, and whose very testimony is enigmatic.

III

The earlier study mentioned a Byzantine measurement called the "bowshot," but despaired of recovering its precise value ("between 290

⁶In legionary fortresses, the maximum interval is 100 feet; see for example the twelve fortresses drawn to the same scale in V. E. Nash-Williams, *The Roman Frontier in Wales* (2nd edition, Cardiff 1969) 147–149, figs. 80–82. Semi-permanent camps from the siege of Masada in A.D. 73 have *intervalla* of less than 10 metres; I. A. Richmond, *JRS* 52 (1962) 147, fig. 6; 149, fig. 7. Most temporary camps preserve only the fosse and rampart; an exception is Glenlochar, Kirkcudbrightshire; to judge from the aerial photograph, where crop markings show the lines of tents, the *intervallum* was little more than twenty feet; J. K. St. Joseph, *JRS* 41 (1951) 60–61 and pl. 6.2. The Flavian work camp southwest of the legionary fortress of Inchtuthil, Perthshire, exhibits similar markings; but no dimensions are given; J. K. St. Joseph, *JRS* 55 (1965) 82–83 and pl. 10.2. The handbook of [Hyginus], *De Munitionibus Castrorum* 14, specifies 60 feet of space between wall and legions. See now Graham Webster, *The Roman Imperial Army of the First and Second Centuries A.D.* (London 1969), Chapter 4, "Camps and Forts of the First and Second Centuries," esp. 166–187.

⁷H. A. Harris, *G&R* 2nd s., 10.34–35; *Greek Athletes and Athletics* 95–97; the quotation is from 96.

metres and 335 metres").⁸ Recently Schilbach has had more success. It was equal to 156 surveyor's fathoms; one of the latter was equivalent to 108 "fingers," each of them 1/16 of a foot. The bowshot then is 1053 feet. But the Byzantine foot was 0.3123 metres—a value obtained by E. M. Antoniades, who collated his own measurements of the Church of Hagia Sophia with the dimensions reported in the literary tradition. Hence the bowshot equals 328.84 metres (actually $1053 \times .3123 = 328.8519$).⁹

Is this as airtight as it seems? The "literary sources" cited by Antoniades consist of several sentences from the *Ecclesiastical History* of the sixth-century author Evagrius Scholasticus, who gave six measurements of the church.¹⁰ Of these, one is lost. A second, according to Antoniades, is "defective, being irreconcilable with the remaining proportions of the church." A third, the height of the dome, yields a foot of 0.3072 metres; "which," says Antoniades, "I believe is misleading, because (a) the dome has subsided, and is lower today, and (b) the [height in Evagrius] must refer to the external height." He continues, "the other lengths given by Evagrius are erroneous." So much for Buckingham!

The value of the foot is still to seek. But courage, we are almost there! "The width of the large apses," continues our guide, "because of its proportionality to the height, . . . was certainly 100 Byzantine feet." Width, 31.07 metres; hence, foot, 0.3107 metres. But this still does not satisfy Antoniades.

"I noted that if we accept this value it leads to very great difficulties, since it cannot account in round numbers for the other measurements of the building. So I was forced to acknowledge that the proportions of the building in Byzantine feet refer to the brick walls, and not to their marble orthostate veneer. Then I found that the value of the Byzantine foot which suits all the measurements is 0.3123 metres. . . ."

So far from being derived from literary texts, Antoniades' foot is just another inferential or inductive module. Several sixth century modules come close to this; Schilbach gives six examples between 0.308 and 0.32 metres, none of them conclusive or even consistent.¹¹ Perhaps no closer

⁸*Phoenix* 19.11–12.

⁹Erich Schilbach, *Byzantinische Metrologie* (Müller's *Handbuch der Altertumswissenschaft* 12.4 [Munich 1970]) 42; on the geometric *orgyia*, 23; on the *daktylos*, 16; on the *pous*, 13–16.

¹⁰Eugenios Michael Antoniades, *Ἐκφρασις τῆς Ἀγίας Σοφίας* 1 (Athens 1907) 77–78: ὁ βυζαντινὸς ποῦς.

¹¹Besides the Bethlehem standard foot (of 0.3089 m., F.-M. Abel, *Revue Biblique* 35 [1926] 284–288), Schilbach cites the Acheiropoietos Church, Thessalonike, and the Church of St John of Studios, Constantinople. His other examples are taken from Paul A. Underwood, "Some Principles of Measure in the Architecture of the Period of Justinian," *Cahiers archéologiques* 3 (1948) 64–74. He might have added a reference to K. Wulzinger, "Die Apostelkirche und die Mehmedije zu Konstantinopel," *Byzantion* 7 (1932) 7–39, esp. 28–32, "Der justinianische Baufuss und die Johannes-Kirche zu Ephesos."

approximation to the Justinianian foot is possible. If we are confident that it was still current four centuries later, when the *τόξου βολή* was defined, the Byzantine bowshot would fall between 324.3 metres and 337.0 metres. An improvement, certainly.

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PRO MURENA 16 AND CICERO'S USE OF HISTORICAL EXEMPLA

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IN WHAT IS BY FAR the most substantial portion of the *refutatio* in the *Pro Murena*, the *contentio dignitatis*,¹ Cicero undertakes to show that his client's claims to the consulship are more compelling than those of Ser. Sulpicius Rufus, Murena's unsuccessful competitor in the consular elections of 63, and his accuser under the *lex de ambitu*. In answer to Sulpicius Rufus' contention that his was the nobler family, Cicero draws upon historical precedent. It is by virtuous qualities, he argues, rather than by nobility of birth that a man must be judged, and he goes on to employ an *exemplum* involving two consulars of earlier days:

Nec mihi umquam minus in Q. Pompeio, novo homine et fortissimo viro, virtutis esse visum est quam in homine nobilissimo, M. Aemilio. Etenim eiusdem animi atque ingeni est posteris suis, quod Pompeius fecit, amplitudinem nominis quam non acceperit tradere et, ut Scaurus, memoriam prope intermortuam generis sua virtute renovare. (Mur. 16)

It is, at first sight, a curious collocation of names, for the consulars in question belonged to different generations. Cicero is saying that Murena, who was not a *nobilis*, is no more inferior to Sulpicius Rufus, scion of a decayed noble family, than was Q. Pompeius (*cos.* 141), a new man, to M. Aemilius Scaurus (*cos.* 115), whose brilliant career reinvigorated a noble family which in the generations previous to Scaurus had greatly declined in influence.² And the analogy also has further implications which might not have been lost upon the jury at Murena's trial. Both Q. Pompeius and Scaurus had had their difficulties in the courts. Pompeius, after surviving an acrimonious hearing on the subject of his misconduct as proconsul in Spain, was forced to endure prosecution for

¹Cf. *Mur.* 11: *Intellego, iudices, tris totius accusationis partis fuisse, et earum unam in reprehensione vitae, alteram in contentione dignitatis, tertiam in criminibus ambitus esse versatam.* The sections devoted to the respective subjects are as follows: *vita Murenæ* 11–14; *contentio dignitatis* 15–53; *crimina ambitus* 54–77.

²Miltner, *RE* 21. 2056–2058, no. 12 (Q. Pompeius); Klebs, *RE* 1.584–588, no. 140 (M. Aemilius Scaurus).