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Carbon-14 chronology for the late-Roman fortifications of the Thermopylai frontier

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The purpose of this note is to assess by an independent means (and not by relying upon Procopius¹) who was responsible for erecting the frontier defenses along the Thermopylai frontier. As a result it will be possible to reassess the much-publicized rôle attributed to Justinian by Procopius. In his description of frontier forts, walls and towers, like those at Thermopylai, Procopius, resorting to his classical roots, displays open imitation² and dependence upon things Herodotean³ for his vocabulary, topographical descriptions, and so forth. In some 90 lines of the Teubner text (Book 4.2.1-22) he describes the Thermopylai frontier, its former defensive structures, and what he claims that Justinian saw fit to repair, improve, or build afresh.⁴

The method

In the early 1970s a scientific technique made practical the radiocarbon dating of lime mortars and plasters.⁵ The distinct advantage of this technique is that the chronology obtained relates directly to when the mortar or plaster first set and then hardened.⁶ To date, this process has been used on structures at Stobi,⁷ Dijon,⁸ and Dhéma.⁹ The process of collection of the lime mortar sample can be destructive, since a sample of 2 kg is required per test. In the laboratory, the sample will be prepared for chemical analysis. To obtain a nearly pure sample of lime mortar or plaster, the sample must first be broken up carefully with a rubber mallet to dislodge chunks of aggregate or any foreign material present. Then a graduated series of sievings removes small stones, pebbles, and coarse grains of sand from the sample. The last contaminants of aggregate are removed by microscopic observation. The remaining pure lime powder is then chemically induced to release the CO₂ gas which was trapped in it when the sample hardened. Analysis of this CO₂ produces the chronological data. The raw radiocarbon data are then subjected to several correction factors. Because of known fluctuations in atmospheric CO₂ in antiquity, the radiocarbon samples were calibrated according to Stuiver and Becker.¹⁰

- 1 Procopius' *de aedificiis*, an unfinished panegyric work of imperial propaganda, composed according to the strict rules of rhetoric and written in an archaic Greek style, is dedicated to the building achievements of his master Justinian I (cf. G. Downey, "The composition of Procopius' *De Aedificiis*," *TAPA* 78 [1947] 171-83). It was for long considered most reliable for architectural and toponymic information, but work by Averil Cameron (*Procopius and the sixth century* [Berkeley 1985]) and by B. Croke and J. Crow ("Procopius and Dara," *JRS* 73 [1983] 143-59) has shed doubt upon Procopius' reliability. As Cameron has so ably argued, he must be read with extreme care, and his claims can be accepted only after thorough independent corroboration.
- 2 Cf. H. Hunger, "On imitation (ΜΙΜΗΣΙΣ) of antiquity in Byzantine literature," *DOP* 23-24 (1969-70) 15-38.
- 3 H. Braun, *Die Nachahmung Herodots durch Prokop* (Nürnberg 1885).
- 4 The incomplete book 4 is noted for its barren toponomic lists, but the text of this passage is polished and thus one of the most readily believed.
- 5 R. L. Folk and S. Valastro, Jr., "Geologic contributions to archaeology and dating techniques: Stobi, Yugoslavia," *GSA (A)* 1973, 624; iid., "A new radiocarbon technique for dating of mortars," *ibid.* 1974, 993-94; iid., "Radiocarbon dating of mortar at Stobi," in J. Wiseman (ed.), *Studies in the antiquities of Stobi 2* (Beograd 1975) 29-39.
- 6 Lime mortar core samples can take 5-10 years to harden: R. L. Folk and S. Valastro, Jr., "Successful technique for dating of lime mortar by Carbon-14," *JFA* 3 (1976) esp. 204 n.9.
- 7 *Stobi 2* (supra n.5) 29-39.
- 8 C. Malone, S. Valastro, Jr. and A. G. Varela, "Carbon-14 chronology of mortar from excavations in the medieval church of Saint-Benigne, Dijon, France," *JFA* 7 (1980) 329-43.
- 9 W. J. Cherf, "Procopius, lime mortar C¹⁴ dating and the late Roman fortifications of Thermopylai," *AJA* 88 (1984) 596, Table A.
- 10 Final computer calibration was done by the University of Washington Quaternary Isotope Laboratory, Radiocarbon Calibration Program 1987, Rev. ed. 2.0, of M. Stuiver, P. J. Reimer, "A computer program for