

# New light on the 7th-c. Yassi Ada shipwreck: capacities and standard sizes of LRA1 amphoras

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## Introduction

Three decades ago, from 1961 to 1964, a team of underwater archaeologists from the University of Pennsylvania, led by George F. Bass, excavated an early 7th c. A.D. Byzantine shipwreck at Yassi Ada near Bodrum, Turkey. Since publication of the Yassi Ada final report in 1982,<sup>1</sup> new questions and methods of investigation have prompted further study of the ship's cargo carried in 'globular' and 'cylindrical' amphoras. Presented here are the results of a re-study of the cylindrical amphoras and a preliminary re-interpretation of the nature of the cargo and function of the ship. A restudy of the globular amphoras is currently underway.

This new work on the Yassi Ada cargo amphoras was inspired by F. H. van Doorninck, Jr.'s recent study of 11th c. A.D. amphoras from the shipwreck excavated in Serçe Limanı, Turkey. Van Doorninck's discovery of a remarkable degree of precision in the metrology of these amphoras led to the conclusion that Byzantine potters produced highly standardized jars designed to carry specific weights of red wine, white wine, or oil.<sup>2</sup> Measurement of the 102 wine amphoras recovered from the Serçe Limanı wreck has shown that their volume capacities in liters correlate to weight capacities in Byzantine λίτραι (pounds) for red and white wine. Moreover, some linear dimensions, such as maximum widths and internal diameters of the mouth openings, appear to correlate in most cases to some multiple of 0.5 δάκτυλος, the δάκτυλος being a Byzantine linear measurement equal to 1.95 cm. To date, such precision is not known in amphoras from the Hellenistic or Roman periods. Earlier potters did produce amphoras of many standard sizes, but linear and volumetric measurements varied considerably from jar to jar.<sup>3</sup> At some unknown point in late antiquity, the much more complex and controlled metrological system exhibited by the Serçe Limanı amphoras began to emerge.

The Yassi Ada cylindrical amphoras exhibit a somewhat similar degree of metrological precision as those from Serçe Limanı and also appear to belong to a capacity system based on the Byzantine λίτρα. This metrological closeness has potentially significant ramifications in the realm of late-antique exchange and economics that will be discussed below.

## Methodology<sup>4</sup>

The evidence presented here relies upon accurate amphora measurements. Thus, mention must be made of the methodology that was followed in taking these measurements, since it differs to some extent from that commonly used. Before measurement of the cylindrical amphoras could be made, it was essential that the jars be thoroughly cleaned, both inside and out, of any marine concretion deposits. Even small amounts of

- 1 G. F. Bass and F. H. van Doorninck, Jr., *Yassi Ada 1: A seventh-century Byzantine shipwreck* (College Station 1982).
- 2 The Serçe Limanı final report is forthcoming. Preliminary work on the amphoras has appeared in F. H. van Doorninck, Jr., "The amphoras: old jars from the north," *INA Newsletter* 15.3 (1988) 22-23 and "Giving good weight in eleventh-century Byzantium: the metrology of the Glass Wreck amphoras," *INA Quarterly* 20.2 (1993) 8-12; "The piriform amphoras from the 11th-century shipwreck at Serçe Limanı: sophisticated containers for Byzantine commerce in wine," *Graeco-Arabica* 6 (1995) 181-89.
- 3 Research on Classical and Hellenistic amphora metrology has been summarized in M. B. Wallace, "Progress in measuring amphora capacities," in J.-Y. Empereur and Y. Garlan (edd.), *Recherches sur les amphores grecques*, (BCH Suppl. 13, 1986) 87-94.
- 4 The methods described here were used by van Doorninck for the Serçe Limanı study in 1993 and 1994 and are presented at some length in van Doorninck 1993 (supra n.2).