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The Archimedes Palimpsest: I, Catalog and Commentary, II, Images and Transcriptions, edited by Reviel Netz, William Noel, Natalie Tchernetska and Nigel Wilson (Cambridge and Baltimore: Cambridge UP and the Walters Art Museum, 2011; pp. 340; ix, 344; £150.00, \$215.00; ISBN 9781107016842)

In 1906 J. L. Heiberg of Copenhagen University examined a palimpsest *Euchologion* in the Metochion of the Holy Sepulcher in Constantinople. He found therein the oldest witness to seven treatises of Archimedes, two unique, the *Method* and *Stomachion*. Heiberg published the Archimedes material beginning in 1907. The palimpsest subsequently disappeared, resurfacing and offered for sale in the 1930s and again in the 1970s, then purchased at auction in 1998. The anonymous buyer deposited the volume with the Walters Art Museum in Baltimore, MD, USA to be made available for study.

The poor condition of the manuscript and its palimpsest nature necessitated extensive collaboration among conservation and imaging scientists and classical scholars to retrieve the underlying text. The process and results of that ten-year effort are described in these two richly illustrated folio volumes with a full set of images and transcriptions of the Archimedes texts and two others.

The Introduction by W. Noel describes the personnel details of the project: a professional project manager to formulate and oversee performance goals, classical paleographical and mathematics specialists to transcribe the text, a conservationist to

disbind the manuscript (allowing reading of text hidden in the spine and full folio imaging), and imaging specialists “to render the erased text more legible.” He notes that the work subsequently revealed that in addition to the Archimedes texts the palimpsest contained fragments of two speeches of the fourth century BC orator Hyperides, a fragmentary commentary on Aristotle’s *Categories*, and other fragments.

“Part 1 - The Manuscripts” provides in-depth physical description of each text, including: dimensions, quires, collation, foliation, parchment, ink, ruling, script, binding, and provenance.

In “Part 2 – History” A. Quandt describes the production of the *Euchologion*, J. Lowden focuses on the history of the volume in the 20th century, and E. Petersen on the work of Heiberg. Quandt dates the prayer book’s origin to early thirteenth century Palestine, notes the seven different manuscripts from which it was created, and describes different medieval recipes for “deleting solutions” used to dissolve ink, although the specific solution used in this case is not identified. The folios were turned 90 degrees to make the new volume. Lowden examines the presence of the volume in Paris in the possession of an art dealer, Salomon Guerson, and argues, against the claim of the Jerusalem patriarchate, that the book was probably purchased in the 1920s, not stolen. He also examines the addition to the book of forged illuminations of the four evangelists, suggesting that Guerson did so to increase the value in the desperate circumstances of 1942. Peterson describes Heiberg’s journeys to Constantinople in 1906 and 1908. His excitement on finding the text of the *Method* is conveyed in a letter to a colleague, Anders Drachmann. Heiberg also found (despite initial misgivings) that he

would be able to have useable photographs made. His *editio princeps* of the *Method* was published in the journal *Hermes* in May 2007.

In “Part 3 – Conservation” Quandt describes the severely deteriorated state of the volume, the process of disbinding, the treatment of the inks and parchment, conservation of the forgeries, and the decision not to rebind, but mount individual leaves in double-sided window mats.

In “Part 4 – The Digital Palimpsest” Christiens-Barry, Easton, and Knox describe their “multispectral imaging” process as combining “images taken at a variety of wave lengths” to enhance “features not visible to the naked eye”, stressing their use of continuous improvement techniques as the project progressed. They note that their work was driven by the transcribers of the text whose assessment of the images produced was the sole criterion of success. U. Bergmann describes the use of x-ray fluorescence imaging to recover text where the prior technique was not successful, notably on the folios with the forged illuminations. Finally Emery, Lee and Toth describe the creation of a web-based complete manuscript data set (www.archimedespalimpsest.net) integrating images, metadata, and transcriptions under a Creative Commons license.

In “Part 5 – The Texts” Tchernetska and Wilson note that the Hyperides texts are unique in codex form (there are papyri) and radically alter the reigning perception that this author did not survive into the Byzantine period; Sedley and Rashed date the manuscript of the fragmentary Commentary on Aristotle’s *Categories* to the late ninth or early tenth century, provide an elegant argument for attribution to Porphyry, and

note that the text supplies significant new information on the well-known debate about the *Categories* 50 BC – AD 200. In the final chapter R. Netz focuses on the significance of new readings to the text of Archimedes resulting from the project, while rightly crediting the work of Heiberg (“our achievement pales next to his”). He faults Heiberg’s neglect of the schematic diagrams in the manuscript and asserts each one’s importance in the logic of the related argument. He also indicates that “the main new discovery of our new transcription” is the recovery of a long passage on proposition 14 in the *Method* which he interprets as indicating Archimedes’s use of “actual infinity,” an interpretation he acknowledges “is sure to be debated by future historians of mathematics.”

I conclude with a comment on the availability of Archimedes in the tenth century. The palimpsested manuscript is dated in vol. I to “Third quarter of the tenth century?” (p. 41), “mid-tenth century” (p. 97), and “second half of the tenth century” (p. 249). The so-called Heron of Byzantium, writing most likely in the late 930s or 940s in Constantinople, in his *Geodesia* 8:112ff (see D. Sullivan, *Siegecraft, Two Tenth-Century Instructional Manuals* [Washington DC, 2000]) cites four interlocked statements on centers of gravity (cylinder and prism, cone and pyramid), the first three closely matching the three given in the *Method* (vol. II, p. 73 col. 2, 23-31) and not found elsewhere in the *Thesaurus Linguae Graecae*. He also twice names Archimedes and cites or paraphrases other passages, specifically indicating that he anthologized for mathematical beginners what Archimedes provided for the more accomplished. “Heron” may have used a manuscript of Archimedes written earlier than the palimpsested one.

These are exceptional volumes and a tribute to an extraordinary scholarly collaboration. They will have a major impact on palimpsest studies, particularly due to the completely documented approach of the imaging processes. They also provide significant improvements to the text of Archimedes and recover other texts previously unavailable.

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