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## Introducing Athena Ruby, Dumbarton Oaks' New Font for Byzantine Inscriptions

Abstract: Dumbarton Oaks has created Athena Ruby, a comprehensive Open Type font for the scholarly publication of Byzantine inscriptions. The font takes advantage of newly emergent standards for digital publishing. This article offers a panoramic view of the letterforms, symbols, and punctuation, and provides an example of how the font may be used to publish inscriptions.

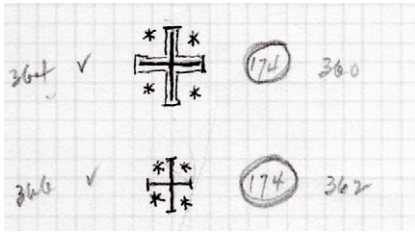
In the typical edition of an inscription, the transcription is frequently peppered with brackets, parentheses, punctuation, word spaces, and so forth, to render the text intelligible and to distinguish in the synthesis what is seen from what the editor wishes to restore. Such transcriptions are frequently preceded by a version of the text that shows the appearance of the original. For *unica*, this visual record is rendered by a photograph or a line drawing. But for inscriptions that are repeated—perhaps they were mass-produced or an artist traveled in an area—the visual rendering is difficult or impossible to commit to a photograph. Abrasion, corrosion, and other problems in an inscribed object can make photographs impossible to read accurately. Some items, such as coins and seals, cluster around a typological ideal, and the drawing or photograph of any individual object would not convey the ideal specimen.

Such difficulties have led epigraphers—particularly numismatists and sigillographers—to provide a preliminary, visual transcription to stand between the photograph or drawing and the critically edited transcription. This visual transcription normally shows the ideal form of the special letterforms, ligatures, decorations, and so on. These customized glyphs do not presume to replace photographs or drawings. Rather they allow a scholar to interpret his or her materials, to present the letterforms with a regulated variety, and to convey some reasons for classifying and dating the object.

In the age of print, it was expensive, but technologically easy, to accommodate epigraphers' typographical needs. Hot lead is conducive to inventive letterforms, designs, and glyphs. A print house merely had to have on staff someone who could carve new glyphs. For example, some of the catalogues Dumbarton Oaks published in the 1950s and 1960s were executed by German typesetters, who replicated the letterforms that scholars meticulously drew (see fig. 1).<sup>1</sup> Such books are beautiful to see and touch. The designs, usually executed by a single typographer, are consistently harmonious, not just internally but also with the Latin alphabet used elsewhere in the book. Tracing the page with a finger, the reader feels the designs, raised through the letterpress printing process. The catalogues, like their subjects, are objets d'art.

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<sup>1</sup> A. BELLINGER – Ph. GRIERSON, *Catalogue of the Byzantine Coins in the Dumbarton Oaks Collection and in the Whittemore Collection, Volume 1: Anastasius I to Maurice, 491–602 (Byzantine Collection Catalogues)*. Washington, D.C. 1966.



JUSTINIAN I – UNCERTAIN – DECANUMMIUM

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No.	Metal Wt.	Size Die Position	Obverse	Reverse	Date
*364	Æ 2.33	17 ↓	Bust r. Plain border DNIVSTIN [	 Dotted border	538–565
365.1	Æ 3.57	16 ↓	Same DNIVSTINI ANVSPANC	Same, but stars intended for *	
*365.2	Æ 3.35	17 ↓	Same die as 365.1 Bust facing	 Raised border or wreath tied at bottom	

Fig. 1: Typography for Justinianic coins from the Dumbarton Oaks coin collection. The characters drawn by Bellinger (above) were replicated in hot lead by J. J. Augustin, Glückstadt (below). (Courtesy Dumbarton Oaks Research Library and Collection)

Through the twentieth century, as publishers and printers embraced new technologies, fine-art typography took a step backward. Letterpress gave way to offset printing; hot lead, to camera-ready copy, and then to electronic files. Once publishers began to rely exclusively upon computers, erosion in the art of typography became most evident. It is common to find in scholarly publications from the 1980s digital fonts designed by amateurs, or professionally designed fonts amateurishly retrofitted to new designs. Latin-alphabet-based standards for information interchange (e.g., ASCII) were press-ganged into serving as the foundation for polytonic Greek fonts of varying quality. This hampered information exchange, as text committed to one Greek font was gibberish to anyone without it.

Not all was lost. In other ways the era’s innovations helped advance scholarly research and communication. For example, Nicolas Oikonomidès oversaw the development of the world’s first font for Byzantine inscriptions (first called Seal Short, then from the early 1990s, after it was rebuilt, Athena). The first book to use this font was intended, in part, to begin a scholarly conversation about dating and classifying seals according to letterform.<sup>2</sup> As other publications requiring special typography came along, Dumbarton Oaks produced new specialized fonts.<sup>3</sup>

The profusion of Greek fonts, their confused keyboard layouts, their uneven design, and their incompatibility with Unicode standards motivated Dumbarton Oaks in 2010 to begin work on the next generation of Byzantine type tools: Athena Ruby, named after Glenn Ruby (d. 2004), who cultivated typographic innova-

<sup>2</sup> N. OIKONOMIDES, *A Collection of Dated Byzantine Lead Seals*. Washington, D.C. 1986.

<sup>3</sup> To explain more fully the historical developments in the previous two paragraphs I am preparing a study of typography at Dumbarton Oaks.



Waiting cutting-edge software to arrive, and for scholars to embrace it, could take a while. To make the font useful for scholars now, with the software currently in use, Athena Ruby duplicates the Unicode-compliant variant letterforms in the private use area (PUA).<sup>5</sup> This practice is normally discouraged, since it reverts to pre-Unicode practices, when characters were arbitrarily assigned codepoints. But it will make the tool immediately useful. Thus, a scholar can use a relatively unsophisticated word processor, coupled with standard, visually based character-input devices (such as CharMap on the PC, Character Palette on the Mac), to select variants in Athena Ruby. The resulting text will not be interchangeable, and will not be legible to anyone who does not have the font installed. But the checklist, mentioned above, will help anyone who receives text entered through the PUA to convert it to its proper Unicode counterpart, where correlation exists.<sup>6</sup>

Thus, we anticipate three different ways of inputting character variants in Athena Ruby. Each method has advantages and disadvantages, and users should choose according to their resources, needs, and purposes (see table 1).

	<b>Method A XML and CSS</b>	<b>Method B Direct glyph variant input</b>	<b>Method C Private Use Area</b>
<i>Who should use</i>	Anyone publishing inscriptions with XML. Especially suitable for collaborative Web-based projects (e.g., EpiDoc, SigiDoc)	Publishers and those with specialized software that supports direct input of individual glyphs (e.g., InDesign)	Anyone who needs to display a particular variant in software that does not provide access to OpenType Layout or direct glyph input
<i>How to use</i>	Mark variants, ligatures, and symbols with XML tags; set up CSS to render the XML code correctly in a browser	Choose variant letters, ligatures, and other glyphs with built-in advanced glyph palette	Use word processor or character map software (e.g., CharMap on the PC, Character Palette on the Mac) to select variants in the PUA codeplane
<i>Advantages</i>	Text remains Unicode compliant from start to end. Does not rely upon specialized software for document creation. CSS standards may be used, so readers need not have the font installed	One can see precisely which variant or ligature is being used. Text should remain Unicode compliant from start to end, although in some cases software may embed raw glyph IDs.	Can be used in many commonly used programs (e.g., Word, OpenOffice, Excel). One can see precisely which variant or ligature is being used.
<i>Disadvantages</i>	Cumbersome to see variants as you type. Training in XML can be daunting, and few use it (so far). CSS syntax for advanced layout features not yet finalized and is only just beginning to be supported in browsers.	Limited to relatively expensive, professional page layout software. Unicode text preservation results may vary.	This method uses the PUA, which is not recommended because it is idiosyncratic and font-dependent. Text is not Unicode compliant, so cannot be reliably searched, sorted or indexed (to make it Unicode compliant the text must be converted).

Table 1: Methods of using Athena Ruby

<sup>5</sup> This article has been prepared using this third, less-favored option.

<sup>6</sup> Many of the symbols and decorations used especially by Byzantine numismatists do not have Unicode points, and probably never will.

Of these three approaches, Option C should be most familiar to epigraphers. Option B will be most relevant to publishers, not scholars. Option A is least familiar but most deserves epigraphers' attention. In fact, acquaintance with this approach to publishing inscriptions is as important as familiarity with the Leiden convention.<sup>7</sup> The prospect can be daunting, and it can be difficult to know how to start. So I provide here an example.<sup>8</sup>

To transcribe the eighth-century seal DO 55.1.4278, already published,<sup>9</sup> the user types the text below.

```
<p>ENO...UP˘RSTU<span class="alt-U">U</span>˘<span class="alt-U">U</span>KAITU˘AGIUPNS</p>
```

```
<p>LEON|KAICONSTA|NTI<span class="alt-N">N</span>OS..|STOIBA˘.|LISROM|AIO<span class="alt-N">N</span></p>
```

Everything outside of angle brackets is plain Latin and Greek text, along with line separators, underdots, and overbars, all of which are straightforward Unicode characters. The material within the angle brackets is the editor's commentary. The tags `<p>` and `</p>` tell the computer where a paragraph begins and ends. The tags `<span class=...>` and `</span>` surround a letter that the editor wishes to note as having a variant shape. The magic occurs in the value that follows each instance of "class=". That value will be compared by a reader's computer to the style sheet:

```
@font-feature-values Athena Ruby {
  @character-variant
    leo-B 2 1, leo-M 13 3,
    leo-alt-N 14 1, leo-N 14 2,
    leo-T 20 1,
    leo-U 21 2, leo-alt-U 21 4;
}
p {
  font-variant: additional-ligatures, character-variant(leo-B, leo-M,
leo-N, leo-T, leo-U);
}
span.alt-N {
  font-variant-alternates: character-variant(leo-alt-N);
}
span.alt-U {
  font-variant-alternates: character-variant(leo-alt-U);
}
```

That style sheet is, by convention, at the head of a document, or in a separate one altogether. It is usually set up ahead of time by project managers who normally understand how style sheets work and try to ensure participants in the project employ a consistent vocabulary. In the first case of the attribute "class=", the value, alt-U, is matched in the style sheet to span.alt-U, which tells the computer that the character variant is the

<sup>7</sup> St. DOW, *Conventions in Editing: A Suggested Reformulation of the Leiden System (GRBS, Scholarly Aids 2)*. Durham, N.C. 1969. The conventions are handily summarized at Wikipedia, s.v. Leiden Conventions, and their proposed digital equivalents are documented by Epidoc (see n. 4 above) and by Integrating Digital Papyri, <http://idp.atlantides.org/trac/idp/wiki/Leiden%2B/Syntax>.

<sup>8</sup> The coding in this example is not necessarily the best way to tag an inscription. For example, the underdots should probably be replaced with tags describing the difficulty of reading the letters. I retain the underdots to simplify the example.

<sup>9</sup> J. NESBITT, *Catalogue of Byzantine Seals at Dumbarton Oaks and in the Fogg Museum of Art: Emperors, Patriarchs of Constantinople, Addenda, Volume 6 (Byzantine Collection Catalogues)*. Washington, D.C. 2009, no. 31.2, slightly corrected (reverse, line 4, third character).



equivalent of leo-alt-U. The character variants are declared in the first five lines of the style sheet, which defines leo-alt-U to be 21st glyph in the font, 4th variant.

The XML code is transformed by the reader's browser according to instructions in the CSS, and formats the catalogue entry (fig. 3). The text in red is rendered using Athena Ruby. Below each line, the same XML text is displayed in a standard font without variants. Note the two variants for U and N.



*Obverse*

ENO...ϸP̄R̄S̄T̄ϸV̄V̄S̄T̄ϸĀḠĪϸP̄N̄S̄

En o[nom(ati) t]u p(at)r(os) (καὶ) tu γ(io)u (καὶ) tu agiu pn(eumato)s.

ENO...ŪP̄R̄S̄T̄ŪŪK̄ĀĪT̄ŪĀḠĪŪP̄N̄S̄

*Reverse*

LEON|S̄CONSTA|NTINOS..|S̄TOIBAŞ̄.|LISROM|AION

Leon (καὶ) Constantinos [pi]stoi bas[i]lis Romaion.

LEON|KAICONSTA|NTINOS..|S̄TOIBAŞ̄.|LISROM|AION

Fig. 3: A typical browser's display of DO 55.1.4278 using HTML/XML markup and a CSS 3.0 stylesheet. (Courtesy Dumbarton Oaks Research Library and Collection)

Athena Ruby is now available at the website for Dumbarton Oaks ([doaks.org](http://doaks.org)), for download or cross-use as a web-open format font. The font is free to all scholars on a noncommercial basis, with the request that anyone who uses Athena Ruby for publication, whether in print or electronically, should recognize Dumbarton Oaks in the credits. The font comes with a full set of documentation, the character checklist, and other tools, including text inputter and a converter for Dumbarton Oaks' older fonts. And because the font has been released under a Creative Commons Attribution-ShareAlike 3.0 Unported license, scholars are welcome to develop their own variations, or add their own characters.

Dumbarton Oaks will add to the font only as our publishing needs grow, and even then only as funding permits. Users of the font are encouraged to take this gift and build upon it themselves. The study of letterforms and their types has inched forward since the days of Oikonomidès. In releasing the font, Dumbarton Oaks hopes to encourage deeper study, conversation, and discoveries in the typology of Byzantine letterforms. But that task belongs to the scholarly community.