An Annotated Reconstruction of the Great Stemma

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Summary: The Piggin Stemma is an SVG document that reconstructs the fifth-century Great Stemma, presenting it in a modern idiom as a digital document with regular typefaces, strict graphic alignments and twelve explanatory overlays. This is the most complete edition to date of this late antique diagrammatic chronicle of biblical history and genealogy, and the technical format and choices involved in the publication are explained here.

Printable PDF versions of this document, not necessarily updated, may be found at these repositories:
https://independent.academia.edu/JeanBaptistePiggin
https://www.researchgate.net/profile/Jean-Baptiste_Piggin

The current and up-to-date version of the chart itself can be found using the following URL as a jump-off point:
http://piggin.net/stemmahist/envelopereconstructor.htm

The anonymous Great Stemma is the forerunner of every family tree and railway-network diagram today. It was drawn in about 425 CE to summarize Jewish history at a glance for Christian readers. As the world's oldest infographic, it demonstrates how Latin culture devised an intuitive new way to visualize abstractions, and how the graphics techniques to do this first evolved, before centuries of cultural preconceptions about the right and wrong ways to draw a visualization took over.

Here I introduce my reconstruction of the diagram as it is most likely to have looked when first drawn. Late antique copies no longer exist. The earliest parchment copies we possess were ones made more than 500 years later in the tenth century, when a great many errors and changes had corrupted the original form.

The Piggin Stemma is thus a synthesis. It interprets the Great Stemma in the most original possible spirit, but in the modern idiom of a digital document with regular typefaces and strict graphic alignments. The twelve overlays of annotations and the modern-language translation add new strata of information which were never available to the original author or readers. Despite these transformations, the Piggin Stemma offers a more authentic experience of the chart than the imperfect medieval copies do.

The layout of the chart and its textual content is explained in detail on the Piggin.Net website. Each of the twelve overlays has its own thematic approach, as follows:

First Exploration

The designer of the Great Stemma probably had few or no graphic-design forerunners to copy. Classical Rome knew *fasti* and tabulated lists, but true information visualization is a late antique invention. The two principle advances were to represent abstractions with moveable graphic entities, and to place these in a two-dimensional matrix that not only represents the relationships but follows consistent rules. This was a major cognitive step and an entire new notation had to be invented from scratch.

The Line of God

The evangelist Luke terms Adam the "son of God". So where is God n the chart? The late antique designer devised a unique graphic solution. Instead of the ancestors of Jesus being drawn like beads on a string, they mutually connect to one another via a bar drawn outside their line. I argue that this represents the deity who guided their couplings and destiny. This Line of God forks at David and recombines behind Jesus.

History

Late antique chronographers believed they could deduce the age of the world by calculating from statements in the Bible about the ages when the patriarchs begat sons, the lengths of reigns and other time totals scattered at various places in scripture. The designer presents this non-genealogical data in a series of pools, which educated readers could recognize from their own bible-based learning. To make it clearer, I have used a modern graphical device, joining the chronographic material into a river highlighted in blue.

Women

Gender balance in the Great Stemma is constrained by the data source: the Old Testament (Tanakh) and the Gospels. The Great Stemma designer seems to have taken particular pains to maximize the number of females, inserting all "wives" of the kings of Judah and the daughters in law of Noah as named in rabbinical tradition (but not in Genesis). It is noticeable that row two of the chart is very much a female band as a result.

Doppelganger

The Great Stemma contains 13 doppelganger (the German-origin term for a ghostly double) or fetches (the Irish term), that is to say, simultaneous appearances of the same person in two places. For example, Hezron is shown attached to his clan as one of its many offspring and is shown again in the pared-down line of the direct ancestors of Jesus, or Rebekah is shown as her father's daughter in one place and as her husband's wife in another. This graphical method serves to simplify the layout, eliminating long snaking connectors, but the doubling forces the reader to mentally register these virtual "hyperlinks". In this overlay, the 13 role-pair links are rendered visually.

Reproduction: The Grid

A first principle of good information visualization is to create a 2D array that resembles the spatial reference system that we believe exists in the human mind. The sparse evidence in the manuscripts can be interpreted to conclude that the chart designer based the layout on a grid of 10 rows' height and about 110 columns' width. To us, accustomed to print and digital layouts, this seems self-explanatory, but a millennium before the invention of western printing, this choice had an altogether different motivation. It gave the Great Stemma a degree of rigidity to counteract the anarchic behaviour of scribes and was thus the ideal format for the chart to be mass-copied by hand.

Docking

Reading the Great Stemma can be difficult for modern readers who cannot step outside their own assumptions about the meanings of joins between roundels. This overlay analyses and introduces the bonding notation adopted by the fifth-century author for the various historical and genealogical relationships. Borrowing from biochemistry, I describe these graphic bonds as "docking" methods.

Docking form	Relationship Type	Example
Ramification	Patriarchs' and matriarchs' children	Rachel's sons
Pendant chain	Nether descendants, grouped	Rachel's great-grandchildren
Necklace	Dynastic	Descendants of Cain
Queue	Passage of historical time	Seven phases after Ibzan's judgeship
Bar-docked (filum)	Divinely guided procreation	Fila from Adam to Christ
Bar-docked (harem)	Polygamy	David's wives
Wife dock	Solo marriage	Zipporah to Moses

Reproduction: Compression

Preserving the Great Stemma for centuries required repeated copying, as manuscripts wore out. This was costly in parchment and scribe time. Six pages in the Bible of Ripoll codex at the Vatican contain the text only of a version of the Great Stemma, without the graphics. Shoulder letters written next to the names there are only explicable as keys for a scribe reconstructing the chart from two files. If this hypothesis is correct, the two-files method – medieval ZIP software as it were – offered the benefit of saving parchment and making the data easily transportable. These keys are transposed onto this overlay of the chart to demonstrate how the zipping is likely to have worked.

The Codices

No surviving copy of the Great Stemma presents it in a roll form: the medieval copies are sectioned up to fit on successive pages of codex books. This overlay offers an impression of the sectioning, showing the breaks typical of the two best manuscripts, Plut.20.54 at the Laurentian Library in Florence and cod. 78 at the Royal Academy of History in Madrid. Since each manuscript is different, and none of the manuscripts reproduce the layout correctly, this sectioning can only be impressionistic. The overlay also contains hyperlinks that take the reader direct to digital facsimiles of those two manuscripts, as well as to analytical studies on the Piggin.Net website of the sections.

Bespoke Features

The early users of the Great Stemma glossed and modified it in many ways and passed on those alterations whenever their own bespoke versions became the models for a follow-on copy. We can trace these changes in the differences among the various recensions. The most important of these modifications is an anonymous text known as the *Ordo Annorum Mundi* (separately edited and published by José Carlos Martìn in 2013) placed on the right edge of the chart.[1] It contains a new Eusebian chronology which modifies that propounded by the chart's original author.

Corruption

All copies of the Great Stemma were made by hand and inevitably mistakes were made. Roundels were omitted or text was misread. The major instances of damage

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[1] Martín Iglesias, José Carlos. 'Ordo Annorum Mundi'. In *Iulianus Toletanus: Opera II*, edited by José Carlos Martín-Iglesias and Valeriano Yarza Urquiola. CCSL 115A. Turnhout: Brepols, 2014.

to the textual tradition are shown in this overlay with two emphases: omissions in all or most of the existing copies, which are highlighted smudged in purple, and a major shift in roundel locations, which is demonstrated by an animation. One can see how the latter blunder reduced the upper filum by seven positions: in all the manuscripts there is of course no visible gap: Azor and Zadok abut one another.

Doctrines

The Christian doctrinal positions in the Great Stemma mainly concern matters of biblical exegesis that were controversial in the 4th and 5th centuries. Did Jesus have an ancestral link to a priestly tribe, the Levites? Which text of the Gospel of Luke is best? How is a contradiction between the Gospels of Luke and of Matthew over Jesus's genealogy to be accounted for? This overlay introduces issues which are known from other patristic sources to have been under debate. The reader should also note which patristic doctrines are absent from the Great Stemma, in particular the views of Augustine of Hippo. There is nothing whatever in the Great Stemma that embraces Augustine's theory of the Six Ages of the World which was later to be influential.

Scalable Vector Graphics

From my first discovery of the chart's anterior existence and proof of its roll form, scholars have debated how a contemporary edition of it could be produced.[2] It would plainly be most unsatisfactory to section it to into page units for a book or article, and even a fold-out printed sheet would be most unsatisfactory, since there would be neither place for annotations nor any effective way to show the chart's evolution.

It was therefore plain that the publication would have to be purely digital. The most effective digital language for the purpose is the open-standard format Scalable Vector Graphics (SVG) which enables zooming in and out without any loss of resolution and a variety of animation effects including the overlays and movement.

The SVG file places the chart on a canvas that is nominally 9560 x 780 pixels in size, with the font-size of the original Latin script set at a nominal 12 pixels and that of the annotations at 16 pixels. The file was drafted in the program Inkscape and then the source code was radically simplified by hand. This page source marks the position of every element as an offset from the top left corner and is not only fairly easy to understand and correct directly, but will remain intelligible many centuries hence.

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[2] Piggin, Jean-Baptiste. 'The Great Stemma: A Late Antique Diagrammatic Chronicle of Pre-Christian Time'. *Studia Patristica* 62 (July 2013): 259–78.

Reading the Reconstruction

The Great Stemma was probably drawn on a roll of papyrus of standard height (30 centimetres say) and at least as long as the bed you sleep in. The Piggin Stemma has no standard size, and can be viewed on a device as small as a smartphone by panning, by zooming in and out to read words and see the full expanse, and by using the built-in controls to reveal the overlays. If the Romans had had computers, this is how they would have read their scroll-format books on them.

In the control panel at the left margin, each right button makes a new effect visible: the corresponding left button makes the overlay go away. The overlay entitled "Damage" includes an animation (with start and return buttons) showing how roundels were displaced early in the manuscript tradition to the wrong positions as a result of a scribal blunder.
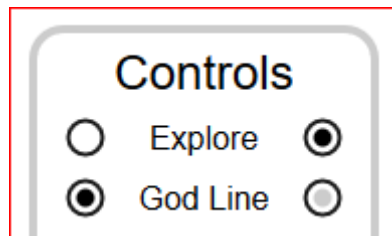
The Animation

The animation represents a third and finally successful attempt to analyse and depict what failed in the scribal blunder. A first attempt in 2010 was a static graphic which marked those wives who had "moved" and by how many steps. This was confusing. A second attempt, in version 0.90 of the Piggin Stemma animated these wife moves. After receiving sage advice from David Morrison of Uppsala, the movements were entirely redesigned, this time leaving the wives' positions static and making the husbands mobile instead. These are matters of choreography alone, and are in no way meant to represent what "really" happened on the scribe's parchment. The three-stage dance is solely meant to make clear to the reader how the old and the new configurations differ from one another. This animation, using SMIL markup, does not work in Microsoft Edge or Internet Explorer, but functions in other browsers.

Digital Humanities

The age of print made the humanities accessible to the wider reading public. Texts could not only be printed at low cost but produced in canonical versions that were not susceptible to corruption by scribes. The digital humanities take us beyond that, allowing historic documents to be rebuilt as if they were virtual places.

This site has the ambition to be a kind of archaeological excavation, like the ruins of Pergamum: a place any literate tourist can explore unaided, reading the signs in the overlays and enjoying the pleasures of discovery at every corner. In that sense, it makes the Great Stemma into a human-habited place again, a millennium after it had been largely abandoned, opening up the phase in its life termed reception history. Not only does reverse-engineering the Stemma as an artefact bring its original workmanship to light and explain it. The reconstruction cannot help but extend the original work. For all our respect for the original creator, an edition inevitably modernizes an old work and gives it a new lease of life. Imposing strict alignment or creating a zoom tool necessarily means redrawing the Great Stemma and making it neater than it ever was. I trust I have been careful to only employ methods and techniques which would have been welcomed by the original author if they had existed in the long-ago past and are sympathetic to the author's original purpose.

The File

The SVG file is about 300 MB in size, even before German, French and Spanish translations have been added. Reproducing it on paper is not likely to satisfy anyone.

It would have been a simple matter to append the 5,000 lines of page source to this introduction, adding 130 pages to this document, but that too would not have been useful. The document must be read in a web browser. Go to the internet and find the jump-off page at: http://piggin.net/stemmahist/envelopereconstructor.htm

If this cannot be found, consult the Wayback Machine at Archive.Org or record 81268192800002836 Alma Collection at the National Library of New Zealand or Academia.Edu or ResearchGate.Net.

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