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# Image Extraction and *ECCO*: Rediscovering Decorated Books

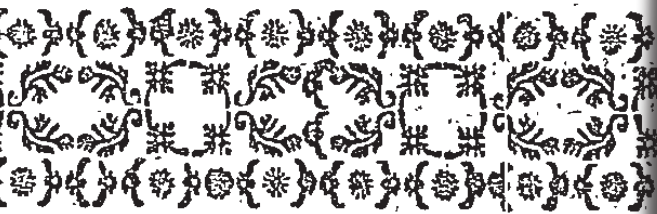
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Various source media, *Eighteenth Century Collections Online*



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*Fleuron* is a database of over 1 million eighteenth-century printers' ornaments, created from [Eighteenth Century Collections Online](#) (ECCO). In this essay I will explain what printers' ornaments are, why we need a database of them, how *Fleuron* was made, and how it will be developed further in the future.



### What are printers' ornaments?

Printers' ornaments are the decorative images that appear in printed books to embellish title pages, headings, chapter endings, and any otherwise blank spaces; the term can also include decorated initial letters. Printers' ornaments were common throughout the hand press period (c. 1470–1830), when they were printed from designs cut into wood or metal blocks, or cast in type-metal. Ornaments can depict anything from simple geometric designs to elaborate scenes. Common subjects are natural forms (flowers and animals), religious and classical imagery, people, and everyday objects (from books to scientific instruments). Ornaments appear in all genres of books, from works of literature, philosophy, and history, to political pamphlets, scientific treatises, cookery books, and household manuals. Some ornaments were specially made for particular types of publication: *memento mori* depicting skeletons and hour glasses were reserved for printing funeral sermons, for example. By definition, ornaments do not illustrate the text, but compositors often found creative points of contact between word and image, choosing an ornament depicting a thunderstorm to decorate a shipwreck narrative, for instance. A printer would have owned a wide selection of ornaments to use in different types of books, including ornaments of many sizes to fit different page dimensions. Ornaments could be made in several different ways. Designs could be printed from blocks of wood or metal, into which the design was cut by hand. A hand-cut block could be copied by making a cast in hot type-metal. Alternatively, ornamentation could be achieved with fleurons (also known as printers' flowers): fleurons are used just like alphabetical type, but feature small designs (usually leaves, flowers, or abstract shapes) instead of letters.

They could be used individually for a tiny flourish, or arranged into complex patterns to form a headpiece, tailpiece, or even a full page border. They could also be combined with a block ornament to add further embellishment, or to increase its size to better fit the page. Creative ornamentation was a fine art.



### Why study printers' ornaments?

Our knowledge of who printed what, and when, in the British hand press period is drastically incomplete. Printers did not always put their names to their work. When the financial backing for a book was provided by a third party (the publisher), their name was more likely than the printer's to appear on the book. Pseudonyms were often used for works that might be accused of sedition, slander, heresy, or indecency, or when a printer was pirating a work that was protected by copyright. Knowing who printed a book or pamphlet is the first step to answering a variety of research questions. In literary studies, and particularly in literary editing, knowing that an author worked with a particular printer can tell us about the circumstances of a text's original production, which can guide the decisions of scholarly editors. Knowledge of the printer's identity can help us to date printed material more accurately, and in some cases the printer's identity can be a vital piece of evidence in an authorship attribution (or de-attribution). Printers often had strong political affiliations, and were key members of the networks of influence that drove political change through print media. In some cases the printer is of special biographical interest: Benjamin Franklin and Samuel Richardson are two notable cases whose printing has attracted considerable attention. There is much more to learn about less famous printers, including the book trade's many women. For most of the hand press period, London had a (often unofficial) monopoly on copyrights, so regional printers, and Scottish and Irish printers, often disguised their identities, meaning there is still much to learn about printing outside London.

In the absence of documentary evidence like ledgers, which only survive in a handful of cases, by far the most useful resource for identifying unknown printers are their ornaments.

Hand-cut ornaments are unique, and even cast ornaments develop unique signs of wear over time. Complex arrangements of fleurons might be reused in several books before being reassembled. These unique qualities mean that ornaments can act as bibliographical fingerprints. Simply put, if the printer of Book A is unknown, but it shares ornaments with Book B, the printer of which *is* known (they are named on the title page, or we have other documentary evidence), they are likely to share a printer. Ideally we will find multiple examples to support the identification.

Printers' ornaments have a well-established role in literary and bibliographical research, but manually finding and tracking ornaments across multiple books is time consuming, laborious, and error-prone, even when working with digitised books, like the c.180,000 titles in *ECCO*. There are many thousands of possible printer identifications to be made, but the full research potential of printers' ornaments has not been realised. Printers' ornaments have been overlooked in both literary criticism and art history, since they have fallen through the gap between the two disciplines, being neither full-scale illustrations nor (supposedly) part of the text.



The creation of Fleuron

Fleuron ([fleuron.lib.cam.ac.uk](http://fleuron.lib.cam.ac.uk)) is an online database of images of eighteenth-century printers' ornaments. It was created to make it easier to find and study ornaments. Containing over a million images, it is the largest collection of its kind ever assembled. It was possible to create a database of this size only because Gale, A Cengage Company supplied the Fleuron project with a hard drive containing all 32 million page images from *ECCO*, along with their metadata.

Scanning that many pages anew would have been impossibly costly and time consuming. Fleuron was created using a custom-made image detection program, which was sponsored by the Bibliographical Society. The program was designed by Machine Doing Ltd., in collaboration with the Cambridge Research Software Engineering group. Our program was trained to identify and extract ornaments from the pages from *ECCO*. The analysis and extraction process took place on the High Performance Computing cluster, which allowed multiple images to be processed at once. To ensure we captured as many ornaments as possible, the program was designed to be lenient in its inclusion criteria, so it incorrectly identified as ornaments some library stamps, handwritten notes, and blurred or overexposed areas of text. We are using machine learning and manual sorting to gradually identify and remove these items from the database.

The extracted images are searchable using the same criteria as an *ECCO* search: by date, author, place of publication, publisher/printer details, and genre. This means that for the first time we can instantly see whether a book contains ornaments, and we can see them at once, rather than searching manually through the book or digital file. Each ornament has a unique ID code, so users can keep track of specific ornaments. We can now view ornaments in entirely new ways: we can find all ornaments used in a given city in any year, allowing us to pose new research questions. For example, for the first time we can easily see what kinds of iconography were being used in London in 1745: did the Jacobite uprisings have an effect on the types of religious imagery being used in book design?

Using the keyword search functions currently available, users of Fleuron have already begun finding ornaments that have furthered their research into individual printers and publishers, as well as topics like depictions of eighteenth-century London, and images from science and medicine. In a review of Fleuron, the bibliographer John Ross wrote that it 'has been a seriously game-changing advance for students of the historical bibliography of eighteenth-century British books' (*Script & Print* 41, 2017). The availability of images of printers' ornaments en masse is also inspiring new creative work. The artist Caroline Hack has used Fleuron to find images from eighteenth-century zoological books for an artistic project on whales and whaling.

We have also carried out experiments using 3D printing to recreate eighteenth-century ornamental blocks from *Fleuron*. At the Radcliffe Science Library in Oxford we have turned 2D images of ornaments from *Fleuron* into relief models, and printed them on a 3D printer. The reincarnated printers' ornaments have then been used on a hand press to create new images. *Fleuron* is revitalising creative research using letterpress.



### Future directions

The ability to search *Fleuron* using keywords will only get us so far in the identification of unknown printers. It drastically speeds up our searches for printers' ornaments in likely places. But what about when they appear in unlikely places? What if we want to identify the owner of an ornament that appears in a book where the printer has deliberately disguised their identity, by giving a false city and year? Where do we start looking for other examples of that ornament? A keyword search by city or year will not help. To ask more speculative research questions of the database, we need to be able to search it visually.

The *Fleuron* project is working with the Oxford Visual Geometry Group to apply their innovative image-matching software to the database. The website will be updated with an image-search function in early 2019. Having located an ornament, users will be able to perform an image-search to see all matching or similar ornaments within the database. The ability to locate the same ornament in multiple books will make it possible to study the output of individual printers about whom there is little other documentary evidence. It will also make it easier to trace different types of imagery, which will make the resource more useful to historians of art and design. A researcher interested in (for example) classical imagery, could use the new search function to track down a wealth of images that have not been included in traditional histories of visual culture. We are also working on enabling users to upload their own images to *Fleuron*, to see matches from the database, allowing us to

include previously un-digitised material in our researches. A longer term aim is to extend the database beyond the eighteenth century to include the whole of the hand press period, and to make it cross-searchable with similar databases of non-British material, like the *Iberian Books* project (<https://iberian.ucd.ie>).

The ramifications of these new developments extend well beyond academia. *Fleuron* will be a major resource for antiquarian booksellers and collectors, for example. Booksellers will be able to find out more about rare or puzzling items in their stock, and collectors will be able to discover new information about their collections. This may change how we value material: will we place increased value on a book that contains ornaments that were used in Shakespeare's first folio? *Fleuron* may even help us to detect piracies and forgeries, leading to a safer marketplace for all.

The many applications of *Fleuron* show us how many exciting new discoveries are possible when large digital repositories like *ECCO* are made available to scholars.



# CITATION

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