

CSCI 1377

Tools for Thought

Hypertext I

Managing Information Overload

“In the course of so many centuries the number of events has become infinite, as has the number of books that have been composed. [...] The enormousness of these writings, which is tiring just to think about, should be divided and fragmented to make available to all what they contain which is useful.”

— Byzantine Emperor Constantine VII Porphyrogenetos, circa 950 CE

Information overload has been a problem for a long time

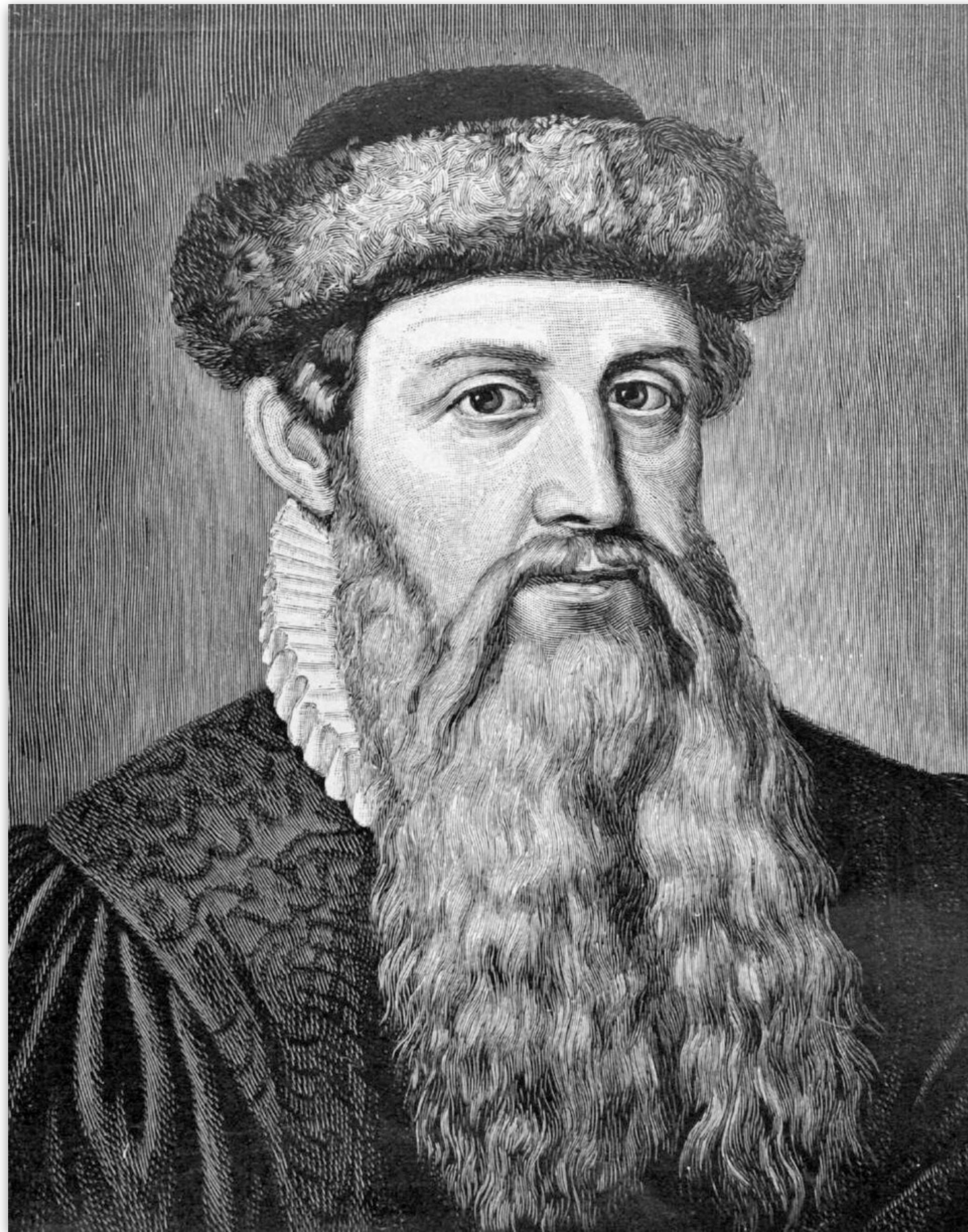
Ecclesiastes 12:12 (c. 450-180 BCE), Douay Bible translation (1582 CE)

“Of making many books there is no end: and much study is an affliction of the flesh.”

Seneca, *Epistulae Morales ad Lucilium* (65 CE)

“Be careful, however, lest this reading of many authors and books of every sort may tend to make you discursive and unsteady.”

Printing press dramatically increased textual output



Johannes Gutenberg

Public domain, via Wikimedia Commons



via Letterpress Commons

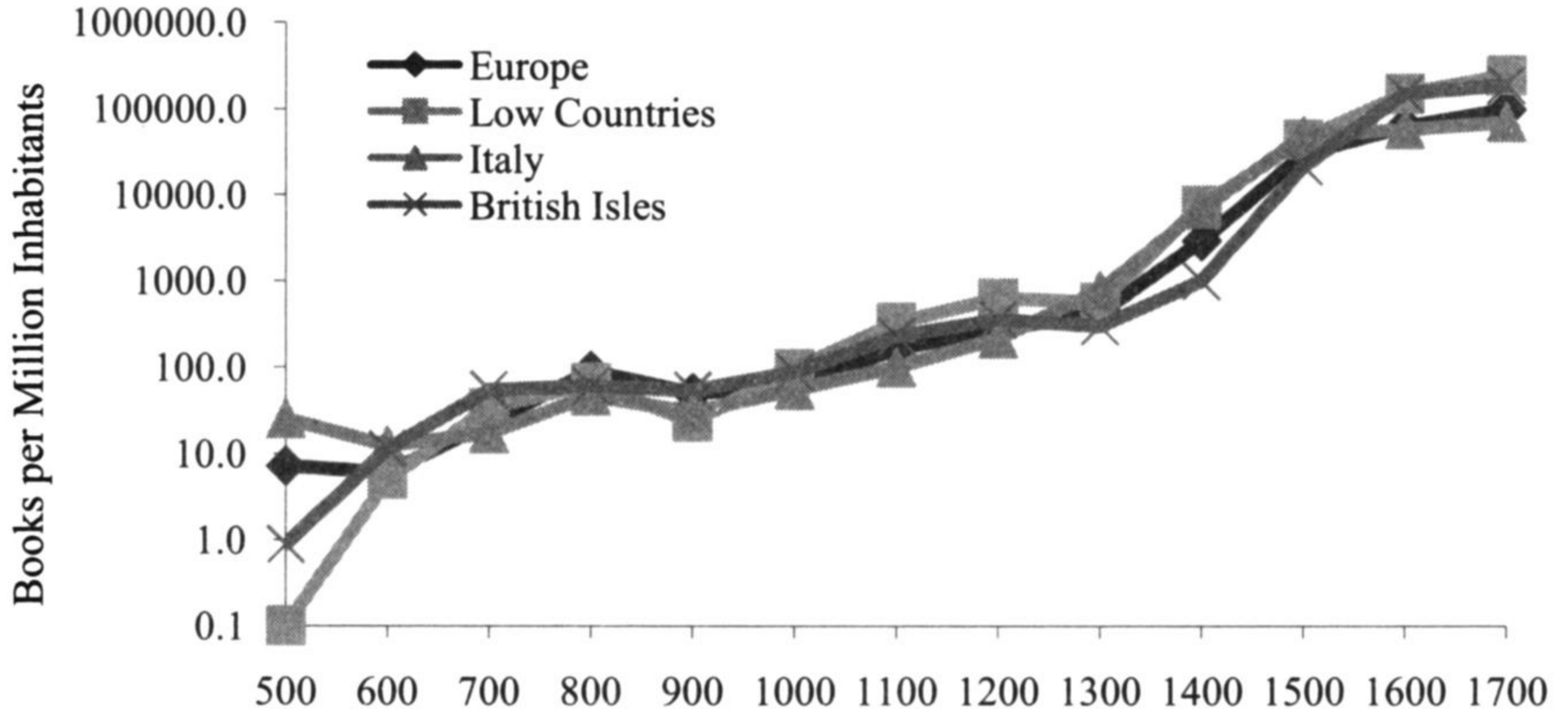
**Key combination
of ideas:**

Movable type of
durable metal

Matrix mold for
casting letters

Oil-based ink

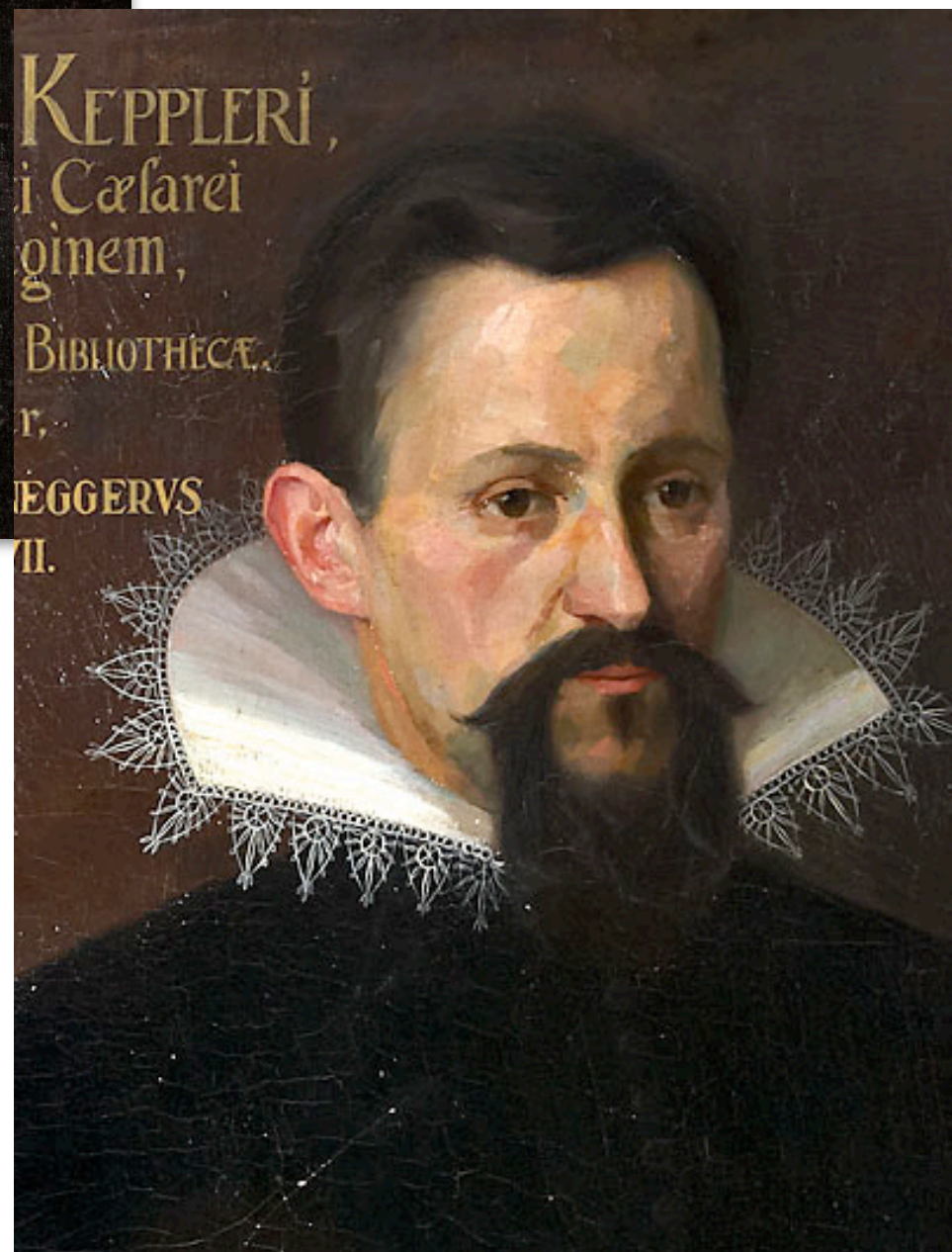
Printing press dramatically increased textual output



The effect of the printing press on astronomy



Tycho Brahe



Johannes Kepler

Public domain, via Wikimedia Commons

- Printing made copies of contradictory texts available for comparison
 - "Even as an untutored teenager he could compare Copernicus with Ptolemy and study tables derived from both."
- Printing made mathematical tools tables widely available
 - "Printed sine tables, trigonometry texts, and star catalogues did represent new objects and instruments in Tycho's day."

Printing arrested the decay of text

“Very early in the course of my researches into the laws of Virginia, I observed that many of them were already lost [...] The question is, what means will be the most effectual for preserving these remains from future loss? All the care I can take of them, will not preserve them from the worm, from the natural decay of the paper, from the accident of fire [...] how many of the precious works of antiquity were lost while they existed only in manuscript? Has there ever been one lost since the art of printing has rendered it practicable to multiply and disperse copies?”

— Thomas Jefferson, in correspondence to George Wythe

Printing made information overload only worse

Francisco Araoz, royal official in Seville, 1631:

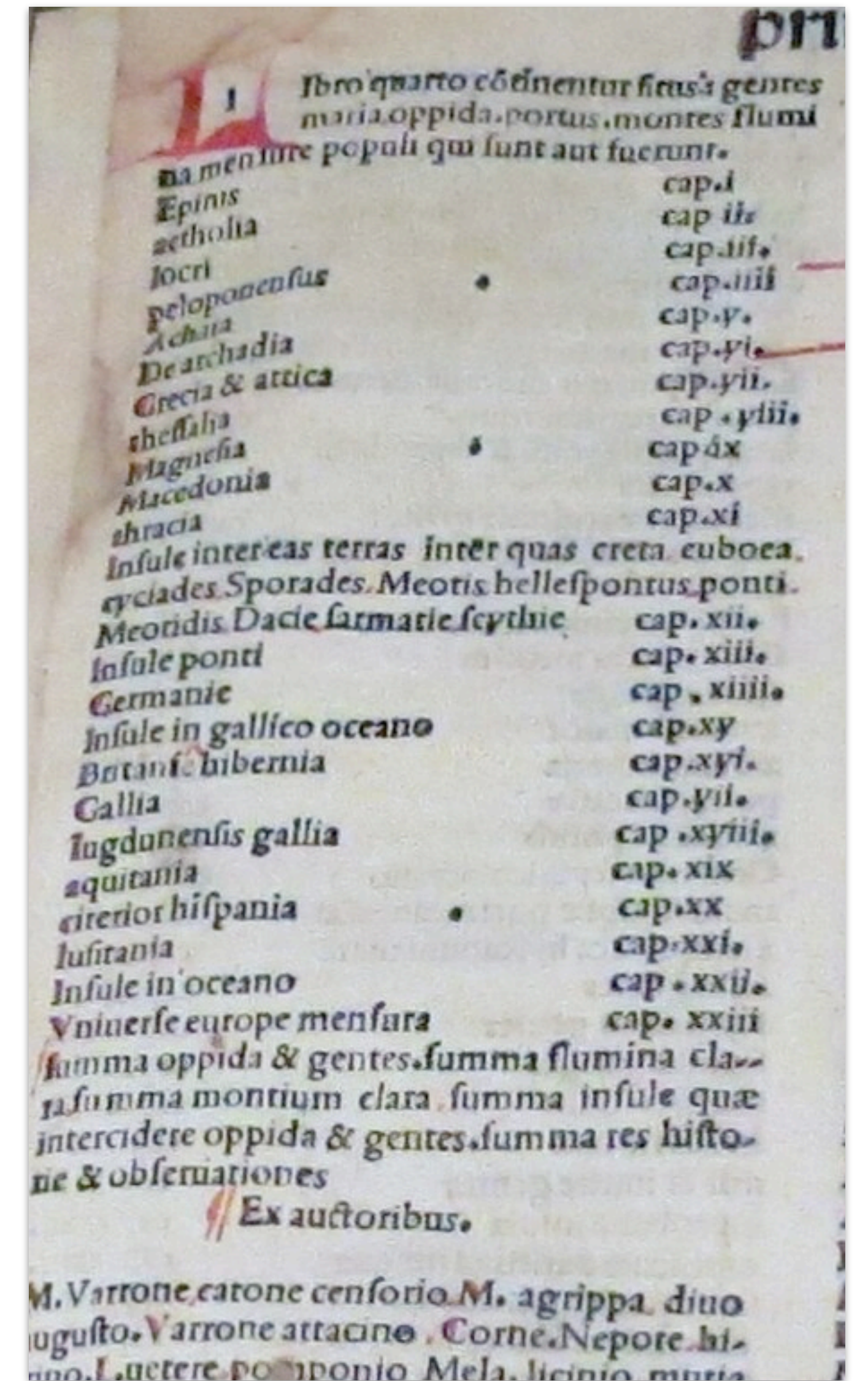
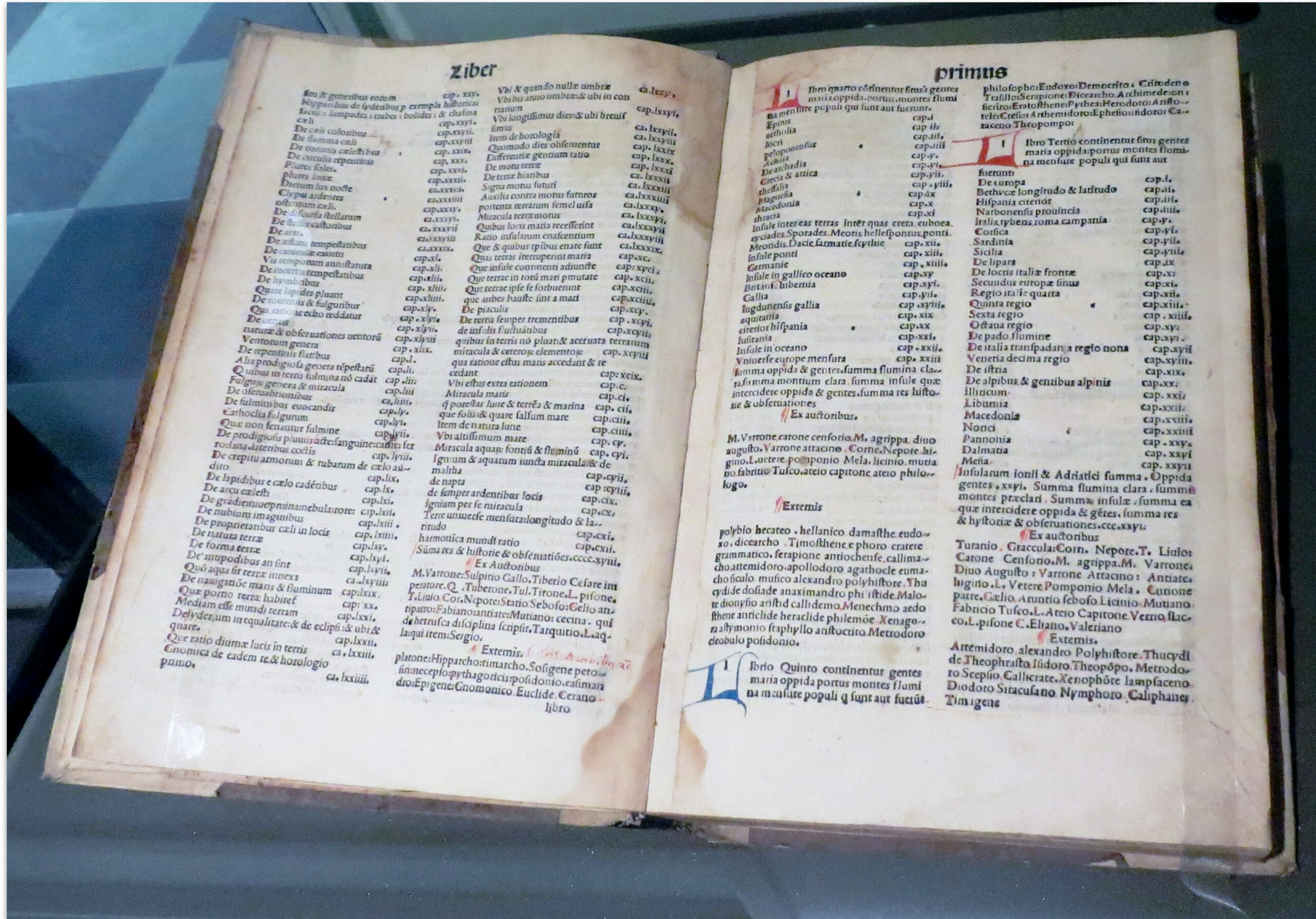
“In our time the multitude of books becomes an immensity, so that it is more effort to find and distinguish the books than it is to obtain / read the letters.”

Desiderius Erasmus, 1525

Is there anywhere on earth exempt from these swarms of new books? [...] these distractions call them away from the reading of ancient authors.

Evidence of encyclopedic books ~2000y ago

Pliny's *Naturalis Historia* (orig. 77 CE)

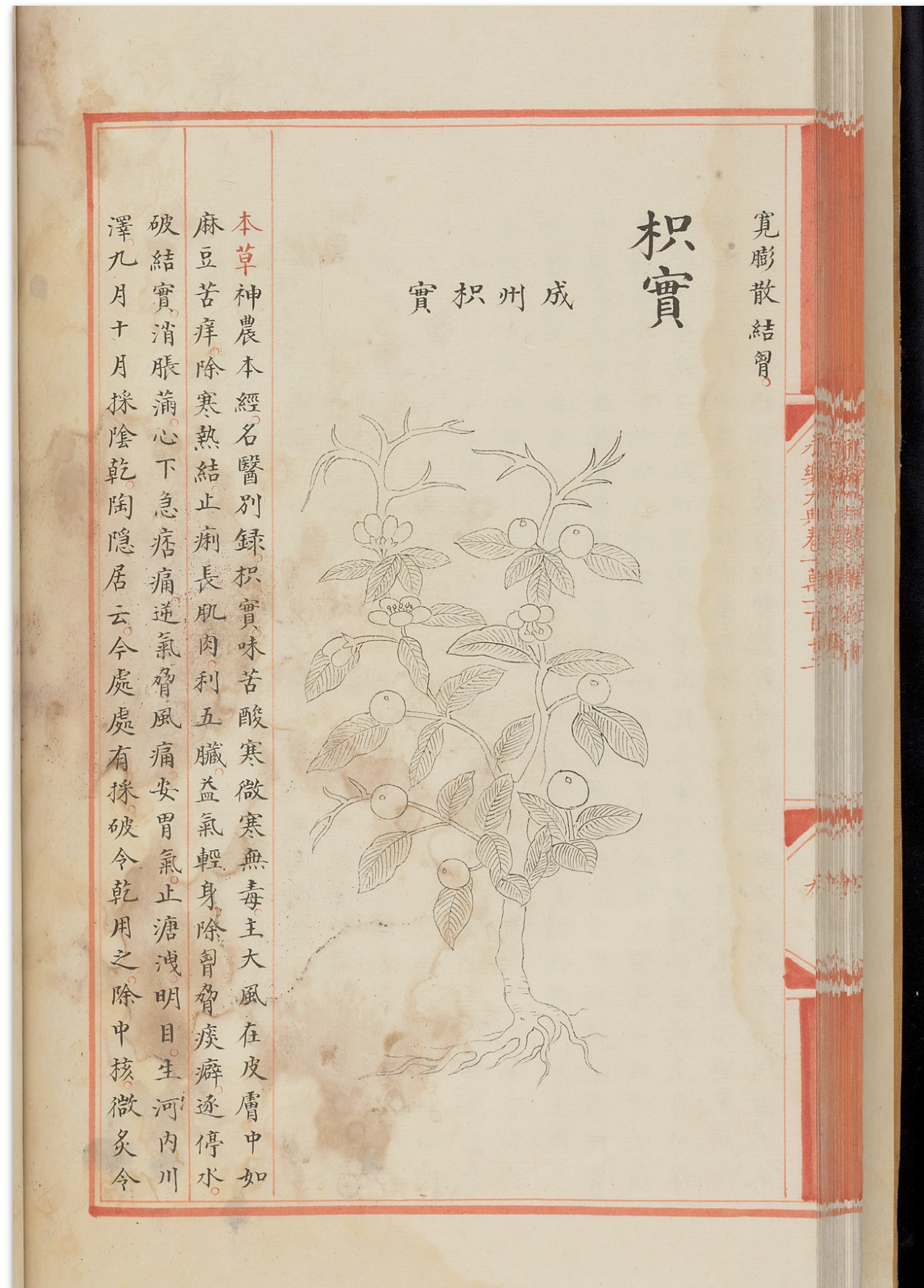


Evidence of encyclopedic books ~2000y ago

Huanglan leishu written 222 AD, since lost

Yongle leishu written 1408, largest encyclopedia until Wikipedia

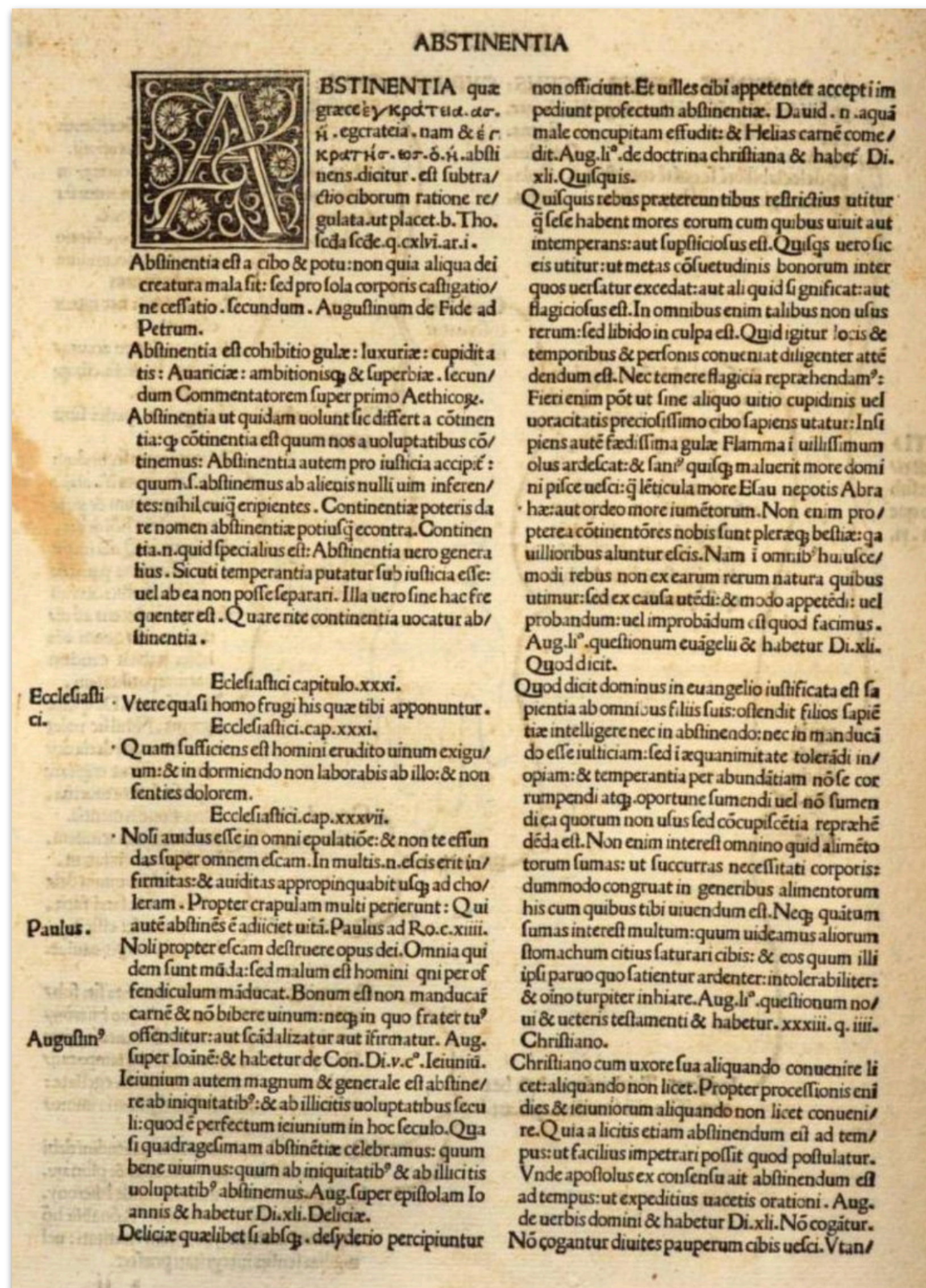
“In *Shennong Bencao Jing* and *Mingyi Bieju*, *zhishi* [bitter orange] is described as bitter, sour, cold, slightly cold, non-toxic.”



Kinds of medieval “repertory” books

- **Dictionaries:** alphabetically-ordered list of information about words and phrases
 - Calepino’s *Dictionarium* (1502) defined Latin words in Latin with extra context
 - Additional “dictionaries” defined people, places
- **Florilegia:** collections of quotes / excerpts from other works
 - Mirabelli’s *Polyanthea* (1503) offered quick advice for clergy on theological questions
- **Commonplace books:** collections of examples to illustrate a variety of concepts
 - Zwinger’s *Theatrum vitae humanae* (1565) offered advice for everyday situations

Example of a florilegium



ABSTINENTIA quae graece ἐγκράτεια, id est, egcrateia, nam & ἐγκρατής, abstinens dicitur, est subtratio ciborum ratione regulata, ut placet b. Tho, sede q. cxlvi. ar. i.

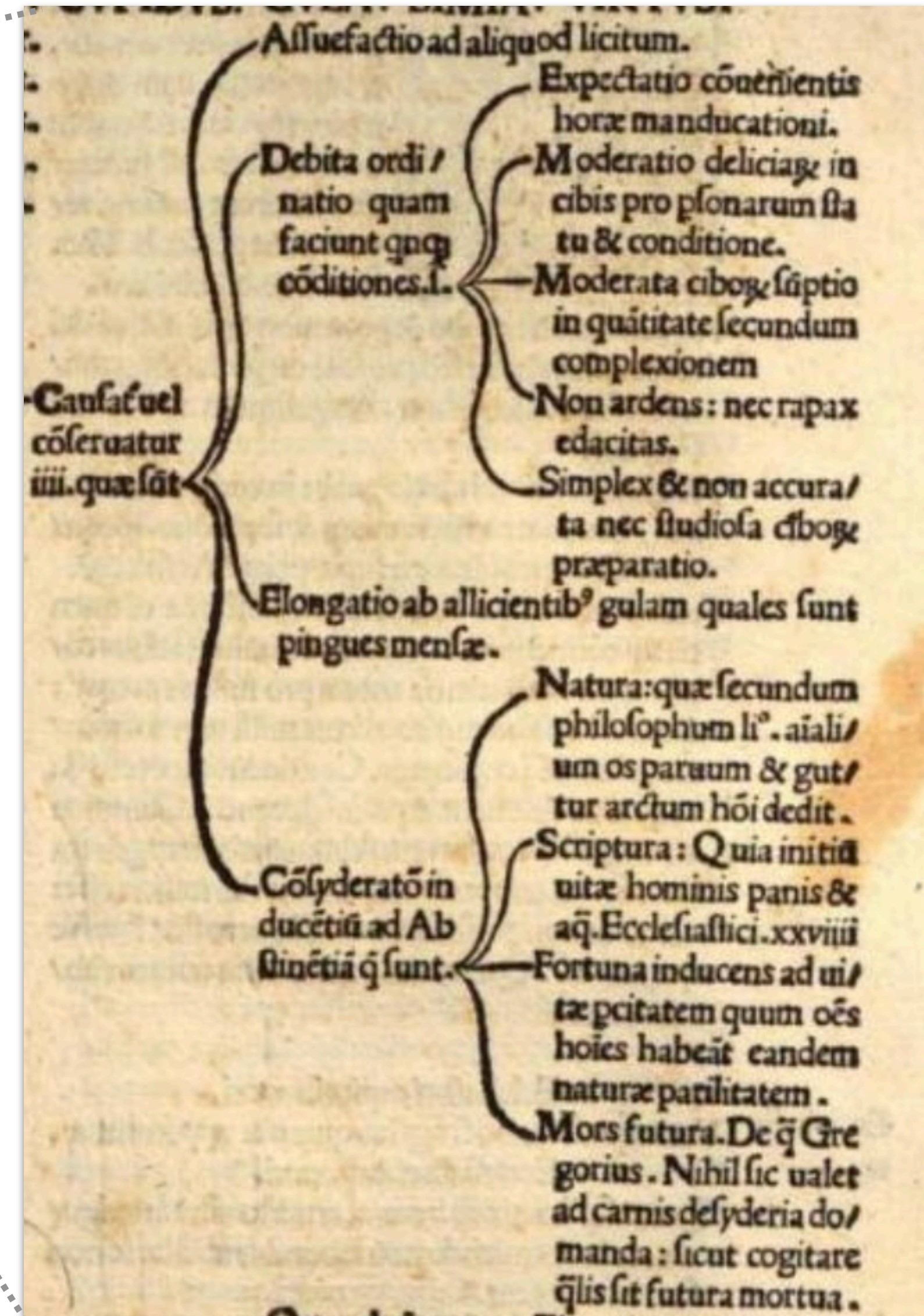
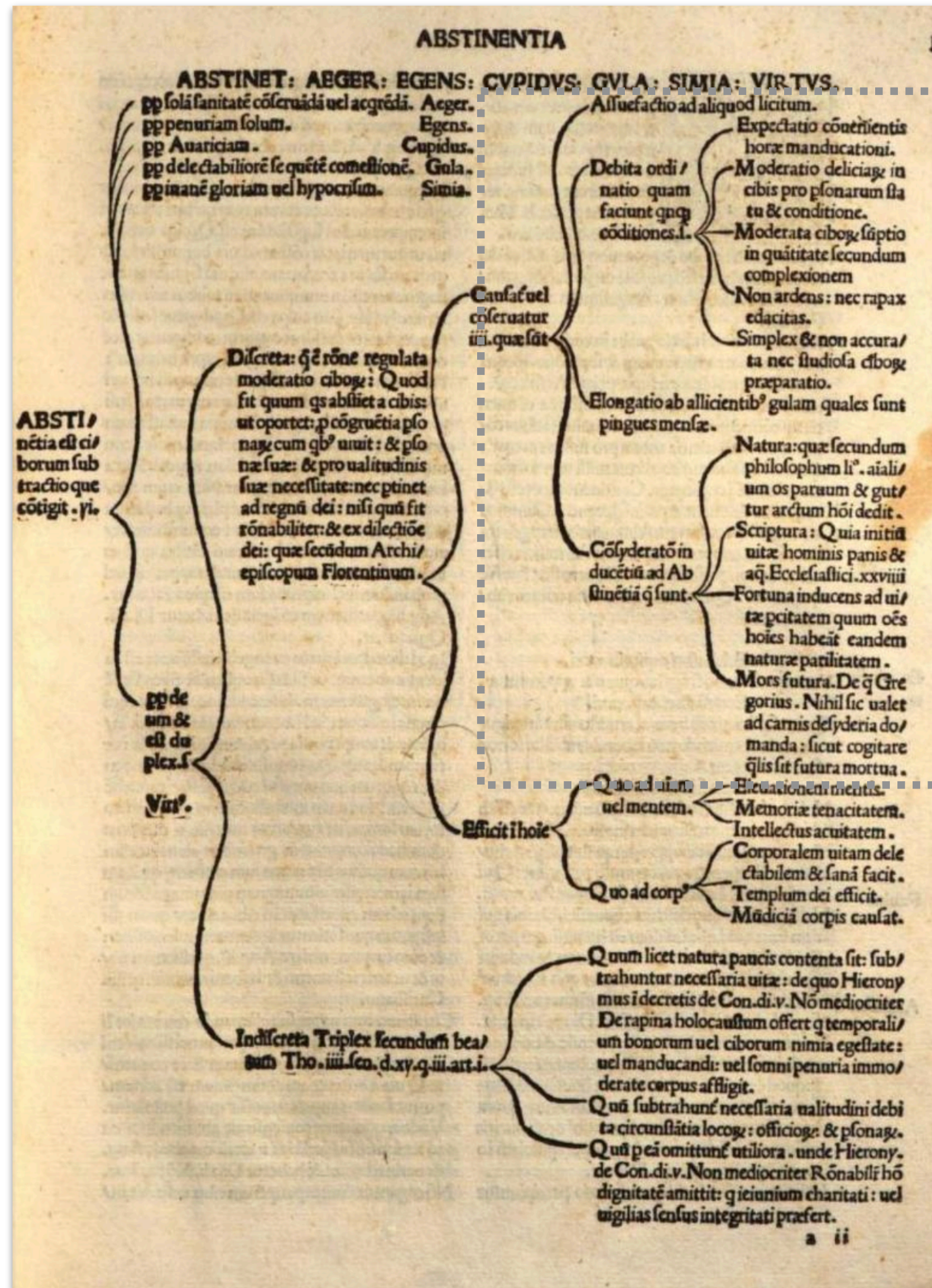
ABSTINENCE, which in Greek is *enkrateia* (for *enkratēs* means "abstinent"), is the subtraction of foods regulated by reason, as St. Thomas holds (Sede q. 146, art. 1).

Ecclesiastici cap. xxxvii. Noli avidus esse in omni epulatione: & non te effundas super omnem escam. In multis enim escis erit infirmitas: & aviditas appropinquabit usque ad choleram. Propter crapulam multi perierunt: Qui autem abstinens est adiiciet vitam.

Ecclesiasticus, ch. 37. Do not be greedy at every feast, and do not pour yourself out upon every food. For in many foods there will be sickness, and greediness will approach even to bile. On account of drunkenness many have perished; but he who is abstinent will add to his life.

N.B. OCR + translation performed by Opus 4.6. OCR spot-checked manually, translation spot-checked against Google Translate.

Ye olde... decision trees?



Kinds of medieval “finding devices” / paratexts

- “List of authorities”: authors cited or influential in creation
 - Originally used for credentialing the compiler rather than crediting the authors
- “List of headings”: table of contents
 - Zwinger published first known indented ToC in 1565
 - Separate alphabetized list of headings sometimes included
- Indices: lists of words, people, concepts mapped to pages

Abelard, Peter, 45

Abundance of books, 15, 17–22, 33, 54–55, 55–61, 71, 73, 207, 241, 257; Byzantium, 23; China, 32; criticism of, 15, 48, 85, 90; Gesner on, 56; Islam, 24, 27; La Mothe Le Vayer on, 58; range of responses to, 5; Seneca on, 15; Vincent of Beauvais, 42.

See also Lack of books

Academies, 101–2; Française, 102, 254, 259;

des Sciences, 94. *See also* Royal Society

Adelaide (Henrietta Adelaide) of Savoy, 236

Adversaria, 72, 206, 235, 245

Advice on: building a library, 56–57, 119–20; indexing, 96, 111; keeping methods secret, 71; selecting helpers, 110; studying and note-taking, 70–73, 76–80, 103–4, 166, 168; using an index, 137–38, 140, 263

Aelian, 20

Alan of Lille, 38

Alciati, 12, 192

Aldrovandi, Ulisse: on memory, 76; notes

Alexandro, Alexander ab, 130–31, 215, 241, 242, 245

Al-Farabi, 25

Algazi, Gadi, 105

Al-Jāhiz, 25

Al-Juzajani, 25

Alphabetical order: Aldrovandi and, 105, 282n30; in antiquity, 16–17, 21, 24; Beyerlinck and, 136–37, 150; Calepino and, 130; commonplace books and, 131; criticized, 127, 252; dictionaries, 121; Dioscorides, 40; in 18th-century genres, 171, 259, 260, 263; encyclopedias and, 260; Gesner and alphabetizing, 96, 117, 129, 141, 162; headings and, 137–40; in indexes, 49, 74, 79, 92, 96, 111, 127, 132, 140–44, 169, 172; for the inexperienced, 162–63; in Islamic works, 25, 27; in Jewish works, 39; Johnson's *Dictionary* and, 228; Keckermann and, 152; Labbé and, 164; Lange and, 185; in Latin medieval works, 22, 26, 28, 41; Library

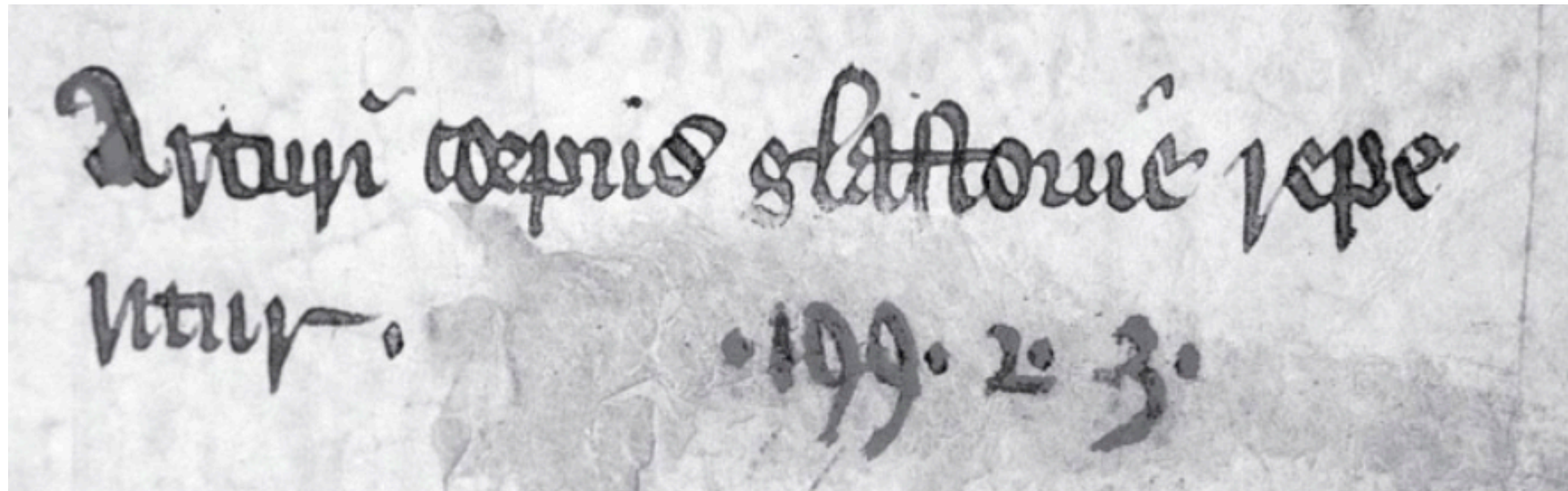
A concordance indexed words and phrases

Zion s forth her hands, and there	Lev 13:57	6524
SPREADING		
it is a s plague.....	Lev 13:57	6524
s himself like a green bay tree	Ps 37:35	6168
became a s vine of low stature,	Eze 17:6	5628
It shall be a place for the s of	Eze 26:5	4894
SPREADINGS		
understand the s of the clouds.....	Job 36:29	4666
SPRIGS		
cut off the s with pruninghooks	Is 18:5	2150
forth branches, and shot forth s	Eze 17:6	6288
SPRING		
sang this song, S up, O well.....	Num 21:17	5927
depths that s out of valleys and.....	Deut 8:7	3318
and when the day began to s	Judg 19:25	5927
to pass about the s of the day	1Sa 9:26	5927
forth unto the s of the waters.....	2Kin 2:21	4161
doth trouble s out of the ground.....	Job 5:6	6779
bud of the tender herb to s forth.....	Job 38:27	6779
Truth shall s out of the earth.....	Ps 85:11	6779
When the wicked s as the grass	Ps 92:7	6524
troubled fountain, and a corrupt s	Prov 25:26	4726
a s shut up, a fountain sealed.....	Song 4:12	1530
before they s forth I tell you of	Is 42:9	6779
now it shall s forth.....	Is 43:19	6779
they shall s up as among the.....	Is 44:4	6779
let righteousness s up together	Is 45:8	6779
health shall s forth speedily	Is 58:8	6779
like a s of water, whose waters.....	Is 58:11	4161
that are sown in it to s forth	Is 61:11	6779
praise to s forth before all the.....	Is 61:11	6779
wither in all the leaves of her s	Eze 17:9	6780
his s shall become dry, and his	Hos 13:15	4726
pastures of the wilderness do s	Joel 2:22	1876
and day, and the seed should s	Mk 4:27	985
SPRINGETH		
the hyssop that s out of the wall.....	1Kin 4:33	3318
----- that which s of the same.....	2Kin 19:29	7823

- Primarily used for holy texts due to significant labor involved
- First Bible concordance compiled in 1262 using 500 friars
- It's much easier to make a concordance today!

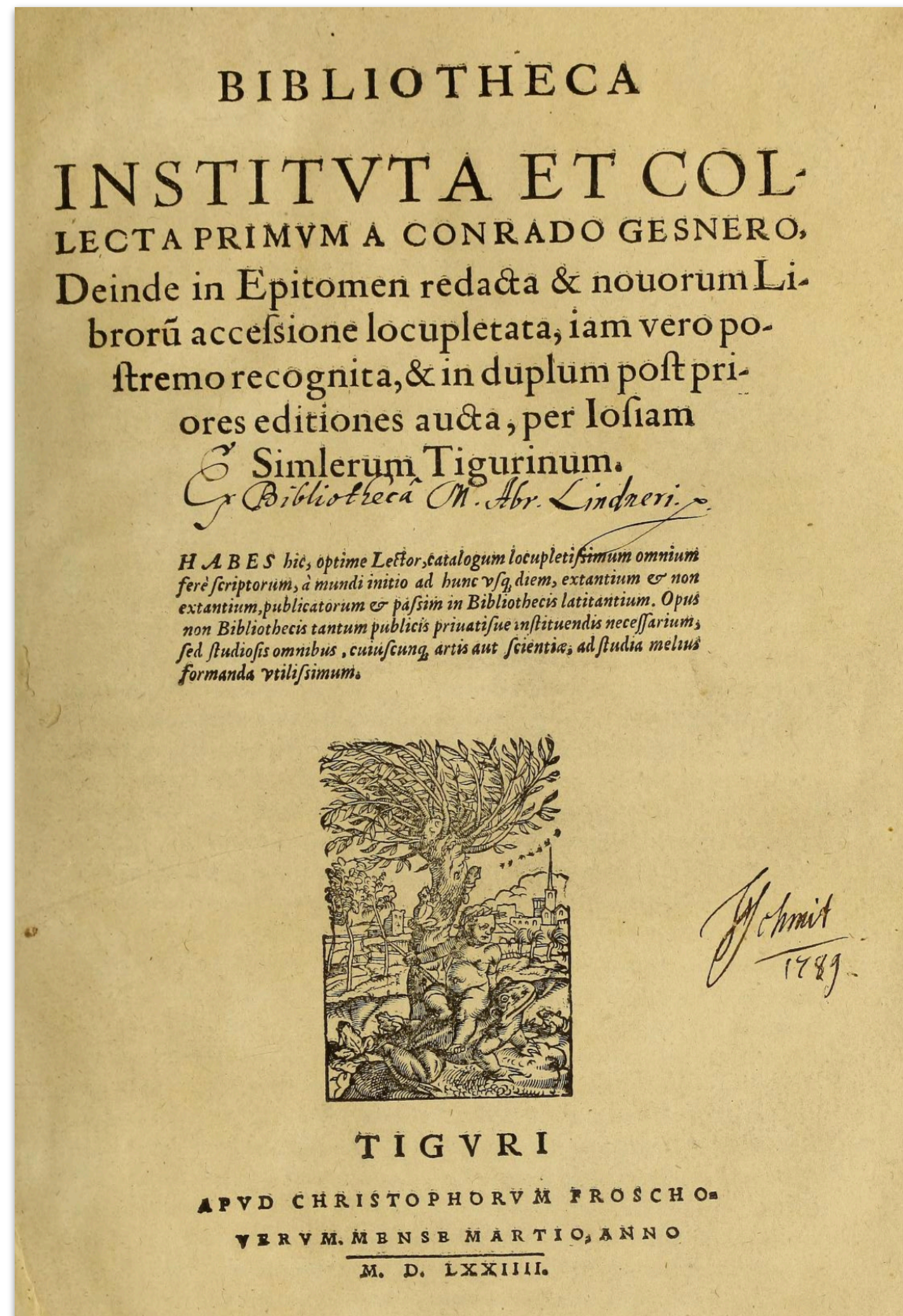
Reliable page numbers are a technology, too

- In manuscript era, page numbers were unreliable due to instability of page layout across copies
- Only 10% of printed books from 1500s contain page numbers
- But their adoption rose quickly afterwards



A corrected page reference
("medieval broken link")

Some works more exhaustively catalogued books



via Internet Archive

Conrad Gessner's *Bibliotheca Universalis* (1548)

Forerunner to the modern bibliography

≥10,000 texts from ~3,000 authors

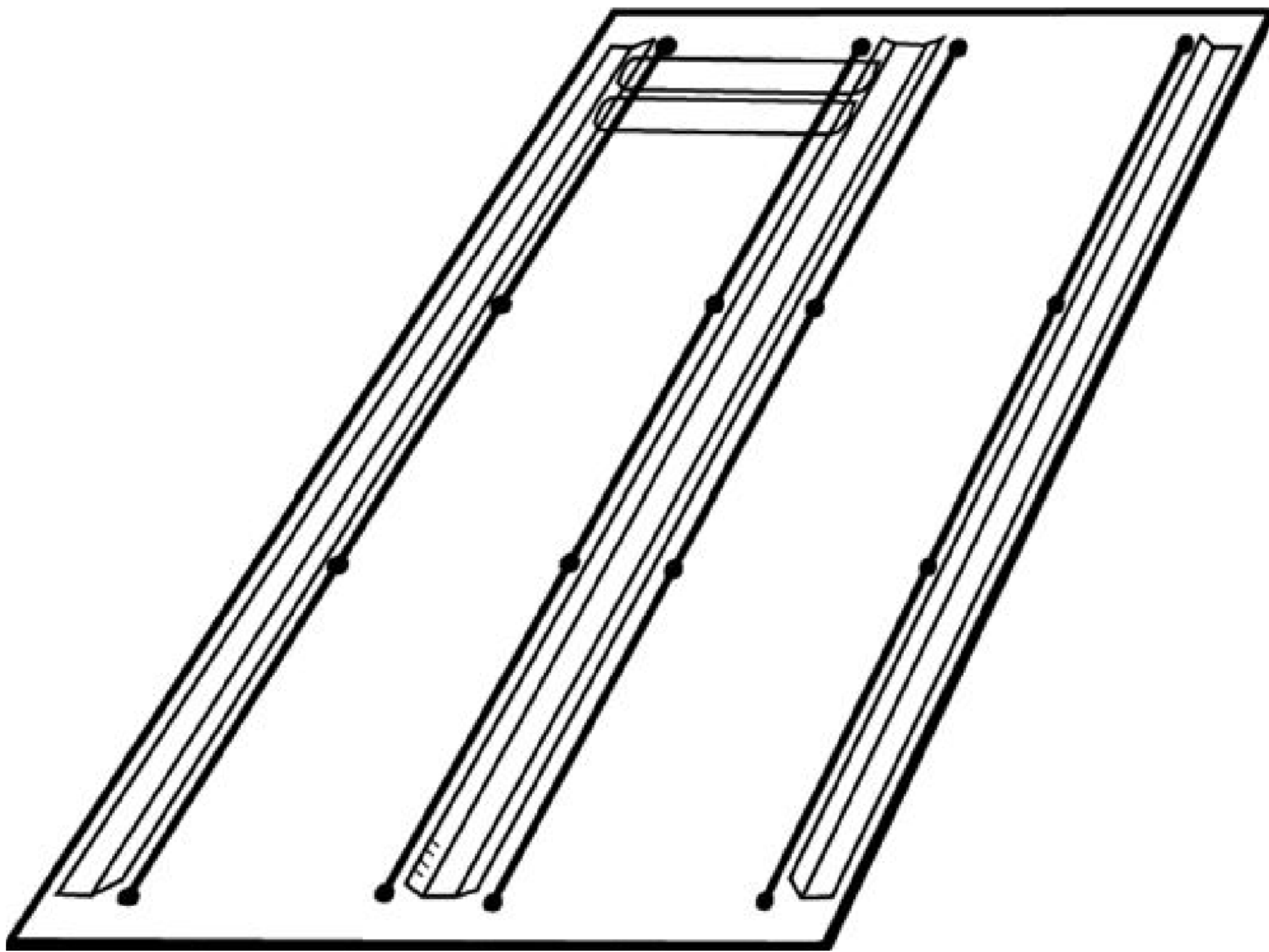
“No author was spurned by me, not so much because I considered them all worthy of being cataloged or remembered, but rather to satisfy the plan which I had set for myself, simply to enumerate without selection all [writings] which happened.”

Ann Blair. *Too Much to Know: Managing Scholarly Information Before the Modern Age*. 2010

Markus Krajewski. *Paper Machines: About Cards & Catalogs, 1548-1929*. 2011

Indexing drove tools for managing excerpts

Gessner's card rack



via Krajewski

1. “When reading, everything of importance and whatever appears useful should be copied onto a good sheet of paper.
2. A new line should be used for every idea.
3. Finally, cut out everything you have copied with a pair of scissors; arrange the slips as you desire, first into larger clusters which can then be subdivided again as often as necessary.
4. As soon as the desired order is produced, arranged, and sorted on tables or in small boxes, it should be fixed or copied directly.”

TAB IV.

This table is a complex cryptographic device, likely a cipher table. It is divided into several sections:

- Left Section:** A large grid of letters, organized into columns labeled A through Z. The letters are arranged in a pattern that suggests a specific cipher or key.
- Top Section:** A grid of letters labeled F, G, H, I, L, M. This section contains various symbols and numbers, possibly representing a key or a specific cipher.
- Right Section:** A grid of numbers, organized into columns. This section likely represents a numerical key or a specific cipher.
- Bottom Section:** A row of ten small boxes, each containing a number. These boxes are arranged in a row and are likely used for a specific purpose, possibly as a key or a specific cipher.

The table is highly detailed and contains a large amount of information, including letters, numbers, and symbols. The overall layout is complex and suggests a sophisticated cryptographic system.

Card catalogs organized book metadata



Libraries focused on practicality over purity

On the purpose of a library catalog:

1. To enable a person to find a book of which either
 - (A) the author
 - (B) the title
 - (C) the subject } is known.
2. To show what the library has
 - (D) by a given author
 - (E) on a given subject
 - (F) in a given kind of literature.
3. To assist in the choice of a book
 - (G) as to its edition (bibliographically).
 - (H) as to its character (literary or topical).

On the Dewey decimal system:

“The impossibility of making a satisfactory classification of all knowledge as preserved in books, has been appreciated from the first, and nothing of the kind attempted. Theoretical harmony and exactness has been repeatedly sacrificed to the practical requirements of the library.”

The Dewey Decimal system as of DDC 23 (2013)

000 – Computer science, information and general works

100 – Philosophy and psychology

200 – Religion

300 – Social sciences

400 – Language

500 – Pure science

600 – Technology

700 – Arts and recreation

800 – Literature

900 – History and geography

020 – Library and information sciences

021 – Library relationships (with archives, information centers, etc.)

022 – Administration of physical plant

023 – Personnel management

024 – [Unassigned]

025 – Library operations

0.25.042 – World Wide Web

0.25.0422 – Web sites

025.1 – Administration

0.25.2 – Acquisitions and collection development

Notes on the structure of DDC

“The dot is not a decimal point in the mathematical sense, but a psychological pause to break the monotony of numerical digits and to ease the transcription and copying of the class number.”

“Since the parts of the DDC are arranged by discipline, not subject, a subject may appear in more than one class. For example, “clothing” has aspects that fall under several disciplines. The psychological influence of clothing belongs in 155.95 as part of the discipline of psychology; customs associated with clothing belong in 391 as part of the discipline of customs; and clothing in the sense of fashion design belongs in 746.92 as part of the discipline of the arts.”

Examples of Universal Decimal Classification

94 (410) "19" (075)

Main subject

History

Aux. place

United Kingdom

Aux. time

1900s

Aux. form

Textbook

37-042.3:32

Main subject

Education

Aux. phase

Influenced by

Related subject

Politics

Wooton patent desk (1880)

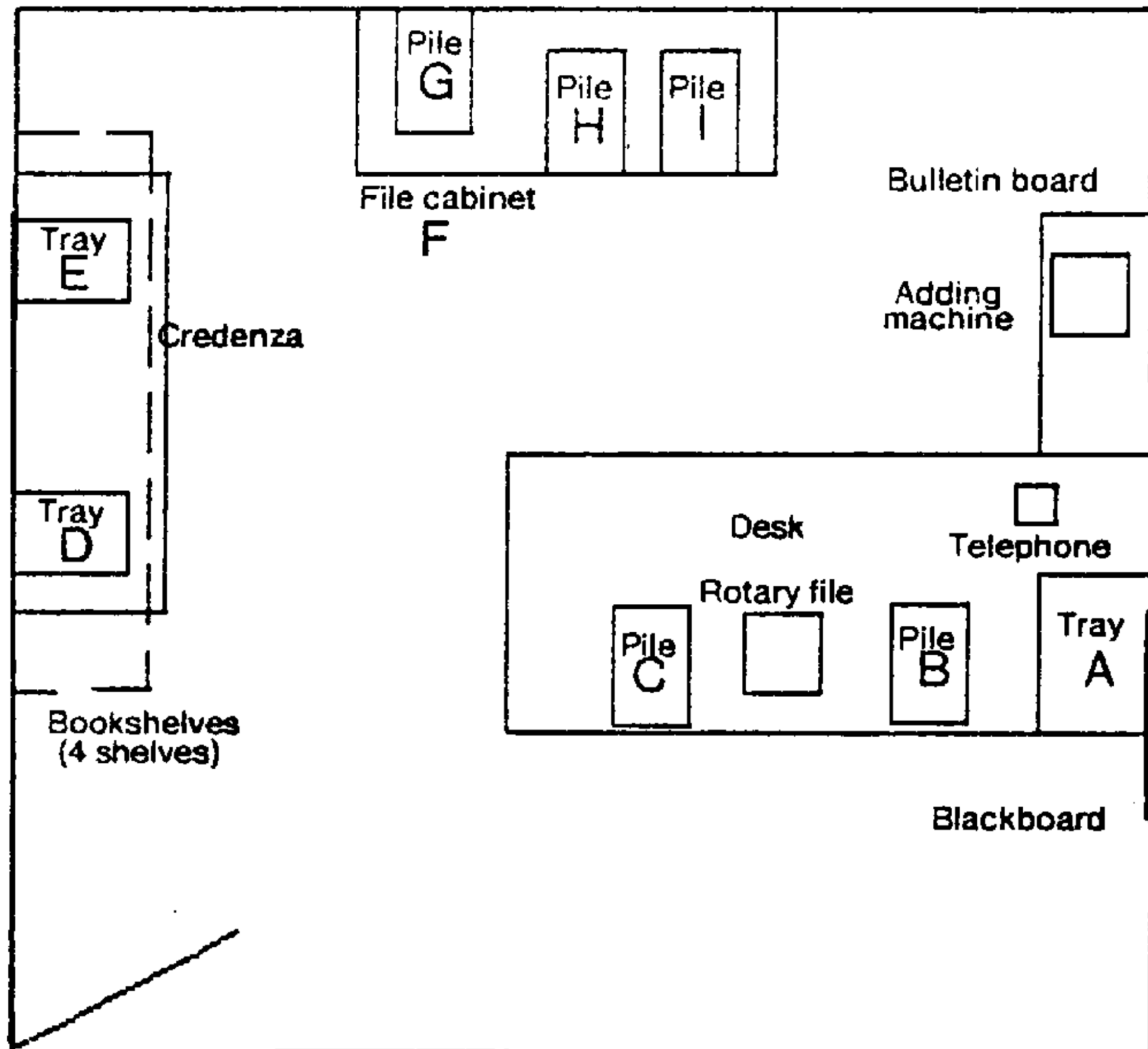
“With this
Desk a man
absolutely
has no
excuse for
slovenly
habits...”



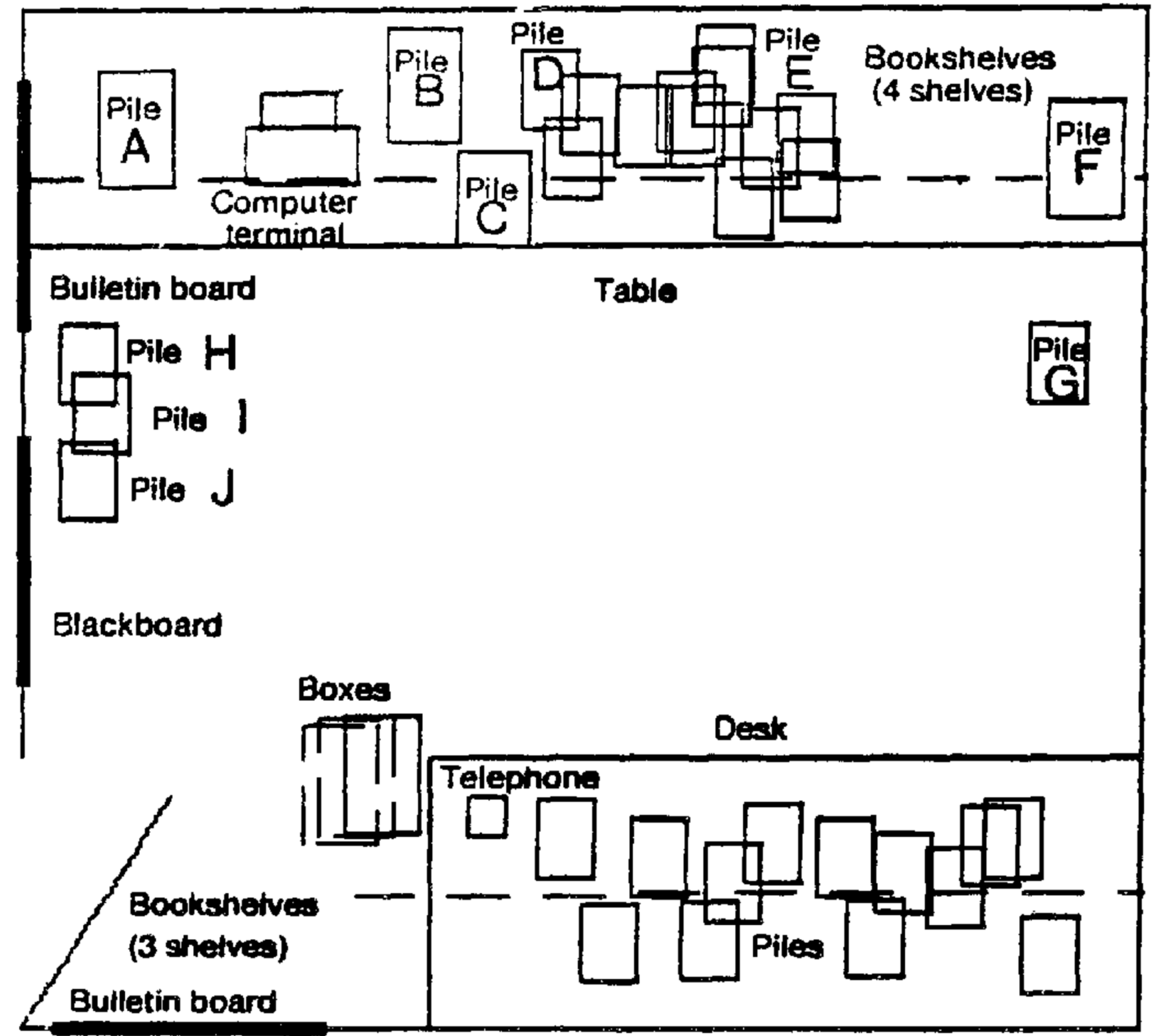


Examples of information organization in 1983

The purchasing agent



The research scientist



Observations from participants' desks

- “Files and piles”: piles are unordered and untitled
- Many piles were placed as visual reminders, rather than part of a coherent search mechanism
- Participants resisted classifying documents, found it time-consuming and onerous

Zettelkasten organizes linked ideas on index cards

CONTENT OVERVIEW OF THE ZK I

subjectivity... [38]

57,4e7b1a10 Concept of Expectation [485]

57,4e7b1a10c Expectation [47]

57,4e7b1a10f Social Consensus [135]

57,4e7b1a10l The behaviorist expectancy teaching [39]

57,4e7b1a12 Expectation as reference [27]

57,4e7b1a19 Openness of reference (Horizont) [22]

57,4e7b1a26 Time dimension of expectation [21]

57,4e7b1a35 Emotion, Feeling: stabilizing adventure aid [184]

57,4e7b1b Aprior understanding horizon / Concept of a priori [61]

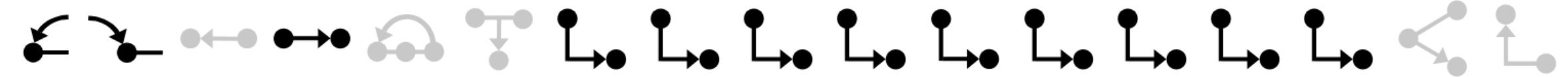
57,4e7b1c objective horizon of a science as a substantiated draft [189]

57,4e7b1d Horizon as a context of experience [98]

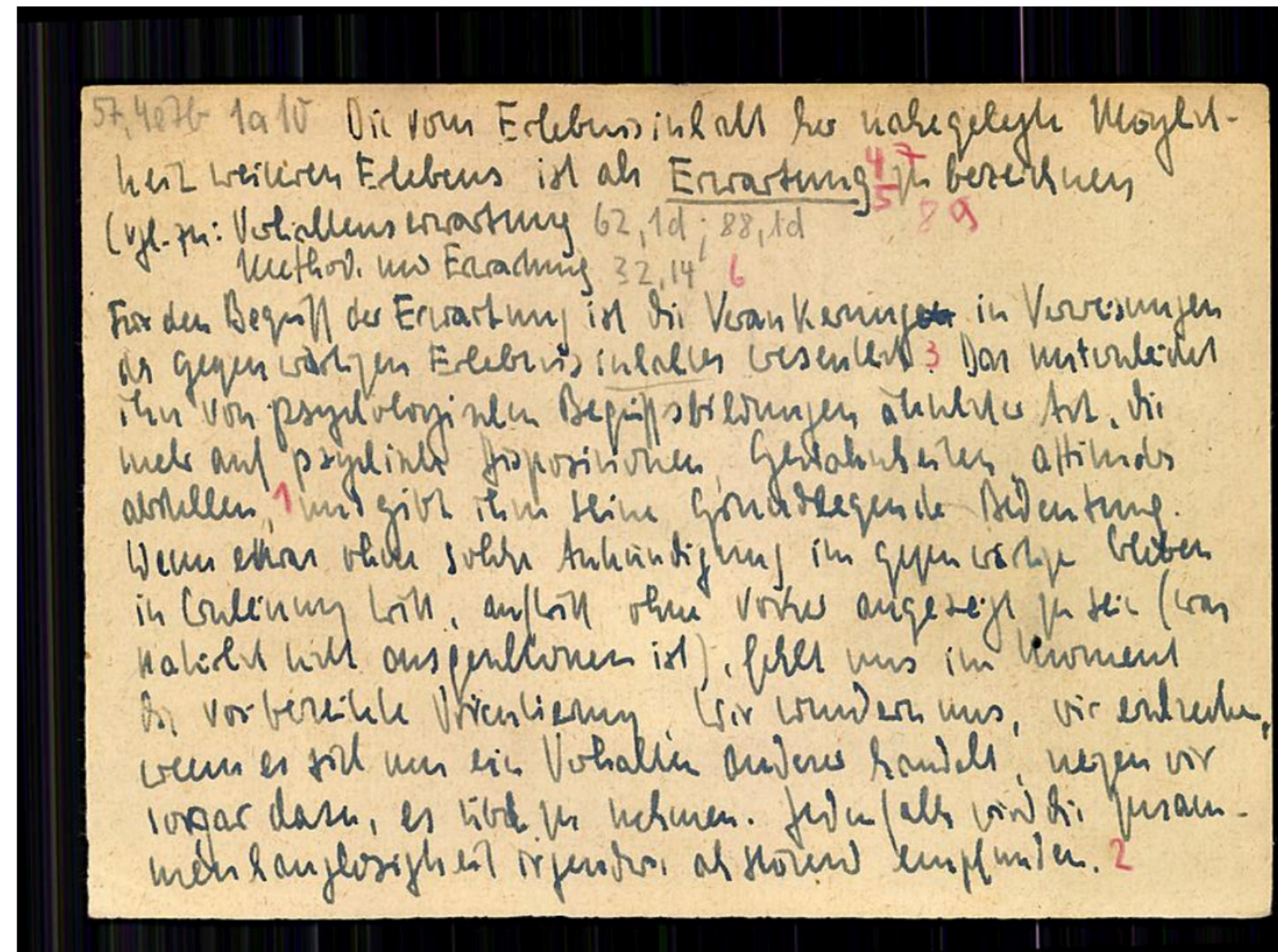
57,4e7b1e Horizon – Substance – Identity of Things [572]



123 123

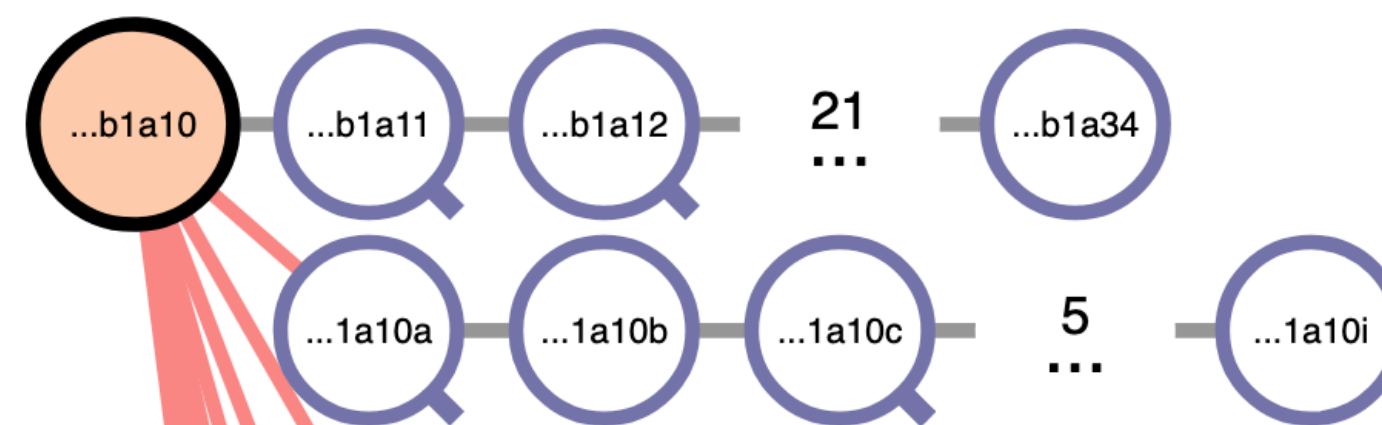


ZK I Note 57,4e7b1a10



57,4e7b1a10 The possible possible – keit further experience is as an expectation [4](#) [7](#); [5](#); [7](#); [8](#); (see: Behavioural expectations [62.1d](#); [88.1d](#) Method and Expectation [32:14](#); [6](#))).

For the notion of expectation, anchoring is in references the present experience content essential. [3](#) That distinguishes him of psychological concepts of a similar nature, the more on psychic dispositions, thought units, attitudes leave, [1](#) and give it its fundamental meaning. If something without such announcement in the current experience in appearance occurs without being indicated first (what of course not excluded), we are missing at the moment The prepared orientation. We wonder, we scare, If it is a behavior of others, we tend Even to resent it. Anyway, the togetherness – Manhanglessness somehow perceived as disturbing. [2](#)



Search

“Hypertext is the combination of natural-language text with the computer’s capacities for interactive, branching or dynamic display, *when explicitly used as a medium.*”

Ted Nelson, “Getting It Out of Our System” (1967)