Cartographies of Time

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—Kevin C. Lippert, publisher

A New Chart of History

For all of the advances in chronological scholarship in the early modern period, the graphic ambitions of the chronologers proved hard to fulfill. The textbooks said over and over again that chronology and geography were the two eyes of history. But if this were the case, the early modern history student was liable to end up with serious problems of depth perception. During the fifteenth and sixteenth centuries, geographical maps became more sophisticated and precise, as cartographers abandoned the venerable and durable form of the Ptolemaic map for new conventions and added vast amounts of previously unknown information.

Like cartography, the study of chronology changed rapidly in this period. Early modern chronologers employed new techniques from fields as disparate as astronomy and numismatics and labored tirelessly to incorporate into their schemes new information drawn from all over the world. But, until the eighteenth century, the field of chronology did not undergo a *visual* revolution comparable to the one that took place in geography. The contrast was so striking that, as late as 1753, French physician and amateur chronologer Jacques Barbeu-Dubourg could still write,

> Geography is a pleasant and gratifying study. It places before us an image of the world entire, which we may traverse quickly and return to with pleasure. In it, the world is familiar: we see the world's peoples; we measure distances at a glance of an eye or with a compass in hand; we trace the contours of the map so deeply in our imagination that they can never be fully erased. The same cannot be said for chronology, a field so dry, difficult, and thankless that it offers nothing more to the spirit than a multitude of ugly dates that overwhelm and frustrate the memory and are then easily forgotten.[1]

This from a man with a passion for historical dates.

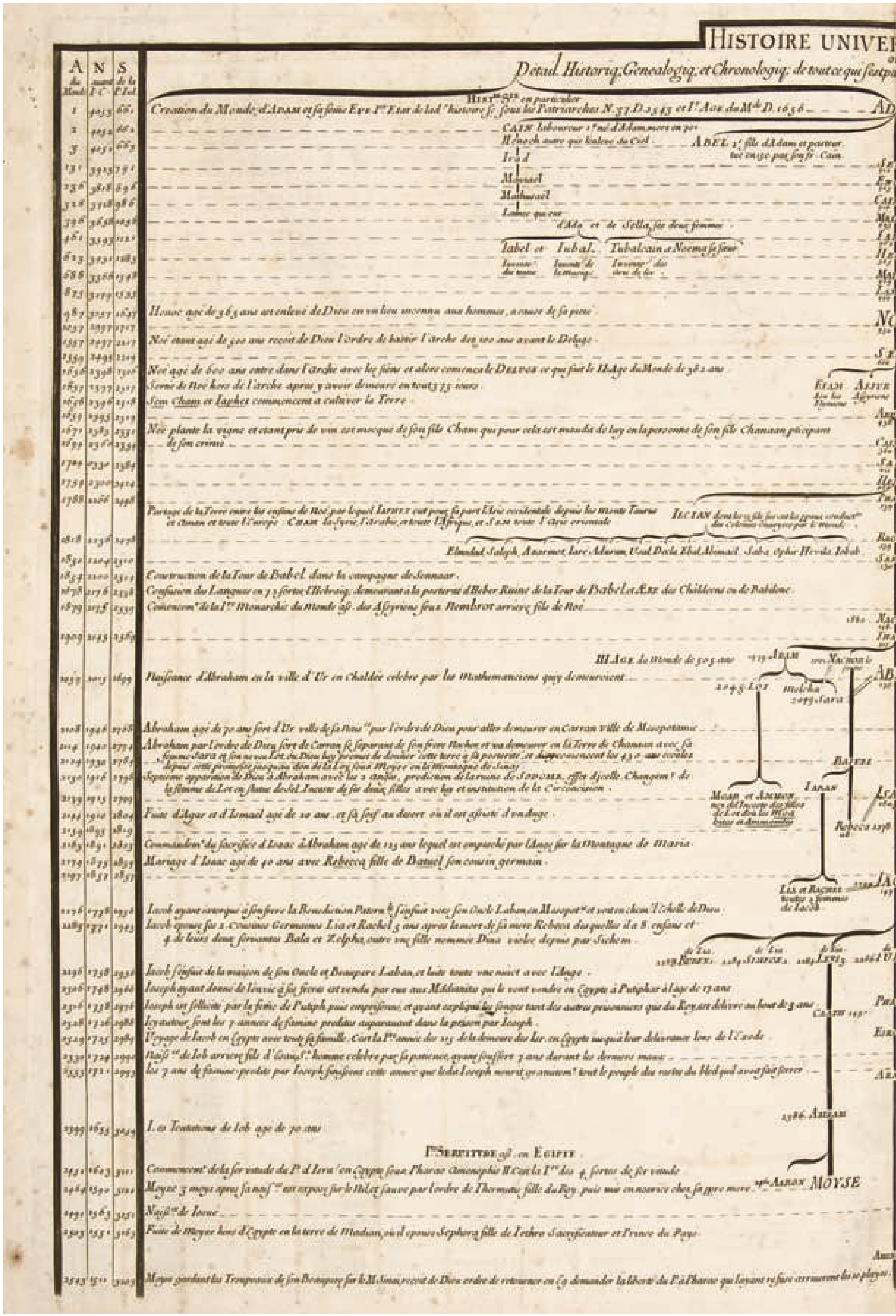
Even before the coming of the printing press, chronology was a book-heavy field, dependent on the collection and organization of many precise and discrete pieces of information. Print technology facilitated the storage, reproduction, and dissemination of information in many forms, but it was particularly well suited to the needs of chronology, where exact reproduction was a necessity, the accumulation of data was paramount, and big, overstuffed reference books were in high demand. In the fifteenth and sixteenth centuries, new dating techniques led to significant advances in chronology—Apianus, for example, sought to establish firm chronological footholds by correlating data from astronomy with received historical accounts—but many of the most striking advances of the period relied

on innovations in information organization. And, in the following two centuries, the impact of such innovations intensified. In contrast to the type-dominated chronology books of the fifteenth and sixteenth centuries, seventeenth-century chronologies relied heavily on fine engraving, which enabled greater and greater feats of data compression, a more fluid mixture of image and text, and nearly unlimited variations in script, layout, and proportion. As a result, during the second half of the seventeenth century, the precedent of Jean Boulaese, who attempted to condense much of Eusebius into a single chart, was widely pursued.

Among the most influential of the synoptic works of the later seventeenth century were the *Tables historiques, chronologiques, & généalogiques* (Historical, chronological, and genealogical tables) published in the 1670s in two volumes by the French protestant lawyer Jean Rou.[2] [*fig.* **1**] The work comprised a series of engraved tables that condensed huge amounts of chronological and genealogical information on several oversized pages. Influential as they were to become, Rou's charts were not immediately imitated in France. His first volume, on ancient history, was a great success, but his second volume on modern history, including the period of the Reformation, proved so controversial that it was banned, and Rou was forced to take refuge in the Netherlands.[3]

Though it would be decades before Rou's approach was attempted again in France, in England, it was taken up almost immediately in *A View of Universal History* by Francis Tallents, a nonconforming minister and teacher in the provincial town of Shrewsbury in the West Midlands near the border of Wales. Through Tallents's book, Rou's format passed into wider use, especially in the English dissenting academies, institutions established from the end of the seventeenth century to serve students excluded from Oxford and Cambridge on religious grounds. (And it was in these very academies that Joseph Priestley, the famous scientist and theologian who would revolutionize the field of chronography in the 1760s, first encountered them.)[4]

Eventually, in 1729, the abbé Nicolas Lenglet du Fresnoy, author of numerous pedagogical treatises—including the popular *Méthode pour étudier l'histoire* (Method for studying history)—published a similar work in France, the *Tables chronologiques de l'histoire universelle* (Chronological tables of world history).[5] To Lenglet du Fresnoy, the need to push the boundaries of synoptic representation seemed urgent. By the early eighteenth century, the field of published historiography was huge and rapidly growing: he estimated that it had already surpassed 30,000 volumes. Calculating on the basis of his own prodigious



HISTOIRE UNIVE
Detail Historiq. Genealogiq. et Chronologiq. de tout ce qui s'est pa
A N S
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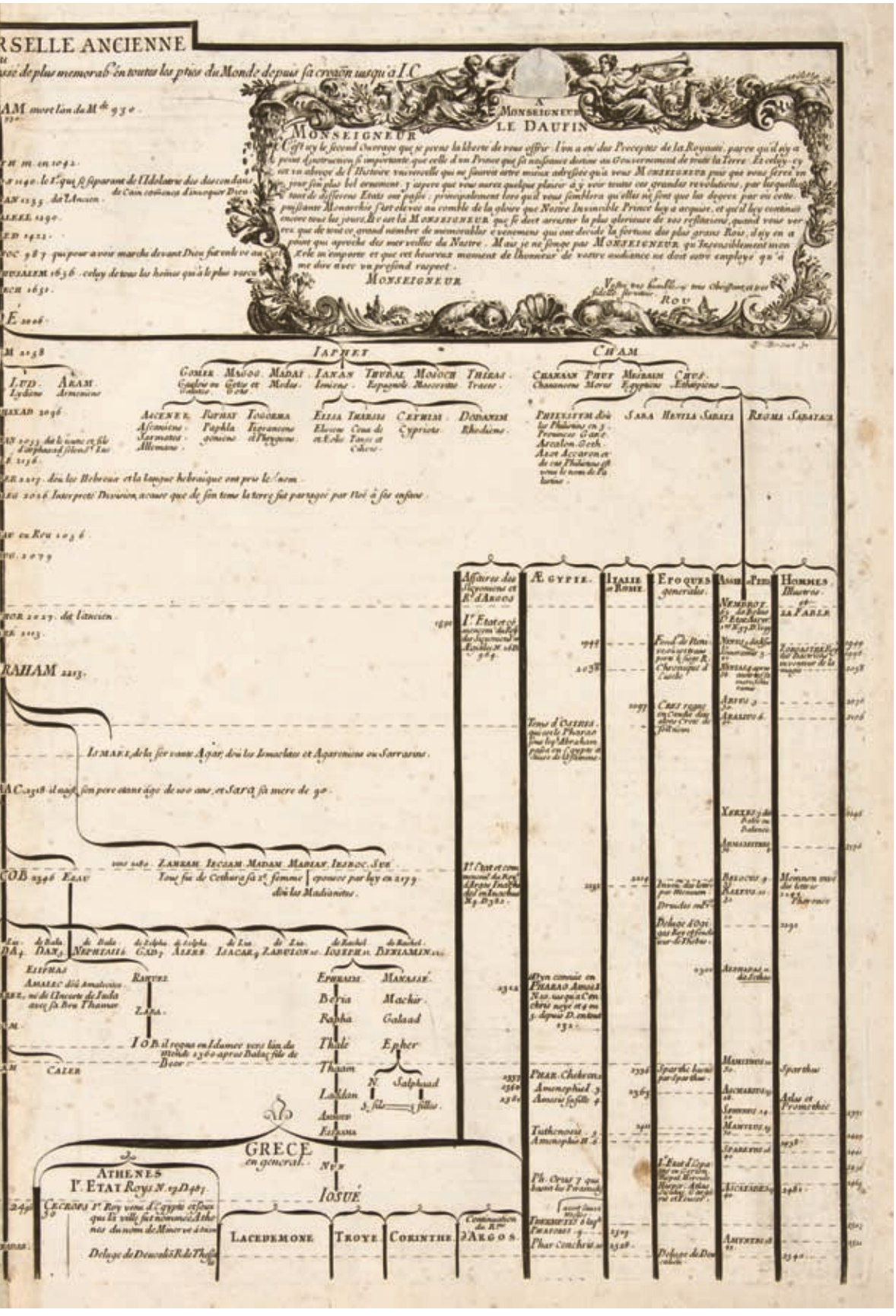
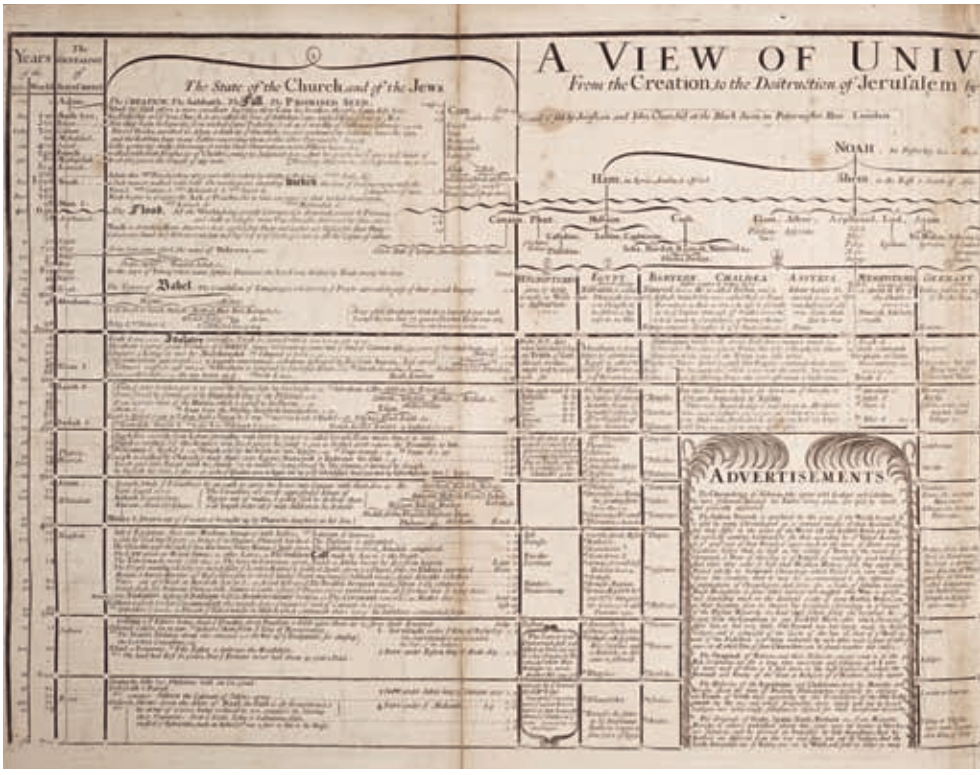


[1]

In 1672 the first volume of Jean Rou's elegantly engraved *Tables historiques, chronologiques, & généalogiques* on ancient history was received with acclaim in Paris, but after his modern history tables appeared in 1675, his works were banned for their perceived Protestant content. In 1682 the philosopher Pierre Bayle lamented that Rou's tables had become almost impossible to find.

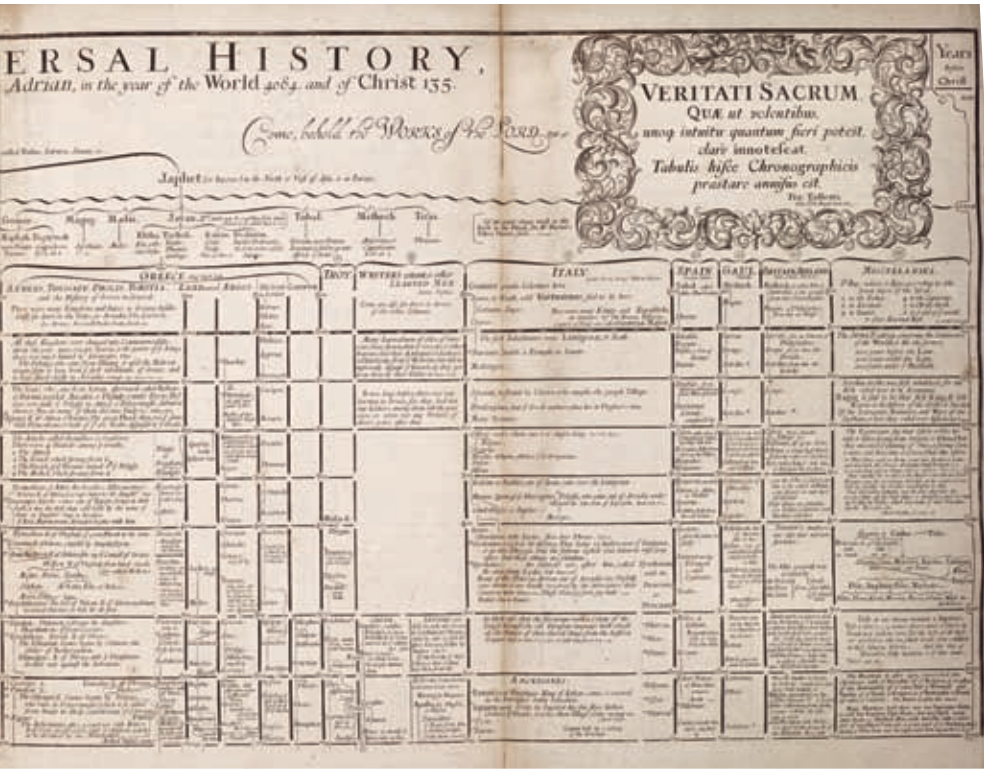


speed and endurance in reading—he sometimes read for fourteen hours a day—Lenglet du Fresnoy estimated that a diligent student could not hope to read more than 1,800 works of history without making unacceptable sacrifices in memory and comprehension. And, to assure good value for the intellectual labor, he recommended reading no more than 1,200 such works in a lifetime, a number which might allow a person to think "a little about what he reads."[6] Lenglet du Fresnoy was among the greatest eighteenth-century promoters of the study of chronology, but in his work, we can already detect its declining status. Even as he emphasized the importance of chronology, Lenglet du Frensnoy lamented that it was so little valued in relation to the prestigious field of history.[7]

During the late seventeenth century some chronographies grew; others shrank. [*figs.* **2–4**] Fine engraving techniques made tiny fonts practical, and by the 1680s the French writer Guillaume Marcel was publishing political and ecclesiastical chronologies in pocket size. Marcel's model was copied across Europe. In England, it was adopted by William Parsons, a former officer in the invading army of the Prince of Orange now an entrepreneur who saw a potential money-maker in this clever, portable object. The study of history, he reasoned, was popular enough and the subject matter messy enough that many people might like to have a small chronological cheat sheet to use while they read. Heavy tomes on chronology were all well and good, but what use were they to the regular reader?

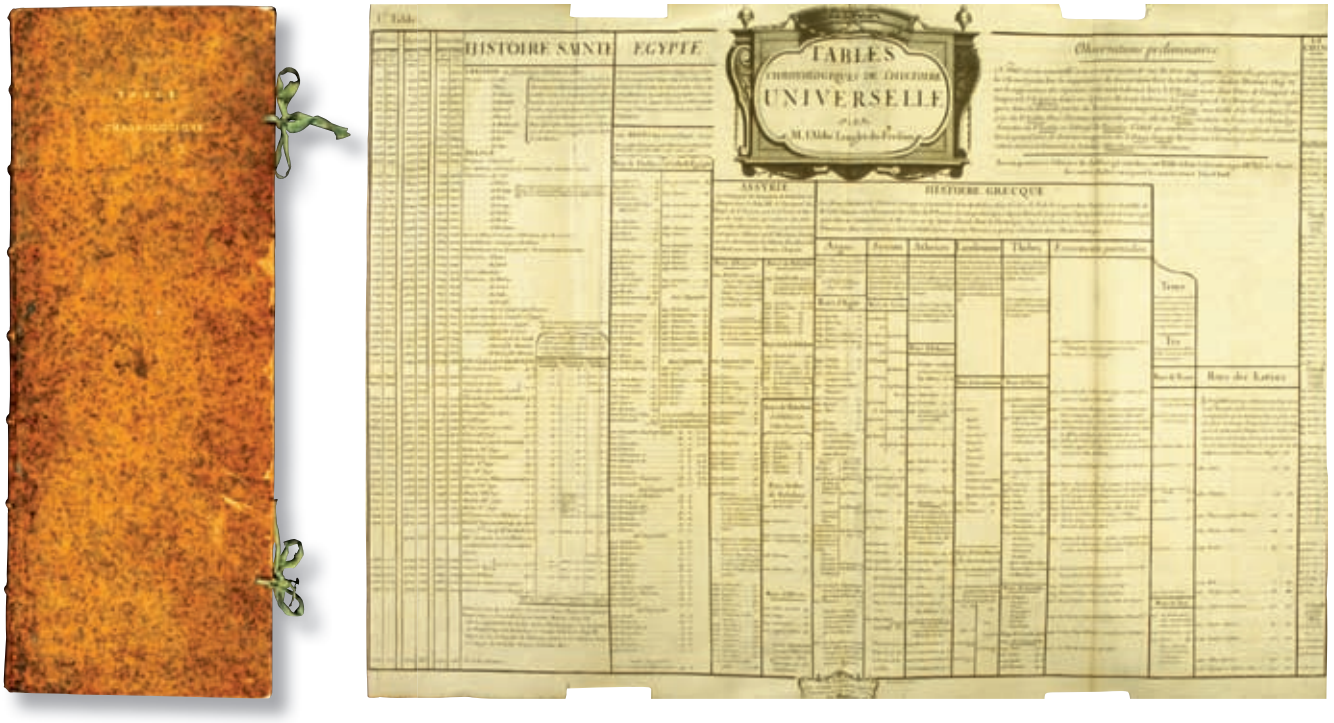
Parsons's chronography was finely tuned to the contemporary uses of books. [*figs.* **5–7**] For his first edition of 1689, he commissioned forty-three plates from the engraver John Sturt, simplified Marcel's complex layout and symbolic scheme, and reduced its size even further. As Parsons hoped, his new format was a commercial success, and many editions followed, selling 4,000 copies in about a decade.[8] Though Parsons prized miniaturization, he noticed that in some ways the tiny first edition sacrificed too much to considerations of size. The paper was too thin to write on easily, and there was precious little space in which to add annotations. He chose thicker, higher quality paper for his second edition and printed on only one side of each page, leaving the reverse free for notation.

The importance of new printing and engraving techniques in the chronographies of the later seventeenth century is evident too in lavish productions such as the charts from the *Lumen historiae sacrae* (Illuminations of sacred history) by Danish antiquarian Jens Bircherod, which blend figurative and allegorical elements with mountains of data.[9]



[2]

In his 1685 *A View of Universal History*, the nonconforming English minister and teacher Francis Tallents took up the same visual vocabulary used by Jean Rou a decade earlier. Tallents's tables were somewhat smaller, but, like Rou's, they performed an impressive feat of data compression. In these tables, dates are not regularly spaced. During the early ages of the world, especially, historical time appears to expand and contract according to the rhythms of generations and of important events.

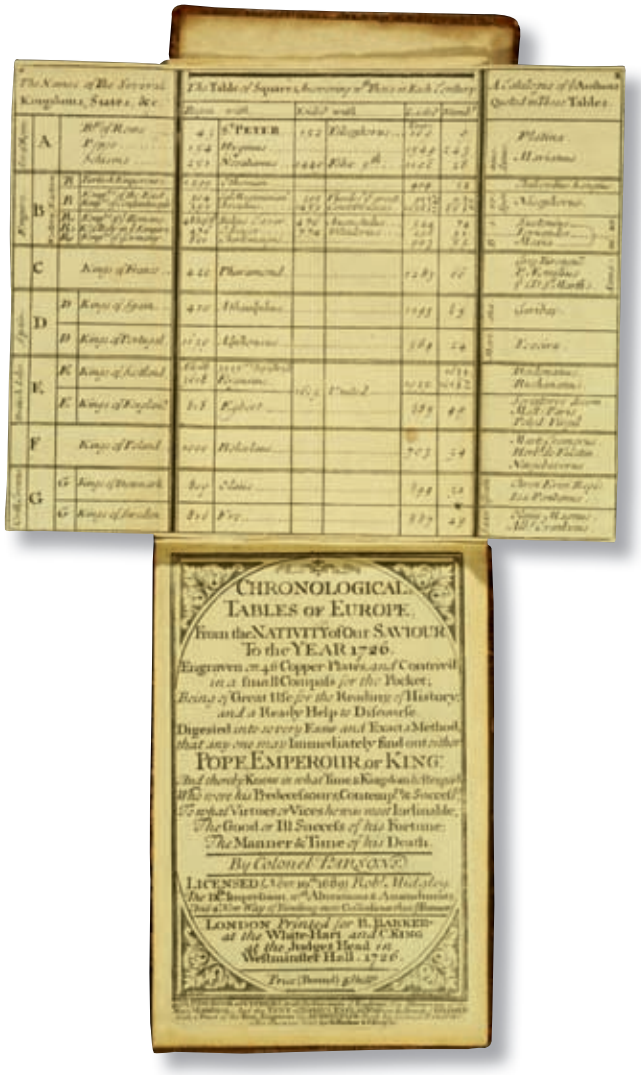


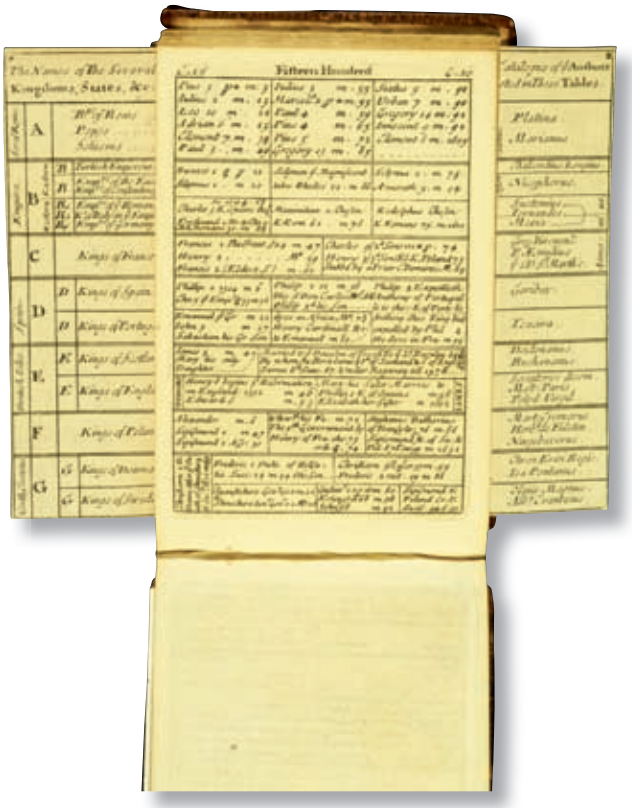
[3–4]

Nicolas Lenglet du Fresnoy, cover and interior of *Tables chronologiques de l'histoire universelle*, Paris, 1729

[5–6]

William Parsons, *Chronological tables of Europe, from the Nativity of our Saviour to the Year 1703: Engraven on 46 copper-plates, and contriv'd in a small compass for the pocket: Being of great use for the reading of history, and a ready help to discourse*, London, 1707. Parsons's chart book included a fold-out key inside the front cover so that users could easily understand the compressed notations on interior pages, as here, on the page for the sixteenth century.





[7]

William Parsons's pocket-sized *Chronological tables* (1707) sitting atop Johann Georg Hagelgans's huge *Atlas historicus.* (1718)

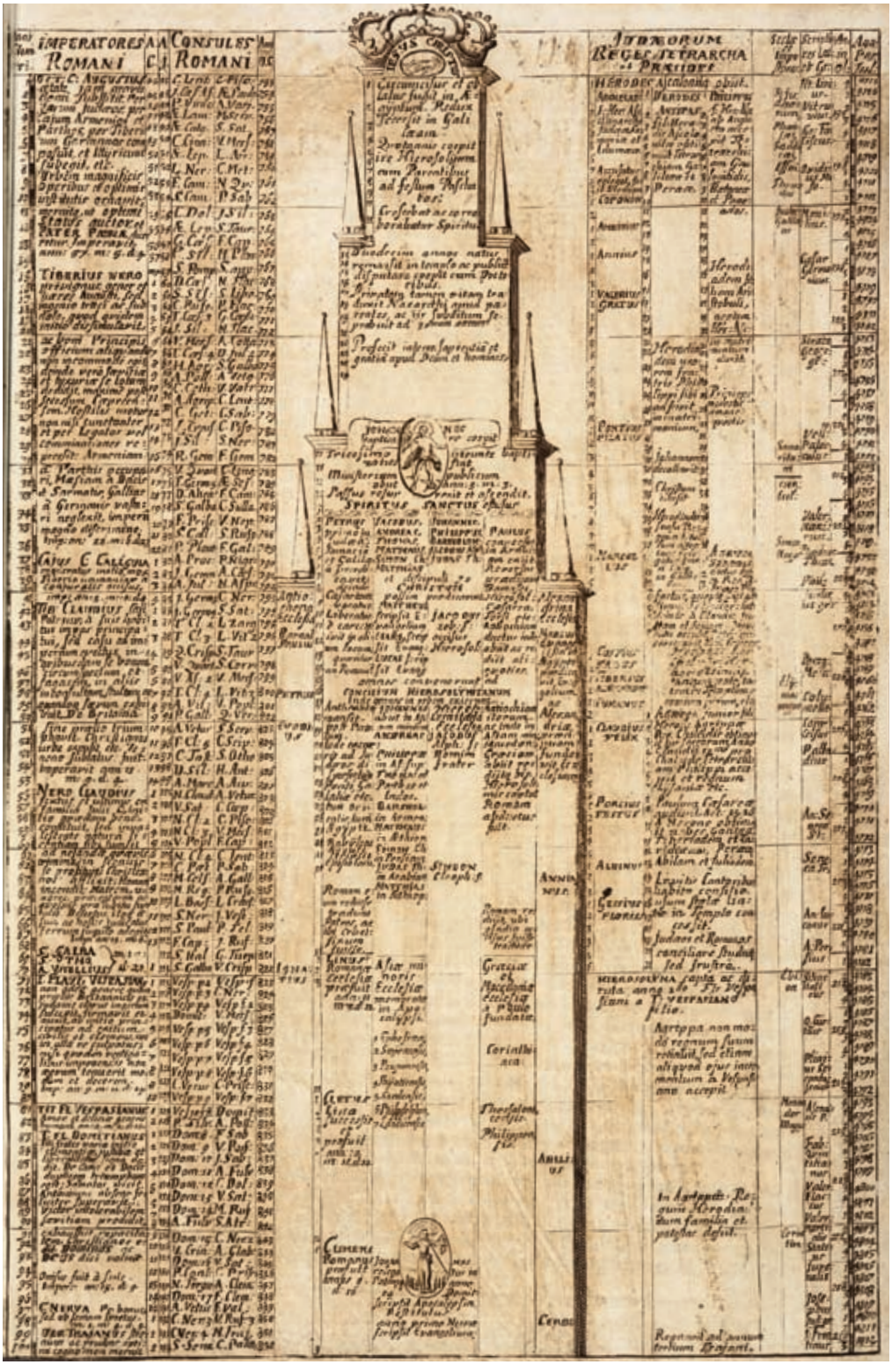
[8]

The *Lumen historiae sacrae veteris & novi testamenti per tabulas chronologicas* from 1687 by the Danish antiquarian Jens Bircherod begins with a set of several chronological tables, each organized differently. Though smaller than the charts of Rou and Tallents, Bircherod's are finely engraved, combining large amounts of data and pictorial and decorative elements.

[*figs.* **8–9**] In one chart, Bircherod figures the genealogy of Jesus as an inscription upon a neoclassical monument festooned with ribbons, fruit, and flowers. In another, the edifice of the Church forms a column in a Eusebian table. In a third, a table is interlaced with pictorial representations of the Creation. The chronological scales of Bircherod's tables vary, but each is sharply drawn, with a fine sense of both aesthetics and the practical demands of information design.

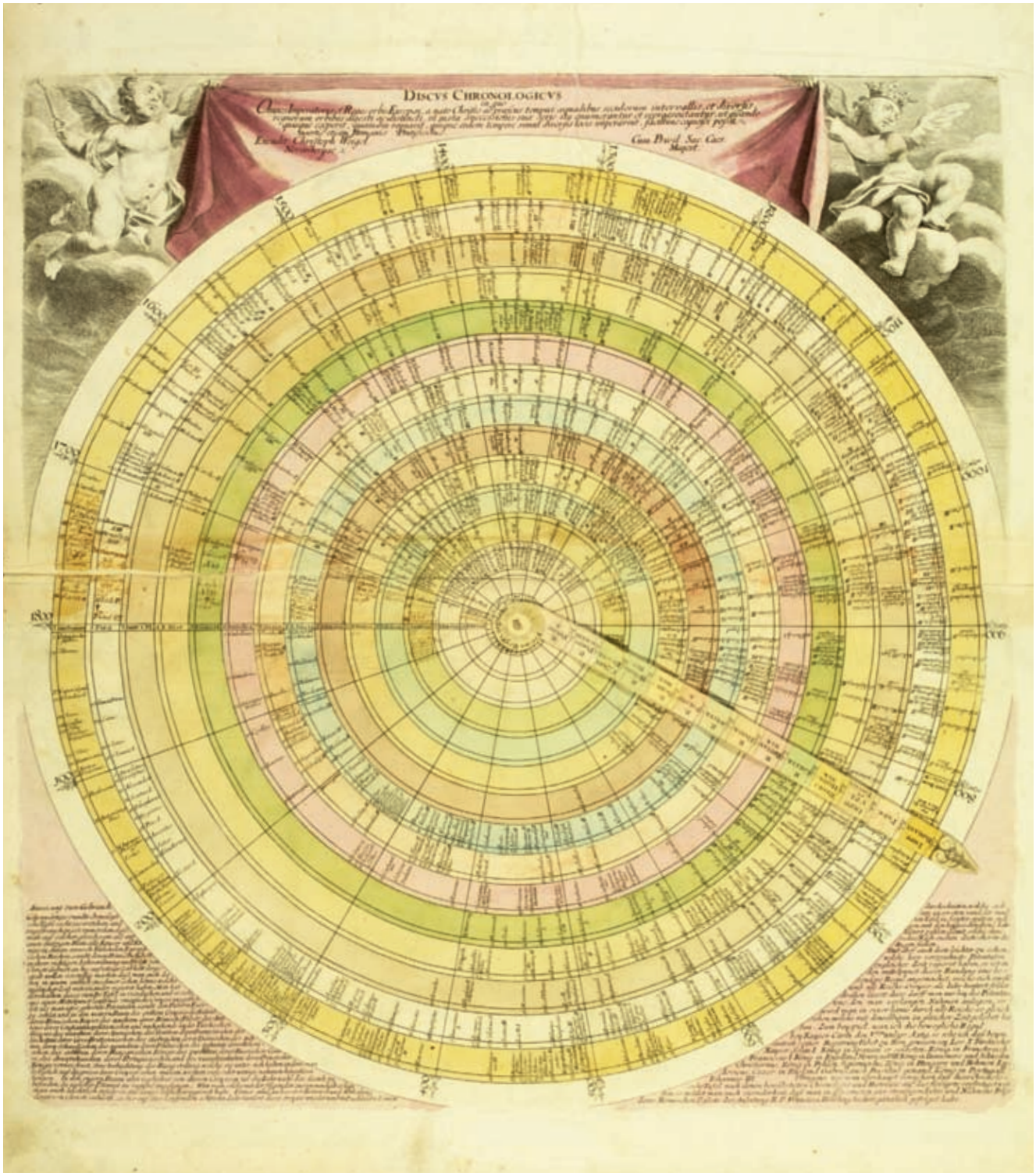
Even as chronographies became more visually precise and delicate, they continued to attract the bent nibs of their readers. [*fig.* **10**] A notable instance of manuscript annotation occurs in the Princeton University copy of *Discus chronologicus* (Chronological disc) created by the prolific German engraver Christoph Weigel around 1723. As its name implies, the *Discus* has the form of a circle. At heart, however, it is a Eusebian table, with columns for dates and rows for nations—only the columns here are radii, and the rows are concentric bands. The circular structure created challenges for annotators. In the classic Eusebian table, there is usually ample space for writing, as well as room for interleaving and additions at the end. But the closed circular form created by Weigel left little room for handwriting. As a result, the owner of this chart squeezed his or her notes on contemporary events into whatever blank spaces were available. The notes begin, as they should, in the slim wedge designated for the eighteenth century, then creep over into the chronologically distant but graphically continuous first century CE.

Other eighteenth-century scholars and engravers followed even more adventurous graphic paths. [*fig.* **11**] In 1718, German engraver Johann Georg Hagelgans published a political and military *Atlas historicus* (Historical atlas) that treated the Eusebian format in an imaginative new way. Like Lenglet du Fresnoy, Hagelgans blew up the page beyond folio size.[10] Then, in the matrix created by the traditional row and column format, he drew thousands of tiny images of soldiers, statesmen, and political figures from biblical times to the present. Hagelgans's tables were full of surprising visual twists. Chronological grid lines frame perspective images of biblical and historical scenes, and all over, trompe l'oeil openings reveal detailed tableaux hiding beneath the surface of the chart. Despite the huge scale of the work, Hagelgans aimed to be as visually efficient as possible. His *Atlas* came with a list of eighty symbols that indicated such details as the ways that kings died and how crowns were acquired. This permitted him to nearly do away with text while preserving and enlivening the old Eusebian matrix.



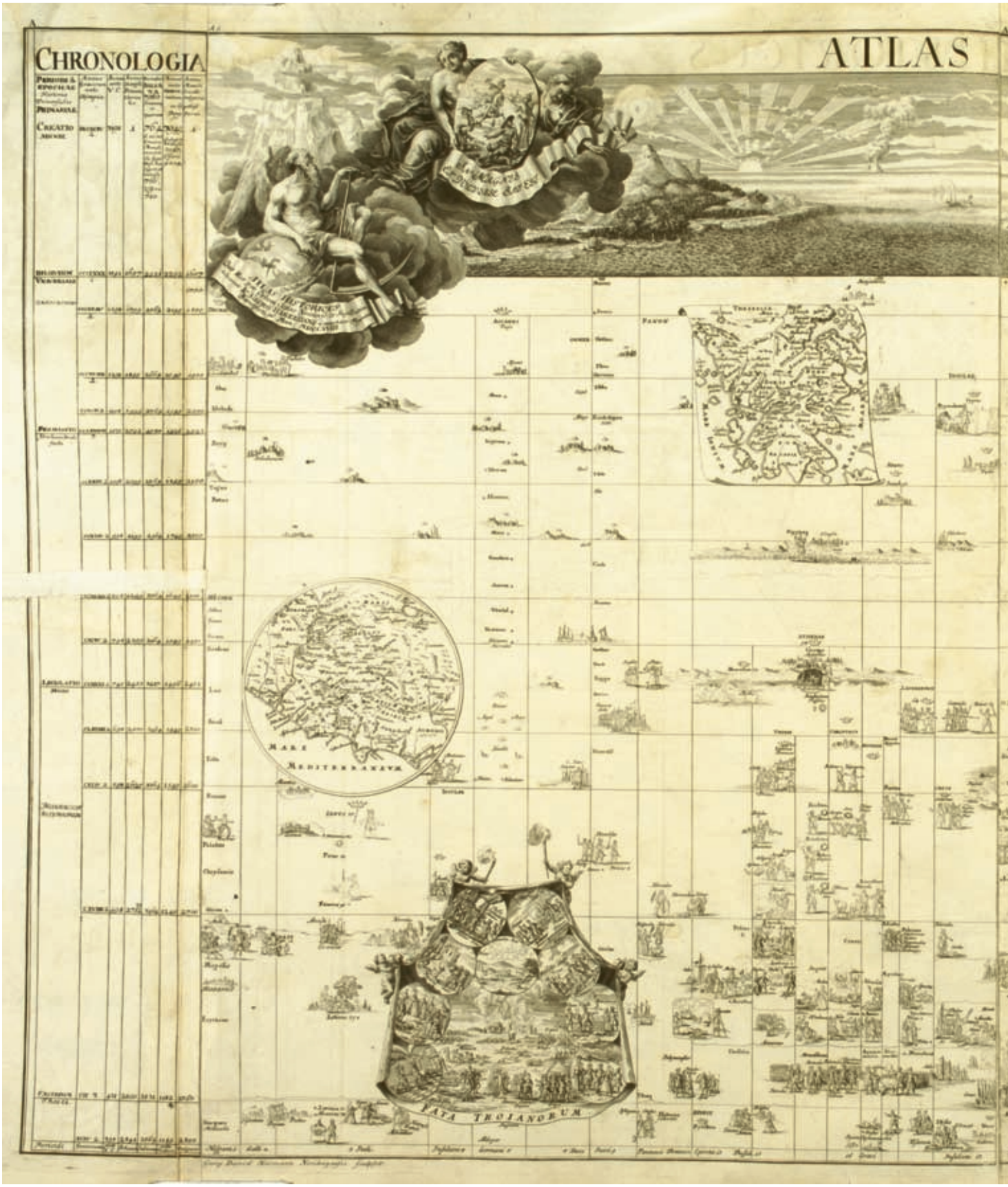
[9]

Traditional columns and elegant obelisks represented as part of a vast monument appear side by side in Bircherod's chronology of Roman history.



[10]

The aptly named *Discus chronologicus* published in the early 1720s by the German engraver Christoph Weigel is a volvelle, a paper chart with a pivoting central arm. The basic organization of data is inherited from Eusebius, but here the layout is circular with rings representing kingdoms and radial wedges representing centuries. The names of kingdoms are printed on the moveable arm. On this Princeton University copy a reader has inscribed events from contemporary history in the blank spaces of the eighteenth-century wedge, at one point carrying over into the contiguous space of the first century CE.


CHRONOLOGIA
ATLAS
MARE
MEDITERRANEVM
FATA TROIANORVM

[11]

The chronological chart of the Creation and the first epoch of world history from the *Atlas historicus* published by the Frankfurt engraver Johann Georg Hagelgans in 1718 pushed the limits of what could be expressed in the classic tabular format of Eusebius. Though Hagelgans maintained the familiar historical matrix in the background, his enormous charts burst through everywhere with images, maps, and data.

Other works, such as the "historical maps" of the Italian poet and scholar Girolamo Andrea Martignoni, dispensed with Eusebian format altogether.[11] [*figs.* **12–14**] In several finely engraved charts published in 1721, Martignoni made a striking visual analogy between geographic space and historical time. Though he calls them maps, Martignoni's works are not historical maps in the conventional sense of geographical snapshots from different moments in history: they are chronological charts presented in a cartographic form. While, at a glance, they seem to depict a circular territory with a great lake at the center and rivers running to and fro, on examination, these rivers and land masses turn out not to be landscape features but temporal metaphors—territories of history and rivers of time. The streams at the top of the chart represent the nations conquered by the Roman Empire; those at the bottom, the nations that emerged from it; and the great lake at the center, the empire itself.

Like Hagelgans, Martignoni attempted, as much as possible, to suppress text on his chart. His aim was to draw the reader into a visual experience of information. And, just as in Hagelgans's work, here the results are mixed: the charts are often awkwardly symbolic, particularly when coded icons are combined. When a king dies while still on the throne, the event is marked by a tiny skull; when two thrones are joined by marriage, this is marked by a ring; when a king dies and a queen succeeds him, a skull appears next to a ring, to a somewhat sinister effect. But the true difficulties of Martignoni's chart are of a different order. Geographical space, it turns out, obeys different rules of contiguity and continuity than does historical time. Conquests of distant lands, complicated dynastic alliances, marriages, remarriages, and so forth, pose tricky problems for the geographic metaphor. On Martignoni's map, rivers often pass over other rivers, others double back, landforms are repeated, and laws of gravity and fluid mechanics are everywhere defied.

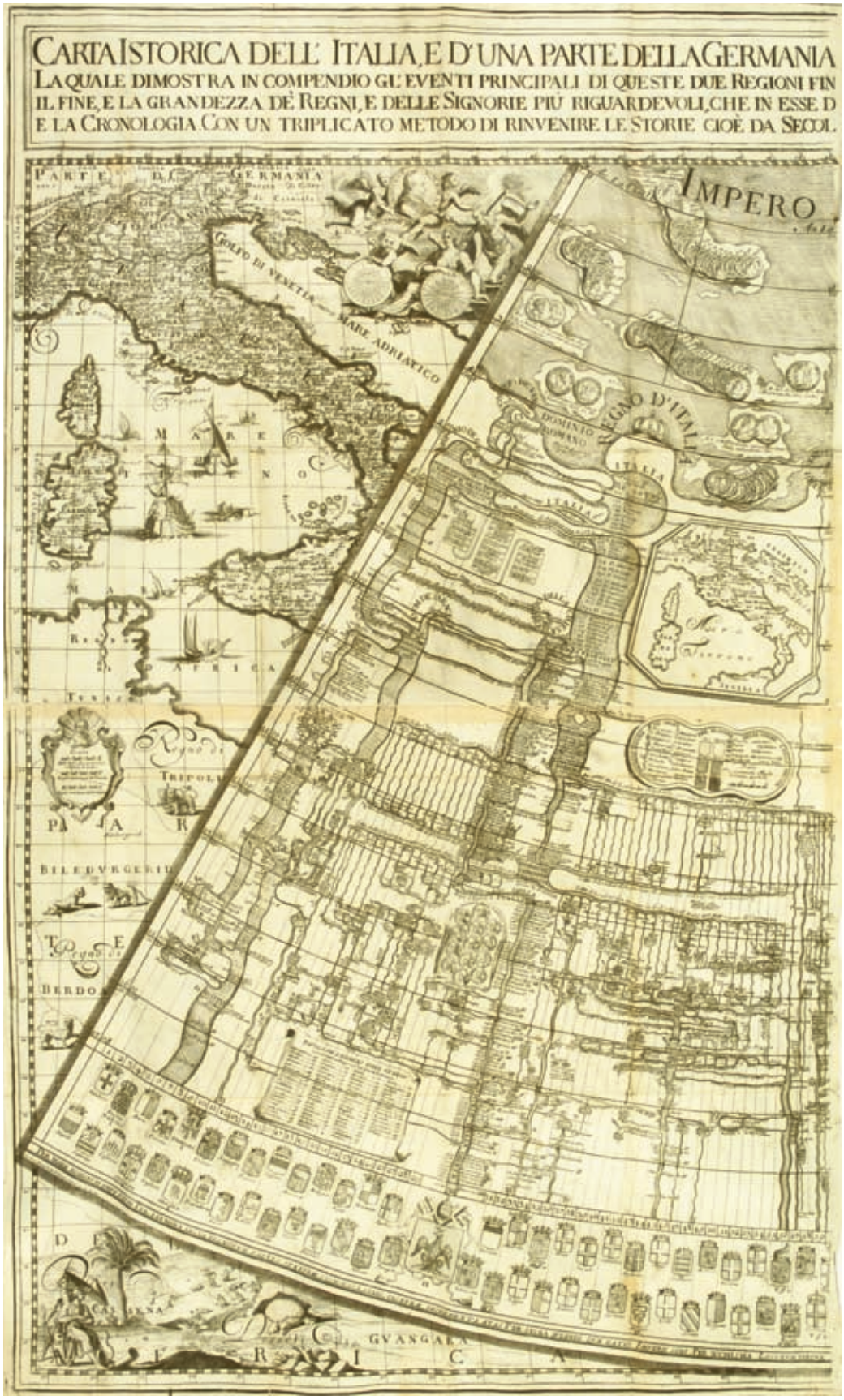
Martignoni's work offered one of the first systematic visualizations of the stream-of-time metaphor, but it was far from the last. Later chronographers would take a simpler approach, using the image of the river to demonstrate only the greater movements of history, not the fine details that led Martignoni into so many eddies and backwaters. None of this is to devalue the attempt. Like Hagelgans, Martignoni stretched what could be shown in a single view to the very limit. Though a riot of visual contradictions, his work suggested what might be possible if a map of time could be drawn in a consistent manner.

[12]

Girolamo Andrea Martignoni,
Spiegazione della carta istorica dell'Italia
(Historical map of Italy), Rome, 1721

[13–14]

The historical charts published by the Italian scholar and poet Girolamo Andrea Martignoni in 1721 imitated cartographic forms. What appear at first to be world maps are in fact hybrid charts combining geographic and chronographic information. The large rivers here are rivers of time. Martignoni's model was not widely copied, but it vividly illustrates the eighteenth-century pursuit of a new visual vocabulary for the time map.




DALLA NASCITA DI GIESÚ CRISTO ALL' ANNO MILLESETTECENTO
CHÈ DURÒ L' IMPERO ROMANO, E DAPPOI L' ORIGINE, L' ACCRESCIMENTO LA DIMINUZIONE
ERIVARONO, I TITOLI DE' DOMINI, LE DIGNITÀ, LA SERIE DEI RÈ, LE ARME, LA GEOGRAFIA
O IN SECOLO, DA SUCCESSO IN SUCCESSO, E DA SIGNORIA IN SIGNORIA
ROMANO
OCEANO GERMANICO
MARE BALTICO
G E R M A N I A
SICILIA
TARGA

For the rest of the eighteenth century, the problem of regularization and measurement dominated new chronographic representation. [*figs.* **15–17**] Not all efforts were equally successful. One of the most ambitious works of the period was the linear *Chronographie universelle* (Universal chronography) published in 1753 by Jacques Barbeu-Dubourg—a friend of Benjamin Franklin and an associate of the Encyclopedists—which extended the tabular approach of Eusebius into the graphic sphere of the eighteenth-century engravers.[12] Following the logic of cartography, Barbeu-Dubourg imposed a rigorously uniform graphic scale on his chart, marked out by linear segments with the look of measuring rods. Visual regularity, in itself, was not new, and some sixteenth- and seventeenth-century works, such as those of Gerardus Mercator and Ubbo Emmius, had ventured in the direction of the measured line. Both of their works were typographically beautiful and simple; and both went on for pages and pages presenting only a time scale with little or no information surrounding it. Still, there is an important difference between their works and that of Barbeu-Dubourg. Although the earlier chronographies define a linear graphic space, they do so in only the rough terms of typography. Barbeu-Dubourg's engraved chart, by contrast, allows the reader to measure time with great precision—and the second edition of his work from 1838 came equipped with a small brass tool for doing just that.[13]

Barbeu-Dubourg's chart took the principles of regularity and encyclopedism to their logical end: his chart was huge. In fact, at 54 feet long, it was very difficult to display all at once. But Barbeu-Dubourg made a virtue of necessity. Though his *Chronographie universelle* could be purchased as an accordion book that could be unfolded to the full 54 feet, it was designed to be scrolled and viewed one section at a time. To this end, it could be mounted on an apparatus that Barbeu-Dubourg called a "chronographic machine," a custom box fitted with metal scrolls and cranks. Barbeu-Dubourg's time machine was hinged at the center, so that it could be opened on any surface and advanced freely, allowing the user to move with ease backward and forward over great stretches of world history. Though never commercially successful, it achieved perhaps the highest honor of the period, a dedicated entry in the *Encyclopédie* of Diderot and d'Alembert.

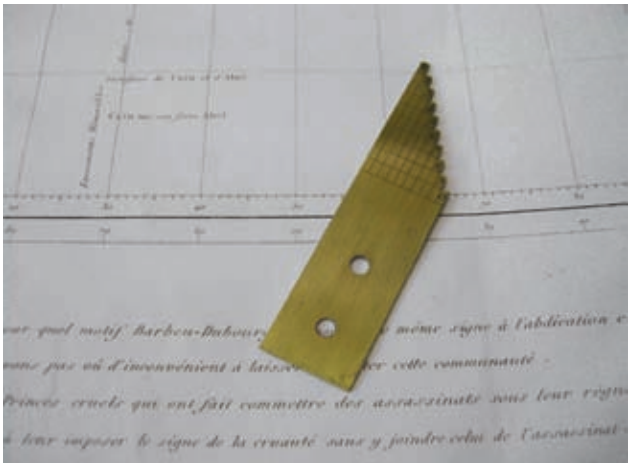
The 1750s saw the publication of other important chronographies as well. [*fig.* **18**] In England, at just about the time that Barbeu-Dubourg's machine first appeared, the cartographer Thomas Jefferys released *A Chart of Universal History*, a work that attempted to resolve the difficulties

[15–16]

Princeton University's still-functional copy of Jacques Barbeu-Dubourg's 54-foot-long *Chronographie universelle*, mounted on cranks and enclosed in a case. Cranking from left to right, the scroll reveals a continuous, measured timeline of history from the Creation to the present day.

[17]

Chronological measuring stick sold with the 1838 edition of Jacques Barbeu-Dubourg's *Chronographie universelle*.

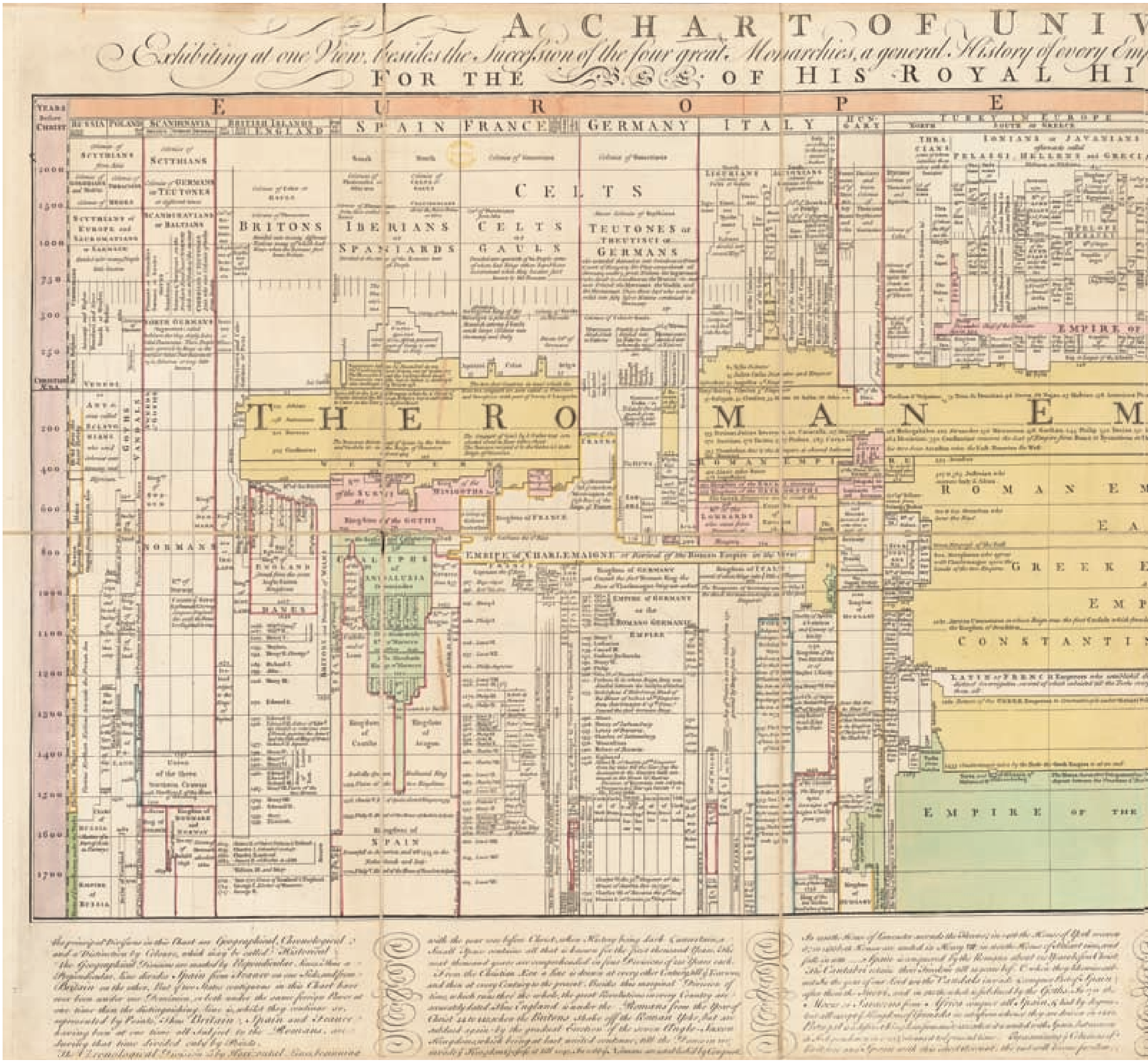


of the cartographic approach in a different way.[14] Like the *Chronographie universelle*, Jefferys's *Chart of Universal History* commences from a conventional premise. As in the tables of Eusebius, on Jefferys's chart nations are named in a row at the top of the page, while dates descend in a column down the side. And, just as in the older tables, events may be located by cross-referencing date against place. But this is where the similarities end.

In the first place, Jefferys's chart is synoptic: it displays all of its data in a single, continuous plane, visible all at once. It is, of course, possible to confine a standard Eusebian table to one page, and this is what Jean Boulaese had done when he condensed and reformatted Eusebius as a broadside. But, beyond abridgement, most such efforts offered no real functional advantage over the codex format. Unlike Boulaese—and unlike Helvicus and others who had produced codex chronicles with uniform pages—Jefferys did not divide his data into discrete, indexed cells but made the space of the chart a continuous field. Thus, while the content of his chart is similar to that of a traditional table, the force of demonstration is essentially inverted. The older form directs our attention to the historical content of a given time/space; Jefferys's new approach directs it to the temporal boundaries of historical entities and events.

Some of the advantages of the Eusebian format are clearly sacrificed in Jefferys's approach. Because his chart is continuous rather than cellular, it does not divide easily, and so—while it works beautifully as a chart—it translates less well into the form of a bound book. His chart is built to be scanned visually like a geographic map, not indexed by row and column. But the advantages of Jefferys's approach are equally clear. In contrast to the Eusebian table, Jefferys's chart not only *gives* dates, it *shows* them in a highly intuitive format. Empires such as that of Alexander the Great, which were geographically vast but short-lived, look like pancakes, short and wide. Others such as the Byzantine, which were geographically compact but long-lived, look like reeds, tall and narrow. Empires that were both large and long-lived such as the Roman and Ottoman appear as great colored blocks. Identically colored fragments scattered here and there indicate regions belonging to a single empire.

But because Jefferys's chart is not a geographic map, relative placement can be deceiving. On it, France and Germany are separated by Italy; and Egypt is sandwiched between China and South America. Size is also deceptive in many cases: Jefferys devotes as much space on the chart to Italy as he does to India, and more to Spain than to


A CHART OF UNIV
Exhibiting at one View, besides the Succession of the four great Monarchies, a general History of every Emp
FOR THE
OF HIS ROYAL HI
E U R O P E
RUSSIA
POLAND
SCANDINAVIA
BRITISH ISLANDS
ENGLAND
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FRANCE
GERMANY
ITALY
TURKEY IN EUROPE
SCYTHIANS
CELTS
BRITONS
IBERIANS or SPANIARDS
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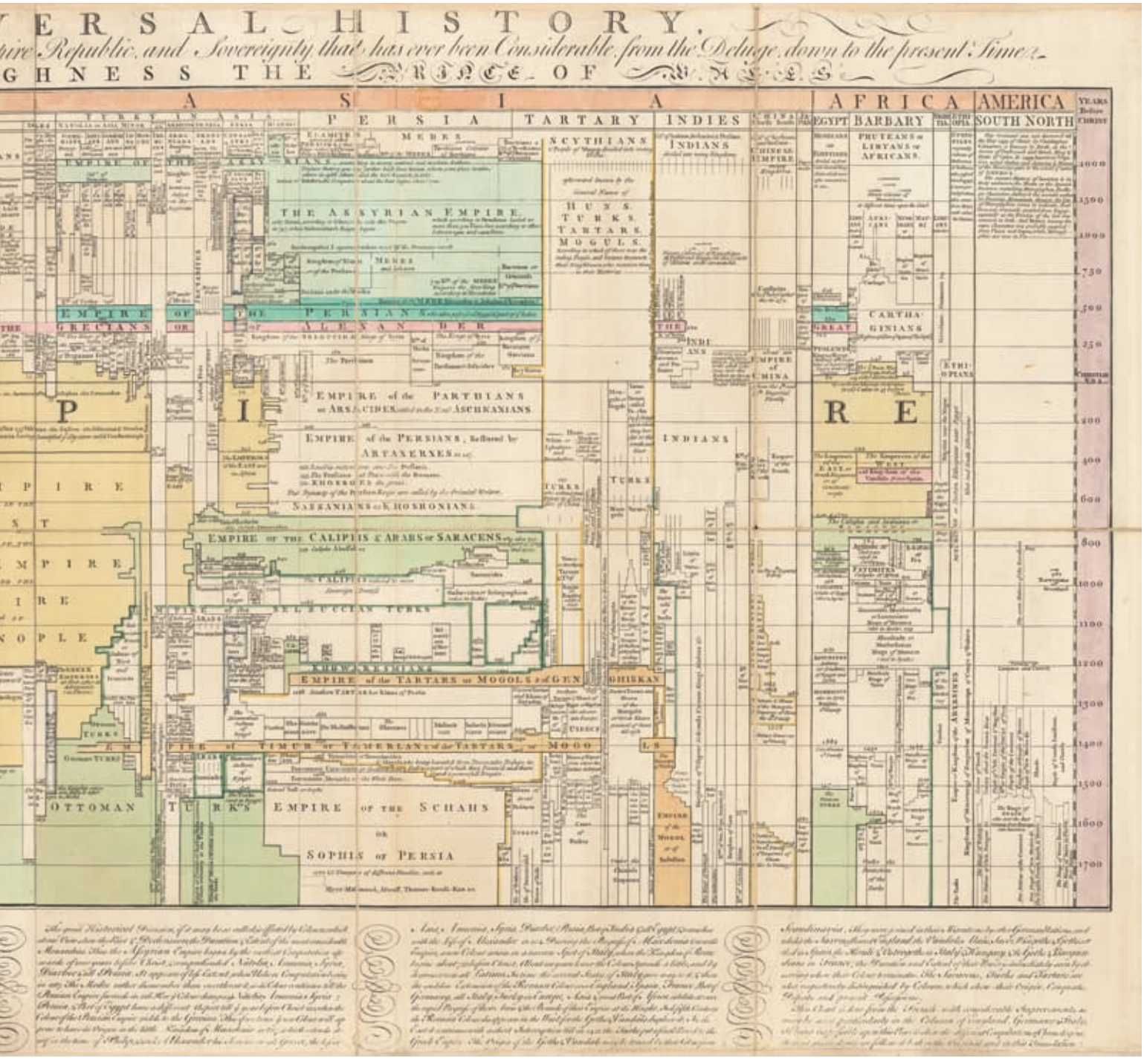


[18]

A Chart of Universal History was published in 1753 by the prolific cartographer-engraver Thomas Jefferys, apparently on a French model. The chart directly influenced Joseph Priestley, though Priestley objected to several elements including its lack of uniform scale. In 1760, Jefferys was named geographer to George III, a post he held until his death in 1771. His greatest achievements include the *General Topography of North America* of 1768.

North and South America combined. The chart is proudly Romanocentric, situating the Roman Empire at the very heart of world history and geography. Even so, it has the powerful effect of demonstrating the impermanence of all empires. In the terms of the chart, geographic nations persist throughout history, but every empire—even the imposing empire of Rome—is an island or an archipelago in time.

Remarkable as it was, the *Chart of Universal History* came and went quickly; a single lonely copy still resides in the British Library. Its greatest impact came not directly but by way of its influence on the scientist and theologian, Joseph Priestley, one of the best-known writers of his day. When Jefferys's chart appeared, Priestley was twenty years old and starting his career. He had yet to embark upon the research that would lead to his discovery of "dephlogisticated air" in 1774 or the ensuing controversy with the French scientist Antoine Lavoisier, who offered a competing explanation for Priestley's discovery and a competing term, "oxygen."

Priestley held a job as a teacher in a provincial dissenting academy where he gave courses on many subjects including history. And, to this end, he read a great deal of history and consulted whatever good reference works he could find, including those of Thomas Jefferys, Nicolas Lenglet du Fresnoy, and Francis Tallents. Out of these teaching years came important works on history, politics, and education, some of which were very widely read, among them his 1788 *Lectures on History and General Policy*. Two of the most enduring were his engraved double-folio charts of chronology, *A Chart of Biography* from 1765 and *A New Chart of History* from 1769.

To anyone who had seen Jefferys's chart, the conceit of Priestley's would have come as no surprise. [*figs.* **19–20**] Priestley appropriated Jefferys's basic layout and some of his visual concepts, but he also innovated in crucial ways. Jefferys brought to the chronographic project the vision of an engraver: his chart demonstrated just how much could be done within the confines of a single page. Priestley, by contrast, brought it the vision of a scientist: he was the first chronographer to conceptualize his charts in terms similar to those of scientific illustration, and he was the first to lay out systematic principles for the translation of historical data into a visual medium.

Priestley's charts were elegant and big—more than three feet wide and two feet tall. The *Chart of Biography* was large enough to accurately register the births and deaths of two thousand famous historical figures, virtually all of them men, across three thousand years in "universal time"; the *New Chart of History* displayed the fates of seventy-eight

important kingdoms and empires during the same period.[15] Both works could be purchased as posters or as scrolls wound up on rollers, and they were aggressively marketed by Priestley's London publisher.

Priestley designed his charts for the curiosity and pleasure of a general reader, but they were also meant to serve the scholar—and Priestley believed that the two aims were well served by the same approach. Faced with these charts, Priestley said, any child could recognize the error of the "tasteless chronologer" who through tortured calculations had managed to separate the lovers Dido and Aeneas by more than three hundred years.[16] A simple visual demonstration, Priestley said, would be enough to put an end to a controversy that had worried commentators on Virgil since the time of Petrarch at least.

Priestley's charts are masterpieces of visual economy. Both the *Chart of Biography* and the *New Chart of History* obey strict graphic conventions. Along their top and bottom edges, the charts are marked at intervals of one hundred years. Between these century marks, small dots indicate decades. Dates inscribed at top and bottom are connected by vertical grid lines to make the chart easy to read. In addition, the *Chart of Biography* is divided into six horizontal bands representing areas of life achievement. The uppermost is devoted to Historians, Antiquaries, and Lawyers; the next, to Orators and Critics; Artists and Poets; Mathematicians and Physicians; Divines and Metaphysicians; and finally, at the very bottom of the chart, Statesmen and Warriors.

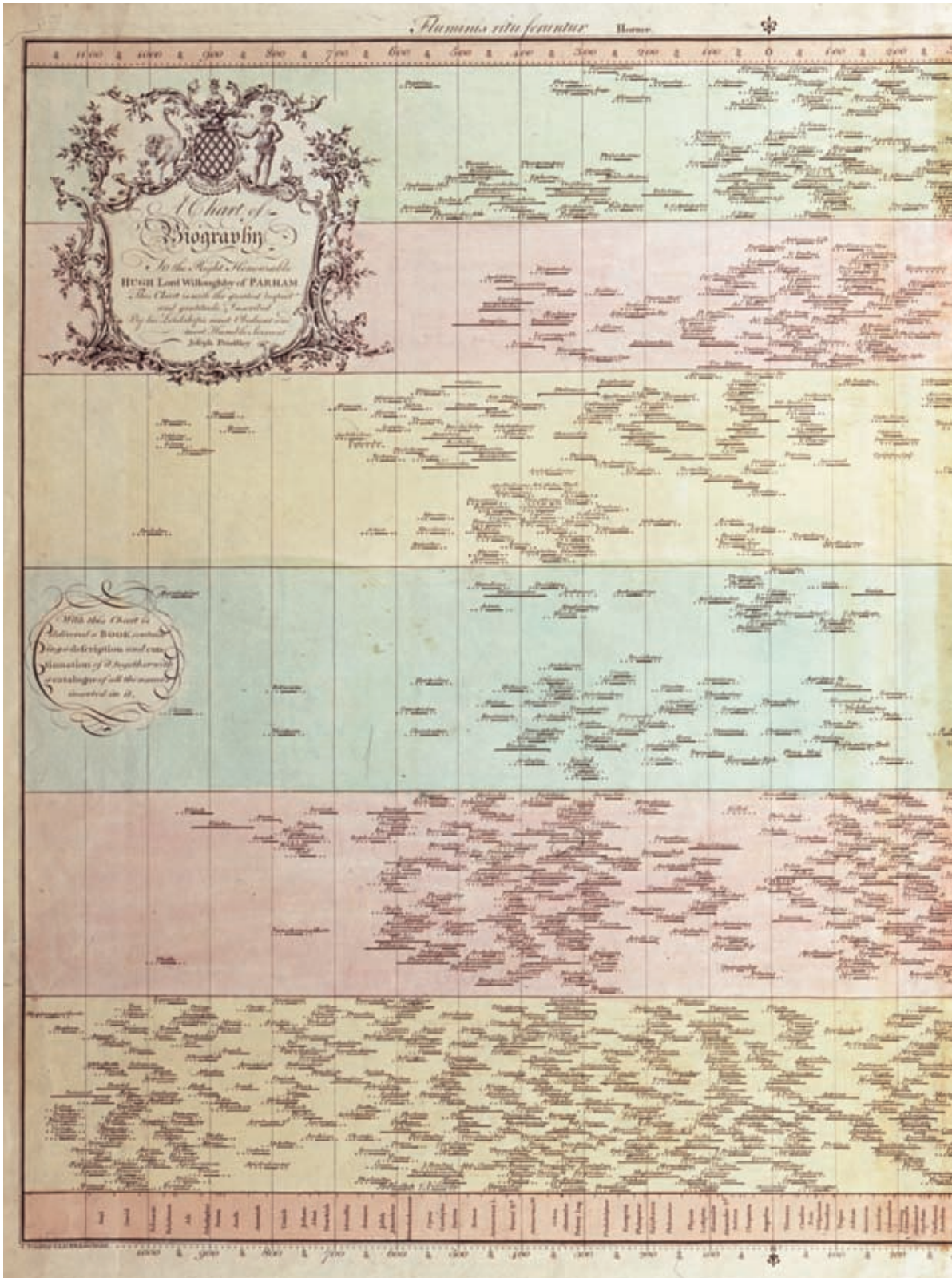
The interior of the *Chart of Biography* is filled with about two thousand small solid black horizontal lines representing the lives of famous individuals. When Priestley was certain of dates of birth and death, he began and ended these lines cleanly at the appropriate place on the chart. When he was uncertain, he began or ended a line with an ellipsis. Even these ellipses were carefully drawn: "When it is said that a writer *flourished* at or *about* a particular time, a short full line is drawn about two thirds before and one third after that particular time, with three dots before and two after it; because, in general, men are said to flourish much nearer the time of their death than the time of their birth."[17]

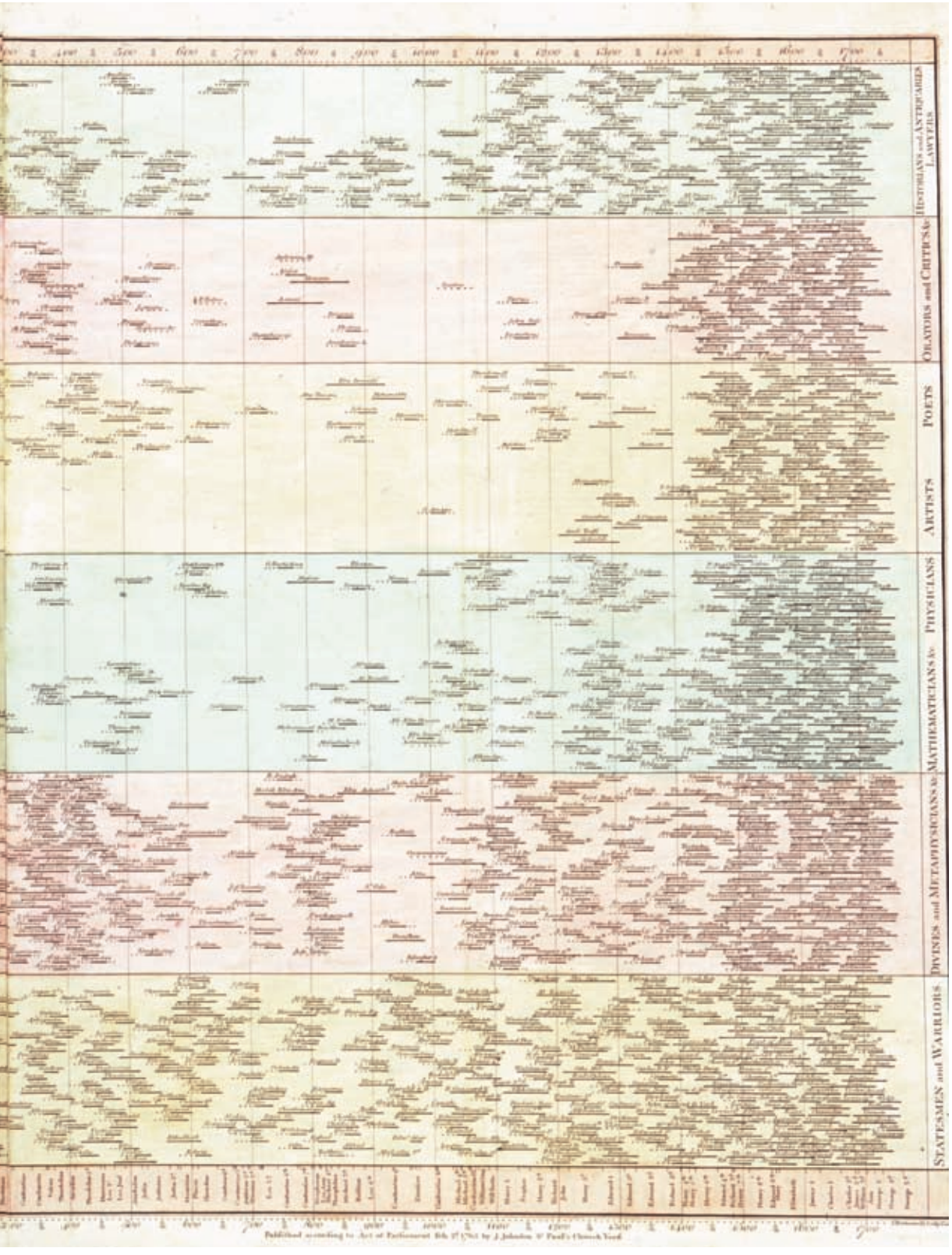
The biographical chart displays a striking simplicity of form. Priestley meant his chart to be an "ocular demonstration" of the mathematical principles that Isaac Newton had applied in his own (posthumously published) chronological writings.[18] There, Newton argued that many chronological controversies could be settled if the distance between generations were estimated according to mathematical averages. One of his followers, John Craig, had even tried

[19]

Joseph Priestley's *A Chart of Biography* from 1765 was the most influential timeline of the eighteenth century. Dates run horizontally at a regular pace along the top and bottom margins. More than two thousand tiny lines show the lives of famous men. The life lines are divided into six categories arranged as horizontal bands: Historians, Antiquarians and Lawyers; Orators and Critics; Artists and Poets; Mathematicians and Physicians; Divines and Metaphysicians; Statesmen and Warriors. In the bottom margin of the chart a list of important kings is given, from Saul to George III.

Courtesy of the Library Company of Philadelphia

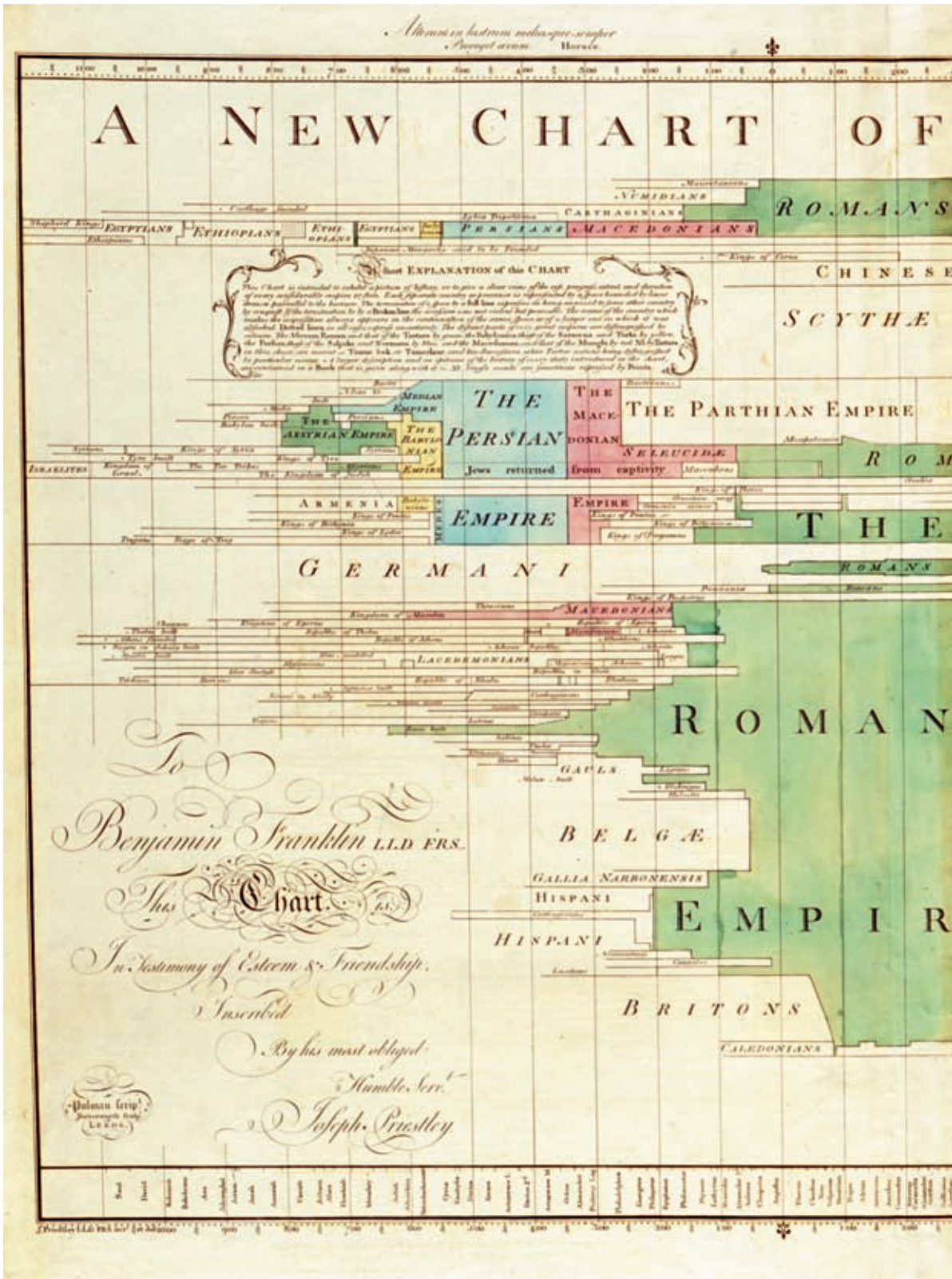


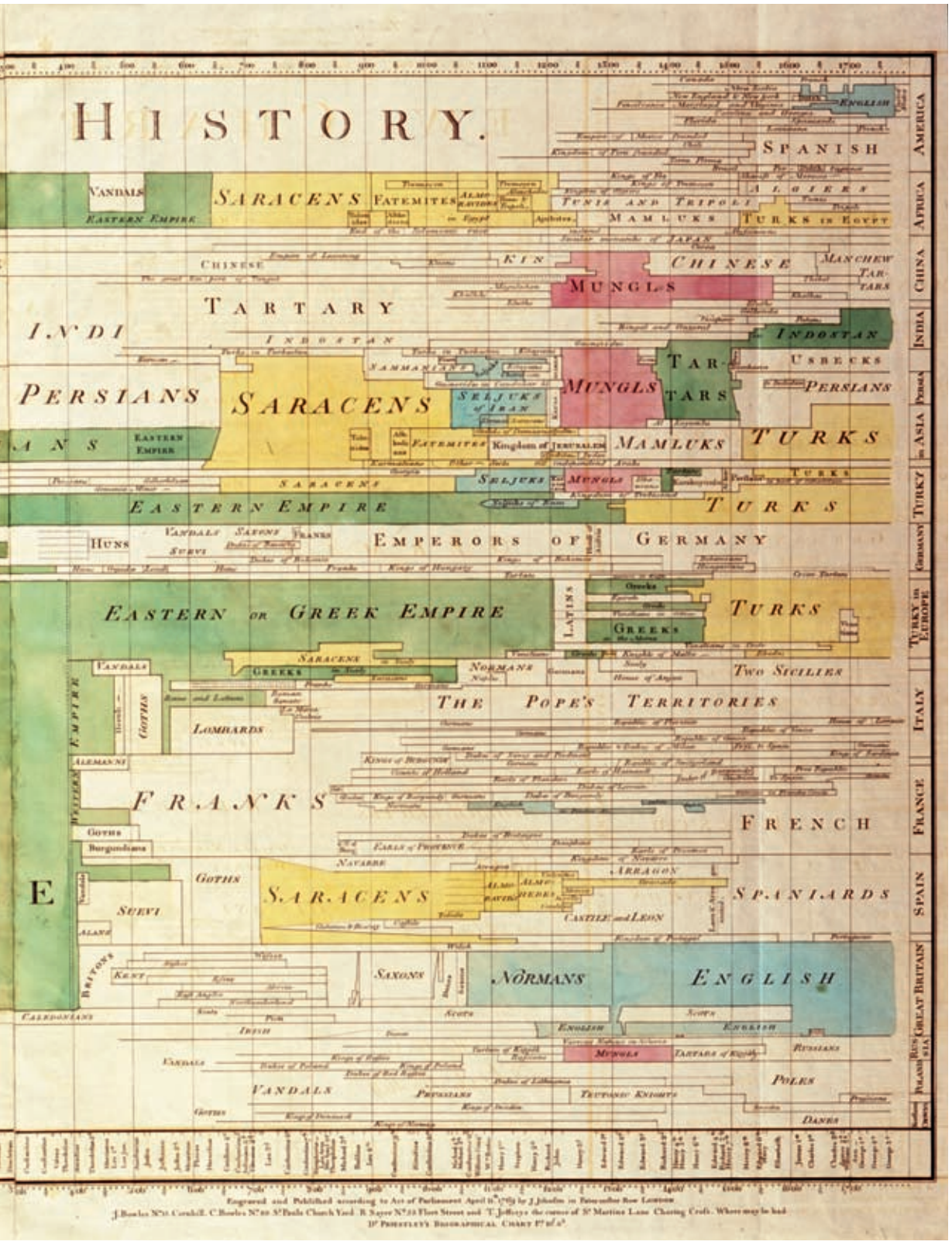

Historians and Antiquaries
Lawyers
Orators and Critics
Poets
Artists
Physicians
Mathematicians &c
Divines and Metaphysicians
Statesmen and Warriors

[20]

In 1769 Joseph Priestley published *A New Chart of History*, hewing more closely to Thomas Jefferys's model for a historical chart. Priestley regularized the distribution of dates on the chart and oriented it horizontally to emphasize the continuous flow of historical time. Priestley's two charts obeyed the same scale so that data from one could be lifted directly and moved to the other.

Courtesy of the Library Company of Philadelphia




HISTORY.
AMERICA
AFRICA
CHINA
INDIA
PERSIA
ASIA
TURKY
GERMANY
TURKY in EUROPE
ITALY
FRANCE
SPAIN
GREAT BRITAIN
POLAND
RUSSIA
SPANISH
VANDALS
EASTERN EMPIRE
SARACENS
FATEMITES
ALMORAVIDES
in Egypt
TUNIS AND TRIPOLI
ALGIERS
MAMLUKS
TURKS in EGYPT
CHINESE
KIN
CHINESE
MANCHEW TARTARS
MUNGLS
TARTARY
INDOSTAN
USBECKS
PERSIANS
SARACENS
SELJUKS of IRAN
MUNGLS
TARTARS
FATEMITES
Kingdom of JERUSALEM
MAMLUKS
TURKS
SELJUKS
MUNGLS
TURKS
EASTERN EMPIRE
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HUNS
VANDALS
SAXONS
FRANKS
SUEVI
EMPERORS OF GERMANY
EASTERN or GREEK EMPIRE
LATINS
GREEKS
TURKS
SARACENS
GREEKS
NORMANS
TWO SICILIES
THE POPE'S TERRITORIES
VANDALS
GOTHS
LOMBARDS
ALEMANNI
FRANKS
FRENCH
GOTHS
BURGUNDIANS
NAVARRE
ARRAGON
GOTHS
SARACENS
SUEVI
CASTILE and LEON
SPANIARDS
ALANS
BRITONS
KENT
SAXONS
NORMANS
ENGLISH
CALEDONIANS
IRISH
SCOTS
ENGLISH
SCOTS
ENGLISH
VANDALS
MUNGLS
TARTARS of KAZAN
RUSSIANS
VANDALS
PRUSSIANS
TEUTONIC KNIGHTS
POLES
GOTHS
DANES
Engraved and Published according to Act of Parliament April 1st 1765 by J. Jefferys in Pater noster Row LONDON
J. Bowles N°13 Cornhill. C. Bowles N°69 St Pauls Church Yard. R. Sayer N°53 Fleet Street and T. Jefferys the corner of St Martins Lane Charing Cross. Where may be had
D° PRIESTLEY'S BIOGRAPHICAL CHART 1st ed.ⁿ

to work out rules to express the rate at which historical sources lost their probative value over time. In Priestley's chart, these averages display themselves everywhere just "as the uniformity of the course of nature requires."[19]

The *New Chart of History* is identical to the *Chart of Biography* in size and scale; it begins and ends at the same dates and has, running along its bottom edge, the same list of rulers beginning with the Hebrews and culminating with the modern kings of England.[20] Priestley hoped that this common scale would make the two charts easy to use together. Though they could not literally be superimposed, they could be placed side by side for comparison, and, as Priestley notes, readers might very easily inscribe on one chart information drawn from the other.[21]

As with the *Chart of Biography*, Priestley promoted the *New Chart of History* as a tool to appeal to the mind directly through the senses. In contrast to chronology books, which required great mental labor, the *New Chart of History* was designed to give the student the feeling of seeing history in action. Priestley writes,

> If the reader carry his eye *vertically*, he will see the contemporary state of all the empires subsisting in the world, at any particular time. He may observe which were then rising, which were flourishing, and which were upon the decline. Casting his eye a little on each side of the vertical line, he will see what empires had lately gone off the stage, and which were about to come on.[22]

Priestley emphasizes that this experience comes *without reading*. He makes only one significant concession to the limitations of the simple linear graphic: following Jefferys, he adds color to the *New Chart of History*, an innovation that allows him to exhibit the unity of empires that "cannot be represented by continuous spaces."[23]

Both of Priestley's charts perform impressive feats of condensation. In fact, they are so dense that they are difficult to reproduce well. And, when displayed one part at a time (electronically, on film, or in print), the aggregating effects of the works can easily be lost. According to Priestley, the charts had the special characteristic of communicating chronological relationships "at one view."[24] In this way, they expressed the potential of the graphic image and amplified the virtues of historical study itself. In the charts, as in history, wrote Priestley, "the whole is before us. We see men and things at their full length, as we may say; and we likewise generally see them through a medium which is less partial than that of experience."[25]

[21]

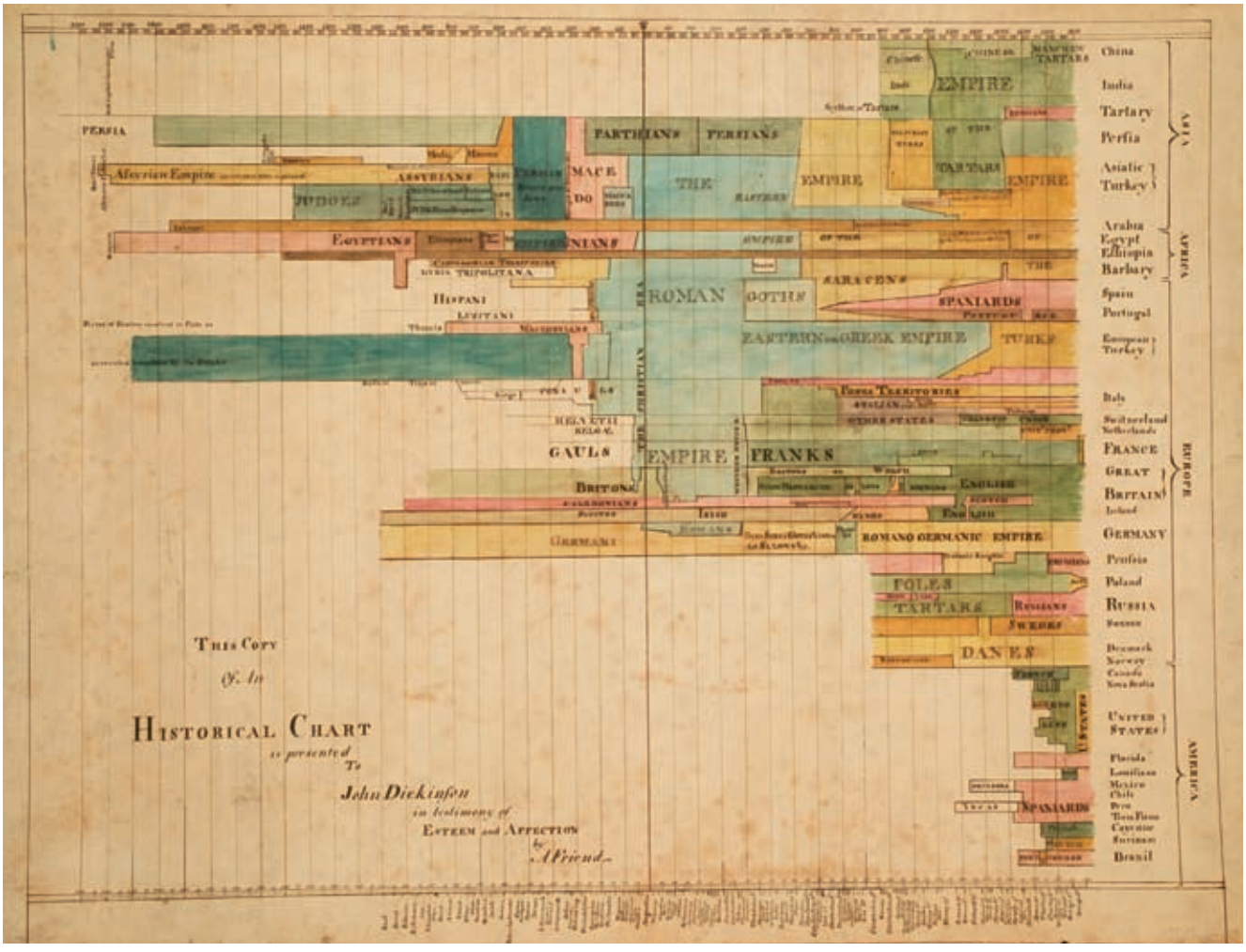
Harry distracted by a kaleidoscope salesman, from Jefferys Taylor, *Harry's Holiday, or the Doings of One Who Had Nothing to Do*, London, 1818

For decades, Priestley's charts were heavily used, and accounts of them appear throughout the pedagogical literature of the late eighteenth and early nineteenth centuries. [*fig.* **21**] They were, according to the *Cambridge Magazine*, an essential part of a gentleman's library. And both the novelist Maria Edgeworth and the physician Erasmus Darwin (grandfather to Charles) recommended them as aids in the education of women.[26] By the early nineteenth century, Priestley's charts had become an easily recognizable part of print culture. An 1818 children's book about the dangers of distraction called *Harry's Holiday* hinges on a young boy's failed attempt to hand copy one of Priestley's charts—a foolish effort which occasions a lecture from his father on the virtues of mechanical reproduction.[27]

But the fictional Harry was far from alone, and manuscript copies of historical charts from the eighteenth century can still be found in libraries and archives. Some of these are rote student work; others, like Harry's, are the product of individual initiative. A manuscript historical chart in the manner of Priestley's *New Chart of History* made around 1800, for example, can be found in the papers of John Dickinson, the first governor of the State of Delaware. And a copy of Priestley's chart of Hebrew chronology from the eighteenth century can still be found slipped inside a Priestley volume held at the Library Company of Philadelphia, an early circulating library established by Benjamin Franklin in 1731. [*figs.* **22–23**]

For Priestley, the essential aim of the chronological chart was to give a broad view. From a distance, to use his own analogy, the lines on the *Chart of Biography* should look like "so many small straws swimming on the surface of [an] immense river," bunching and drifting apart as the currents of history change speed.[28] The chart is densest at the far right edge, that is to say, in recent history. This is no accident of design; according to Priestley,

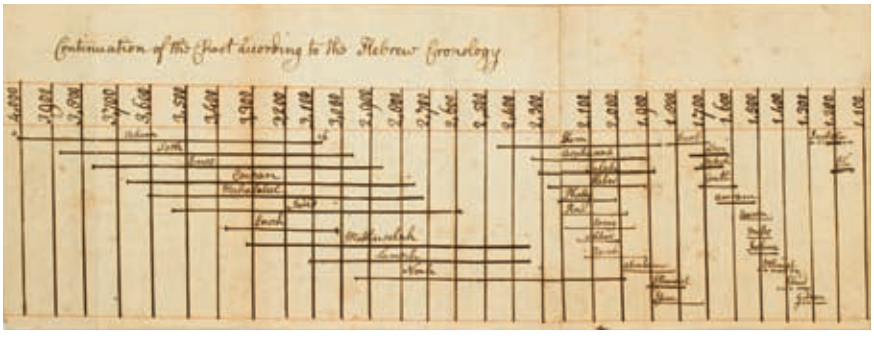
> the noblest prospect…is suggested by a view of the crowds of names in the divisions appropriated to the arts and sciences in the last two centuries. Here all the classes of renown, and, I may add, of merit, are full and a hundred times as many might have been admitted, of equal attainments in knowledge with their predecessors. This prospect gives us a kind of security for the continual propagation and extension of knowledge; and that for the future, no more great chasms of men really eminent for knowledge, will ever disfigure that part of the chart of their lives which I cannot draw, or ever see drawn.[29]



[22]

Anonymous *Historical Chart* presented to John Dickinson around 1800

Courtesy of the Library Company of Philadelphia



[23]

W. H. Barker's manuscript copy of Joseph Priestley's timeline of Hebrew chronology in *A Description of a Chart of Biography*, London, 1767

Courtesy of the Library Company of Philadelphia

In other words, in Priestley's view, the mass of straws accumulated at the right of the chart represents an actual historical phenomenon, the "acceleration" of the arts and sciences in his own time.[30] On the *Chart of Biography*, Priestley writes, "what a figure must science make."[31] And, indeed, in Priestley's chart something called science literally takes on a figure, perhaps for the first time.

In Priestley's work, the great stages of history are framed in quantitative terms. On the chart, the Renaissance features more great scientists than does the medieval period, and the Enlightenment still more than the Renaissance. But as Priestley notes, such changes are not apparent in every category. While the charts show clearly that there are ages of science and art, they also show that every age is an age of warriors. In Priestley's view, there is a moral to all this. He writes,

> By the several void spaces between…groups of great men, we have a clear idea of the great revolutions of all kinds of science, from the very origin of it; so that the thin and void places in the chart are, in fact, no less instructive than the most crowded, in giving us an idea of the great interruptions of science, and the intervals at which it hath flourished…. We see no void spaces in the division of Statesmen, Heroes, and Politicians. The world hath never wanted competitors for empire and power, and least of all in those periods in which the sciences and the arts have been the most neglected.[32]

Priestley was interested in individual biographies, but the *Chart of Biography* was meant to depict history in the broadest terms, to show that every life, even the most extraordinary, was best understood in relation to its time.[33] (*see p. 18*) Priestley notes that,

> It is a peculiar kind of pleasure we receive, from such a view as this chart exhibits, of a great man, such as Sir Isaac Newton, seated, as it were, in the circle of his friends and illustrious contemporaries. We see at once with whom he was capable of holding conversation, and in a manner (from the distinct view of their respective ages) upon what terms they might converse.[34]

Priestley's admiration for Newton was boundless, and in other works he discusses at length the achievements of "that great father of the true philosophy."[35] But, on the *Chart of Biography*, Newton does not stand apart from his contemporaries. His line begins and ends simply, just like all of the others.

Though the *Chart of Biography* presented precise information about individual lives, it was the aggregating effects of the chart that Priestley found most remarkable, and its ability to communicate ideas in a purely graphic fashion, without the use of words. Priestley writes,

> It is plain that if a sheet of paper be divided into any equal spaces, to denote centuries, or other intervals, it will be a chart truly representing a certain portion of universal time; and if the time of any particular person's birth and death be known, it is but joining the two points of the chart which correspond to them, and you have a line truly representing the situation of that life, and every part of it, in universal time, and the proportion it bears to the whole period which the chart comprises.... They are the lines... which suggest the ideas; and this they do immediately, without the intervention of words: and what words would do but very imperfectly, and in a long time, this method effects in the completest manner possible, and almost at a single glance.[36]

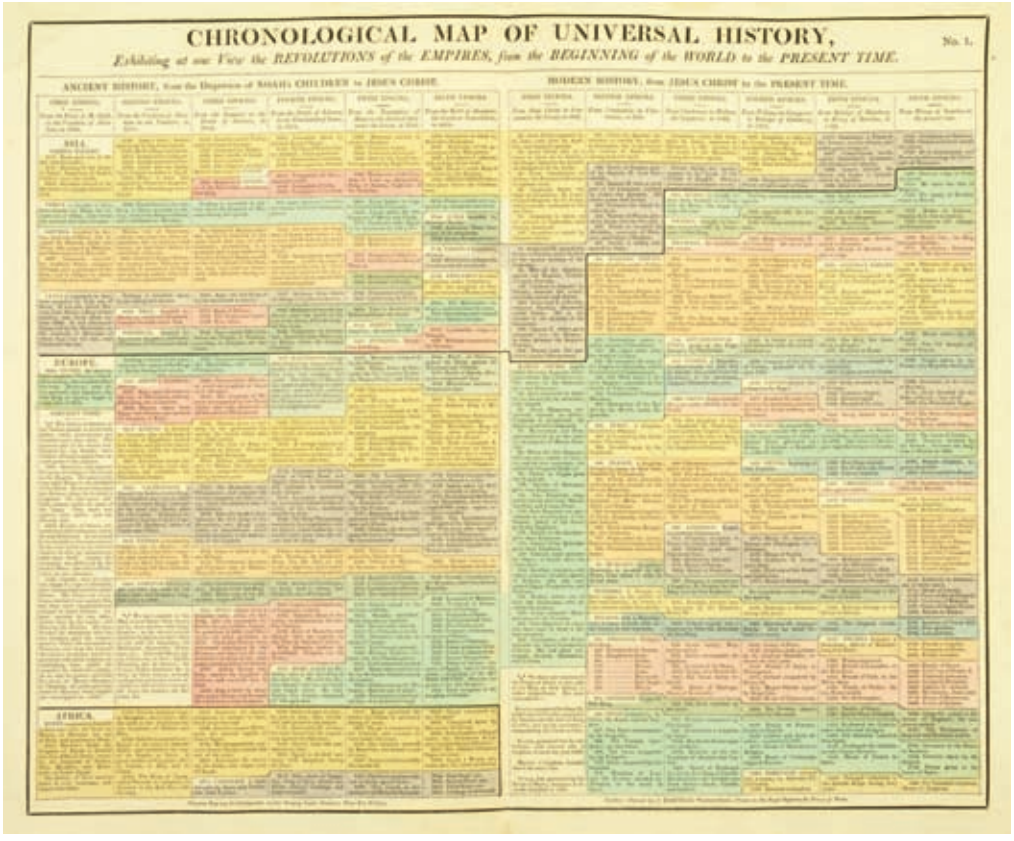
Though Priestley says that names must be written on the chart, he specifies that their function is merely indexical. The chart functions as a graphical representation of history without a single name being mentioned. In Priestley's words, "it is the *black line* under each name which is to be attended to: the names are only added because there was no other method of signifying what lives the lines stand for."[37]

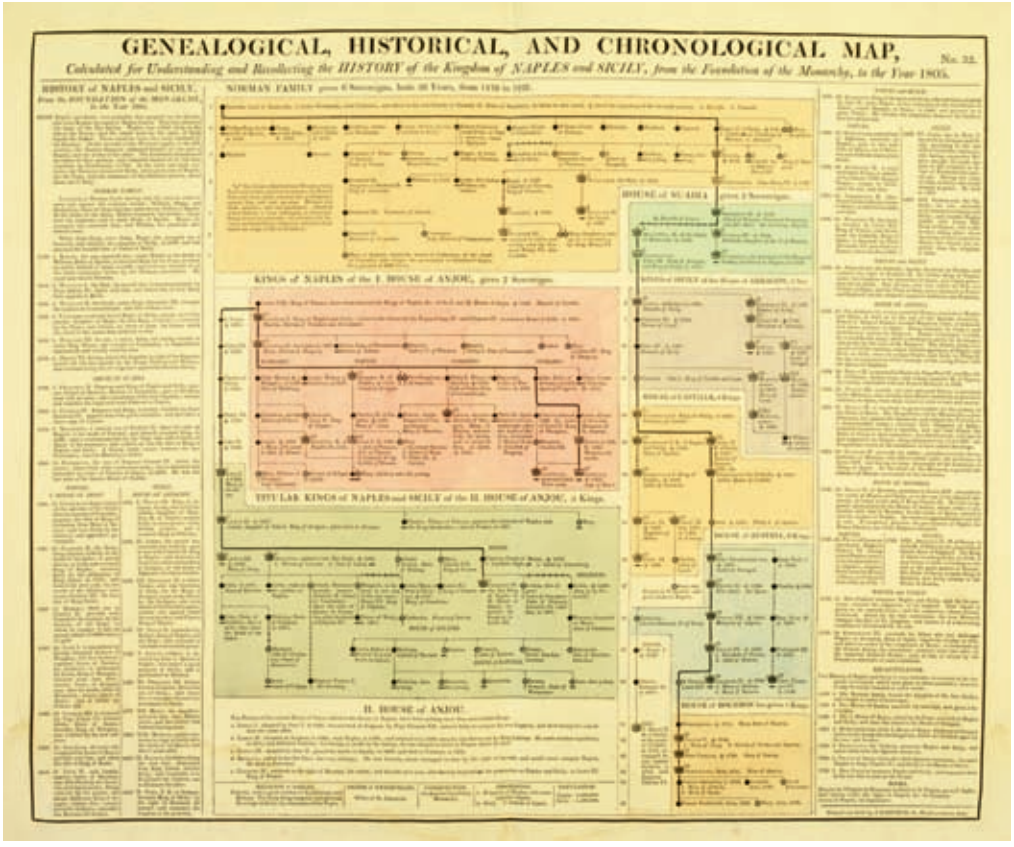
Priestley's charts mark a crucial transition in the history of chronographic representation. After Priestley, most readers simply assumed the analogy between historical time and measured graphic space, so the nature of the arguments around chronographic representation shifted dramatically. The issue was no longer how to justify the analogy but how best to implement it. Priestley had demonstrated that the elusive time map sought by Martignoni and others was not a map in the conventional sense. And, following Priestley's example, modern chronologers would exploit the visual language of cartography, but in a different idiom.

Early modern cartographers were interested in history, too, and experimented widely with ways of representing history through maps.[38] In 1570, with his foundational work *Theatrum orbis terrarum* (Theater of the world), the cartographer Abraham Ortelius reformulated the old rhetorical formula that made chronology and geography two eyes of history in a way that favored the mapmakers. For Ortelius, geography was not one of the two eyes of history, but its single *oculus*: "All [lovers of histories] will readily

[24–25]

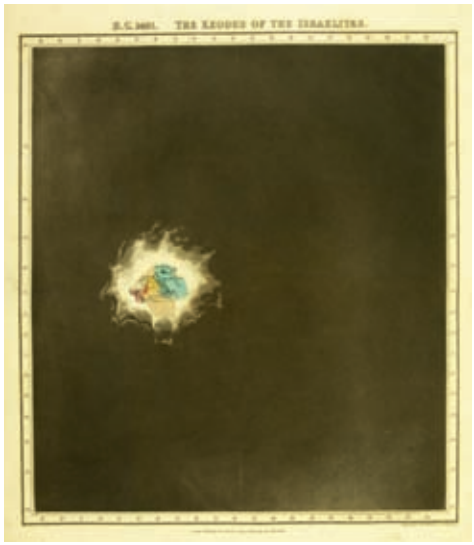
Many publishers created atlases based on Las Cases's system, among them C. V. Lavoisne. His *A new genealogical, historical, and chronological atlas*, 1807, with its characteristic typeset tables, is pictured here.





[26–28]

The concept of a historical atlas as a collection of geographical maps showing snapshots of the world at different historical moments is exemplified in Edward Quin's *An Historical Atlas*, first published in 1828. Quin's maps showed how the political world was divided up at different moments of history, and, through the device of clouds rolling back, he indicated how much of the world was known to the West at each stage in history.



affirm with us how necessary is the knowledge of regions and provinces, of the seas, the location of mountains, valleys, cities, the course of rivers, etc., for attaining [a full] understanding of histories. This is what the Greeks called by the proper name *geography*, and certain learned persons (rightly) call *the eye of history*."[39] The *Theatrum* of Ortelius aimed to aid the study of history by providing maps of terrains discussed in historical texts.

Over the course of the seventeenth century, cartographers produced many variations on the Ortelian theme: collections of maps organized geographically, thematically, and—very occasionally, as in the 1651 *Holy Land* of Philippe de la Ruë—chronologically.[40] In some instances, as in Zacharias Châtelain's famous *Atlas historique* (Historical atlas) published in Amsterdam between 1705 and 1720, maps were juxtaposed with texts on history, date lists, and genealogical trees.[41] The same logic was later amplified in the wildly successful *Atlas Lesage*, first published in 1801 by the French aristocrat Emmanuel-Augustin-Dieudonné-Joseph, comte de Las Cases—a colorful figure who eventually served as one of Napoleon's secretary-memoirists during his exile on St. Helena. [*figs.* **24–25**] The *Atlas Lesage*—so named for the nom de plume of Las Cases—was organized geographically, not chronologically. But each page was loaded with historical information, genealogical trees, and typeset historical schematics.[42]

During the late eighteenth century, especially after Johann Matthias Hase's *Atlas historicus* (Historical atlas) of 1750, it became increasingly common to arrange collections of historical maps chronologically, but it was not until the beginning of the nineteenth century that historical cartographers, such as Christian Kruse, began to depict time at regular historical intervals. In Hase's atlas and others like it, maps are given for important historical events such as great battles and conquests, and so the flow of time is capricious. By contrast, Kruse's *Atlas zur Übersicht der Geschichte aller europäischen Staaten* (Survey atlas of the history of all the European states) of 1802–10 provides one map for each century regardless of how eventful that century may have been.[43]

The works of both Hase and Kruse, like most of the historical atlases that would follow, represented history as a series of discrete moments—though some cartographers such as Edward Quin tried hard to introduce a feeling of temporal flow. [*figs.* **26–28**] Quin's 1830 *Historical Atlas* follows the example of Hase, but his charts ingeniously imply the growth of historical knowledge through images of clouds gradually dispersing from panel to panel. In Quin's


A.D. 337. AT THE DEATH OF CONSTANTINE.

Historical Atlas, the world is shown first in darkness, with clouds obscuring everything outside the Garden of Eden. Gradually, as history reveals more of the world, the clouds roll back. Turning the pages of the atlas is a bit like riffling through a flip book, watching darkness recede and the world known to Europeans grow.

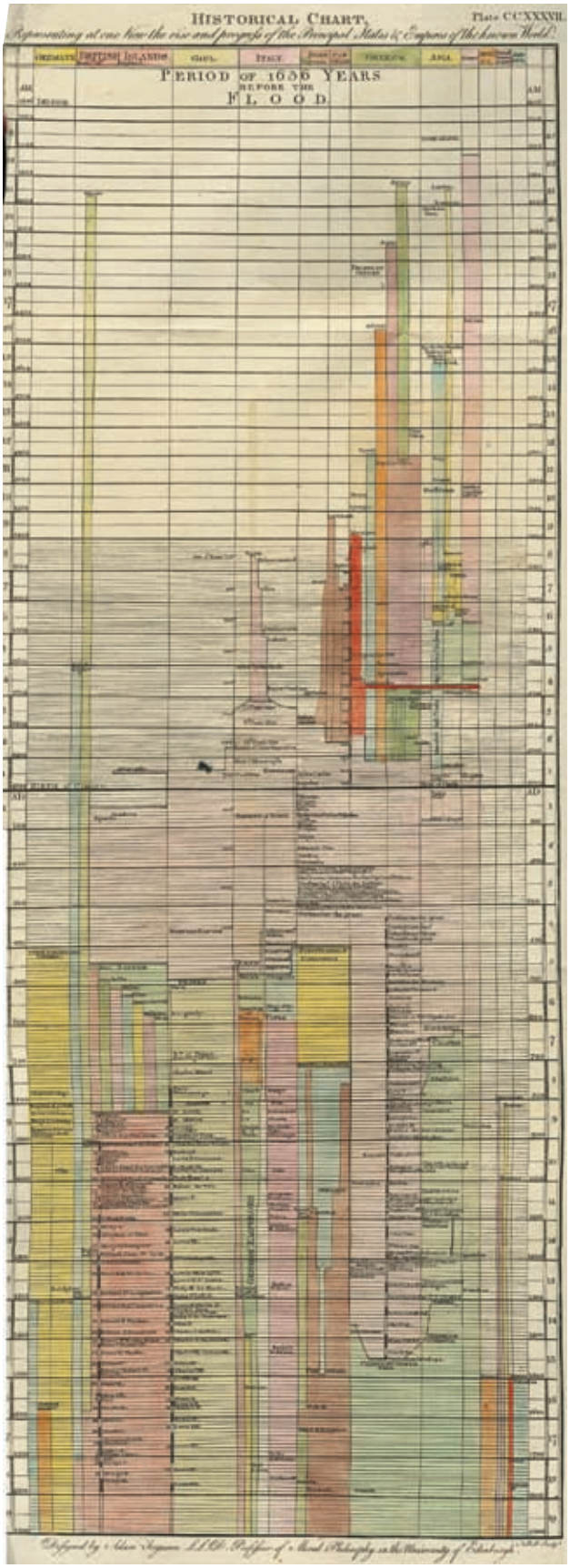
A related dynamic of revealing is at work in many of the extended chronographic charts as well, and the effect is often surprising. Eighteenth- and nineteenth-century chronology charts give a great deal of information about Egypt, Persia, India, and China in ancient times. By contrast, they give very little about Europe, Africa, or the Americas. In narrative historiography, this posed little problem: subjects were raised as the historian had something to say. But in the quasi-geographic format of the historical chart, such gaps in historical knowledge were glaring. On Priestley's *New Chart of History*, for example, the chronology of each nation is shown from 1200 BCE to 1800 CE regardless of whether Priestley has entries to make. Priestley finessed the problem by devoting blank spaces to other ends, his title, dedication, and so forth. Where, for example, English history might be—were there any English history to speak of in ancient times—Priestley places an ornate dedication to Benjamin Franklin. Priestley wasn't trying to hide anything by doing this: in his text narrative, early English history gets barely a mention. Priestley's goal was to maintain the appearance of consistency and regularity in the chart by balancing its visual composition.

Similar gestures may be seen in works that follow Priestley's model, such as the large fold-out chart of the Scottish philosopher Adam Ferguson for the third edition of the *Encyclopaedia Britannica*. [*fig.* **29**] In his chart, Ferguson had an even tougher graphic challenge than Priestley. Priestley's chart begins in the classical period; Ferguson's begins at the Creation. As a consequence, it treads into more controversial chronological territory and encompasses a longer time span, approaching 6,000 years. To achieve a feel of regularity, Ferguson cheated on his scale, compressing the first ages of the world into a small space at the top of his chart. In the context of an all-inclusive encyclopedia, the gesture is practical, but it proves conceptually awkward since, in every other respect, Ferguson's chart obeys the conventions of a regular timeline.

Within very few years, variations on Priestley's charts began to appear just about everywhere. [*figs.* **30–33**] When his own charts were not copied outright, they were adapted and interpreted, and, over the course of the nineteenth century, envisioning history in the form of a timeline became

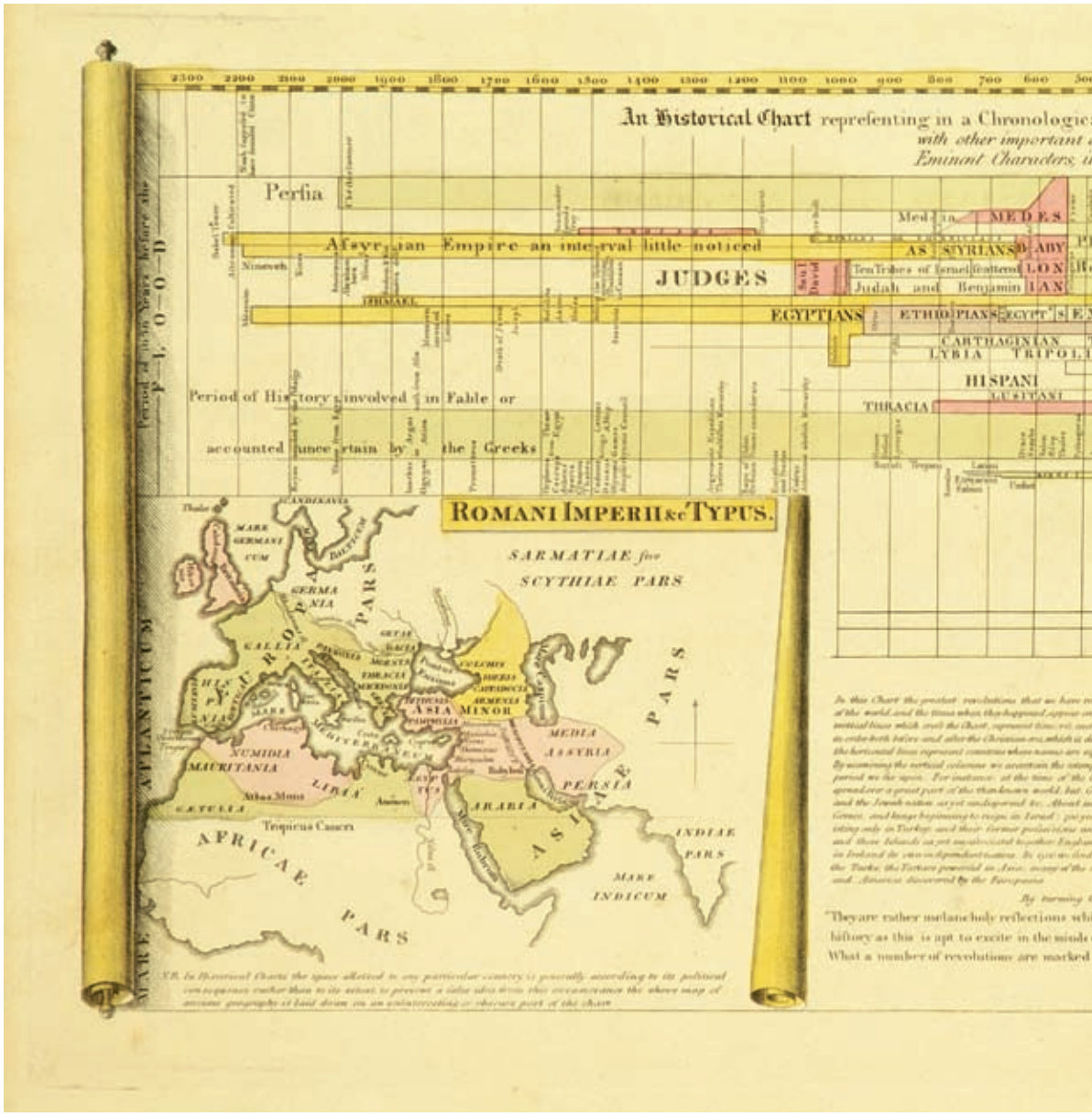
[29]

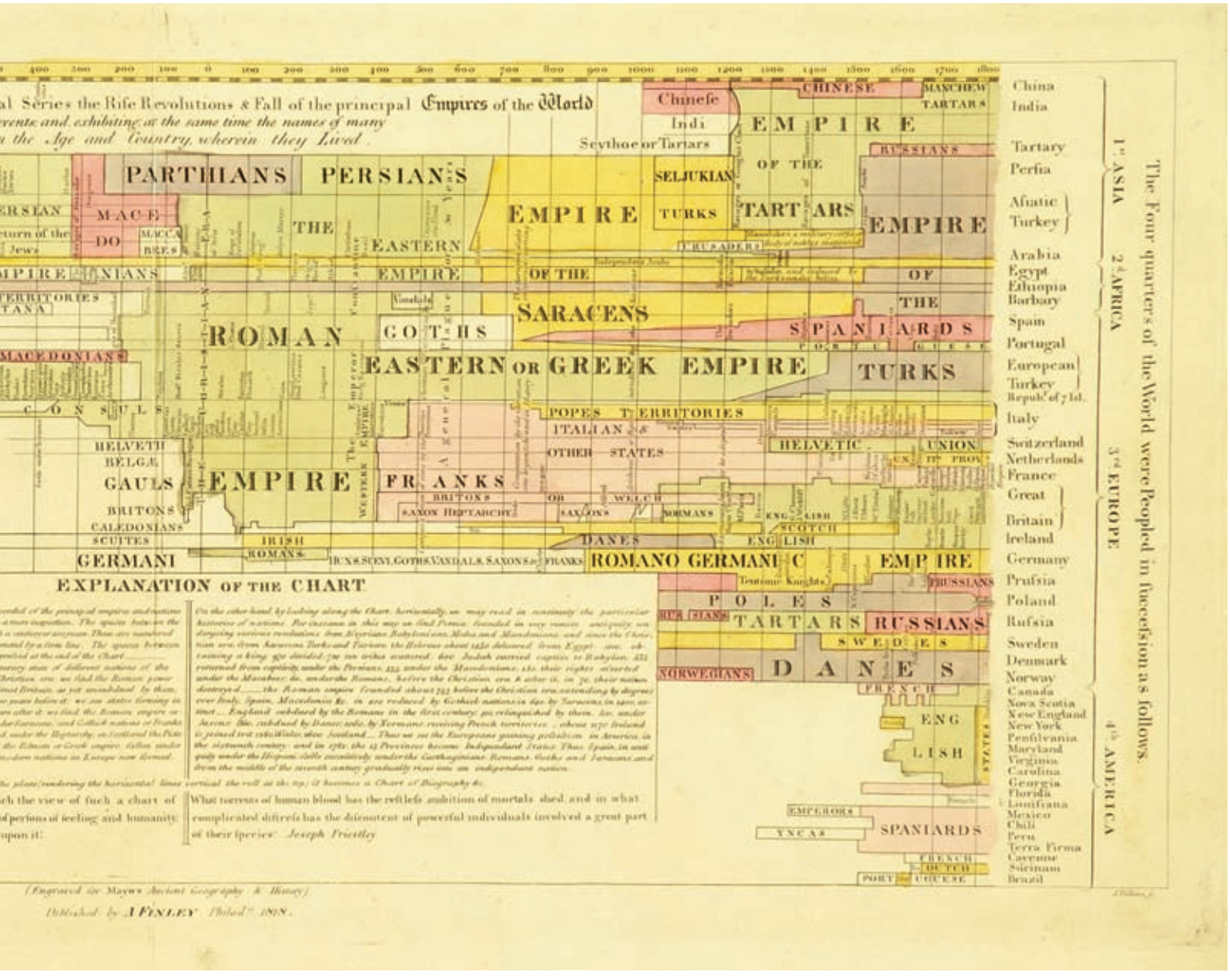
The second edition of the *Encyclopaedia Britannica* included a hand-colored fold-out chart of history to accompany the articles by Adam Ferguson on civil and ecclesiastical history. This was the first timeline to be included in the *Britannica*. Ferguson's chart resembles Joseph Priestley's *New Chart of History* in many ways, but in contrast to Priestley's chart it sacrifices uniform scale for comprehensiveness, compressing much of the "revealed history" of the Bible into a blank space at the top, making almost no entries at all. Despite his use of the chronographic format, in some ways Ferguson thought that dates mattered less than periods in history. He mostly drew the dates on his chart from a standard reference work, and left the chart as spare as possible so that readers might fill it in however they wished. This image is from the third edition published in Edinburgh in 1797.

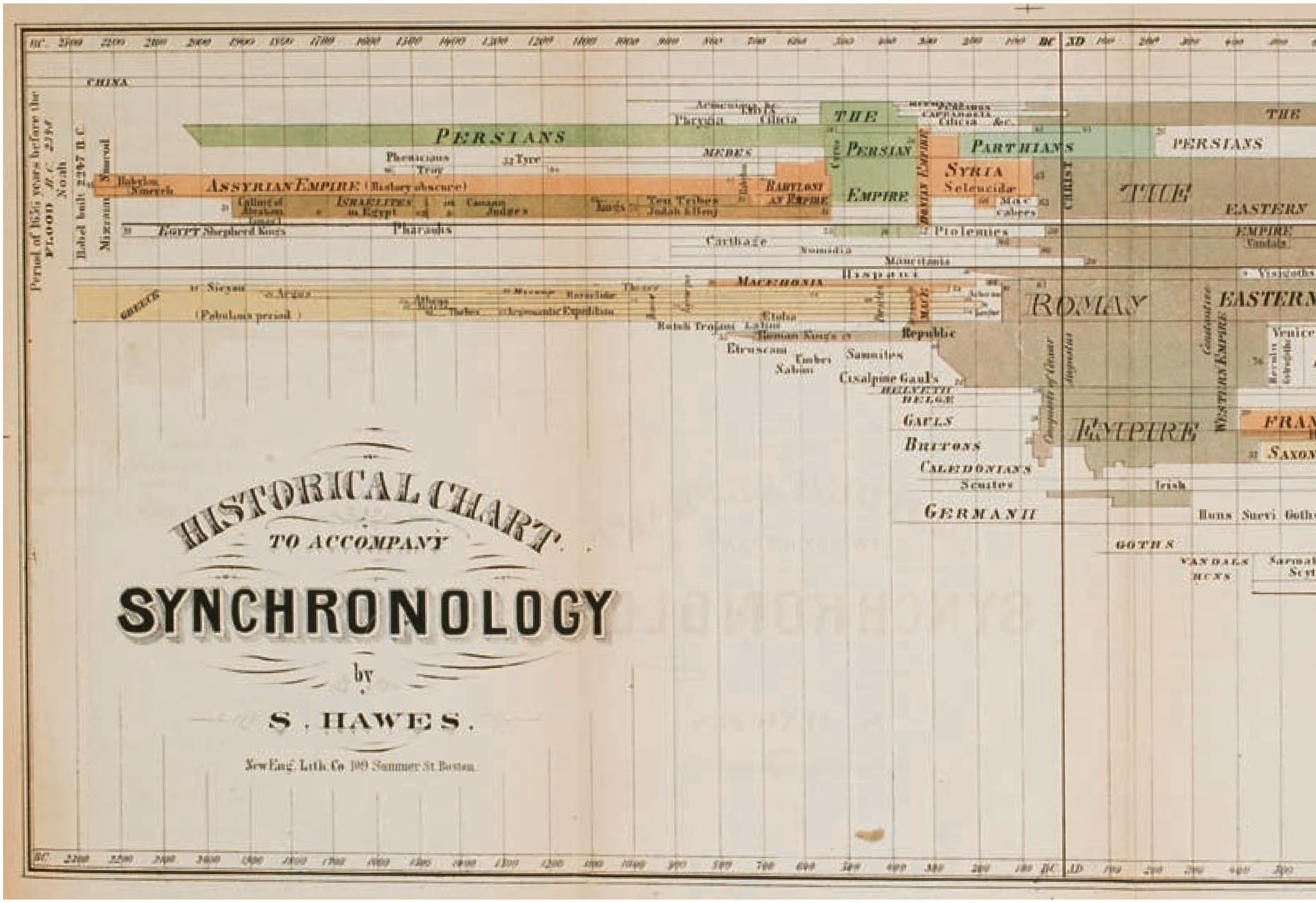


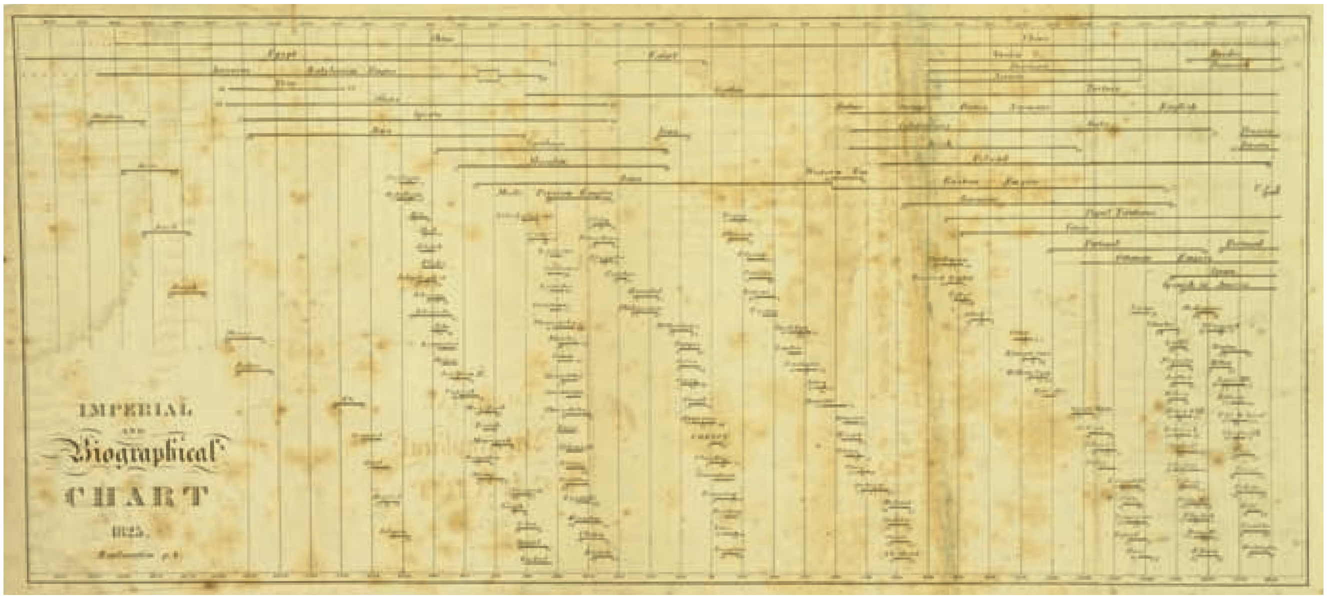
[30]

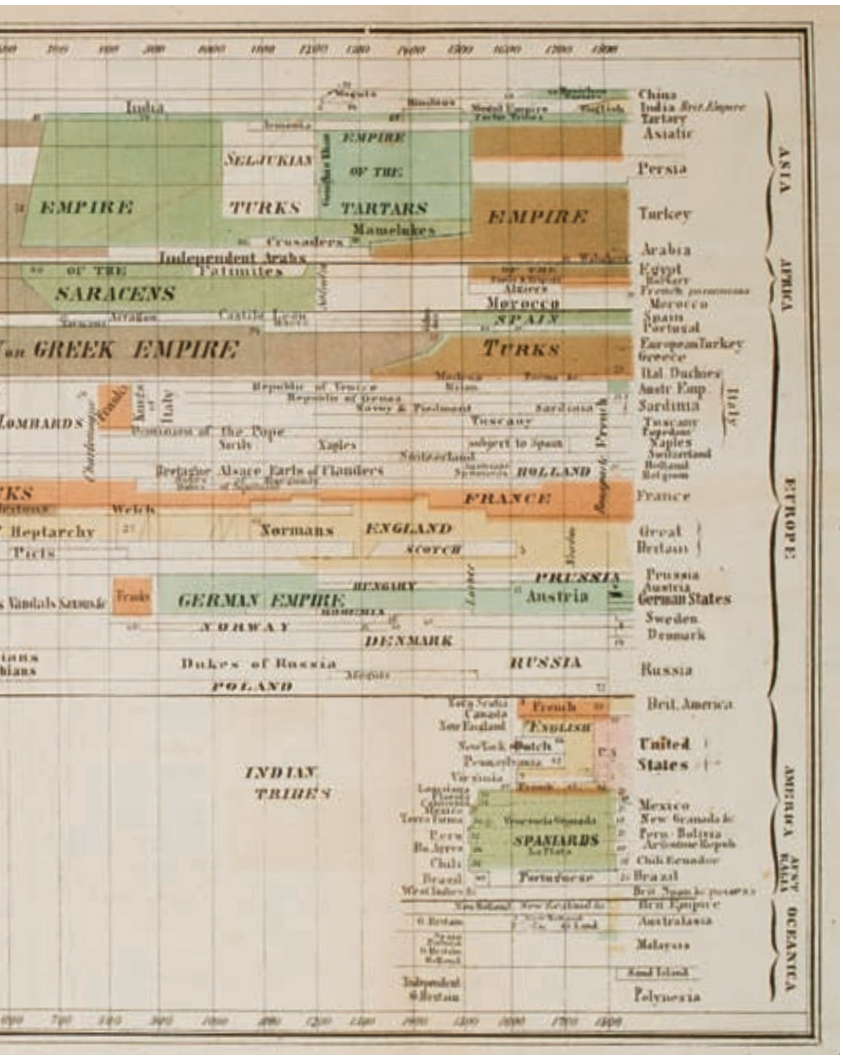
The late eighteenth and early nineteenth centuries produced many copies and interpretations of Joseph Priestley's charts. This chart from Anthony Finley's 1818 *Atlas classica* combines elements of both of Priestley's charts. The inscription gives Priestley his due.




al Series the Rife Revolutions & Fall of the principal Empires of the World
China
India
Tartary
Perfia
Afiatic Turkey
Arabia
Egypt
Ethiopia
Barbary
Spain
Portugal
European Turkey
Italy
Switzerland
Netherlands
France
Great Britain
Ireland
Germany
Prufsia
Poland
Rufsia
Sweden
Denmark
Norway
Canada
Nova Scotia
New England
New York
Penfilvania
Maryland
Virginia
Carolina
Georgia
Florida
Louifiana
Mexico
Chili
Peru
Terra Firma
Cayenne
Surinam
Brazil
The Four quarters of the World were Peopled in fucceſsion as follows.
1st ASIA
2d AFRICA
3rd EUROPE
4th AMERICA
PARTHIANS
PERSIANS
SELJUKIAN TURKS
EMPIRE
TARTARS
EMPIRE
ROMAN
GOTHS
SARACENS
SPANIARDS
EASTERN OR GREEK EMPIRE
TURKS
GAULS
EMPIRE
FRANKS
ROMANO GERMANIC EMPIRE
POLES
TARTARS
RUSSIANS
SWEDES
DANES
ENGLISH
SPANIARDS
EXPLANATION OF THE CHART
What torrents of human blood has the reſtleſs ambition of mortals ſhed and in what complicated diſtreſs has the diſſention of powerful individuals involved a great part of their ſpecies' Joseph Priestley


HISTORICAL CHART
TO ACCOMPANY
SYNCHRONOLOGY
by
S. HAWES.
New Eng. Lith. Co. 109 Summer St. Boston.
CHINA
PERSIANS
ASSYRIAN EMPIRE (History obscure)
THE PERSIAN EMPIRE
PARTHIANS
SYRIA
Seleucidæ
CHRIST
THE EASTERN EMPIRE
PERSIANS
ROMAN EMPIRE
EASTERN
MACEDONIA
Carthage
Numidia
Mauritania
Ptolemies
GAULS
BRITONS
CALEDONIANS
Scuties
GERMANII
GOTHS
VANDALS
HUNS
Huns Suevi Goths
Irish
SAXON
FRAN
Republic
Etruscans
Samnites
Cisalpine Gauls
HELVETII
BELGE
Pharaohs
EGYPT Shepherd Kings
Phenicians
Troy
Tyre
MEDES
Phrygia
Cilicia
Mac cabees
Visigoths
Venice


IMPERIAL
AND
Biographical
CHART
1825.



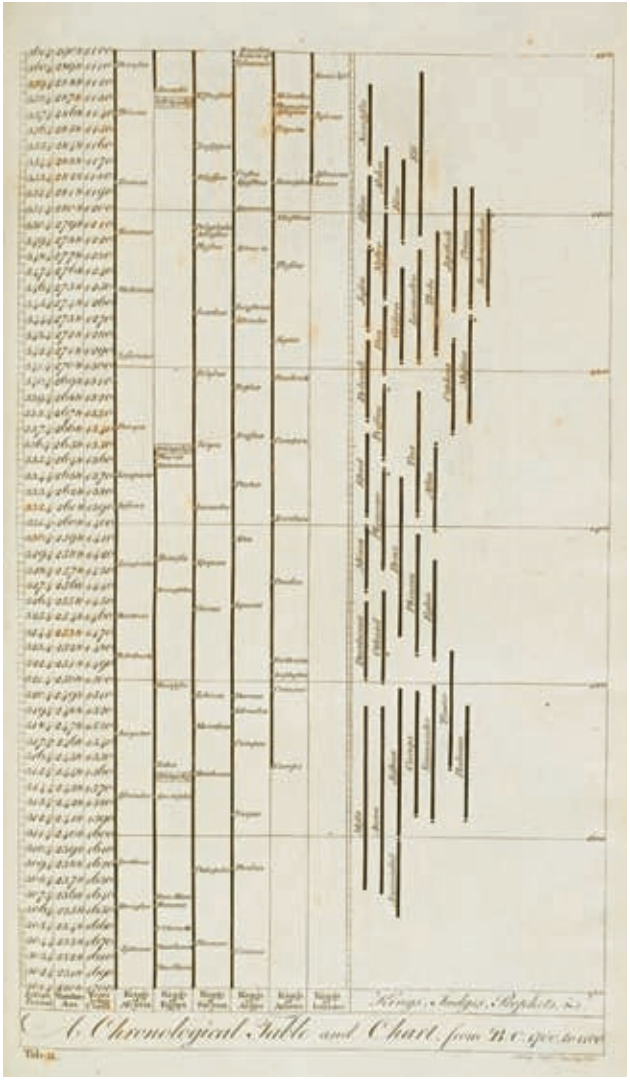
[31]

By 1869 when Stephen Hawes published his *Synchronology of the principal events in sacred and profane history: from the creation of man, to the present time*, the graphic conventions of Joseph Priestley's charts had become so commonplace that they rarely were attributed to Priestley at all.

[32]

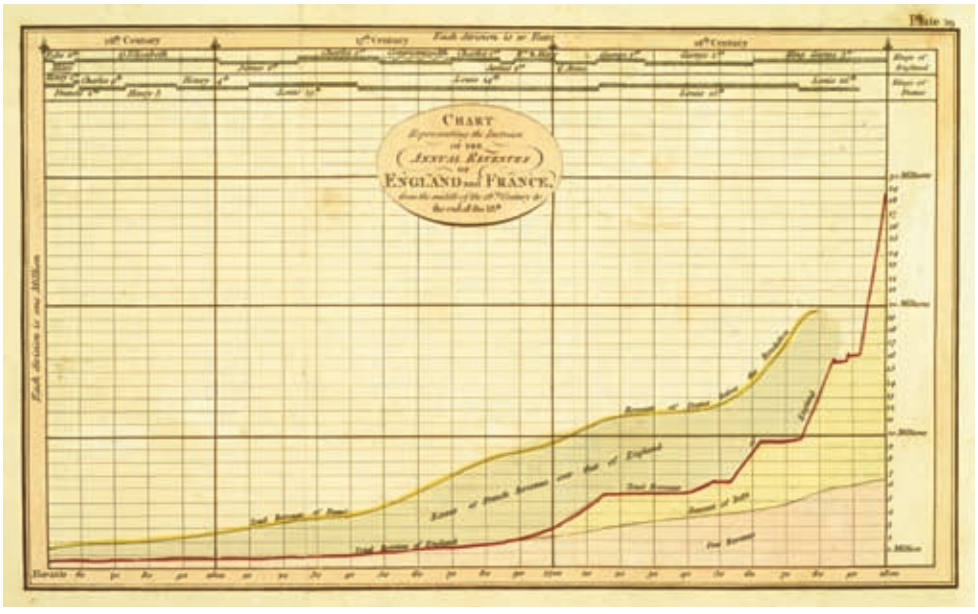
In *A System of Chronology*, Edinburgh, 1784, the Scottish divine James Playfair combined the chronological styles of Eusebius and Priestley and demonstrated the adaptability of Priestley's lines to tables with multiple dating systems.

Courtesy of the Library Company of Philadelphia



[33]

In 1808, while running an academy in Morristown, New Jersey, the Presbyterian minister Samuel Whelpley published a popular history textbook called *A compend of history, from earliest times*, complete with a biographical chart modeled on Priestley's. Whelpley's work went through several editions through 1853. This 1825 edition includes Whelpley's "imperial and biographical chart."



[34]

William Playfair's line graphs, including this chart of the annual revenues of France and England from the third edition of his *Commercial and Political Atlas*, developed the logic of the chronographic chart in new directions. As here, Playfair's statistical graphs often included timelines of political history.

[35]

Luigi Perozzo, 1879 stereogram of the Swedish census for the years 1750 to 1875, showing the number of male births per year in relation to the number of survivors over time

second nature. Priestley's charts also had a major impact in other areas. In his 1786 *Commercial and Political Atlas*—widely recognized as the foundational work in the field of statistical graphics—William Playfair cited Priestley's historical charts as a direct predecessor to his own line graphs and bar charts.[44] Though he promoted his own originality with vigor, in the third edition of the *Commercial and Political Atlas*, published in 1801, Playfair confirmed the influence of chronography on the development of his framework. He writes,

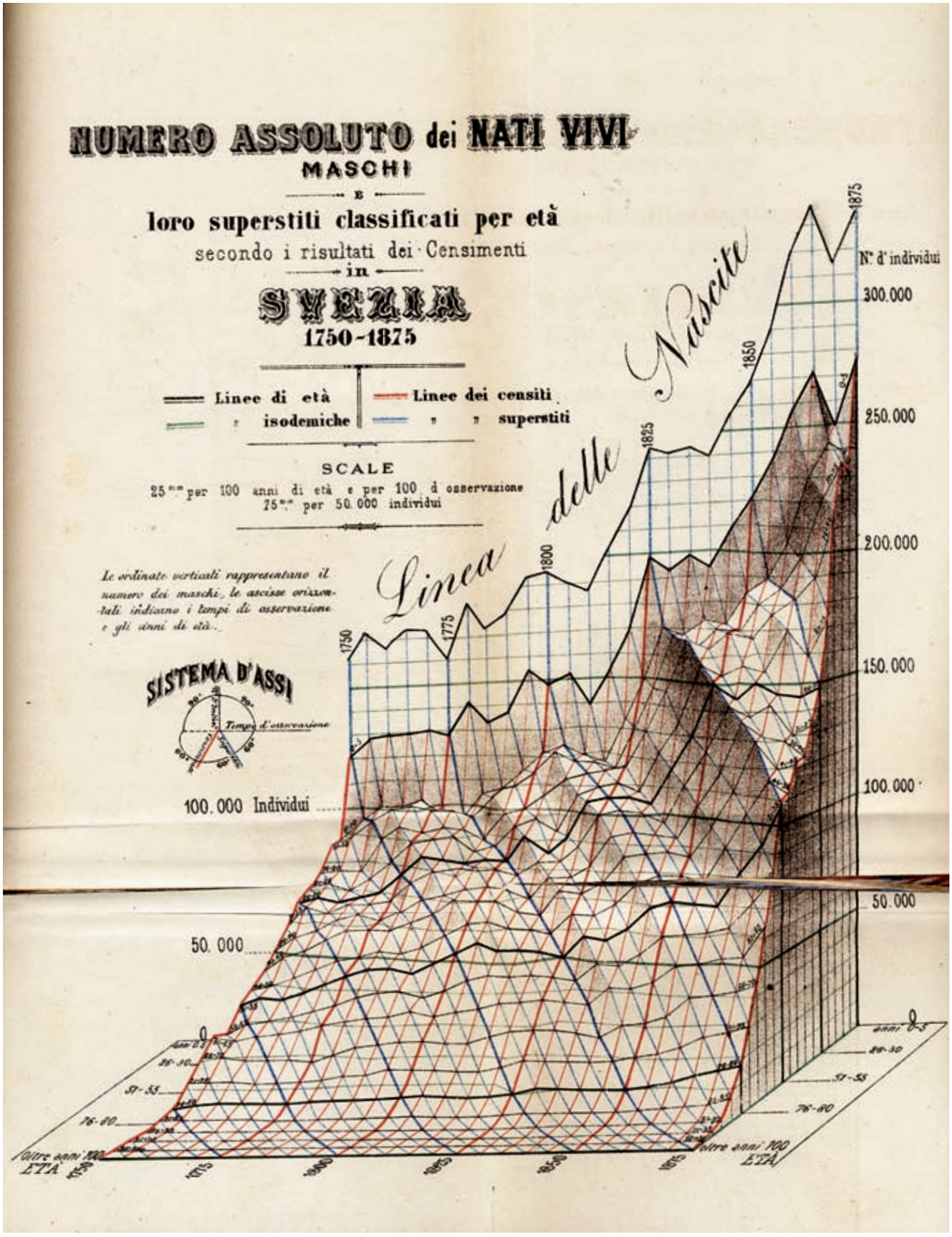
> It is now sixteen years since I first thought of applying lines to subjects of Finance….At the time when this invention made its first appearance it was much approved of in England;…I confess I was long anxious to find out, whether I was actually the first who applied the principles of geometry to matters of Finance, as it had long before been applied to chronology with great success. I am now satisfied, upon due inquiry, that I was the first; for during fifteen years I have not been able to learn that any thing of a similar nature had ever before been produced.[45]

As a science of dates, chronology always had a quantitative dimension, but it was not until the middle of the eighteenth century that uniformity of scale became a usual characteristic of chronographic space. Once that uniformity had been achieved, projecting other kinds of quantitative data into the chronographic space was not difficult. In his 1801 *Statistical Breviary*, Playfair specified precisely how eighteenth-century chronographers cleared the way for statistical graphics. He writes,

> The study of chronology has been much facilitated by making space represent time, and a line of proportional length, and in a suitable position, the life of a man, by means of which the remarkable men of past ages appear as it were before us in their proper time and place.[46]

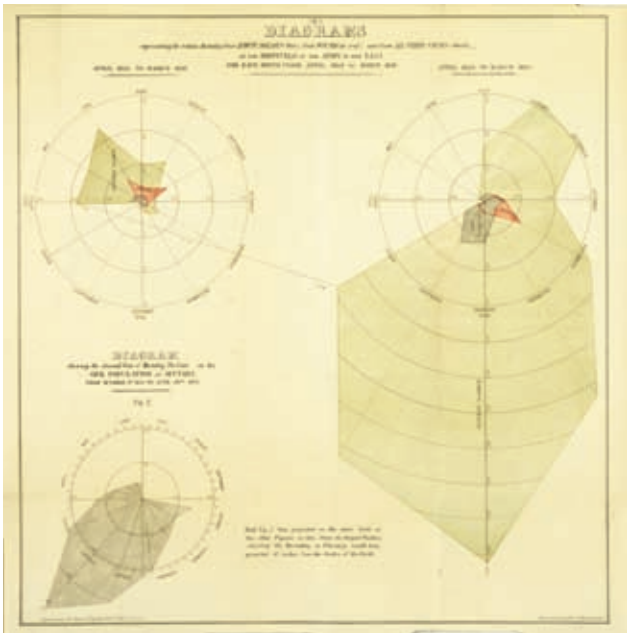
Over the course of the next half century, Playfair's line graph, which counterposed two quantitative axes (one for time, the other for economic measures such as exports, imports, and debts) became one of the most recognizable chronographic forms. [*fig.* **34**] Later statisticians would not be satisfied with only two graphic dimensions. By the 1870s, demographers such as the Italian Luigi Perozzo were experimenting with three-dimensional statistical projections.[47] [*fig.* **35**]

After Playfair, statistical representations of historical phenomena proliferated, first in fields such as economics


NUMERO ASSOLUTO dei NATI VIVI
MASCHI
E
loro superstiti classificati per età
secondo i risultati dei Censimenti
in
SVEZIA
1750-1875
Linee di età isodemiche
Linee dei censiti superstiti
SCALE
25 mm per 100 anni di età e per 100 d osservazione
75 mm per 50.000 individui
Le ordinate verticali rappresentano il numero dei maschi, le ascisse orizzontali indicano i tempi di osservazione e gli anni di età.
SISTEMA D'ASSI
Tempi d'osservazione
100.000 Individui
50.000
0
Linea delle Nascite
1750
1775
1800
1825
1850
1875
N° d' individui
300.000
250.000
200.000
150.000
100.000
50.000
0
ETA
oltre anni 100
anni 0-5
5-10
10-20
20-30
30-40
40-50
50-55
55-60
60-70
70-80
76-80
80-90
oltre anni 100

[36]

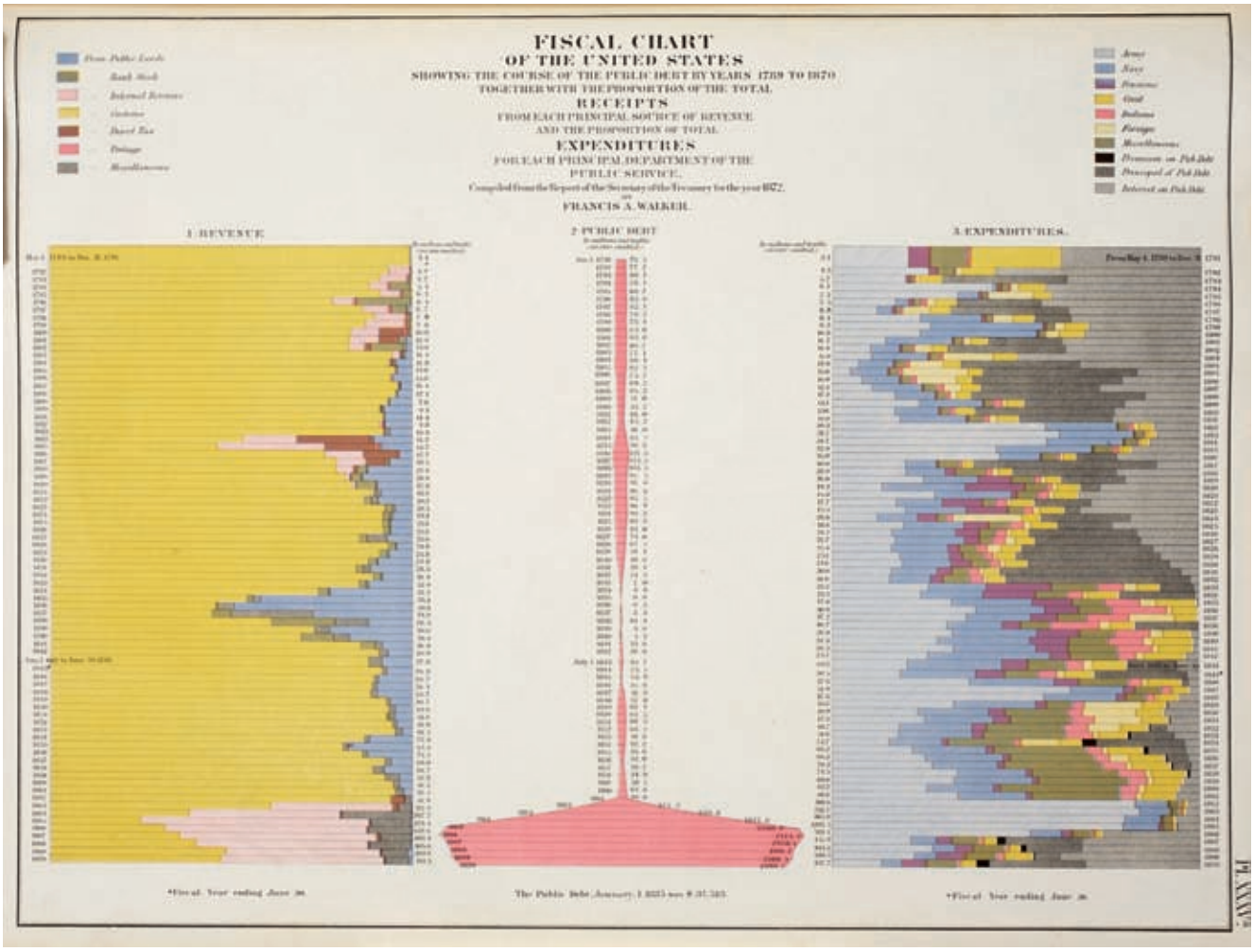
Florence Nightingale, diagrams from *Mortality of the British Army: At Home, and Abroad, and During the Russian War, as Compared with the Mortality of the Civil Population in England*, London, 1858. Nightingale's diagrams, in which chronological time is represented as a circle, revealed that during the Crimean War infection and disease caused more British deaths than did enemy bullets and bayonets.



that were already rife with quantitative data and then, with the rise of the social statistics, just about everywhere. [*figs.* **36–37**] By the middle of the nineteenth century, a wide and inventive range of charts, including some that were quite technical, could be found in general publications such as Florence Nightingale's "rose" and "batwing" charts of the 1850s showing changing causes of death over the course of the Crimean War; the French engineer Charles Joseph Minard's thematic maps of the 1860s, including his famous diagram of declining troop strength in Napoleon's invasion of Russia (*see p. 22*); and the magnificent graphic projections of the 1870 United States Census by Francis A. Walker, superintendant of the census and future president of the American Statistical Association, the American Economic Association, and the Massachusetts Institute of Technology.[48] But through all of this, the line itself—straight, crooked, curved, or branching—remained the principal visual metaphor by which historical chronologies were envisioned.

Ironically, the rise of the modern timeline coincided with the decline of academic chronology. During the eighteenth century, questions of chronology were posed everywhere, but the role of the chronologist who specialized in the study of dates diminished in relation to that of the historian. Meanwhile, the chronologist's traditional domain was compartmentalized: astronomy was set apart from astrology, philology from biblical commentary, empirical science from revealed science, and so on. Chronology, a field of study that once claimed plausibly to be the very "soul of historical knowledge," was left little more than a skeleton.[49]

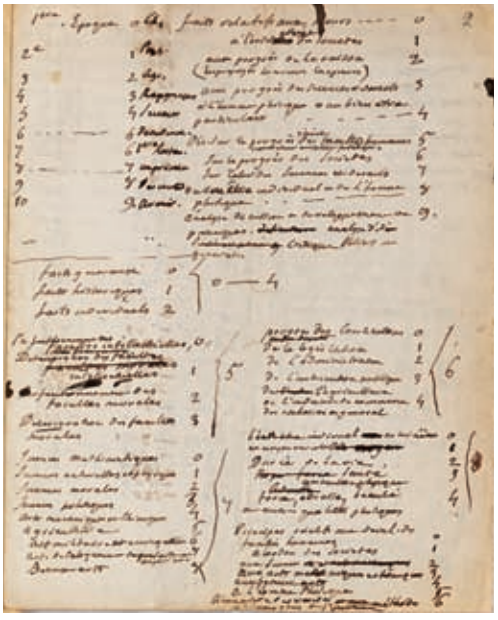
This did not mean that the *subject* of chronology declined in importance. As universal history came to be understood as the study of intrinsic causes, relations, and effects, and as the key periodizations came to be understood as internal rather than external to historical sequence, problems of chronology gained a different kind of importance. And, for the same reason, the new chronologies of the eighteenth and nineteenth centuries obeyed different rules. The importance of computing the exact *annus mundi*, the year of the world calculated from the Creation, diminished. Priestley's view was typical in this regard. As far as he was concerned, in the representation of secular history, any dating system would do so long as it was universally agreed upon and rigorously applied. In itself, this approach was not new, but it was during this period that it ceased to be a matter of significant methodological controversy. When Priestley presented charts of universal history bracketing the question of Creation, there was hardly a murmur on



[37]

Francis A. Walker, *Fiscal Chart of the United States Showing the Public Debt by Years 1789 to 1870 . . . Receipts from Each Principal Source of Revenue . . . and Expenditures from Each Principal Department*, from *Statistical Atlas of the United States Based on the Results of the Ninth Census, 1870*, New York, 1874

Courtesy of the Library Company of Philadelphia



[38]

A page of notes from the papers of Jean-Antoine-Nicolas de Caritat, marquis de Condorcet, for a never-completed chronological classification system that would trace the development of human society and culture. In the upper left, Condorcet lists the ten "principal epochs" of world history as discussed in his *Sketch for a historical picture of the progress of the human mind*, also incomplete at the time of his death in 1794; in the upper right, principal thematic categories including cultural, social, intellectual, scientific facts; below, subcategories applying to one or several of the principals.

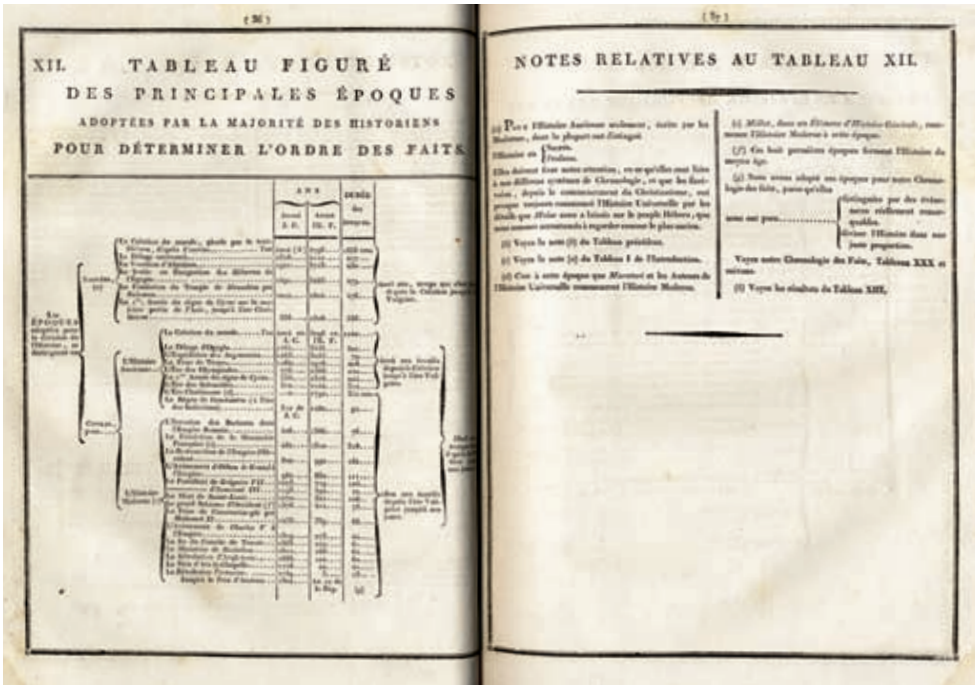
the subject. To the contrary, what struck readers most was how obvious his approach was, and how strange it was that it had not been in general use a long time before.

To most readers, Priestley's inventions were both useful and intuitive. In addition, they resonated strongly with the linear historical visions outlined by the philosophers of the Enlightenment. The significance of this graphic articulation of "homogeneous, empty time"—to borrow the phrase of the twentieth-century philosopher and critic Walter Benjamin—cannot be overstated.[50] At the same time, it needs to be understood in context. For Priestley himself, the empty timeline was only a heuristic. It was not supposed to take God out of history. To the contrary, Priestley thought that, by revealing aggregate social phenomena consistent with the operation of Providence, it would beautifully illuminate God's plan.

Priestley's apparatus proved highly popular in the nineteenth century, his philosophical experimentalism, less so. To many readers, Priestley's charts seemed to offer a picture of time itself. In the context of the Newtonian revolution, this made perfect sense. Newton's own forays into historical chronology were thoroughly rooted in the seventeenth-century millennialist framework and never evolved a graphic component. But the theory of time expounded in his physics resonated strongly with the uniformity depicted in Priestley's charts. These were not meant to be hard science, but they were quantitative and statistical, and, as the work of William Playfair amply demonstrates, they created an analytical framework useful in other fields.

Though it spread rapidly, Priestley's system was slower to take hold in France than it was in Britain and elsewhere in Europe. In France in the 1790s, Jean-Antoine-Nicolas de Caritat, marquis de Condorcet, one of the founders of social statistics, attempted to design a different visual system. Like Priestley, Condorcet believed that social phenomena could be understood in aggregate. He believed that cause/effect relationships in history were intrinsic rather than extrinsic. And he believed that universal history followed a basically linear path as expressed in his posthumous *Sketch for a historical picture of the progress of the human mind* of 1793. Indeed, knowing nothing of Condorcet other than his ten stages of history, one might guess that he would have been a great proponent of Priestley's linear charts.

But Condorcet's account of universal history was structural rather than descriptive; his principal interest was not to provide a record of facts but to determine general historical patterns. Like many of the conjectural historians of the Enlightenment, Condorcet believed that all societies


XII. TABLEAU FIGURÉ
DES PRINCIPALES ÉPOQUES
ADOPTÉES PAR LA MAJORITÉ DES HISTORIENS
POUR DÉTERMINER L'ORDRE DES FAITS.

NOTES RELATIVES AU TABLEAU XII.

[39]

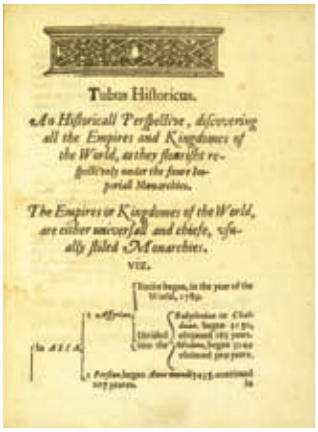
Pierre-Nicolas Chantreau's table of the principal epochs of human history adopted by the majority of historians for determining the order of facts from his *Science de l'historie* from 1803. Chantreau employs a hierarchical system of organization like that employed in the *Encyclopédie* of Denis Diderot and Jean le Rond d'Alembert.

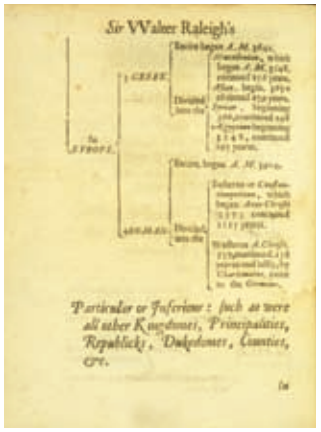
pass through a series of comparable, if not identical, developments. And his system was designed around this premise. While the graphics of Eusebius and of Priestley allowed for the quick identification of chronological synchronisms, Condorcet's did something different. Instead of showing what was happening at the same time in different places, Condorcet's system showed how different nations and cultures progressed through equivalent stages of social development.[51]

In his outline for a new system of historical notation, Condorcet treated chronology as one of three dimensions of classification, along with two somewhat heterogeneous thematic categories. [*fig.* **38**] In this system, every entry is assigned a historical epoch ranging from one to ten (from hunter-gatherer to modern man), a general subject area (such as the progress of society), and a specific subject (such as legislation or administration). The resulting notations were complicated, not least because the third category of classification was partly dependent on the second (there is, for example, a category for administration under the general subject of politics but not under the arts and sciences). Still, according to Condorcet, classifying historical events in multiple dimensions, in this fashion, had important advantages. It provided an easily cross-referenced database of historical information, and it facilitated a consistent analysis of cause and effect across many different historical examples.

Condorcet's system could have been represented in a manner similar to that of a Eusebian table, and Condorcet does seem to have contemplated this possibility.[52] But Condorcet's three dimensions lent themselves less readily to graphic representation than did the two dimensions of Priestley and Eusebius. Perhaps Condorcet would have pursued the graphic dimension of his project further had he had access to the three-dimensional projections developed later in the nineteenth century or to the electronic technologies available today that allow the shuffling and reshuffling of data and multiple data projection schemes. Using the tools at his disposal, however, he never arrived at a successful graphic format for his system, and the only artifacts of it that remain are lists of historical events coded with three-dimensional classifying coordinates.

This is not to say that Priestley's approach lacked proponents in France and elsewhere. [*fig.* **39**] At the beginning of the nineteenth century, Pierre-Nicolas Chantreau, for example, promoted Priestley's biographical lines in his theoretical works on the study of history. But, like many French writers, Chantreau remained equally interested in





[40–41]

Author unknown, *Tubus Historicus: An Historicall Perspective, Discovering all the Empires and Kingdomes of the World as they flourisht respectively under the foure Imperiall Monarchies*, London, 1636

[42]

Charles Fourier, chart of the four "movements" or stages of history from *Théorie des quatre mouvements et des destinées générales: prospectus et annonce de la découverte,* Lyon, 1808

the possibilities presented by the schematic tree form developed in the sixteenth century by the French humanist Petrus Ramus and widely popularized in the eighteenth century by the *Encyclopédie* of Diderot and d'Alembert. In the sections of his 1803 *Science de l'histoire* (The science of history) that explained the divisions of historical study, he applied these widely. He also used them in his chronological tables themselves to group and subdivide biographical categories.[53]

There were precedents for Chantreau's graphic strategies. Ramist brackets had divided up the different kingdoms of the past in the *Tubus Historicus: An Historicall Perspective; Discovering all the Empires and Kingdomes of the World, as they flourisht respectively under the foure Imperiall Monarchies*, a work falsely ascribed to Walter Raleigh that appeared in 1636. [*figs.* **40–41**] But in a work such as this, designed to illuminate a given eschatological structure, the graphic worked differently. The emphasis here was not on the precise dating of individual events but on the division and sequence of a limited number of chronological periods. Though it works well for eschatology, the form of the encyclopedic tree proved an awkward fit for the regular, mundane work of giving dates to events. But, in France at any rate, the tree format continued to find proponents. Perhaps the last great example of its application to chronography is the 1808 *Théorie des quatre mouvements* (Theory of four movements) by the French utopian socialist Charles Fourier, another four-stage schema of history. In adopting the tree format for his chronographic chart, Fourier was clearly trying to appeal to the prestige of the encyclopedic model. He was also doing what he did best, confecting social systems.

Fourier claimed that human history—from its foggy prehistoric beginnings to its eventual end—would last approximately eighty thousand years in total. [*fig.* **42**] Along the way, it would go through four major stages or "movements," with movements one and four each enduring for five thousand years, and two and three, thirty-five thousand years. The first and last stages, he said, would both be periods of misery, the second and third, of enjoyment. In Fourier's view, the world of 1808 had lots of problems, but its long-term prognosis was good: according to his scheme, humanity was just finishing the first historical movement. After five thousand years of near universal misery, it was at last entering the first period of social happiness. All of this, he hoped, would put the difficulties of present life in perspective. "The immensity of our suffering," Fourier wrote, "can only be assessed when one understands the excess of happiness in store for us, to which state we shall

[43–44]

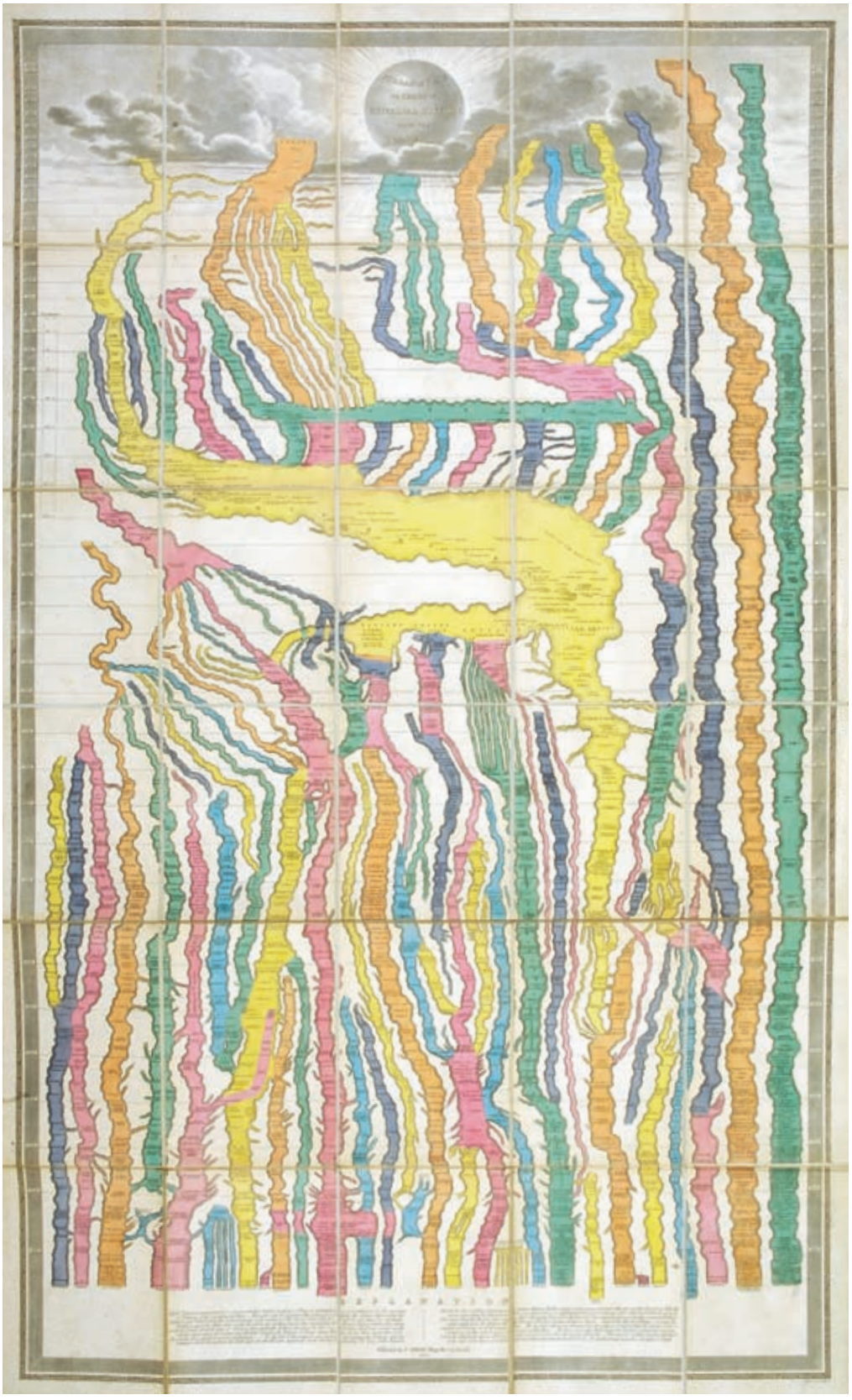
Auguste Comte, *Calendrier positiviste*, from *Catéchisme positiviste*, Paris, 1852

rapidly pass."[54] This happy state, Fourier said, would bring social and sexual harmony, and human industry so powerful that it would literally melt the polar ice caps. We did not have long to wait, said Fourier, before the climate in St. Petersburg would resemble that of Sicily. Sadly, of all of Fourier's predictions (seas full of lemonade, zebra taxis) this one currently seems most likely.

In 1849, the Positivist philosopher Auguste Comte came up with yet another bold schema for history. Comte's thirteen-month *Calendrier positiviste* (Positivist calendar) was not principally intended as a graphic. [*figs.* **43–44**] It was what it called itself, a calendar designed to organize reflection and historical memory, and to replace extant religious calendars—positivism was also a religion for Comte. But, while Comte's calendar cycled through a yearly set of observances, like the Catholic and Protestant calendars it aimed to replace, it also followed the linear order of history. The first of the thirteen months of the positivist calendar, named for Moses, memorialized the ancient heroes of positivism, such as Lycurgus, Zoroaster, and Confucius; the thirteenth month, named after the French anatomist Marie François Xavier Bichat, memorialized the heroes of modern times, such as Copernicus, Newton, and Priestley. Like Fourier's system, Comte's demonstrates the heterogeneity of chronographic visions in modernity and the persistence of traditional temporal structures in an age of progress.

In Germany and Austria, too, Priestley's unrelenting emphasis on regular measured chronology met some resistance. [*fig.* **45**] In 1804, for example, the Austrian chronologer Friedrich Strass published a highly influential chart entitled *Strom der Zeiten* (Stream of time), a work translated into several languages, including English and Russian, and referenced in numerous historical works. Like Priestley, Strass believed that a graphic representation of history held manifold advantages over a textual one: it revealed order, scale, and synchronism simply and without the trouble of memorization and calculation. But according to Strass's English translator, William Bell, the "equisecular" or geometrically regular organization of Priestley's charts implied a uniformity in the processes of history that was simply misleading.[55] Strass resisted, in a fashion consistent with the rhetoric of Romantic historiography, equating order with measurement. As William Bell put it,

> However natural it may be to assist the perceptive faculty, in its assumption of abstract time, by the idea of a line…it is astonishing that…the image of a Stream should not have presented itself to any one….The expressions of gliding,

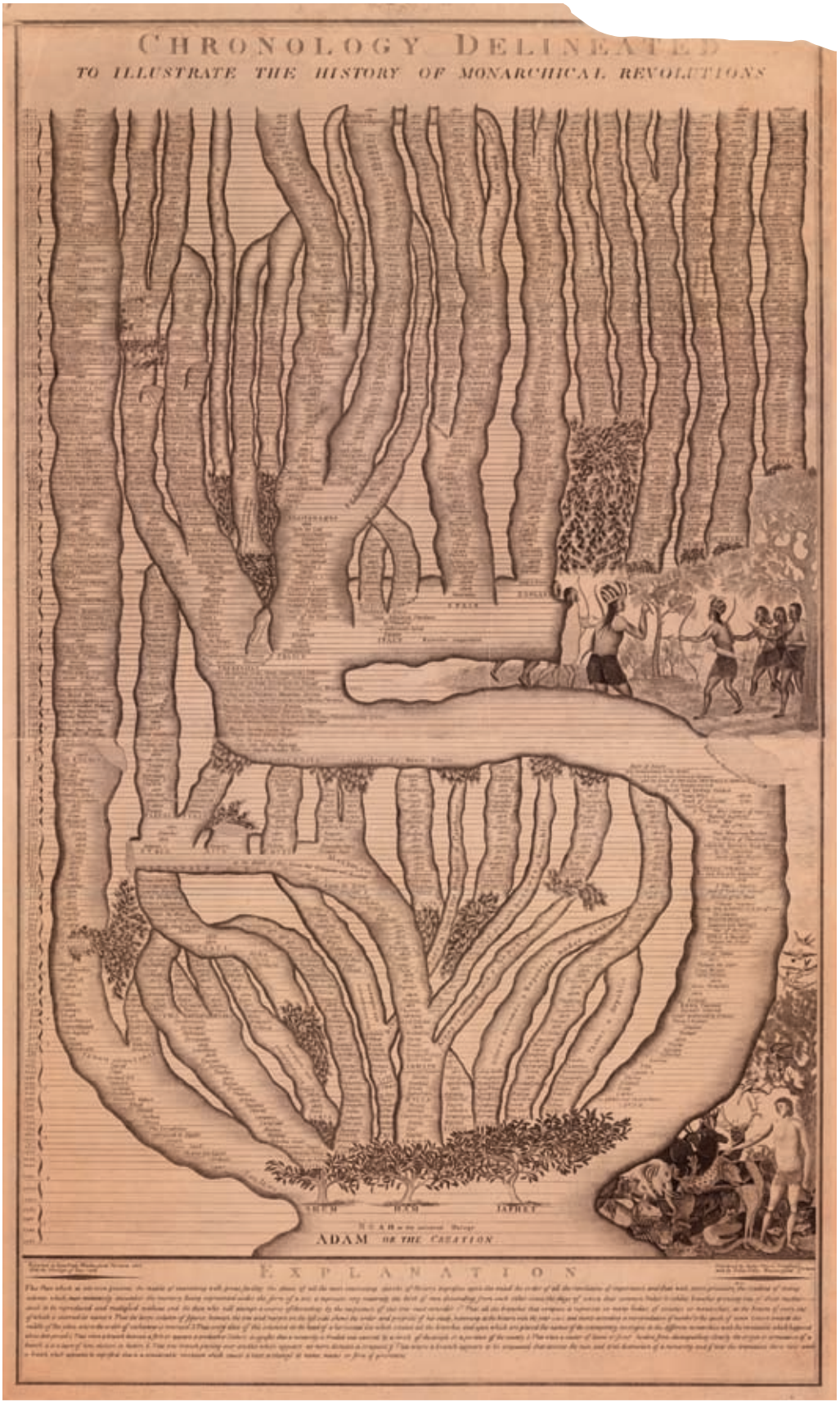


[45]

William Bell, English translation of Friedrich Strass's 1804 *Strom der Zeiten*, London, 1849

[46]

Stephen and Daniel Dod's *A Chronological, Historical, and Biographical Chart* from 1807 resembles Friedrich Strass's *Strom der Zeiten* but takes the form of a tree growing up rather than a stream flowing down. Priestley's name figures on the Dods' chart on the biographical branch at the upper right.



[47]

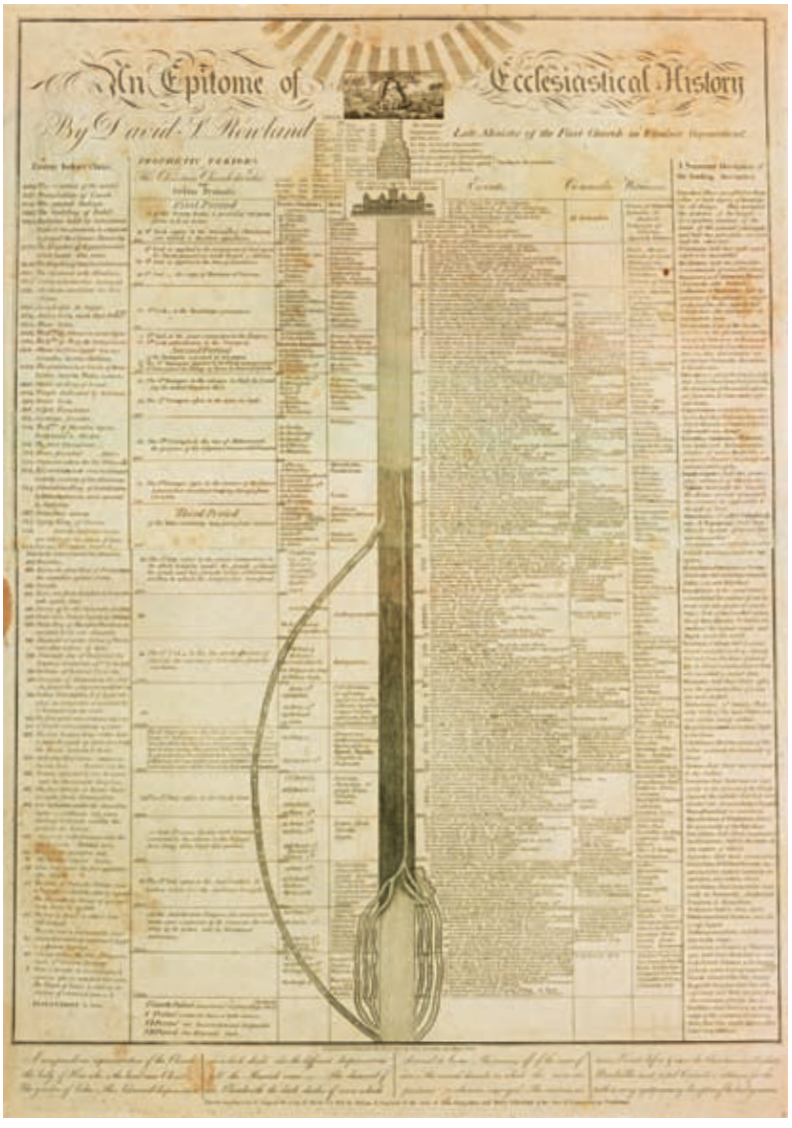
In many cases precise authorship of chronological charts is difficult to establish. Typically these works were the result of a collaboration among writers, engravers, and publishers, and new charts often relied heavily on older ones. In 1812 the pioneering printer Isaac Eddy produced the first Vermont Bible. The following year, in collaboration with the globe-maker James Wilson, Eddy published a chart entitled *Chronology Delineated to Illustrate the History of Monarchical Revolutions*. The form of the Vermont chart closely resembles the chart of Stephen and Daniel Dod, though the content, framing, and illustrations differ.

> and rolling on; or of the rapid current, applied to time, are equally familiar to us with those of long and short. Neither does it require any great discernment to trace…in the rise and fall of empire, an allusion to the source of a river, and to the increasing rapidity of its current, in proportion with the declivity of their channels towards the engulfing ocean. Nay, this metaphor…gives greater liveliness to the ideas, and impresses events more forcibly upon the mind, than the stiff regularity of the straight line. Its diversified power likewise of separating the various currents into subordinate branches, or of uniting them into one vast ocean of power…tends to render the idea by its beauty more attractive, by its simplicity more perspicuous, and by its resemblance more consistent.[56]

History, for Strass and Bell, was a kind of knowledge about the past, not merely a set of recorded facts. Accordingly, while the framing structure of Strass's chart retains the general feel of Jefferys and Priestley, its representation of history itself looks entirely different. The *Strom der Zeiten* originates in a storm at the top of his great broadside. In it, events ebb and flow, fork and twist, run and roll and thunder. Mercator would have been fascinated to see his modest efforts at changing the rate of time's passage transformed into so grand and flexible a visual metaphor.

Strass was not the only chart maker to take such a tack. Whether in the form of a stream (usually descending) or a tree (usually ascending), similar visual schemes appeared everywhere in the nineteenth century. [*figs.* **46–47**] Only a few years after the first publication of *Strom der Zeiten*, two notable New Jersey inventors, the brothers Daniel and Stephen Dod, made a similar chart, though theirs was based on a tree. American charts such as that of the Dods were more ephemeral than their European counterparts. They were also, often, rougher around the edges. Though wonderful in itself, the Dod chart is best remembered not for its own qualities but because of the renown of its creators. Stephen and Daniel Dod were sons of the American clock maker Lebbeus Dod, whose skills were put to armaments during the Revolutionary War. Stephen was a noted surveyor and served as mayor of Newark. Daniel designed and built the steam engine for the *Savannah*, the first American steamship to cross the Atlantic. But the Dods' chart itself had some influence in the United States, and in 1813 a new version was prepared by the widely known Vermont printer and engraver Isaac Eddy and the globemaker James Wilson.

The stream chart continued to be popular throughout the nineteenth century. [*figs.* **48–50**] In Connecticut in 1806,

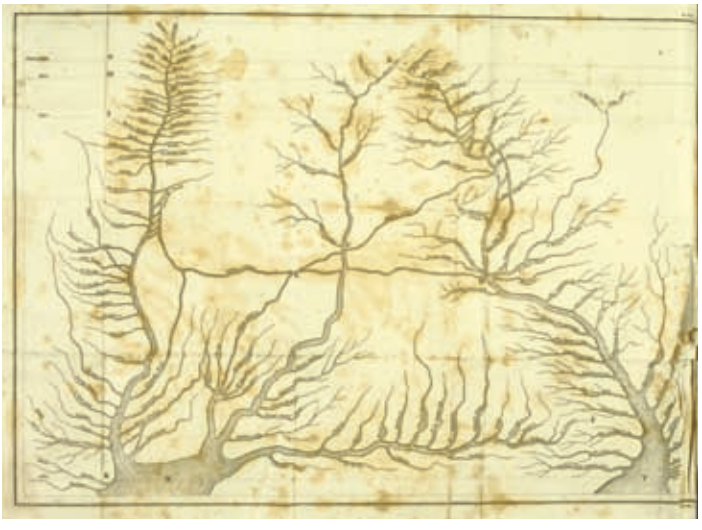


[48]

The visual metaphor of the stream was sometimes integrated into a larger tabular framework as in the 1806 *Epitome of Ecclesiastical History* by David Rowland, the Congregationalist minister of the First Church of Windsor, Connecticut. In Rowland's diagram, the central stream of Christianity becomes murky with the "dark shades of error" during the Middle Ages, with only a thin, clear channel of dissent running through. During the Protestant Reformation, several dissenting channels separate from and then rejoin the main stream of Christianity.

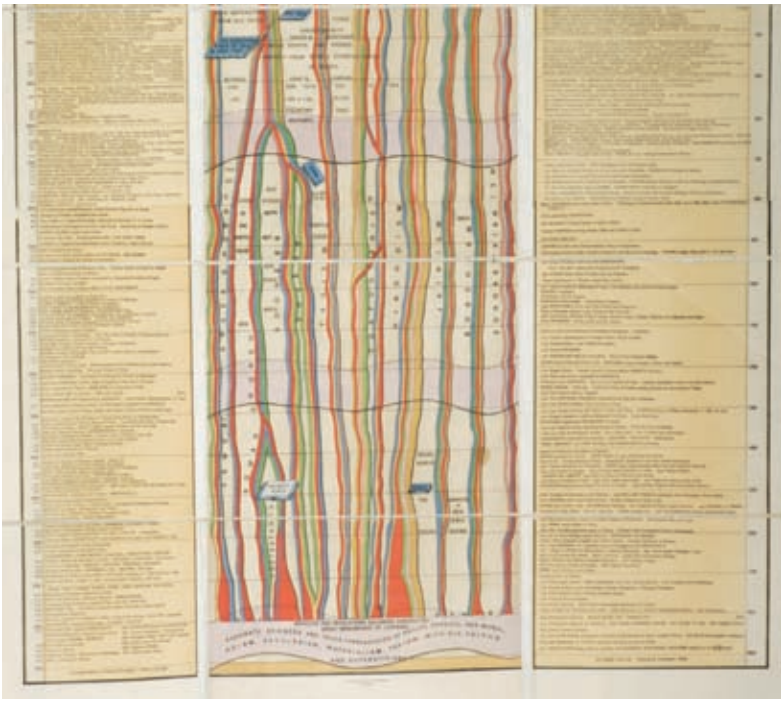
[49]

The English abolitionist Thomas Clarkson included a stream chart in his 1808 *The History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave-Trade by the British Parliament*. Here the early supporters of abolition are represented as "springs and rivulets" contributing to two great political rivers representing the abolitionist movement in England and in America. This is the 1836 New York edition.



[50]

In 1883, after retiring from forty years of military service in India, the British Major-General James George Roche Forlong published a thick three-volume work on the development of world religions entitled *Rivers of Life, or, Sources and Streams of the Faiths of Man in All Lands; Showing the Evolution of Faiths from the Rudest Symbolisms to the Latest Spiritual Developments*. Forlong's work came with a seven-and-a-half foot colored chart of "faith streams" demonstrating his vision of the interconnectedness of world religions.



the Congregationalist minister David Rowland used the stream metaphor rather than the standard Eusebian format in his *Epitome of Ecclesiastical History*. Thomas Clarkson's 1808 *The History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave-Trade by the British Parliament* used the stream metaphor as well, as did the 1883 ethnography of world religion by James George Roche Forlong—who competes with Temporarius for best-named chronologist—*Rivers of Life, or, Sources and Streams of the Faiths of Man in All Lands; Showing the Evolution of Faiths from the Rudest Symbolisms to the Latest Spiritual Developments*.

Nonetheless, with time, the conventions of the stream chart and the linear chronology tended to converge. Despite William Bell's protest, during the nineteenth century it was typical for such charts to employ some version of the "equisecular" format that Priestley had popularized. Though their internal conventions were different, their framing structures more and more resembled the regular, measured format of the timeline that was already ubiquitous only a few decades after it had first appeared.