WELCOME

Kerry Magruder

Painters • Prophets • Poets

Imagining New Creation Together

Today, you are a researcher. This is a privilege and a dare.
Beware, the books will change you. *Let him who has ears to hear...*
I pray you will find one that speaks to you.
One that rouses your imagination like the Oklahoma winds.
One that strengthens you with the comfort of the companionship of a true friend.
Enter in hope, all ye who enter here.

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WONDER

Painters • Prophets • Poets

Imagining New Creation Together

Earth & Heavens

Engage your poetic imagination and explore the wonders of the Earth and then the heavens in the first two sections of this display.

Dove's Press Bible

(London, 1902-1904), 5 vols., vol. 1. [Case #21.1]

In the opening chapters of Genesis we read that God called upon the land to bring forth living creatures, and then made Adam from the dust of the ground. As humans, we discover our identity in humility, in solidarity with the *humus* in which we are grounded and in fellowship with the living creatures of the earth (Hannah Anderson, *Humble Roots*). God also made the Sun, Moon, and stars, those bright signs of beauty and the passing of time which lift our eyes and aspirations to wonder at the entire created cosmos.

The Dove's Press Bible is one of the most artfully-crafted books printed in the 20th century. T.J. Cobden-Sanderson and Emery Walker established the Doves Press in Hammersmith, London, as an expression of the Arts and Crafts movement. In every aspect, from the distinctive typeface to the hand sewing and binding, the Doves Press paid tribute to the artistry of the early printers.

Gerard Hoet

Figures de la Bible (La Haye [The Hague], 1728)

"In the beginning, God created the heavens and the earth."

In this book of biblical illustrations, texts are cited in Hebrew, Greek, German, English, French, Latin, and Dutch.

Conventions of biblical illustration interacted with scientific investigation, each influencing and shaping the other:

• Hoet's *cosmic section* depicts the Copernican universe where the Sun is in the center and the Earth moves through the heavens.

• Hoet's *global section* depicts 18th-century understandings of the formation of the Earth during the creation week.

Engage your poetic imagination and explore the wonders of the *earth* and then the *heavens* in the first two sections of today's display.

Nicholas Lane, pocket globe

(London, 1809).
Papier mache and plaster sphere, varnished.
Wooden concave case with black sharkskin.

Imagine carrying the heavens and the Earth in your pocket.

Then take them out and ponder the wonders therein.

On this little terrestrial globe one might track Cook's third voyage, examine the "Stoney Mountains" of the American West, or scan the northern and southern stars on the celestial maps.

The vibrant colors, applied by hand on copperplate engravings, feature Lane's characteristic dark green hues.

Engage your poetic imagination and explore the wonders of the *Earth* and then the *heavens* in the first two sections of this display.

1

WONDER

Painters • Prophets • Poets

Imagining New Creation Together

Earth

How is wonder an antidote to reductionism in science? Does wonder increase as science progresses? What is the scientific imagination?

Aristotle, *De animalibus*

(Venice, 1476). Various collected writings "on animals."

Wonder and science go together. All science begins with wonder. And wonder is the end of science. The more we learn, the more the wonder grows.

Aristotle opened his *Metaphysics* by declaring,
"All humans by nature desire to understand."

For Aristotle, all inquiry begins with wonder; i.e., with questions we wonder about on an experiential level. Yet the wonder continues as progress is made with the discovery of causes on an explanatory level. As Aristotle admonishes:

> "We therefore must not recoil with childish aversion from the examination of the humbler animals. Every realm of nature is marvelous...." (Aristotle, *Parts of Animals*)

The modern idea that scientific explanation diminishes wonder would have astonished Aristotle. For Aristotle, even the lowliest animals are beautiful and full of more and more wonder as one grows in understanding. *How do we preserve that wonder in an age of science? What is the role of the imagination in science?*

Pietro de' Crescenzi (ca. 1233 – ca. 1320)

Ruralium commodorum (Augsburg, 1471), 1st ed.
"The Advantages of Country Living"

This is the earliest published work on agriculture, a manual for managing a feudal estate. It is an ancestor to the early printed herbals. Crescenzi explains which plants one must cultivate to be able to make the common remedies.

The first page, printed with movable type, was illuminated by hand with gold leaf and artistic flair.

Compare the typeface on the first printed page with the handwriting in Carolingian script on the facing page. The facing page is part of the original binding, made of brushed vellum. The markings above the lines of text are signs for Gregorian chant. This style of musical notation dates the vellum to the 10th century, which was then recycled 500 years later to serve as the original binding (running through to the back side) for the text printed in 1471.

Later on, the book was protected by the addition of a dark brown, outside binding. It derives from the German speaking parts of Europe after 1600, a century and a half after the book was printed.

Leonhart Fuchs

De historia stirpium (Basil, 1542), 1st ed.
"On the Natural History of Plants"

Fuchs extracted the best knowledge available from ancient sources, yet he gave each plant a German name as well as the traditional Latin. This work contains descriptions of 500 plants, 400 of which were native to Germany. He described nearly 100 northern European plants unknown to Roman-era physicians. Four different indices provide cross-references of plant names according to Greek, Latin, German and common apothecary usage.

Fuchs combined careful textual scholarship with striking depictions of plants drawn from life. In a portrait on the verso of the title page he rests one hand on his book, while the other hand holds a plant for inspection. Three portraits at the end of the work depict the craftsmen at work: Heinricus Füllmaurer, the artist; Albertus Mayer, who transferred the drawings to the blocks; and a woodblock cutter, Veitus Rudolph Speckle. The skilled women who likely hand-colored the illustrations in this copy were not similarly honored. In collaboration they created over 500 woodcuts for Fuchs' text, which often served as the basis for illustrations in later herbals.

John Gerard

"God is creating through us a garden..."
(Makoto Fujimura)

The Herball (London, 1597), 1st ed.

Gerard directed the gardens of William Cecil (Lord Burghley), Queen Elizabeth's chief executive. In this capacity, Gerard maintained contacts with naturalists around the world who sent him both exotic plants and the soil to grow them in (cf. frontispiece).

The first illustration of the "Virginia potato" appears in this volume. The history of the world would have been quite different if the potato had never been brought to Europe from the Americas.

Gerard grew and described many American plants, including chili peppers, squash, pumpkins, gourds, and Turkie corn, which was cultivated by the Mayans as a staple crop. Although maize originated in Mexico, it became known as Turkey Corn (Turcicum, Türchlich Korn) because it was shipped to Europe through Turkey and the Ottoman empire.

Gerard's herbal throws light upon the meanings of plants mentioned by Shakespeare and other contemporary English authors. Yum!

Edward Topsell

The Historie of Foure-Footed Beastes
(London, 1658), 2 vols. bound in 1

Topsell's natural history includes both familiar and exotic creatures, drawn from sources both new and old. Topsell describes the horse, reindeer and chameleon. He portrays the magnificent appearance of the rhinoceros in the artistic tradition of Dürer. An appendix surveys what was known of the bee and bee-keeping. He included strange creatures such as the unicorn and the manticore.

In 1672, Nicolaas Tulp would report that the horn of the unicorn on display in many continental museums was actually the tusk of the narwhal. However, the weight of classical testimony could be taken as independent evidence that the land-dwelling unicorn really existed as a terrestrial counterpart to the aquatic one.

Ferrante Imperato

Dell' Historia Naturale (Naples, 1599), 1st ed. "On Natural History"

In this engraving of a "cabinet of curiosity" in Naples, the author's son points out the marvels of nature to visitors. *Which objects draw your eye?* Cabinets of curiosity were museums in miniature, displaying collections of antiquarian, fossil, and natural history objects. *Does this cabinet also contain books?*

Among the books in Imperato's cabinet was a manuscript copy of the natural history of Mexico by Hernandez. Although unpublished, the Hernandez manuscript was already being avidly sought after as a rumored guide to the fountain of youth. When Prince Federigo Cesi visited Naples, Imperato showed him the Hernandez manuscript. Cesi bought it, took it home, and showed it to Galileo, who was professionally trained in medicine. Cesi created the *Academia dei Lincei* (Academy of the Lynx) to edit it and prepare it for publication. Galileo was the most illustrious member of the Lynx, but members of this early scientific society included several of the most accomplished naturalists and physicians of the day. After many delays, the Lynx edition of Hernandez was finally published in 1651 (next item).

Francesco Hernandez

Nova plantarum, animalium et mineralium Mexicanorum historia (Rome, 1651); "A New Natural History of the Plants, Animals and Minerals of Mexico"

The indigenous Mexican knowledge reported by Hernandez transformed European natural history in incalculable ways. Subsequent European progress in the life sciences directly depended upon the natural knowledge of the natives of central Mexico. Writers still cited this Lynx edition as late as the 19th century.

Many believed that cures for every disease lay hidden in the natural resources of the world. It was part of the divine calling of physicians to discover those cures, develop them, and then use them to care for others and remediate the effects of the Fall. This widespread anticipation of the coming restoration of all things underlay the excitement aroused by increasing knowledge of indigenous botanical and medical traditions around the world, as conveyed in the Hernandez, although European expeditions were grievously tainted by colonial exploitation.

Roesel von Rosenhof

Historia naturalis ranarum (Amsterdam, 1758)
"Natural History of Amphibians"

Observing nature with the eyes of an artist

Few full-time jobs were available in biology during the 18th century. Without an independent source of wealth to draw upon, Rosenhof became a portrait artist by profession. In his spare time he pursued his first love, the natural history of amphibians (this volume) and invertebrates (*De natuurlyke historie der insecten* [1764-1768], 9 vols., not displayed today).

In this study, Rosenhof paid special attention to the life stages and generation of frogs, portraying eggs, tadpoles and juveniles as well as adults. Some structures are made more evident in black and white, while others require color (painted by hand in every copy). Text appears in parallel Latin and German columns, with a dedication to the renowned naturalist Albrecht von Haller.

Georges Louis Leclerc, comte de Buffon

• *Histoire naturelle* (Paris, 1749-1804), 44 vols. "Natural History."
• *Buffon de la Jeunesse: Histoire naturelle des Mammifères, des Oiseaux, des Reptiles et des Poissons* (Paris, nd), 2d ed. "Buffon for Youth: Natural History of Mammals, Birds, Reptiles and Fish."

Buffon's monumental series was the most popular work of natural history in the 18th century. Rather than adopting a merely taxonomic, systematic approach as did his contemporary, Linneaus, Buffon wrote in a riveting prose style. He began with the animals that are most familiar to and interdependent upon human beings, such as the horse. The first volume set the stage by considering the historical development of the Earth in a *Théorie de la terre*. One volume of a first edition set, still in the original binding, is on display today alongside a colorful edition that was adapted for children.

Musée des Dames et des Demoiselles

(Paris, 1825), 5 vols. in a decorative box

These inviting turquoise volumes, housed in a gold box with a pink interior, offered a young lady her first introduction to several departments of natural history. Separate volumes, each beginning with a beautiful color plate, are devoted to insects, flowers, fruits, butterflies, and shells.

The Oklahoma copy is inscribed as a gift from an older sister in England to enable her younger sister to learn a little French along with the natural history.

Ogden Nash

Zoo (New York, 1972)

"I kind of like the playful porpoise,
A healthy mind in a healthy corpus.
He and his cousin, the playful dolphin,
Why they like swimmin like I like golphin."

"Behold the hippopotamus!
We laugh at how he looks to us.
And yet in moments dank and grim
I wonder how we look to him.
Peace, peace, thou hippopotamus!
We really look all right to us,
As you no doubt delight the eye
Of other hippopotami."

Gerard Manley Hopkins

"God's Grandeur," 1877

The world is charged with the grandeur of God.
It will flame out, like shining from shook foil;
It gathers to a greatness, like the ooze of oil
Crushed. Why do men then now not reck his rod?

Generations have trod, have trod, have trod;
And all is seared with trade; bleared, smeared with toil;
And wears man's smudge and shares man's smell: the soil
Is bare now, nor can foot feel, being shod.

And for all this, nature is never spent;
There lives the dearest freshness deep down things;
And though the last lights off the black West went

Oh, morning, at the brown brink eastward, springs –
Because the Holy Ghost over the bent
World broods with warm breast and with ah! bright wings.

William Wordsworth, "Tables Turned"

There is more to reality than meets the eye. In contrast, the positivist science of the 18th and 19th centuries seemed to undermine wonder with a reductionistic approach in which nothing is real but what appears to the senses ("nothing but..."). In opposition, the Romantic poet William Wordsworth wrote:

"Sweet is the lore which Nature brings;
Our meddling intellect
Mis-shapes the beauteous forms of things: –
We murder to dissect.
Enough of Science and of Art;
Close up those barren leaves;
Come forth, and bring with you a heart
That watches and receives."

By "Science" Wordsworth means reductionistic science, and by "Art" he means technology cut off from human values, particularly in the industrial revolution. Wordsworth is pleading for us to cultivate an integrated imaginative grasp of a multi-dimensional reality. Reductionism is murder. Reductionism is to dissect, to analyze, to look at only one surface level of reality and to miss the whole rich, wondrous depth of multi-leveled reality.

C. S. Lewis

An Experiment in Criticism (Cambridge, 1961)

"The man who is contented to be only himself [in isolation, closed off from relations with others], and therefore less a self, is in prison. My own eyes are not enough for me, I will see through the eyes of others... Even the eyes of all humanity are not enough. I regret that the brutes cannot write books. Very gladly would I learn what face things present to a mouse or a bee; more gladly still would I perceive the olfactory world charged with all the information and emotion it carries for a dog.... Literary experience heals the wound, without undermining the privilege, of individuality... But in reading great literature, I become a thousand men and yet remain myself. Like the night sky in the Greek poem, I see with a myriad eyes, but it is still I who see. Here, as in worship, in love, in moral action, and in knowing, I transcend myself; and am never more myself than when I do."

Charles Darwin, Robert Garner

Robert Garner, *Natural History of Staffordshire* (London, 1844)
Charles Darwin to Robert Garner, 22 February [1864, 1870 or 1871].

Can you read Darwin's handwriting?

The recipient of this letter, Robert Garner, wrote about the natural history of Staffordshire (located in the West-Midlands region of England). This is Garner's own copy of his book. When Garner received a letter from Darwin, he bound it in the end-papers for safe-keeping.

Over his lifetime, Darwin's productivity was astounding: Darwin published 22 printed volumes and authored more than 200 articles, not counting his notebooks, nor the many translations and revised editions, nor his posthumously-published *Autobiography*. How did he do it? An important part of the answer is the overlap he maintained between his writing and his correspondence. Darwin penned an estimated 15,000 letters! The key to his productivity was the community he worked tirelessly to maintain among geographically-dispersed acquaintances like Garner who shared similar interests and were willing to engage in the effort of collaboration through correspondence. When Darwin worked alone in his study, he was not writing alone.

Charles Darwin

The Formation of Vegetable Mould through the Action of Worms (London, 1881), 1st ed. F1357.

To view all 22 printed volumes of Charles Darwin's first editions yields an unforgettable impression of the breadth and beauty of Darwin's work. As an example, the last book Darwin published is one of his least-known, but his study of mold and earthworms drew upon his broad interests. Far from being small and insignificant creatures, Darwin argued, earthworms turn over the soil in vast quantities, creating a suitable habitat for the growth of plants. Drawing upon some of his early geological work in the production of soils, this work represents a founding exemplar of quantitative ecology.

Like Darwin's other books, it also contains interesting visual representations — for example, a tower of earthworm casts and diagrams showing the importance of mold in forming soil.

Charles Darwin, Mammals

Zoology of the Voyage of H.M.S. Beagle (London, 1838-1843).

Darwin's *Zoology of the Beagle* is one of the most beautiful works of 19th-century natural history. It is more rare than the *Origin of Species*. In it, Darwin described the South American animals he encountered on the Beagle expedition. Of the 180 lithographs in the work, half have been colored by hand, one at a time, in every copy. The work was issued in 19 numbered sections, like a magazine, over a period of 6 years.

Although Darwin edited and superintended the work, he was a young man and not well known in the British scientific scene, so he enlisted the help of five elite and well-respected naturalists. In Part 1, Richard Owen assisted in describing South American fossil mammals. Detailed engravings include an actual-size fold-out of the skull of the prehistoric *Toxodon* mammal. In Part 2, Darwin collaborated with George Waterhouse to describe living mammals. South American foxes, wild cats and aquatic mammals are portrayed alongside various species of field mice and larger rodents.

Charles Darwin, Birds

Zoology of the Voyage of H.M.S. Beagle
(London, 1838-1843). 5 vols. bound in 3.

Part 3 is devoted to birds. For these specimens, Darwin obtained the help of John Gould, the great English ornithologist and artist. This volume is one of Gould's most famous works of art. Each lithograph was printed in black and white and then painstakingly hand-colored by John Gould and his wife, Elizabeth.

The illustrations capture the immense variation found among species of mockingbirds and finches, and provide glimpses of species' natural habitats based upon Darwin's notes.

> "Hope is the thing with feathers —
> That perches in the soul —
> And sings the tune without the words —
> And never stops — at all —" (Emily Dickinson)

Charles Darwin, Fish & Reptiles

Zoology of the Voyage of H.M.S. Beagle
(London, 1838-1843). 5 vols. bound in 3.

Part 4 is devoted to fish and Part 5 covers reptiles. Lizards from the Galapagos Islands are depicted along with South American frogs and toads. Surprisingly, there is no description of a Galapagos tortoise.

Had Darwin never written another word, he would still be famous as the supervising author of the *Zoology*, a magnificent work of color natural history illustration. The *Zoology* brought Darwin to the attention of scientists everywhere as one of Britain's up-and-coming young naturalists.

The voyage of H.M.S. Beagle from December 1831 through October 1836 became one of the most famous expeditions of modern times. It was a voyage of wonder for Darwin and remains a source of wonder for readers of the *Zoology* then and now.

Charles Darwin

The Voyage of H.M.S. Beagle (London, 1890), F64.
1st ed. (not displayed): Darwin, *Journal of Researches* (1839), F11.

For 19th-century readers, Darwin embodied the Romanticist spirit. As a young man, Darwin was working and writing in a Romanticist mode. Originally published in 1839, Darwin's *Voyage* was an immediate best-seller, a lively account of the Beagle voyage. Darwin recounted adventures at sea sailing around Cape Horn, passing by snow-topped mountains and volcanic islands. And adventures on land crossing icy bridges in the Andes and traversing treacherous mountain passages. He relayed visions of strange, far-away places and the exotic people who lived there. Darwin's travel narrative was widely admired, both in Britain and on the continent, as a Romanticist description of the scientist as an explorer encountering the exotic and sublime. More people read this book in the 19th century than any of Darwin's other works. It's no wonder the *Voyage of the Beagle* has remained in print to this day.

Charles Darwin, *Origin of Species*

(London, 1859), 1st ed. F373. Two copies on display.

Romanticism affected scientists as intensely as poets. Romanticist scientists emphasized the beauty of nature even in wild and remote places. Mountains, instead of being shunned as repugnant places of sheer disorder, became prized as locations where the imagination might grasp a deeper reality and a higher beauty than reductionistic reason alone could ever apprehend. Geology and natural history were pursued with a sense of the sublime. Field investigations led to an explosion of knowledge of the history of life. No scientist better represents these 18th & 19th-century developments than Charles Darwin.

The works of Darwin exhibit a remarkable beauty and breadth of vision that arouses wonder. His reconstruction of the history of life on Earth expresses an imaginative capacity which astonished its readers then and remains captivating today. The *Origin's* concluding paragraph expresses the Romanticist sensibility which underpinned Darwin's early scientific work: *"There is a grandeur in this view of life..."*

Charles Darwin, *Autobiography*

In *Life and Letters* (1887), 3 vols. F1453.

Despite the importance of Romanticism for Darwin's early scientific work, in contrast, consider Darwin's *Autobiography*, written late in life and not published until after his death. In it Darwin observed:

> "I have said that in one respect my mind has changed during the last twenty or thirty years. Up to the age of thirty, or beyond it, poetry of many kinds, such as the works of Milton, Gray, Byron, Wordsworth, Coleridge, and Shelley, gave me great pleasure... I have also said that formerly pictures gave me considerable, and music very great delight. But now for many years I cannot endure to read a line of poetry... I have also almost lost any taste for pictures or music. I retain some taste for fine scenery, but it does not cause me the exquisite delight which it formerly did..."

Darwin continued:

> "This curious and lamentable loss of the higher aesthetic tastes is all the odder... My mind seems to have become a kind of machine for grinding general laws out of large collections of facts, but why this should have caused the atrophy of that part of the brain alone, on which the higher tastes depend, I cannot conceive... if I had to live my life again I would have made a rule to read some poetry and listen to some music at least once every week; for perhaps the parts of my brain now atrophied could thus have been kept active through use. The loss of these tastes is a loss of happiness, and may possibly be injurious to the intellect and more probably to the moral character, by enfeebling the emotional [imaginative] part of our nature."

We might say that, instead of an atrophy of some part of the brain (itself a reductionistic explanation), rather, Darwin was suffering an atrophy of the imagination. Numbed with grief from many sorrows of life, he sensed his loss, a natural concomitant of working for so many years in a mode of functional reductionism, neither cultivating wonder on a day-to-day experiential level nor giving adequate place to the arts. He was suffering what we might call an "imagination deficit disorder," as diagnosed by Wordsworth's "Tables Turned."

C. S. Lewis, *The Abolition of Man*

(London: Geoffrey Bles, 1946), New Edition.

The Abolition of Man offers a sustained argument against reductionism in the sciences which diminishes and degrades the scientist as well as the science. Lewis articulated a redemptive vision in which natural science itself would be transformed so as to aid and recover a sense of wonder:

> "... from Science herself the cure might come. I have described as a 'magician's bargain' that process whereby man surrenders object after object, and finally himself, to Nature in return for power... Is it, then, possible to imagine a new Natural Philosophy... The regenerate science which I have in mind would not do even to minerals and vegetables what modern science threatens to do to man himself..."

In *To Think Christianly*, Charles Cotherman reports that James Houston once asked C. S. Lewis,

> "'What would you say was your central message you were communicating through all your literary works?' Lewis promptly replied, 'Against reductionism.'"

The cultivation of wonder matters as much for the scientist as for the artist.

2

WONDER

Painters • Prophets • Poets

Imagining New Creation Together

Heavens

Engage your poetic imagination and explore the wonders of the heavens and the human stories that connect us with the stars.

Urania's Mirror

(London, 1824). Boxed set of 32 constellation cards.

What are your favorite constellations?

Constellation cards make learning the constellations fun. "Urania" represents the Heavens herself, "mirrored" in these cards.

Holes are punched in the positions of bright stars. Hold any card up to a light and compare the *star pattern* with the *constellation figure*.

The 66 constellations represented in *Urania's Mirror* include several no longer recognized today. The constellation figures were based upon the *Celestial Atlas* of Alexander Jamieson, published in 1822. This is the first edition; subsequent editions include stars outside the boundaries of the featured constellations. The creator of *Urania's Mirror* remains disputed, but a companion book by Jehoshaphat Aspin stated that the cards "were designed by a lady."

Alfred, Lord Tennyson

Poems (London, 1843), 2 vols.

When visiting the home of his childhood, Alfred Lord Tennyson reminisced:

> "Many a night from yonder ivied casement, ere I went to rest,
> Did I look on great Orion sloping slowly to the West.
> Many a night I saw the Pleiades rising through the mellow shade,
> Glitter like a swarm of fireflies tangled in a silver braid."
>
> "Locksley Hall," 5th couplet.

Friedrich Braun, constellation cards

Himmels Atlas in Transparenten Karten (1860)
"Star Atlas with Transparent Cards"

Born of the earth, we were created also to lift our eyes above. The stories of the stars we tell through the ages connect the heavens and the earth. In every generation, humans honor figures of the earth by weaving them into stories of the stars.

Constellations were not named because the star patterns *resembled* the figures in human stories. Rather, it took imagination to create them then, and it takes imagination to see them now. Similarly, we may imagine now how to project new figures upon the same familiar star patterns to tell our own cherished stories tonight.

What stories would you lift to the stars?

What constellations would you create?

Hoot the Owl

Anna Todd, 2d grade, Rose Witcher Elementary School,
El Reno Public Schools, Oklahoma (2017)

Hoot the Owl is not one of the 88 official constellations recognized by the International Astronomical Union, but it's my new favorite constellation! You can read the book just as Anna Todd wrote and illustrated it. Her 2d grade student teacher, Stacey Stephenson, recounted:

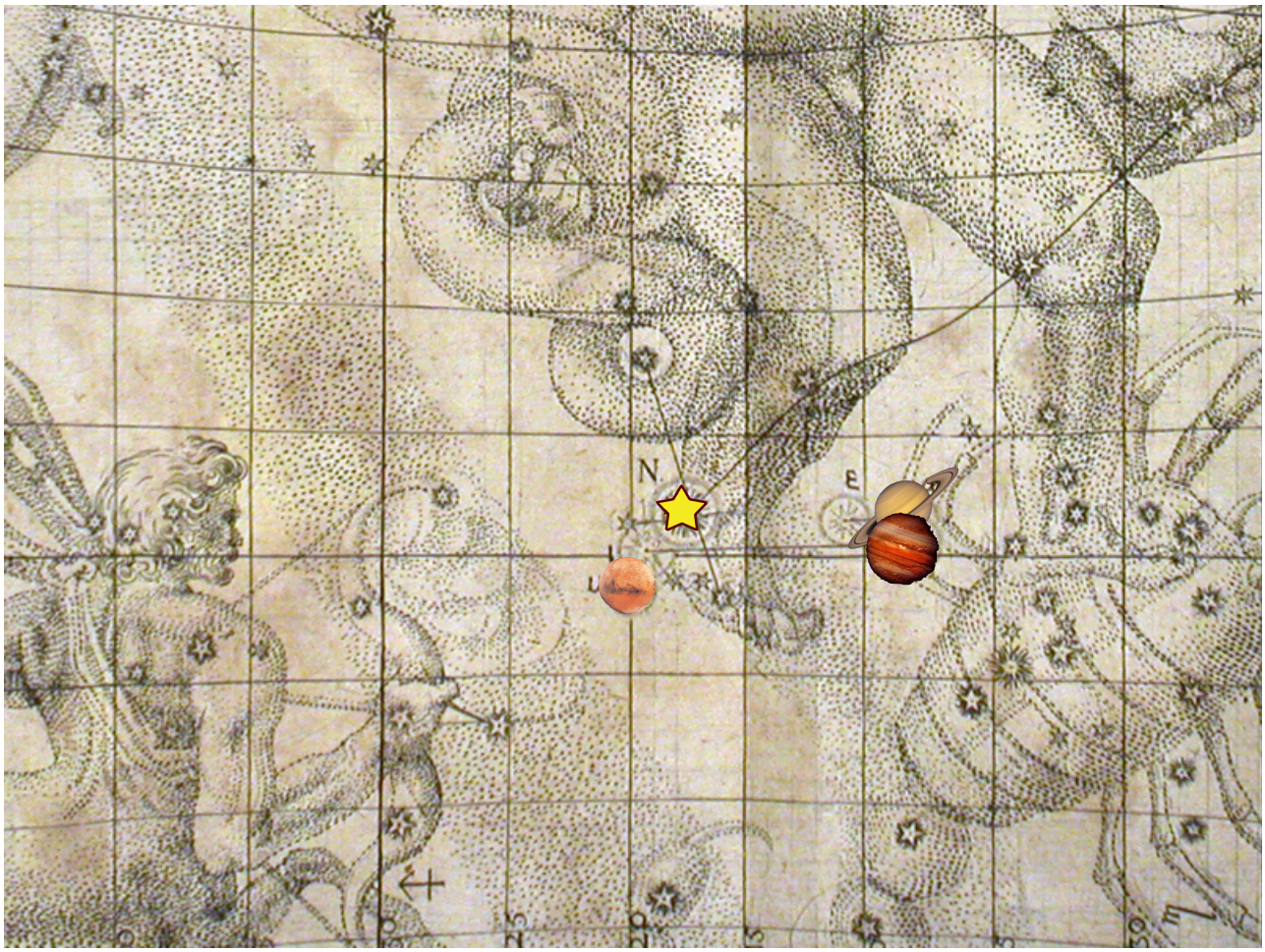
> "She was in awe, absolutely consumed by the idea of constellations. She was able to comprehend that the pictures were not actually in the sky but '*imaginary, for my heart to see but not my eyes*,' those are her words. We read the captions connected to the images on the materials you handed out and on the website. After a few meetings of reading only about constellations and stars, she decided to write her own book about a constellation... She says, '*The more I practice reading, the more I will be able to read about the sky when I am older and can understand the biggest words of all.*'"

Johann Kepler

De stella nova in pede Serpentarii (Prague, 1606), 1st ed.
"On the New Star in the Foot of Ophiuchus"

Kepler's star map shows the constellations of Ophiuchus (the Serpent Handler), Sagittarius and Scorpius. The Milky Way runs diagonally down from the left, and the "ecliptic," or annual path of the Sun, runs horizontally through Sagittarius and Scorpius.

A triple conjunction of Jupiter and Saturn took place in 1603, followed by a planetary massing with Mars in 1604. After the planetary massing, a "Nova" or bright star ("N") suddenly appeared in the ankle of Ophiuchus on October 10, 1604. The new star was no ordinary star; it remained visible even in the daytime sky for over a year. The new star prompted widespread debate about what it might portend and whether the heavens could change. Now called Kepler's nova, it was the second supernova to be observed in a generation, after the supernova in Cassiopeia, described by Tycho, which appeared in 1572. No supernova within the Milky Way galaxy has been observed since.



Johann Kepler

De stella nova in pede Serpentarii (Prague, 1606), 1st ed.
"On the New Star in the Foot of Ophiuchus"

Aristotle taught that conjunctions and planetary massings produce comets. Here, less ominously, they seemed to have produced a new star. Kepler mused that this new star might have been caused by the planets' proximity, might portend the fall of the Turks, or perhaps the second advent of Christ. Above all, he forecast that it would result in good business for booksellers, as a rash of hastily produced pamphlets would be rushed into print to explain it!

Or maybe, he wondered, something similar might have happened for the Bethlehem Star. Some variation of Kepler's account is the most common explanation of the Star of Bethlehem offered in planetarium shows and astronomer talks today.

Johann Bayer

Uranometria ("Measuring the Heavens"; Ulm, 1661), bound with Explicatio characterum (Star catalog; Ulm, 1697)

Bayer's 51 artfully-drawn constellation figures influenced every subsequent star atlas. Each figure is superimposed upon an accurate star map, plotted on a one-degree grid. By fusing science and art, Bayer inaugurated the golden age of the celestial atlas.

Bayer labeled the stars with Greek letters, according to their apparent magnitude, so that the brightest star in Taurus is **α**-Tauri. This convention is still used today.

If we define a "golden atlas" as the most advanced scientific star atlas of its time, which also equally influenced subsequent art, then Bayer's was the 1st of four: Bayer, Hevelius, Flamsteed (not on display today), and Bode.

Elisabeth and Johann Hevelius, *Uranographia*

Firmamentum Sobiescianum sive Uranographia ("The Firmament of King Sobiesci, or Map of the Heavens"; Gdansk, 1690); bound with *Prodromus Astronomiae* ("Preliminary Discourse for Astronomy"; Gdansk, 1690); bound with *Catalogus stellarum fixarum* ("Catalog of the Fixed Stars"; Gdansk, 1687), all 1st eds.

Johann and Elizabeth Hevelius operated the greatest observatory in Europe in the generation after Galileo. Their *Uranographia* was the most detailed and influential celestial atlas of the 17th century. The star catalog includes coordinates for more than 1,500 stars, about 600 of which were new. Of the 12 constellations they created, 7 are still recognized today.

In 1679 their observatory burned. Fire destroyed manuscripts, books, and instruments. Johann was 67 years old, and lost heart to continue the work. After his death six years later, his wife and fellow astronomer Elisabeth carried on. Over the next two years, Elisabeth restored the manuscripts, finished the books, and saw them through publication. Elisabeth, perhaps out of deference to his memory, chose not to include her own name on the title pages of these three works.

In the OU copy, all three titles — the star catalog, methods and atlas — are bound together in one volume.

The four star atlases of Bayer, Hevelius, Flamsteed (not on display today), and Bode, each fulfilled two criteria simultaneously: (1) they were scientifically up-to-date, showing everything astronomers knew about up in the sky, and (2) they were artistically influential, having a profound affect on painting and iconography.

Johann Bode, *Uranographia*

"Map of the Heavens" (Berlin, 1801)

Bode's atlas represents a high-level fusion of artistic beauty and scientific precision. Twenty large copperplate engravings plot more than 17,000 stars, far more than any previous atlas. Bode depicted more than 100 constellations (compared with 88 accepted today). Among the constellation figures, 2,500 cloudy patches or "nebula" appear, which had been recently cataloged by Caroline and William Herschel.

Few atlases are larger. After Bode's monumental effort, scientific star atlases became more specialized in scope or dispensed altogether with the artistic depiction of constellation figures.

The four great celestial atlases of Bayer, Hevelius, Flamsteed and Bode fused art and science, the best of both worlds. After Bode, this fusion ceased, as scientific atlases no longer could print plates large enough to accommodate artistic depictions of intact full-size constellation figures.

3

Music of the Spheres

Painters • Prophets • Poets

Imagining New Creation Together

Do you hear the harmony of the universe around you?
Is the cosmos a place of love,
in which we might learn to love?

Camille Flammarion

L'Atmosphere: Météorologie Populaire (Paris, 1888)
"The Atmosphere: Popular Meteorology"

Science is a quest of wonder, a challenge of boldly exploring where no one has gone before. That is the appeal and rhetorically durable theme which has made this woodcut so appealing.

Many who have reprinted this illustration through the years have not recognized that it first appeared in a popular work on meteorology. Often misattributed to the Middle Ages or Renaissance, this 1888 book is its original source. Flammarion was an astronomer and popular science writer who worked at the Juvissy Observatory in Paris. He created the illustration to promote an erroneous "flat-Earth myth" (see next item).

A version colorized by Susanna J. Magruder is available at *kerrysloft.com*. Put it on a mug or notecard, or color your own.

Peter Apian

Cosmographicum (1540)
Introduction to the Cosmos

The most common-sense understanding of the heavens is to imagine bright points of light carried around within a set of concentric, solid, transparent celestial spheres.

Why does the same side of the Moon always face the Earth? The Moon lies embedded within a solid sphere that carries it around the Earth once a month.

Why are the stars fixed in stable patterns? High overhead the stars appear as bright points of light embedded within their own transparent sphere. The sphere of stars rotates around the Earth once each day, maintaining the patterns of the constellations. We can learn to tell time by the turning sphere of the stars.

Additional spheres carry all the planets in their regular motions.

Apian's cosmic section illustrates the ancient understanding of the universe as a set of concentric celestial spheres.

Peter Apian

Cosmographicum (1545)
Introduction to the Cosmos

In the ancient cosmos, the Earth was round.

Another woodcut illustration in Apian's textbook shows one of Aristotle's arguments for the sphericity of the Earth:

During a lunar eclipse, the Earth's shadow on the Moon is always curved. If the Earth were any other shape, at some time or other its shadow would be angular. This is not observed. Therefore, neither Aristotle nor his later readers needed to circumnavigate the globe to see with their own eyes that the Earth is round.

This argument was never forgotten. The mistaken idea that Columbus faced opposition from flat-Earthers is a modern myth.

Dante, *La Divina commedia*

(Venice, 1757-58), 5 vols in 4. 1st ed. of Dante's collected works.

In the modern imagination, is the cosmos a place suffused with love?

According to Dante, the celestial spheres turn by love. Significantly, each of the three volumes of *The Divine Comedy* concludes with the word "stars." The final line of the last volume alludes to "the love that moves the Sun and other stars." Dante's epic journey through the universe, from its center up to the highest celestial sphere, portrays a universe animated by love. For Dante, the universe is filled with meaning. It is no wonder that he pays close attention to the stars throughout the poem.

The facts of cosmology have changed. We know the universe is not made of concentric celestial spheres, as the ancients supposed. But is the vision of love and the cosmos necessarily displaced? How might Dante or Kepler write of it today? Do modern literature, science fiction, film, art and cultural thought invest the universe with love? That is the fundamental question. (*Tip:* read George MacDonald, C.S. Lewis, and J.R.R. Tolkien.)

What is your *imaginative vision of love and the cosmos?*

Astrolabes

The astrolabe, one of the fundamental instruments for observational astronomy, consists of three major parts:

1. the **mater**, or underlying disk;
2. the **climate**, a removable disk adjusted for latitude; and
3. the **rete**, a ring marked with star positions.

Astrolabe replica, *Brian Grieg* (2014)

The removable climate disk in this replica astrolabe corresponds to OU's latitude of 35°N. The rete displays 29 stars. One may tell time with this astrolabe to within 20 minutes.

Persian Astrolabe

The original Persian astrolabe (no date) is as yet unstudied.

Complex Armillary Sphere replica

Brian Grieg, ca. 2014

Armillary spheres were made in many sizes and designs. For ancient astronomers, a simple armillary sphere represented the fundamental circles of the sky: the local horizon, the celestial equator, the tropics of Cancer and Capricorn, and the ecliptic (or apparent path of the Sun). Using such an instrument, with the Earth at the center, one may observe the positions of stars, demonstrate the motion of the Sun, and calculate for any date the positions of the Sun, bright stars, and Zodiac constellations.

By the 16th century, the crafting of ever more complex armillary spheres reflected attempts to realize a functioning model of the celestial spheres. This replica is based on an instrument created in Amsterdam between 1725-1750 by Leonhard Gerhard Valk and now held in The National Maritime Museum Collection at Greenwich, England (ASTO625).

Plato, *Republic / Timaeus*

Diuus Plato (Venice, 1491), ed. Marsilio Ficino
"The Divine Plato"

Plato wrote, "As our eyes are framed for astronomy, so our ears are framed for the movements of harmony, and these two sciences are sisters." [*Republic*, VII 530d.] From antiquity, music was a sister science to astronomy.

In the *Timaeus*, Plato taught that the cosmos is constructed from regular geometrical figures known as the Pythagorean solids. Whenever one finds an emphasis upon mathematical demonstrations in science, one may credit Plato and the Pythagoreans. Alfred North Whitehead wrote that the history of philosophy is a series of footnotes to Plato; many have said the same about the history of science.

This early edition of Plato's works was edited by Marsilio Ficino, the leading scholar of the Italian Quattrocento (Renaissance). It includes Ficino's own essays on theology and Platonic love. Under the patronage of Lorenzo de Medici, Ficino founded the Florentine Platonic Academy.

Martianus Capella (fl. 450)

De nuptijs philologie [et] Mercurij (Vicenza, 1499), 1st printed ed.
"On the Marriage of Philology and Mercury"

Capella's strange title refers to a wedding of the swiftest god and the most learned goddess. Its meaning is the joining of speech and insight as if our thoughts and language were as agile as a little sphere of mercury rolling around on a sheet of glass (C. S. Lewis, *The Discarded Image*).

Capella described the seven liberal arts. The first three are grammar, logic (dialectic), and rhetoric. The next four, the quadrivium, are mathematical sciences. Arithmetic and geometry are devoted to *numbers* and *magnitudes* respectively.

QUADRIVIUM	Numbers	Magnitudes
Entities	Arithmetic	Geometry
Entities in motion	Music	Astronomy

Music is the science of numbers *in motion*. Astronomy is the science of magnitudes *in motion* (e.g. circles and spheres). Thus music and astronomy are by nature sister sciences.

Nicolaus Copernicus

De revolutionibus orbium coelestium (Nuremberg, 1543), 1st ed.
"On the Revolutions of the Heavenly Spheres"

The "celestial orbs" in the title are the concentric solid spheres of Plato and Aristotle, which Copernicus still accepted.

Yet Copernicus argued that the Sun rather than the Earth lies in the center of the universe. The Earth moves in its own celestial sphere as a planet revolving each year around the Sun.

In 1543 little proof was available that the Earth moves; it was not directly supported by any observations and there were many reasons not to accept it. Ptolemaic astronomy was neither overly complex nor inaccurate. The most important advantage offered by Copernicus was a vision of the universe as a coherent and integrated system, where all the planets move together in elegant harmony.

Accepting Copernicus required the utmost imaginative vision. It did not entail rejecting the music of the spheres.

When the Counter-Reformation began in earnest after the Council of Trent, the Catholic reception of Copernicus became immensely complicated by the desire to avoid unsanctioned novelties. The late Catholic astronomer once hailed by cardinals and popes now became suspect, associated with northern heretics.

In 1616, this work by Copernicus was put on the *Index* of prohibited books, suspended until it could be corrected. The OU 1st ed. copy is "censored." Notice how the heading on the page facing the cosmic section is emended. Where the original heading reads, "*Demonstration of the triple motion of the Earth*," the handwritten correction states, "Demonstration of the *hypothesis* of the triple motion of the Earth." This is one of the 10 corrections mandated by the Inquisition in 1620. Once the corrections were published, it became permissible for Catholics to read Copernicus again so long as they would keep the corrections in mind.

Leonard Digges, *A prognostication euerlasting of right good effect…; Lately corrected and augmented by Thomas Digges his sonne* (London, 1605)

This Sun-centered cosmic section represents the first published defense of Copernicus in England. The Earth carries its meteorological regions of water, air and fire along with it, as a single poignant "*globe of mortalitye*" within the otherwise uncorrupted heavenly spheres. The fixed stars, each far larger than the Sun, extend "*infinitely up*" in a "*Pallace of Foelicitye*."

Leonard Digges wrote this prognostication in a genre known as "astro-meteorology." Astro-meteorologies were early versions of *The Farmer's Almanac*. They attempted to provide annual guidance for agricultural activities and other events on the basis of meteorological and astronomical patterns.

Thomas, Leonard's son, published an updated edition in which he substituted the Copernican system for his father's reliance upon the Ptolemaic. An appendix includes the first English translation of Book 1 of Copernicus' *On the Revolutions*.

Johann Kepler

Mysterium cosmographicum (Tübingen, 1596), 1st ed., 1st state.
"Sacred Mystery of the Structure of the Cosmos"

The best known 16th-century defender of Copernicus was Johann Kepler. In this, his first book, he "proved" Copernicus by refuting two disadvantages of the Copernican model. Besides the motion of the Earth, the Copernican model differed from the Ptolemaic in (1) the number of the planets, and (2) the distances between them.

First, with respect to the number of planets, in the Earth-centered Ptolemaic system there are 7 planets, including the Sun and the Moon. In the Copernican system, there are only 6 planets: The Sun and the Earth switch places. The number of planets decreases by one, because the Moon is demoted; it becomes a satellite of the Earth, moving within the Earth's sphere, rather than a planet with a sphere of its own. Critics objected to the idea of a planetary satellite. So Kepler searched for a reason why there should be only 6 planets instead of 7.

Second, with respect to the distances between the planets, in the Ptolemaic system all the planetary spheres nest together with no intervening spaces. By contrast, in the Copernican system, the spheres of the planets become thin, separated by large distances. Skeptics asked, why would the Divine Architect have wasted so much empty space? Indeed, Kepler calculated that the gaps are so large that most of the universe is empty space! This only made the problem worse. How could such wastefulness be consistent with love?

Kepler's blueprints of the universe used the five regular Pythagorean solids to address both the number of the planets and the amazing proportions of the planetary spheres. Instead of nesting one planetary sphere immediately after another, in the ideal blueprints of the cosmos the Creator alternated planetary spheres with the 5 regular solids. For Kepler, because there were only 5 regular solids, there could be only 6 planets (with 5 spaces between them). For the calculated distances, the geometry amazingly worked out to within the limits of known observational error. So the mystery of the universe was now revealed, because the Divine Architect knew Pythagorean geometry and used it to construct a Copernican universe!

In 1596, Kepler's "blueprints" offered the strongest available proof that the Earth actually moves. *Would it have convinced you?*

Vincenzo Galilei

Dialogo della mvsica antica, et della moderna (Florence, 1581)
1st ed. "Dialogue on Ancient and Modern Music"

Throughout history, music and astronomy are deeply intertwined. Galileo's father, Vincenzo Galilei, was a prominent music theorist who contributed to the development of Italian opera.

Both Vincenzo and Galileo played the lute. Vincenzo's compositions for the lute were widely appreciated, and as a young man Galileo gave lectures on the acoustics of the lute.

Vincenzo undertook a comprehensive program of experimental testing to determine the effects of string length, tension, and thickness upon pitch. As a result, Vincenzo critiqued purely numeric tuning schemes in favor of acoustical and empirical methods.

This book was acquired in Fall 2014 with generous assistance from the Athletics Department. Go Sooners!

Johann Kepler

Harmonices mundi (Linz, Austria, 1619), 1st ed.
"On the Harmony of the Universe"

This work, which introduced Kepler's "third law," was the first to contain all three of what are now called his three laws of celestial motion. But Kepler did not refer to his discoveries as "three laws"; rather, he sought to fulfill the ancient dream of integrating the theoretical foundations of astronomy and music. The music of the spheres did not fall silent with Copernicus.

Kepler achieved a synthesis of his new astronomy with recent polyphonic musical theory. Kepler demonstrated that the motions of the planets consisted of precisely the same harmonic ratios as would be fitting for the musical handiwork of the Creator. The beauty of music provided the context for what we call his "third law."

Kepler's imaginative vision of cosmic hope and consolation arose amidst earthly sorrow. During the writing of this treatise:

- his best friend was murdered;
- his children contracted smallpox (which killed his son);
- Prague was overrun with violence and his employer, emperor Rudolph, forced to abdicate; and
- his wife died from typhus (all of these 1611).
- In 1612 at Linz, the Lutheran pastor excluded him from communion because of his sympathy for Calvinists, a prohibition which was enforced in spite of Kepler's repeated appeals.
- In 1617 and 1618 two daughters died,
- Kepler defended his mother against charges of witchcraft and threats of torture. She had enjoyed cooking suspicious mushrooms and spiking friends' drinks with hallucinogens; though finally acquitted,
- she died six months later.

In the midst of these successive waves of sorrows, Kepler affirmed that:

> "The movements of the heavens are nothing except a certain everlasting polyphony (intelligible, not audible)... Hence it should no longer seem strange that man, the image of his Creator, has finally discovered the art of singing polyphonically, which was unknown to the ancients. With this symphony of voices man can play through the eternity of time in less than an hour, and can taste in small measure the delight of God the Supreme Artist..."

Kepler shows that Copernicanism did not make inevitable the anguish of a vast and empty silence, of a consciousness haunted by the meaningless existence of life on only one lonely outpost. As with the Pythagoreans and their music of the spheres, to step outside under the stars at night with Kepler is to enter the presence of the most elegant of symphonies, and even into the majestic presence of a Father and Creator beyond the cosmos. To Kepler, for the one with ears to hear, the harmonies of the universe unceasingly ring out the song of the love of God.

Johann Kepler

Harmonices mundi (Linz, Austria, 1619), 1st ed.
"On the Harmony of the Universe"

"While I strive to bring forth this line of argument into the light of human understanding by the conventional procedure of geometry, may the author of the heavens himself, the father of understanding, the bestower of mortal senses, Himself immortal and blessed above all, look favorably upon us, and prevent the darkness of our mind from putting forth anything concerning this His work which is unworthy.... Holy Father, keep us in the concord of mutual love, so that we may be one, as You are one with Your Son, our Lord, and the Holy Spirit, and as You have made all Your works one by the delightful bonds of consonances; and so that from the restored concord of Your people the body of Your church may be built on this Earth just as You have constructed the heaven itself from harmonies."

Athanasius Kircher

Musurgia universalis (Rome, 1650), 2 vols. 1st ed.
"The Universal Musical Art"

This 17th-century treatise on music depicts a mechanical, water-driven harpsichord. Water enters on the right side of the diagram, turning a gear mechanism that animates a cylinder roll and keyboard. Musical notation cut into the cylinder roll determines the keys depressed at any given moment.

On the far left, blacksmiths strike hammers upon an anvil, recalling the story of Pythagoras discovering the mathematical ratios of the musical scale from the chance hearing of blacksmiths at work. The blacksmith ensemble, with its visual reference to Pythagoras, served as an emblem of the mathematical and musical basis of the natural order. Treatises on music assumed that the universe itself is a musical instrument, one which expresses harmonic proportions, the music of the spheres.

Caroline Herschel

Memoir and Correspondence (London, 1876)

The music of the spheres extends to the heavens far beyond realms visible to our unaided sense of sight. The 19th century saw an unprecedented expansion of known objects in the universe.

William Hershel and his sister Caroline Herschel conducted a comprehensive search of northern skies with telescopes powerful enough to resolve many nebulae into star clusters. Their achievements include the discovery of Uranus in 1781 and the publication of a catalog of 2,500 nebulae and star clusters in 1802 (these were included in Bode's 1801 atlas, as we have seen). Caroline was the first woman in England to receive a professional salary as an astronomer.

William served as organist and choirmaster at the Octagon Chapel in Bath. He composed 24 symphonies and 15 concertos, as well as numerous hymns. Caroline performed as lead soprano soloist on numerous occasions, including productions of Handel's *Messiah* which William directed. In this book Caroline tells their story. Practices of music and astronomy harmonized together.

Right: Poster advertising a performance of Handel's *Messiah* on April 15, 1778, held in the New Assembly Rooms. William directed and Caroline performed.

Below: The Herschel's Delamarche Orrery.

Photos taken at the Herschel Museum in Bath (2023).

At the NEW ROOMS,

On WEDNESDAY the 15th of *April*, 1778.

WILL BE

Mr. HERSCHEL's Benefit-Concert:

The MUSIC taken from the

SACRED ORATORIO

OF THE

MESSIAH.

The Principal VOCAL PARTS

By Miſs HERSCHEL, Miſs CANTELO, afterwards Mrs. Harris

Mr. BRETT, Mr. WILSON, & Mr. HERSCHEL.

The FIRST VIOLIN

By Mr. BROOKS, Junior.

☞ *With a Full Chorus of additional Voices and Inſtruments.*

N. B. To begin a Quarter before SEVEN o'Clock.

TICKETS at Five Shillings each to be had of Mr. HERSCHEL, No. 19, *New-King-Street*, BATH, and at the Rooms, &c.

Printed by W. GYE, in Weſtgate-Buildings, BATH.

Delamarche Orrery

"Planetariums" and "orreries" show the choreography of planets as they dance with coordinated precision round and round. *Planetariums* are Earth-centered, including the ancient Antikythera device and large mechanical clocks, as well as modern planetarium theaters. *Orreries* are Sun-centered, named after Charles Boyle (1676-1731), Earl of Orrery.

This orrery was made in Paris by the Delamarche family of instrument makers. Charles François Delamarche (1740-1817) was one of the leading orrery makers in Paris. His son Felix Delamarche (d. 1847) continued in the craft after his father's death.

Orreries with 6 planets replicate the solar system as it was known before William and Caroline Herschel discovered Uranus in 1781. J.G. Galle in Berlin discovered Neptune in 1846, after its prediction by Urbain Le Verrier.

Can you guess when this orrery was made? Does it show Uranus? Neptune? Which Delamarche would have crafted it, the father or the son?

4

Art & Astronomy

Painters • Prophets • Poets

Imagining New Creation Together

Do the sciences need the arts?

How are artistic imagination and scientific imagination related?

Galileo Galilei

Sidereus nuncius (Venice, 1610), 1st ed.
"Starry Messenger"

This book, the first published report of observations made with a telescope, made Galileo an international celebrity almost overnight. Galileo discovered four satellites of Jupiter and mountains on the Moon.

On Galileo's title page, he refers to the telescope as a *perspicilli*, a "perspective tube." Galileo regarded the telescope as another tool for perspective drawing. Galileo's years of practice of the principles of light and shadow in perspective drawing enabled him to interpret the markings appearing in his "perspective tube" as the shadows of mountains protruding up from the surface of the Moon.

Galileo Galilei

Facsimile of the OU copy of *Sidereus nuncius* (Venice, 1610), created by Sean Richards in 2004.

Galileo's sensational telescopic discoveries were made possible by his training and experience in Renaissance art. When Galileo peered through his telescope and discovered mountains on the Moon, he did so because he was seeing with the eyes of an artist. Contemporaries without artistic training were not able to see what Galileo saw; they were able to look but not to see. Because lenses at that time were of such poor quality, Galileo's discoveries were made not by optics but by the artistic training of his eyes.

Johann and Elisabeth Hevelius

Selenographia (Gdansk, 1647), 1st ed. "Lunar Atlas"

Galileo's book set off the 17th-century race for the Moon. Not a race to go there, but a race to map its surface. It's astonishing that this task was accomplished by mid-century — in this comprehensive lunar atlas, less than 40 years after Galileo's initial telescopic discoveries. To stare directly at the Full Moon is blinding at night; surface detail is entirely washed out. To map the Moon, one must examine the "shadow line" night after night as it passes across the face of the Moon. Light moves back and forth, first one way and then the other, over the month-long lunar cycle, casting shadows in both directions at opposite phases. Here, 40 stunning copper-plate engravings portray topographical relief along the Moon's shadow-line, or terminator, at every conceivable angle of solar illumination. They represent the appearance of the Moon, along the terminator, over a period of five years. The lunar map gradually emerges as a composite representation of many individual topographical studies.

Luca Pacioli (Leonardo da Vinci)

De divina proportione (Venice, 1509), 1st ed.
"On the Divine Proportion"

This geometrical drawing demonstrates true perspective and a mastery of light and shadow. You don't get that by accident.

This and other similar diagrams were drawn by Leonardo da Vinci. They were the only materials ever put in print by Leonardo during his lifetime, appearing in a work on drawing by Leonardo's friend Luca Pacioli. Artists over the following century practiced the techniques and tools of perspective drawing by re-creating geometrical figures like Leonardo's.

The most revolutionary astronomical discoveries of Galileo grew out of modes of inquiry and practice initially developed in art for perspective drawing. To repeat, when Galileo peered through his telescope and discovered mountains on the Moon, he did so only because he was seeing with the eyes of an artist. He made his telescopic discoveries as much through art as through optics.

Albrecht Dürer

Institutionum geometricarum (Paris, 1535)
"Institutes of Geometry"

This illustration of perspective drawing comes from a work by Albrecht Dürer similar in scope to the Pacioli, yet published a generation later. Dürer here shows a variation on the perspective drawing technique known as "Alberti's window." The artist is creating a drawing of a lute with true perspective by means of a string running from the object, through the canvas window, to the vanishing point on the wall.

The mere fact that an artist as well-known as Albrecht Dürer wrote a treatise entitled "Institutes of Geometry" can serve as an emblem of the interdisciplinary relations of art and science.

Lorenzo Sirigatti

La Pratica di Prospettiva (Venice, 1596), 1st ed.
"On the Practice of Perspective Drawing"

This beautiful work, published when Galileo was a young man, brings the tradition of perspective drawing from Leonardo up to Galileo's time. It contains 64 full-page engravings, each with an accompanying exercise. Galileo worked his way through Sirigatti, practicing the techniques of linear perspective by reproducing these and the other drawings. Imagine that each spike is the same lunar mountain observed at different times under light from different angles. Careful study of the spikes on this ring and the shadows they cast prepared Galileo's eyes to interpret the shadows cast on the Moon by mountains and other topographical features. Any young artist or mathematician working his way through Sirigatti, like previous generations working through the exercises of Leonardo or Dürer, would master perspective and the handling of light and shadow.

Jean François Niceron

La Perspectiva Curieuse (Paris, 1663)

During a visit to Florence, the French mathematician Jean François Nicéron met with Galileo's artist friend Cigoli. Cigoli referred to Galileo as his "master" in perspective. Cigoli showed Nicéron a perspective drawing tool he himself had invented. Nicéron published Cigoli's technique in this book.

In Florence, Nicéron also viewed examples of anamorphic drawing techniques, such as Alberti perspective boxes. Make your own Alberti box by taping this image inside the long side of a shoebox. Then cut a sighting hole in the small end of the box, so that the narrow point ("P") is positioned at the sighting hole. Hold the box sideways up to your eye so that you can sight along the diagram with your eye at point P. What picture will you see?

Florentine artistic culture, steeped in the techniques of perspective drawing, was the midwife at the birth of Galileo's telescopic astronomy.

Vincenzo Coronelli

Celestial Globe Gores
(Paris 1693; reprint ca. 1800)

To make a celestial globe, one begins with prints like these. Each slice is called a "gore." Cut them out, color them in, paste them down, and a three-dimensional globe emerges. *Can you imagine them in 3-D?*

These Coronelli gores were printed two centuries ago using original 1693 plates. They were part of a set to make a globe three and a half feet in diameter. *Are any of them in order? Can you arrange any others side-by-side so that the edges match?*

Coronelli's globes were influenced by the Hevelius star atlas, one of the "golden" star atlases encountered earlier. As with those historic star atlases, these beautiful Coronelli gores show that there was no clear boundary between books, instruments, and art. Without imagination, the sciences and the arts alike will perish.

5

Prophecy

Painters • Prophets • Poets

Imagining New Creation Together

New Creation

#	*This section has five parts:*
5.1	Hope for all Creation: From Cycles to History
5.2	Anatomy: From Taboo to Glory
5.3	Interpretation: The Bible and Science
5.4	Bibles: Echoes of the Word Made Flesh
5.5	Chorus from the Rock

Has the Resurrection changed the world, “already and not yet”? What does prophetic hope in the New Creation look like for us now “between the times”?

"I consider that our present sufferings are not worth comparing with the glory that will be revealed in us. For the creation *waits* in eager expectation for the children of God to be revealed. For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in **hope** that the creation itself will be liberated from its bondage to decay and brought into the freedom and glory of the children of God. We know that the whole creation has been groaning as in the pains of childbirth right up to the present time. Not only so, but we ourselves, who have the first fruits of the Spirit, groan inwardly as we *wait* eagerly for our adoption to sonship, the redemption of our bodies. For in this **hope** we were saved. But **hope** that is seen is no **hope** at all. Who **hopes** for what they already have? But if we **hope** for what we do not yet have, we *wait* for it patiently."
– Romans 8:18–25

x

Prophecy: New Creation

Hope for all Creation: From Cycles to History

Peter Guthrie Tait, knots

Royal Society of Edinburgh (1876-77)
Proceedings, vol. 9; *Transactions*, vol. 28

Rather than a string of yarn laid out in a simple line, history appears as a great confused ball so tightly wound and so thoroughly knotted up that its purpose and direction seem hidden to us. Yet we find ourselves stretched out in time, waiting in hope that God knows how to untie all our "knotted up lives" (Beth Moore). History someday will be disentangled, knot by knot, and something beautiful beyond our imagination revealed.

The Edinburgh natural philosopher Peter Guthrie Tait is best known to physicists for his work on thermodynamics, and to chemists for his investigations of the kinetic molecular theory of gases, but to mathematicians he is famous for developing knot theory, now known as topology. Some of his early work on knot theory is found in the *Proceedings* and *Transactions* of the Royal Society of Edinburgh for 1876-1877.

Augustine, *City of God*

(1489) [Case 13.2]

To discern the Spirit of God at work we do not scrutinize the machinations of the great powers nor place our hopes in the maneuvers of political actors on the world stage. God is ever hiddenly at work behind the scenes, his kingdom both already and not yet visibly manifest.

Augustine is shown writing at his desk in northern Africa. Vandals were sacking Rome, and his monastery was about to be overrun. He knew that christendom, meaning the Christian culture of the late Roman empire, was dead and crumbling away. Yet he affirmed that God is ever doing a new, hidden, secret work. Do not fear. The City of Man is ever perishing, but we know that the City of God will never pass away. God is the Lord of history. In the power of Jesus' Resurrection, a New Creation is coming. Even now, confident in our sure hope, we can seek the good of the land knowing that his word will not return void and our labor is not in vain. We bear the good news of an unshakable hope for the flourishing of all creation (Miroslav Volf and Matthew Croasmun, *For the Life of the World*).

Pagan perspectives of time tended to be cyclical, a deterministic wheel of fate and fortune, driven by a combination of chance and necessity. In contrast, on the basis of the Incarnation, theologians in the early church argued for *contingent history*, that history consists of unique and utterly novel events in a meaningful and irreversible sequence. Against the idea of endless repetitions of predetermined cosmic cycles, in the *City of God* Augustine affirmed that God could

> "... keep on endlessly creating one new and dissimilar thing after another."

The Incarnation was the most new and dissimilar event ever! Therefore, for Augustine, the temporal succession of events occurs neither by chance nor by necessity, whether in human history or in the history of nature. History becomes real, a mark of every creature. We are all characters in a dramatic story. For each of us the story has unimaginable depth and meaning, a story of prophetic hope and New Creation.

An Incarnational vision of *contingent history* was hugely influential, not only for western ideas of history but also for the eventual development of the historical sciences.

Thomas Aquinas

Summa Theologicae (1496), Part 1. [Case 12.23]

The writings of Thomas Aquinas, perhaps the greatest theologian of the high middle ages, were as significant for science as for theology. Scientists for centuries ever since have read Aquinas both day and night. The writer Flannery O'Connor read him in the evenings. Wormholes in the binding reveal that insects once paid rapt attention to this early copy.

At the end of his life, as Thomas was performing a mass, he saw a vision of Jesus. In light of that encounter, he viewed all he had written as dust, and wrote no more.

The grass withers, the flower falls, but the Word of the Lord endures forever. The Resurrection of the Living Word heralds a New Creation. As Chrysostom proclaimed, "Dust now sits at the right hand of God." I expect when we arrive we'll find Aquinas at work writing again right nearby.

Book of Hours

France, ca. 1400. [Case #5.36]

As Malcolm teaches us, poems are prayers; prayers are poems. From the Psalms to The Lord's Prayer, from the Songs of Isaiah to the choruses of Revelation, prayers unite the people of God down the years of our lifetimes, across the generations, and around the globe. Suspended "between the times" in the "already and not yet," the people of God pray. Practices of prayer attune us to the invisible presence of the Spirit of God already bringing the first fruits of the New Creation. Prayer nurtures within us the prophetic hope of the Resurrection and the consummation of all things.

Books of hours were manuscript prayer books colored by hand. This book of hours was prepared in the early fifteenth century in northern France. It is written in black ink on brushed vellum, with red, blue, and gold leaf ornamentation. If such a prayer book were your own devotional manuscript, what stories, scripture passages, and prayers would you want it to contain?

Book of Common Prayer

(Cambridge, 1758). [Case #2.29]

"We believe… in the resurrection of the body, and the life everlasting."

The Book of Common Prayer shapes the practices of devotion and worship for Anglicans and Episcopalians and indirectly serves the global church. On Sundays and in morning and evening services throughout the week, in every time zone, the language of the Book of Common Prayer gives voice to the praises, songs, confessions and petitionary prayers of the people of God, and unites them in the reading of the scriptures in worship.

In this copy, hand-drawn red lines ornament the pages. The distinctive binding suggests that it may once have resided in the library of King George II. Perhaps it lingered overlong in the colonies in the possession of a former treasonous subject? Perhaps Malcolm would like to see it returned, and be willing to transport it back to Windsor Castle himself? Well, I don't know about that.

Thomas Burnet, *Theory of the Earth*

(1684), 1st English edition

Thomas Burnet, a royal chaplain, classical scholar, and Cambridge Platonist, published *Telluris theoria sacra* in 1681. Its famous frontispiece first appeared in this English edition of 1684. A circle of seven globes represents the Earth completing its journey through time. *Can you identify what each globe represents?*

Three habitable worlds include the paradise that was lost; the present world of wreck and ruin; and the millennium or paradise regained. Four 'Revolutions of our natural world,' accomplished through natural causes, appear as transitions between them: the original chaos, Noah's universal deluge, a future conflagration, and a final consummation when the Earth will be transformed into a fixed star.

With a temporal scope as comprehensive as Milton, Burnet set out to tell the epic story of the world updated with the science of Descartes. In so doing, he created a tradition known as "Theories of the Earth."

Johann Jakob Scheuchzer

Geestelyke natuurkunde (Amsterdam, 1728), 6 vols. Vol. 1.

Scheuchzer was a leading Swiss naturalist and an early advocate for the organic origin of fossils.

In the first volume of this popular natural history encyclopedia, which he organized as an illustrated companion for Bible reading, Scheuchzer portrayed the sequential development of the Earth during the days of the creation week. That series of depictions merged traditions of biblical illustration with the artistic conventions of natural history and provided an important precedent for emerging representations of pre-human worlds (cf. Martin Rudwick, *Scenes from Deep Time*).

Johann Jakob Scheuchzer

Geestelyke natuurkunde (Amsterdam, 1728), 6 vols. Vol. 6.

Scheuchzer admired Burnet's *Theory of the Earth*. In the final volume of this popular natural history encyclopedia, Scheuchzer followed Burnet in emphasizing Peter's account of a fiery conflagration at the consummation of all things.

For Christians, the Incarnation proves that there is more to temporal succession than endless cycles of fatalistic events. History is real. As in music, time consists of a meaningful relation of unique events. And if human history is real, *does a meaningful history also characterize nature, our sister, with whom we are in creaturely solidarity?*

Biblical accounts of the creation week, deluge, and future conflagration provided naturalists with an idiom for exploring changes in the heavens and the Earth over time. *Might nature herself have a history? If so, where has creation come from? Where will it all lead? Might we recover nature's story, and write her biography?*

Anatomy:

From Taboo to Glory

Mondino dei Luzzi

Anothomia (Venice, 1507)

Written in 1316 by a professor of medicine at the University of Padua, the *Anatomy* of Mondino was the most widely-used manual for human dissection in the middle ages. To the modern eye, the most striking thing about this early print edition is the lack of illustrations. This 1507 edition reproduces the nature of the manuscript tradition before the advent of printing.

In the Middle Ages, universities revived the practice of human dissection, which had been prohibited by the Romans due to ethical concerns and taboos about contact with the dead. A profound cultural shift was occurring which led to an early modern convergence between art and anatomy.

Medieval medical pedagogy featured lectures on ancient texts, although medical students in most universities by 1400 attended dissections which illustrated the lectures. Human anatomy became studied not merely on utilitarian grounds as a prerequisite for medicine, physiology, or law, but also as a worthy and noble endeavor in itself. *Why were the Roman taboos broken? What caused such an immense cultural shift?*

Mondino dei Luzzi

Anatomia (Marburg, 1541), ed. Johann Dryander

Art and anatomy converge. These human figures are more than utilitarian. Set not in a dissecting room but in an outdoor landscape, they are posed as if revealing to our eyes the unseen beauty and wonder of human anatomy. They reflect an increasingly artistic approach to the human body which seeks to do justice to the nobility of the subject.

Belief in the Resurrection of Christ transformed cultural attitudes toward the human body, displacing Roman taboos against contact with the dead while creating a posture of triumphant confidence in the coming New Creation. Apart from this context, it is difficult to fully comprehend either the significance of relics of the saints or the convergence of art and anatomy. What happened with veneration of relics reflected the same ramifications of belief in the Resurrection which underlay the developments in medicine and art.

Charles Estienne

De dissectione partium corporis humani (Paris, 1545), 1st ed.
"On the dissection of parts of the human body"

Clip art with woodblocks

Estienne obtained a number of woodblocks from an obscure Italian artist. To show anatomical detail, he cut little rectangles out of the art woodblocks and substituted his own diagrammatic drawings. If you look closely, you can see the white outlines of the rectangular diagram, inset within the larger art woodblock.

Estienne's anatomy was completed before that of Vesalius (next item), but encountered numerous delays in publication.

Andreas Vesalius

De humani corporis fabrica (Basil, 1543), 1st ed.
"On the Fabric of the Human Body"

This volume is without doubt the most handsome 16th-century anatomical work. The skeletons are depicted in dynamic poses. A series of "muscle men" perambulate around a naturalistic setting — an actual landscape of an identifiable place. The images of *De fabrica* are often regarded as Vesalius' major contribution to Renaissance medicine, but the images were not drawn by Vesalius himself. In contrast to Estienne, Vesalius was fortunate to team up with a world-class artist. The title page displays Vesalius conducting a public autopsy. At the top, the initials I-O stand for Johannes, i.e., Jan Stephan van Calcar, a student of Titian. That the first edition was built around the illustrations of a student of Titian reveals the significance of the Renaissance convergence of art and anatomy. The Roman taboos have been left far behind.

Andreas Vesalius

De humani corporis fabrica (Basil, 1555), 2d ed.
"On the Fabric of the Human Body"

In contrast to Roman-era taboos prohibiting physical contact with the dead, this series of works, from Mondino to Vesalius, represents a new aesthetic and cultural attitude toward the human body.

When Melanchthon was reforming the curriculum of the universities founded by the Lutherans during the Reformation, he settled upon the study of Vesalius as the most suitable replacement for traditional undergraduate study of Aristotle. Human anatomy took its place in the common core, the culmination of a cultural transformation echoing the Resurrection and anticipating the New Creation.

(Jan Stephan passed away after the 1st ed. and the illustrations were slightly redrawn for the 2d ed., with inferior execution.)

Interpretation:

The Bible and Science

Galileo Galilei

Nov-antiqua sanctissimorum patrum, & probatorum theologorum doctrina, de Sacae Scripturae testimoniis (Strassburg, 1636), 1st ed.
"Letter to the Grand Duchess Christina"

In an unpublished letter to the Grand Duchess Christina, Galileo argued that the purpose of scripture is to tell us how to go to heaven, not how the heavens go; scripture never errs, but its interpreters do err; and read rightly, scripture and science will never conflict (there is a unity of truth). That which is obscure (figurative language) should be explained by that which is clear (mathematical demonstrations). To show the traditional basis of his approach, he cited Augustine throughout. In theory, nothing would have prevented theologians at the time from accepting the Copernican system had they rigorously followed their own explicitly formulated principles of interpreting scripture, which Galileo articulated here. This is its first printed edition.

Pope John Paul II used Galilean language to affirm similar hermeneutical principles in 1992. *How do you approach the Bible and science? Would you have opposed Copernicus if you lived back then?*

Galileo Galilei

Lettera Madama Cristina di Lorena (Milan, 1967)
"Letter to the Grand Duchess Christina"

Galileo's *Letter to the Grand Duchess Christina* provides a modern example of the book arts.

The outer case opens to show a smaller case, the size of a miniature version published in the late 19th century.

The 1967 edition fits entirely within the circumference of a nickel. A magnifying glass to read it is included in the smaller case, along with one of the plates used to print it. This is no. 27 of 100 copies.

The larger gilt-morocco book-shaped case contains, bound within it, a 75-page essay by Giuseppe Cantamessa which describes the process of crafting the miniature edition.

Galileo Galilei

Dialogo sopra i Due Massimi Sistemi del Mondo (Florence, 1632), 1st ed. "Dialogue on the Two Chief Systems of the World"

This is Galileo's witty and entertaining dialogue in defense of Copernicus. In the frontispiece, Aristotle and Ptolemy hold an Earth-centered armillary sphere (left). Copernicus holds a Sun-centered model of the universe (right). Just two systems appear in the *Dialogo*; Galileo nowhere mentioned the Tychonic system then favored by most astronomers. Nor did he engage with Kepler.

Galileo inserted caveats about the hypothetical character of the work in the preface and conclusion. Nevertheless, the book as a whole was anything but even-handed, contrary to instructions issued to him in 1616. Once published, because it was not hypothetical, Urban VIII gave orders for the *Dialogo* to be recalled and summoned Galileo to Rome for trial.

Galileo placed greatest emphasis in this book upon an argument for Copernicus from the ebb and flow of the tides. This argument was physical in nature, based on causal explanation, rather than mathematical demonstrations. It was an attempt to achieve a level of certainty which had proven elusive for mathematical methods alone. Unfortunately, the argument was not persuasive, then or now.

Galileo, "The Ancient and Modern Doctrine of Holy Fathers," in *Mathematical Collections* (London, 1661), ed. Thomas Salusbury (London, 1661-1665)

This volume contains the first English translations of any of Galileo's works, including Galileo's *Dialogue on the Two Chief Systems of the World*, the book for which he was put on trial. It also includes the most important documents related to Scripture and Copernicanism, including Galileo's *Letter to the Grand Duchess Christina*; similar essays by Kepler and Foscarini, a Carmelite monk; and an excerpt from Diego de Zuniga's commentary on Job which contained a sophisticated and skillful defense of Copernicus.

The volume is charred and blackened around the edges. Many copies perished in the Great Fire of London in 1666.

Note on provenance: The inside end-paper bears the name of "Thomas Wo" at Cambridge. A survey of all those in *Alumni Cambridiensis* to 1751 with surnames beginning with "Wo" reveals that Thomas was not a common Christian name and provides only one candidate, Thomas Worlich, who entered Jesus College in 1700, migrated to Trinity, and graduated MA in 1708.

Isaac Newton

Philosophiae Naturalis Principia Mathematica (London, 1687), 1st ed. "Mathematical Principles of Natural Philosophy."

The Copernican idea that the Earth moves as a planet required a thorough revision of physics. Galileo undertook this task in his *Discourse on Two New Sciences*, published 80 years after Copernicus. With a mathematical description of the law of universal gravitation, Newton in this book unified the terrestrial physics of Galileo with the celestial laws of Kepler. The development of science from Copernicus to Newton then became recognized as a "Scientific Revolution," a complete overthrow of Aristotelian physics and cosmology.

Newton's title is a deliberate rejection of Descartes' approach to scientific explanation in the *Principles of Philosophy* (1644). Whereas Descartes engaged all of philosophy, deducing cosmology from first principles of ontology and epistemology, Newton claimed only to address "*Natural*" philosophy. And whereas Descartes' "Principles" were mechanical causes, even hypothetical ones, Newton argued that "*Mathematical*" laws suffice for science, since they are certain, even if they are only descriptive rather than causal. Causes are ephemeral; mathematics endures.

Isaac Newton

Observations upon the prophecies of Daniel and the Apocalypse of St. John (London, 1733), 1st ed.

For Newton, science and the Bible were not opposed, provided that one understood each correctly. In his study of Daniel and Revelation, Newton affirmed that God's dominion in history is demonstrated by fulfilled prophecy, and that God will soon put an end to idolatry and restore authentic monotheism. As Betty Jo Dobbs, a distinguished Newton historian, put it in her classic study, *Janus Faces of Genius*:

> "Blinded by the brilliance of the laws of motion, the laws of optics, the calculus, the concept of universal gravitation, the rigorous experimentation, the methodological success, we have seldom wondered whether the discovery of the laws of nature was all Newton had in mind. We have often missed the religious nature of his quest and taken the stunningly successful by-products for his primary goal. But Newton wished to look through nature to see God, and it was not false modesty when in old age he said he had been only like a boy at the seashore picking up now and again a smoother pebble or a prettier shell than usual while the great ocean of Truth lay all undiscovered before him.... Newton's goal was a unified system of God and nature."

Bibles: Echoes of the Word Made Flesh

Luther's Bible

Christoph Saur (Germantown, Pennsylvania, 1743) [Case #12.17]

From ancient times, God's people have longed for God's word in our own vernacular, in the language of the heart, in the same words as our songs and stories. We do not all learn Hebrew and Greek, for the Living Word of God descends to dwell with each of us. Bibles are echoes of the Word made flesh.

The German translation of Martin Luther became the first Bible in a European language printed in America. Yet Christoph Saur nearly went bankrupt from giving away so many copies to poor families. Saur was saved by the Continental Congress, who needed a printer!

Luther translated the Bible from Hebrew and Greek sources during his exile in the Wartburg castle, where he was protected by Frederick the Wise of Saxony after his famous confrontation with the Roman Catholic Church and Holy Roman Emperor Charles V at the Diet of Wurms. The power of books to transform society is evident in that as many as one third of the books printed in Germany during the 1530's were written by Luther. The dependence of the Protestant Reformation upon the printing press suggests that printing caused greater cultural change in early modern Europe than has yet been realized by the Internet in the modern world. *Or has it?*

Geneva Bible (Geneva, 1560), 1st ed. [Case #4.11]

This little English Bible is one of the most subversive products of the printing revolution. With verse divisions, a small and readable font, cross-references to parallel passages and extensive marginal annotations, the Geneva Bible transformed the way people read scripture and debated theology. Given this hand-sized lay study Bible, the word of God spread like a flame to the home and tavern, outside the walls of hierarchical institutions such as the church and university.

The verse divisions and cross-references encouraged a profound change in the act of reading. Readers began to pay less attention to the art of storytelling, reading from a single unbroken text, and to place more emphasis on comparing and contrasting short passages from diverse contexts, moving back and forth between different chapters and verses at will.

Bibles on the go

The first thing one notices about the Geneva Bible is the small size: it fits in your hand. As with the Geneva Bible, makers of Bibles have valued portability, the ability to take the Word of God with you on the go.

Jeremiah Rich invented shorthand in the 17th century to create a little 3-volume edition of the New Testament and Psalms (1659; Case #2.6).

Miniature Bibles were a triumph of early 20th century printing arts. Even when a magnifying glass is included (New York and Leipzig, 1927), it's hard to read when the whole Bible is not much larger than a nickel (Glasgow and London, 1901?).

Today there are many ways to put the Bible in your pocket. God goes with us, he willingly comes into our world. We are not limited to massive Bibles chained to altars in cathedrals in languages or typefaces only bishops can read.

King James Version

(London, 1611), 1st edition. "He issue" and "She issue." [16.4, 16.6]

King James, who spoke with a thick Scottish brogue, wanted an English translation of the Bible that his people would find eloquent and moving when read aloud on solemn public occasions. So James appointed 50 scholars to create a definitive translation for English use: "Out of many good ones, one principal one."

Many prose passages subtly incorporate the rhythms of classical poetry. The King James (Authorized Version) was the translation used by Milton and countless other writers all the way up to Abraham Lincoln, whose Gettysburg Address reveals its influence in its rhythm, cadence, vocabulary, content, solemnity, and moral vision.

Compare the translation of Ruth 3:15 in the two copies. *Who went into the city?* Whichever one is incorrect is the earliest and rarest, for this typo was corrected in most copies.

Walton's Polyglot (1653-1658), 7 vols.

Walton's polyglot collated the most important ancient manuscripts then known for reconstructing the authentic biblical text. How many languages are represented on the page shown? For a typical Old Testament passage, one might observe the Hebrew text on the left, the Greek text of the ancient Septuagint translation on the right, with the Latin translation of Jerome in the middle. Including texts in nine languages, the polyglot of Brian Walton was a monumental achievement of 17th century scholarship.

It took Walton 7 massive volumes to print the important ancient manuscripts for the entire Bible. Each is a hefty volume requiring the firm grip of two hands to lift. And this was just for the manuscripts available in the 1650's; many more have been recovered since.

The final volume contains 200 pages of scholarly apparatus, including visual representations such as a display of temple items.

What languages did Jesus of Nazareth speak?

Many scholars believe he was trilingual, speaking Aramaic, the language of common people in the region of Nazareth, where he grew up; Hebrew, when reading in the synagogue or debating with scribes; and Greek, the language of commerce and government, while working as a carpenter in nearby Sepphoris or speaking with Gentiles; e.g., the Syro-Phoenician woman, the Roman centurion, or Pilate. Some scholars think he may also have spoken Latin, but this is less certain.

During his time on the Earth, the Living Word of God spoke to us in more than one language, depending upon our need. It remains the same today, and every day.

"If I speak in the tongues of mortals and of angels, but do not have love, I am a noisy gong or a clanging cymbal." (1 Corinthians 13:1)

Love speaks.

Coptic Bible

(Date and place unknown)

Given what *kintsugi* is to pottery (Makoto Fujimura and Haejin Shim Fujimura), what would be the equivalent in the book arts?

Perhaps the inscription of God's holy word upon the flawed vellum of this Coptic Bible? The threads and patches evident in the tenderly-crafted sheets of this volume became the very surfaces which now carry the Word of God, for "the Word became flesh and dwelt among us" (John 1:14). This is the Bible of a pastoral student. We don't know his name, or even when he lived, but he was likely an Ethiopian priest. The priest and his people didn't have to learn Hebrew or Greek to read the Bible. It's written in Coptic, once the language of the Pharoahs, later the language of common people. Making his own copy of the Bible by hand, in his own language, on vellum he himself prepared, was the central focus of his pastoral training. He treasured the Word of God which came to him and his people in torn and broken flesh.

Bengali New Testament

(Calcutta, 1847)

William Carey of the Calcutta Inland Missions prepared this translation. Carey also translated the Hindu scriptures from Sanskrit into Bengali, so that natives of India could read them side by side.

Carey played a crucial role in promoting the translation of the Bible into the languages of the world. As a result of two centuries of translation efforts, Christianity has become a worldwide indigenous religion. Rather than a western religion, the majority of Christians today live outside of Europe and the United States.

Do you have Bibles in non-English languages in your home?
More Bibles are stored elsewhere, but just in this room, Bibles visible on the shelves might be in Basque, Javanese, Mongolian, Mooltan, Persian, Swahili, Tartan, and Turkish, among others. Feel free to browse!

First Americans Translations

Cherokee New Testament

(New York, 1860) [Case #9.5]

Muskogee Gospel of Matthew

(New York, 1867) [Case #10.25]

Writing on delicate materials

What if our writing material is more delicate than vellum or paper?

Palm Leaf book (no date) [McGhee collection]

In southern Asia and the Indo-Pacific, books were made with palm leaves. Because such delicate plant material might easily tear, especially under the pressure of straight-line strokes or sharp angles with the pen, characters were drawn in a more rounded and curlicue style, as on this palm leaf book.

Malayalam New Testament (Kottayam, India, 1829) [Case #9.52]

That style has persisted into modern typography, as in this printed New Testament in a classical language of India.

Illumination of the heart

Greek New Testament (Cambridge, 1763). [Case #9.39]

Gold leaf was applied to the pages of medieval manuscripts like the Book of Hours and early printed works like the Crescenzi encountered earlier. When a page is being turned, when the angle is just right, light glancing off the gold leaf may strike the eye. Similarly, the heart receives intellectual "illumination" only in the act of reading, as the pages are turned, not when the book is closed.

Fore-edge painting expressed the same idea for select books crafted in the late 18th and early 19th centuries. When the Bible is closed and one observes the text block from the side, all that is seen is a gilded edge. Yet when the Bible is open and read from front to back, the pages roll from one side to the other, revealing a fore-edge painting. The meaning and beauty of the Bible are hidden when it's on the shelf or altar, and revealed only in the act of reading.

The following items related to Japan are displayed for the delight of Makoto Fujimura and Haejin Shim Fujimura

Giacomo Cantelli, *Il Regno della China* (Rome, 1682). Can you find Japan?

Nobutoyo, *Yahon Hiden* (ca. 1846); "Book of the Arrow." Nobutoyo, *Koto no sho* (ca. 1846); "Book of Leggings." Ise, Heizo Sadatake, *Kasakake zenki* (ca. 1846); "Secret Book of Hunger for the Target." Ise, Heizo Sadatake, *Fuku (no) Sho* (ca. 1846); "Secret Book of the Quiver." Set of four Samurai manuals, copied by Hajime Terai, of 16th-18th century originals.

Johann Schreck, *Ensei kiki zusetsu rokusai* (Japan, 1830); "Wonderful Machines of the Far West." Originally published in Beijing (1630). Schreck helped Galileo show the telescope to the Medici family and others in Rome. Once he arrived in China, he wrote this work on engineering in Chinese. This is the first edition printed in Japan, with Sino-Japanese notes and Japanese-style illustrations.

Dou, Guifang, *Shinkan Kotei meido kyukyo* (Japan, 1659); "The Yellow Emperor's Canon of Moxibustion." A commentary on the *Ling-shu*, a classic treatise on acupuncture and moxibustion. It describes treatments for a variety of conditions, with 45 depictions of acupuncture points for both adults and children.

Baba, Nobutake, *Shogaku tenmon shinansho* (Osaka, 1706); "Introduction to Astronomy." This work, written by a Kyoto physician, represents Asian astronomy in the generation following Adam Schall, a Jesuit in China who introduced many European techniques. Baba countered superstitious interpretations of solar eclipses, and used magnetic theory rather than yin and yang to explain the tides. Baba adopted the Tychonic model of cosmology. His book exemplifies the circulation of knowledge in East Asia and the interplay between Asian and European ideas.

Hokusai Katsushika. *Manga;* "Sketches." 1814-1819 (10 vols.) and 1834-1878 (5 vols.). Block prints in three colors (black, gray, and flesh).

A nishiki-e print illustrating a solar eclipse predicted to occur in Japan on August 19, 1887. Tokyo: Shinkichi Kobayashi, Meiji 20 [July or August 1887]. *Look closely at each figure... who is depicted? what are they doing?*

Bible. Japanese. 1894. [Case #14.19]

Imagine a stack of Bibles written in every language that has ever been spoken on the face of the Earth. How tall would that stack be?

God understands every language, even the forgotten ones. He delights to speak each one. He has chosen to be with us, in our speech, in the language of every heart, the Living Word made flesh.

This is the hope of the New Creation:

> And they sang a new song, saying:
> "You are worthy to take the scroll
> and to open its seals,
> because you were slain,
> and with your blood you purchased for God
> persons from every tribe and language and people and nation.
> Revelation 5:9

Chorus from the Rock

Michael Barfield, 2021

> "And the Church must be forever building,
> and always decaying,
> and always being restored..." (T. S. Eliot)

What was the artist doing here? What is this painting about? What does it mean?

Two books form the crown of the piece: one volume about Jan van Eyck and the other about Caspar David Friedrich, the two artists to whom the piece pays homage.

The title comes from T. S. Eliot's poem "Chorus from the Rock."

See the stapled pages if you're interested in my reflections on the painting.

Dove's Press Bible

(London, 1903-1905), 5 vols., vol. 5. [Case #21.1]

"And he shewed me a pure river of water of life, clear as crystal, proceeding out of the throne of God and of the Lamb. In the midst of the street of it, and on either side of the river, was there the tree of life, which bare twelve manner of fruits, and yielded her fruit every month: and the leaves of the tree were for the healing of the nations. And there shall be no more curse: but the throne of God and of the Lamb shall be in it; and his servants shall serve him: & they shall see his face; and his name shall be in their foreheads. And there shall be no night there; and they need no candle, neither light of the sun; for the Lord God giveth them light: and they shall reign for ever and ever."

Revelation 22:1-5

Thank you

Painters • Prophets • Poets

Imagining New Creation Together

Kerry Magruder

	#	*Section*
Poets	1	Wonder: Earth
	2	Wonder: Heavens
	3	Music of the Spheres
Painters	4	Art and Astronomy
Prophets	5	New Creation

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