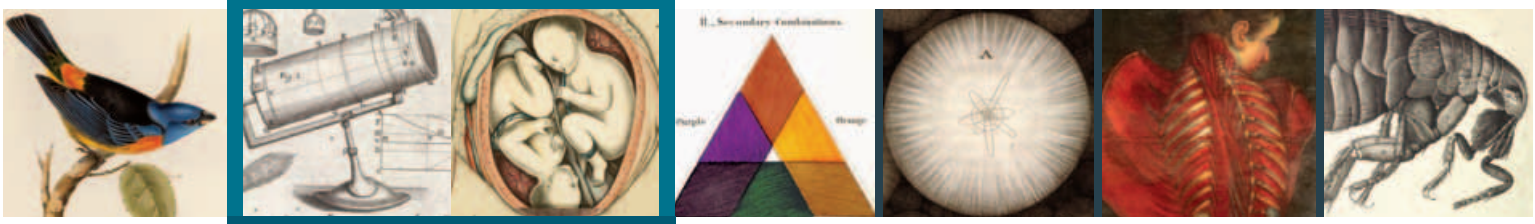

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Dibner Hall of the History of Science

"Beautiful Science: Ideas that Changed the World"

Boswell: But, Sir is it not somewhat singular that you should happen to have Cocker's *Arithmetic* about you on your journey?

Dr. Johnson: Why, Sir if you are to have but one book with you upon a journey, let it be a book of science. When you read through a book of entertainment, you know it, and it can do no more for you; but a book of science is inexhaustible.

–James Boswell (1740–1795), biographer of Samuel Johnson

Science is a dance between the creative and the precise mind, and over the centuries, we can chart a range of extraordinary ideas that have come as a result—Isaac Newton's law of gravity and Charles Darwin's theory of evolution, for instance. Some are technological, changing the ways in which we look at the world, such as Robert Hooke's microscope, which provided visual access to a previously unseen world. Still others consist of those serendipitous mixtures of creativity and logic that lead to new solutions for age-old problems, such as measuring the speed of light.

In four sections—**Astronomy, Natural History, Medicine**, and **Light**—"Beautiful Science" presents books, illustrations, manuscripts, and instruments that show the elegance of scientific endeavor. Among them, groundbreaking achievements (describing the law of gravity, the discovery that white light is made of colors, and the harnessing of electricity) and broadenings of the imagination (that we are just one of billions of galaxies; that all organisms evolve to adapt, or perish).

Astronomy

Studying astronomy before the invention of the telescope in the early 17th century was not just a matter of staring upward at the night sky. Astronomers of the era had sophisticated and accurate tools to measure the motions of planets and stars and were able to predict the appearance and location of eclipses, comets, and other motions in the heavens. They also mapped the night sky in great detail, setting a vital base for future centuries of work.

Works in this gallery will demonstrate how understanding of the Earth's place in the heavens has shifted, from the Earth-centered models espoused by Ptolemy (dating back to about the first

century) to the Sun-centered models of 15th-century scientist Copernicus. Advances in understanding are marked by rare books and manuscripts written by a range of major scientific figures, from Johannes Kepler to Edwin Hubble, Albert Einstein, and James Watson. Visitors will be able to see the inner mechanisms of a replica of Galileo's telescope—and possibly marvel at how challenging an instrument it was to use!

Highlighted works:

- Manuscript of *Almagest* (The Greatest), Ptolemy, 1279
- *Astronomicum Caesareum* (Caesar's Astronomy), Petrus Apianus, 1540
- *De Revolutionibus* (On the Revolutions of the Heavenly Spheres), Nicolas Copernicus, 1566
- *Astronomia nova* (New Astronomy), Johannes Kepler, 1609
- *Sidereus nuncius* (Starry Messenger), Galileo Galilei, 1610
- *Dialogo dei massimi sistemi del mundo* (On the Two Chief World Systems), Galileo Galilei, 1632
- *An Account of a New Kind of Telescope*, Isaac Newton, 1672
- *Principia Mathematica* (Mathematical Principles), Isaac Newton, 1687
- *An Original Theory or New Hypothesis of the Universe*, Thomas Wright, 1750
- *On the Construction of the Heavens,* William Herschel, 1785
- *Selenotopographische Fragmente* (Moon Topography Fragments), Johann Schroter, 1791
- Letter, Albert Einstein to George Ellery Hale, 1913
- Logbook with Hubble's observations through the 100-inch Hooker Telescope, Mt. Wilson, Edwin Hubble, 1923

Natural History

Scientists and artists over time have added to the planet's storehouse of beauty by holding a mirror up to the natural world. This section draws inspiration from early curiosity cabinets in the first museums. It shows a wide array of illustrations in the natural world, ranging from early woodcuts to modern chromolithographic prints, which satisfied a wide public eager to see images from nature, often from faraway lands. A set of cabinets in the room will contain written materials and natural history objects highlighting zoology, botany, and geology. These items will be displayed in drawers that visitors can slide open.

Our changing understanding of evolution has been marked by intense curiosity among scientists, and it has led to dramatic advances in genetics, medicine, and agriculture as well as a clearer understanding of our interconnectedness across species. A gallery shelf displaying more than 250 copies of Darwin's *Origin of Species* (first published in 1859) is meant to demonstrate the impact of the scientist's work across time and society—volumes date from the first printing to the present day, translated into many languages.

In *Micrographia* (1665), Robert Hooke drew detailed pictures of what he saw under the microscope. Adjacent to the book will be a microscope focused on insects and objects that Hooke himself observed. Also featured, a replica of Antoni van Leeuwenhoek's tiny microscope dating back to the 17th century—a small, simple instrument with the remarkable ability to magnify more than 200 times the size of the object. Visitors will be encouraged to look through both instruments to get a better understanding of the early tools scientists used to make their observations.

Highlighted works:

- Manuscript of *De animalibus* (Of the Animals), Aristotle, ca. 1275
- *Historia Naturalis* (Natural History), Pliny the Elder, 1469

- *Historiae Animalium* (History of Animals), Conrad Gesner, 1558–1603
- *Micrographia* (Tiny Pictures), Robert Hooke, 1665
- *The History of Four-Footed Beasts and Serpents,* Edward Topsell, 1658
- *Werken* (Works), Antoni van Leeuwenhoek, 1684–1718
- *Metamorphosis insectorum Surinamensium* (The Metamorphosis of the Insects of Surinam), Maria Sibylla Merian, 1730
- *The Natural History of Carolina, Florida and the Bahama Islands,* Mark Catesby,1731–43
- *Systeme des animaux sans vertèbres* (System of Invertebrates), Jean Baptiste Lamarck, 1801
- *Recherches sur les ossemens fossiles de quadrupède* (Research on the Fossil Bones of Quadrupeds), Georges Cuvier, 1812
- *On the Origin of Species*, Charles Darwin, 1859
- *Experiments in Plant Hybridization*, Gregor Mendel, 1866

Medicine

By studying the living body and examining cadavers, scientists over time made new discoveries about circulation, skeletal and muscular structure, and much more. Teasing out the workings of the body led to new abilities to help treat a wide range of physical conditions—from stabilizing and repairing fractured limbs to inventing antiseptics, antibiotics, and diagnostic tools like the X-ray.

One of the most important books on human anatomy is included in the exhibition: *De humani corporis fabrica* (*On the fabric of the human body*, 1543), by Andreas Vesalius. Alongside the book will sit a copy of the overlay sheets used by 16th-century medical students to help them understand the different systems of the body: skeletal, nervous, muscular, and circulatory. Visitors will be able to lift the facsimile layers, like those students may have done so long ago.

Highlighted works:

- *Canon of Medicine*, Avicenna, 1479
- *Fasciculus Medicinae* (Group of Medical Texts), Johannes Ketham, 1491
- *De humani corporis fabrica* (On the Fabric of the Human Body), Andreas Vesalius, 1543
- *Byrth of Mankind,* Eucharius Rosslin, 1613
- *De motu cordis et sanguinis* (The Movement of the Heart and the Blood), William Harvey, 1653
- *Osteographia* (Study of Bones), William Cheselden, 1733
- *Myologie complette en couleur et grandeur naturelle* (Complete Study of Muscles in Color and Natural Grandeur), Gautier D'Agoty, 1746
- *Tabulae Sceleti et Musculorum Corporis Humani* (Table of the Skeleton and Musculature of the Human Body), Bernhard Siegfried Albinus, 1749
- *Anatomia uteri humani gravidi* (Anatomy of the Human Gravid Uterus), William Hunter, 1774
- *Obstetric Tables,* George Spratt, 1841
- *Études sur la maladie des vers à soie* (Studies of the Diseases of Silkworms), Louis Pasteur, 1870

Light

Harnessing the power of light has challenged scientists for centuries. Our understanding of the properties of light and energy, as well as the ways in which we use them, continue to evolve. Here, the study of light is presented through the lens of experimentation: how testing ideas related to vision, color, and speed has led to phenomenal change, such as the ability to power countless tools to do tasks previously done by hand.

As electricity pioneer Michael Faraday noted, "The beauty of electricity is not that the power is mysterious, and unexpected . . . but that it is under *law,* and that the taught intellect can now govern it largely." Alhacen, Kepler, and many other scientists used a camera obscura—an optical device used in drawing—in their experiments, as well as in their explanations of light and vision.

Additional interactive features will round out the gallery, including Newton's rainbow, in which visitors can move a white card in between a beam of white light that has been split into the colors of the rainbow. Moving the card back and forth will show that white light is composed of colors and can be reconstituted into white light using only lenses and prisms.

Highlighted works:

- *Optica* (Optics), Euclid, 1557
- *Kithab al-Manazir* (Book of Optics), Ibn Al-Haytham (Alhacen), 1572
- *Ad Vitellionem paralipomena* (The Optics), Johannes Kepler, 1604
- *Ars Magna Lucis et Umbrae* (The Great Art of Light and Shadow), Athanasius Kircher, 1646
- *Experiments and Considerations Touching Colors,* Robert Boyle, 1664
- *Letter of Mr. Isaac Newton . . . Containing His New Theory about Light and Colors,* Isaac Newton, 1671
- *Opticks,* Isaac Newton, 1717
- *Experiments and Observations on Electricity,* Benjamin Franklin, 1754
- *A Dynamical Theory of the Electromagnetic Field,* James Clerk Maxwell, 1865
- *Catalogue "E" and Price List,* Edison General Electric Co., 1890
- *On the Electrodynamics of Moving Bodies,* Albert Einstein, 1905

Additional interpretive materials for visitors:

- **Audio interpretation** will be provided at stations throughout the gallery, featuring excerpts from the written works on display. Recordings by Michael York will help to bring the works to life, directly communicating scientific ideas and discoveries through their original medium: the scientists' written words.

- In addition to a Web site component, **computer stations** in the exhibition will provide visitors with additional information along with the opportunity to explore works in the history of science from The Huntington's collections.