



Renaissance Biology

Part I - The Rise of Observational Science

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The Renaissance Era was a landmark period in human history, the formulative era where Europe became the center of learning, taking the knowledge gathered by earlier, classical cultures and the fading Islamic world. As with many fields of study during the Renaissance, biology and natural science began to develop their own identity and separate from the other areas, becoming increasingly specialized.

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Undoubtedly, religion and a biblical view of the universe initially dictated the direction of natural science, but the Renaissance saw scholars and philosophers lay down the foundations that would influence the great thinkers of the Enlightenment. Society began to explore the possibility that the body was a machine or automaton, with the soul as the only difference between humans and animals.



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Natural Science and Art



Andreas Vesalius : "De corporis humani fabrica" – illustrations of the human anatomy (Public Domain)

As with much of the Renaissance cultural revolution, art and science were inseparable, and it was the work of artists and sculptors that brought biology and anatomy to the fore. The great Renaissance artists sought perfect realism in their work, a trend initiated by the invention of perspective and other subtle means of portraying perfect, artistic realism. Andreas Vesalius ^[2] (1514-1564), drafted a tome, *De Humani Corpis Fabrica* (On the Fabric of the Human Body), which contained intricate illustrations by Van Calcar, student of the great Titian, and this set the tone for the art of the Renaissance. These artists began to dissect animals, plants and even humans to understand the structure underpinning the workings of the human body and create ever more dynamic and realistic works of art. Da Vinci was the first scholar to make the connection between the structure of humans and of animals, another observation that would eventually lead to the biology and Darwin, albeit via a long and circuitous route. Almost as a side effect, this revealed the physiological structure of the human body and showed how the different organs interacted to make life possible. Central to the development of biology, as with most Renaissance knowledge, was the invention of printing and woodblock engraving, which allowed scholars to share their work quickly and easily. Texts and anatomical drawings could be sent across Europe, ensuring that scholars did not have to repeat the same experiments and could legitimately build upon the work of others. As is still the case, the study of all areas of biology, from human anatomy to botany, was intertwined with the craft of medicine as physicians sought better ways to cure, heal and prevent illness, injury, and disease.

Renaissance Botany – the German Botanists



Otto Brunfels (Public Domain)

The need for better medicines and healing herbs fuelled an explosion in the study of botany, moving it away from garbled old-wives' tales and folklore, although some of that knowledge was useful, and moving it into a proper system of classification and study of plant structure and properties. The Germans were particularly influential in the art of herbalism, an affinity that is apparent even today and a trend that still infuses Germanic heritage and the collective psyche. In 1530, Otto Brunfels (1488–1534) published two landmark books about medicinal herbs, *Herbarium vivae icones* (1530 and 1536, in three parts) and *Contrafayt Kräuterbuch* (1532-1537, in two parts), which included some wonderful woodcuts illustrating the plants he found during his wandering through Germany.



Contrafayt Kräuterbuch, Otto Brunfels (Public Domain)

These diagrams brought the book to life and aided study and identification, and he was careful to describe the plants independently of their medicinal uses, making an important distinction between medical herbalism and the study of plants for its own sake. Brunfels took full advantage of the advances in printing and included detailed, rich illustrations, and he

brought the knowledge of plants to a much wider audience, using realism rather than artistic license in the illustrations. Also a theologian and physician, he developed a love of studying plants through herbalism and the drive to classify healing and medicinal plants. He is regarded as one of the first true botanists, often referred to as a father of botany, and he relied upon his own observations rather than draw upon the works of the ancients. To complete the German stranglehold on botany during the early renaissance period, Hieronymus Bock (1498–1554) and Leonhard Fuchs (1501--1566) published books about wildflowers. These volumes were packed with information about the various types, undoubtedly aiding identification in the field and ensuring that potential botanists could identify plants without the need for experience or teachers. Little is known about Bock but, in 1529, he produced a book called the *Kreutterbuch* (lit. "Plant book"). This work documented over 700 plants found in his native Germany and he classified them according to characteristics and medicinal uses, a drift away from following the classifications used by the Ancient Greek, Roman, and Islamic scholars. He was also careful to include the geographical and ecological distribution, stating in which habitats the plants were most likely to be found.



Portrait of Leonhart Fuchs (Public Domain)

Fuchs specialized in herbal medicines and remedies, writing books about the uses of medicinal herbs that blended the work of classical scholars with his own insights and experience. He removed the folklore and arcane philosophy from medicine and stuck to documenting the uses of specific plants and herbs. His first publication, *Errata recentiorum medicorum* (Errors of recent doctors), in 1530, advised physicians to use simple herbal remedies rather than the complex alchemical mixes that dominated medicine and which were built upon flawed models of the universe, often causing more harm than good. Fuchs also contributed a guide to herbal plants, *De historia stirpium commentarii insignes* (Notable commentaries on the history of plants), which became available in German, English and Dutch. Fuchs did not attempt to classify plants according to characteristics but stuck with an encyclopaedic format, in alphabetical order, and he described the characteristics of over 500 plants: 400 wild and 100 domesticated. The book also included over 500 woodcuts of plants, aiding identification and reinforcing the importance of using skilled illustrators, such as Heinrich Füllmauer and Albert Meyer, and a talented woodcutter such as Veit Rudolph. Fuchs also ensured that the illustrators and woodcutter were acknowledged in the book, understanding that they were an essential part of the process and giving them due credit.

The Importance of Classification



Breyter Indianischer Pfeffer,
Leonhard Fuchs 1543 (Public
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Due to the sheer number of plants species and variants, it had become essential to find a universal system of classification especially as, across an entire continent. Common names could vary between countries or even regions, leading to easy misidentification, a potential problem if the wrong medicinal plant were used. The setting up of gardens for rare species, initially at the great Italian universities, showed the need for a coherent classification system. The first man to make an attempt at this was Gaspard Bauhin (1560-1624), a Swiss botanist who gave plants a double name, with a system similar to modern biological classification. Bauhin used a generic and special name, although he did not divide plant types into families

or try to group them according to properties and common traits. Other naturalists also contributed to this the process: The Frenchman, Pierre Belon (1517-1564), wrote two books, on trees and horticulture, where he documented species throughout the Middle East. Belon, respected for his botanical work, also attempted to group animals into a systematic classification system, covering mammals, fishes and mollusks amongst other types. His grasp of anatomy was good and his taxonomy was a very good attempt at trying to untangle the complicated web of interacting species in any environment. Other scholars travelled far and wide across the globe, helped by the fleets of European ships trading and exploring the new world and Asia, bringing back dried plants for study by scholars. The flourishing of the natural sciences became inextricably tied to voyages in the New World, a period where it can be argued that scientific riches were uncovered alongside the gold and land.

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