

Anatomic Abnormalities in Botticelli's Artwork

La Primavera

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La *Primavera* is one of the most famous works of Sandro Botticelli. Born in Florence in 1445, Botticelli studied painting with the eminent Florentine master Fra Filippo del Carmine. Painted in 1481–82, this masterpiece was hung at Lorenzo di Pierfrancesco de' Medici Villa in Castello where it was seen about 70 years later and entitled *La Primavera* or *Allegory of Spring* in the mid-sixteenth century by Italian painter, architect, writer and historian Giorgio Vasari, who was also the friend and biographer of Michelangelo.

DESCRIPTION

According to the most common explanation, the story of this painting is mythological and was inspired by the poetry of Ancient Rome. On the right of the panel [see Figure], Zephyr, god of the west wind in Greek mythology, levitates. He abducts

and impregnates with a breath the nymph Chloris, nymph of the spring and of new growth. Her transformation to Flora, the goddess of spring and flowers, is symbolized by the touching of their hands. Chloris's body tilts toward Flora and a flower springs from her mouth. In the center, under the broken arch, stands Venus, goddess of beauty, sex, love, fertility, and prosperity. Blindfolded Cupid, the god of erotic love, soars above his mother, Venus, and aims a phallic arrow towards the Three Graces, three sisters – Pleasure, Chastity, and Beauty – who traditionally accompany Venus. Mercury, the god of commerce and financial gain, at the left of the Three Graces, disperses wispy winter clouds with a wooden rod. The figures are dispersed in a magic garden of about 500 plants, 190 of which are identified flowers that bloom from March to May in the Florence spring. The garden is guarded by Mercury who holds a sword and helmet, but not by Cupid and Zephyr who are weightless.

The gaps between the plants around Venus are interpreted as a concealed lung structure: “If you look carefully at the shape, angle and juxtaposition of two openings, a very clear anatomical image appears – a pair of human lungs...In the exact middle, framing Venus and her heart-red pendant, are two lungs to reaffirm the connection of Love and Life” [1]. Another anatomic-physiological interaction, hidden in *La Primavera* and elegantly reported by Lazzeri in 2017 [2], is the different position of the upper extremities: “On the right, the arms of Zephyr, Chloris, and Flora are placed along the body as if to represent the act of expiration; all the figures on the left, starting with the central figure of Venus to the composition the three Graces and then Mercury, have one upper limb outstretched as if they were in the act of inspiring.” Anatomical details, not visible in this picture, may reflect Renaissance artists' knowledge of human body structures and even their active participation in scientific progress. Artists' fascination with human anatomy during the Renaissance is evident in drawings of human and animal body structures at autopsy done by painters. Sometimes dissection and penciling were performed simultaneously by a fine arts master. Knowledge of anatomy helped many Renaissance artists depict characters more naturally than the flat and unnatural figures seen in paintings of the Middle Ages [1,3].

Recognizing the hidden structures of the human body or detecting a pathologic condition in fine artwork has always attracted physicians. Modern technology has made it possible

Figure 1. *La Primavera (Spring)*. Tempera on panel, 3140 x 2030 mm, by Sandro Botticelli, 1481–1482. Uffizi Gallery, Florence. **[Insert A]** *La Primavera* (detail). Mass on Venus's left hand. **[Insert B]** *La Primavera* (detail). Flora's foot with Morton's toe



to access the arsenal of fine art and to interpret the findings. Using the zoom-in function of Windows 10 we were able to detect anatomic abnormalities, previously not discussed, in Botticelli's artwork *La Primavera*.

Multiple-fold magnification reveals a round, nearly 2-cm diameter mass on the metacarpophalangeal projection on the dorsal surface of Venus's left hand [Figure 1, insert A]. Different pathological conditions may have similar appearances. Considering the patient's age and gender, and the site, color, and integrity of the mass and its relation to the dorsal surface of the goddess's hand, the mass can be defined as a ganglion cyst (ganglion, synovial cyst, Bible bump). Ganglion cyst is a synovia-derived mucus-filled bleb associated with a joint or tendon sheath. It is usually harmless but may sometimes be complicated by pain or carpal tunnel syndrome.

Historically, the first mention of an abnormal clinical characteristic was by Hippocrates (460 BCE–c.370 BCE) in his work "On the Articulations," part 40, under the term "ganglionic case." Tutorials of Hippocrates, as well as Aristotle, Galen, Avicenna, Rhazes, Averroes (Ibn Rushd) were medical education textbooks during the Renaissance. Medical education in Florence began in 1321 in the *Studium Generale* (Imperial University from 1364). In the 1480s, when *La Primavera* was painted, 33 physicians served 40,000 Florence citizens. A list of their surgical treatments includes "cautery, phlebotomy, setting fractures, repairing hernia, rectifying dislocation, treatment of wounds, sore, and sprains" [3]. A diagnosis of "ganglionic case" was possible then (according to Hippocrates' textbooks) and was probably made in the present case, where the carrier of Bible bump was, as supposed, Lucrezia Donati, the platonic ladylove of Lorenzo de' Medici, patron of the arts and particularly Botticelli.

A study of human anatomy together with sketches of cadavers and skeletons were obligatory for 15th and 16th century artists at the Florentine Academy of Art [4]. The depiction of a new and rare anatomic detail – a ganglion cyst – perhaps for the first time in fine art history corresponded with the professional spirit of the Florentine master. *La Primavera* demonstrated the gross pattern (macroscopic view) of the wrist ganglion about 1880 years after Hippocrates' pioneer work. Distinct hand masses are rarely depicted in famous artworks. One of them is the lipoma on the right hand of the *Mona Lisa* portrait by Leonardo da Vinci [5].

In addition to the hand ganglion, *La Primavera* captured an abnormality in another part of the body – the foot. The pointer toe (index finger, forefinger, digitus secundus, trigger finger) of Venus, Flora, Chloris, the two Graces (perhaps the third as well) and Mercury is longer than the hallux [Figure 1, insert B]. The orthopedic eponym of this abnormality is Morton's toe. Other names are Greek toe, Royal toe, among

others. The frequency of Morton's toe ranges from 2.95% to 90% (the latter relates to the Ainu, the indigenous people of the Hokkaido, Sakhalin and Kuril islands). Data concerning the female-to-male ratio are controversial. Some Morton's toe patients suffer from callus, foot, back and neck pain and require surgical treatment or assistance using an orthopedic device. The significance of a similar foot abnormality in almost all the characters in *La Primavera* may be found in the Greco-Roman tradition. This period portrayed figures with a long digitus secundus. In addition to *La Primavera*, the forefinger dominates in several of Botticelli's masterpieces – *Madonna with Saints, Pallas and the Centaur, Birth of Venus, La Forza/ Fortitude, Noli Me Tangere*, and *Mars and Venus*. Morton's toe is clearly distinguished in many artworks of Albrecht Dürer, Lucas Cranach the Elder, Heinrich Aldegrever, Lucas van Leyden, and Lucas Cranach the Younger.

COMMENT

Many canvases of outstanding masters contain hidden and explicit details of normal and abnormal human structures. Botticelli's artwork *La Primavera* depicts a group of goddesses, gods and nymphs who, free from the last breath of winter, salute the first sign of spring. In the poses of mythical characters against the backdrop of the Florentine spring landscape, Botticelli hides the lungs image and the components involved in the act of human breathing. In addition to the hidden details, the artist captured two anatomic abnormalities. Approximately 1880 years after the clinical description of abnormality by Hippocrates, *La Primavera* demonstrated for the first time a macroscopic view of a ganglion cyst on the wrist. Many painted figures have Morton's toe, which may in real life manifest clinically. Most probably the image of Morton's toe in *La Primavera*, as in several pictures of Botticelli and other Renaissance masters, is a tribute to the Greco-Roman fine art tradition.

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"Outside of a dog, a book is a man's best friend. Inside of a dog, it's too dark to read"

Groucho Marx (1890–1977), American comedian, actor