



## Review

# Colombo and the clitoris

Mark D. Stringer\*, Ines Becker

Department of Anatomy and Structural Biology, Otago School of Medical Sciences, University of Otago, Dunedin, New Zealand

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### ABSTRACT

In 1559, the Italian anatomist Realdo Colombo (1515/6–1559) claimed to have “discovered” the clitoris. Closer scrutiny reveals that whilst he certainly emphasized the role of the clitoris in female sexuality, his claim to priority is unfounded. The clitoris had been known to Greek, Persian, and Arabic writers on medicine and surgery, albeit with misconceptions about its function. Colombo is best known for his definitive description of the pulmonary circulation but here too the question of priority is mired in controversy. Whilst Colombo was an extremely accomplished and successful anatomist, contemporary professional rivalry probably encouraged exaggerated claims of priority. Modern anatomical studies have greatly advanced our understanding of the surgical anatomy of the clitoris, optimising the ability to preserve its function during genital surgery.

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“The truth is rarely pure and never simple.”

Oscar Wilde, Irish poet, playwright, and author 1854–1900

During the height of the Renaissance in sixteenth century Italy, at the ancient University of Padua, Realdo Colombo claimed to have discovered the clitoris. So momentous was this discovery, it has become the stuff of legend, inviting comparison in historical fiction with Christoforo Colombo’s (1451–1506) discovery of America some 50 years earlier [1]. Just who was Realdo Colombo and what did he discover?

## 1. Biography

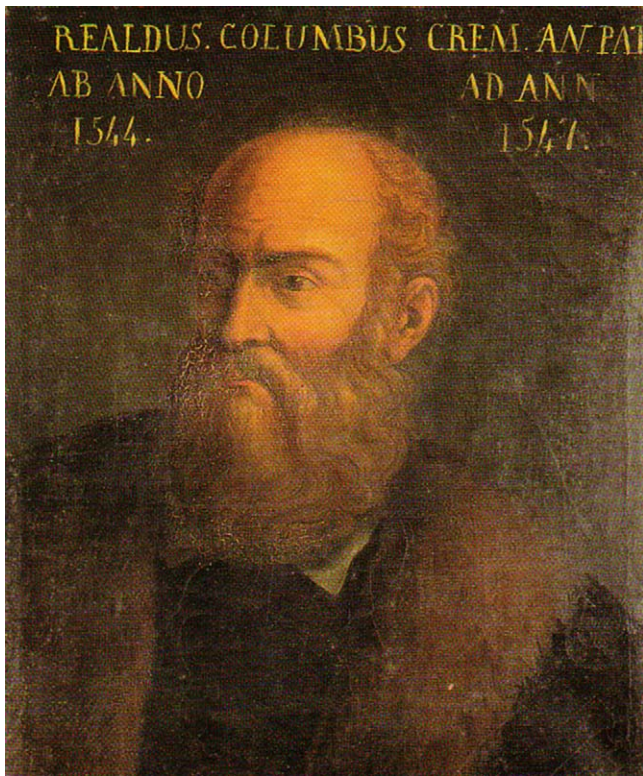
Realdo Colombo, the son of an apothecary, was born in Cremona, near Milan, Italy in 1515 or 1516 [2,3]. Although he is

often referred to as Matteo Realdo Colombo he signed himself as Realdo Colombo (Realdus Columbus in Latin) in letters and in his only published work [3]. After studying liberal arts in Milan, he spent 7 years as a surgical apprentice in Venice before moving to the University of Padua to study medicine in 1540. Here, his dissection skills must have impressed Andreas Vesalius (1514–1564), Professor of Anatomy and Surgery, who duly appointed Colombo as his assistant in 1541 [3,4].

In July 1542 Vesalius left Padua to visit Basel to oversee the publication of his famous book, *De Humani Corporis Fabrica Libri Septem* (On the Fabric of the Human Body) [3,5]. Colombo was appointed as a temporary replacement for Vesalius in January 1543, a position which was made permanent the following year when Vesalius left Padua to join the court of the Holy Roman Emperor, Charles V [6] (Fig. 1). Colombo’s relationship with Vesalius has been well documented [3,4]. They started on good terms. In the first edition of the *Fabrica* published in 1543, Vesalius refers to Colombo thus: “My close friend Realdo Colombo, a keen student of anatomy, who is at present a teacher of sophistics at Padua, ...” [5]. However, their relationship soured after Vesalius returned unexpectedly to Padua late in 1543 only to find that his

\* Corresponding author at: Department of Anatomy and Structural Biology, Otago School of Medical Sciences, University of Otago, PO Box 913, Dunedin, Otago 9054, New Zealand. Tel.: +64 3 479 5992; fax: +64 3 479 7254.

E-mail address: [mark.stringer@anatomy.otago.ac.nz](mailto:mark.stringer@anatomy.otago.ac.nz) (M.D. Stringer).



**Fig. 1.** Portrait of Realdo Colombo (by kind permission of the University of Padua Medical School).

anatomical studies were being publicly criticized by Colombo. In Vesalius's next publication in 1546 (*Letter on the China Root*, concerning the treatment of syphilis with this Chinese herbal extract) he referred to Colombo as one "who learned something of anatomy by assisting me in my work, although he was incompletely educated" [4]. There is no mention of Colombo in the revised edition of *Fabrica* published in 1555.

In 1545, Colombo took up the Chair of Anatomy at the newly reopened University of Pisa at the behest of the Grand Duke of Tuscany, Cosimo I de' Medici. Three years later he moved to Rome where he was Professor of Anatomy at the Sapienza (Papal University) until his death in 1559. In Rome he conducted private anatomical studies with Michelangelo (1475–1564) and performed autopsies on leading ecclesiastics such as (Saint) Ignatius of Loyola (1491–1556). By 1550, he was one of the surgeons to Pope Julius III [3,4,6,7].

Colombo completed his one and only text *De re anatomica* in 1559. He probably started writing this in 1542 [6], but died before its publication, which was overseen by his two sons [3]. *De re anatomica* proved to be a popular, enduring and influential book; it is organised into 15 chapters but, surprisingly, contains only a single illustration (Fig. 2). It is likely that Colombo was hoping to have the work illustrated by Michelangelo, who was not only a personal friend but later a patient when Colombo diagnosed and treated him for kidney stones in 1549 [6,8]. In a letter from Rome to the Grand Duke of Tuscany sent in April 1548, Colombo wrote that he was composing a work and "as luck would have it the leading painter in the world is assisting me with this" [3].

*De re anatomica* was a seminal work, based on Colombo's extensive dissection of cadavers and experiments on living animals. He corrected previous anatomical misconceptions (e.g. he demonstrated that the right kidney is lower than the left and showed that the lens is in the anterior chamber of the eye), recognized anatomical variants (e.g. the presence of palmaris



**Fig. 2.** Title page from Realdo Colombo's *De re anatomica* (1559) designed by Paolo Veronese and showing Colombo performing a dissection.

longus), and described congenital malformations (e.g. horseshoe kidney) [6,9]. His greatest contribution was his description of the pulmonary circulation, overturning Galen's longstanding doctrine that blood passed from the right ventricle to the left through pores in the interventricular septum. Colombo traced the movement of venous blood from the right ventricle through the pulmonary artery to the lungs, and noted that blood returning to the left ventricle was mixed with a 'spirit' derived from the air (but did not itself contain air). His writings greatly influenced William Harvey (1578–1657), who acknowledged Colombo's observations in his later description of the systemic circulation [2,10].

## 2. Colombo and the clitoris

In *De re anatomica* (1559) Colombo claimed to have been the first to describe the clitoris and its function [11]. Discussing the anatomy of the female external genitalia in book XI, he refers to "processes" ascending above the "pubes" and ending at a "certain small part, which is elevated on the apex vaginae above the foramen from which urine exits. And this dearest reader is that, it is the principal seat of women's enjoyment in intercourse; so that if you not only rub it with your penis, but even touch it with your little finger, the pleasure causes their seed to flow forth in all directions, swifter than the wind, even if they don't want it to." He continued: "Since no one else has discerned these processes and their working; if it is permissible to give a name to things discovered by me, it should be called the love or sweetness of Venus. It cannot be said how much I am astonished by so many

remarkable anatomists, that they not even have detected [it] on account of so great advantage this so beautiful thing formed by so great art." [11].

Colombo makes one further reference to the clitoris in book XV entitled "On those things rarely found in anatomy" [4]. Here, he describes an "Ethiopian" woman whose clitoris was developed to the "length and thickness of the little finger." She also had a narrow vaginal opening which "scarcely admitted the tip of the little finger." This suggests to us the possibility that this woman had congenital adrenal hyperplasia [12]. Glucocorticoid deficiency leads to excessive secretion of ACTH from the anterior pituitary, resulting in adrenal hyperplasia; there may also be a deficiency of aldosterone causing salt loss. Girls with the classic form of the disorder (21-hydroxylase deficiency) are exposed to high systemic levels of adrenal androgens in utero and are born with ambiguous genitalia: specifically, a large clitoris, rugose and partially fused labia majora, and a common urogenital sinus instead of a separate urethra and vagina. Skin hyperpigmentation occurs occasionally.

### 3. The issue of priority

Did Colombo really "discover" the clitoris? His teacher, Vesalius, with whom he had fallen out, subsequently denied the existence of "this new and useless part" in healthy women [13] and considered the clitoris a pathological structure found only in hermaphrodites [14]. Colombo's successor at Pisa in 1548, and later at Padua in 1551, was Gabriele Falloppio (1523–1562) [15]. In Falloppio's *Observations anatomicae*, published in 1561 but written around 1550 [14], he commented that this part of female anatomy is hidden from and neglected by anatomists and adds "...it is so hidden that I was the first to discover it ... and if others have spoken of it, know that they have taken it from me or my students" [16]. Given the professional rivalry between Colombo and Falloppio and the race for priority among anatomists and scientists at the time, the historical facts are difficult to establish.

In reality, neither claim was correct. In respect of published accounts, the clitoris had been known to Greek, Persian, and Arabic writers on medicine and surgery [14,17,18], although there were many misconceptions about its function. For example, the French anatomist Charles Estienne (1504–1564) had described the clitoris (*membre honteux* or "shameful member") in his 1545 Latin text *De Dissectione Partium Corporis Humani* based on human dissection but he related its function to micturition [19]. Maybe Colombo was the first to emphasize the role of the clitoris in female sexuality but even this is debatable. Pietro d'Abano (c. 1250–1316), an Italian philosopher and professor of medicine in Padua, published his *Conciliator differentiarum philosophorum et medicorum* in 1476 and later editions were in circulation in the early 1500s [18]. In this work, he wrote that women were driven to desire "...especially by having the upper orifice near the pubis rubbed; in this way the indiscreet (?curiosi) bring them to orgasm" [cited in 18]. Nevertheless, d'Abano did not describe the anatomy of the clitoris.

The clitoris was not the only anatomical feature described by Colombo which has generated controversy about priority and the possibility of plagiarism. Colombo claimed to have discovered the stapes ossicle bone but Falloppio subsequently pointed out that this had been described in 1548 by Ingrassia [4]. Similarly, although he is credited with discovering the pulmonary circulation, there were two previous published accounts of this phenomenon to which Colombo may have had access, although Coppola considers that Colombo reached his conclusions independently [3]. Michael Servetus (1511–1553) from Spain had described the pulmonary circulation in a theological tract, *Christianismi restitutio*, in 1553, copies of which were probably still in existence [2]. More significantly, the pulmonary circulation had been described during the thirteenth century by the Arabic

physician Ibn an-Nafis (c. 1210–1288). A close friend of Colombo's nephew had translated some of the works of Ibn an-Nafis, to which Colombo's description bears a close resemblance [3,20].

### 4. The clitoris in later literature

In the seventeenth century, progressively more detailed and accurate descriptions of the clitoris were reported by numerous authors including Caspar Bartholin (1585–1629) in Copenhagen [21], Jean Riolan the Younger (1580–1657) in Paris [22], and Regnier de Graaf (1641–1673) in Delft [17]. The latter in particular detailed the roots, muscles, blood and nerve supply of the clitoris and reaffirmed the sexual importance of the clitoris [17]. But de Graaf goes too far in stating: "...if these parts of the pudendum had not been endowed with such an exquisite sensitivity to pleasure and passion, no woman would be willing to take upon herself the irksome 9-months-long business of gestation, the painful and often fatal process of expelling the fetus and the worrisome and care-ridden task of raising children" [17].

In 1844, another notable contribution to the anatomy of the clitoris came from the German anatomist, George Kobelt (1804–1857) who published a text entitled *Die männlichen und weiblichen Wollustorgane des Menschen und einiger Säugetiere* (The male and female organs of sexual arousal in man and some other mammals.) [23]. This was based on detailed dissections, including vascular injection studies and comparative anatomy, and included comment on the function of the clitoris.

In the twentieth century, the anatomical literature on the clitoris has been the victim of cultural convention; until relatively recently, detailed diagrams in early editions of well-established anatomy texts were either omitted or replaced with figures with the clitoris unlabeled [24]. Fortunately, this trend has been reversed in recent years. Helen O'Connell et al. from Melbourne have expertly reappraised the anatomy and function of the clitoris using modern dissection and imaging techniques [25]. Others have exploited comparative anatomy to further our anatomical understanding; the close similarities between the clitoris and the penis in the spotted hyena (*Crocota crocuta*) has been particularly useful [26]. These findings have proven to be especially relevant to the management of paediatric intersex disorders, where it is essential to preserve long-term sexual function in the procedure of feminizing genitoplasty [27].

### 5. Conclusion

Just as Christoforo Colombo was not the first to reach the Americas from Europe, neither was Realdo Colombo the first anatomist to describe the clitoris. In Renaissance Europe, the clitoris was not newly discovered, only newly legitimised as an anatomical entity by male anatomists competing for reputation and priority [28].

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