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Bolognese Medicine during the Time of Dante

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Abstract. This research article shows the importance of the *Anothomia* written by Mondino de' Liuzzi in Medical history. It was decided to consider Mondino and Dante and dissection because this enables us to draw attention to the medical profession and to raise questions related to training in health. Specifically in scientific and educational context, the centrality of body experience is essential and the primary way of learning in medical knowledge is given by the formation and shaping of a gaze on the body and the patient's experience. The anatomy lesson in particular, given that it is the first experience of body transformation seen through biomedical gaze which medical students must undergo, may be considered as food for thought to shed light on some of the issues related to action of doctors.

Key words: bolognese medicine, Mondino de' Liuzzi, Dante Alighieri

Introduction

The University of Bologna dates back to the 11th century and it was the first in the world in terms of free teaching by private teachers to groups of students gathered in associations. Although these would gather in traditional places such as certain ancient and religious centres of culture (San Procolo abbey, the churches of San Francesco and San Domenico), lessons had been given for five centuries at professors' residencies or in rented premises (1). It was only in the second half of the 16th century that University lessons were given permanently in a single place (2).

The palace of the Archiginnasio was built in order to house all the schools of the Legisti (canon and civil law) and Artisti (philosophy, medicine, mathematics, natural sciences and physics) under one roof, having previously been located in various places across the town.

Since 1841 the rooms of the Archiginnasio Palace have housed the prestigious Società Medica Chirurgica of Bologna. It's the oldest medical society in Italy and it was founded in 1802. Recognized by the Government of the Kingdom of Italy in 1805, only during the age of the Restoration, in 1823, was there a possibility for some of the old members to regroup, founding a reborn Society. It collaborated with the Facoltà Medica in promoting a greater exchange of scientific information between its own members as well as between these ones and the most qualified representatives of the medical sciences worldwide (3). In addition to this educational and cultural activity, the Society made up for the lack of the Papal Health Services with numerous initiatives: the recovery of the practice of vaccination since 1828, the creation of a free clinic for the «poveri infermi» and the establishment of a Commission for monitoring epidemics in the State. The Society always paid attention to the updating of the members and, since its refounding, it instituted a library, which can still be seen as the most important Italian collection of medical journals and pamphlets of the 19th and the 20th century. The scientific life found its expression not only in meetings, but also in the publication of the *Bullettino delle Scienze Mediche*, which has been published continuously since 1829.

During the two hundred years of its existence, the Società Medica Chirurgica of Bologna has collected thousands of volumes, thanks to donations, changes

in the social periodical, and purchases. The collections are enriched by manuscripts and the most important of these is a copy dating back to the end of the 14th century or the beginning of the 15th century of the *Anothomia* by Mondino de' Liuzzi.

The Anothomia written by Mondino de' Liuzzi in Medical History

This codex was given to the Society in 1844 by the corresponding member Dr. Domenico Cavazzi, Head of the Subiaco Hospital (Rome), and we have good reason to believe that it is the oldest, and one of the oldest surviving, almost contemporary with the composition of the work. This is an edition, not a simple transcription. The above codex is kept at the headquarters of the Società Medica Chirurgica of Bologna. It is a paper manuscript with 84 pages (42 folia) written by a small but very clear hand. The pages are well-sewn and bound in leather, but the binding is clearly modern and made in the 19th century. The codex contains only the *Anothomia* of Mondino.

The manuscript was presented by Lino Sighinolfi (1876-1956) at the Second National Congress of the Società per la Storia della Medicina (September 25-27, 1922) and anastatic reproductions of the entire document were published in 1930 (4) and in 1988 (5).

At the meeting held on June 28, 1844 in the Società Medica Chirurgica, under the heading «Books received as a gift» it was noted «... a manuscript of the 14th century, which is a compendium of human anatomy of the famous Bolognese Mondino de' Liuzzi, sent as a gift for the Society from the corresponding member Dr. Domenico Cavazzi doctor in Subiaco» (6). With this laconic note this precious document was acquired.

In the 14th and 15th centuries the *Anothomia* was copied in many manuscripts which circulated throughout Europe and from 1475 there were more than thirty printed editions. The text of the manuscripts, however, have significant differences from those of the printed editions which have often been supervised by doctors who have revised the original text. The reasons for removing or adding parts of the text may have been different. One reason seems to have been in order to eliminate the most obvious repetitions and to make the text more readable. This kind of review, while altering the historical features of Mondino's work, does not seem to alter the scientific content. Another reason to correct the text of Mondino was to update the anatomical knowledge that had been accumulated in the meantime.

As for the text held in Società Medica Chirurgica di Bologna, it is to be noted that it is often convoluted and repetitive as if it were like notes taken during class activity and never fully reviewed by Mondino for a final draft. However, the *Anothomia* had the intention of illustrating the anatomy applied to surgery and to clinical practice, not to make learned disquisitions, which are located, on the contrary, in his other minor works.

Though Guglielmo da Saliceto had already elevated surgery at academic levels well above the practical surgery of the Middle Ages, Mondino combined for the first time physiology, pathology and clinical concepts, with the description of the human body. The *Anothomia* contains descriptions of six surgical treatments and two about cures. It cites classical sources numerous times: Galen 33 times, Avicenna 12 times, Aristotle 3 times, Hippocrates 2 times, Averroes 1 time. In many passages we can read the incitement to check the classical legacy through practical observation, and in some cases we can find that Mondino showed doubts and different opinions from the old Masters.

The first bibliographical notes of Mondino were the result of the Enlightenment in Italy. In 1775 Girolamo Tiraboschi included some scientific works in his «Storia della Letteratura Italiana» and devoted considerable space to Mondino de' Liuzzi. Medical historians of the 19th century took notice most of the academic production of Mondino and its significance in the evolution of anatomy rather than of the still obscure aspects of his life. In fact, despite the attempt at clarification by an unknown author (7), many historians still confused Mondino de' Liuzzi from Bologna with a contemporary doctor named Mondino da Cividale, or with Mondino da Forli who never existed. The confusion between different "Mondino" dragged on until the first half of the 20th century, and the identity of Mondino de' Liuzzi was finally clarified only in 1955.

Mondino was born in Bologna. We do not know the year of his birth but since he graduated probably in

1290-91 according to the university education system of the time, he was probably born around 1270. The Liuzzis were traditionally pharmacists, or rather, they traded spices and healing herbs, but Mondino was introduced to the study and to the practice of medicine by his uncle Liuzzo de' Liuzzi. The latter, who at the time did not teach at the University and still practiced medicine without academic qualifications in connection with the family pharmacy, taught together with his nephew in a private house owned by him.

The young Mondino would have had an easy life in a wealthy bourgeois family where father and uncle had intended him for an interesting career, but there was continuing political struggle between the Bolognese families allied to the Geremeis, who were influenced by Guelfi's ideas, and those which were allied to the Lambertazzis, who were influenced by Ghibellini's ideas. The Liuzzis sided openly on the side of the Lambertazzis and suffered the consequences: for example they had to pay a large sum of money as a ransom for the young doctor Mondino, who was about 35 years old and held as a hostage by the Guelfis. Even the fights between students, and between the city and students, involved Mondino, who clearly was not one to shirk social conflicts.

Despite the political difficulties, Mondino was able to pursue a brilliant medical career, probably thanks to a solid family and the respect which a good doctor enjoys. He was strongly influenced by the new medicine promoted by Taddeo Alderotti, characterized by harmony between theory and practice and by the academic study of Greek and Arab authors, who were translated into Latin in the 12th and 13th centuries (8).

Mondino was a modern doctor who kept up to date with literature, followed new academic trends and brought important innovations to his discipline such as the introduction of the cadaver in the teaching programme (9, 10). The Bolognese doctor Mondino de' Liuzzi is therefore considered the modernizer of human anatomy and his method is based on the systematic dissection of the four regions of the body. In fact, after about 1500 years where there was an interruption in the practice of dissection of the human body, Mondino introduced it as an academic tool and around 1316 he wrote *Anothomia*, the first book devoted exclusively to this discipline. In the text there is ample evidence that Mondino had dissected many corpses of all ages and both sexes before writing his work.

During the period around 1250 to 1350, Bologna had special social and academic circumstances due to its Scuola Medica, and this allowed the development of a particularly modern combination, for those times, of theory and practice in the teaching of medicine. In Bologna, in particular, the presence of law schools, which had experience and expertise, and carried out post-mortem examinations in the event of suspicious deaths, on one hand, and the presence of a thriving Surgery School, which inspired similar schools at the Universities of Montpellier and Paris, on the other hand, paved the way for the development of body dissection practices. In the early 14th century, these practices were carefully regulated and officially recognized, thanks to Mondino's work and teachings. Understanding the natural philosophy of Mondino de' Liuzzi, who worked in such an interesting historical period, is therefore a first step to clarifying the role of the University of Bologna in medical history.

The Middle Ages in the Western countries were remarkably pervaded by pressures from the Church on society and culture, but also on the private lives and on the destinies of individuals as regard to illness and death events. Of course Canons and Papal Bulls offer valuable food for reflection about the position of the Church towards the development of medical science.

In the Christian Middle Ages, medicine was almost exclusively prerogative of the Church and especially of monks. At the beginning of the 13th century the Lateran Council prohibited doctors, under penalty of exclusion from the Church, to undertake any treatment without submitting the decision to the Council Church:

> «*Cum infirmitas corporalis nonnumquam ex peccato proveniat, dicente Domino, languido quem sanaverat:* «Vade et amplius noli peccare, ne deterius aliquid tibi contingat», *decreto praesenti statuimus et districte praecipimus medicis corporum, ut cum eos ad infirmos vocari contigerit, ipsos ante omnia moneant et inducant, quod medicos advocent animarum, ut postquam infirmis fuerit de spirituali salute provisum, ad corporalis medicinae remedium salubrius procedatur, cum*

causa cessante cesset effectus. Hoc quidem inter alia huic causam dedit edicto, quod quidam in aegritudinis lecto iacentes, cum eis a medicis suadetur, ut de animarum salute disponant, in desperationis articulum incidunt, unde facilius mortis periculum incurrunt. Si quis autem medicorum huius nostrae constitutionis, postquam per praelatos locorum fuerit publicata, transgressor extiterit, tamdiu ab ingressu ecclesiae arceatur, donec pro transgressione huiusmodi satisfecerit competenter. Ceterum cum anima sit multo pretiosor corpore, sub interminatione anathematis prohibemus, ne quis medicorum pro corporali salute aliquid aegroto suadeat, quod in periculum animae convertatur».

Concilio Lateranense IV, 1215,
Costituzione 22 (11).

The Church did not only rise strong obstacles to the development of secular medicine, it also established prohibitions in medical practice, managed at the time by priests and monks who were dedicated to helping the poor and sick people. Through the Canons the practice, and indeed the study and teaching of medicine, were banned.

With regard to the Papal Bulls, that of Pope Bonifacio VIII in 1299, called *De Sepulturis*, otherwise known as *Detestandae Feritatis*, it contains a clear prohibition to the practice of dissection. However, the enactment of this religious document was actually referring to the custom of dismembering the corpses of the Crusaders in order to bring the remains back home and not to the prohibition of dissecting cadavers for scientific purposes.

Anyway, history of anatomy has demonstrated that its progress has not been interrupted and that the year 1300 corresponds exactly to the date on which there are proofs of anatomical dissection practices at Italian universities. In fact, during the second decade of the 1300s, Mondino de' Liuzzi was the first author of a modern anatomical study, the *Anothomia*.

So the proof that dissections occurred in public for the benefit of doctors seem to demonstrate that the date of Bonifacio's Bull, far from representing the eclipse of anatomy, actually sets the date of the beginning of the modern practice of anatomical studies, that reached maturity with the *De humani corporis fabrica* written by Vesalio in 1543.

The real opposition to scientific progress, attributed to religious reasons, would rather be linked to the resistance of scientists and pseudo-scientists who, because of a conservative attitude, constantly put people in a position to object to all kinds of innovation. Such a prejudice against surgery by doctors dedicated to internal medicine has always existed, and still exists. However the historical evidence shows that the dissections were widely performed at the time.

The *Anothomia* in medical history marks a deep distinction and transformation between the medieval philosophical thought and that of modern times. Teaching methods in Bologna showed the interplay between logic and philosophy teaching on the one hand, and medicine on the other. The attention to *quaestio*, and in particular to *quaestio disputata*, is deeply felt. By this term we should understand the way a problem is investigated. The typical medieval method consists of organizing the discussion materials into for and against arguments towards a given thesis that are compared and tested as to their logical and epistemological capacity. Broadly speaking, the question can be found in various contexts, often inserted into simple notes too, sometimes at the end of a lesson. The term *quaestio disputata* in the proper sense refers rather to a real school act, subjected to a fixed statutory legislation and that is part of the teacher's duties. Noted on several occasions, this school act was at first called for a debate, for which the teacher was present, while the for and against arguments were subjected to an analysis conducted by the *responders* and the *opponentes*. The teacher intervened some days later, expounding and corroborating through some arguments his own solution to the problem: this second part was called *determinatio*. He was then obliged to deliver the written record of this work to the *bidello stazionario*, for publication (12).

After the introduction, the *quaestio disputata* is usually divided into other sections, present in many if not all the handlings we own. So we find, often in this order, the exposition of authoritative opinions on the problem, the solution proposed by the teacher, the solution to some doubts and, finally, the answer to the arguments put forward in the debate to support a different view from that embraced by the author. These parts contribute to consider the *quaestio disputata*, at

least in its written form, as an organic and complete discussion of the analyzed problem.

The use of these teaching and exposing techniques in the medical education in Bologna, in the 13th century, is fully confirmed by several studies on Mondino's works. For our purpose here it will be enough to remember that Mondino, in addition to the well-known treatise entitled *Anothomia*, also composed current comments to works that were part of the medical curriculum of the time, *consilia* and some *quaestiones disputatae*, as well as other short treatises (13, 14).

The dissection of corpses was the main means of learning about the composition of the human body. After many unproductive centuries for the study of anatomy, the University of Bologna turned it into a teaching subject about seven hundred years ago, well in advance of other European University Centres.

Mondino reached such fame in the field of medicine as to be remembered after his death (which took place between 17 February and 15 May 1326) in several local news much more warmly than any doctor at that time. In fact local news were primarily involved only in political and military facts and the reporting of the death of an intellectual or a doctor was uncommon.

It is useful to mention that Mondino also looked after a complex family because from two wives, Giovanna and Mina, he had four sons and two daughters. Both the will and its application show a solicitous interest in the wellbeing of his children, relatives and people associated with his city and country properties (15). Despite his academic and family commitments, he maintained regular relationships with colleagues in other parts of Italy, especially those from Tuscany, because of the Tuscan origin of the Liuzzis.

There is ample evidence of important relationships between Mondino and other intellectuals outside of Bologna, especially in the circle of the Tuscani ones. Although Mondino spent his entire medical career in Bologna at a time when it was normal to move among various European universities, we should not think that he lived in a provincial academic world. It is very probable that he knew well the young Tuscan poet Dante Alighieri when between 1285 and 1288 they were both attending classes at the University of Bologna (16).

The fact that Dante had a solid medical knowledge is supported by more than one commentator (17). He used scientific terms in various episodes of the Divina Commedia, like in the story of Mastro Adamo, the forger drew in XXX canto of the Inferno, where he explained the pathogenesis of ascites, and specifying «Umor che non converte» that's to say humours that the liver did not digest, did not metabolize. Moreover Dante reminded us of epilepsy while writing about Vanni Fucci in XXIV canto and believed caused «per forza di demon ch'a terra il tira / o d'altra oppilazion che lega l'omo» stressing that the two etiological interpretations in vogue at his times i.e. the popular one of diabolic possession and the scientific one about the ventricular obstruction of the brain. Furthermore, he reminded us of malaria mentioning the shaking thrill of quartan which comes before the febrile crises (XVII - Inferno) (18).

It is not a coincidence that the Poet is registered in the guild of physicians and apothecaries: he was a pupil of Brunetto Latini, the first to introduce him to the study of scientific subjects and pupil of Taddeo degli Alderotti and friend of Mondino de' Liuzzi. According to Bernabeo and Cerbo, two eminent historians of the University of Bologna, Dante would have even attended lectures of this Master for his scientific enrichment. Cerbo said: «In Bologna Dante certainly followed the lessons of philosophy and medicine, as he considered all the sciences recognizing their high value and all necessary to know the universal order that theology shows in its providential significance» (19).

Obviously Dante follows the anatomical knowledge of his time (20-22), articulated on the Hippocratic-Galenic humoral doctrine that shows the twilight hours as dominated by the humour of sadness, of anxiety, of restlessness. However, he knows well how the alternation of humoral influences on humans is linked to the alternation of periods of light and dark. The blood prevails in the first three hours of the morning and in the last of the evening; bile in the six middle hours of the day; melancholy in the last three hours of the day and in the early of the evening; phlegma during the night.

Today science explains these phenomena with the circadian rhythms, which are connected with the light-dark alternation: a succession of events that give

rise to certain brain neurotransmitters such as epinephrine, dopamine, and serotonin, known to affect mood. Their reduced concentration in fact generates hypochondriac and depressive phenomena, while their increase involves euphoric effects. They are substances that during the day could present peaks and falls in the brain and blood concentration in accordance with the intensity of light, justifying contemporary and consistent mood changes.

Conclusion

It was decided to consider Mondino (23) and Dante and dissection because this enables us to draw attention to the medical profession and to raise questions related to training in health (24). Specifically in scientific and educational context, the centrality of body experience is essential and the primary way of learning in medical knowledge is given by the formation and shaping of a gaze on the body and the patient's experience. The anatomy lesson in particular, given that it is the first experience of body transformation seen through biomedical gaze which medical students must undergo, may be considered as food for thought to shed light on some of the issues related to action of doctors (25).

What I have tried to bring to light is that the body as a machine designed according to the principles of physical laws, which also provide the tools to understand and repair the damage of this machine, has created really big problems. Doctors sometimes have difficulty in understanding that "who or what" they must heal is the patient, not the disease or the damaged body. This makes us aware of the complex social and ethical contextualization of medical art and these considerations are becoming vital in our society (26).

While the anatomy lesson, beyond the content it transmits, had its efficacy in the objectification of a body that is depersonalized to become an object subjected to the medical gaze, without name, memory, or history, now the anatomy teachers perform a reverse action: they attract students' attention to the fact that that body lying inert on the dissection table is inseparable from the memory of the person who one was.

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