



Medicine and Pharmacy in the works of Dante Alighieri (1265-1321)

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Abstract

The 700th commemorative year of Dante's death began on 25 March 2021, the day of the *Annunciation of the Lord*, of the creation of the world, the New Year's Day in old Florence according to *ab Incarnatione*. On 25 March 2021, Holy Father Francis published the apostolic letter *Candor Lucis Aeternae* solemnly uniting the voice of the catholic church with the chorus of all the ones honoring the memory of the illustrious poet Dante Alighieri. In professional fraternity the voices of the guild colleagues join in, physicians and pharmacists, descendants of those in *Arte dei Medici e degli Speciali*, which proudly included among their members Dante Alighieri, at the crossing between the 13th and 14th centuries.

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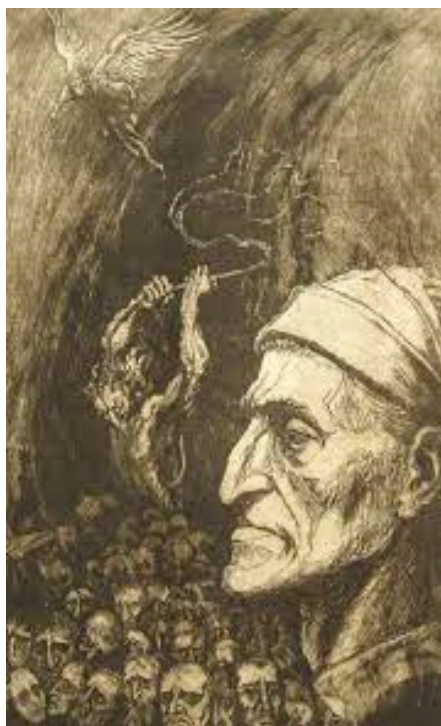


Figure 1. Dante Alighieri, etching by Marcel Chirnoaga (1930-2008).

Year of Dante Alighieri (Figure 1), the seventh centennial of Dante's death, began on 25 March 2021. A day full of significance: the Annunciation of the Lord, day of the creation of the world, Holy Father Francis joined the universal commemoration of the illustrious poet by publishing the apostolic letter *Candor Lucis Aeternae* (*Splendour of Light Eternal*) [1].

Blessed by providence with the poetic gift, and also exceptional intellectual faculties, Dante completed his education as a pupil of renowned personalities and continued to deepen his studies in many other fields, among the starkest of the time, like medicine and pharmacy [2]. Dante imposes by his medical knowledge, the precise mastering of special terminology. He is in fact a member of the corpus of physicians and pharmacists, though his inclusion in the guild is circumstantial. Nearing his 30th year, Dante has the attractiveness of politics. But to be a candidate for public functions in Florence, the *Ordinamenti*

della Giustizia (1293) of Giano della Bella required one to be member of a guild [3,4,5]. On 6 July 1295 Dante enrolls in *Arte dei Medici e degli Speziali* [6]. In the following years he holds important public positions, which, on 15 June 1300, culminated with his election as prior, for two months, on behalf of the white guelphs, defendants of Florence autonomy from the Papal State. Excommunicated by the Pope on 23 September 1300, the Florentine government sent a message mission to Rome, led by Dante. During this time, at Pope Boniface VIII's request, Charles of Valois enters Florence and "brings peace". The black guelphs gain full power and start persecutions against the white guelphs, among which Dante, who is judged *in absentia*. By the infamous final decision in March 1302, Dante is deprived of all his goods and condemned to death by burning at the stake. The long exile ensues, till the passage to eternity, in Ravenna, the night of 13/14 September 1321 [7].

Arte dei Medici e degli Speziali

The first mention of the physicians and pharmacists guild of Florence dates from 1197 [3]. In 1770 Granduca di Toscana, Pietro Leopoldo I, suppressed the public activity of guilds [8].

Structure and organization

Arte dei Medici e degli Speziali was one of the most influential Florentine guilds, the second in the hierarchy of the seven *Arti Maggiori*. It included physicians and pharmacists, but it also accepted surgeons and barbers. In Florence around the year 1200 there were about 60 physicians and surgeons for 100,000 inhabitants, their number increasing in the second half of the 13th century. The number of pharmacists was roughly 100 around 1200 [3].

In order to limit the proliferation of different guilds, the existing ones decided to take under their protection trades not directly related to the major special professions, giving them a reduced influence in the corporation [9].

Patroni spirituali

In Florence the saint patron of the physicians and pharmacists guild was Virgin Mary. In one of the niches in the façade of the Orsanmichele church, under the care of guilds, a statue commissioned to Pietro di Giovanni Tedesco was placed in 1399; it is *Madonna della Rosa*, with the infant in her arms, the right hand holding a rose, the insignia of the physician and pharmacists guild. The same symbol is placed above the tabernacle in a round medallion of colored terracotta [10].

Clothing of the members of *Arte dei Medici e degli Speziali* was purple red, distinguished by sober, elegant lines. Over the *gonnella*, from neck to ankle, went the *guarnaca*, a mantle with rich folds and large sleeves [11]. The final piece, typically Florentine, was *il lucco* [12], which appears in most portraits of Dante [13,14] and of other prominent members of the guild.

Cultural engagement

Besides the many public health and commercial activities, *Arte dei Medici e degli Speziali* also undertook cultural and artistic activities. It was customary for the intellectual elites (poets, philosophers, painters) to meet in the hospitable spezieria, Dante being a frequent participant. The guild colleagues, pharmacists and physicians, were prestigious members, all involved in public life and sharing the same cultural values. Among the pharmacists, Giovanni Sercambi (1348-1424), Matteo Palmieri (1406-1475), Giovanni Antonio di Faye (1409-1470), Luca Landucci (1436-1516) left a legacy of literary and historical works in Latin and vulgate [15]. The *Arte dei Medici e degli Speziali* also registered Domenico di Giovanni (Burchiello) (1404-1449), former barber, without special education. He is the creator of a new style "alla burchia" in Italian poetry. His sonnets, in bulk form, brought him celebrity by the paradoxical and apparently absurd usage of language [16].

Arte dei Medici e degli Speziali also admitted in their ranks well known painters, starting with the 14th century. The guild records list famous names: Giotto, Gaddo di Zenobi (Gaddo Gaddi) and his son Taddeo Gaddi, Maso di Banco, Masaccio, Paolo Uccello, Andrea di Cione di Arcangelo (Andrea Orcagna), Jacopo di Cione, Niccolò di Tommaso. In 1339, the Florentine painters in the *Arte dei Medici e degli Speziali* founded "*Compagnia del glorioso messer Santo Luca Evangelista*", seated in the great chapel of the Santa Maria Nuova hospital [2]. Along the years the hospital and the pharmacy received valuable works of the great painters as gifts, which built up an impressive artistic legacy [17]. On 13 January 1563 the *Compagnia dei Pittori di S. Luca* became *Accademia delle arti del disegno*, and in 1784, after profound reforms, it took its actual name: *Accademia di belle arti di Firenze*. Following the Florentine model, in 1593 the *Accademia di San Luca* was founded in Roma [18].

Dante's choice

Born in a family with well established aristocratic origins, Dante Alighieri had a relatively distant behavior, showing restraint but obvious conceit. Even the enthusiastic Boccaccio attributed him a certain arrogance and petulance [7]. With such a temperament and profile, it was inconceivable for Dante to practice petty commerce with leather, fur, silk or other goods. He did not have a lot of money and never sought lucrative benefits. He had the choice between two representative guilds for enlightened minds: the judges and notaries, or the physicians and pharmacists. With a brilliant education in liberal arts, the basis of both medicine and philosophy, the choice of the *Arte dei Medici e degli Speziali* was natural. Dante was adopted without any reservation by the guild members, who appreciated his outstanding intellectual qualities. Several years later, nominated as leader of the diplomatic

delegation to Pope Boniface VIII, Dante valued his role without modesty: “If I go, who stays? If I stay, who goes?” [7].

Dante’s medical studies

In his youth, Dante acquired impressive medical and pharmaceutical knowledge through both personal readings and attending lectures of the scholars of the time [2,7].

Dante knew the medical writings of Peter of Spain (Petrus Hispanus, Pedro Juliao Rebelo). Born at Lisbon [?(1205-1220)-1277], Petrus Hispanus completes his studies in theology and medicine at the University in Paris (Roger Bacon’s pupil) and at the medical school in Montpellier and Salerno [19]. In 1247 he becomes a teacher of medicine at the new University of medicine in Siena [19,20]. Among his medical writings, a famous one is *Thesaurus pauperum*, extensively issued in dozens of editions, manuscripts and prints in between XIII-XVIIth Century. Equally known is *Liber de Oculo (De Oculis)*. At the National Library of Madrid there have been discovered 14 “questiones” and answers directed to medical students [21]. What makes Peter of Spain famous is the monumental treaty *Summulae Logicales*, with more than 48 editions in manuscript and prints, with a colossal success in the European Universities till the XVIIth Century [21,22]. It is the work representing him among the glorified souls in the Heaven of the Sun [23].

.... and Peter of Spain,

Who down below in volumes twelve is shining;
(Paradiso, Canto XII, v. 134-135)

The ecclesiastic ascension of Petrus Hispanus is impressive, culminating with his election in the papal chair under the name of John XXI (Ioannes XXI). (13(20) sept. 1276 - 20 may 1277). John XXI is the only pontiff in Medieval Portugal, the only pope physician and the only one among the popes contemporary with Dante, encountered in Paradiso.

Dante had a personal relationship with the famous professor Taddeo Alderotti (c1215-1295), a born Florentine, renowned medical practitioner [24]. At the Faculty of Medicine of Bologna University, Dante attended his lectures of medicine and philosophy (1285-1288). Taddeo Alderotti is mentioned by the poet in the *Paradiso* (Canto XII, v. 83) and the *Convivio* (Conv. I. 10) – “Taddeo ipocratista” [25]. In the library of Bologna University, Dante had access to manuscripts in Latin, translated from Arabic, of Aristotle, Hippocrates, Galenus, Avicenna, Averroes. *Materia Medica* is a frequently used bibliographic source in the *Divine Comedy*, while its author, the botanist, physician and pharmacist Dioscorides is praised for his art of healing by medicinal plants. Pagans without access to Paradise, the great scholars of antiquity were placed by Dante, under the constraints of the catholic dogma, on the limbo of the Inferno, in the

noble castle of the great spirits [23,26], a shelter away from pains (Inferno, Canto IV, v. 139-144).

Among the numerous Taddeo Alderotti’s disciples, the best known are Mondini de’ Liuzzi and Fiduccio de’ Milotti. Mondini de’ Liuzzi (c1270-1326), professor at the Bologna Medical School, supervised the first documented session of public dissection approved by the church, in January 1315. In 1316 the manuscript *Anathomia* by Mondini appeared, the first modern dissection guide [27]. In the *Divine Comedy*, Dante uses with precision the anatomical terms that are identical with those in Mondini’s didactic work (Inferno, Canto XXXII, v. 127-129). According to some commentators, the scene of prophet Mohamed’s punishment follows the rules established by Mondini for the dissection lessons (Inferno, Canto XXVIII v. 22-27). Together with the sowers of discord and scandal, the Prophet, accused of breaking Islam from Christian faith, appears sectioned vertically into two, eviscerated, with a detailed and precise description of all the exposed organs [28]. All this horror is happening... live, because in the Dantesque Inferno there are no... corpses, as opposed to the real world.

The relationship between Dante and Mondini de’ Liuzzi might have been possible, but it remains blurred, no matter how attractive it might seem and how many papers of the history of medicine it generated [29]. The two disciples of Taddeo do not mention themselves in their works and there is no written proof of their direct encounter. *Anathomia* was launched in 1316, long after the appearance of *Inferno* (1308), the first *cantica* of the *Divine Comedy* [2,27].

The other disciple of Taddeo, Fiduccio de’ Milotti, of Tuscan origin, settled in Ravenna in 1300 and practiced medicine. He became Dante’s friend and personal physician and mediated his correspondence with Giovanni del Virgilio, the Bolognese humanist. Fiduccio de’ Milotti died in 1323, in Bologna, while visiting Mondini de’ Liuzzi [2].

Dante’s contacts with the medical world were not limited to the University of Bologna. Between 1304-1306, in Padua, an important university center, reputed for the studies of Aristotle, Dante met several physicians, among which Pietro d’Abano (c1250- c1315) [30]. A researcher of primary scientific source, d’Abano was investigated by the Inquisition more than once.

On 20 January 1320, at Sant’Elena Church of Verona, in front of all the clerics and laymen, Dante exposed his famous “*Questio de Aqua et Terra*” [31]. A critical intervention, expressing a different theory, came from Antonio Pelacani (c1275-1327), a physician and philosopher of Verona, a pundit of Avicenna and Galenus and lecturer of medicine at the University of Bologna [32]. With a Ghibelline orientation, counsellor and physician of Matteo I Visconti and friend of Cangrande della Scala, Pelacani was implicated in several trials of heresy staged by Pope John XXII [32].

Dante between Medicine, Philosophy and Theology

In the course of his education process, after learning the liberal arts, Dante undertakes studies of philosophy and theology, at the same time refining his skills in the art of poetry. Endowed with exceptional intellectual ability, Dante acquires vast knowledge of astronomy, physics, geography, medicine, pharmacy and other sciences of the time.

Medicine and health in Dante's epoch

Dante's genius surprises us with the fine understanding of human nature and the complicated social relations. Dante includes illness in the wide context of human condition, whelmed by suffering. He uses the term *infirmity* (Purgatorio, Canto X, v. 122), in which he includes, beside the common illnesses, disabilities caused by the ecosystem, work, accidents, hunger and other factors related to social inequality and marginalization. The concept of the quality of life begins to come through, to be confirmed centuries later. By Christian mercy, life's destitutes find spiritual comfort and bodily care in dedicated institutions. Suggestive is also the use of the cruch as a symbol of such medieval establishments for the sufferers ("La Gruccia" - Ospedale del Valdarno). In central and northern Italy the appearance of hospitals is documented starting with the 11th century [2,33]. The common ones provided care to all categories of sick people, especially the needy. Some hospitals were specialized for certain categories of patients (severe infections like leprosy), others served the members of certain congregations. The hygiene conditions were hard to observe, overcrowding and promiscuity shedding a very bad light on these establishments. Dante transposed this picture into the pestilential bolgias of the Inferno, sites of the damned suffering crowded together (Inferno, Canto xxix, v. 46-51).

In Florence, Ospedale di Santa Maria Nuova has a particular history. It was inaugurated on 23 June 1288 by Folco Portinari, father of Beatrice, Dante's beloved. Manetto Portinari, Beatrice's brother and good friend of Dante (next in order after the first) was often accompanied by the latter in his frequent visits to the hospital. Ospedale di Santa Maria Nuova is the oldest European hospital that never closed down. From the beginning it had its own pharmacy and a botanic garden for medicinal herbs [34]. Medical care was ensured by a group of *pie donne* called *Oblate*, whose representative figure was Monna Tessa, governess of the Portinari family. The care of patients, mostly poor, was delivered according to the evangelical spirit and it observed strict Franciscan rules. *Suore Oblate Ospedaliere Francescane* are organized as a religious institution, with rules revised in 1932. On 11 October 1952, the congregation received the honorary pontifical decree (*Decreto di lode*). The Santa Maria Nuova Hospital was a model for the construction and design of many a

hospital in European cities and continues to be an elite health care institution [2]. The hospital and the pharmacy host one of the finest art treasures in the world [17].

Diseases in Dante's work. Terminology, etiology, clinical picture

The anatomical and clinical terminology used by Dante was in conformity with his time.

Very thorough and precise is the presentation of hemorrhages (obviously violent, on the battle fields). Bonconte de Montefeltro, captain of the Guibelines army of Arezzo, died in the battle of Campaldino (1289). In the Purgatorio, in the dialogue with Dante, Bonconte describes his abundant, gushing bleeding from a severe wound at the neck. Death occurs rapidly, the soldier only having the time to invoke the Virgin's name and cross his arms over his chest, thus saving himself from the throes of the Inferno (Purgatorio, Canto V, v. 97-102).

Jacopo del Cassero, who is with Bonconte in the Purgatorio, also approaches Dante and describes how he was hacked by paid assassins and how he bled slowly and abundantly (Purgatorio, Canto V, v. 73-84). Besides the extraordinary poetic images [26,35], Dante also provides an explanation of the difference between the two violent deaths based on a galenic pattern. The loss of *virtus vitalis* circulating through the arteries led to Bonconte da Montefeltro's quick death, while del Cassero, who bled from the veins, had a lucid agony ending in a pool of blood [2].

With an Italian given name, malaria was endemic in several regions of continental Italy and in Sardinia and Sicily [36]. A remarkable clinical picture is given by Dante in the presentation of the bout of chills. It is an episode of quartan fever, with profuse and stinking sweating. Besides the general symptomatology, livid nails are also described [2]. Their pale grey color is caused by the clustering of parakeratotic cells in the nail bed (*lividitas in unguibus*). (Inferno, Canto XVII, v. 85-87). The paludic disease peak, coinciding with the multiplication of mosquito larvae, occurred in July-September, crowding the hospital wards and burdening the conditions of care. In the ninth bolgia of the eighth circle of the Inferno, the horrific filth in which forgerers scuffle evokes in Dante's mind the earthly hospitals overcrowded by malaria patients (Inferno, Canto XXIX, v. 46-51).

Malaria did not have mercy on the great poet either. Gone to Venice as ambassador of the lord (podestà) of Ravenna, Guido Novello da Polenta, to Dante the route back home by sea was refused. Returned to the marshes around Ravenna, Dante falls ill with malaria and dies on the night of September 13/14, 1321. In 2007, with undenyng fate, Ravenna and its surroundings became the first focus area of Chikungunya fever in Europe [37]. Global warming favored the adaption of the Chikungunya virus vector, the *Aedes albopictus* mosquito, in the hospitable marshes of the region [38].

Sin – contrapasso - disease

A pilgrim into the world beyond, Dante acknowledges and rejects sin, he crosses through the seven circles of penitence into the Purgatorio and finally ascends to Paradise toward God.

The dark Inferno hosts the damned passed through the divine justice. The punishments are a measure of the sins. The pains without respite and without end are produced by the action of natural elements, by metamorphosis, the intervention of mythological creatures, or by disease. Pain dominates the landscape of the bolgias of Hell, as warned by the inscription on the Hell's gate [26]:

*Per me si va ne la città dolente,
per me si va ne l'eterno dolore,
per me si va tra la perduta gente.*

.....
Lasciate ogne speranza, voi ch'intrate'.
(*Inferno, Canto III, v. 1-3; 9*)

Dante grasped the wide range of manifestations of pain in the sensory area, as well as its emotional component; he puts in order the meanings of pain and makes a hierarchy of the consecutive disabilities [39]. The text analysis of Inferno evidences 46 descriptors of the pain experience, out of the 78 listed in the Italian version of McGill Pain Questionnaire [40].

Abandoned to the evil forces, the Inferno is still submitted to divine justice. The balance sin-punishment is established by the *contrapasso* rule in two ways: by analogy and by contrast [41].

The analogy is obvious in Canto XXVIII, v. 22-27, for the sowers of discord and scandal, creators of schism, placed on the ninth chasm of the eighth circle of Hell. With cut off arms (Mosca dei Lambertini), perforated neck (Fra Dolcino), cut-out tongue (Curio), split from head crown to the chin (Ali, Mohamed's son-in-law), beheaded, carrying his head in his arms (Bertrand de Born, the bard of Provence), and culminating with the eviscerated prophet Mohamed, all received the analogous scission that exposes parts of their bodies [28].

In the fourth bolgia of the eighth circle of Hell the soothsayers are gathered. In their new condition, by the *contrapasso by contrast*, their head is rotated by 180°, with all the consequences that follow from this anomaly. They walk forward looking backwards. The damned cannot see their very first step, in contrast with their amazing visionary abilities in their former life (Inferno, Canto XX, v. 10-18, 22-24). Among them are mentioned many prophets of the Ancient World, Greek and Roman, and astrologists of the Medieval Age [23,26]. A wide space is given to Manto the fortune teller, Tiresias's daughter, who had left Theba after her father's death to settle in the north of Italy (Inferno, Canto XX, v. 52-54). Her son founded the town that bears her name, Mantua (Mantova). The changes induced in the bodies of

fortunetellers by *contrapasso* are difficult to match with known pathological aspects ("When our own image near me I beheld, Distorted so..." Inferno, Canto XX, v. 22). For the severe forms of spasmodic torticollis similar to the body distortions in Inferno, the name Manto's syndrome was proposed [42].

The "infernal" pathology by *contrapasso* may be found in almost every canto. Some characters have been thoroughly analyzed, becoming true models of didactic presentations: Master Adam the hydropsic (Inferno, Canto XXX v. 49-69), the alchemists with unbearable pruritus (Inferno, Canto XXIX, v. 73-78), Vanni Fucci with his epileptic bouts (Inferno, Canto XXIV, v. 112-117) are only a few of the sufferers of hell [43-48].

In the Divine Comedy Dante uses his fantasy to give force to the poetic images or allegoric constructions. Preoccupied, in the first place, to render reality truthfully, Dante grasps its most striking aspects with impressive accuracy, due to his exceptional intellectual ability, sharp observation and outstanding intuition. In this reality, medical aspects hold an important place. Integrated in the epic tissue of the Inferno and Purgatorio, diseases and pains are described with the same competence and mastery as the splendor and terrors of cosmic phenomena, the scenes of violence between mythological characters, the metamorphoses of the world beyond, or the political, social, artistic and military events from the earthly world.

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