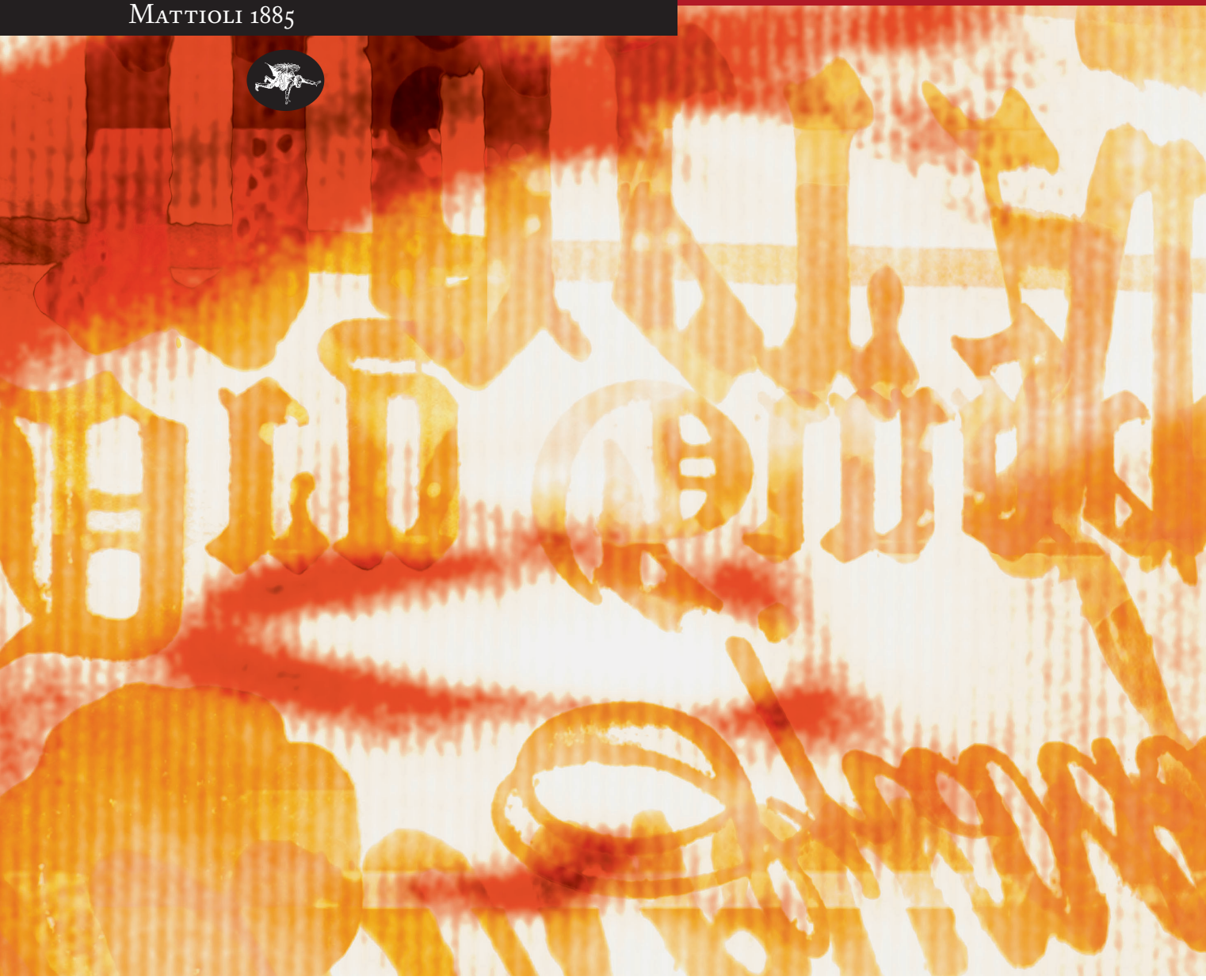
Med. Histor. - Vol. 2 - N. 1 - April 2018 | ISSN 2532-2370

MEDICINA HISTORICA

Organo Ufficiale della Società Italiana di Storia della Medicina

Mattioli 1885



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MEDICINA HISTORICA
Registrazione Tribunale di Parma
n. 20/1997
ISSN 2532-2370
Periodicità quadrimestrale

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Index

Volume 2 / n. 1 April 2018

Editoriale

La didattica storico medica oggi in Università

L'insegnamento di Storia della Medicina nell'università italiana è ricompreso nel Settore Scientifico Disciplinare *Med02* (Storia della Medicina, Bioetica, Pedagogia Medica, Paleopatologia, Museologia scientifica) ed è fornito agli studenti di diversi corsi di laurea di medicina e chirurgia, triennali e magistrali. All'intersezione con gli insegnamenti storici e bioetici, la disciplina non appartiene solo al perfezionamento culturale dello studente, perché si dimostra oggi sempre più caratterizzante nella formazione del medico e di tutti i professionisti sanitari. Ha una posizione centrale, non trasferibile ad altri settori e si configura tra le materie necessarie ad acquisire maggiori capacità di riflessione e di critica epistemologica, in coerenza con gli attuali sviluppi culturali e nel rispetto delle specificità delle attività di ricerca e di didattica. I docenti di storia della medicina, in tutta Italia, sono impegnati in un importante carico didattico e in molte sedi - attraverso musei e biblioteche di interesse storico con patrimoni storico-culturali rilevanti - garantiscono anche la trasmissione della memoria e la tutela dei beni culturali di interesse medico-scientifico presso le università e altri luoghi e istituzioni del sapere. La loro didattica costituisce un momento di raccordo che facilita la comprensione dell'impianto teorico ed epistemologico della medicina, dei motivi comuni delle professioni sanitarie e delle interrelazioni tra discipline. Proprio le profonde trasformazioni incardinate alle tecnologie biomediche hanno suggerito di orientare lo studente anche ad un pensiero medico scientifico nutrito dal confronto con quello storico, epistemologico, etico e antropologico. Mentre si sviluppano le specificità che qualificano i diversi ambiti didattici, questo insegnamento si è rivelato indispensabile per stimolare le capacità di riflessione critica necessarie nel guidare le scelte professionali, dipendenti dalla disposizione al ragionamento individuale. Lo scenario nel quale oggi crescono i medici e le altre figure sanitarie pretende lo studio di questi temi affini per creare sotto l'etichetta di *Scienze umane* uno strato di sapere necessario, accanto alla istruzione scientifica e tecnica e all'addestramento della clinica. Le diverse professioni sanitarie che oggi si articolano con le competenze dei medici pretendono un'apertura di conoscenze verso la storia delle dottrine e delle idee, come si sono modificate e come vanno modificandosi nel tempo. Anche il mutare della didattica, segnato dal trasformarsi delle "tabelle" nel loro succedersi, è dimostrativo di alcuni dei principali problemi legati alla formazione in sanità e dell'importanza che, nella formulazione dell'offerta allo studente dei diversi corsi di laurea, è stata attribuita all'insegnamento delle *Medical Humanities*, caratterizzante la formazione di ogni operatore di area medica, nel percorsi universitari triennali, magistrali e nelle scuole di specializzazione. Tale importanza è, peraltro, riconosciuta in modo crescente anche in ambito europeo ed internazionale, come dimostra ovunque in Europa e nel mondo il fiorire di centri di didattica e di ricerca dedicati alle *Scienze Umane* applicate alla medicina. I docenti di storia della medicina - incardinati nei ruoli universitari o con contratti di insegnamento - si riconoscono nelle peculiarità espresse dalla declaratoria del settore con una peculiarità scientifica che non può confondersi con altre, anche in relazione alla differenza degli strumenti e dei parametri valutativi per i prodotti della ricerca.

Valentina Gazzaniga

Editorial

The teaching of medical history in universities today

The teaching of the History of Medicine in Italian universities is included in the Scientific Sector Guidelines *Med02* (History of Medicine, Bioethics, Medical Pedagogy, Paleopathology, Scientific Museology) and is provided to students of various medical and surgical degree courses – the three-year degree and master's programs . At the crossroads with the historical and bioethical teachings, this area of study is not simply part of the student's cultural enrichment, due to the fact that the history of medicine today proves to be increasingly fundamental in the training of doctors as well as all healthcare professions. This subject has a central position – which cannot be easily transferred to other areas of study – and is defined among the necessary subjects in order to acquire greater capacity and expertise for reflection and epistemological critique, in line with current cultural developments and in respect of the specificities of research and teaching activities. Teachers and professors of medical history, throughout Italy, are currently working with a large teaching burden, and in many locations – through museums and libraries of historical interest with relevant historical and cultural heritage – they also guarantee the proper passing of memory, the past, and the protection of cultural heritage of medical-scientific interest at universities and other places and educational institutions. Their teaching and lessons have become a moment of connection with students, facilitating the understanding of the theoretical and epistemological system of medicine, as well as the common reasoning behind health professions and interrelations between various disciplines and areas of study. Fundamentally, the profound transformation and change incardinated to biomedical technologies have pushed to orientate the student also towards a scientific and medical thinking that is nourished by a comparison with the historical, epistemological, ethical and anthropological aspects. While the specific areas and aspects that define the different teaching environments are developed, this teaching has proved to be fundamental in order to stimulate the critical thinking skills necessary to guide professional choices, depending on the student's willingness and reasoning skills. The scenario in which physicians and other healthcare professions develop today demands the study of these pertinent themes, in order to create a foundation of the knowledge they need, under the label of "Human Sciences", alongside scientific and technical instruction and clinical training. The various health professions that today are structured around the expertise and knowhow of the doctors demand an open attitude towards an understanding of the history of doctrines and ideas, how they have changed in past, and how they are changing today. Moreover, even the current changes in teaching, marked by the transformation of "tables" in their later loss, is evidence of some of the main issues related to training in healthcare and the importance, in the formulation of an offer to the student of the various degrees, that has been given to the teaching of the *Medical Humanities*. This area of study defines the training of each person working in the medical profession, during the three-year university courses, master's degree courses and their specialization. Moreover, this importance has been increasingly recognized in Europe and internationally, as shown in Europe and around the world by the increase in teaching and research centres dedicated to the Human Sciences applied to medicine. Furthermore, professors of medical history – in university positions or with teaching contracts – understand the uniqueness expressed by this area of study – with a scientific singularity that cannot be confused with others – also in relation to the differences among the assessment tools and parameters for research work.

Valentina Gazzaniga

Medicina Historica 2018; Vol. 2, N. 1: 5-18

On the hellebore trail an anthropological research into madness

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Abstract. Beginning with myth, this article retraces the history of an antique psychiatric therapy, hellebore, present in medicine from Hippocratic times until well beyond the age of Enlightenment. Providing a background are aspects of the anthropological history of madness, relating to culture, not only medical, together with literary examples, which were reiterated from classic antiquity up to '900.

Key words: hellebore, madness

"You need a good dose of hellebore!" was, in ancient times the equivalent of our "You're absolutely crazy!" An example of this is seen in a brief dialogue between Menippus and Tantalus that Lucian, a Greek writer of the II century A.D. recounts in one of his *Dialogues of the Dead:*

> *Menippus:*
> There is no meaning in that, o Tantalus, there is a draught
> you need, though; some neat hellebore is what you want
> *Tantalus:*
> I would as life drink hellebore as anything, o Menippus, if
> I could but drink (1).

This is what was written about hellebore in a History of Medicine a few years ago:

> In ancient Greek and Roman times the term hellebore was designated as in fact still happens even today, to two different types of species, Veratrum and Helleborus. In ancient times one was defined as white hellebore (Veratrum album), the other as black hellebore (Helleborus niger) (Fig. 1). They were considered to be exceptionally efficient for eliminating harmful humors that infested the brain. They were therefore administered in the form of infusions, decoctions or the like to those suffering from melancholy, madness or epilepsy [...]
> The white hellebore provoked vomiting while the black one provoked strong diuresis and violent bowel motions. Hellebore therapy had already been advocated in *Hppocratic Corpus* and recommendations may be found in all the pharmacological and therapeutic works of Galen, [...]
> Hellebore remained a principle medication until the XVII century when it all but disappeared from use (2).

Both are accurately described in a work by Dioscorides, a Greek doctor and botanist who practised medicine in Rome even earlier that Galen, during the period of Emperor Nero.

De materia medica, a 5 volume work, written in Greek, is considered to be the first Pharmacological treatise that considerably influenced the history of medical treatment in the centuries to come and was repeatedly translated into a number of languages until the end of 1500.

Pietro Andrea Mattioli, a doctor and humanist from Siena, translated it in the mid 1500's first into Italian (in two editions, the first in five volumes, the second in six, in 1544 and 1548 respectively) and then

into Latin (1554) (3), having as reference the Latin translation of the French doctor and botanist Jean Ruel that had come out a few years earlier.

In this work, besides an extensive botanical description of both species with illustrations, it also defines the different habitats (the *Veratrum Album* prefers damp, marshy places in the mountains, while the *Helleborus niger* likes dry soil and has a much wider habitat ranging from the sea to the mountains) and its therapeutic properties.

The black hellebore is said to purge the stomach and aids in cases of epilepsy, melancholy and madness. Matteoli declared that he himself had verified its efficacy and the absence of side effects.

But what about hellebore today?

Obviously, there is a botany card, a clear placement in the databases of poisonous plants, indications that are, however, extremely limited as far as pharmacology is concerned.

Above all, it should be underlined that in the past (as can also be seen in the drawings above) the two species of *Helleborus* and *Veratrum* were often confused while they do in fact belong to two different genera, the first to the ranunculaceae and the second to the liliaceae.

From a botanical point of view the *Helleborus niger* is a plant which goes under a variety of names: white hellebore, black hellebore, Christmas rose, winter rose, Hippocrates' root and is usually sold as an ornamental plant.

The name white hellebore is due to the colour of its flowers that can also be pink or red. The name black hellebore, that is also its scientific name, comes from the colour of its rhizome, Christmas and winter rose for the period when it comes into flower, the name Hippocrates' root for its history and therapeutic use in the past.

It is a perennial herbaceous plant, an evergreen, with a preference for hilly habitats, in woods or pinewoods, favouring limestone soils.

In the list of poisonous plants it states that all parts of the plant are toxic due to helleborine and its derivatives contained in them (these are cardio-toxic glukosides, similar to digitalis) and ingestion even of only the seeds can prove to be fatal.

The medicinal properties of the plant, moreover no longer utilized because of its high toxicity even for doses close to therapeutic ones, concern purgative effects such as drastic, narcotic, emetic and cardiotonic drugs.

It is still used externally in the form of creams and as a counter-irritant for some skin diseases.

In the past and up until quite recently it was regularly quoted in manuals and prescriptions for therapies together with the 'Simples'. One example I found in a botanical dissertation of the early 700s (4), gives a description and prescriptions for its use (with dosages in various forms, expressed in drachm, scruples and grains, and the names of the prescribers) and here, too, the names of *Helleborus* and *Veratrum* are used synonymously.

The *Veratrum album*, belonging to the liliacee family and also known as false gentian was used in medicine in the past, for its analgesic, emetic and vesicatory properties (5).

Both the *Veratrum album* and *Helleborus* are still in use today for multiple purposes particularly in psychiatric and neurological diseases, in homeopathic medicine. However, due to the characteristics of this type of medicine, with its use of substances that are highly diluted and the theoretical assumptions having little in common with traditional medicine, especially with the Hippocrates-Galenic approach, they have a dif-

Figure 1. On the left *Veratrum album* – on the right *Helleborus Niger* by Pierandrea Mattioli – *Commentarii in libros sex Pedacii Dioscoridis Anazarbei De Materia Medica,* Venetiis, apud Valgrisium, 1554

ferent significance, which is totally incompatible and incomparable with what was previously indicated for the medicinal properties of these plants.

The stories of hellebore during the course of the centuries must obviously begin with myth and the myth is that of the young daughters of Proetus, King of Tiryns, their madness and Melampus who cured them.

The myth is found in Hesiod (VIII-VII B.C.) (6) and Bacchylides (VI-V B.C.), and more recently in Apollodorus or to be more precise in that which is known as Pseudo-Apollodorus (In *Biblioteca* from the II century A.D. falsely attributed to Apollodorus, an Athenian historian and grammarian of the II century B.C. in which there are numerous references to Melampus, Proetus and the Argos women's madness cured by him).

However this myth reoccurs in many other texts and is also mentioned by Ovid in Metamorphoses, speaking about Melampus as the son of Amythaon. ("Amythaon's son, when he had saved the demented daughters of Proetus from madness, by herbs and incantations ...) (7).

An indirect reference is also made by Theophrastus, the Greek philosopher and botanist of the IV century B.C. who even indicates hellebore by the name of melampodion, "from the name of someone who first found it and cut it" (8) and in Pliny that with the some nome indicates it in his monumental *Historia naturalis:*

> The repute of Melampus, as being highly skilled in the arts of divination, is universally known. This personage has given a name to one species of hellebore, known as the "Melampodion." Some persons, however, attribute the discovery of this plant to a shepherd of that name, who remarked that his she-goats were violently purged after browsing upon it, and afterwards cured the daughters of Proetus of madness, by, giving them the milk of the goats (9).

This is the myth according to Bacchylides:

> For while still virgins, they entered the sanctuary of the purple-belted goddess, and said that their father far surpassed in wealth the golden-haired consort of holy, widely powerful Zeus.
> In anger at them, she put a twisted thought into their minds, and they fled to the wooded mountain with terrible screams, leaving behind the city of Tiryns and its god-built streets.
> [...]
> For thirteen whole months his daughters roamed wildly through the shadowy forests and fled through sheep-nurturing Arcadia (10).

According to all sources, it concerns, a furious madness, that Apollodorus, perhaps the most moderate in terminology, described as "a total lack of decorum", "absolutely shameless".

The conclusion, however, is always successful but with varying solutions.

The healer is almost always Melampus, the diviner-healer, who sometimes uses hellebore, which goes under the name of melampodion, on other occasions it is symbolic and suggestive rituals, and sometimes both.

Occasionally however it is Artimedes who heals the Pretid after expiatory rites and sacrifices and in one particular case Asclepius.
Bacchyllides writes further:

> And the huntress, whose father is the highest, god heard him praying.
> She persuaded Hera, and stopped the godless mania of the bud-garlanded girls (11).

A short but complete biography of the Melampus is the subject of a recent publication by Francesca Marzari (12, 13).

Her conclusions begin like this:

> At a distance of almost three millennia from his debut in Homeric poems, the legendary soothsayer Melampus continues to exercise an indisputable fascination, so much so that some medical historians see him as one of the founding fathers of psychiatry and pharmacotherapy [...]

Hellebore, already found in the pharmaceutical bag of Hippocrates, the father of medicine, can therefore be considered the very first of psychiatric drugs.

In fact it was with Hippocrates that medicine as a secular profession was first born, finally rejecting the previous management by priests and the temples.

And Hippocrates was the first, despite the limitations of that era, to define madness and a way of curing it from a scientific approach.

References appear in *Hippocratic Corpus* and particularly in the *On the Sacred Disease* and *Epistles,* in correspondence between Hippocrates and Democritus.

Madness, in Hippocrates, has an etiological explanation when concerned with his humoral theory and this is what is said:

The texts are the following:

From *On the Sacred Disease,* Ch. 14:

> Men ought to know that from nothing else but the brain come joys, delight, laughter and sports, and sorrows, grief, despondency, and lamentations. And by this in an especial manner we acquire wisdom and knowledge, and see and hear, and know what are foul and what are fair, what are bad and what are good, what are sweet and what unsavoury;
> [...] And by the same organ we become mad and delirious, and fears and terrors assail us, some by night, and some by day, and dreams and untimely wanderings, and cares that are not suitable, and ignorance of present circumstances, desuetude, and unskillfulness. And these things we endure from the brain, when it is not healthy, but is more hot, more cold, more moist, or more dry than natural, or when it suffers any other pretenatural and unusual affection [...] (14).

and from Chap. 15:

> As long as the brain is at rest, the man enjoys his reason, but the depravement of the brain arises from phlegm and bile, either of which you may recognize in this manner: Those who are made from phlegm are quiet, and do not cry out nor make a noise; but those from bile are vociferous, malignant, and will not be quiet, but are always doing something improper. If the madness be constant, these are the causes thereof. But if terrors and fears assail, they are connected with derangement of the brain, and derangement is owing to its being heated. And it is heated by bile when it is determined to the brain along the blood vessels running from the trunk; and fear is present until it returns again to the veins and trunk, when it ceases (15).

The *Epistles*, or at least those referred to here, like most of the *Corpus*, have authors other than Hippocrates and were written in a later period. They are not, therefore, a real correspondence between Hippocrates and Democritus, but rather an amusing elaboration of an anecdote that was being told and which had become a pretext for speaking about a type of remedy that was fashionable at that time.

The anecdote recounts that the inhabitants of Abdera, an ancient city in Tracia, land of Democritus, were worried about the mental health of the philosopher, who mocked and criticized everyone always with a smile on his lips, so they invited Hippocrates to come and have a look at him and treat him, because according to them someone who behaved like that must be mad.

And madness was treated with hellebore.

The letters as such became the occasion to speak about this treatment and for Hippocrates to say that hellebore should be given not so much to Democritus but rather to the inhabitants of Abdera for their superficial judgements.

Here are two short excerpts from two of the Epistles.

Letter from Hippocrates to Democritus:

> The letter you send me criticized the idea of using hellebore medicinally...When I met you, I realized, by Zeus, that this wasn't a case of losing one's mind, but of intense mindfulness. So I eagerly praised your nature and judged you the best interpreter of Nature and the cosmos; I blamed those who had brought me there and labelled them madmen. They were the ones who needed the medicine, not you. ... the best thing would be for you to write to me often and share with me any books you've written. I've enclosed my treatise on hellebore for you to read. [...] (16).

Hippocrates' letter to Democritus about the uses of hellebore

> Persons, who are not easily purged upward by the hellebores, should have their bodies moistened by

> plenty of food and rest before taking the draught. When one takes the draught of hellebore, one should be made to move more about, and indulge less in sleep and repose. Sailing on the sea shows that motion disorders the body. When you wish the hellebore to act more, move the body. Hellebore is dangerous to persons whose flesh is sound, for it induces convulsion. The spasm that follows the draught is deadly. In a super purgation should spasm or choking occur, that is a bad sign... It is necessary to purge with hellebore one who has a fluxion that descends from the head; it should not be given in cases of empyema; do not evacuate pale or raucous people, those with an affected spleen, anaemic, those with laboured breathing, or dry cough, [...] (17).

The description of hellebore and how it works has previously been mentioned.

However, this treatment was considered to have a specific therapeutic action on melancholy, mental disorders in general, epilepsy and other pathologies of the brain.

The purgatives were then justified because they integrated well with the Hippocratic theory of 'humors' or bodily fluids, that considered illnesses, not just the psychiatric and neurological ones, to be a consequence of corrupt humors or their imbalance.

The purge, eliminating corrupt humors and facilitating a rebalancing of healthy ones would thereby promote healing.

This hypothesis of disease intended as a phenomena, which involved the entire organism with aetiology being related to the humoral theory survived up until the time of Morgagni (18), the pathologist who altered the Hippocratic concept of illness (no longer a phenomena that concerned the entire organism but the consequence of a lesion that had as characteristic elements the seat and nature of the lesion itself), in the second half of '700.

That purging could be useful in many or almost all diseases is a concept that has remained in popular culture, and in many cases even in medicine almost to the present day.

Starobinski, cited by Huldrych M. Koelbing, in this *History of Medical Therapy* (19) speaking about hellebore therapy, considers it to have the ideal requisites to be included in that which he calls "fairy tale pharmacology".

It is surely so, (even if the overall judgement, although based on empirical assumptions, cannot be so cutting), for the importance of the myth in attributing to this plant miraculous effects, that have gone, as Koelbing says (20), well beyond the clinical indications, so much so as to be used by intellectuals, "from ancient times until the beginnings of the modern age" as a type of drug "to sharpen their wits."

Moreover, many centuries earlier, Petronio Arbitro, in one of his *Satires* had already noted: and Chrysippus three times with hellebore did purge himself in order to succeed in his discoveries (21).

On the subject of hellebore and madness, it is also worth mentioning a particular nosography category indicated in *Corpus Hippocraticum* in the *De virginum morbo* libellous that talks about "the madness of the virgins".

This category does not exist in modern nosography, but it could be of some significance, in a historic-anthropological sphere, as an expression of the culture and beliefs of that period, but which has also led to certain idioms, proverbs and beliefs that are still around even today.

This topic has also been dealt with in a recent publication by Francesca Marzari (22), previously mentioned for her book on Melampus.

In the Hippocratic text the condition of virginity is said to be dangerous during the period from menarche to matrimony.

The reasoning behind this concept is again the humoral theory interpreted with a great deal of fantasy.

With the occurrence of the first menstruation virginity represents an obstacle, albeit partial, to the normal outflow of corrupted blood and that brings about negative effects and a humoral unbalance, creating a condition of extreme psychological fragility and vulnerability while also causing an alteration of sexual instincts.

The therapy indicated for a lasting resolution for this condition of fragility was in fact marriage.

An example as to what point this psychological disturbance and alteration of instincts can reach would be the story of the Proetides as previously mentioned.

No one nowadays would dream of sustaining this type of hypothesis. But quite often, even today, both as friendly advice and the assertions of some doctors, a girl who has psychological problems or psychosomatic disturbances is often told, "Get married! You'll see everything will work out for the best"

A last note on hellebore in Hippocratic Greece, perhaps in the past, but certainly in the centuries to come, concerns health tourism for this therapy, similar nowadays to a stay in a spa resort for medical care.

The city where he went to cure madness was Antikyra in the gulf of Corinth was well known because of the excellent hellebore that grew there naturally.

Antikyra also became part of proverbial sayings.

Telling a person "Ἀντικίρρας σε δεῖ" (*Antikìrras se dèi*) that is to say "You should go to Anitkyra!" had the same meaning, as "You need a good dose of hellebore!"

Hippocrates' doctrine and especially the humoral theory, continued to be the main reference point for medicine throughout ancient times, both in Greek and Alexandrian and Roman areas, due to the fact that many doctors working in Rome were in fact Greek.

Dioscorides (I century A.D.) has previously been cited for his *De Materia Medica* in which hellebore had been adequately presented and discussed.

Many others could also be remembered.

Some of whom were extremely good psychiatrists.

However, I will limit myself to Aretaeus of Cappadocia (I century A.D.) and the great Galen (II century A.D.) who, as far as psychiatry is concerned, were renowned for their important contributions to the nosography definition of madness and were the forerunners of psychosocial therapies associated with pharmacological ones, also acknowledged by Pinel and Esquirol, french psychiatrists of the early nineteenth century, considered to be the fathers, with their "moral therapy" of an antipositivist psychiatry.

Galen is one of the most famous physicians of Ancient times and, together with Hippocrates, greatly influenced medical thinking in the centuries to come.

He had a Hippocratic approach that was in tune with Plato's philosophical doctrine of the soul and with Aristotle's naturalism, which was in his opinion of Alessandrian derivation.

In his pharmacological works, when speaking about madness, hellebore is omnipresent and recommended, however with the advice that it should be used sparingly and carefully due to the negative effects that excessive doses could cause (23).

Medicine in Rome, after Galen, continued to maintain the format of the Maestri, expressed by many illustrious figures such as Caelius Aurelianus, in the V century A.D, an excellent psychiatrist not only as a clinician but also for his commitment to improving assistance for the insane.

With the fall of the Western Roman Empire however there began a decadence that led fairly rapidly to the destruction of that medical and philosophical culture that had per se characterized the levels of that civilisation to which there would be a somewhat laborious return only many centuries later.

The concepts of Hippocrates and Galen were however maintained in the East and later in Arab medicine in the centuries around one thousand, from which illustrious figures are remembered who were at the same time both physicians and philosophers, some of whom, such as Avicenna (980-1037) and Averroes (1126-1198) found a place, together with some of those Ancient physicians mentioned previously, in Dante's limbo:

> I saw the worthy categorizer of herbs,
> Dioscorides, I mean; and I saw Orpheus,
> Tully, Linus, Seneca the moralist,
> Euclid the geometer, Ptolemy,
> Hippocrates, Galen, Avicenna,
> And Averroes, who wrote the Commentary (24).

In Luciano Sterpellone and Mahomoud Salem Elsheikh (25) we can find some of these representatives of Arab medicine who had also written about psychiatry, among these Rhazes (865-925) that in his *Continens Liber* (the Virtuous Life) actually dedicated four chapters to illnesses that can afflict the mind and body and Avincenna in his *Canon of Medicine* maintains the theories of Hippocrates and Galen of black bile being the cause of melancholy. Rhazes should also be remembered because he is attributed to introducing the term "psychotherapy" into medicine.

In fact, hellebore was present in the pharmaceutical handbook of both of them, even though Rhazes recognised the potential effectiveness of hellebore

when treating melancholy, he gives preference to the "Armenian stone because it is less toxic" (26).

In the West, the Middle Ages particularly the High Medieval Period, was, as far as the treatment of the insane and contemplations on madness were concerned, a time of great involution. Mental disorders were often considered as divine punishment for a wrongdoing and patients as being possessed by demons and consequently treated as such.

An initial recovery of the conceptions of Hippocrates and Galen only came about with the birth of the first Universities and with them the "De Materia Medica" of Dioscorides and Galen.

Hellebore, however, was always present in medieval prescriptions.

In medieval pharmacopoeia in which the Simples played an important role, other purges were also to be found, which had even been used empirically in indications previous to hellebore.

Furthermore, in the treatment of madness, bloodletting also became more and more frequent, a therapy that had been used since the earliest of times usually, however, for other indications.

Moving on to the next century, the treatment of madness in the hospitals for the insane of '500 and also its classification was dealt with by Lisa Roscioni in a recent publication entitled *Il governo della follia. Ospedali medici e pazzi nell'età moderna* (The governement of madness. Hospitales, doctors and madness in the modern age).

Moreover, it recounts the experience of Salustrio Salviani, a Roman physician, who worked for a decade during the second half of '500, at the Hospital S. Maria della Pietà, and published *De melancholia et mania morbo et eius curattone*.

Taking advantage of these and other evidence found in publications of that era, provides us with information on the purges, and their supposed purpose (basically still that of Galen and Hippocrates), on the extent of their application and also on blood letting and on the comparison that was already being made between these two different types of treatment.

> [...] original are the observations of Salviani concerning the practice of blood letting, widely used since ancient times not only in the treatment of madness. He strongly recommends phlebotomy in the cases of mania and melancholy disagreeing with an extremely common practice of the sixteenth century.
> [...]Purges represent another classic therapy of modern times: they were applied to practically all types of complaints. The French physician Pierre Pigrey, in his famous surgical manual, thus describes the purge and its effects as opposed to blood letting: the purge is an evacuation of humors that due to its corruption or poor quality offends the body [...]. The purge is different from the mission of the blood because it separates, and arrests the corrupted humors [...] it cleans and evacuates them and leaves what is necessary to nature, but phlebotomy on the contrary evacuates all humors equally both the good and the bad. [...] Three are the medications for purging: "strong" such as hellebore and mercury, "weak" such as manna or prunes, "moderate" such as rhubarb or senna. [...] (27).
>
> (Salviani) In the case of melancholy advise, above all, the syrup of hellebore "medically of high repute for the infirmity of melancholy and particularly in the case of madness" [...] However in the case of mania, Salviani suggests, more that a purge, the administration of a syrup made from poppy, in order to placate the maniac and humidify and warm the damaged parts. [...] Lastly in the case of particularly severe and persistent melancholy and mania Salviani advises a syrup of chicory or apple, decoctions of lettuce, melissa and cuscuta. One of these, the syrup of apple, together with that of hellebore is one of the "classics" in the pharmacological treatment of madness (28).

In the centuries to come there was neither any change in the conditions for the insane nor in the treatment for madness.

It was only in the age of the Enlightenment that it again found its place in medicine and its classification as a somatic disease.

As previously mentioned, the turning point was determined by the work of Morgagni, who had radi-

cally changed the concept of disease, by anchoring it to pathological anatomy.

Medicine as a whole assumed a precise naturalistic and positivistic approach and this also involved psychiatry with a neurobiological orientation that maintained its absolute prevalence until the mid '900.

In that period, however, there were also the believers in psychogenesis who defended the hypothesis of an aetiology of psychic disorders that was not simply organic.

It was not an opinion of the majority, but due to their initiative it greatly contributed to an improvement of psychiatric patients in the institutions.

Among these were the french psychiatrists Philippe Pinel and Jean Etienne Esquirol. With their 'moral treatment' they were only the forerunners to a way of seeing and treating psychic disorders that was developed and established very much later.

It was in fact thanks to Psychoanalysis, Phenomenology and the cultural movement born in the mid '900 that the conditions were created for that cultural, healthcare and therapeutic revolution in the decades to come.

As the approach was certainly not conducive to medical treatments, I started from what they had written in order to learn whether the hellebore therapy at the beginning of the '800 was a treatment practised at that time and to find out what their judgement of it was.

This is what Pinel says about hellebore:

> It was a point of doctrina among the ancients the use of hellebore in maniacal diseases, the choice, preparation and administration of that vegetable; the preliminary remedies and precautions adopted to promote its action and to prevent its pernicious effects, formed among the ancients a regular body of doctrine. Experience proved that this drastic sometimes produced violent hypercatharsis, obstinate vomiting, convulsions, inflammation of the intestines and even death. The reader is referred for a detailed account of this subject to the articles Elleboro Elleborismo, in the Encyclopedie Methodique. Whether we consider its empirical administration or the unfounded theories and superstitious fancies which in some instances sanctioned its employment, the disuse into which this remedy is fallen, ought to cause little regret. The history and distinctions of the disease were neglected through the excessive and infatuated attention to the remedy. The science of medicine, enlightened by the acquisitions of chemistry and botany, is now happy in the possession and choice of purgatives and emetics, the effects of which are more determined, and not succeeded by any dangerous consequences; however medication must always be regarded as an accessory of which a much less indiscreet use is made, due to the fact that we have more extensive views and safer resources together with other moral and physical means (29).

In Pinel's opinion, therefore, hellebore should have been banned, but purgatives and emetics were therapies that could still be practiced, to be included, however, in a much more articulated and important context of therapy.

This is what Esquirol wrote:

> The ancients only knew hellebore. The moderns made lavish use of bloodletting, purgatives and showers. However Aretaeus of Cappadocia, Celsus and Caelius Aurelianus drafted the first outlines of the moral treatment, while Erasistratus and Galen provided a successful implementation. Later pharmaceutical methods were abandoned for empiricism; moral treatment was also completely abandoned (30).

> As the causes of madness are general and individual, physical and moral so also the remedies will be general or individual, physical and moral and it is often necessary to vary, combine and modify their means of employment; for there is no specific treatment for insanity (31).

> Evacuates have been celebrated from very ancient times and for a long period formed the basis of treatment in insanity, particularly melancholy. However they are not always suitable [...] Their choice is by no means indifferent; sometimes the drastics are preferred, sometimes the wormers, sometimes the sweets; [...] Hellebore, gambage,

> bryony, aloes, submirate of mercury and especially the tartrate of antimony and potassa together with purgative mineral waters are used at will (32).

For Esquirol, who was Pinel's pupil, purges played only an extremely limited and marginal role in the treatment of madness, but hellebore still had a place in his pharmacological baggage.

And from Hippocrates more than 2200 had passed!

However, besides the official medical field and the empirical ones as a medication, hellebore was also to be found in literature as co-protagonist in short anecdotes or even sad and dramatic documentations, that proposed, albeit with different interpretations, its therapeutic effects or also, as a keyword, common sayings and proverbial expressions, which had become symbolic aspects of a culture in which the terms of madness and hellebore had also taken on ironic and paradoxical meanings. It is exactly in these cases that proverbial sayings express as, Manzoni would say, the "wisdom of mankind", if we intend this as scientific knowledge.

Wisdom is also an expression of a culture derived from convictions that are handed down and then sooner or later adapted with the evolution of knowledge. Wisdom is also however and perhaps more so, the defused and ironic evaluations and behaviours even for things that are in reality much more serious.

The presence of hellebore in not just medical literature is in any case a presence that has persisted here too for well over two thousand years.

Here are just a few examples of this:

I'll go back to Lucian and his *Dialogues of the Dead* in which I already mentioned the one between Menippus and Tantalus and to be exact with that between Diogenes and Alexander.

It is a dialogue which for our purposes allows us some psychopathological considerations; it is also, however, above all, a desecrating dialogue between the "Great" Alexander and Aristotle, "the maestro of those who know", as Dante says, that in literature have had and have, in general, a very different type of treatment.

From a psychopathological point of view, Alexander, teased by Diogenes, expresses delusions of immortality, but more by his behaviour that by his expressions, he also manifests a state of depression.

And it is exactly for the latter that Diogenes considers hellebore, however in Hades there isn't any, so he falls back on hydrotherapy with water from the Lethe, which in Greek mythology is the river of oblivion.

Diogenes
Dear me, Alexander, *you* dead like the rest of us?
Alexander
As you see, sir; is there anything extraordinary in a mortal's dying?
*Diog*enes
So Ammon lied when he said you were his son; you were Philip's after all.
Alexander
Apparently; if I had been Ammon's, I should not have died.
[…]
Alexander
I have lain in Babylon a full month to-day; and Ptolemy of the Guards is pledged, as soon as he can get a moment's respite from present disturbances, to take and bury me in Egypt, there to be reckoned
Diogenes
I have some reason to laugh, you see; still nursing vain hopes of developing into an Osiris or Anubis! Pray, your Godhead, put these expectations from you; none may re-ascend who has once sailed the lake and penetrated our entrance; Aeacus is watchful, and Cerberus an awkward customer. But there is one thing I wish you would tell me: how do you like thinking over all the earthly bliss you left to come here your guards and armour-bearers and lieutenant-governors, your heaps of gold and adoring peoples, Babylon and Bactria, your huge elephants, your honour and glory, those conspicuous drives with white-cinctured locks and clasped purple cloak? does the thought of them *hurt*? What, crying? silly fellow! did not your wise Aristotle include in his instructions any hint of the insecurity of fortune's favours?
Alexander
Wise? call him the craftiest of all flatterers. Allow me to know a little more than other people about Aristotle; his requests and his letters came to *my* address; *I* know how he profited by my passion

for culture; how he would toady and compliment me, to be sure! now it was my beauty--that too is included under The Good; now it was my deeds and my money; for money too he called a Good--he meant that he was not going to be ashamed of taking it. Ah, Diogenes, an impostor; and a past master at it too. For me, the result of his wisdom is that I am distressed for the things you catalogued just now, as if I had lost in them the chief Goods.

Diogenes

Wouldst know thy course? I will prescribe for your distress. Our flora, unfortunately, does not include hellebore; but you take plenty of Lethe-water--good, deep, repeated draughts; that will relieve your distress over the Aristotelian Goods. Quick; here are Clitus, Callis-thenes, and a lot of others making for you; they mean to tear you in pieces and pay you out. Here, go the opposite way; and remember, repeated draughts (33).

A much more complex anecdote in which hellebore plays a leading role is that told by Horace in one of his Epistles (which in fact chronologically precedes the story of Lucian).

Someone from Argos, by the will of his relatives, was treated with hellebore for his madness, but although the result was in fact positive he was by no means happy.

Many centuries later, Erasmus of Rotterdam in his *Eulogies of madness* commented on the affair.

The madness this person was affected by we could define as a chronic delirium of fantasy with a strong hallucinatory component, which permitted him pleasant evasions without creating any significant repercussions on his personal and social behaviour.

Horace:

Once at Argos there was a man of some rank, who used to fancy that he was listening to wonderful tragic actors, while he sat happy and applauded in the empty theatre – a man who would correctly perform all other duties of life, a most worthy neighbour, an amiable host, kind to his wife, one that could excuse his slaves, and not get frantic if the seal of a flask were broken, one that could avoid a precipice or an open well. This man was cured by his kinsmen's help and care, but when with strong hellebore he had driven out the malady and its bile and had come to himself again, he cried:

"Egad! You have killed me, my friends, not saved me; for thus you have robbed me of a pleasure and taken away perforce the dearest illusion of my heart" (34).

And this is Erasmus's comment:

By which you see he liked it so well that he lost it against his will. And trust me, I think they were the madder of the two, and had the greater need of hellebore, that should offer to look upon so pleasant a madness as an evil to be removed by physic (35).

The narrative of hellebore in literature, a few years after the publication of Erasmus's *Eulogy,* which is 1511, encounters another significant event, this time real and extremely sad: the madness of a great poet, Torquato Tasso.

Tasso's madness is an important aspect of his biography that scarred him for the rest of his life.

It started to become apparent, shortly after he reached the age of thirty, around 1575, with behavioural problems that gradually got worse over the following years.

In 1579, he was admitted to the S. Anna hospital in Ferrara, after, in the grip of persecution mania, he had attempted to kill a servant who he believed had been spying on him, under the orders of Duke Alfonso D'Este, at whose court he resided.

Montaigne, in a short note in the XII chapter of the 2nd volume of *Essais,* describes his visit to the invalid that took place in 1580, when he found Tasso chained and locked up in a cell for "*furiosi*".

I had more irritation than compassion at seeing him at Ferrara in so pitiful a state, surviving, not recognising himself or his works that, without his knowledge but before his very eyes, went to press incorrect and inform (36).

According to present day nosography classification, Tasso's insanity could be defined as a schizoaffec-

tive psychosis, in which his mood disorder, characterised by severe alternating episodes of depression and mania, was overlaid by animated delirious, persecutory activity and probably, above all in the maniacal phases, also megalomania.

Tasso spoke often of his madness in many of his *Letters* (37), written to relatives and various personalities, even demonstrating a certain self-awareness of his illness, moreover for the most part only partial. The letter in which he speaks about hellebore was written in 1589, after his release from the S. Anna hospital and was addressed to the physician Giovanni Antonio Pisano.

In it, after expressing his distrust in the doctors who were treating him he says that in any case it is not possible to do without medicine and with a reference to the correspondence between Hippocrates and Democritus, which I have previously mentioned, suggests a similarity between his situation and that of the "crazy philosopher" who was not really mad even by Hippocrates' judgment, saying that he, too, wanted to be treated with hellebore.

This is a passage from the letter.

> [...] but I must accept the opinion of the doctors even if what they said was to deceive me rather than cure me. But should my care be not hopeless, as could be argued according to the many signs given by Hippocrates, I would not want to be abandoned of their help.
> The barbarians, said Hippocrates, "*nulla utebantur medicina*" but to me who is almost nourished in the study and arts of the Greeks, this injustice should not be done.
> [...] Therefore your lordship I commend myself [...] because for you it is easier to write rather than visit in this heat, having began the purge on the advice of these doctors. But as some are of the opinion that the distillation of the head is the main cause of the infirmity, I cannot pass over in silence what Hippocrates writes to Democritus: "*Veratro elleborato eos, quibus de capite distillate rheuma*". And though this has been said with some warnings and some conditions, I would nevertheless like to be purged with the black hellebore, yes because this ancient medicine both for the heroes and the philosophers who likewise were medicated (38).

It would, therefore, appear that Tasso had begun treatment with a purgative that wasn't hellebore that in that period was still being used for psychiatric disorders but was no longer the treatment of choice, that he didn't trust the doctors who were taking care of him and for this reason he had asked for a sort of supervision or control by Pisano and that treatment with hellebore would not displease him, because besides being a famous remedy, it permitted him to be included in a host of illustrious persons who had taken it or been recommended it, such as Democritus, who had been unjustly derided and considered to be mad.

This interpretation can also be substantiated by another letter, that he had written to Scipione Gonzaga two years before, describing his condition.

> I am not very healthy, and so melancholic that I am reputed to be crazy by others and myself, when not managing to conceal many boring thoughts and anxieties of a sick and perturbed mind, I break out into very long soliloquies, which if some people (and they could be many) have heard, to many are my plans known, and it is that what I hope and what I most desire (39).

In the centuries to come, hellebore, despite being used much less frequently as a medication for insanity, in any case remained as a term connected to it, both as a figure of speech, and for learned quotations.

One example of its widespread diffusion is its presence, used ironically, in a well-known work by the English author and literary critic Samuel Johnson, *The Life of Milton*, published in the late '700 as part of one of his most important works, *The Life of the Most Eminent English Poets.*

Johnson recounts that Milton was only inspired to write poetry in the period from the autumn to spring equinox and what he wrote during the other seasons was never to his liking and it ended up being thrown away.

Johnson's words were reiterated a few decades later by G.B. Brocchi in a book entitled *Lettere sopra la Divina Commedia di Dante.* Brocchi wrote or pretend-

ed to write to an English Lady, who speaking about the changing poetic inspiration of various poets and referring to the *Life of Milton* says:

Johnson in the critical and geographical Preface of this poet's works, mocks the claimed influence that the seasons have on the soul and, with typical English frankness, sends anyone who believes it to purge his brain with a good dose of hellebore (40).

A final example, and we are by now in the '900, is D'Annunzio. Hellebore appears in *La figlia di Iorio* and its meaning must be seen as a cultural expression within a tragedy, that takes place in a rustic and superstitious environment, where ancient rituals are repeated but the drama has a primitive feel, where there are still mega-sorcerers, Iorio, women suspected of witchcraft, his daughter Mila and the old herbalists.

The following is a short passage from the 2nd Act, where there are the protagonists, Aligi, the male lead, Mila his lover and as a background character, Anna Onna who is, in fact, the 'old woman of the herbs':

Aligi
Yea, verily, you have partaken of honey, wild honey
That your mind is thus troubled! And you would go whither?
Mila
Pass on thither where all roads are leading
Aligi
Ah! Will you come then with me? O, come ye with me!
Though full long the journey, you, also Mila,
Will I place on the mule's back and travel.
Cherishing hope toward Rome the eternal!
Mila
Needs be that I go the opposite way.
With steps hurried, bereft of all hoping.
Aligi
Anna Onna! Up, arouse you! Go and find me
Grains of black hellebore, hellebore ebon
To give back to this woman her senses.

Born out of curiosity and destined to be a short research on a forgotten psychiatric therapy, not for a reading of a psychiatric text but for the reminiscence of a myth from classical antiquity, this work has, unintentionally, finished up being a journey into what has been the longest psychiatric therapy practised of all time, that has given an insight, if only as a background, of aspects in the anthropological history of madness and also look into topics that had been removed from psychiatry because they concerned things that were not well liked (the treatment with hellebore was after all only "a purgative") or in any case, quite rightly, were no longer of interest.

The conclusions to this, however, can only be questions to which there is no easy answer.

How come a treatment so far removed from the criteria of present day therapies could continue to be practised, albeit with a gradual modification of some aspects of its specifications, for almost or perhaps even more that 2500 years?

Were the persons who practised it healed or did they at least have some sort of benefits?

If it was maintained, as an empirical practice for so long the answer would appear to be the affirmative.

What then, is the reason?

I have happened to say, when speaking about medicine in general, that if we look at medical treatments during the last centuries, but often even of those of a few decades ago, that we were taught at University, we can only conclude that all too often patients got better *in spite of the treatment* and that, if this were not so, medicine would be long dead and could in no way have survived (41).

The reasons are manifold.

One of these is that often in treatment *the therapy is the doctor,* more so than the drugs, the doctor that in his relationship with the patient puts himself at stake, in such a way that it helps the patient and nature do their bit. But perhaps, indeed certainly, this is only part of the answer.

Perhaps one non-psychological reason, in the hellebore therapy can also be hypothesized.

In medical therapies, even in those in official medicine, all too often the starting point is a casual observation, then there is the empiric application and only later follows a scientific explanation.

So it was with penicillin, born out of a culture of moldy germs, from which Alexander Fleming was able to grasp its unimaginable significance.

The same happened in psychiatry, for the shock therapies, from Sakel's insulin therapy to Cerlettis's electroshock and the first psycho-pharmaceutical

drugs, and already in the fifties of the last century, with chlorpromazine and Lithium salts, which are still on the market even today.

Basically hellebore therapy, too, considered both drastic and dangerous, was, therefore, a type of shock therapy and could, in my opinion, be likened to insulin comas.

One reason, in the lack of any neurobiological explanation, had been given by the psychoanalysts, with the hypothesis that improvement and healing mechanisms could have been traced back to the experiences of regression and care that this type of therapy involved for the patient.

I have tried to give a neurobiological explanation based on present day hypotheses of neuroscience and brain function, for some of the shock therapies including insulin therapy, which hasn't been used now for many years, but had in its time found numerous supporters.

If the brain is an organ whose job is that of consenting a relationship with reality and ourselves, intended as a psychophysical unit, and based on predetermined programmes or self-defined ones, shock therapies or at least some of them, could provide, the same as can be done in many electronic devices, a *resetting*, that is a cancelling of dysfunctional programmes and a refreshing of previous programming.

And madness, with this hypothesis, would only be a dysfunction of some of the congenital or acquired programmes that control the brain functioning (42).

These are discussions and assumptions on which book upon book could be written, without coming to any definitive conclusions and besides I don't know up to what point my neurobiological hypothesis could also pertain to hellebore therapy.

So?

Above all when taking into consideration theories, convictions and also behaviour referring to the past, with great humility, considering the certainties of contemporary medicine, it is worth recalling the words of Karl Popper, a well-known Austrian epistemologist and philosopher of science with his *critical rationalism*: that various sciences all have their own specific characteristics defined epistemically, but are influenced and evolved together and therefore the basic theories and conclusions that are reached are never absolute and all are provisional and fallible and therefore cannot arrive at definitive judgements when they concern previous hypothesis and theories that appear to be completely out-dated.

And I consider it therefore opportune to remember as I have already done on other occasions, what Adalberto Pazzini, the medical historian, wrote, many years ago, on the certainties of medical knowledge:

> If today our interpretive ability provides a certainty of knowledge that seems to us greater than that of our predecessors, those who did not possess the possibilities of today's research were perfectly convinced, just like us today, of the truth and a correct interpretation of the facts. Astral pathology, demonic possession daily considered to be present, illnesses deriving from spells and sorcery, were no less true for yesterday's physician than today's microbial pathology, organ replacement, hormone imbalance, the profound imbalance of the composition of the blood. Ultimately, man always finds himself, albeit in a relative manner, in the same position when faced with scientific knowledge. Inasmuch as he always believes he knows what in fact he can never possess absolutely (43).

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Medicina Historica 2018; Vol. 2, N. 1: 19-26

Original article: history of medicine

When early modern Europe caught the flu. A scientific account of pandemic influenza in sixteenth century Sicily

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Abstract. The year 1510 marked the first recognition of pandemic influenza. The disease arrived in Sicily along trade routes from Africa and spread along the Mediterranean coasts. When a new epidemic swept over Europe in 1557, afflicting Sicily, the physician Giovan Filippo Ingrassia pursued a new approach to pandemic control. Since an influenza pandemic was a public health emergency, he conceived pandemic planning as a collaborative process between healthcare officials and the Government. He also highlighted the importance of strengthening influenza surveillance as a means for the early detection of an emerging pandemic. While the Sicilian Government had to provide for the community in terms of prevention, treatment was a physicians' responsibility. On September 18th, 1558, Ingrassia held a public lecture introducing an innovative position as regards epidemiology and public medicine: territorial control was the answer to the chaos caused by epidemics.

Key words: history of influenza, epidemics, medical renaissance, sicilian medicine, Giovan Filippo Ingrassia

Introduction

Five centuries of documented influenza

Historians have identified a number of epidemic diseases that afflicted sixteenth century Europe, most notably influenza. Besides literally meaning 'influence', from medieval Latin influentia, the Italian word has also meant *epidemic* since at least 1504. In the mid-eighteenth century it was imported into English as the name for a respiratory infection with a wide range of symptoms. The medical word derives from the Latin locution *ab occulta coeli influential.*

In the late medieval age, the word appeared in Pietro Buoninsegni's description of the epidemics in the years 1357-58: «fu in ditto mese (August 1357) grande influenza di lunghe e mortali infermità in Firenze e nel contado, e morirono molti e buoni cittadini […] Cominciò una influenza di freddo che quasi ogni persona della città e distretto e dintorno s'infreddarono e molti ne morirono» (1, 2).

Although it seems impossible to be certain when the first influenza pandemic occurred, the year 1510 marked the first recognition of pandemic influenza (3). There are a few contemporary chronicles of this event. One written by Tommasino de' Bianchi (4, 5) represents an impressive first-hand account of the disease. It is helpful in the reconstruction of the history of influenza in 16th century Europe as well as graphically describing the dreadful symptoms, suffering, and pain: «Item […] in questo dì 13 lujo in sabato […] non ge reman de polastri in piaza, tuti o la mazor parte son comprati per amalati che son in Modena de una malatia che dura 5 dì con una gran febra, e doglia de testa, e poi se levano e non pare che siano quelli, ma ge reman una tosse teribile che ge dura forse 8 dì et poi se vano liberande a pocho a pocho e de le 10 caxade le 8 ge n'è de amalati et in tal taxe son tuti per tera, e nesuno non perisse» (6).

While contagion had been linked to a few diseases over the preceding 300 years, the notion of infection was almost non-existent in 1510. In effect, although

influenza has been known in Europe since the middle of the 13th century and there are some records documenting six visitations in the 14th century, and four in the 15th, it only began to be studied by the profession from the start of the following century. Only then records of erupted epidemics appeared, together with the circumstances which attended their outbreak and progression, and their characteristic symptoms. In the 16th century, the disease is reported to have prevailed epidemically nine times; in the 17th century, «we have accounts of twelve visitations; in the 18th, of sixteen; and during the present century, there have already been six. Of the epidemics on record, several, as those of 1510, 1557, 1732, 1743, 1782, 1803, and 1837, extended their range from Asia, through Russia and Turkey, to the countries of Western Europe, and, in some instances, to America […]. During the last 150 years, the disease has prevailed epidemically, at intervals varying from three or four, to ten or fifteen years» (7).

Unable to identify microbial agents or understand etiopathological entities, observers like Tommasino de' Bianchi probably did not suspect that these periodic epidemic fevers with coughing might represent a single continually re-emerging disease. The disease of the summer and autumn of 1510 was called, in various European locales, cephalie catarrhale, coquelicot, *poppy* (perhaps because opiates were used to treat it), tussis quinta, or words indicating "hoods", such as capuchon, cocoluccio, coqueluche, cuculionibus, or cucullo, since those affected by the illness seem to have worn coverings over their heads (8).

The 1510 pandemic was followed by recurrent episodes of apparent "seasonal influenza" and by two additional influenza pandemics in 1557 and 1580, resulting in well-documented descriptions (7) 16th century chroniclers recorded how the disease caused moderate mortality describing the basic features by which we know influenza today (9).

Contagion in the early modern era

In July and August 1510, a *gasping oppression* with cough, fever, and a sensation of constriction of the heart and lungs began to rage, seemingly everywhere at once. The disease spread to almost every part of the known world, from Asia to Africa, Italy and France. It burned out soon after it started and it had a high attack rate but few recognized deaths, these occurring mostly in children or after excessive blood-letting (10), a common treatment for febrile and other diseases. To observers, influenza came to be recognized as a distinct disease with consistent clinical features including acute onset of fever, headache, cough, and myalgia, with uncommon complications that included pneumonia. Its epidemiologic features were understood to include explosive spread with high attack rates and directional movement along travel or trade routes, prevalence in a town or city for no more than four to six weeks, appearance at unpredictable intervals and at any time of year, and low-to-moderate mortality. No plausible infectious disease theory would be proposed until Fracastoro's great book *De contagionibus* published in 1546*;* it took another century for microbes to be discovered and two more to link microbes to human diseases (11).

For centuries, influenza represented an important subject of study and statistics, with its variable symptomatology yet conforming to a pattern, and with mortality rates ranging from low to very high. In many respects, it remains even today an inscrutable menace. In the past, indeed, any of the foregoing epidemics was *influenza*. Many observers had attempted to construct pandemic chronologies, but this was difficult before the late 1700s. Only then a new interest arose in cataloguing and differentiating epidemics, as well as the emergence of international medical literature (12). In effect, influenza pandemics have been reported for at least five centuries, with inter-pandemic intervals averaging approximately 40 years (13).

An important nineteenth-century source provides the survival rates to influenza epidemics. Using the existing data from 1173 until 1875, the German physician and medical historian, August Hirsch (1817-1894) drew up a chronological table divided by year, epidemic season and the European regions in which the disease occurred, and affirmed that influenza held a prominent position among the acute infective diseases by reason of its wide prevalence in space and time. The history of the disease: «may be followed into the remotest periods from which we have any epidemiological record at all, and its geographical distribution, in so

far as we may trust the information before us, extends over the whole habitable globe» (14, 15).

Pandemic influenza in 1557

The pandemic of spring 1557 that hit both sides of the Atlantic was the first documented global involvement (16). Unlike the previous one, this was highly fatal, with deaths recorded as being due to *pleurisy and fatal peripneumony*. It first infested Asia, then Constantinople, and having spread all over Europe, afterwards attacked America. Before autumn 1557, it simultaneously hit all parts of Spain so quickly that: «the greater part of the population in that Kingdom were seized with it almost on the same day» (17).

Thomas Short described the epidemic based on contemporary reports, the disease: «came from the land Melite in Africa, into Sicily; so into Spain, and Italy […]. It attacked at once, and raged all over Europe, not missing a family and scarce a person. A grievous pain of the head, heaviness, difficulty of breathing, hoarseness, loss of strength and appetite, restlessness, watchings, from a terrible taring cough. Presently succeeded a chillness, and so violent a cough, that many were in danger of suffocation». According to this report, there were no mortalities except for some children; the most useful therapies were bole armoniac, with oily linctus's pectoral troches, and decoctions (18). The epidemic was preceded by a *moist* air and swept once again through Europe in 1557, this time apparently originating in the Far East, and it came to be designated *febris catarralis* (11). Parish registries in England record a high mortality rate from 1558 to 1560, representing the first documentation of numerous influenza deaths in a population, and confirm that the disease prevailed for at least two years (19).

A public lecture on influenza in Sicily

From the second half of the 15th century to the 16th, this age of cultural and scientific rebirth opened up new frontiers, not only for medical and pharmaceutical science but also for healthcare. Safeguarding health became a common policy of all those in power in the different States presiding over the Italian peninsula, and throughout Europe.

The 1557 epidemic, just as before, moved westward from Asia, crossing Malta, and invading Sicily (20). During the second half of the sixteenth century, the autonomy of the *Protomedicato* on this island would allow Giovanni Filippo Ingrassia (the Sicilian Protomedicus) considerable freedom to intervene in public health matters and also in his dealings with the highest officers of the Kingdom. In the years he spent in charge of the health of the island, Ingrassia reorganized the practice of medicine and established the institutional framework of the *Protomedicato*: from that moment on an office designed to consolidate public health functions under State control. Its sphere of action encompassed not only the rules about the exercise of medicine, but also the social life of the Kingdom, including not merely health, but also hygiene and poor relief, thereby bridging the gap between old medical theories and innovative practice in early modern Sicily (21). Obviously, infectious diseases were unremitting. Despite this, the Protomedicus had a great new vision; in his role as the authority in charge of public healthcare, he expressed a heartfelt wish for the continued education of physicians. He also insisted that medicine be considered a scientific discipline, one aimed at achieving objective knowledge and avoiding subjective interpretations to guarantee the best treatment. The goal was to develop healthcare policies, as well as to encourage healthy lifestyle behaviours of the population. Since epidemics remained the main public health problem, he radically overhauled the old approach towards prevention. His main concern was to draw up a framework for public intervention, containing three fundamental elements. The first was to strengthen the pillars of public health, first and foremost the surveillance of infectious diseases; the second was to assess the impact of any public health measures implemented to reduce infectious diseases, thereby identifying effective methods for reducing rates of illness and death; in the third he developed a new approach to pandemics, the most serious public health issue, in order to reduce the vulnerability of individuals and communities.

We have to remember that, at the time, public health authorities were concerned only with plague, the disease that dominated the Renaissance, here con-

sidered the period from approximately the beginning of the thirteenth century to the middle of the seventeenth century. Italy was far ahead of other European countries in the field of public health, and gradually the local authorities began to control general standards of hygiene, registration of deaths, prostitution, movement of foreign merchandise and the selling of food. Public health measures were related to the social and economic factors of the time. The concept and practice of public health, however, was basically a creation arising from the perils of the plague and when this disease subsided in Italy, at the end of the eighteenth century, so did the controls. The physicians were a homogeneous group. However, the different social contexts in which they moved and the different types of patients they attended to were important elements of discrimination in a society with precise class distinctions. G. F. Ingrassia's attitude reflected a social reality: medicine had its rules and principles and they were true and well established (22).

When the severe influenza epidemic afflicted Sicily in 1557 and 1558, due to his great fame of physician, Ingrassia was asked by the Senate to intervene in an advisory capacity. While addressing the Government of Palermo, he made a statement: it was the doctors' responsibility to deliver therapies to individual patients. The administration had to ask advice on how to provide for the collectivity (23). Therapy was therefore supposed to be the domain of physicians, who were directly responsible to their patients, but the Healthcare Authority had the duty to care for the collectivity, dealing not only therapy, but also prevention. Ingrassia had to provide the Senate of the Kingdom of Sicily with practical advice on both aspects. As therapies were of no value in the majority of cases, Ingrassia generally put more emphasis on prevention than on therapy.

The 1500s was an age of prodigious decisions, a *turning point*, which marked the beginning of an effort to control and instill organization in healthcare. Health laws and regulations had yet to satisfy the need for prevention, the importance of which grew as it became increasingly difficult to control the terrible epidemics which slaughtered the population at regular intervals. At the first sign of an epidemic, a strict division of urban space was implemented, even the surrounding areas were closed off and no one was allowed to leave them, on penalty of death.

G. F. Ingrassia firmly sustained that territorial control was the answer to the chaos of epidemics. The short paper *Ragionamento sopra le infermità epidemiali*, contained *in nuce* all those principles he was to implement during the pestilence and can be considered a precursor. This earlier work, written some years before the great plague by this «politically active Palermitan plague fighter», and inspired by influenza epidemics, was published together with a tract about two monsters born in Palermo. The report about the epidemic was delivered before the city magistrates, and with admirable succinctness dealt first: «with the history of plague and epidemics in Sicily during the sixteenth century, the definitions of pandemic and epidemic, the signs of plague, notions of contagion, and 'atoms' in the air, all supported with copious references to Hippocrates, Galen, Aristotle, and other classical authorities. The final two folios, however, concern remedies directed to the ruler of Sicily: prayers for forgiveness of sins; purification of the air by burning fires; removal of stagnant water what was green and smelly at the drapery (Panneria) under the church of Santo Spirito; covering the stream of the tanners; cleaning water troughs of waste usually filled with dead dogs, cleaning public roads, purging stench with perfumes and big fires, covering wells, canals and aqueducts to stop fetid vapours polluting the air, and provisioning the population with good bread and meat (carne di gienco), which will be of the greatest protection for the afflicted poors as well as the healthy during an epidemic» (24).

In order to answer the Senate's questions on the origins of the illness and remedies against it, the Sicilian physician gave a public lecture in the presence of the city's powers that be on September 18, 1558. While not departing from the Hippocratic medicine, he introduced the doctrine of *seminaria principia*, learned from Fracastoro, which would be further developed in his treatise on plague in 1575. Ingrassia's ideas about epidemiology and public medicine were innovative. From the very beginning, Ingrassia offered us a taste of his modus operandi *per causas*, which validates the originality of his medical humanism, based on the rejection of any argument not confirmed by experience and the inductive-deductive research method applied to public health. He propounded that, along with the causes and consequences of the disease, it was

necessary to know the urban conditions in order to seek a remedy. As a public official, he knew the extent to which plans were ignored and regulations violated. City council protocols could only help to establish the scale of resources (human, financial, administrative) allocated to incentivise participation and to ensure a modicum of cooperation.

Two analyses of G. F. Ingrassia's essay

The Sicilian physician, Liborio Giuffrè, Head of the Medical Clinics of the University of Palermo, and fellow of the Royal Academy of Science in Palermo from 1886 (25), examined Ingrassia's report on the 1557 influenza epidemic, and conducted an exegetical study of the text. Since this had originally been printed together with another essay, it was not easy to find (26). Prof. Giuffrè affirmed that the city of Palermo had been the first in which influenza occurred in Italy. The Senate of the capital of the Kingdom of Sicily was so concerned about the occurrence of so many epidemic diseases that it petitioned Giovan Filippo Ingrassia to ascertain precisely what the contagion was, and what measures needed to be taken against this public health threat. The well-known anatomist had returned from Naples to Palermo a few years earlier, in 1553, to hold medical lecture. In 1558, G. F. Ingrassia's talk took the form of a "Proclama", being printed only in 1560 (27).

This prototype of a public lecture was addressed to Sicilian magistrates. By way of introduction, Ingrassia declared that he had been asked to discover the true state of the city, and the *causa primiera* of the contagion: «Illustre signor Pretore, et voi spettabili signori Giurati, le Signorie vostre ne fecero questa proposta, cioè che le dicessimo in che stato si trova oggi la Città, circa le infermità che corrono. Secondariamente qual sia la causa primiera, cioè donde proceda et habbia origine cotal mortalità di gente et concorso di infermitadi, quali regnano in questa città. Terzo che esito pensiamo che deggiano avere, cioè quando s'averanno a finire. Et ultimo che le volessimo dichiarare se ci è qualche rimedio, col quale potesseno sue Signorie al male presente occorrere, come quelli che hoggi hanno la cura di questa Città» (28).

Finally, he was asked to state whether the epidemic would soon come to an end and whether there were any remedies to it. As mentioned earlier, his reply contained an admonishment: therapy should be solely the concern of the doctor who was directly responsible to the patient; the Health Deputation should care for the community. However, duties and expertise could not be so neatly separated, because physicians concerned themselves not only with therapy but with prevention as well, and they were expected to provide the Health Board with scientific advice on both aspects (28).

Although the disease had quickly spread *universalmente per tutto il Regno* and it was clearly an epidemic, it was not particularly virulent. Ingrassia left a brief but comprehensive description of the influenza of 1557, enabling epidemiologists to use and compare it with the data available for other places for the same period . While not deviating far from the doctrines of his day, Ingrassia's approach embraced modern theories. He emphasised that those unacquainted with medical science, even if they were the governors of the city, should have absolutely no power to identify the therapies needed; their duty was to lay down the rules and ensure their compliance. It was doctors who had to devise and implement therapies (24).

Giuffrè concluded his essay by saying that he wanted to report all Ingrassia's proposals to demonstrate how they actually constituted the fundamental principles of public hygiene and health measures. The Sicilian Government was called on not only to care for the sick and poor, and to supervise comestibles and medicines, but also to take steps to remove all plausible causes of illness, such as dirty roads, the presence in the town of *fornaci* (furnaces), the presence of swamps and marshlands, the lack of drains for dirty water, and so on. This shrewd observer highlighted a key issue: environmental pollution. G. F. Ingrassia described the pollution of the water in wells situated near public and private latrines. Even in the 16th century, he tried to prevent and abate such insanitary conditions by tackling the problem of public sanitation; consolidating the water and sewer system, along with other measures aimed at improving the hygiene and cleanliness of cities. In terms of epidemiology and public medicine, the ideas of this illustrious Protomedicus represented the pinnacle of achievement in the second half of the six-

teenth century. He stood out in this field no less than in that of anatomy, in which his important discoveries led him to be regarded as much more than a scientist, but as an innovator contributing to the progress of science.

The second exegete of Ingrassia's discourse is a scholar of our time, Luigi Ingaliso. He confirms the ideas expressed in the essay containing a description of symptoms suggesting that the Sicilian epidemic was one of the first cases of influenza in Italy (29). Ingaliso's thesis, widely shared, states that almost twenty years prior to the plague of 1575, Ingrassia had already analysed the causes of the spread of an epidemic, as well as drafting a prevention programme. Examining the text of the *Ragionamento*, it is possible to understand how the issues present in the *Informatione* on the origin of evil and possible remedies (30), had already existed from the mid-sixteenth century: the *regimento preservativo*, introduced by Ingrassia in 1575, had been proposed years before to the Senate of the city in the *Ragionamento*, and, almost twenty years after, was more effective in defeating pestilence than any treatment.

In determining prevention measures, it was crucial to establish the causes of the epidemic. On 18 September 1558, Ingrassia answered the questions posed by the Senate of Palermo about the nature of evil, the outcome and the remedies. In the *Ragionamento*, Ingrassia, while not departing from Hippocratic-galenic medicine, introduced the doctrine of *seminaria principia*, learned over the years by reading Fracastoro, which was to be developed further in the *Informatione*. Ingrassia's ideas represent the most innovative medical science in the second half of the 16th century in the field of epidemiology and public medicine, which is why the arguments of the Protomedicus can be summarised by the following questions: a) what state is the city in; b) what are the causes of the disease; c) how long will it be active and what may be the consequences; d) is there any remedy to it. He rejected all reasoning not supported by experience. In seeking the cause of the disease, he cites many examples of epidemics, distinguishing between *vera peste* and *febbre pestilenziale*, where the former is described as contagious and mortal; with possibly occult causes, maybe of divine or demoniac origin, or deriving from Astral influences. The 1558 influenza epidemic in Palermo was, instead, a *pestilential fever*, called a *pandemio*, i.e. a disease which can be contagious for the whole population. It was caused by «corrottione di cibi» (rotten food), but, some years after, Ingrassia was to classify diseases based on how the disease was spread (31, 32).

Conclusion

Ingrassia's medical theory was the basis of the Protomedicus' action during the plague years; his method was supported by keen vigilance, a strict quarantine policy, confining plague victims and suspects to the *lazzaretti*, as well as aiding the poor.

It is to be underlined that the culture of plague opened a new chapter in the history of medicine, as the study of this peculiar disease involved not only an attempt to understand its pathology, but also its modes of transmission and the social characteristics of the victims. Consequently, medical thinking evolved considerably due to the plague. Many academic medical treatises on the plague were published during the sixteenth century. From erudite definitions, remote causes and cures, physicians now discovered their most "valiant remedies" in public health: strict segregation of the healthy from the diseased, cleaning streets and latrines, addressing the long-term causes of plague-poverty. In the heartland of Counter-Reformation Italy, physicians along with those outside the profession questioned the foundations of Galenic and Renaissance medicine, even the role of God. Assaults on medieval and experimental medicine did not need to await the seventeenth century Protestant-Paracelsian alliance in northern Europe. Instead, creative forces planted by the 1575-8 pandemic sowed seeds of doubt and unveiled new concerns and ideas, even within that supposedly most conservative form of medical writing, the plague tract. Relying on Health Board statistics and dramatized by eyewitness descriptions of events and suffering, these writers created the framework for the plague classics of the eighteenth century. The crisis of 1575 «fundamentally altered doctors' approach to and thinking about plagues from individual patients to the community». Giovan Filippo Ingrassia, by including in his recommendations ordinances and decrees,

designs for building hospitals, quarantine orders, isolation of those infected, cleaning the streets, disinfecting houses, regulations for butchers, punishments for thieves stealing infected goods, was the first physician to pay attention to tracking a disease, tracing the possible paths of its arrival to a region and detailing its spread within neighbourhoods once it had entered a city, and improving public controls against the spread of the disease by every means possible. In his efforts to understand and to contain the disease, he anticipated the field of epidemiology, born in the nineteenth century (25).

In this context, the problems due to an environment in which men lived in poor housing in close proximity to rats and fleas were aggravated by malnutrition, Ingrassia's call to improve public hygiene was probably the most original contribution to sixteenth century thinking devoted to identifying the problems of Palermo and the proposed attempts to solve them by the urban modernization of the Capital. Despite this, the serious health problem of the discharge of stagnant waters, especially those outside the Royal Palace of Palermo, remained unresolved. Despite worsening hygiene conditions, the Protomedicus' petitions yielded no other result than the cleanup of the Papireto site. Only during the plague years, did the magistrates of Palermo order the marshes be dried to purify the air of the city, an action the Protomedicus had been demanding repeatedly for decades. Finally, we must point out that when this speech was published, this publication was a true bibliographic rarity and remained so up until the end of the 19th century (29). Moreover, this short essay deserves recognition as confirmation, if any was needed, of the role of Giovan Filippo Ingrassia as a forerunner in the history of science. In the period we have examined here, he assigned himself two tasks: first, to do his work, and second, to make political leaders aware of the risks. Just as in the past, preparatory efforts require resources. Only the political process can allocate them.

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Medicina Historica 2018; Vol. 2, N. 1: 27-37

Original article: history of medicine

From Aldini's galvanization of human bodies to the Modern Prometheus

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Abstract. During the 18th century the perception of electricity was significantly different from it is today. In particular, the idea of 'bioelectricity' - the electrical phenomena that control our body - was trying to surface among a set of multifaceted studies and innovative processes involving electricity. The concept of animal electricity finally emerged at the very end of the 18th century thanks to the work of the Italian physician, physicist and anatomist at the University of Bologna, Luigi Galvani, whose findings were disputed by the physicist Alessandro Volta, from Como. At the beginning of the 19th century, Giovanni Aldini, the nephew of Galvani, attempted to demonstrate the existence of animal electricity by using voltaic batteries to stimulate the corpse of animals and humans, often in front of laypersons. One of these public events occurred in London on January 17, 1803, when Aldini applied electrical stimulation (at that time called Galvanic stimulation) on the corpse of a hanged criminal, 'almost to give an appearance of re-animation'. The results of such gruesome exhibitions were reported in detail by local newspapers, ingraining the idea that electricity might be the long-sought vital force. The English writer Mary Shelley is likely to have been influenced by such events, which suggest the possibility of reanimating dead bodies by the application of electricity. She ingeniously put this concept into action in her highly influential gothic novel Frankenstein, or the modern Prometheus that was first published exactly 200 years ago.

Key words: Giovanni Aldini, galvanism, Mary Shelley, Frankenstein, electricity

«Tema della *pièce*?»
«La vita e la morte».
«Impegnativo. Attore unico?»
«No, due. Ma il secondo non parla».
«Allora che ci sta a fare in scena?»
«Si suppone debba muoversi».
«Si suppone?»
«Non è detto che accada»
(*Manfredi G. Tecniche di resurrezione. 2010 Gargoyle Books, Roma. p.14*)

«Subject of the play?»
«Life and death».
«Challenging. Only one actor?»
«No, two. But the second doesn't talk».
«But then, what is he doing on the scene?»
«He is supposed to move».
«Supposed?»
«There's no guarantee it happens»

Introduction

The medical use of electricity dates back to Antiquity, as revealed by the Roman physician Scribonius Largus, whose writing published in the first century, mentioned the use of electric shocks of black torpedoes to treat pathological conditions as varied as headache and gout (1). However, it was not before the 18th century that the concept of electricity became clearer and its use as a medical tool made more appropriate. The first steps along this path are the electrical conduction ex-

periments of the English scientist Stephen Grey (1666-1736) and the invention of the Leyden Jar, attributed to the Dutch physicist Pieter van Musschenbroek (1692-1761). Later on came the discovery of 'animal electricity' by Luigi Galvani (1737-1798) - he acknowledged Pierre Bertholon (1741-1800) as the inventor of the term *animalis electricitas* in his 1791 *Commentarius* (2) - and the development of the first electrical battery by Alessandro Volta (1745-1827) (3, 4, 5). The growing enthusiasm associated with the use of electricity, even for pleasure (as in Gray's experience or alcohol lighting), led the Venetian physician Eusebio Sguario to explicitly declare (Dissertazione II, p. 366-7):

> '*Ciò che ricercano gli uomini dalle scienze non essendo solamente il dilettevole, quanto l'utile […]: appena si conobbe, che tanto era il potere che aveva l'elettricità sui corpi umani, che subito si ricerco s'ella avrebbe potuto mai per buona ventura apportar qualche sollievo ai mancamenti della salute. Nessun pensiero era più facile a cader in mente di questo…*' (*What people look for in science is not only pleasure, but usefulness […]: as soon as the power of electricity on human bodies was known, research was initiated to see if it could be used to bring relief to the failures of health. No thought was easier to conceive than that one…*) (6).

At that time, electricity started to be used more or less successfully as a remedy for pathologies that ranged from paralysis to blindness, and from rheumatisms to hysteria (3,4). However, the interest in this 'new' field continuously increased and, during the second half of the 18th century, electricity was often defined as something 'marvelous', as for example, '*the wonderful effect of pointed bodies*' (Franklin, 1747) (7), '*les merveilleux effets qu'on attribuait depuis quelques années à l'électricité*' (Nollet, 1749) (8), or '*il fenomeno fu costante ed è certo meraviglioso*', referring to frog's movement after stimulation (L. Galvani, 1781) (4).

The exponential growth of such studies and experiments created an indissoluble link between electricity and medicine. Questions so far related to theology and philosophy, such as the nature of life itself started to be considered by physicians, scientists and writers (9). This novel attitude contributed to pave the way to the birth of Romantic medicine and yielded some concepts that were integrated into the first true work of science fiction, *Frankenstein; or, the Modern Prometheus* (1818), by Mary Shelley (10).

Galvani-Volta controversy

Luigi Galvani (Fig. 1, left), son of Domenico and Barbara Foschi, was born in Bologna, Italy, on September 9, 1737. Although he had shown a strong inclination for religious life since he was a child, Galvani entered the Faculty of Arts of the University of Bologna, where he attended the medicine course during the second half of the 1750s. One of his professors was Jacopo Bartolomeo Beccari (1682–1766), *anatomicus emeritus*, who taught Galvani the basic notions of medicine and chemistry. Galvani also followed the lectures in physic given by Domenico Gusmano Galeazzi (1686 –1775), who ran one of the most modern laboratories in Italy and taught contemporary disciplines such as electricity, a hot topic of that time that attracted Galvani's interest.

While studying electricity, the young Galvani progressively became a skilled surgeon and applied his ability to treat patients as well as to perform animal experiments (2). In 1759 he graduated in both medicine and philosophy - it was a usual custom at the University of Bologna - and then worked for 3 years as a permanent anatomist (*anatomici ordinari*) of the University. In 1762 Galvani married Galeazzi's daughter Lucia (1743-1788), moving to Galeazzi's house, where he probably took the inspiration for his own researches (2). Strongly interested in the therapeutic use of elec-

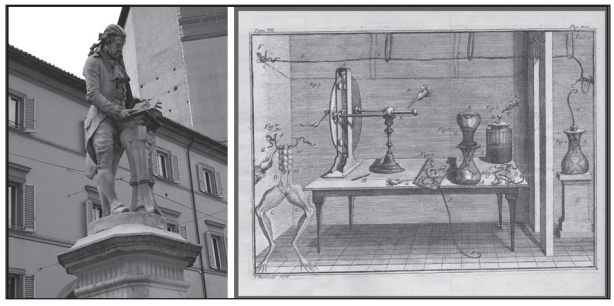

Figure 1. The statute of Luigi Galvani in Piazza Galvani in front of the *Archiginnasio*, in Bologna (left) and a copy of the first plate of his *Commentarius* published in 1791 (11, right). Credit: Wellcome Collection.

tricity, he began a series of experiments on muscle contraction in frogs. He reported the results of enlightening investigation in a famous work entitled *De Viribus Electricitatis in Motu Musculari. Commentarius* (Commentary on the Effect of Electricity on Muscular Motion) published in 1791 by the Academy of Sciences of Bologna (11). Of note is the experiment he did on January 26, 1781, in which a dissected frog '*alla maniera di Galvani*' was left on the table close to an electrical machine but not physically connected with it. When an assistant - probably his wife or his nephew Aldini, who often helped him in the laboratory - touched the femoral nerve with a scalpel, a strong muscular contraction ensued, in conjunction with a spark discharge from the prime conductor (Fig. 1, right). This crucial experiment, which appears first in the *Commentarius*, gave Galvani the idea of an intrinsic form of electricity within the muscle, which, when activated by the electrical flow through the nerves, leads to muscle contraction (12). Galvani also expressed the idea that the animal electricity (or the nerveo-electric fluid; he used both terms) was not different from artificial electricity. He saw it as being generated in the brain, distributed through the inner core of nerves covered by an outer oily layer that prevents electrical diffusion, as far down as to the muscles (3, 13). These ideas, which ruled out the old Galenic concept of animal spirit flowing through hollow nerves, were considered revolutionary, although judged with caution (4, 5, 14).

A scientist from Como, Alessandro Volta, at that time professor of 'experimental physics' at the University of Pavia, was among the first to reproduce Galvani's experiments and to embrace the concept of animal electricity. In his *Memoria prima sull'elettricità animale* (First Memoir on Animal Electricity) dated May 5, 1792, he refers to '*una di quelle grandi e luminose scoperte, che meritano di far epoca negli annali delle scienze fisiche e mediche*' (one of those great and luminous discoveries which deserve to be a landmark in the annals of physical and medical sciences) (15).

Alessandro Giuseppe Antonio Anastasio Volta (Fig. 2, left), son of Count Filippo and Countess Maddalena Inzaghi, was born in Como on February 18, 1745. He went to the Jesuit School in Como and, while pressed toward legal studies, the young Volta expressed preferences for physics, an orientation that was supported by the family friend Canon Giulio Cesare Gattoni who was teaching at the Royal Benzi Seminary. At 24, Volta writes his first treatise on electric phenomena *De vi attractiva ignis electrici ac phaenomenis independentibus* (On the forces of attraction of electric fire), a merely hypothetical work. In 1774 he accepted a professorship at the Royal School in Como and, in 1779, he moved to Pavia (16). Volta was 45 old and already an authority in the field of electricity when he first read Galvani's *Commentarius*; he had already invented the '*electrophorus*' a generator of electricity and the '*condensatore*', an instrument able to detect small quantities of electricity (12).

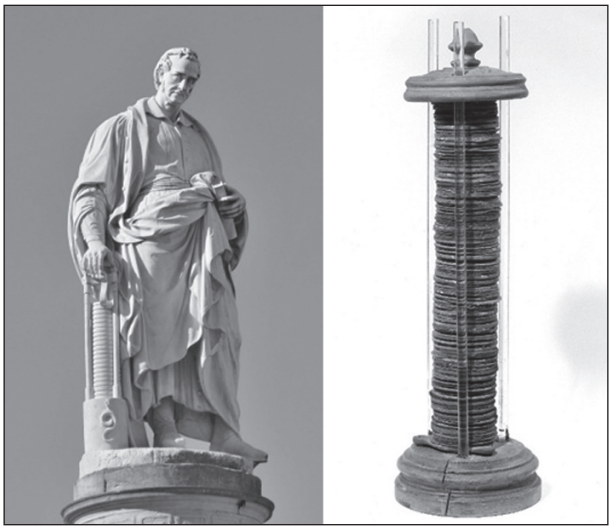

Figure 2. The statute of Alessandro Volta in Piazza Volta, in Como (left) and a photograph of his bi-metallic (voltaic) pile (right). Credit: Como City-hall and Wellcome Collection.

Volta's initial enthusiasm over Galvani's findings progressively changed into skepticism. In his *Memoria prima sull'elettricità aniamle*, in 1792, he wrote: '*una giacchè o due di tali sperienze […] sembran pure indicare qualche cosa di vera elettricità animale, sebben non provi neppure questa decisamente*' (One or two features […] suggest something real about animal electricity, although they do not prove it decisively) (15). Volta then argued that the muscular contractions observed by Galvani were in fact generated by the two different metals used to connect nerves and muscles, and not by intrinsic animal electricity. He thought that there was no need of any biological preparation to produce

electricity since two different metals were sufficient to do the work. What was initially a simple scientific controversy soon became a legendary dispute between Volta and Galvani that attracted worldwide attention (5, 12). During the last years of the 18th century, the German physiologist Emil Du Bois Reymond (1818-1896) gave a clear summary of the various aspects of Galvani's and Volta's theories in his voluminous treatise *Untersuchungen über thierische Elektricität* (Investigation of Animal Electricity) (17):

> '*It can be said that wherever it was possible to find frogs and heterogeneous pieces of metal they were immediately put in contact, and anybody could be convinced, through evidence, of the wonderful resuscitation of severed limbs. Physiologist believed that they could hold in their hands the ancient dream of the life force; physicians […] believed that any treatment would be possible, and that any apparent dead body would have not been buried before being galvanized*' (4).

Volta later used the idea of '*elettricità metallica*' (metallic electricity) to create his famous electric pile (Fig. 2, right) that he first called '*organe électrique artificiel*' (artificial electric organ) to distinguish it from to the '*organe électrique naturel*' (natural electric organ) of the torpedo, whose structural organization seems to have inspired, at least in part, his own invention (3, 5). He presented his great discovery on March 20, 1800 in a letter addressed to the Royal Society of London and, in 1801 he demonstrated his battery to the French Emperor Napoléon Bonaparte, who made him a count and a senator of the kingdom of Lombardy.

Aldini steps forward

In contrast to Volta, Galvani had a reserved character and he progressively led his more communicative nephew Giovanni Aldini in charge of the defense of the animal electricity concept (2). Giovanni Aldini (Fig. 3), son of Giuseppe and Caterina Galvani, was born in Bologna on April 16, 1762. His father was a law professor and his mother, the sister of Luigi Galvani, had a great influence on the orientation of Giovanni toward science. After graduating in physics, he started working with his uncle and developed a great passion for electricity and Galvanism, a term introduced during the last years of the 18th century (5, 13).

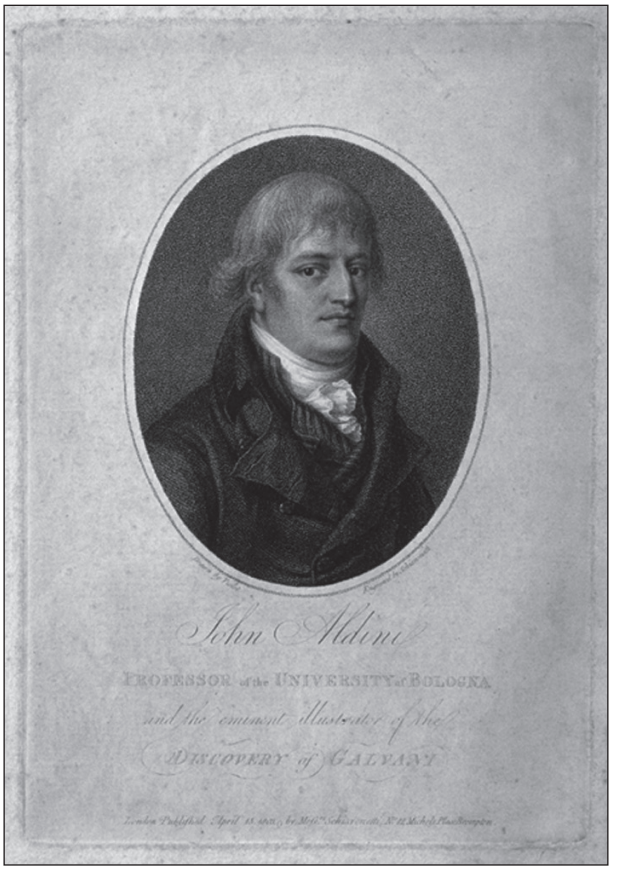

Figure 3. A portrait of Giovanni Aldini as it appears on his 1803 Account of the late improvements in Galvanism (25). Credit: Wellcome Collection.

Aldini became a great defender of his uncle theories and Galvanism. He prepared a second edition of the *Commentarius* that appeared in Modena in the autumn of 1792, with new experiments using only one metal to produce muscle contraction. In 1794 he helped Galvani in publishing, although anonymously, the *Trattato dell'Arco Conduttore* (Treatise on the Conducting Arc), with still new experiments in which muscle contraction was obtained without any metal (18), a sort of response to Volta's criticism (13). In 1794 Aldini published his own *De animali electricitate dissertationes duae* (Two dissertations on animal electricity) (19), a treatise describing the results he obtained on animal electricity, including experiments undertaken

on warm-blooded animals. Furthermore, Aldini significantly contributed to Galvani's last work *Memorie sulla elettricità animale* (Memoir on animal electricity), published in 1797 in the form of a letter to Lazzaro Spallanzani (1729-1799), a firm believer of his theory (5, 13). Galvani died in 1798, the year when Aldini took the Bologna University chair in physics, vacant after the retirement of his former master Sebastiano Canterzani (1734-1819). Despite Galvani's death and his new teaching commitments, Aldini carried on his work on Galvanism founding, in the late 1790s, the Galvanic Society. While Galvani's researches had been conducted almost entirely on frogs, Aldini explored more esoteric paths, involving experiments on the heads of different warm-blooded animals, particularly oxen and lambs (Fig. 4).

While performing these animal studies, Aldini found that the stimulation of one hemisphere produces muscle contractions on the opposite side, an important finding that was to be better described in the late 19th century by Fritsch and Hitzig in dogs and by Robert Bartholow in humans (20). In addition, he noted that stimulations of different brain regions produce specific effects, leading him to appreciate the use of electrical stimulation as a therapeutic tool in humans (21). Ironically, Aldini had to use Volta's bimetallic battery to convince scientists and physicians of the therapeutic usefulness of Galvanism. He initially tested Galvanic stimulation upon himself, reporting:

> '*D'abord le fluide s'empara d'une grande partie du cerveau, qui éprouva une forte secousse, et comme une espèce d'ébranlement contre la parois de la boîte osseuse. Les effets augmentèrent encore, lorsque je conduisis les arcs d'une oreille à l'autre. J'ai ressenti une forte action à la tête, et une insomnie prolongée pendant plusieurs jours…*' (*First, the fluid took over a large part of my brain, which felt a strong shock, a sort of jolt against the inner surface of my skull. The effect increased further as I moved the electric arcs from one ear to the other. I felt a strong head stroke and I became insomniac for several days…*) (22).

Later, Aldini applied Galvanic stimulation to the head of Luigi Lanzarini, a 27-year-old farmer suffering from melancholy (major depression), who had been committed to Sant'Orsola Hospital, in Bologna, on May 17, 1801, thus pioneering the idea of modern transcranial electrical stimulation developed in the 20th century (23, 24) (Fig. 5). After 6 weeks of such treatment, Aldini reported that the patient's mood had progressively improved up to the point that Lanzarini was considered "*complètement guéri*" (completely cured) (22).

In January and February 1802, Aldinin applied Galvanic stimulation on the bodies of three criminals executed by decapitation close to the Bologna's Palace of Justice (Fig. 6). Marked muscular contractions of various types resulted from the application of electric arcs on different parts of these corpses, and Aldini noted that such effects were still elicitable up to three hours

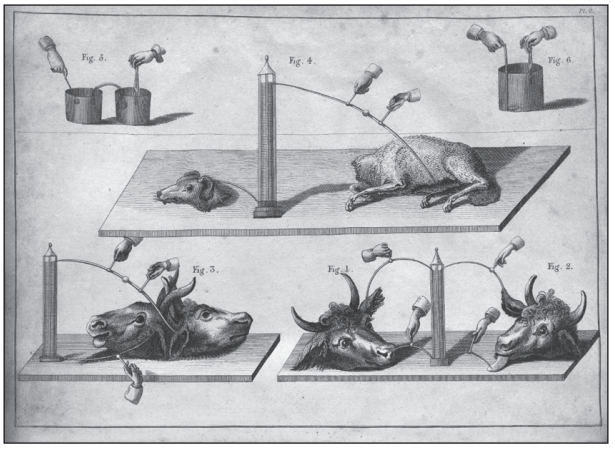

Figure 4. A copy of plate II in Aldini's 1803 *An account of the late improvements in Galvanism* (25). Courtesy of the Center for the History of Medicine of the Harvard University.

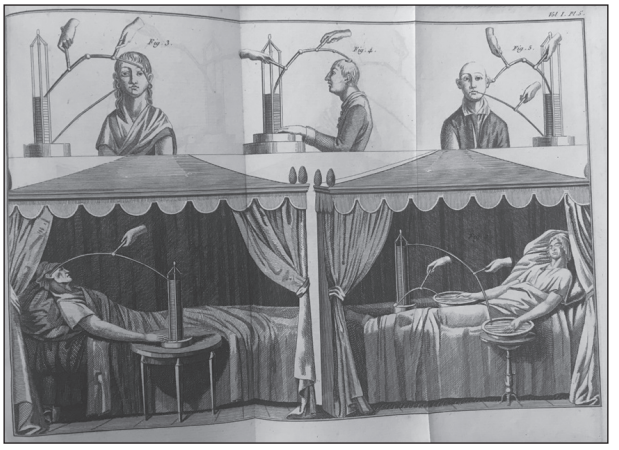

Figure 5. A copy of plate V in Aldini's 1804 *Essai théorique et experimental sur le Galvanisme,* volume I (22). Courtesy of the library of the Department of Physics of the University of Turin.

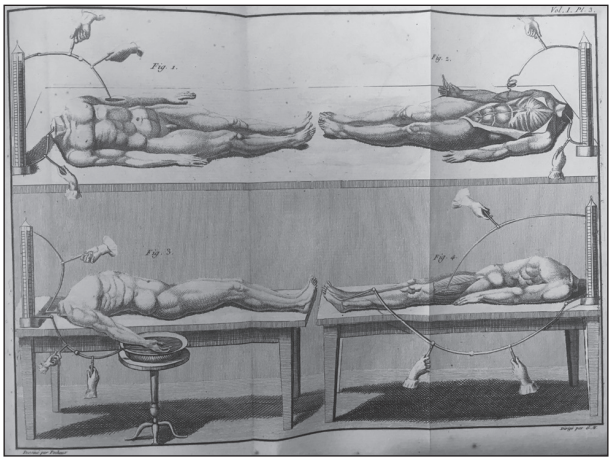

Figure 6. A copy of plate 3 in Aldini's 1804 *Essai théorique et experimental sur le Galvanisme,* volume I (22). Courtesy of the library of the Department of Physics of the University of Turin.

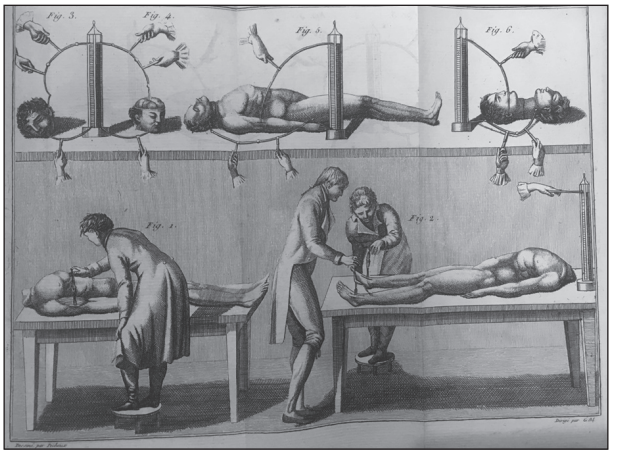

Figure 7. A copy of plate IV in Aldini's 1804 *Essai théorique et experimental sur le Galvanisme,* volume I (22). Courtesy of the library of the Department of Physics of the University of Turin.

after death. These results appeared in Aldini's 1804 treatise (2-volume, 680-page) entitled '*Essai théorique et expérimental sur le galvanisme*', together with the surprising observation that the heart – considered the most important of all the muscles – was unresponsive to Galvanic stimulation (22).

Aldini's European tour

To persuade the scientific community of the existence of animal electricity and the importance of Galvanism in medicine Aldini initiated a European tour. In the fall of 1802 he was at the Salpêtrière Hospital in Paris attempting to convince the famous psychiatrist Philippe Pinel (1745-1826) of the beneficial effects of Galvanic stimulation on depressed patients. Aldini applied the same therapy he used in Bologna, but with a limited success (20, 22). At the beginning of 1803, Aldini went to England, where he was invited to present his data on Galvanism and to give practical lessons in Oxford and London. At the College of Surgeons, in London, on Monday, January 17, Aldini undertook his most famous demonstration on the body of a malefactor executed by hanging (Fig. 7) at the Newgate Prison (25). It is worth noting that the Newgate Calendar reported that Foster's execution took place on January 18, and not on the 17th, as reported by Aldini (13). Referring to the *The Murder Act* of 1751 (26), Aldini stated:

> '*the British laws, which are founded on the basis of humanity and public benefit, that the bodies of those who during life violated one of the most sacred rights of mankind, should after execution be devoted to a purpose which might make some atonement for their crime, by rendering their remains beneficial to that society which they offended*' (25; Appendix pp. 189-190).

London offered Aldini his first possibility to apply Galvanism on an intact human body, and not on decapitated corpses, as he had previously done in Bologna. One of his ideas behind such demonstrations was to convince the scientific community that Galvanism could be used in cases of '*asphyxia and suspended animation*' associated with drowning (25), a concept that Aldini expounded in his work *An account of the late improvements in Galvanism* (Fig. 8):

> *'In a commercial and maritime country like Britain, where so many persons, in consequence of their occupations at sea, on canals, rivers, and in mines, are exposed to drowning, suffocation, and other accidents, this object is of the utmost importance in a public view, and is entitled to every encouragement'* (25).

Aldini was convinced that the '*power*' that occurs in muscular fibers and disappears after death could be

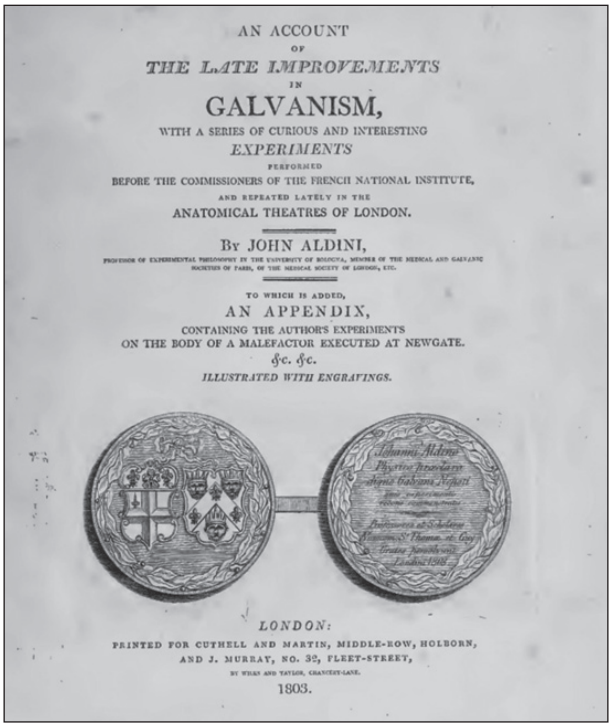
AN ACCOUNT
OF
THE LATE IMPROVEMENTS
IN
GALVANISM,
WITH A SERIES OF CURIOUS AND INTERESTING
EXPERIMENTS
PERFORMED
BEFORE THE COMMISSIONERS OF THE FRENCH NATIONAL INSTITUTE,
AND REPEATED LATELY IN THE
ANATOMICAL THEATRES OF LONDON.
By JOHN ALDINI,
TO WHICH IS ADDED,
AN APPENDIX,
CONTAINING THE AUTHOR'S EXPERIMENTS
ON THE BODY OF A MALEFACTOR EXECUTED AT NEWGATE.
&c. &c.
ILLUSTRATED WITH ENGRAVINGS.
LONDON:
PRINTED FOR CUTHELL AND MARTIN, MIDDLE-ROW, HOLBORN,
AND J. MURRAY, NO. 32, FLEET-STREET,
1803.

Figure 8. Title page of Aldini's 1803 *Account of the late Improvement of Galvanism* (25).

regained through Galvanism. The criminal, George Foster, was a 26-years-old man who '*seemed to have been of a strong, vigorous constitution*'. Foster had been sentenced for the murder of his wife and child, who were drown in the Paddington Canal (13, 27). Under the supervision of Mr. Keate, master of the Society, Mr. Carpue, lecturer on anatomy and his pupil Mr. Hutchins, '*gentlemen eminently well skilled in the art of dissection*', Aldini '*readily embraced that opportunity of subjecting it to the Galvanic stimulus, which had never before been tried on a person put to death in a similar manner*'. During his demonstration, Aldini received the help of Mr, Cuthbertson, who directed and arranged the Galvanic apparatus (25, 27). In the appendix Aldini reports in detail all the [15] experiments he performed on the executed body of Foster, and all the conclusions he was able to deduce from them (25).

In the first two experiments, the current generated from '*three troughs combined together, each of which contained forty plates of zinc, and as many of copper*' a typical '*Volta's pile*', was applied to the mouth, to both ears or to one ear and the nostrils. Those stimulations generated jaw tremor, eyes opening and '*a convulsive action of all the muscles of the face*', including lips and eyelids. More striking effects were obtained in experiment III, in which the application of conductors to the ear and to the rectum resulted in a general muscle contraction '*stronger than in the preceding experiments*'. Such results were so unexpected that Aldini qualified them as '*almost to give an appearance of re-animation*'. Aldini then performed a series of control experiments in which he applied first ammonia to the nostrils and mouth, and second ammonia in combination with Galvanic stimulation. He noted that the application of ammonia alone produced no '*sensible action*', but when Galvanic stimulus was combined to the volatile alkali '*the convulsions appeared to be much increased by this combination, and extended from the muscles of the head, face, and neck, as far as the deltoid*'. He further commented '*The effect in this case surpassed our most sanguine expectations, and vitality might, perhaps, have been restored, if many circumstances had not rendered it impossible*'. These 'many circumstances' referred principally to the fact that George Foster had been hanged about 2 hours before the experiments began, and, furthermore, the corpse had been maintained for more than an hour after the hanging in a cold room at about -1°C (25). The *appearance of re-animation* following Galvanic stimulation was an unexpected result even for Aldini himself as revealed in his concluding remarks: '*our object in applying the treatment here described was not to produce re-animation, but merely to obtain a practical knowledge how far Galvanism might be employed as an auxiliary to other means in attempts to revive persons under similar circumstances*' (25).

The remaining experiments involved Galvanic stimulation on specifically exposed muscles and dissected nerves, but they did not yield straightforward results, as reported by Aldini himself:

> Exp. VII '*…which induced a forcible effort to clench the hand.*'; Exp. VIII '*…without producing the slightest motion.*' and '*The latter even corroded the muscle, without bringing it into action.*'; Exp. IX '*…I endeavoured to excite action in the ventricles, but without success.*' and '*…but without the slightest visible action being induced*'; Exp. X '*…the right auricle, and produced a considerable contraction*' but

'*…in the left auricle scarcely any action was exhibited.*'; Exp. XI '*…no considerable action in the muscles of the arm and leg was produced.*'; Exp. XIII '*…a very feeble action was produced…*'; Exp. XIV '*…scarcely any motion was excited in the muscles*'.

In the last experiment (XV), Aldini was still able to obtain some effects following electric stimulation of Foster's sciatic nerve '*for seven hours and a half after the execution*' (25). During these time-consuming experiments, Aldini had to renew troughs several times, claiming the assistance of a more powerful apparatus and highlighting the fact that such a lengthy set of experiments could not have been performed by the simple application of metallic coatings. He further stated, '*these coatings, invented in the first instance by Galvani, are passive*', a condition that supports the presence of a pre-existing fluid in the '*animal system.*' In contrast, he considered muscle excitation as an effect of '*the Galvanic batteries of Volta*'. These results led Aldini to conclude that Galvanism acts on both nervous and muscular systems, but that the effects produced by Volta's batteries and Galvani's simple metallic coatings are significantly different (25). This can certainly be considered a major step forward in understanding the phenomena behind electrophysiology, a rising science at that time.

From science to literature: Aldini's electric stimulations recreated into a major gothic novel

The notion of electricity was deeply embodied in the Romantic intellectual movement that characterized the arts, literature and natural sciences throughout Europe at the beginning of the 19th century. Perhaps because its true nature was poorly understood, electricity was seen as a wonderful instrument that could benefit the entire society in a vast array of fields. In medicine, for example, electricity was seen as a potent tool to diagnose and treat many types of diseases. It was also considered a central concept in several natural sciences disciplines, and some even envisaged its possible use in the development of novel mechanical devices that could significantly increase industrial growth (28). It is within this very peculiar social and cultural context that Aldini's spectacular demonstration on George Foster, which was reported in great detail in the January 22, 1803 daily issue of the newspaper *The Times*, left a strong and persistent impression in the mind of both scientists and laypersons. It is thus not surprising to see that the idea that electricity might be the source of the long-sought vital force, or the 'principle of life' began to pervade a large portion of the European society.

These ideas form the core of the highly influent gothic novel *Frankenstein; or, the Modern Prometheus* first published in 1818 by Mary Wollstonecraft Godwin, better known as Mary Shelley (10). Obsessed with the idea of controlling life and death, the young Dr. Frankenstein in Shelley's novel is a brilliant scientist who wants to go beyond the limits of science. With help of a combination of chemistry, alchemy and, above all, a decisive electrical spark, he is able to bring to life his 'Creature' made out of human remains from different corpses (Fig. 9). Let's now examine how the idea of making such a gruesome scenario the center of

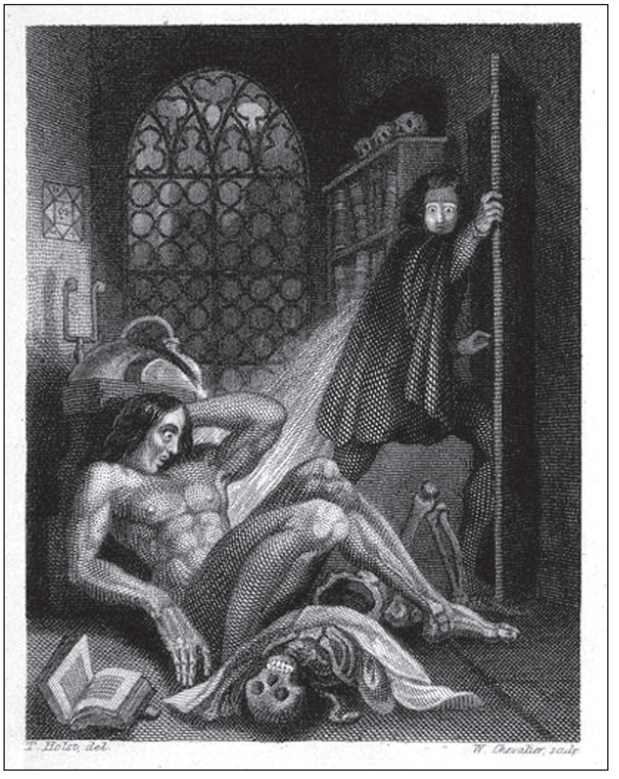

Figure 9. Frontispiece page of Mary Shelley's 1831 edition of *Frankenstein or the Modern Prometheus*. Credit: Wellcome Collection.

one of the first science-fiction novel came to the mind of an 18-years-old, well-educated British girl.

Mary Wollstonecraft Godwin was born in London on August 30, 1797 from the feminist writer Mary Wollstonecraft and the anarchist philosopher William Godwin. Thanks to her parent's connections, Mary became familiar not only with poets and writers but also with scientists, like the chemists Humphry Davy (1778-1829) and William Nicholson (1753-1815), two pioneers in the field of electricity (29). In 1814, she felt in love with the Romantic poet Percy Bysshe Shelley (1792-1822) and they married on December 30, 1816 (30). Percy was to exert a strong influence upon Mary, who was thus quite aware of the scientific milieu permeating that period. Although famous for his poetry, it is important to mention that Percy Shelley was initially trained in sciences. His college apartment at Oxford University did not contain only books but also a wide variety of scientific apparatus, including 'an electrical machine, an air-pump, galvanic troughs, a solar microscope, and large glass jars and receivers' (31).

In 1816, Mary stepsister Claire Clairmont (1798-1879), who was having a love affair with the leading figure of the Romantic movement Lord Byron (1788-1824), convinced Mary and Percy Shelley to join Byron in Switzerland with their son. They settled into the chalet Chappuis, close to the Lake Geneva, while Byron rented the Villa Diodati, followed by his young physician, John William Polidori (1795-1821). Polidori was trained in medicine at Edinburgh, where electrotherapy was highly considered, and he was quite familiar with the medical writers of the past (32). That year was characterized by severe climate abnormalities, and was defined as the 'year without summer' (33). Mary remembered that '*it proved a wet, ungenial summer, and incessant rain often confined us for days to the house*'. The heterogeneous group spent the cold and rainy nights at Villa Diodati, where they discussed various scientific issues, such as the nature of life (29). They certainly alluded to Aldini's theatrical 're-animation' on Foster's body, which raised the possibility of resuscitating dead people by electricity (34), in according to some observations that Erasmus Darwin (1731-1802) reported in 1794 on spontaneous generation and the nature of organic life (*Zoonomia* 1794). In the preface of the 1831 edition of her novel, Mary Shelly indeed reports conversations that occurred then, mainly between Byron and Percy Shelley, about '*the experiments of Dr. Darwin*' and '*galvanism*' (35). In the preface he wrote for the 1818 edition of Mary's novel, Percy Shelley mentioned that '*The event on which this fiction is founded has been supposed, by Dr. Darwin, and some of the physiological writers of Germany, as not of impossible occurrence*'. One possible German '*physiological writers*' could have been Karl August Weinhold (1782-1828), a scientist from Halle who performed a series of experiments on the nature of animal life and its relation with electricity (32).

The final conception of Frankenstein apparently goes back to a storytelling competition initiated by Byron, and in which Byron himself, as well as Percy Shelley, Polidori and Mary Shelley had to write a ghost story. Mary recalled that, after some days of '*blank incapability*', the night of June 16 (36) she had a '*waking dream*' that was at the origin of her own story: '*I saw the hideous phantasm of a man stretched out; and then, on the working of some powerful engine, show signs of life, and stir with an uneasy, half-vital motion*' (35). This description shares many similarities with what happened in London on January 17, 1803 when Aldini showed that Galvanic stimulation of the brain seemed able '*to give an appearance of re-animation*' (25). In the second chapter of Mary's novel, the echo of the electrical experiments on dead bodies became even stronger, as Dr. Frankenstein specifically refers to electricity as '*that science as being built upon secure foundations, and so worthy of my consideration*' (35).

Mary Shelley started writing her short story on two notebooks at Villa Diodati and later, thanks to Percy Shelley's encouragement, she extended it into the much longer 1818 account. It was only in 1831 that Mary published a revised version of her novel, where terms and scientific explanations were reduced, and with a new preface in which she provided '*some account of the origin of the story*' (29). A first theatrical version of Mary's bestseller was presented in 1823 at the English Opera House, in London, under the title *Presumption: or the Fate of Frankenstein*. The marked and long-lasting influence of Mary Shelley's work is attested by the fact that, so far, there have been more than 90 dramatizations and more than 70 films based on it. Furthermore, the doctor who has the capacity of resuscitating dead creature has been displayed in a multitude of cartoons and comics.

Conclusion

The impact of science on literature is almost as old as science itself. With respect to the novel *Frankenstein, or the Modern Prometheus* we have to consider that Mary Shelley was an eclectic reader, who, besides poetry, theatrical plays and novels, often plunged herself directly into scientific books. Furthermore, she regularly discussed various scientific questions with her husband Percy Shelly. Thus, she must have been fully aware of the major issues that were dealt with the English science of the Romantic era, particularly the claim that electricity might be at the origin of the life force, if not life force itself. Although indirectly, Mary came to know the details of what happened at the London College of Surgeons on January 17, 1803 when she was just 5-and-a-half years-old. This single event, together with the growing knowledge and curiosity on the theme of electricity and its deep relationship with the principle of life, undoubtedly played a key role in Shelley's elaboration of Dr. Frankenstein and his 'Creature', a sort of gothic transmutation of Giovanni Aldini and George Foster that led to the persistent myth of the mortal creator who generate life from science.

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Medicina Historica 2018; Vol. 2, N. 1: 38-40

The treaties on the origins of Forensic Medicine, Occupational Medicine and Public Hygiene

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Abstract. Forensic Medicine, Public Hygiene and Occupational Medicine are disciplines that have arisen in different times, with their own skills and different historical developments and have concured to enriching scientific knowledge over the centuries. This article amins to examine the main treatises and their authors who have contributed to define these doctrines in their origin.

Key words: forensic medicine, public hygiene, occupational medicine, Johann Peter Frank, Bernardino Ramazzini, Paolo Zacchia

The main treaties of Medicine and Public Health, which deal with disciplines such as Forensic Medicine, Occupational Medicine and Public Hygiene - including the old name of Medical Police - are now preserved in libraries or private collections. In particular, our study is dedicated to some authors and their works that have shaped the history of these doctrines. These disciplines exercised their competence in various fields of Public Health: Hygiene and Police Medical and Occupational Medicine have as a priority the protection and improvement of community health, while Forensic Medicine is at the service of criminal and civil justice. In addition, these sciences have very different stories. The concept of hygiene, intended as a safeguard of the physical, mental and social well-being of the individual and of the community, has very ancient origins. Born as a set of often empirical norms, hygiene played a role of great importance already in remote historical periods in relation to religious practices and rites. In the classical age the Hippocratic treatise *Delle acque, delle arie e dei luoghi* emphasized how environmental and climatic factors, soil qualities and hydrogeological conditions can affect the healthy man and the determination of a disease (1). In his Oath, Hippocrates invoked the goddess Igea, mother of hygiene, and without making direct reference to health, he affirmed the idea of a harmonious development of body and spirit. During the Middle Ages the physicians of the Salernitan School considered hygiene a fundamental aspect for the defense of health. The references to health became explicit by *regimina sanitatis, si tu vis vivere sanum*, or if you want to live healthy, follow the rules of health. The XXIII Rule of the Regimen Sanitatis Salernitanum, entitled *De lotione manuum*, underlined how the physicians incentivized to follow what is the golden rule of personal hygiene and above all public: to wash one's hands. The Salernitan Medical School showed its modernity also in oral hygiene. Especially in the *De Ornatu Mulierum*, text attributed to Trotula, there were many prescriptions for the care of the mouth and teeth. Trotula suggested rubbing the teeth with a linen cloth wrapped around damp wool and soaked in burned marble dust, burnt date seeds, white natron, a red tile, salt and pumice, the medieval ancestors of the toothbrush and toothpaste. *De Ornatu* also recommended that the mouth should be rinsed every evening with a fragrant wine and frequently chewed fennel, lovage or parsley during the day to keep the white teeth, the gums clean and the scented breath. Furthermore, in the Middle Ages the estab-

lishment of the *Magisteri* or Health Offices manifested the attention for public health. In particular, due to pestilence, also prevention assumed great importance as demonstrated by the first quarantine and health police measures.

However hygiene, as an organic science founded on solid foundations, will assert itself much later thanks to the Viennese clinician Johann Peter Frank (1745-1821) and to his work *A Complete System of Medical Policy (System einer vollständigen medicinischen Polizey)*, published in 1779. In 1785 the Hapsburg government sent Frank to the University of Pavia. He was appointed sanitary inspector general of Lombardy and introduced reforms in medical instruction and practice. Frank inserted the study of the Medical Police and Hygiene into university teaching plans. Their teaching was foreseen in the sixth and final year of the Faculty of Medicine and was entrusted to a single professor who was also to teach Special Pathology and Forensic Medicine (2). At the end of the eighteenth century the concept of Medical Police represented a turning point in science, as it suggested that for the prosperity of Nations governments should protect the health of their peoples, meaning health not a wealth of the individual, but of the whole collectivity (3). Frank proposed that in the field of medicine and health, caring for citizens, the maintenance of the poor and public welfare were the responsibility and task of the State (4). These ideas were at the heart of Frank's contribution to the development of social medicine and public health. Frank has studied and described all the social factors that, from birth to death, can influence human life, providing and outlining rules, regulations and programs for the protection of individuals from diseases and for the promotion of health. He was able to define an extraordinarily detailed system to regulate and promote hygiene by intervening in all aspects of social life:

"The medical police is the custodian who takes care of the health of men living in society and their pets according to equally liberal principles."

Frank's treaty is divided into chapters representing the major problems of the late eighteenth century intervening especially in defense of those categories at greatest risk for the proper functioning of the state. He took care of agriculture, industry, professions, discusses the planning of interventions in favor of motherhood and children, of farmers exposed to malaria and pellagra, of the artisans of the cities. He addressed the subject of animals, clothing, the healthiness of homes and workplaces, hospitals and shelters for the poor and orphans, urban planning, leisure time, cemeteries and burials, including the regulation of education and activity of the doctor, pharmacist and midwife; he also treated about deaths caused by homicide or suicide, in particular the so-called "honor killing".

As the health director and health official of Lombardy, Frank identified the unfortunate conditions of poverty among the population the main cause that fed the diseases. In his academic speech entitled *De populorum miseria: morborum genetrice*, (The misery of the people: mother of diseases), (1790) Frank attacked frontally and without hiding the situation of inequality and poverty existing as a direct cause of the health problems of the population, emphasizing that:

"Every social group has its own type of health and diseases, determined by mode of living. They are different for the courtiers and nobleman, for the soldiers and scholars. The artisans have various diseases peculiar to them, some of which have been specially investigated by physicians. The diseases caused by the poverty of the people and by lack of all the goods of life, however, are so exceedingly numerous that in a brief address they can be discussed only in outline."

In the introduction of *A Complete System of Medical Policy*, Frank shows interest in Forensic Medicine, outlining the pertinences and skills:

"Forensic medicine is already different from the medical police. The object of this is the general health of the state and the order necessary to preserve it; where the former is concerned with dissolving legal issues, which arise in certain meetings, and belong to the doctor more closely" (4).

The organic constitution of Forensic Medicine thought dates back to the sixteenth and seventeenth centuries with the works of the sicilians Gianfilippo Ingrassia (1510-1580) and Fortunato Fedeli (1550-1630), of the Giovan Battista Codronchi (1547-1628) and, above all, of the roman Paolo Zacchia (1584-1659). His work *Quaestiones medico-legales* marked a fundamental moment in the meeting between medical-scientific knowledge and legal knowledge (5). The chapters of this work are dedicated to insanity, to toxicology, to simulations of illnesses, to pregnancy, to

professional errors and to a long series of medical-legal advice and decisions. Zacchia deals with important issues such as the expert examination of wounds, the control of diseases of prisoners, diabolical possessions, the techniques of assessment of the vein, the qualification of hermaphroditism and the role of torture in the judicial procedure. This treatise has exerted a wide influence in Italy and in Europe in the establishment of Forensic Medicine and in the practice of medico-legal proceedings until the end of the eighteenth century when Legal Medicine was renewed through a new treatise based on updated scientific knowledge. An exponent of this innovative development of Forensic Medicine was the French Francois Emmanuel Foderè (1764-1835) with his work entitled *Les lois* éclairées *par les sciences physiques ou traité de médicine – légale et d›hygiène publique*, published in Paris in 1799. He aspires to regulate and legitimize the practice of the coroner and to clearly define the specifics of a discipline rejecting medico-legal empiricism based on a practical routine without any theoretical basis.

Finally, our attention is turned to Occupational Medicine. This discipline was born in the eighteenth century thanks to the work of the Italian physician Bernardo Ramazzini (1633-1714) (6). His most important contribution to medicine was his treatise on occupational diseases *De Morbis Artificum Diatriba*, written after forty of medical practice. Ramazzini is interested in diseases that affect the most miserable people and the artisans; in particular during his geophysical investigations he had directly observed sewer workers (7). Each chapter of the treaty is dedicated to the description of the illness associated with a particular work activity followed by a description of the workplace, questions for workers, description of the disease, remedies and advice. He investigated most of the professional conditions that could cause damage to health such as the use of chemical or physical agents and traumas caused by prolonged, violent and irregular movements and prolonged postures imposed by modern work in factories. The modernity of his thought was also reflected in the opportunity to combat occupational diseases with prophylaxis rather than with therapy. Despite the *De morbis artificum diatribe* was an innovative volume in its content, it remained an isolated study, unprecedented in medical historiography, but also destined to remain unseen for a long time yet. We must await the nineteenth-century innovative medicine in order to see recognition for the study and work of Ramazzini and the revolutionary importance of his argument for Occupational Medicine (8), considered later the founder of this discipline.

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Medicina Historica 2018; Vol. 2, N. 1: 41-48

Teaching and learning the History of Medicine in the university: some considerations after the students' final exams

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Abstract. Reports about the teaching of the History of Medicine in universities worldwide can be found easily in medical literature. They are often comparative studies in which the opinions provided by the professors of History of Medicine are collected and the teaching programs are compared. A survey was also done based on questionnaires given to the students, in which queries about programs and matters of the teaching were proposed, but answering the closed and predefined questions of a questionnaire can limit or condition the opinion of the student on the subject. Our study is instead centered on the final tests of the students, in which the candidate had the ability to choose the topic of discussion, and to outline his personal analysis. In this way the interaction between the student and the discipline, and his feelings about it appears to be more clearly recognizable. Therefore, this study may be proposed as a contribution to improving the knowledge surrounding the various scenarios that characterize teaching the History of Medicine, and more so the Humanities, in Italian universities today.

Key words: medical education, teaching history of medicine, medical school curriculum, medica humanities

Introduction

As early as 1941, an american gynecologist by the name of Frederick Loomis wrote that there is a great difference between the science of medicine and the art of medicine, and that the patient is in need of both. While science is taught in every medical school, art is taught in a relatively small number of schools, and even then, it is the student himself who unconsciously learns the best way to do things (1).

The overall organization of studies in the degree program in medicine, is as a whole based on the model of bio-medicine – namely the perspective of medicine as science that mainly emphasizes the biological and physiological principles applied to clinical practice.

This risk of imbalance may cloud the human dimension of medical practice and does not help the student develop the awareness that his future profession requires and attitudes and methods that go beyond pure technical knowledge (2, 3). The skills acquired by the student according to the exclusive model of biomedicine must match, at the time of application in the practice, with the cultural and social context, the economic situation, and the anthropological dimension of each person. The doctor-patient relationship sometimes resembles a true art rather than a pure science.

Due to this pedagogical concern, in the early sixties of the twentieth century in the United States, the so-called Humanities became part of the curricula of medical schools (4). The inclusion of the Medical Humanities in the study programs, spreading from the United States to other contexts such as the European one, is considered a great innovation in medical education in recent last years (5). It would be optimal if one could transmit the contents of the Medical Humanities into every single clinical teaching, as well as in medical practice. This would allow the human and clinical dimension to merge into the unicum of the patient, thus integrating them into the so-called hidden curriculum, namely the set of cultural contents, expec-

tations, and values that are not formally communicated and established, but which are nevertheless transmitted within a learning environment (6, 7).

This kind of approach, which David Jones summarizes as "infiltrating the curriculum", has already been integrated into the educational systems of some American Universities (8, 9).

The History of Medicine, as part of the Medical Humanities, serves as a valuable tool when it comes to teaching students the concept of medicine as a science that is applied to humans, and helping them understand that the role of the physician is to not only act as a clinician and as a scientist, but also as a figure who is included in a social context. In fact, the study of the History of Medicine, whether it be by way of discoveries and progress or errors and failures, can help the student in pre-clinical training when it comes to understanding the professional identity that has been built over the centuries by responding and modeling to the sociocultural circumstances of every age, with a critical spirit.

The statements of the Italian Ministery for Education, University and Research, concerning the academic discipline encoded as MED/02 S.S.D. (Settore Scientifico-Disciplinare - Scientific-disciplinary Sector) foresees that the History of Medicine is interested in scientific and didactic-training activity in the medical history field, including medical museology, paleopathology, and the history of veterinary medicine; the discipline also focuses on developing skills in bioethics, the history of bioethics, and the aspects of teaching in the health sector that are derived from the history of the medical sciences.

The limited amount of lecture times that are offered for frontal lessons force the teacher to limit the number of topics that are to be taught in the classroom, thus obliging him to make a suitable choice when it comes to offering the student adequate elements to develop an autonomous critical approach to the discipline.

Unlike the strictly technical-professional, biological, and clinical subjects, which lend themselves to a didactic program that is built in a fairly standardized way, so as to lead the student to achieve the necessary skills, the fluidity of the topics that the History of Medicine offers, allows one to reach educational objectives in variety of ways.The aforementioned academic fluidity may allow teachers and students to build, through an appropriate interaction, a path that is not necessarily pre-established, but is flexible and adaptable, in light of previous experiences.

Beginning with a description of the experience of the semiannual course about the History of Medicine, this study then moves on to an analysis of the topics discussed during the students' final exam, which was based on an autonomous and individual choice. The aim of this study is to obtain an indication of the level of interest they developed in relation to the subject matter, to understand the students' ability to individually elaborate one of the chosen subjects, and to comprehend the teacher's final expectations in regards to the panel of issues discussed during the lessons.

In order to complete the above-mentioned analysis, the results obtained from the exam survey were compared to those that were collected from the answers of the students' questionnaires for the evaluation of the course's didactic at the University of Bologna's Medical School.

Reports about the teaching of the History of Medicine in universities worldwide can be found easily in medical literature (10-13). They are often comparative studies in which the opinions provided by the professors of History of Medicine are collected and the teaching programs are compared. A survey carried out by Neil H. Metcalfe is based on a research in 32 universities in the United Kingdom and highlighted how the History of Medicine is delivered, learnt, and assessed in a variety of ways as a Student Selected Component (optional modules) of the curriculum (14). This study is based on questionnaires given to the students, in which queries about programs and matters of the teaching were proposed, but answering the closed and predefined questions of a questionnaire can limit or condition the opinion of the student on the subject. Our study is instead centered on the final tests of the students, in which the candidate had the ability to choose the topic of discussion, and to outline his personal analysis. In this way the interaction between the student and the discipline, and his feelings about it appears to be more clearly recognizable.

Therefore, this study may be proposed as a contribution to improving the knowledge surrounding the

various scenarios that characterize teaching the History of Medicine, and more so the Humanities, in Italian universities today.

Materials and methods

During the 2014-2015 academic year, the University of Bologna's Medical School introduced a slight change to the structure of the first year of the Course of Medicine and Surgery. In addition to the two customary groups (identified as channels A and B) in which the students are generally divided, a third group (deemed the Recovery Channel) was set up in the second semester. This additional group was created for students that were enrolled with reserved status in the school, by virtue of the legal appeal against the national admission selection test in the 2014-2015 academic year. One hundred and thirty students were thus enrolled in this Recovery Channel. According to the school programs, they followed the Integrated Course of Human Anatomy - History of Medicine. The History of Medicine module provided eight hours of frontal teaching and was assigned to an external teacher (NNA) in possession of the National Scientific Qualification for the Competition Area 06/A2, comprehending the History of Medicine disciplines, and with previous experience in teaching at the university level as a contract professor of History of Medicine and Medical Humanities. For the purpose of setting up the examining board, an „exam board member" (Cultore della Materia) trained in the discipline, was also appointed (E.A.).

Considering the limited number of hours of scheduled teaching, only some introductory and general issues were dealt with during lessons, namely:

1) History of Medicine's role in the training of the medical doctor
2) The teaching of medicine before and after the birth of the University
3) Origins and evolution of hospital care
4) The development of anatomy from antiquity to the nineteenth century: normal and pathological anatomy, the microscope, microscopic anatomy, and the study of the cell and tissues.

The learning material used in the classroom was made available to all students, both those attending and those not attending to the lessons, thanks to the AMS Campus platform that was specially created on-line by the University of Bologna. In addition, the teacher also placed a file on this site containing the entire historical path of medicine, from its origins to the nineteenth century, that he had already used in his other courses, so as to give to the students a general trajectory for their studies. For the final examination, students were asked to discuss a topic of their choice in the field of the History of Medicine, including topics that were not discussed in class. The topic was discussed in a short paper, which was then presented orally to the examining commission. The commission then used the paper topic to develop the oral questions that were used to evaluate the candidate's acquisition of autonomous critical reasoning.

The dissertations presented by the students were then collected and filed. Once the exams were completed, this material was submitted for careful review, in order to elaborate upon and draw out the elements that would be most useful for an assessment of the students' educational path.

Moreover, at the end of each course, the University of Bologna's Medical School gave the students an optional and anonymous questionnaire in order to evaluate the didactic activity. For the 2014-2015 academic year, the questionnaire included seventeen questions that encompassed all the didactic aspects (teaching, classrooms, didactic material, final exam procedure, etc.) with respect to which the students were asked to choose one of the following four possibilities of personal judgment: Clearly NO, More NO than YES, More YES than NO, Clearly YES.

The results that emerged from the questionnaires were analyzed and compared with what emerged from the students' exams.

For the purpose of this study, the papers were first divided into two sets, depending on whether they were characterized mainly by historical-philosophical contextualization, or rather bio-medical (iatrocentric) contextualization, in regards to the topic. Within these two sets, some main thematic subcategories were been identified. Due to the complexity of this discipline, and the fact that some topics pertained to several of these subcategories, it was decided that the commis-

sion should consider them as belonging only to the more predominant category.

Results

Starting from the summer session of the 2014-2015 Academic Year, and in the following sessions leading up to June 2016, one hundred and fifteen students took the exam, which included delivering the dissertation and discussing it orally.

The topics presented at the final exam were allocated between the two main areas of interest determined above without much difference: 53% concerning the historical-philosophical area, 47% concerning the iatrocentric area.

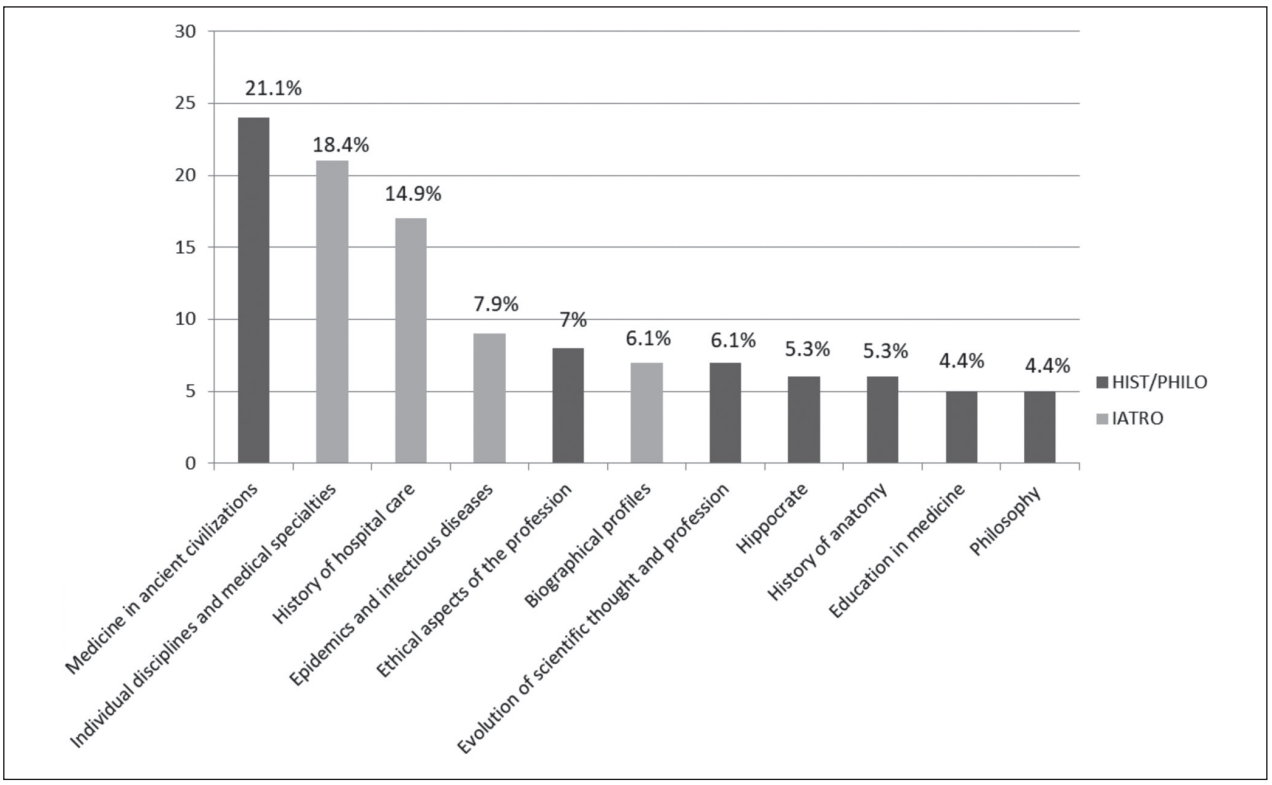
The students' topics on historical-philosophical issues have been further grouped in the following subcategories (Tab. 1):

Medicine in ancient civilizations: 24 dissertations (21.1%). This category collected three papers dedicated to medicine in Ancient Rome, five dedicated to Egyptian medicine, nine dedicated to medicine in Ancient Greece, and six compared Greek and Roman medicine. In terms of percentage, this grouping represents the subcategory chosen most by the students. While these issues were only dealt with in an introductory way during the lessons, the fact that 24 students chose to write a dissertation on this topic leads us to conclude that they were interested in the subject matter themselves.

Ethical aspects of the profession: 8 dissertations (7%). This category collects very different dissertations in amongst themselves, in addition to issues exclusively dealing with ethics and deontology, such as the right to health, the medical sciences, the gender medicine, the the doctor-patient relationship.

Evolution of scientific thought and medical practice: 7 dissertations (6.1%). This subcategory includes the students whose topics deal with events and discoveries that have marked the progress of scientific thought and medical practice.

Table 1. Students dissertations presented at the final exam broken down by topics and allocated between the two main areas of interest: historical-philosophical area (HIST-PHILO), and iatrocentric area (IATRO)



Hippocrates: 6 dissertations (5.3%). The commission decided to consider this subject in a distinct way, even though it may be included in other categories for two reasons. The first reason is quantitative in nature, because the number of works that had the Hippocratic figure as their theme was numerically relevant in itself. The second reason for the creation of this subcategory is the variety of profiles chosen by the students: biographical, ethical-deontological, scientific-philosophical – thus demonstrating that this theme deserves an autonomous categorization.

History of anatomy: 6 dissertations (5.3%). As for those dedicated to Hippocrates, it was decided to maintain a separate category for the relevance of this topic. The history of anatomy has been addressed by highlighting the aspects related to the scientific innovation that it represented, creating a socio-cultural contextualization of the historical period in which the practice of dissection was reintroduced, and studying the artistic repercussions resulting from the evolution of anatomical sciences. All the works dealt with anatomy using a predominantly humanistic interpretation. For this reason, one must consider these dissertations as belonging to the historical-philosophical and non-iatrocentric area.

Education in medicine: 5 dissertations (4.4%). This category includes dissertations that have retraced the main historical phases of the evolution of medical training or focus on particular moments and facts (for example the Scuola Salernitana).

Philosophy: 5 dissertations (4.4%) The dissertations were based on the relationship between the philosophical and scientific disciplines in Medicine. They studied the epistemology of scientific method and clinical reasoning by relating the models of the scientific environment with those of the surrounding human society. The students' dissertations about Biomedical issues (iatrocentric) have been grouped into the following sub categories (Tab. 1):

Individual disciplines and medical specialties: 21 dissertations (18.4%). The students chose to discuss the history of some medical specializations and / or pathophysiology of organs and apparatuses. Their choices were often motivated by their interest in a specific medical discipline, which had already begun to emerge after their first year of study. This led the students to carry out the completion of their dissertations with great research autonomy.

History of hospital care: 17 dissertations (14.9%). In order to develop this topic, the students were provided with the teaching material that was used by the teacher in the classroom. The were also some dissertations that successfully personalized the topic and treated in a very original way. For example, some students carried out historical research on local hospitals that are located close to their residence.

Epidemics and infectious diseases: 9 dissertations (7.9%). In this group, it is perhaps easier to appreciate the willingness of the student to seek a synthesis of the interpretative keys of the History of Medicine, thus drawing up a social, philological, and historical-scientific framework of the main epidemics and infectious diseases in history (plague, tuberculosis, and AIDS) – taking on the perspective of both the doctor and the patient.

Biographical profiles: 7 dissertations (6.1%). The selected biographies focused on figures that played a pivotal role in the History of Medicine, such as Giovanni Battista Morgagni (1682-1771), Ignaz Philipp Semmelweis (1818-1865), William Conrad Roentgen (1845-1923), and Florence Nightingale (1820-1910).

Furthermore, it was then possible to divide the students' dissertations in relation to their degree of originality and personalization, with respect to the themes proposed by the teacher. During the exam period:

36 students (31.3%) were inspired to choose dissertation topics that were contained in the teaching material that was made available by the teacher on the AMS Campus platform but not presented during the lessons.

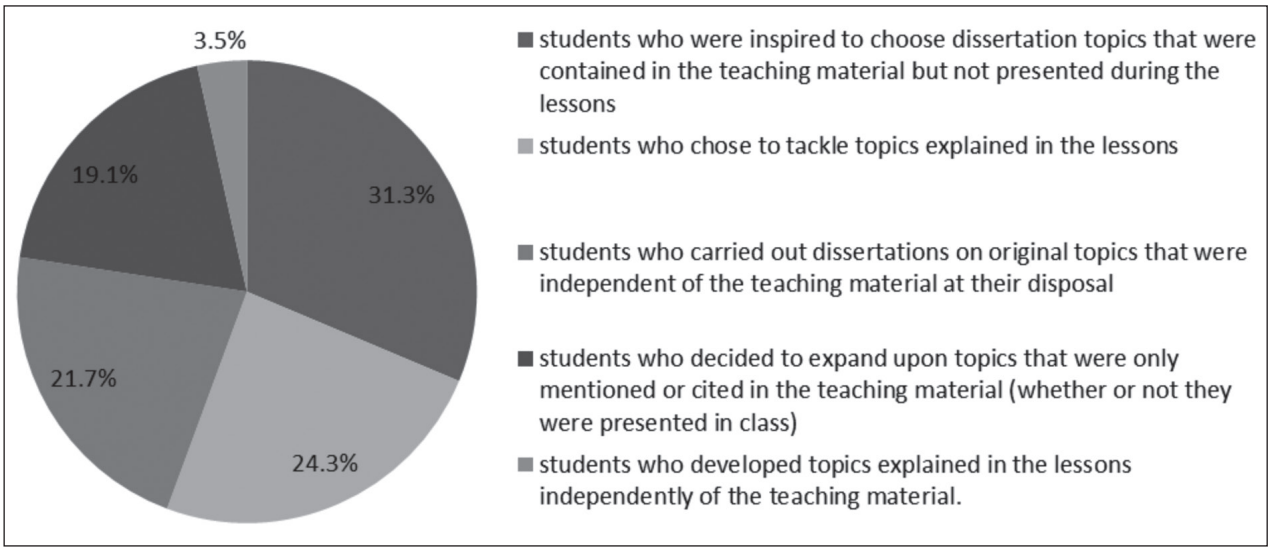
22 students (19.1%) decided to expand upon topics that were only mentioned or cited in the teaching material (whether or not they were presented in class) in their dissertation.

25 students (21.7%) carried out dissertations on original topics that were independent of the teaching material at their disposal.

28 students (24.3%) chose to tackle topics explained in the lessons, and the main subject of their dissertations was the history of hospital care.

4 students (3.5%) developed topics explained in the lessons independently of the teaching material.

Table 2. Students dissertations divided in relation to their degree of originality and personalization with respect to the themes proposed by the teacher



Thirtyfive students filled in the the questionnaire for the evaluation of the course, which amounts to just over a quarter of the total number of students. Of the 17 questions proposed in the university scheduled format, the following six were considered as relevant for this study:

1) Was the preliminary knowledge possessed sufficient to understand the topics included in the exam program?
2) Is the teaching material (that is indicated and available online) adequate for the study of the subject?
3) Were the examination methods clearly defined?
4) Does the teacher stimulate interest in this discipline?
5) Has the teaching been carried out consistently with what was stated on the course website?
6) Were you interested in the topics covered in the course?

The summarized results of the inquiry provided by the university offices show that the positive opinions (More YES than NO, Clearly YES) were 97.1% for the first question, 91.4% for the second question, 88.6% for the third question, 94.3% for the fourth question, 97.1% for the fifth question, and 91.4% for the sixth question (Tab. 3).

Table 3. Most relevant results about students questionnaire for the evaluation of the course of HIstory of Medicine

Question	Positive opinions
Was the preliminary knowledge possessed sufficient to understand the topics included in the exam program?	97.1%
Is the teaching material (that is indicated and available online) adequate for the study of the subject?	91.4%
Were the examination methods clearly defined?	88.6%
Does the teacher stimulate interest in this discipline?	94.3%
Has the teaching been carried out consistently with what was stated on the course website?	97.1%
Were you interested in the topics covered in the course?	91.4%

Discussion

Prior to commenting on the results of this report, some methodological aspects must be considered: this study is based on a fairly small sample, which refers to a single academic year and to a single university. In order to carry out a more extensive survey, it would be beneficial to expand the research. However, it is important to be aware of the fact that individual teachers adopt different teaching and examination methods, which may lead to difficulties in outlining a homogeneous collection of data.

To begin with, this study shows the tendency of students to consider other topics as well as those discussed in lessons. Furthermore, they tend to develop dissertation topics in a personal way, thus taking advantage of their freedom to choose content based on their own attitudes, aspirations, interests, and cultural background.

Second, out of the 32 students (27.8%) who chose to focus on topics discussed in class, 28 of them (24.3%) solely relied upon the teaching material that was at their disposal. Therefore, one can argue that these students are not willing to further develop their personal research skills and to expand upon what has already been explained by the teacher; On the other hand, 4 of them (3.5%) developed the subject independently of the teaching material, and adopted a method that revealed their personal interests in the topic. In fact, one can argue that the course topic aroused their interest in this field of study, which led them to further develop it.

Third, nine dissertations (7.8%) dealt with topics related to the place of origin of the students. For instance, some students from Rimini discussed the "*domus of the surgeon* of Rimini" in a in-class presentation. Fourth, three dissertations analyzed the role of women in the History of Medicine. Due to the fact that all of these papers were written by female students, one can gather that future female doctors can already perceive gender inequalities, and feel the social responsibility to change this structure.

In light of the above, it is now possible to connect the results of the final examinations and the opinions expressed in the questionnaire regarding the teaching activities.

Despite the limited and partial representativeness of the sample (it was not obligatory to complete the questionnaire in order to take the exam, as it was in some other universities), the opinions previously highlighted seem to be reinforced by the questionnaire results. For example, the students showed interest in the discipline itself, and this agree with the fact that several of them also chose topics that were not included in the teaching program (questions 4 and 6). They also were successful in the examinations, thus proving that they were able to understand the relevant mode of examination (question 3). A connection between the student's cultural background and the topics discussed during the exam was identifiable (question 1). Finally, the circumstance that a large part of the students expressed a positive judgment on the teaching material (question 2) highlights the fact that they were inspired by it, which then encouraged them to further develop these topics by using external sources.

More, the categories with the highest number of dissertations were: "Medicine in Ancient Civilizations" and "Individual Disciplines and Medical Specialties" (also including physiopathological or therapeutic topics related to some diseases). The first of these choices suggests that the students were interested not only in the strictly technical aspects of medicine, but also in the evolution of medical thought, its socio-cultural contextualization, and the intertwining of social dynamics and the humanistic-literary world.

The second of these choices highlights the fact that students tend to decide upon their specialization within the first years of medical school. As a consequence, students risk focusing on specific parts of medicine rather than the sick person as a whole. At the same time, an epistemological approach leads the student to comprehend that the evolution of a single medical specialty is connected to the evolution of all the other specialties, and overall that they are focused on the human being.

Finally, 85 of the students (74%) did not mention any bibliographic sources, which highlights the lack of methodological skills. While there was no instruction given in regard to creating a bibliography, this shows that the teachers cannot assume that first-year students have any knowledge of these skills. With regards to the oral examinations, it is clear that the students grasped the material overall, with a generally satisfactory interview.

Conclusion

The teaching of the History of Medicine is traditionally taught during the first year of Medical School in Italian universities. One can argue that including this course in the first year is a logical choice because it allows the students to study the foundations of medicine. On the other hand, one may claim that students are not capable of fully understanding the depth of this material, especially in regard to iatrocentric topics compared to the historical-philosophical subjects. It is, therefore, the duty of the teachers to understand how to make the History of Medicine accessible to the students (15). They must not limit their instruction to a simplistic list of episodes or definitions, and should instead insist upon the use of a methodological approach, critical rigor, and questioning the facts. As G. Armocida writes, the History of Medicine should focus on "historical information, which is useful to approach ideas and methods of the present, through the conscious use of conceptual, intellectual, and logical tools" (16).

J. Jones recently highlighted, "We believe that historical analysis can contribute to medical education in exactly the same ways as anatomy, biochemistry, or pathophysiology, as a fundamental component of medical knowledge. If this argument can be made visible through solid pedagogy, then the system of competencies can itself become a structure for demonstrating the value of history" (8). In conclusion, this study represents a proposal for further and more detailed investigations, with the involvement of a greater number of students from a variety of university medical schools, and through repeated observation in multiple academic years. For example, the multicentric collection of data makes it possible to compare different teaching models. Further, if the final exam is based on a free choice of topics, it must remembered that students can change their choices over the years, and this fact could represent how contemporary events impact their approach towards the history of medicine.

Acknowledgements

The authors will to thank Willa Davis for editing the English Manuscript.

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Medicina Historica 2018; Vol. 2, N. 1: 49-50

Some examples of treatment for the aortic aneurysm in use during the *Belle Époque*

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Abstract. The following report briefly illustrates the developmental level of aortic aneurysm treatment, as it is portrayed in a compendium of general medicine which dates back to the early 20th century.

Key words: aortic aneurysm, cardiovascular medicine, *Belle Époque*

Conventionally dated from the end of the Franco-Prussian War to the outbreak of World War I, the period commonly known as *Belle Époque* was characterised by a widespread confidence and a renewed passion towards the discoveries of Science and Technology, which were gaining a foothold both in Europe and in USA between the 19th and the 20th centuries (1). In this regard, Medicine made great strides in several fields. For example, X-rays were introduced for the radiodiagnostic; Bacteriology and Serotherapy took hold; blood groups were discovered; salicylic acetylated acid was widely sold; vascular sutures spread; physiopathology was used to make sense of several diseases, in what was becoming an increasing accurate Semeiotic. Definitely, many medical fields started to take on a sort of connotation that may be considered the backbone of their modern scientific paradigm. In this context, we would like to detect the first fruitful signs of contemporary *Cardiovascular Medicine* (2, 3): therefore, in this report we will briefly present some instances of treatment specifically employed for the *aortic aneurysm* (a topic largely debated in the medical literature of the 18th and 19th centuries), in the way in which they were portrayed in the Italian medical textbooks for practitioners in the early twentieth century. In particular, we think that Filiberto Mariani's summary illustration that concerns the developmental level of aortic aneurysm treatment is thorough, although schematic. Mariani (1867-1919), physician of the University of Genoa, inserted it in his *Compendio di Medicina interna e Terapia razionale* (Milan, 1902) (4).

The aortic aneurysm was described as a *dilatation* that was to be found in a segment of the vase: if the aortic tunica was not torn a *true aneurysm* would occur. This kind of aneurysm was also classified as *cylindrical*, or *resembling a sac* (5). Among the determining causes of the onset of the aneurysm there were old age, alcoholism, arteriosclerosis, syphilis, gout, lead poisoning; as for other causes that could contribute to the aetiology of this illness, it is worth to mention the effect of jobs, like that of porters or manual labourers, and that of particular physical activities, such as riding.

The treatment for this pathological manifestation derived from the observation of the spontaneous process of healing, or better, of the compensation of the disease. Inside the aneurysmal dilatation clots of blood form and, as they increase in size, they reduce the effect of the aneurysm. Thus, the treatment approaches suggested before and during the *Belle Époque* had the purpose of favouring the formation of clots inside the dilation of the aneurysm.

One of the first procedures mentioned in Italian medical textbooks of that era is the ancient *Valsalva method*, which was said to be still employed with success in the clinics of Genoa and Rome. This method consisted in daily bloodletting that, if combined with a proper diet and a period of rest, could have diminished the quantity and the strength of the bloodstream, in

this way favouring the spontaneous formation of blood clots, but also, in fact, decreasing the blood pressure.

According to the indications of Fergusson, massages were also provided, together with applications of astringents, refrigerants, *Collodion* and even caustic substances. In particular, the instillation of astringent substances in the lumen of the aneurysmal sac was previously conceived by Giovanni Battista Monteggia (1762-1815), who would use alcohol, lead acetate and tannin. At a later time, iron acetate, lactate, iron perchloride and ergotin were also employed.

A controversial method was that of the acupuncture thought up by Alfred Valpeau (1795-1867), who envisaged to put up to fifty needles inside the aneurysmal dilatation in order to break the bloodstream and consequently induce the formation of the clot. However, subsequent applications by other doctors (also Italian ones) were not successful.

Between the first and the second half of the 19th century, electricity was beginning to be applied on aneurysms as treatment, believing that the electric current would provoke the coagulation of blood. Among the others, many Italian doctors studied and applied this galvanic-acupuncture method and its variations: we remember Luigi Ciniselli (1803-1878) in Cremona (6), and Stefano Balp and Errico De Renzi (1839-1921) during the *Belle Époque*. Mariani underlined how galvanic applications used as treatment were well tolerated and didn't cause haemorrhages. He suggested the use of six needles and an electric current that should not be too intense (around 40-45 degrees on the galvanometer). The applications could be administered with an interval of 8 to 15 days.

Guido Baccelli (1830-1916) (7), renowned roman clinician, devised a system to induce the formation of clot through the introduction of a tiny clock spring in the lumen of the sac of the aneurysm, that is to say, where protein factors favour the coagulation aggregate. Such procedure was then improved by Baccelli's pupil, Mariani, who regularly employed it in his clinical activity.

In 1897 another newly-conceived method was presented at the Medical Academy of Paris by Lancereaux and Paulesco (8): according to this technique, aneurysms were to be treated through hypodermic injections of gelatine, with the idea that gelatine could easily favour the coagulation of blood. A debate on the effectiveness of this method followed, and many European doctors tried to test its experimental and clinical effectiveness. Mariani too was persuaded to apply this method, but the results he got were of no consequence as for the treatment of aneurysms.

Indeed, the treatments that developed during the *Belle Époque* were not fully effective and conclusive. However, in this period, Alexis Carrel (1873-1944) carried out ground-breaking studies on vascular suture and organ transplant, for which he was awarded the Nobel Prize for Medicine and Physiology in 1912. Carrel was a friend of René Leriche (1879-1955), the teacher of Michael DeBakey (1908-2008). DeBakey became famous for the classification and chirurgical treatment of the aortic dissection.

In conclusion, the thin silver thread that leads to the modern treatment of the aortic aneurysm can be traced back to the *Belle Époque*.

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Anne L. Grauer (Editor), *A companion to Paleopathology*, Wiley-Blackwell New York 2016, pp. 626 (Euro 195,00).

This book will be appreciated by many students and professional workers in the field for both its structure and its content, being at the same time very clear and scrupulous in such a way as to be scholar-friendly and very extensive and comprehensive in the interest of researchers. The discussed topics, thanks to their variety and multidisciplinarity, shall be of interest for paleopathologists, physical anthropologists, biologists, genetists, epidemiologists and other scientists from different backgrounds. In particular it combines the characteristics of a companion to the subject matter, as stated by the editor herself, with the merits of a handbook, an information source and a review of the discipline. The advantage of the book is to have reached an interdisciplinary cooperation between paleopathology and its neighboring disciplines and it appears as a result of a painstaking work, including consultations with a large number of experts in order to provide a thorough review on the subject and a synthesis of the key points of paleopathology. Through the chapters it provides a bird's-eye view on a large number of questions and arguments on the discipline, since as is said by the editor: <<*each contributor to this volume has been asked to provide a snapshot of a topic, and to expose issues and controversies together with their vision of a particular aspect of paleopathology. Their voices are varied, but their own: ranging from dense and detailed, to more casual and introspective. They reflect the discourse in our field*>>.

Starting from the framing of paleopathology, its objectives, its history and changes through time and controversies, the volume treats about the discipline's current and ever-evolving approaches to new directions and interpretations and its relationships with archaeology on one hand and clinical medicine on the other. As the purpose of paleopathology is to diagnose and to place diseases into an evolutionary, environmental and healthiness context in order to understand variables and to create new questions, it is important to promote cooperations and interdisciplinarity. The chapters of the book progress gradually from the general to the particular: beginning from the near and related sciences which supply multiple approaches to paleopathology contributing to its research, as ethics, genetics, epidemiology, parasitology and archaeozoology (Part I), it proceeds to discuss methods and techniques of inquiry (Part II), mostly lent by afferent fields as radiology, clinical medicine and statistic. In Part III the dissertation comes finally to the subjects proper to paleopathology, offering different voices from a large number of authors and researchers based on their own specialization: tumors, developmental disorders, trauma, infectious diseases, metabolic disorders, joint diseases and oral health. In this chapter they all speak about general problems that the discipline deals every day with: how the human body and the bone tissue react to pathological stresses, how the different diseases occur at the skeletal level and the way to recognize the global onset of a pathology on the skeleton to reach a more probable diagnosis.

Very interesting is the Chapter 2 on ethics in the use of human skeletal remains by P. Lambert, which offers a review on the codes that guide researchers to conduct ethical studies on human remains and the Chapter 4 in which R. Buzon speaks about advantages of a bioarchaeological approach to paleopathology to develop a more in-depth analysis of the human illness and morbidity; remarkable is also Chapter 14 for its global usefulness to the researchers, where D. J. Ortner discusses the important matter of differential diagnosis in diseases classification, providing an important dialogue between modern clinical data and paleopathology.

Chiara Tesi

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ARTICLE UP TO 3 AUTHORS. Sheibani K, Battifora H, Burke J. Antigenic phenotype of malignant mesotheliomas and pulmonary adenocarcinomas. Am J Pathol 1986; 123: 212-9.

ARTICLE, MORE THAN 3 AUTHORS. Fisher B, Costantino JP, Redmond CK, et al. Endometrial cancer in tamoxifen-treated breast cancer patients: findings from the National Surgical Adjuvant Breast and Bowel Project (NSABP) B-14. J Natl Cancer Inst 1994; 86: 527-37

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