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Severe gout and its treatment in an early 18th century Southern German monk: palaeopathology and archaeology

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Abstract. Following the restoration of the crypt of the Attel monastery in Southern Germany, the human remains of 16 out of 40 monks were exhumed and underwent anthropological and palaeopathological investigations. These skeletal remains were of individuals who lived between 1700 and 1750 CE. In some cases, thanks to the documentary sources, it was possible to identify individual monks and partially reconstruct their biographies and lifestyles. This situation in particular, applied to Gregorius Lechner (1672-1732 CE), *Oeconomus major* of the monastery. He was affected by severe gout, as shown radiographically (X-ray and CT-scan). Our findings were corroborated by the archival documents, which indicate that at the time of his death Gregorius Lechner was affected by gout and dropsy. Acute renal failure was the ultimate cause of his demise. Very interestingly close to his right arm, a typical «fontanela» plate, used to treat gout in the 18th century, was also found. The presence of this instrument found in close contact with the remains of a gouty Gregorius Lechner confirms its use in 18th century medical practice in Southern Germany.

Keywords: chronic hyperuricaemia, renal failure, «fontanele», monastic communities, Germany.

Introduction

The palaeopathology of metabolic disorders is mostly dependent on typical osseous lesions that are produced by the disease. This holds true for chronic anaemia [resulting in porotic hyperostosis (*cribra cranii* and *cribra orbitalia*)], scurvy and osteomalacia/rickets (resulting in subperiosteal bleeding residues, osteopenia and typical bone deformation) (Aufderheide and Rodriguez-Martin, 1998; Gomes *et al*., 2021). A further metabolic disease that may leave typical osseous traces is gout, the results of chronic hyperuricaemia. In this disease, increased blood levels of urea lead to crystalline deposits in bradytrophic tissues, such as dense connective tissues, preferentially in joint capsules or at subchondral junctions. Most frequently, the first metatarsal joint is affected leading to the erosion of the bone and the characteristic features of «podagra», the historical term for gouty arthritis of that joint (Dalbeth *et al*., 2016; Choi *et al*., 2004).

Increased urea blood levels are often the consequence of various genetic defects in the purine metabolism, mostly affecting the proper excretion of urea. These defects may be balanced, but in combination with enhanced production of urea from high level consumption of purine-rich food, such as entrails and red meat, may lead to clinical manifestation (Kuo *et al*., 2015; Gan *et al*., 2024). As a further factor, alcohol blocks the metabolic excretion of urea and, thereby, may also contribute to its accumulation. Accordingly, both consumption of red meat and/or entrails along with alcohol may lead to hyperuricaemia and may result in clinically manifest gout (Ragab *et al*., 2017; Xiao *et al*., 2024).

The very typical erosion of the first metatarsal joint enables its identification in ancient human remains. In palaeopathology, there exist several examples for chronic gout, the oldest ones being identified in ancient Egyptian mummies (Smith and Dawson, 1924). Since then, several other cases have been reported (e.g. Rowling, 1961; Wells, 1973; Rogers *et al*., 1981; Fornaciari *et al*., 2009; Giuffra *et al*., 2017; Fornaciari *et al*., 2018). Beyond this, documentary sources on typical «podagra» (Fornaciari *et al*., 2018) and inherited gout (Bianucci *et al*., 2016) have also been used to suggest the diagnosis.

In contrast to our modern day pathophysiological and molecular explanation of the disease, historico-medical hypotheses were initially based on the Hippocratic theory of the «four humours» and their misbalance in causing diseases (Adams, 1886). Accordingly, the treatment of gout was mainly aimed to enhance the excretion of phlegm by bloodletting and clysters (enemas). Since the times of Hippocrates pharmacological treatments and strict diet were also prescribed (Griztalis *et al*., 2011). In the early 17th century, one of the medical treatments of gout included the production of surgically

created skin ulcers called «fontanele», although these were not used only for gout therapy, but also for the treatment of numerous other diseases (Schorers, 1671). These skin ulcers were performed mostly at the upper arm and were kept open by using small foreign objects. The ulcers were preserved and covered by a typical metal plate called the «fontanela plate» (Häck and Nerlich, 2016).

In the present report, a case of bilateral arthritis urica of the hallux (podagra) in the skeletal remains of an early 18th century monk from a Bavarian monastery is described. Very interestingly, the recovery of the typical «fontanela plate», originally positioned closed to the right arm of the monk, also occurred. Both the palaeopathological evidence and the recovery of an anatomical instrument used to treat gout strongly suggest that the individual was affected by a chronic form of the disease at the time of his demise.

Materials and Methods

The monastery and the crypt

The present case report is one of a series of 19 individuals exhumed from the crypt of the monastery church of Attel, Bavaria/South Germany (for overview see Nerlich *et al*., 2015) (Fig. 1). The small Benedictine monastery of Attel was founded in 1037 CE. Since then, with a brief break between 1070 and 1110 CE, it was continuously in use until 1803 CE, when due to secularisation, all Bavarian monasteries were abolished.

Fig. 1. *The monastery of Attel, aerial view in 1701 CE. From Topographia bavarica by Michael Wening (1645-1717). Credit: Wikipedia; https://commons.wikimedia.org/wiki/File:Michael_Wening_Closter_Attl.jpg.*

The monastery is located on the banks of the river Inn on a hillside, a position which prevented the buildings from direct damage during frequent floodings. On the other hand, the location facilitated the use of the river as an efficient transport route for various goods and significant trading (Fig. 1). Accordingly, the monastery became moderately wealthy over a long period of time; only interrupted by periods of warfare, such as in the Thirty Years´ War (1615-1645 CE) and the War of Spanish Succession (1701-1711 CE) (Schinagl, 1990).

The results of previous palaeopathological investigations and the analysis of the documentary sources of the monastery church (Schinagl 1990) are available in Nerlich *et al.* (2015). The name, age at death, and function of most members of the monastic community were available. Where possible, the diseases of some personages and, eventually, their cause of death were also determined. Further information on individual monks came from descriptions in «death notices» (the so-called «Totenrodel») (Fig. 2) which were exchanged between monastic communities. In this specific case, the exchanges occurred between the monasteries of Attel and Amberg, Bavaria.

Fig. 2. *The death notice («Totenrodel») from Gregorius Lechner. Credit: Amberg, Provinzialbibliothek, 2Ms39/2, urn:de:bvb:00043077-3, CC BY-NC-SA 4.0 DEED.*

Within the monastery church, the crypt was placed below the altar and was reserved for monks. The crypt consists of 40 burial chambers closed by brick walls. Several burial chambers were labelled with the names of the deceased (Fig. 3).

Due to renovation works by the church authorities (the «legal owners» of the crypt), 16 out of the 40 burial chambers were opened and their content (human remains, residues of wooden coffins, funerary equipment) was removed. All materials were subjected to subsequent investigation by the Bayerische Landesdenkmalamt, München. Our research team was entrusted with the analysis of the human remains by Bayerische Landesdenkmalamt, München. Official permissions for the analyses were obtained both by the

local parish and the official state office (Nerlich *et al.*, 2015). The crypt consists of typical longitudinal loculi approximately dated between 1700 CE and 1750 CE. Each loculus contains one burial.

Fig. 3. *The funeral chamber of Gregorius Lechner before its opening. Credit: A.G. Nerlich.*

After opening of undecorated chambers (2 m long by 60 cm wide by 42 cm high), all materials were removed and pre-screened. Inside the residues of wooden coffins, aside from the skeletal remains, clothes and grave goods e.g. as rosaries and crucifixes, clothes, and leather shoes, were also identified. At the time of the burial, all corpses were mostly covered by large amounts of a whitish crumbly material, lime, to avoid any undesired putrid smells from the decomposing corpses (Fig. 4). All skeletons were in a good state of preservation.

Fig. 4. *The burial chamber of Gregorius Lechner at the time of the opening: the coffin was broken and the skeleton was covered by lime. Credit: A.G. Nerlich.*

Anthropological and palaeopathological investigations

Following the exhumation, an anthropological survey was performed to determine sex, age at death, body height and physical characteristics of the 16 individuals (Buikstra and Ubelacker, 1996). Features of pathological conditions, infectious diseases, sequelae of trauma, chronic metabolic deficiencies and dental pathology, were determined (Nerlich *et al*., 2015). Degenerative diseases of large joints and the vertebral column were evaluated using established criteria and standardised protocols (Schultz, 1988).

Radiological investigations

In order to enhance the palaeopathological diagnostics, X-rays and/or CAT-scans on isolated skeletal elements were performed. Previously described protocols were followed and the technical details (see Panzer *et al*., 2018).

Stable isotope analyses

To investigate the nutritional composition of the examined individuals, standard bone samples from vertebral bodies of all identified persons were used. The analysis of nitrogen and carbon isotopes was performed according to established protocols (O´Connell and Hedges, 1999). Stable isotope analysis and concentration measurements of nitrogen and carbon were performed using ratio mass spectrometry (IsoAnalytical Crewe, UK) as previously described (Panzer *et al*., 2014).

Results

The results of the investigation of a portion of the monastic population (16/40) from Attel are presented in Nerlich *et al.* (2015). The present report is focused exclusively on Gregorius Lechner (1672-1732).

«Biographical» information about Gregorius Lechner

Gregorius was born on the 25th March 1672 in the small Upper Bavarian village of Pfaffing, which is located close to the river Inn, around 15 km from the Attel monastery. Although Gregorius was part of the local population, no information about his family nor on his life before he entered the Attel monastic community is available.

Aged 23 years he took his vows and he was consecrated as a monk 3 years later. He was designated «Oeconomus major» at the age of 41 years thus becoming responsible for all external economic transactions of the monastery. He was frequently involved in official events, representing the monastery in specific functions, such as the «superior» (Schinagl, 1990). Given his role within the monastic administration, he had access to adequate nutrition and

personal resources.

Two archival reports concerning him mention that he had «weak healthiness» and was suffering from chronic gout and dropsy (Schinagl, 1990). Unfortunately, there is no indication about how long these pathological conditions may have persisted or when they started. On the 28th September 1732, Gregorius died at 60 years old (Schinagl, 1990). Chronic gout and consequent acute renal failure (described as dropsy) were stated as the cause of his death.

Anthropological investigation

Following the removal of all materials from the Gregorius Lechner's tomb, an almost complete very well-preserved male skeleton with 38 out of a possible 42 points (90.5%, termed representativity, and 126/126 possible points (100%, termed preservation) (Nerlich *et al*., 2015) was noted (Fig. 5). This previously established evaluation scheme divides the complete skeleton into distinct areas. The completeness (representativity) of the skeletal elements of each area is scored from 0-1 point (in 0.25 point steps). In parallel, the condition of the bone, in each area, is determined ranging between 0 and 3 points in order to indicate the status of preservation of the bone matrix (Nerlich *et al*., 2015).

Fig. 5. *The skeletal remains of Gregorius Lechner (1672-1732). Credit: A.G. Nerlich.*

Sex was evaluated taking in account both the morphology of the pelvis and the skull whereas age at death was determined according to the closure of skull sutures and the symphyseal morphology. Biological age at death indicates advanced age (senile group) of >60 years (Buikstra and Ubelaker, 1994).

The body height was estimated from long bone measurements using standard protocols (Breitinger, 1938). This protocol was applied to all long bones since it is suitable for historic white male populations, particularly in Central Europeans. The resulting values were pooled and the arithmetic mean determined. The measurements of long bones suggest a body height of 1.72 m +/- 2 cm (mean +/- SD).

Further measurements provided evidence for right handedness, while the left leg was preferentially used in walking. These were based on the comparison of the quotient of bone diameters to bone circumferences of the right versus left proximal humerus (for preferential handedness) and the diameters of the right versus left femur diaphysis (for leg preference) (Herrmann *et al*., 1990). In general, the measurements and the observation of muscle insertion zones clearly show low mobility («stenomeric») (Herrmann *et al*., 1990) and no evidence for specific mechanical loads/ overloads. Accordingly, he did not undertake regular exercise which was identified in other skeletons (Nerlich *et al*., 2015).

Palaeopathological findings

From a palaeopathological perspective, the most relevant finding was severe bilateral destruction of both first metatarsophalangeal joints; consisting of subchondral erosions along with the destruction of the capsular insertion zone. These changes are highly suggestive of arthritis urica (gout) (Fig. 6a-b). A similar erosive defect was also noted in the left second metatarsal joint (Fig. 6c). No other signs for erosive pathology affecting any other joints were identified.

Beyond this, the large joints showed minimal arthrosis with slightly higher numbers on the right than on the left side in the proximal humerus and elbow joints. There was no evidence of arthrosis in hips, knees or the ankle. The vertebral bodies showed only minimal degeneration.

Further pathological features were noted in the dentition (Fig. 7a-c). While only minimal dental attrition was present, there was extensive dental calculus (tartar) affecting almost all teeth on both the lingual and buccal surfaces. The left second upper incisor (region 22, FDI, 1971) fractured during lifetime, but otherwise all other teeth were present. The second right molar (region 17, FDI, 1971) showed a small area of buccal caries at the tooth neck.

Fig. 6. *Photograph of* ***a*** *the left first metatarsal* ***b*** *the right first metatarsal, and* ***c*** *the left second metatarsal of Gregorius Lechner. Credit: A.G. Nerlich.*

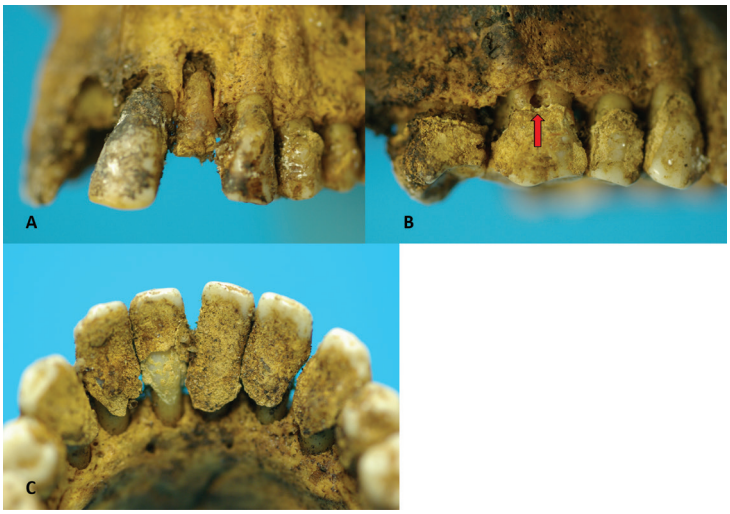

Fig. 7. *Dental pathology: intravitam fracture of the left upper second incisor (22) and extensive dental calculus. Note the small dental caries lesion in b (arrow) Credit: A.G. Nerlich.*

Radiological findings

Conventional X-rays and CT scans were performed on both metatarsals and confirmed the erosive lesions with typical subchondral destruction (Fig. 8a-c).

Stable isotope analysis

In order to evaluate his nutritional status, the ratios of stable nitrogen and carbon isotopes were determined which showed a very similar nutritional pattern for both with nitrogen δ15N values ranging at 13.56 and carbon δ13C

lying at -19.37. These data were in the range of all individuals analysed in the monastery (Nerlich *et al*., 2015). This nutritional pattern was that of mixed carnivore-herbivore diet with considerable amounts of terrestrial protein and an adequate carbohydrate.

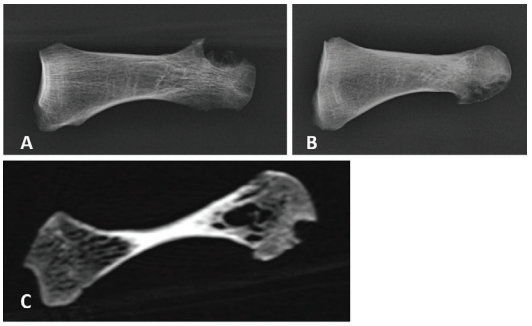

Fig. 8. *Radiological findings of both first metatarsal joints with a and b representing conventional x-rays of both first metatarsals; c shows a longitudinal CAT-scan of the right first metatarsal bone. Credit: S. Panzer.*

Archaelogical findings

Along with the human remains, his coffin contained a few additional objects. The most remarkable finding was a «fontanela» plate. This medical device was made of bronze secured to a well-preserved leather strap. It was used to cover the «fontanela» , a surgically created skin ulcer which, at that time, was created to treat several ailments including gout and dropsy (Galvani, 1620; Scultetus, 1656; Heister, 1749).

The bronze plate was sized of approximately 55 mm x 40 mm x 2 mm, contoured to sit on the arm. On its surface, a further small vertically slotted bronze plate was anchored to a leather strap. This leather strap consisted of an intact single band of moderately well-preserved leather with some superficial erosions due to its long-term persistence in the burial chamber milieu. The plate itself did not show specific decoration or inscriptions. The surface, however, was slightly damaged by superficial corrosion (Fig. 9a-b).

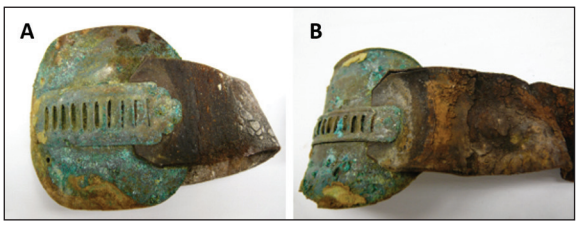

Fig. 9. *Photograph of the «fontanela plate» and the leather strap found close to Gregorius Lechner's right arm of. Credit: A. Riepertinger.*

Besides this, the coffin contained also his leather slippers, which showed considerable tear and wear, and a rosary which had been originally placed on the chest (not shown).

Discussion

Origin and manifestation of gout

The palaeopathological investigation of human remains may offer insights into metabolic bone diseases. Since monastic communities belonged to the wealthier part of historical populations, the presence of metabolic diseases due to access to ample resources could be expected more often than in socially low-level communities. Referred as *morbus dominorum* et *dominus morborum* [«the disease of the lords and the lord of diseases», a term coined by Suetonius (70-130 CE)], gout was associated with intemperance afforded only by the wealthy (Savica *et al*., 2013). The idea that the disease resulted from overindulgence in food, wine, and sex was recorded by ancient Roman authors and persisted into the Christian era (Scholtens, 2008; Gritzalis *et al*., 2011).

Previous palaeopathological research led to uncover several examples of metabolic disorders, including two cases of gout (*arthritis urica*), in a sample of the 17th-18th monastic population (16 out of 40) from Attel, Southern Germany (Nerlich *et al*., 2015). One of those cases was of particular interest since, not only the very typical osseous sequelae of gout were present, but there was also evidence for typical contemporaneous medical treatment of the disease. This case is presented here in detail.

Hyperuricaemia is a chronic metabolic disease originating from a disturbance of the metabolism of purines characterised by the accumulation of its end product sodium urate within the body (Ragab *et al*., 2017; Dalbeth *et al*., 2016). Recent data indicate that most affected patients suffer from inborn errors of metabolism mainly affecting the excretion of urea which, however, may be balanced under «normal» metabolic conditions (Choi *et al*., 2004; Gao *et al*., 2024). In most instances, clinical manifestation of gout comes from a combination of this defect with an excessive uptake of purines from the diet together with an enzymatic blockage of its degradation and excretion by toxic substances, such as alcohol. The enhanced level of urate in the blood stream leads to its deposition in bradytrophic tissue, such as especially the capsule of peripheral small joints. This deposition occurs in crystal form thereby causing massive resorptive inflammation, with consequent swelling and redness of small joints, most preferentially the metatarso-phalangeal and inter-phalangeal joints of the halluces (podagra). Occasionally, other small joints, such as of the hands (chiragra), but also large joints may be affected as well.

The chronic form of this condition leads to typical osseous resorption and joint destruction such as seen in the present case. The significant destruction of the first metatarsals further indicates that the metabolic condition had persisted for a considerable period of time (Kuo *et al*., 2015).

The findings in Gregorius Lechner

Palaeomedical investigation of the skeletal remains of the Oeconomus major of the monastery showed severe bilateral erosive arthritis of both first metatarsals and an affliction of the second metatarsal on the right side. All other joints appeared unaffected. The examination of his skeleton suggested that he did not undertake major physical work, as expected, and stable isotope analysis showed an adequate mixed carnivore-herbivore nutrition with considerable amounts of terrestrial protein and an adequate carbohydrate diet.

Minimal dental attrition also suggested access to a well-prepared adequate diet. Beyond the typically low oral hygiene as suggested by the excessive dental calculus indicates that his saliva contained protecting factors against the development of dental caries more frequently expected with significant carbohydrate intake (as indicated by the stable isotope pattern). The extent of the *arthritis urica* strongly suggested that he may have been an excessive alcohol imbiber, and/or the consumer of offal of cell-rich internal organs, e.g. intestines and liver.

Palaeopathology and history of gout

In palaeopathology, chronic gout has been recorded over time. In ancient Egyptian mummies (Smith and Dawson, 1924) the findings were further confirmed by laboratory investigations (Rowling, 1961). Furthermore, isolated cases have been seen in Roman cemetery (Wells, 1973) and Mediaeval Period skeletons (Rogers *et al*., 1981), in several cases of the Medici family (Fornaciari *et al*., 2009), and also as isolated findings or very small series in modern Pacific islanders (Rothschild *et al*., 1995). The most renowned cases of palaeopathologically verified gout are those of Emperor Charles V (1550-1558) (Ordi *et al*., 2006) and Federico II da Montefeltro (1422-1482 CE), Duke of Urbino (Fornaciari *et al*., 2018). The investigation of one of their fingers provided circumstantial evidence for gout.

In the case of Federico II da Montefeltro, the palaeopathological findings were also corroborated by documentary sources. In a letter dated the 20th of June 1461 addressed to his physician Battiferro, Federico II self-diagnosed a gout attack characterised by acute pain in the right toe worser than previous attacks. He also underlined that he had been on a strict diet (bread and water), but that he had not used the mithridate treatment nor the ointments which

he had been prescribed (Fornaciari *et al*., 2018). A case of early onset gout was identified, via contemporary textual accounts (in the absence of preserved bones), in Guidobaldo I da Montefeltro (1472-1508), Duke of Urbino, the son of Federico II da Montefeltro (Bianucci *et al*., 2016).

In history, gout was treated according to the then prevalent model of its pathophysiology. Hippocrates of Kos (5th century BCE) is considered to be the first to have accurately described gout. He attributed the physical manifestations of «the unwalkable disease» to an abnormal accumulation in the joints of one of the four humours, phlegm which resulted in them becoming painfully distended (Adams, 1886; Gritzalis *et al*., 2011; Nuki and Simkin, 2006). Fully aware of the severity of the disease, Hippocrates wrote that «*Persons affected with the gout who are aged, have tophi in their joints, who have led a hard life, and whose bowels are constipated are beyond the power of medicine to cure*» (Herrick and Tyson, 1936). The eminent Greek Diocles of Carystus (c. 375 BCE - c. 295 BCE) believed that gout was caused by an inflammation determined by precipitation of humours around the nerves of the foot joints. He recommended a strict vegetarian diet (legumes and vegetables) to prevent gout attacks. Basing his thoughts on the Hippocratic theory, Galen (129-ca 216 CE) attributed the presence of tophi to the manifestation of longstanding gout, which, in turn, was caused by *an intemperate, bacchanalian lifestyle* [Gout is the daughter of Bacchus and Venus] (Gaebel, 1983; Bhattacharjee, 2009). Rufus of Ephesus (1st century CE) was the first physician to recognise that gout is accompanied by systemic complications introducing the concept of «visceral gout». Rufus recognised that gout could affect inner organs and that, due to sudden revulsion of bad humours from the joints, pulmonary and cerebral complications, as well as renal failure, could be manifested and result in the death of the patient (Gritzalis *et al*., 2011). As to the prevention of gout, Hippocrates believed in the power of diet in the control of the attacks. He recommended for therapy high doses of white hellebore, which provoked dysentery thus allowing the body to expel the bad humour («*the best natural relief for this disease was an attack of dysentery*»). For the same purposes, the use of clysters was also recommended (Gritzalis *et al*., 2011). Various kinds of drugs both of plant and animal origin, were used to treat gout and were administered both orally or by absorption through the skin. Crateuas (120 BCE - 63 BCE), the court physician of King Mithridates VI of Pontus, recommended root of asphodels for the treatment of gout (Gritzalis *et al*., 2011). Dioscorides (40 CE - 90 CE) offered a list of medicine against gout (*boiled cyclamen root, duckweed, and other weeds*). He also recommended pharmacological preparations based on *smashed salix, bark and leaves warmed in the cortex of pomegranate with attar of rose* (Gritzalis *et al*., 2011). Galen prescribed different kinds of dressing that had to be applied on the affected joint and *made by various ingredients such as*

mandrake, caper, and henbane (Gritzalis *et al*., 2011). For the acute phase of the disease, he recommended tablets made of *aloe and creams containing seeds of conium, mushroom, and deer brain* (Gritzalis *et al*., 2011). He also recommended preparations established by other physicians (e.g. the Greek physician Heras, 1st c. BCE), which contained *olive oil, white lead, litharge and vinegar* (Gritzalis *et al*., 2011). Oribasius (c. 320 CE - 400/403 CE), the personal physician of the emperor Julian the Apostate (331-363 CE) recommended everyday use of a drug called *Remedy of Proclus (9 ounces of germander plus 8 ounces of white centaury)* to patients affected by gout, sciatica and all types of arthritis.

There is also evidence that colchicine, an alkaloid extracted from the bulb of *Colchicum autumnale (the autumn crocus),* was used as a powerful purgative in Greece more than 2000 years ago. Its successful use in the treatment of gout (as an anodyne narcotic) and fever (due to its diuretic and diaphoretic properties) is attributed to the eminent Byzantine Christian physician Alexander of Tralles (c. 525 CE - c. 605 CE). Since colchicine gave remarkable side effects, as the doses increased (vomiting, bloody stools, severe abdominal pain, bradycardia and stupor), its use became limited (Nuki and Simkin, 2006). Alexander of Tralles further recommended a magnet be placed on the affected joint to optimise the therapeutic treatment as well as an unction onto the affected leg.

Last but not least Arabic medicine devoted attention to gout. Rhazes (895 CE - 925 CE), the eminent physician of the mediaeval period, wrote in Baghdad a 23 volume treatise on medicine called Kitab al-Kaki. Great consideration is given to gout which he treated with opium and colchicine to ease the pain.

The «fontanela» arm band

One of the surgical treatments for gout in the early 17th century was described by Domenico Galvani (died 1649 CE) (Galvani, 1620). He applied a «*fontanela*» where a seton needle was used to puncture the skin and created a «small fountain» of blood hence its name. This was to let out the humour. This was most often performed on the upper arm. To keep the incision(s) active it was kept open by a small object such as a pearl or a small stone, which acted as a seton and covered by linen bindings. These were then held in place by an arm band made of leather straps attached to a metallic curved plate which was like the re-rebrace (the half sleeve of metal used to protect the knight's arm in armour). The typical «fontanela plates» have been illustrated in historical medical teaching books (Häck and Nerlich, 2016) such as Galvani's (Galvani 1620), and the German surgeons, Johann Schultz (1595-1645) (Scultetus, 1556) (Fig. 10) and Lorenz Heister (1683-1758) (Heister, 1749).

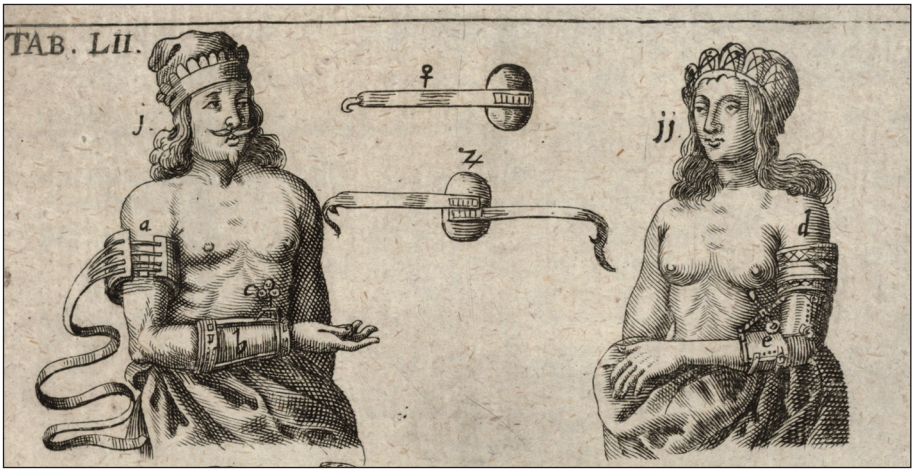

Fig. 10. *Typical representation of a«fontanela plate» by the surgeon Johannes Scultetus (the book was published posthumously in 1666, ten years after the death of the surgeon). Available at: https://books.google.it/books?id=hrAUAAAAQAAJ&printsec=frontcover&dq=scultetus+armamentarium+chirurgicum+1656&hl=en&newbks=1&newbks_redir=0&sa=X&redir_esc=y#v=onepage&q=scultetus%20armamentarium%20chirurgicum%201656&f=false.*

The presence of a «fontanela» plate close to Gregorius Lechner's arm provides evidence that he was buried with this device and that therefore the disease was most likely active at the time of his death. While «fontanella» plates have frequently been misinterpreted as belt buckles or other items of daily use, there exist a few examples of this medical instrument detected in-situ and associated to human remains displaying the typical signs of chronic gout (Häck and Nerlich, 2016). One case was identified in a Bavarian cemetery (Vohburg, 17th/18th century) associated with the human remains of a possible clergyman. In this case a 6 x 6.5 cm sized slightly concave and 2 mm thick bronze plate was found with some decoration and, on the ventral side, several vertical slots which served as fixation points for a leather strap which was wrapped around the arm. In this case the typical macroscopical and radiological signs of gout was documented with involvement of the first metatarsal joints (Häck and Nerlich, 2016). As a further case, the skeletal remains of bishop Johann Jakob Mirgl from Constanze/Lake Constanze, showed not only the traits of gouty arthritis, but also had a typical «fontanela» plate (Jensch and Wahl, 2010). The device was initially (and typically) misinterpreted as a «buckle belt» until re-evaluation established the correct medical use (Häck and Nerlich, 2016).

Conclusions

Gregorius Lechner suffered from chronic gout, whose disease was exacerbated by an unbalanced diet of purine-rich food (meat and offal) and, possibly, the consumption of alcohol. His position as Oeconomus major may have facilitated the access to this diet. Any medicinal therapy therefore is not recorded, but without a diet to reduce his risks then gout may ultimately have contributed to his death.

In contrast to modern concepts of therapy, the prevalent Hippocratic/ Galenic concept of treatment included the «fontanela» regime, an attempt to balance the humours in the diseased person's body. The presence of the «fontanela» plates typically of bronze or copper, should be taken into account when anthropological-palaeopathological examinations are performed, especially when attached to the cadaver. Although a complete work-up of all archaeologically reported cases of fontanella plates will not be possible (most skeletal remains will not be available for precise investigation of residues of gouty arthritis) further studies should take this combination into account, although it is clear that such «fontanela» plates were not used exclusively for the treatment of gout, but for a broad panel of various diseases (Schorers, 1671).

Although written sources suggest that gout has occurred frequently in history (Nuki *et al*., 2006), no data on the prevalence of this disorder in antiquity, nor its occurrence in specific populations such as monastic communities yet exists. This study adds to previous knowledge of gout reported cases in the palaeopathological literature.

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