Beethoven's Hair

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The "Guevara" lock of Beethoven's Hair is an immense historical discovery that yields insight into the life and death of one of the greatest composers of all time, especially the period of suffering during which he created most of his work. Most significantly, the lock provides evidence on Beethoven's infamous deafness, and the causes of the impairment.

On March 27, 1827, the day after Ludwig van Beethoven died, a young German pianist by the name of Ferdinand Hiller - the student of Johann Hummel, an old friend of Beethoven's - clipped a lock of hair off the head of the preeminent composer. Hiller would seal the hair into a small glass locket, and later pass it on to his son, Paul Hiller, shortly before his death in 1885, after a life as a small composer. Paul Hiller kept the locket until his own death in 1934. Before this, he had the locket resealed in 1911 by an art dealer, Hermann Grosshennig, in his hometown of Cologne[1]. This is significant, both because the resealing aided in preserving the hairs, and the inscription left on the locket by Grosshennig and Hiller verified the integrity of the hairs. When Hiller died, his family made numerous attempts to not appear Jewish in his obituary (such as publishing it in the most pro-Nazi newspaper in the area), despite having Jewish ancestry, due to fears of extreme anti-Semitism in Nazi Germany. These fears are most likely the cause of the disappearance of the Hiller family from the local address books at the time. The possessor of the hair is unknown at this point in time, until it reappeared in the Danish coastal town of Gilleleje in 1943, as a gift from an unknown Jewish refugee to the town doctor, Kay

[1] Russell Martin, *Beethoven's Hair* (New York: Random House, 2000), 64-65.

Fremming. On Fremming's death in 1969, the locket was passed to his adoptive daughter, Michele Larsen, who later sold the locket due to financial difficulties. The hair was purchased by American Beethoven collectors by the names of Ira Brilliant and Dr. Che Guevara, who later donated a portion of the hair to the San Jose State University (SJSU) Beethoven Center, in California. The hairs not donated, however, are a much more interesting story. Since the hairs were purchased in 1994, they have been a matter of scientific intrigue, and the subject of numerous state-of-the-art tests; some of these tests are still being performed on the hairs today. The results of these tests have yielded invaluable knowledge about the second half of Beethoven's life - from when he first began to notice his hearing troubles in 1797 - and provides evidence against many theories about Beethoven's death.

Throughout the 19th and 20th centuries, a myriad of theories were proposed to explain the cause of Beethoven's death and deafness. It must be noted that medical tradition at the time was to seek a unifying diagnosis that would account for every symptom a patient showed, a sort of "Occam's Razor" approach. Common theories proposed include: typhoid fever, syphilis, tissue immunopathy (a disorder where the body's own immune system attacks tissues and organs), sarcoidosis (a disease in which growths appear on various organs, and can very rarely lead to deafness), alcoholic cirrhosis, hepatitis, and Whipple's disease (a bacterial infection of the intestine)[2]. Other accompanying (non-fatal) illnesses that were proposed include otosclerosis (a hardening of the bones of the middle ear), Paget's disease (hardening of the bones), and kidney failure. Otosclerosis, however, had already been disproved by Beethoven's autopsy[3], where it was discovered that his ear bones showed no abnormalities apart from normal wear as a result of age, despite the support that this theory gained. Furthermore, many of the above illnesses lack hard evidence. As an example, for typhoid fever to be significant

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[2] Martin, *Beethoven's Hair,* 222-225.
[3] Stanley Oiseth, "Beethoven's autopsy revisited: A pathologist sounds a final note," *Journal of Medical Biography* vol 3, no 3 (2017): abstract, http://journals.sagepub.com/doi/abs/10.1177/0967772015575883

enough to have caused Beethoven's hearing loss, he would have had to suffer a severe attack early in his life[4]; there is no evidence of such an illness. Another example is the theory of tissue immunopathy; Beethoven did not suffer from bloody diarrhea[5], a near ubiquitous symptom of gastrointestinal immunopathy, which is the subset of immunopathy he would have had to suffer from to account for his symptoms. The theory that syphilis was the cause of Beethoven's troubles was as popular as it was controversial, in no small part due to Beethoven's fame. The lack of evidence affirming or denying this theory allowed it to continue gaining traction over the years. That is, until the discovery of Beethoven's very own hair.

In deciding the scientists to perform the testing on the hairs, the owner, Dr. Guevara, gave the Health Research Institute, led by Dr. William Walsh, the responsibility to choose the absolute masters in the field. In this manner, Dr. Werner Baumgartner was one of the chosen few, and the first to handle the hairs. Dr. Baumgartner is famous for pioneering the method with which to test hairs for drug use, used throughout the US for testing applicants for various professions, and used by law enforcement to test criminals for illegal drug use. The technique he used is known as "radioimmunoassay," or RIA, which involves radioisotope tracing to determine drug use in minute samples of bodily fluids or tissues. This test was done primarily to determine if Beethoven had taken opiates before his death, and to test for any other significant pharmacological substances. The results showed that Beethoven had, in fact, not taken any opiates in the time leading up to his death[6] (nor any other significant substances). This is quite surprising, since morphine was nearly universally prescribed at the time. This means that he was either not prescribed morphine, or that he refused to take the drug. The latter is most likely; it is very possible that Beethoven wished to keep a clear mind so as not to hinder his

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[4] Martin, *Beethoven's Hair,* 223.
[5] Michael Stevens, "Lead and the Deafness of Ludwig van Beethoven," *The Laryngoscope* 123, no. 11 (November 2013), 2854-2858, https://onlinelibrary.wiley.com/doi/full/10.1002/lary.24120
[6] William Walsh, "Beethoven Press Conference," Health Research Institute, last modified 2004, https://web.archive.org/web/20080306071933/http://hriptc.org/Beethoven.html

composing, despite the immense pain he must have gone through. Whether Beethoven "transcended pain" to write "profound music," or simply "suffered needlessly," is up to debate[7], though. Although the lack of opiates was an arresting find, the next test would prove much more significant.

The next master in the field chosen by Dr. Walsh was one Dr. Walter McCrone. Dr. McCrone is famed for having tested both the Shroud of Turin and Napoleon's hair, discovering that the Shroud had most likely been painted in the 14th century, and that Napoleon had not, in fact, been poisoned by the British (at least, not poisoned with arsenic, as the theory went). McCrone performed trace metals testing on the hairs, using techniques that include scanning electron microscope dispersion spectrometry (SEM/EDS) and scanning ion microscope mass spectrometry (SIMS), both of which involve studying the emission spectrum of a sample to determine the elements that make up the sample. This yielded two important discoveries. The first is that Beethoven's hair had no evidence of mercury[8]. In Beethoven's lifetime, mercury was the prescribed "cure" for syphilis, as it was believed to be a panacea of sorts. Thus, it was proven that Beethoven did not, in fact, suffer from the disease as so many had previously thought. While he may have also declined mercury as a treatment just as he had declined morphine, this is unlikely, since mercury does not have mind-altering effects, unlike the effects of morphine. The second find, however, was the most compelling find of all of the testing done on the hair.

The trace metals tests revealed that Beethoven's hair contained unusually high concentrations of lead, averaging around 60 parts-per-million[9], which is about 40 times the normal concentration. This has led researchers to believe that Beethoven suffered from

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[7] Martin, *Beethoven's Hair,* 217.
[8] Martin, *Beethoven's Hair,* 227.
[9] Walsh, "Beethoven Press Conference."

consistent, long-term lead poisoning, or plumbism. This diagnosis is revealing; the symptoms of plumbism are a near match to many of the problems Beethoven faced throughout his life. These symptoms include: abdominal problems, including pain, cramps, vomiting, constipation, and diarrhea - which match up perfectly with the descriptions of “the colic,” a common disorder in Beethoven’s time and one that he mentions suffering from in many of his letters - along with increased irritability, an abnormal gait, bone or joint pains, poor appetite, and kidney damage[10]. Finally, while uncommon, plumbism may lead to progressive hearing loss by damaging the auditory nerves, a disorder known as “axonal degeneration,” which can occur as the result of excessive contamination from heavy metals. Plumbism accounts for nearly all of Beethoven’s ailments, including his infamous deafness, and so fits neatly into the “single diagnosis” tradition. The questions that remain are the manner in which Beethoven became poisoned.

It was only in the 16th and 17th centuries that lead was pointed to as the cause of various illnesses. Despite this, the omnipresence of lead in numerous household objects - due to the ease with which lead can be shaped - meant that lead was still quite common in the daily life of Western civilizations. Old lead pipes and dinnerware coated in lead was the norm in a good number of European households. However, it is unlikely that pipes or dinnerware were the cause of Beethoven’s poisoning, since he rarely stayed in one household for long. He also did not interact with lead products in his daily life, such as lead based paints. Instead, the most likely culprit for Beethoven’s poisoning was his alcoholism, specifically his love of cheap wines. It is widely documented that Beethoven took to wine quite often, probably as a way to relieve stress from composing and conducting. A common practice in wine-making, dating back from Roman times, was to infuse the wine with lead. This was done to sweeten particularly sour wines (sourness is a usual sign of a cheap wine), using lead acetate to do so. Lead acetate is known as “sugar of lead,” and wine that has been treated with lead is known as “plumbed” wine.

[10] Gerald O’Malley, “Lead Poisoning,” Merck Manual, last modified January 2018, https://www.merckmanuals.com/

It was not until around 1750 that any laws were made to discourage the creation of plumbed wine, but these laws were incredibly difficult to enforce until effective tests for lead were developed later in the 18th and 19th centuries. Even then, standardised lead testing was unable to prevent all abuses. Lead lined barrels were commonplace, and lead was often used in de-acidification of wines, since lead naturally draws acid out of liquids. Furthermore, tests conducted upon eighteen German wines from the 18th and 19th centuries show that only five had lead levels below modern German laws of 0.3 mg/l. In fact, eleven different wines showed levels above 1 mg/l[11], an extremely high amount of lead. Beethoven's near daily consumption of cheap, plumbed wines is the likely cause for his lead poisoning - and the associated symptoms - and the cirrhosis of his liver, another major factor in his death, since sustained alcoholic abuse commonly leads to liver cirrhosis. While this is the most major discovery from the testing on the Guevara lock of Beethoven's hair, there is still further testing that has revealed more about Beethoven.

Dr. Walsh independently studied the results of the trace metals testing performed by Dr. McCrone, using techniques he had pioneered which note physiological abnormalities based upon different concentrations of metals in the human body. The analysis of the results shows that Beethoven lacked "distinctive trace-metal patterns associated with genius, irritability, glucose disorders, and malabsorption"[12]. This also leads to the conclusion that Beethoven was not naturally irritable; therefore, his irritability noted in the second half of his life is almost certainly a direct result of lead poisoning. DNA analysis has also been performed, but in-depth analysis of genetic traits (particularly for predisposition to musical talent and deafness) is lengthy and ongoing. One other high profile test was performed using Beethoven's hair, a test which has since led to controversy.

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[11] Heinz Eschnauer, "Wine - an enological specimen bank," In *Hazardous Metals in the Environment,* ed. By Markus Stoeppler (Elsevier, 1992), 60-62.
[12] Walsh, "Beethoven Press Conference."

In 1985, two Viennese physicians identified skull bones as belonging to Beethoven. The bones were the possession of one Paul Kaufmann, who stated that they had been passed down through his family for generations. The bones did not attain much significance until the lock of Beethoven's hair became widely known. Since the hair was verified to belong to Beethoven - due to its documented history, particularly the inscription on the locket - it was quickly suggested to compare the hair to the Kaufmann skull bones. Had the hair and bones been a match, the bones could have been used for more in-depth testing; DNA is more easily acquired from bone, which would have accelerated the process of DNA sequencing and analysis, and lead is known to quickly deposit into bone, from where it leaches into the bloodstream over a long period of time. Unfortunately, an independent study by Dr. Tim White proved decisively that the bones were not Beethoven's, since they do not match up with accounts of his autopsy, where his skull was roughly sawed open[13]. This setback means that it can not be conclusively determined that lead was the major factor in Beethoven's ailments, although all evidence still points to lead. Further testing on Beethoven's hair continues to today; the Guevara lock has yet to reveal every mystery it holds.

In 1797, Beethoven first began to report loss of hearing and difficulties relating to "the colic." It was also around this time when his music began to drastically change, from the traditionally classical music of his early years to his Heroic style of music in his middle years. This transition occurred not too long after his habitual drinking began, and he discovered a liking for cheap wines. Unfortunately, this passion, which would grow into abuse, eventually led to his death, from complications of lead poisoning and liver failure from excessive alcohol. And yet, if it were not for this debilitating habit - and the personality altering effects of lead - it is likely the world would not have heard Beethoven's greatest works. It is undeniable that his deafness and illness significantly affected his works. The Beethoven of 1793 was not the Beethoven of 1803,

[13] William Meredith, "Update on Skull Bones," Beethoven Center at San Jose State University, last modified July 24, 2015, http://www.sjsu.edu/

who was not the Beethoven of 1824. These drastic changes in form and temperament are results of his ever-worsening health. While no-one wishes to suffer, Beethoven did, and the world, along with all of music, is, arguably, better for it.

Bibliography

Eschnauer, Heinz R. “Wine - an enological specimen bank.” In *Hazardous Metals in the Environment*, edited by Markus Stoeppler, 60 - 62. Elsevier, 1992.

Martin, Russell. Beethoven’s Hair. New York: Random House, 2000.

Meredith, William. “Update on Skull Bones.” Beethoven Center at San Jose State University. Last modified July 24, 2015.

Oiseth, Stanley J. “Beethoven's autopsy revisited: A pathologist sounds a final note.” *Journal of Medical Biography* vol 25, no 3 (2017): abstract. http://journals.sagepub.com/doi/abs/10.1177/0967772015575883

O’Malley, Gerald F and Rika O’malley. “Lead Poisoning.” Merck Manual, last modified January 2018.

Stevens, Michael H and co. “Lead and the Deafness of Ludwig van Beethoven.” *The Laryngoscope* 123, no. 11 (November 2013): 2854-2858. https://onlinelibrary.wiley.com/doi/full/10.1002/lary.24120

Walsh, William J. “Beethoven Press Conference.” Health Research Institute. Last modified 2004. https://web.archive.org/web/20080306071933/http://hriptc.org/Beethoven.html