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Y-chromosomal analysis identifies the skeletal remains of Swiss national hero Jörg Jenatsch (1596–1639)

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ABSTRACT

Jörg Jenatsch was a Swiss defender of independence and a fighter for liberty in the 17th century. With the help of three living male members of the Jenatsch family, we successfully identified a skeleton exhumed from Chur cathedral as the remains of Jörg Jenatsch. Our conclusion was based upon complete Y-STR and Y-SNP profiles that could be generated by replicate analyses of a bone sample available to us. The skeleton and the three living family members carried the same Y-SNP haplogroup, but were discordant at three of 23 Y-STR loci. This notwithstanding, conservative biostatistical evaluation of the data suggests that the Chur skeleton is at least 20 times more likely than not to be Jörg Jenatsch.

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1. Introduction

1.1. History (adapted from a review [1] of the Jenatsch biography by R. C. Head [2])

Jörg (or Georg) Jenatsch (Fig. 1) was an important political figure in Graubünden (or Grisons, the largest and easternmost canton of present-day Switzerland) during the Thirty Years' War (1618–1648). At the time, the small federation of the “Three Leagues” (German: “Freistaat der drei Bünde”) had become strategically important and therefore a focus of wide political interests. Wedged between the Swiss Confederation, Habsburg Tyrol, Venice and Spanish Milan, the self-governing rural communities of Graubünden controlled the important Valtellina valley. Whenever Spain wanted to send soldiers from northern

Italy to the southern Netherlands in the early 17th Century, they had to pass the Valtellina. Consequently, the Spanish, French and Venetians all tried to gain a foothold in the Valtellina, and in Graubünden as a whole, through patronage, military intervention and downright bribery. Jenatsch, who as a young man became a Calvinist minister, emerged as one of the leaders of the mostly Protestant faction allied with Venice. Despite being a man of the cloth, he showed little reluctance to participate in acts of violence, including assassination and brutal murder. Among his victims were members of the influential “von Planta” family, local nobles who were closely allied with Spain. Keen on taking revenge, they forced Jenatsch into temporary exile. The former clergyman now had to live in Venice for some years and, in the end, became a professional soldier and military entrepreneur. This position turned out an important stepping stone for social advancement, and Jenatsch tried to persuade Ferdinand II, Emperor of the Holy Roman Empire, to grant him a title of nobility and a fief in the 1630s. He was about to achieve this goal when he was assassinated in a tavern in Chur, in 1639. By the time of his death, Jenatsch had undergone a profound change of identity, both religiously and politically, by converting to Catholicism. He had also put an end to

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GEORG JENATSCH
NACH DEM GEMÄLDE IM RHÄTISCHEN MUSEUM IN CHUR

Fig. 1. Presumed contemporary portrait of Jörg Jenatsch (1596–1639). The original of this painting is thought to have disappeared after it had been returned from the Raetian Museum Chur to the owner family in 1935. The same year, the then director of the Raetian Museum commissioned a copy (Inv. Nr. I. 15; shown here) by painter Paul Martig (with kind permission of the Raetian Museum Chur).

his close collaboration with France and had sought patronage and protection in Innsbruck and Vienna. In the 19th Century, Jenatsch became a sort of local and national (Swiss) hero, particularly after the famous novel *Jürg Jenatsch* by Swiss author Conrad Ferdinand Meyer (1825–1898) had been published in 1876 [3]. In 1987, a French-Swiss film adaptation (*Jenatsch*) by Daniel Schmid revived the story [4].

1.2. Exhumation of the skeleton in 1959

According to contemporary reports, Jenatsch was buried in the cathedral of Chur [5]. Due to subsequent renovation works and several rearrangements of the tomb slabs in the cathedral, however, the exact place of the tomb became unknown. The presumed Jenatsch grave was found in 1959 by Swiss anthropologist Erik Hug who identified the skeleton as Jörg Jenatsch on the basis of its clothing and of injuries to the head (Fig. 2). The skeleton was reburied in 1961, though without clothing and ornaments. Hug regularly reported his findings in public lectures but he never got round to publishing a scientific paper about this case. With Hug's death in 1991, all documents of his Jenatsch research disappeared. A long adventurous quest was initiated by Manuel Janosa of the Grisons Archeological Service and involved, among others, Hug's lawyer, an anthropologist friend of Hug and the dean of the Einsiedeln monastery. In 2009, Hug's documents were eventually detected in a safe inside the monastery shop [5,6].

1.3. Re-exhumation of the skeleton in 2012

Based upon the rediscovered Hug documents, the exact place of the Jenatsch grave could be localized inside Chur cathedral. The documents also contained a blood-soaked piece of fabric, purportedly Jenatsch's clothing, which ignited the idea of a kinship analysis. The fabric was analyzed at the University of Zurich (Institutes of Anatomy and Legal Medicine) and three male members of the Jenatsch family were traced. The Jenatsch family tree was reconstructed (Fig. 3) by historian and genealogist Paul Eugen Grimm. Unfortunately, no Y-STR profile could be generated from the blood stain, and the only way out of this deadlock was to collect new sample material. The bishop of Chur gave permission to exhume the skeleton again, which was done in March 2012.

The goal of the present study was to clarify whether the three male family members and the skeleton shared identical Y-chromosomal markers. This would argue strongly in favor of the skeleton belonging to the Jenatsch family and therefore, because no other male relative has ever been connected to the find, of being Jörg Jenatsch himself.

2. Materials and methods

2.1. DNA extraction

Three male descendants of a common ancestor shared with Jörg (named Anton Jenatsch) gave permission for genetic analysis aimed at confirming the authenticity of the skeletal remains. DNA was extracted from buccal swabs of both, the descendants and the excavator, using the QIAamp DNA Mini Kit (Qiagen).

Initially, an attempt was made to extract DNA from the bloodstains on the piece of clothing belonging to Jörg Jenatsch. An expert report from the Institute of Legal Medicine in Berne from 1959 attested that these spots were most probably blood [6], but at present no additional blood tests were performed. Samples were taken from at least two different locations using cotton swabs, and DNA was isolated with the QIAamp DNA Mini Kit. The extraction was performed twice following a DNA purification protocol for dried blood spots provided by the manufacturer, except for an increase of the volume of all buffers used before the washing steps, and of the incubation times.

From the historic skeleton, material from a bone (femur, diaphysis compacta) and a tooth (first right molar, M1/46, lower jaw) was subjected to DNA analysis. These samples were taken during the exhumation by two experienced researchers, with all necessary precautions. After UV radiation to decontaminate the surface, the samples were pulverized with a cryogenic mill (6770 Freezer/Mill[®], SPEX SamplePrep). Two DNA extractions (bone B1, B2, B3 and tooth T1 powder) were performed at a dedicated ancient DNA laboratory (Center for Evolutionary Medicine, Institute of Anatomy, University of Zurich) with adequate precautions and negative controls. A third DNA extraction (bone B4 and tooth T2 powder) was performed at a forensic laboratory (Institute of Legal Medicine, University of Zurich), also taking appropriate care. To ensure the highest possible reliability, some of the most general and widely accepted guidelines for aDNA work were followed [7,8]. These included, for example, the use of negative controls and the analysis of multiple extracts per sample. As was to be expected, an inverse correlation was observed between the amplification efficiency and the size of an amplification product, reflecting the degradation and damage of the ancient DNA template. DNA was extracted either with phenol-chloroform and silico-column clean-up [9] (aDNA laboratory) or using an in-house method whereby the bone powder is first carefully decalcified [10], then extracted and purified with the QIAamp DNA Mini Kit (forensic laboratory).

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