

**POTENTIAL CASE OF GYNECOMASTIA IN MUMMIFIED REMAINS OF AN EARLY  
MODERN PERIOD NORTHERN FINNISH VICAR**

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**RUNNING TITLE: POTENTIAL GYNECOMASTIA IN MUMMIFIED REMAINS**

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## Glimpse of our Past

### **Gynecomastia in a Mummified Northern Finnish Vicar**

#### ***Abstract***

We report possibly the oldest evidence of gynecomastia in mummified human remains.

Computed tomography was performed on the mummified remains of an early 17<sup>th</sup> century Northern Finnish vicar. The examination of the scans revealed large bilateral subareolar irregular masses resembling female mammary glands. The nearly septuagenarian vicar appears to have had gynecomastia, as it is a common condition in elderly men, and is sometimes associated with obesity. Gynecomastia is the most likely explanation for these findings.

**KEY WORDS:** Mummified remains, Gynecomastia, Radiology, Northern Finland, Early Modernity, paleontology, anatomy, archaeology

#### **Background**

Gynecomastia is a particularly common condition among elderly men and is often connected to a decrease in serum testosterone levels, although sometimes its etiology is less benign (e.g., Johnson and Murad 2009). First accounts of the condition date to antiquity, but to our knowledge gynecomastia has never been identified in mummified remains (Dawson, 1999; Aegineta 1847; Aufderheide, 2010). This paper describes possibly the oldest evidence of the condition in mummified remains.

#### ***Gross Findings***

Following his death in 1629, the body of Nikolaus Rungius (b. ca. 1560) (Fig. 1), the 7<sup>th</sup> Vicar of the Lutheran Rite of Kemi Parish (Finnish Lapland), was buried beneath the old church of

Keminmaa, which caused his remains to mummify (Väre, 2017). Previous analyses of his remains suggested that he was overweight. This conclusion is supported by not only the appearance of the mummy, but also the finding of diffuse idiopathic skeletal hyperostosis (DISH) in the thoracic spine (Väre, 2017) (Fig. 2). This condition mostly affects elderly, overweight men, perhaps suffering from metabolic conditions such as diabetes (e.g., Kiss et al., 2002; Manaster et al., 2013). Two minimal non-contiguous calcifications were detected in the femoral arteries while the preserved parts of the aorta were free of calcification suggesting that the vicar did not suffer from severe atherosclerosis.

As a clergyman, it is probable that Vicar Rungius would have had privileged access to foods of his choice and would not have been expected to perform physically demanding tasks, but rather would have led a rather inactive life (Virrankoski 1973, 682–687). His poor health probably decreased his ability to be physically active, and it is plausible that he had Pott's disease. (Väre et al., 2016; Väre 2017) (Fig. 2.)

### *Radiological Findings*

The CT scan of the remains was performed in 2011 at the Oulu University Hospital using a clinical 64-slice CT scanner (Discovery 690, General Electric Medical Systems, Milwaukee, WI, USA). A radiologist utilized clinical workstations to analyze the images. Paleopathological co-analysis of the images allowed a full paleoradiological research approach to be implemented.

The CT scan revealed bilateral subareolar irregular masses resembling female breasts, for which gynecomastia appears to be the best explanation, although they were initially interpreted as possible signs of tuberculous mastitis, which could have caused the tissue to calcify, but is extremely rare in modern populations (Shi et al., 2005; Väre et al., 2016) (Fig. 3.) While gynecomastia-induced

changes do not calcify, without intervention they develop into dense fibrosis – a type of tissue preserving well in mummified remains (Zimmerman, 1979; Ventura et al., 2014). Lastly, a calcified mass was detected inside the Vicar's scrotum.

## ● Discussion

The main factor in the etiology of gynecomastia is hormonal imbalance, which may sometimes be attributable to testicular tumors. However, of the one third and one half of men (age-group dependent) present with gynecomastia, concurrent testicular tumors are rarely the cause. (Braunstein, 1993; Daniels and Layer, 2003; Johnson and Murad, 2009.) In addition, considering the Vicar's age, testicular cancer is unlikely; this condition generally appears in younger men. With modern treatment options the prognosis is typically good, but if left untreated malignant and ultimately fatal metastases may form. (e.g., Hayes-Lattin and Nichols, 2009). Scrotal calcifications can be caused by a variety of other conditions. Although even genital tuberculosis cannot be ruled out, they generally occur as a result of more benign causes, including various types of traumas (Gorse and Belshe, 1985; Artas and Orhan, 2007).

In addition to the tuberculous mastitis, the calcified bilateral subareolar breast masses could also be explained by certain other conditions besides gynecomastia, including breast cancer. While this condition certainly can affect men, particularly the elderly, it rarely occurs bilaterally. Other possible diagnoses for calcified breast lesions could include hemangiomas, or heterotopic ossification caused by trauma-related fat necrosis. While certain parasitic infections could also cause the calcification, the subarctic region makes this a highly unlikely explanation. (e.g., Shi et al., 2005; Johnson and Murad, 2009).

In the absence of previous findings in comparable mummified remains, we are inclined to interpret that gynecomastia was less common in the past, although one explanation for the lack of reports could simply be that the changes in mummified remains with gynecomastia did not preserve well, or that they have been ignored due to their perceived insignificance. Nevertheless, a number of studies seeking to identify similar cases of gynecomastia and related conditions in the past have been largely unsuccessful. For example, art depicting the royal members of the 18<sup>th</sup> Dynasty in Egypt implies feminized features including gynecomastia in bodies of certain male rulers, but examinations of their physical remains have not supported its presence (Aufderheide, 2010).

While reflecting on reasons for this possible change and its contemporary prevalence, one recurring factor is the increased influence of endocrine disruptors, particularly xenoestrogens, on hormonal balance. Some of these compounds directly cause not only gynecomastia but also cancer. What makes these products, some of which are drugs, containing such compounds particularly insidious, is that they may have an endocrinal effect even on individuals that are not in direct contact with them. Once secreted with urine, they end up in water environments and may have a broader adverse effect on the population as a whole, potentially impacting childhood development or male fertility (e.g., Meeker, 2012.) Additionally, in the modern Western world, longer average lifespans and an increase in gynecomastia-causing obesity may make this a more prevalent medical issue than in the past. Interestingly, obesity is also partially related to the increased load of various endocrine disruptors (Darbre, 2017).

## **Conclusions**

**We believe this to be the first report of mummified remains of an individual with gynecomastia.**

## **Appendix**

Scan protocol parameters: slice collimation 0.625 mm, X-ray tube rotation time 0.5 s, X-ray tube voltage 120 kV, X-ray tube current 400 mA, standard reconstruction kernel with a field of view of 665 mm and an image matrix of  $512 \times 512$ , resulting in image voxels the size of  $1.3 \text{ mm} \times 1.3 \text{ mm} \times 0.6 \text{ mm}$ . Clinical workstations: Advantage Windows 4.6, General Electric Medical Systems, Milwaukee, WI, USA, and OsiriX Imaging Software for clinical use.

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### **Figure Legends**

Figure 1: The left arm once crossed over Vicar Rungius's midsection had dried as a result of mummification, while the abdominal tissues below have collapsed.

Figure 2: A manifestation of DISH affected the Vicar's thoracic spine along with possible Pott's disease.

Figure 3: Radiological qualities of the bilateral subareolar findings imply calcification (-20 HU, versus humeral head - 470 HU).

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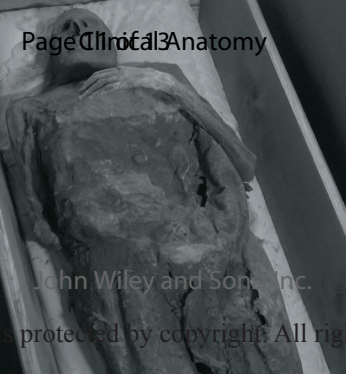


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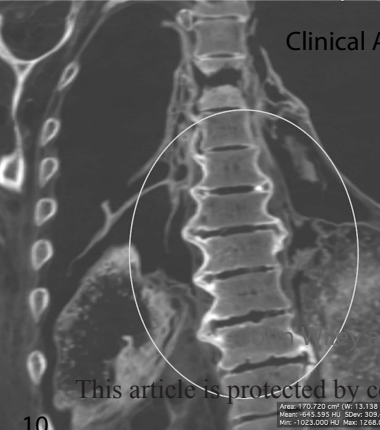
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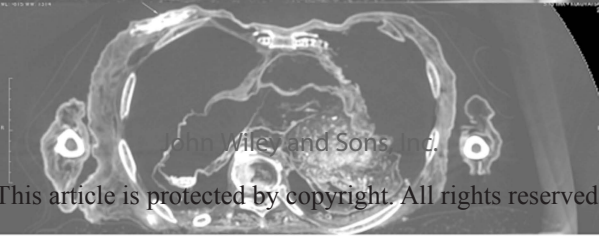
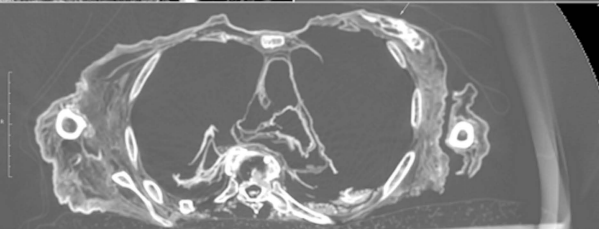
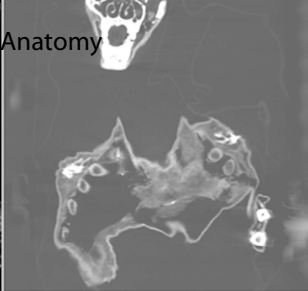
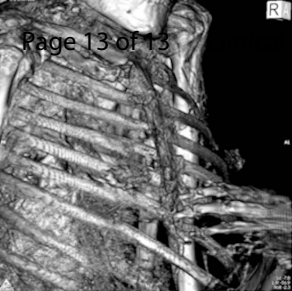
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Area: 170.720 cm<sup>2</sup> (W: 13.138 cm  
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