

Cusp of Carabelli

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Carabelli's tubercle, not to be confused with Zuckerkandl's tubercle, was first described by **Georg Carabelli**, (1787-1842). Carabelli was a prominent Hungarian dentist and professor of dental surgery in Vienna. He held a minor noble rank, which referenced the town of Lunkaszprie. Carabelli was a court dentist to the Austrian Emperor, **King Franz Joseph I**, and co-founder of the stomatology clinic at the University of Vienna. Carabelli was known for his occlusal classification and effective, exemplary mentorship of dental proteges, such as **Moriz Heider** (who will be discussed in a future article).

The Hapsburg Jaw

As a side story, King Franz Joseph I was part of the House of Habsburg which was one of the most powerful royal houses in European history. They controlled much of Western and Central Europe for six centuries. The connection to dentistry is the "Habsburg jaw". The Habsburgs sought to consolidate their power by the frequent use of consanguineous marriages. This resulted in a cumulatively deleterious effect on their gene pool.

Charles II, the last Hapsburg of Spain, was the focused result of this interbreeding. He suffered ill-health throughout his life and has been described as "short, lame, epileptic, senile, unfruitful, and completely bald before 35, always on the verge of death but repeatedly baffling Christendom by continuing to live." He died in Madrid in 1700 at 38 years of age. The physician who performed Charles' autopsy stated his body "did not contain a single drop of blood; his heart was the size of a peppercorn; his lungs corroded; his intestines rotten and gangrenous; he had a single testicle, black as coal, and his head was full of water."

The Carabelli "Cusp"

The Cusp of Carabelli, a small additional tubercle sometimes found on the mesiolingual corner of an upper first molar, was first illustrated in Carabelli's textbook of oral anatomy, published in 1842, and later described in his handbook of dentistry, published posthumously in 1844. Carabelli wrote numerous textbooks and monographs.

Although the morphology is often referred to in dental textbooks as the Cusp of Carabelli, it is actually a tubercle, as it may consist only of enamel, but never has a root underneath. It is unlikely, but possible for the cusp to have a pulp horn.

The Cusp of Carabelli is an heritable feature. Kraus (1951) proposed that homozygosity of a gene is responsible for a pronounced tubercle; whereas, the heterozygote shows slight grooves, pits, tubercles or bulge. Later studies showed that the development of this trait is affected by the expression of the PAX9 and MSX1 genes which are responsible for the extra cusp. These genes encode transcription factors that play a key role during odontogenesis. The cusp of Carabelli is most common among Europeans (75-85% of individuals) and rarest in Pacific Islanders (35-45%).

Variations in the structure of teeth have always been of great interest to the dentist from the scientific as well as a practical point of view. Additionally, intermediate trait relationships have been a useful means to categorize populations to which an individual belongs. What is often overlooked, however, is that Carabelli who is remembered for naming the dental tubercle, was just as importantly admired for his remarkable and dedicated mentorship. - JDW and CDT



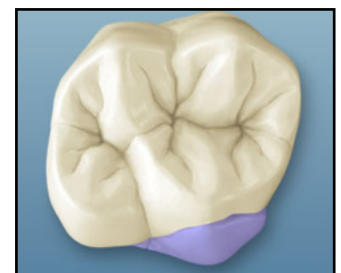
Georg Carabelli (1787-1842)



Charles II etching



Charles II portrait
by Juan de Miranda Carreno



Cusp of Carabelli