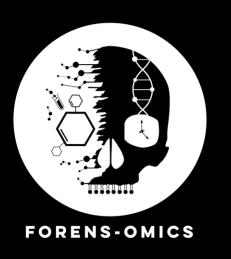


### Northumbria University NEWCASTLE



# About the "tree rings" in our teeth

Valentina Perrone, Patrick Randolph-Quinney, Noemi Procopio

### INTRODUCTION

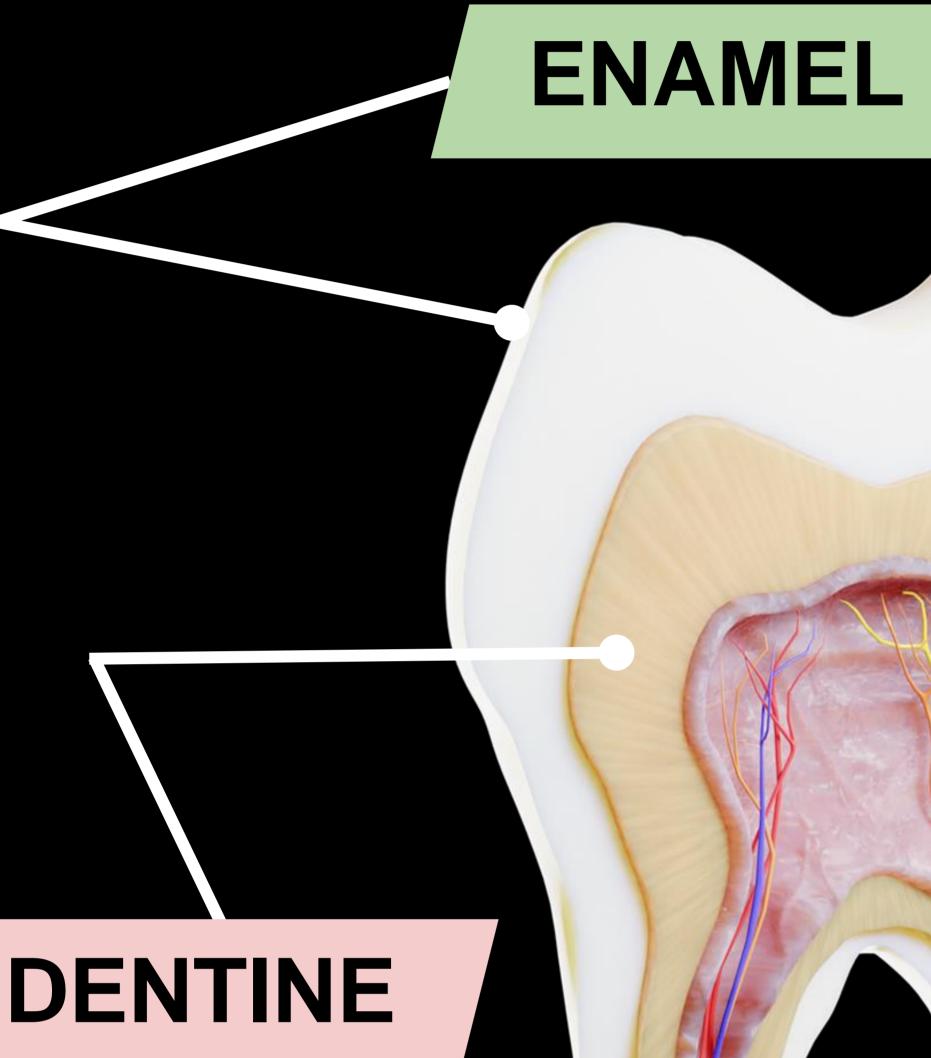
**Cementochronology** relies on the count of pair of dark and light layers that are deposited on the acellular dental cementum (AEFC) in a circannual rhythm. The total count of the increments is added to the tooth-specific age at eruption to estimate the age of the individual. **PROS:** 

1. This technique can estimate age and season at death in adult individuals with a margin of error  $\pm 5$  years from real age<sup>1,2</sup>.

2. In biological anthropology estimating age in adult individuals rely on the individual morphological changes that occur due to the aging process. Contrary to this, the AEFC increases with the same rhythm in everyone.

#### CONS:

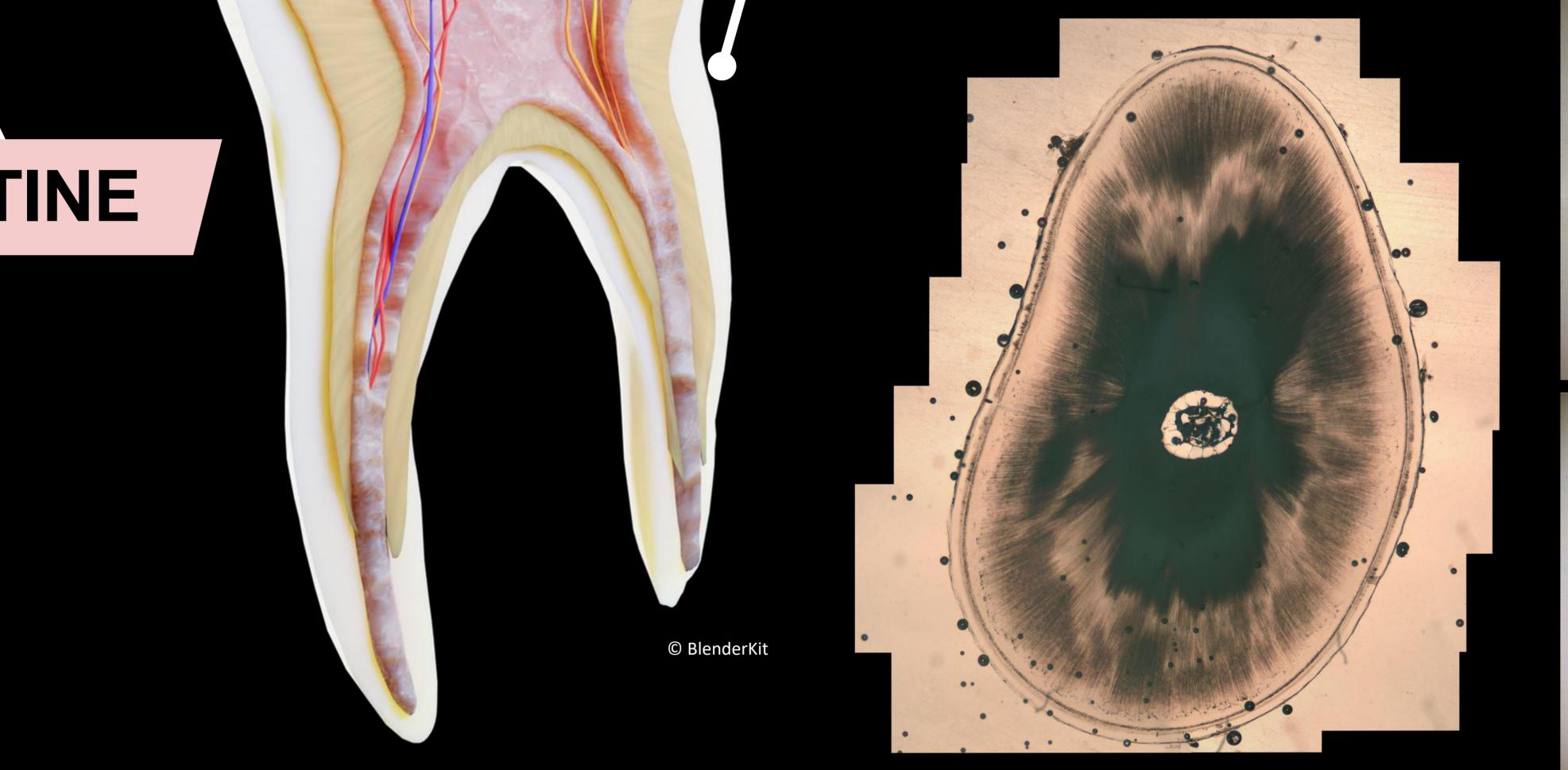
3. The technique has suffered from years of controversies and skepticism due to a lack of consistent application of the protocol and a lack of an accessible repository for raw data, which would help not only in research reproducibility, but also with standardization of the



## ACELLULAR CEMENTUM

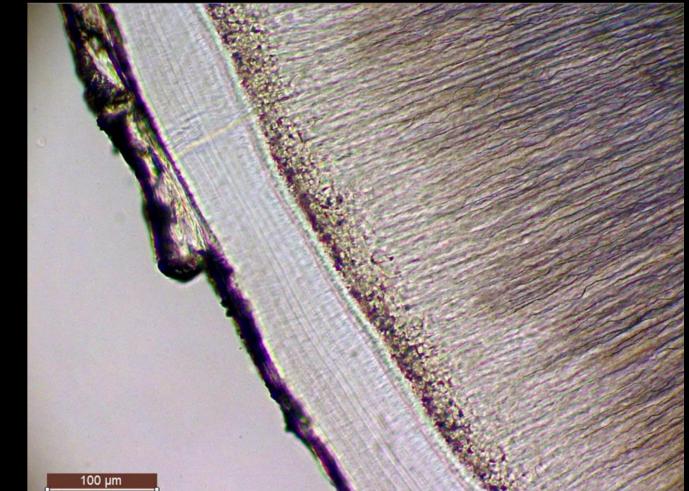
Why are we interested in this part of the dental cementum?<sup>5,6</sup>

- It is found only on the first ⅓ of the root.
- It does not remodel and grows throughout an individual's life.
   It can record life events (i.e., pregnancies) and give a hint of calcium metabolism disorders.
- It grows in alternating dark and light layers.
- Each layer forms seasonally, during a winter period (dark layer) and a summer period (light layer)
- The total pair of layer, the annuli, are added to tooth-specific age at eruption for age estimation.



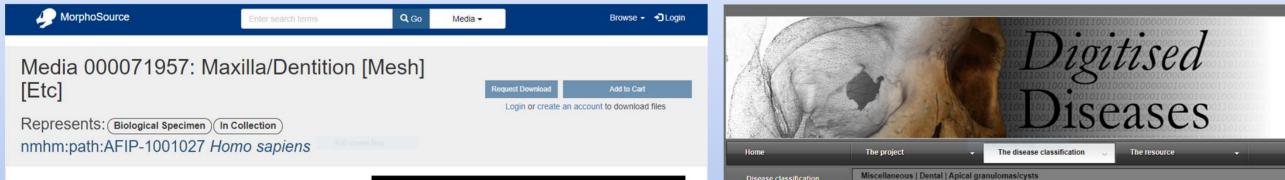






### **OPEN ACCESS IN DENTAL ANTHROPOLOGY**

A major effort in making biological anthropology more openly accessible has been carried out in recent years. Resources such as **MorphoSource**<sup>7</sup> and **Digitised Diseases**<sup>8</sup> are an example of this effort. Through these platforms, researchers and students can shares digitized versions of their specimens, compare and learn from each other.



However, the same cannot be said for dental anthropology (only quickly covered in the abovementioned resources) and, even more specifically, for cementochronology.

GENERAL DETAILS		»				
Media ID	000071957	- TOOL	Developmental	Miscellaneous   Dental	Miscellaneous   Dental	Miscellaneous   Dental
Media type	Mesh	60	Traumatic			(Day)
Object element or part	Maxilla/dentition		Infective		ant	· · · ·
Side	Right		Neoplastic	The second		1799 83
Orientation			Degenerative joint disease	Apical granulomas/cysts	Apical granulomas/cysts	Apical granulomas/cysts
Short description	Right maxilla/dentition OBJ		Endocrine	Bone: Left maxilla Age: Young adult	Bone: Mandible Age: Middle adult	Bone: Left Maxilla Age: Young adult
Full description	Migrated MorphoSource 1 Media	and the state of t	Metabolic	Sex: Male more	Sex: Male more	Sex: Male more
	File Title: Right maxilla/dentition OBJ Migrated MorphoSource 1		Immunological	See more. This is a rounded mass of granulation tissue (consisting of white blood cells, fibroblasts and other immune system components) resulting from death and sterile decomposition of the tooth pulp. Any granuloma larger than 3mm in diameter will become cystic due to cell breakdown. The resultant void in the bone has sharp edges where it meets the external surface of the alveolus and the floor		
	Media Group Title: Right		Circulatory			
	maxilla/dentition with marked calculus build-up Migrated		Miscellaneous	granuloma larger than 3mm in void in the bone has sharp edg	n diameter will become cystic due ges where it meets the external su	to cell breakdown. The resultar
	MorphoSource 1 Media File		Dental	to over 8mm diameter it will	e to its increased blood supply. Wh have become almost entirely c	the cystic granuloma enlarge ystic and the floor of the cavit
	Description: Laser scanned with			becomes smooth, with little po supply.	prosity, as it is lined by a thick cy	st membrane and has little bloo
	NextEngine 2020.\\r\\nV: 584.482\\r\\nF; 1.128.280	< D	Ante-mortem tooth loss			
Creator		•	Apical granulomas/cysts			
Date created		0 ADDITIONAL MEDIA RELATED TO ACQUISITION EVENT	Dental calculus			
Date uploaded	March 17, 2019		Dental caries			
		COLLECTIONS MEDIA BELONGS TO	Dental developmental cysts			
ILE OBJECT DETAILS		NMHM Paleopathology	Dental filling			line
File format(c)	toxt/slain	• тимпии гатеоралоюду				Jisc

In order to address this, part of this project will consist in:

- 1) Sharing our results for cementochronology in one of these preexisting platforms;
- 2) Creating an **only-cementochronology database**, collecting micrographs, sample specifics and respective metadata for each sample.

A similar effort into creating open access resources for cementochronology studies will help in the affirmation of this technique as a valuable tool for age estimation by **a**) bringing researchers together and **b**) showing its scientific validity.

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