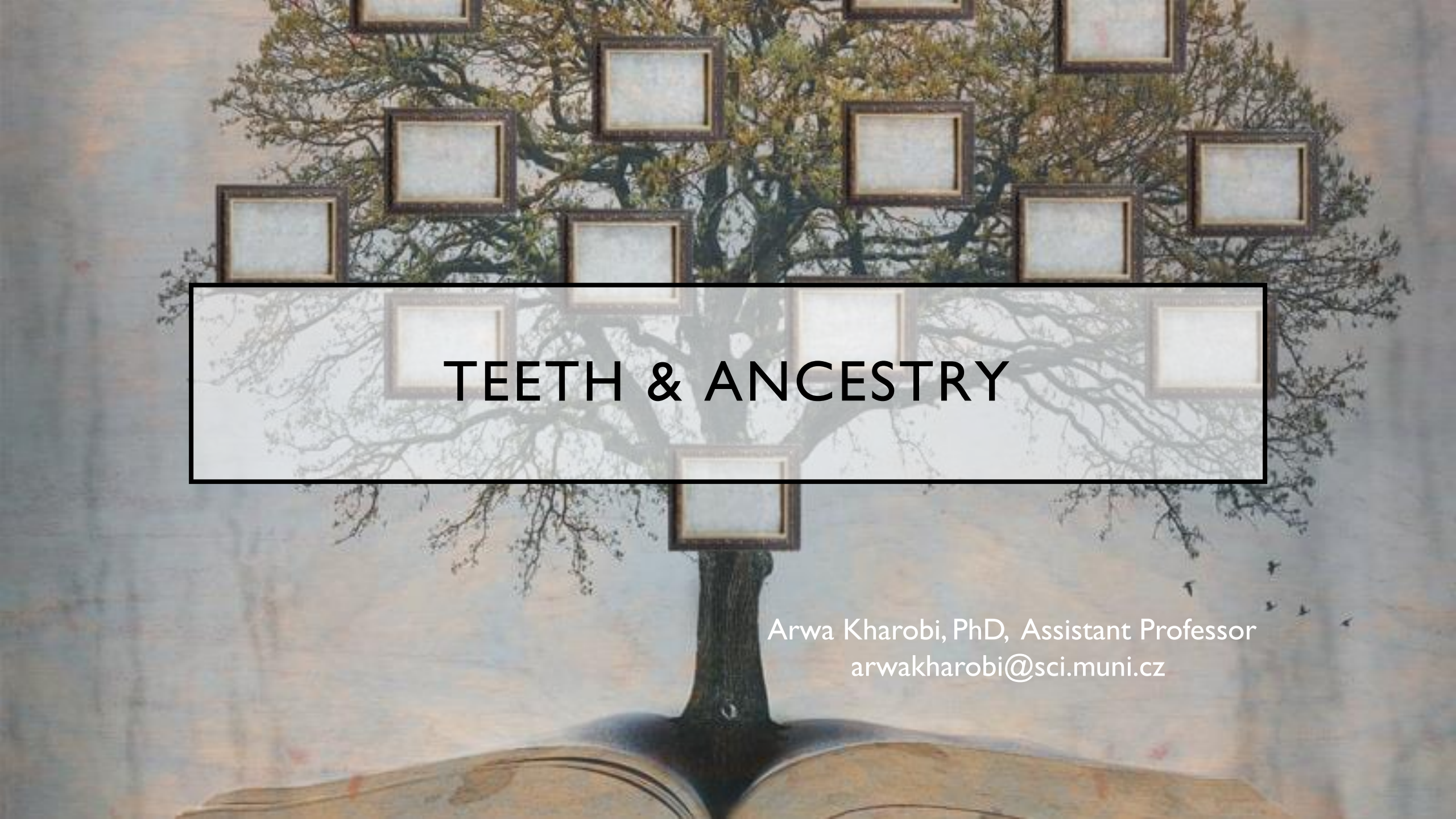

TEETH & ANCESTRY

Arwa Kharobi, PhD, Assistant Professor
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WHAT YOUR TEETH SAY ABOUT YOUR ANCESTRY

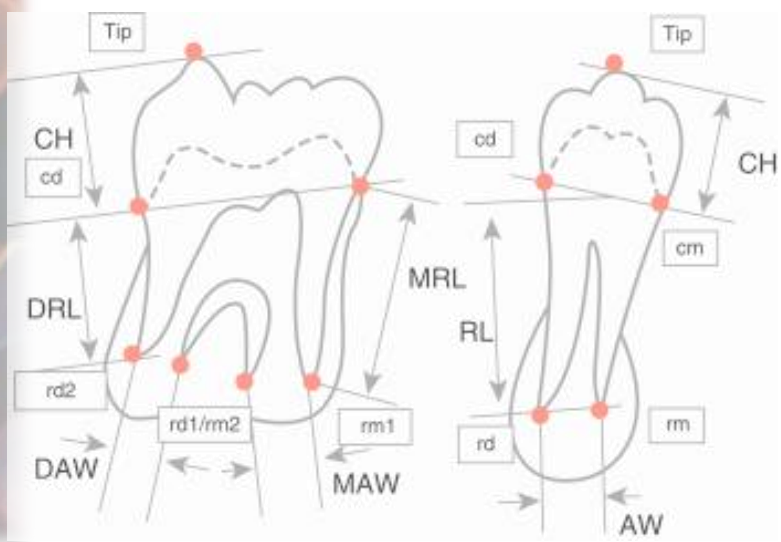
The shape, configuration and landscape of each person's teeth are unique to them

Your teeth are shaped by your genetics and then altered and worn by the food you eat and how you live your life

Your dentist can tell a lot about your personal health and diet from your teeth, and sometimes your teeth also offer clues to your heritage

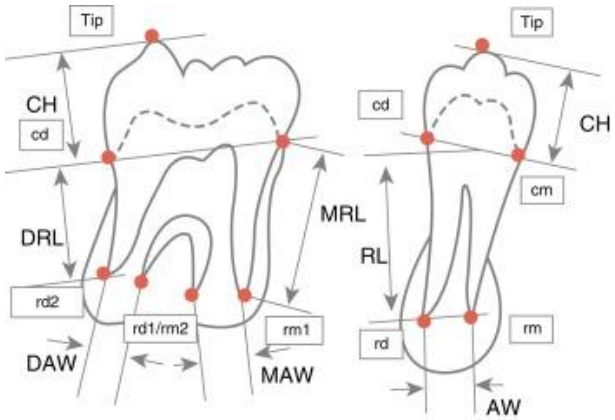
METHODS

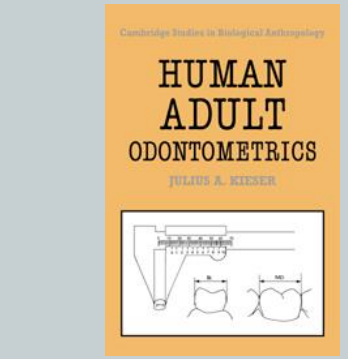
1. Metric dental traits
2. Non-metric dental traits
3. Ancient DNA



METRIC VARIATIONS: ODONTOMETRY

* Tooth measurements
* Most common indicators:
  - Tooth height
  - Mesiodistal diameter
  - Buccolingual diameter
  - Crown module
* Used for age & sex estimation

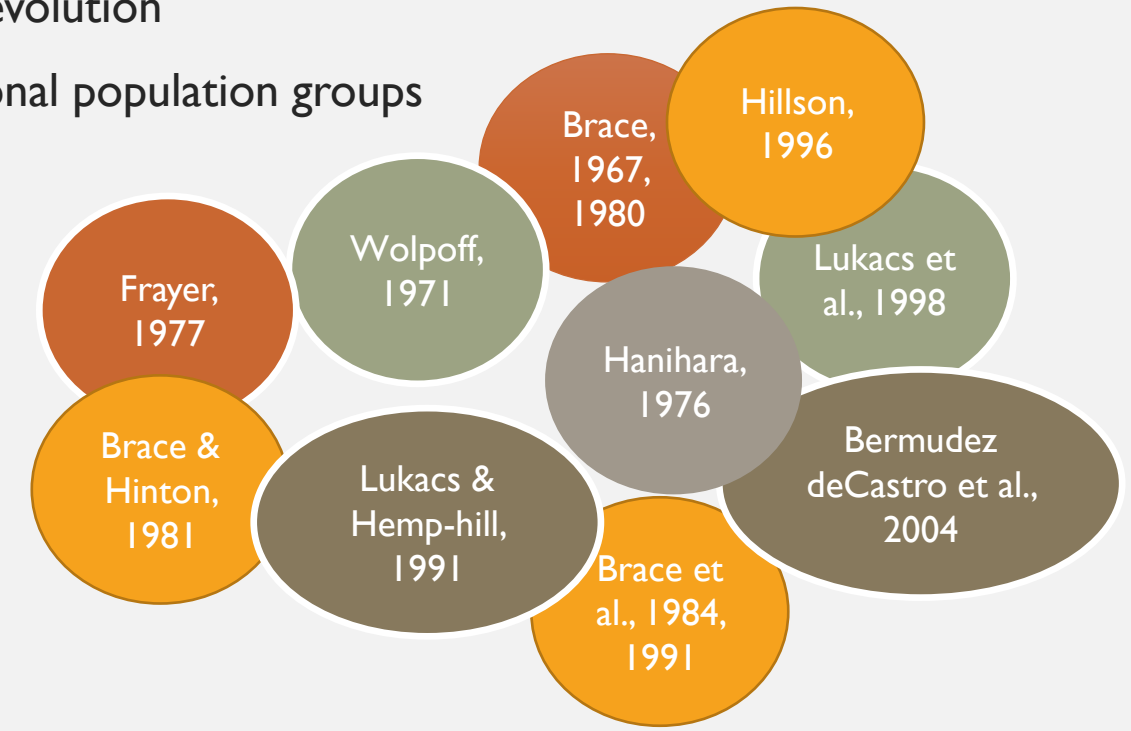




METRIC VARIATIONS

Often used in:

1. investigation of hominid evolution
2. diversity of localand regional population groups



DURING THE PAST FEW DECADES

Some articles on metric dental variation were published:

1. covering a wide range of regional populations (*Lasker & Lee,1957; Falk & Corruccini, 1982; Harris & Bailit, 1988; Kieser, 1990; Schnutenhausand Ro ̈sing, 1998*)
2. classified contemporary & recent populations as microdontic, mesodontic, and megadontic (*Harris and Rathbun, 1991*)

AMERICAN JOURNAL OF PHYSICAL ANTHROPOLOGY 128:287–298 (2005)

Metric Dental Variation of Major Human Populations

Tsunehiko Hanihara[1*] and Hajime Ishida[2]

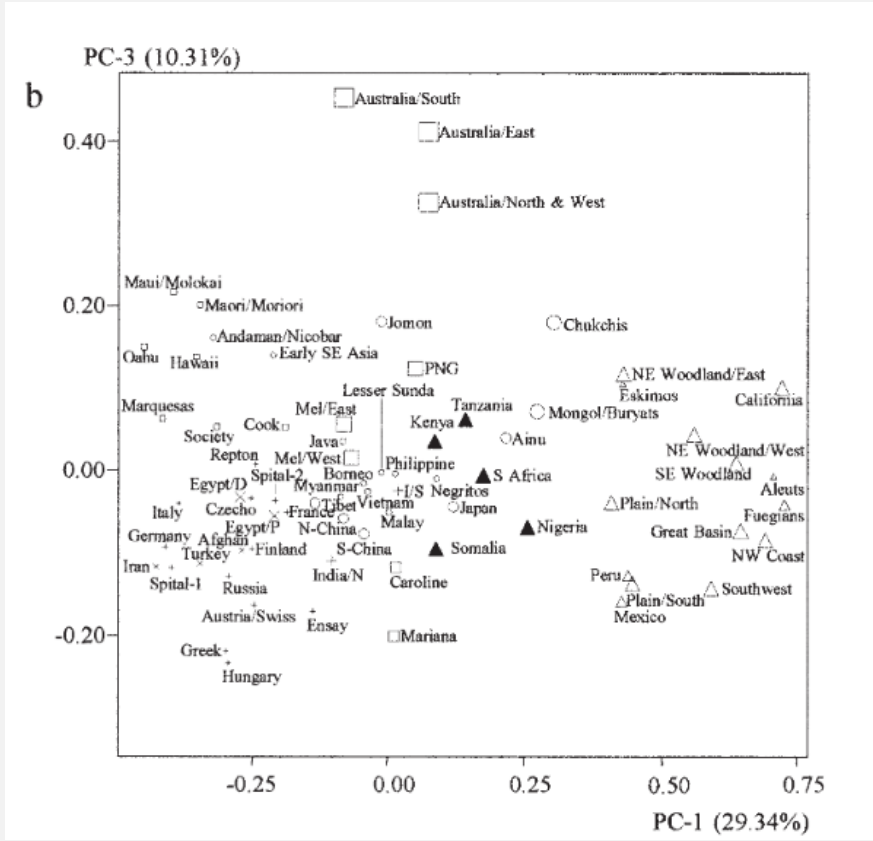
[1]*Department of Anatomy and Biological Anthropology, Saga Medical School, Saga 849-8501, Japan*
[2]*Department of Anatomy, Faculty of Medicine, University of the Ryukyus, Nishihara, 903-0215, Japan*

KEY WORDS odontometrics; phenotypic diversity; geographic variation; interpopulation relationships

ABSTRACT Mesiodistal and buccolingual crown diameters of all teeth recorded in 72 major human population groups and seven geographic groups were analyzed. The results obtained are fivefold. First, the largest teeth are found among Australians, followed by Melanesians, Micronesians, sub-Saharan Africans, and Native Americans. Philippine Negritos, Jomon/Ainu, and Western Eurasians have small teeth, while East/Southeast Asians and Polynesians are intermediate in overall tooth size. Second, in terms of odontometric shape factors, world extremes are Europeans, aboriginal New World populations, and to a lesser extent, Australians. Third, East/Southeast Asians share similar dental features with sub-Saharan Africans, and fall in the center of the phenetic space occupied by a wide array of samples. Fourth, the patterning of dental variation among major geographic populations is more or less consistent with those obtained from genetic and craniometric data. Fifth, once differences in population size between sub-Saharan Africa, Europe, South/West Asia, Australia, and Far East, and genetic drift are taken into consideration, the pattern of sub-Saharan African distinctiveness becomes more or less comparable to that based on genetic and craniometric data. As such, worldwide patterning of odontometric variation provides an additional avenue in the ongoing investigation of the origin(s) of anatomically modern humans. Am J Phys Anthropol 128:287–298, 2005.

RESULTS OF THE STUDY

1. Australians have the largest teeth and Western Eurasians have small teeth
2. In terms of odontometric shape factors, world extremes are Europeans
3. East/Southeast Asians share similar dental features with sub-Saharan Africans
4. Patterning of dental variation among major geographic populations is consistent with genetic and craniometric data
5. Pattern of Sub-Saharan African distinctiveness is comparable to that based on genetic and craniometric data



Scattergrams of 1st & 2nd PC scores (a) and 1st & 3rd PC scores (b), based on C-score data.

J Int Oral Health. 2015 Sep; 7(9): 83–87.

PMCID: PMC4589727

PMID: 26435624

Assessment of Ethnicity in Indian Population using Tooth Crown Metric Dental Traits

V Deepak,[1] S N Goryawala,[2] Yashwanth Reddy,[3] R J Chhabra,[4] Nandaprasad,[5] and Nishit Kumar Shah[6]

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Abstract

Go to: ▸

Background:

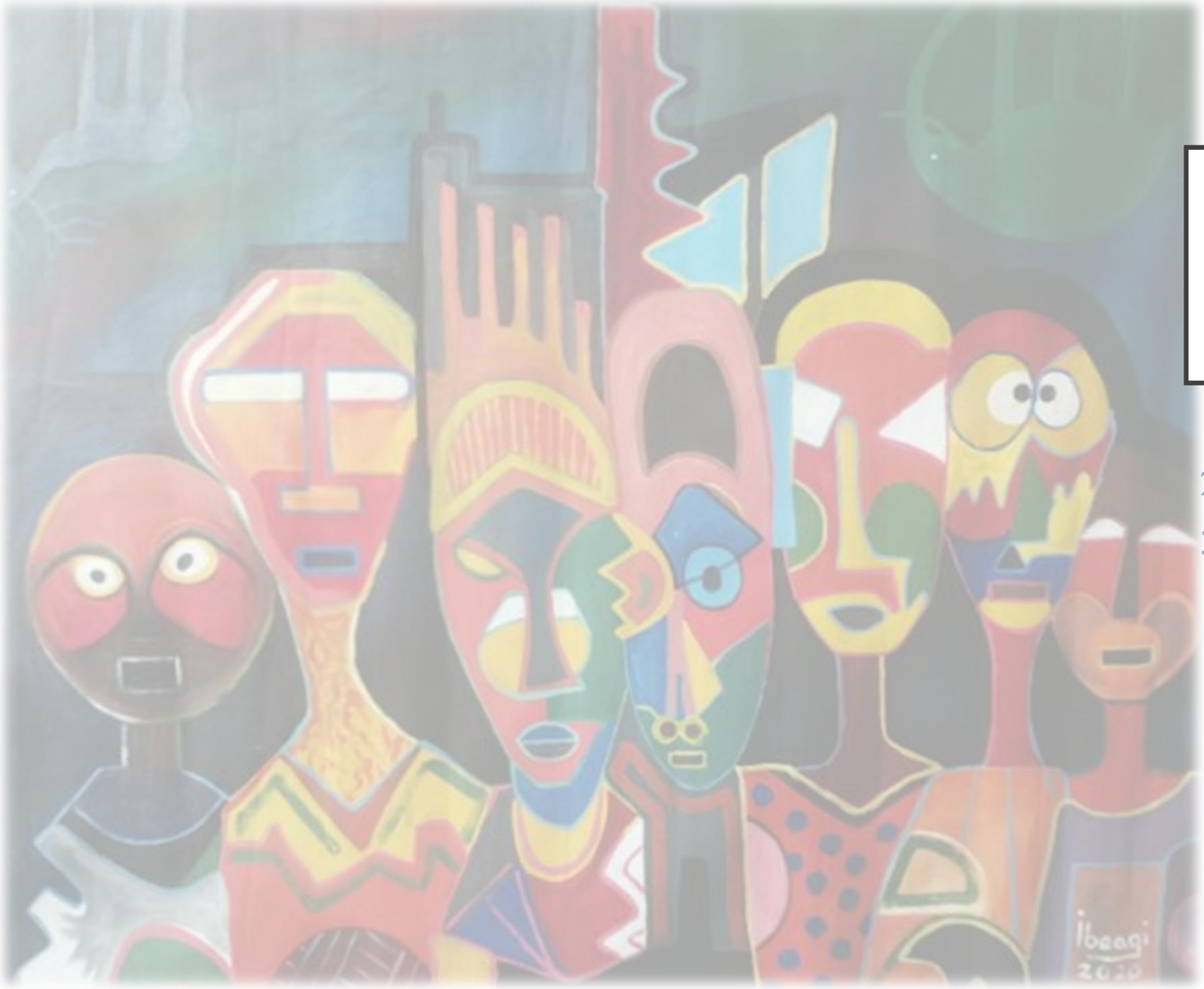
Tooth crown dimensions vary between different ethnic groups, providing insights into the factors controlling human dental development. This present study compares permanent mesiodistal (MD) and buccolingual crown dimensions between four ethnic groups, highlighting patterns of tooth size between these groups and considers the findings in relation to genetic and environmental influences.

Materials and Methods:

MD and buccolingual tooth crown dimensions were recorded using digital vernier calipers on dental casts derived from four different human population: Iranians, Hindus, Muslims, and Christians.

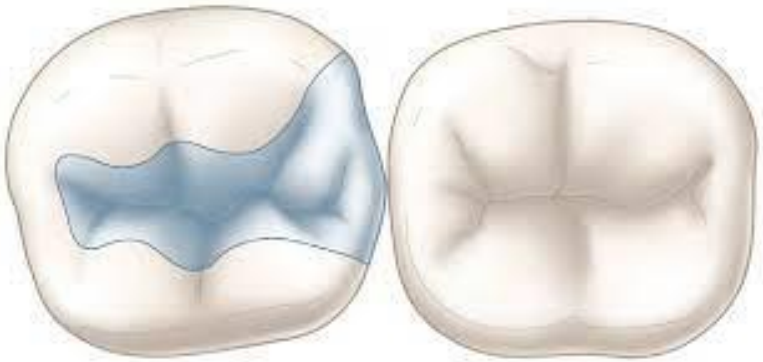
Results:

Obtained measurements were subjected to statistical analysis. The Christian sample was found to have the largest teeth overall, whereas the Iranian sample generally displayed the smallest MD and buccolingual crown dimensions ($P < 0.001$). Comparisons of coefficients of variation for teeth within each class showed that the later-forming teeth displayed greater variation in MD size than the earlier-forming teeth.



METHODS

1. Metric dental traits
2. Non-metric dental traits
3. Ancient DNA



FACT!

All human dentitions are basically the same. The differences between individuals are in the number and extent of the primary and secondary characters of the tooth groups, which in turn are the reflections of the genetic constitution of the individual.

- Dental non-metric traits have become widely used to estimate biological affinities

METHOD

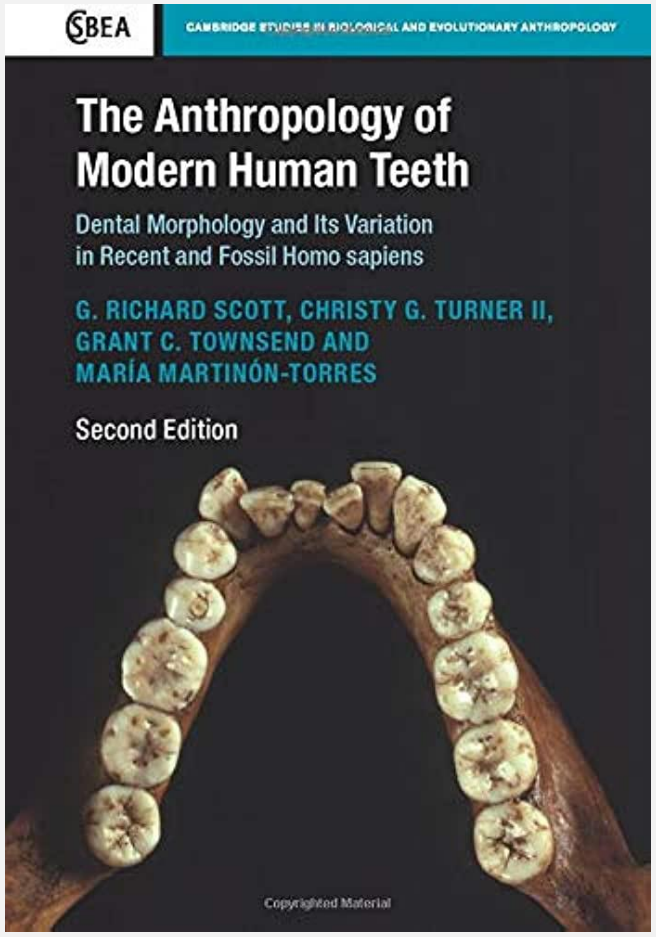
The Arizona State University Dental Anthropology System (ASUDAS)

METHODS

The Arizona State University Dental Anthropology System (ASUDAS)

++ Statistical approach

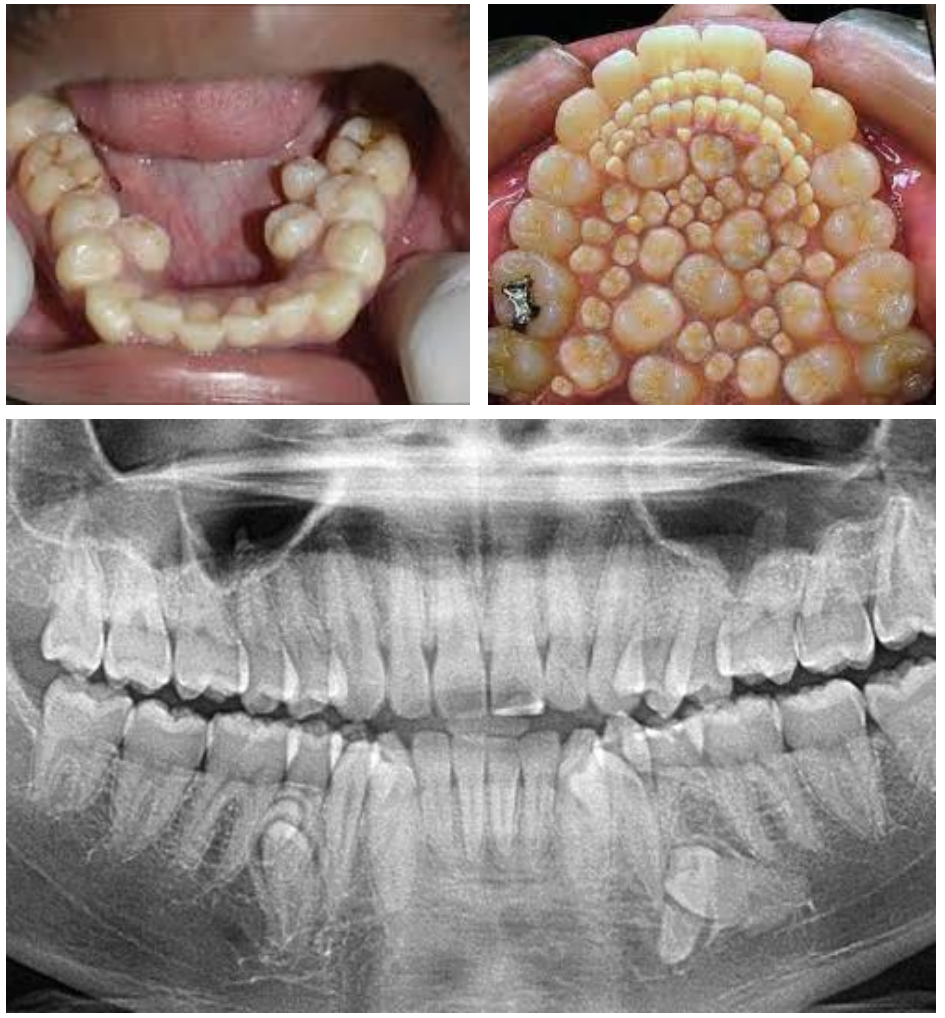
THIS BOOK IS NOT A METHODOLOGICAL GUIDE FOR SCORING CROWN AND ROOT MORPHOLOGY



VARIATIONS IN TOOTH NUMBER & POSITION

VARIATION 1

What is this?



1. SUPERNUMERARY TEETH

are defined as those in addition to the normal series of deciduous or permanent dentition. They may occur:

- anywhere in the mouth
- as a single tooth or multiple teeth,
- unilaterally or bilaterally,
- erupted or impacted
- in mandible/maxilla or both the jaws

VARIATION II

What is this?

VARIATIONS IN TOOTH NUMBER & POSITION

Congenital absence of teeth CMT (hypodontia) is when one or more teeth normally present in the dentition will be missing.

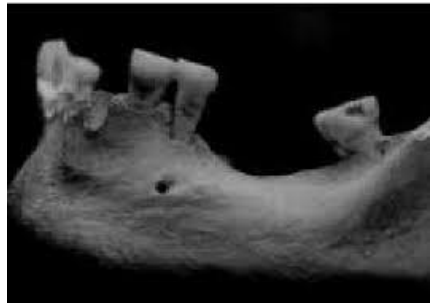
1. "oligodontia" is used for six or more missing teeth
2. "anodontia" for complete absence of teeth

- The 3rd molars are the most frequently missing

VARIATIONS IN TOOTH NUMBER & POSITION

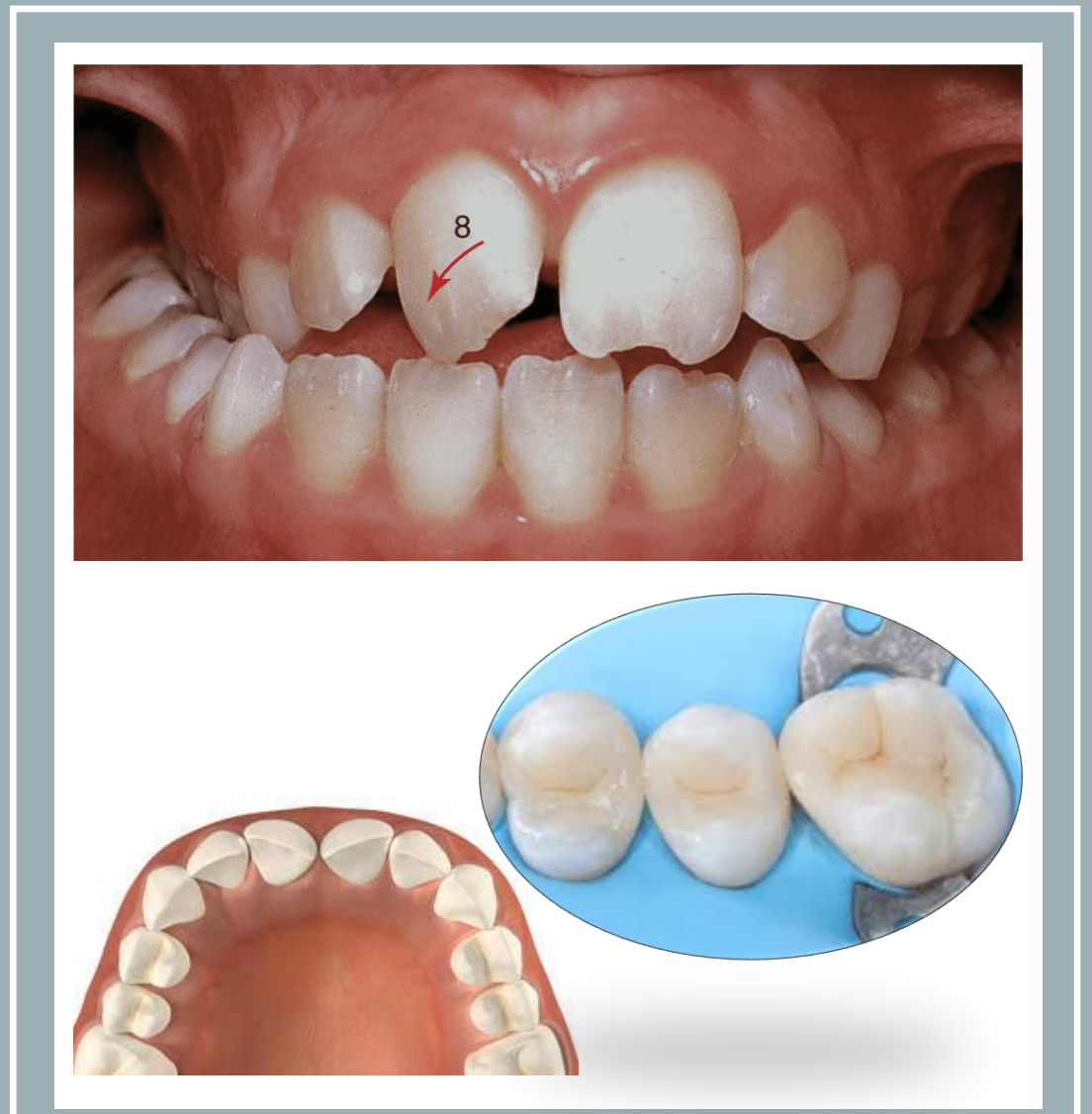
Congenital absence of teeth CMT vs Antemortem tooth loss ATM

- ✓ detected by the characteristic distorted and unequal appearance of the alveolus



VARIATION III

What is this?



VARIATIONS IN TOOTH NUMBER & POSITION

Rotation of teeth is defined as observable mesiolingual or distolingual intra alveolar displacement of the tooth around its longitudinal axis

- Most often second premolars but it is possible for any tooth!

VARIATION IV

What is this?

VARIATIONS IN TOOTH NUMBER & POSITION

Crowding of teeth is the lack of space for all the teeth to fit normally within the jaws.

The teeth may be twisted or displaced.

It occurs when there is:

- ✓ disharmony in the tooth to jaw size relationship,
- ✓ teeth are larger than the available space

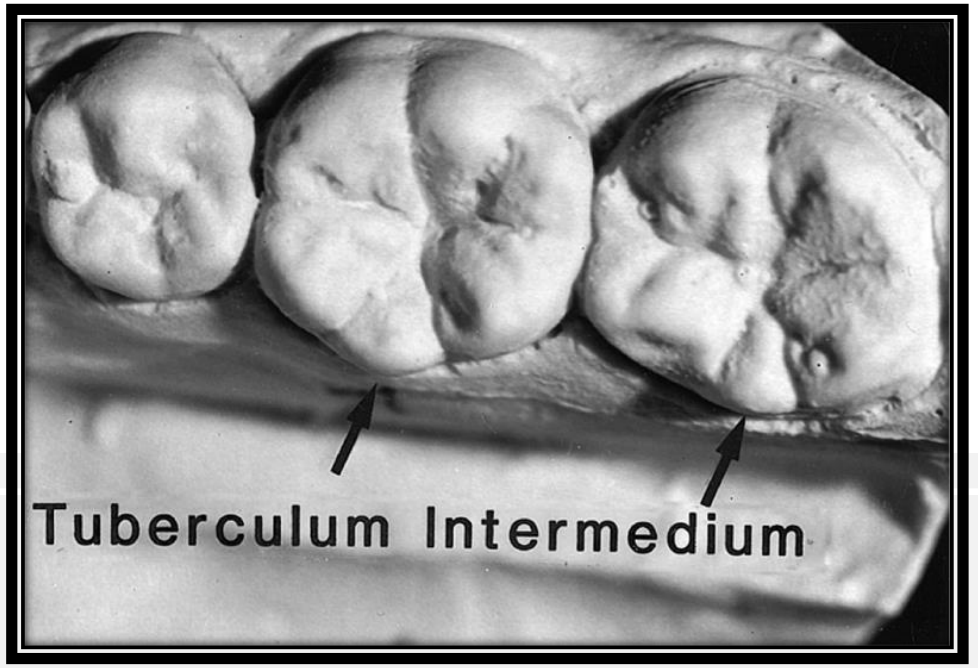
VARIATIONS IN TOOTH NUMBER & POSITION

1. Supernumerary teeth
2. Congenital absence of teeth CMT
3. Rotation of teeth
4. Crowding of teeth

VARIATIONS IN TOOTH MORPHOLOGY

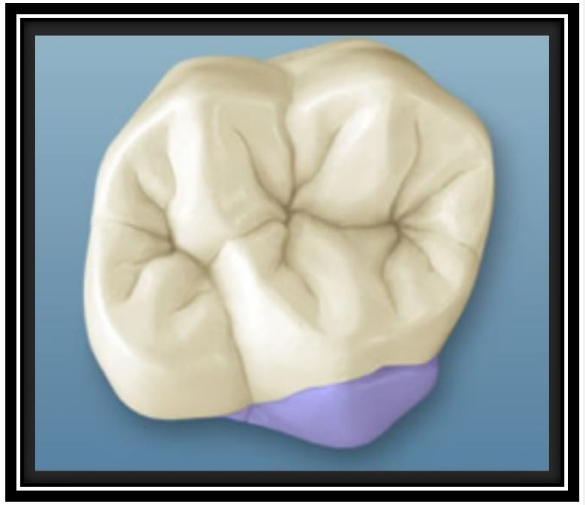
1. EXTRA CUSPS

- A third lingual cusp may develop on mandibular molars
- Called tuberculum if on the lingual surface
- Called tuberculum sextum If on the distal marginal ridge



2. CUSP OF CARABELLI

- A small additional cusp at the mesiopalatal line angle of upper molars (1st)
- Concerned molars have 2 roots instead of 3
- Mostly in European populations

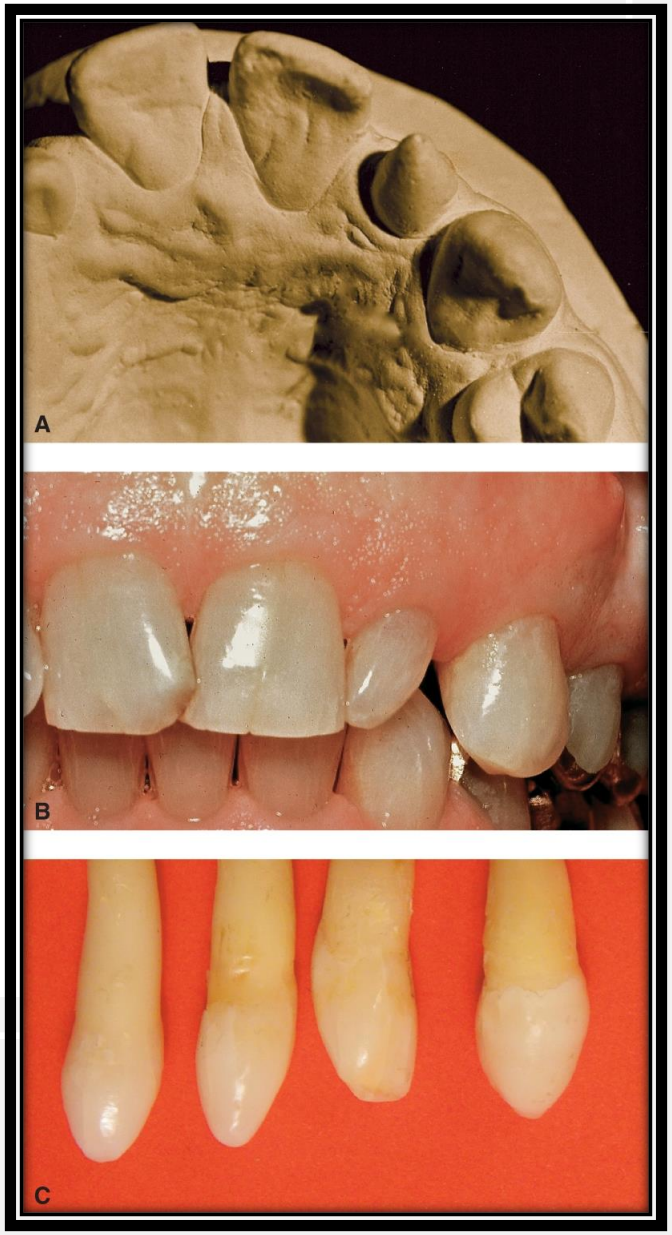


3. SHOVEL-SHAPED TEETH

- On incisors only
- lingual surfaces are scooped as a consequence of lingual marginal ridges, crown curvature or basal tubercles,
- Either alone or in combination
- Mostly with East Asian populations

4. PEG-SHAPED TEETH

- A cone shaped look
- Dental disorder called microdontia, a condition where one or more teeth appear smaller than average
- Upper lateral incisors or 3rd molars are the most common teeth affected
- Have shorter roots than usual teeth
- On both sides in most instances



5. ENAMEL PEARLS

a small nodule of dentine with an enamel cap on the root surface

may be an entirely separate nodule, or be joined to the crown at the cervix by a narrow strip of enamel

STUDY CASE

Bioarchaeology of the Near East, 15:1–24 (2021)

The people of Avaris: Intra-regional biodistance analysis using dental non-metric traits

Nina Maaranen*[1], Sonia Zakrzewski[2], Arwa Kharobi[1], Chris Stantis[1,3], Silvia Prell[4], Manfred Bietak[4], Holger Schutkowski[1]

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STUDY CASE:
AIM, MATERIALS & METHOD

Dental non-metric traits recorded from 90 individuals

Both intra- & inter-site analyses were conducted

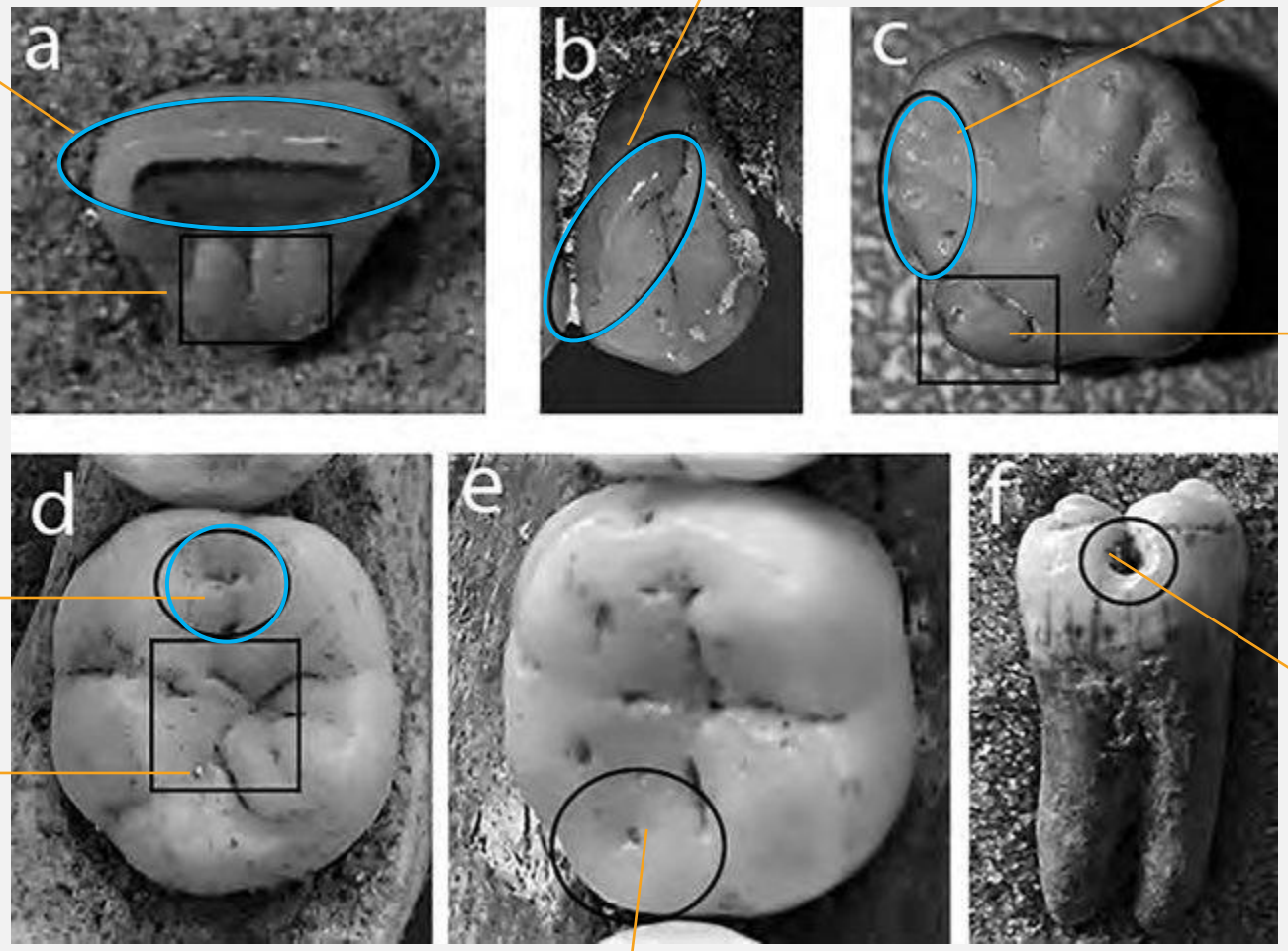
Compare ancestry between:

- locals & non-locals at Avaris
- Avaris to other Egyptian sites to gauge its population distinctiveness

- List of ASUDAS dental traits

Trait	Recorded	Abbreviation
Winging	Score	W
Labial curvature	Score	LC
Palatine torus	Score	PT
Shoveling	Score	S
Double-shoveling	Score	DS
Interruption groove	Present/Absent	IG
Tuberculum dentale	Score	TD
Pegged of reduced incisor	Score	UI2V
Mesial accessory ridge	Score	MAR
Distal accessory ridge	Score	DAR
Premolar accessory ridges	Score	PAR
Accessory cusps	Present/Absent	AC
Metacone size	Score	M
Hypocone size	Score	H
Bifurcated hypocone	Present/Absent	BH
Cusp 5	Score	C5_UM
Marginal ridge tubercles	Present/Absent	MRT
Carabelli cusp	Score	CC
Parastyle	Score	PA
Enamel extensions	Score	EE
Upper premolar root number	Count	RN_UP
Upper molar root number	Count	RN_UM
Congenital absence	Present/Absent	M3V
Odotome	Present/Absent	O
Tome's root	Score	TR
Lower premolar lingual cusp number	Count	CN
Anterior fovea	Score	AF
Mandibular torus	Score	MT
Groove pattern	x/y/+	GP
Rocker jaw	Score	RJ
Cusp number	Score	C5_LM
Cusp number	Score	C6
Cusp 7 size	Score	C7
Deflecting wrinkle	Score	DW
C1–C2 crest	Score	MDTC
Protostylid	Score	PR
Lower canine root number	Count	RN_LC
Lower molar root number	Count	RN_LM1 or LM2
Torsomolar angle	Present/Absent	TA_LM3
Mandibular molar pit tubercle	Score	MPT

Examples of dental traits observed from the samples



shoveling

mesial accessory ridge

marginal ridge tubercles

tuberculum dentale

Carabelli's cusp

anterior fovea

Y-groove pattern

protostylid

worn but still visible cusp 5

Image created by Nina Maaranen.

STUDY CASE:
RESULTS

Avaris

Local

Non-local

not ancestrally different

significant difference ($p<0.01$)

other Egyptian sites

Results are in line with the archaeological evidence, suggesting Avaris was an important hub in the MBA eastern Mediterranean trade network, welcoming people from beyond its borders

METHODS

1. Metric dental traits
2. Non-metric dental traits
3. Ancient DNA