SAPIENZA
UNIVERSITÀ DI ROMA

Dipartimento di
Scienze odontostomatologiche e maxillo facciali

MOTHERS

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MOTHERS

MOdelling THe Evolution of the mother-infant RelationshipS

Alessia Nava

Dipartimento di Scienze Odontostomatologiche e Maxillo Facciali

Sapienza Università di Roma

alessia.nava@uniroma1.it

Roma 21 Luglio 2023

SAPIENZA ERC DAYS

Curriculum vitae in brief

2014 – 2017 **PhD** in Physical Anthropology – Sapienza University of Rome. Thesis title: “Hominin dental enamel: an integrated approach to the study of formation, maturation, and morphology”

2017-2018 **Post-doctoral research fellow** – Museo delle Civiltà di Roma co-funded by Royal Holloway, University of London and Sapienza University of Rome

2019-2020 **Post-doctoral researcher** – Department of Oral and Maxillo Facial Sciences, Sapienza University of Rome, ERC-StG project HIDDEN FOOD (PI Prof.ssa Emanuela Cristiani)

2020-2022 **Marie Skłodowska-Curie Fellowship** – School of Anthropology and Conservation, University of Kent, Canterbury (UK), project WEAN-IT, WEaning practices in ANcient ITaly: from Neolithic farmers to the first cities (N: 842812; SH6)

2022 **Post-doctoral researcher** – Kraków Research Centre of Institute of Geological Sciences, Polish Academy of Sciences

Marie Skłodowska-Curie output

WEAN-IT

(N: 842812; SH6)

WEaning practices in ANcient ITaly: from Neolithic farmers to the first cities

10 scientific papers on peer reviewed journals (PNAS, Journal of Human Evolution, Scientific Reports, Nature Ecology and Evolution, Royal Society Interface….)

14 podium and poster presentations at international conferences

1 keynote invited talk at the international Workshop “Darwin in Medicine: Why Evolution is relevant for research and medical practice”, Ettore Majorana Foundation and Centre for Scientific Culture, Erice, Italy

Scientific development

nature ecology & evolution

[January 2023]

Article

https://doi.org/10.1038/s41559-022-01947-0

Dietary strategies of Pleistocene *Pongo* sp. and *Homo erectus* on Java (Indonesia)

Received: 26 September 2021

Accepted: 9 November 2022

Published online: 16 January 2023

Check for updates

Jülide Kubat[1,2,3], Alessia Nava[4], Luca Bondioli[5,6], M. Christopher Dean[7], Clément Zanolli[8], Nicolas Bourgon[9], Anne-Marie Bacon[3], Fabrice Demeter[10,11], Beatrice Peripoli[6], Richard Albert[1,12], Tina Lüdecke[13,14], Christine Hertler[2,15], Patrick Mahoney[4], Ottmar Kullmer[2,15], Friedemann Schrenk[2,15] & Wolfgang Müller[1,12,17]

PROCEEDINGS B

royalsocietypublishing.org/journal/rspb

Research

Cite this article: Mahoney P et al. 2021 Growth of Neanderthal infants from Krapina (120–130 ka), Croatia. *Proc. R. Soc. B* **288**:

[November 2021]

Growth of Neanderthal infants from Krapina (120–130 ka), Croatia

Patrick Mahoney[1], Gina McFarlane[1], B. Holly Smith[2,3], Justyna J. Miszkiewicz[4,5], Paola Cerrito[6,7], Helen Liversidge[8], Lucia Mancini[9], Diego Dreossi[9], Alessio Veneziano[9,10], Federico Bernardini[11,12], Emanuela Cristiani[13], Alison Behie[4], Alfredo Coppa[14,15,16], Luca Bondioli[17,18,19], David W. Frayer[20], Davorka Radovčić[21] and Alessia Nava[1,13]

communications medicine

[August 2022]

ARTICLE

https://doi.org/10.1038/s43856-022-00164-x OPEN

Dental biorhythm is associated with adolescent weight gain

Patrick Mahoney[1], Gina McFarlane[1], Carolina Loch[2], Sophie White[2], Bruce Floyd[3], Erin C. Dunn[4], Rosie Pitfield[1], Alessia Nava[1] & Debbie Guatelli-Steinberg[1,5]

scientific reports

[May 2022]

OPEN

Tracing the mobility of a Late Epigravettian (~13 ka) male infant from Grotte di Pradis (Northeastern Italian Prealps) at high-temporal resolution

Federico Lugli[1,2], Alessia Nava[3], Rita Sorrentino[1,4], Antonino Vazzana[1], Eugenio Bortolini[1,5], Gregorio Oxilia[1], Sara Silvestrini[1], Nicola Nannini[6,7], Luca Bondioli[1,8], Helen Fewlass[9,10], Sahra Talamo[9,11], Edouard Bard[1,2], Lucia Mancini[13,14], Wolfgang Müller[15,16], Matteo Romandini[1,7,17] & Stefano Benazzi[1]

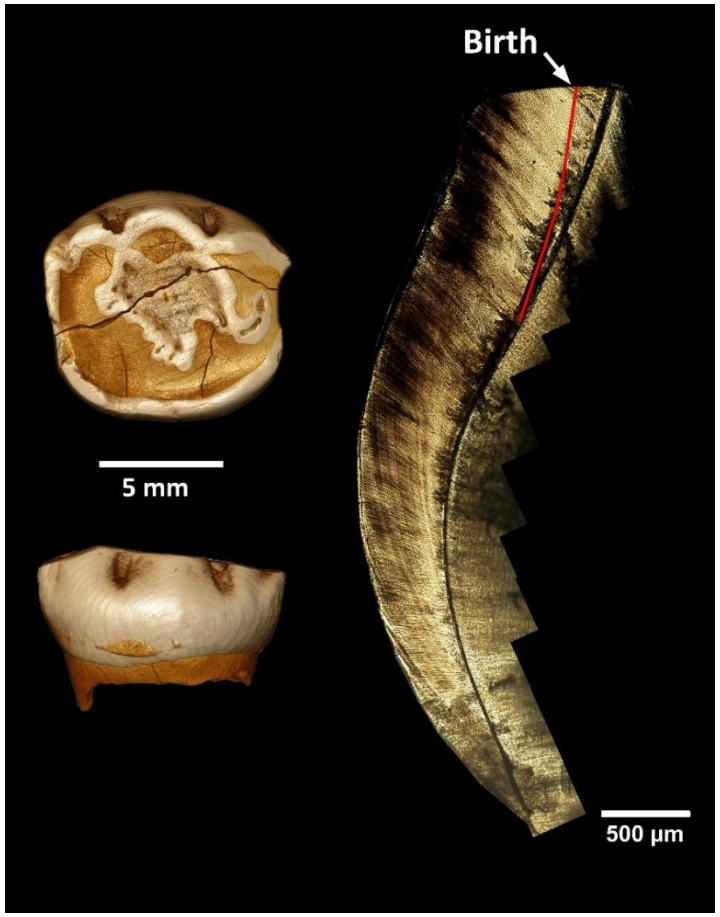
Scientific development

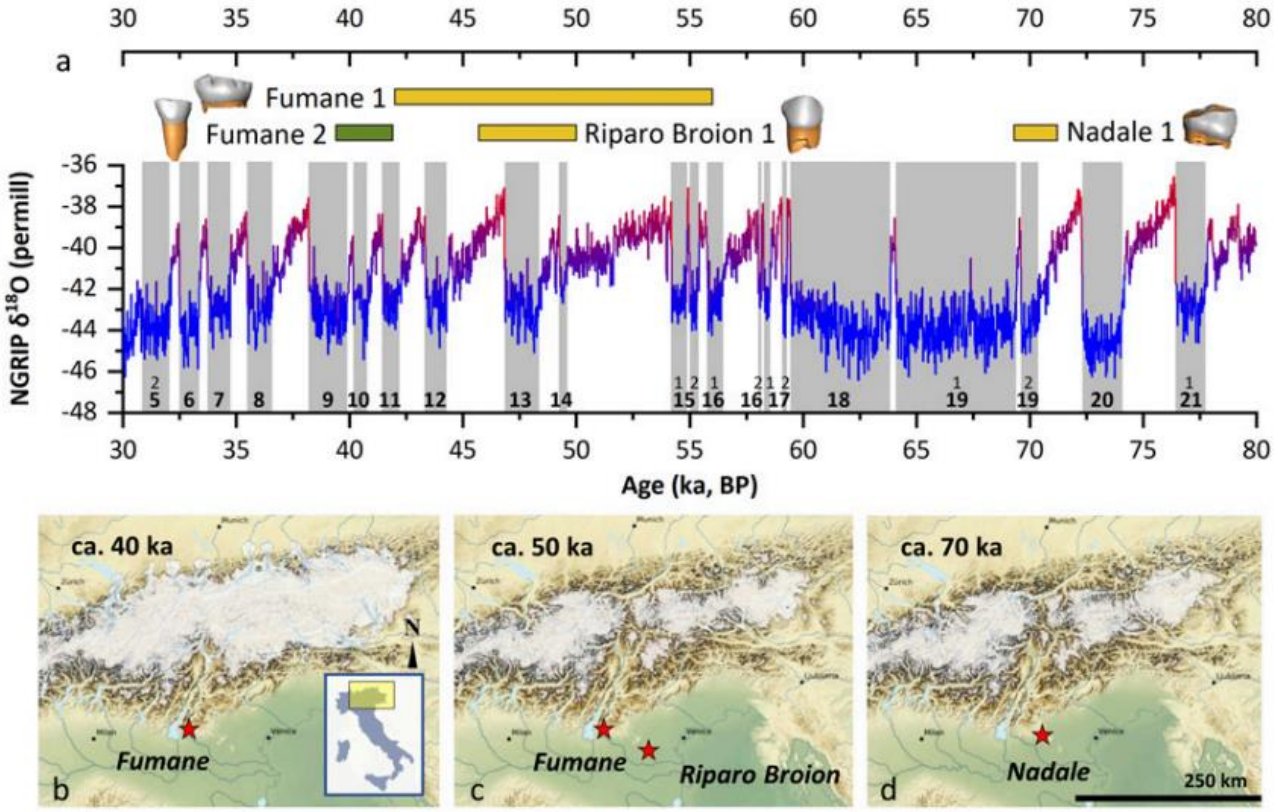
Early life of Neanderthals

2020

Alessia Nava[a,b,1,2], Federico Lugli[c,d,1,2], Matteo Romandini[c,e], Federica Badino[c,f], David Evans[g,h], Angela H. Helbling[g,h], Gregorio Oxilia[c], Simona Arrighi[c], Eugenio Bortolini[c], Davide Delpiano[i], Rossella Duches[j], Carla Figus[c], Alessandra Livraghi[i,k], Giulia Marciani[c], Sara Silvestrini[c], Anna Cipriani[d,l], Tommaso Giovanardi[d], Roberta Pini[f], Claudio Tuniz[m,n,o], Federico Bernardini[m,n], Irene Dori[p,q], Alfredo Coppa[r,s,t], Emanuela Cristiani[a], Christopher Dean[u,v], Luca Bondioli[w,x], Marco Peresani[f,i,2], Wolfgang Müller[g,h,2], and Stefano Benazzi[c,y,2]

PNAS





[Nava, Lugli et al., 2020]

ERC StG project MOTHERS

MOdelling THe Evolution
of the mother-infant RelationshipS

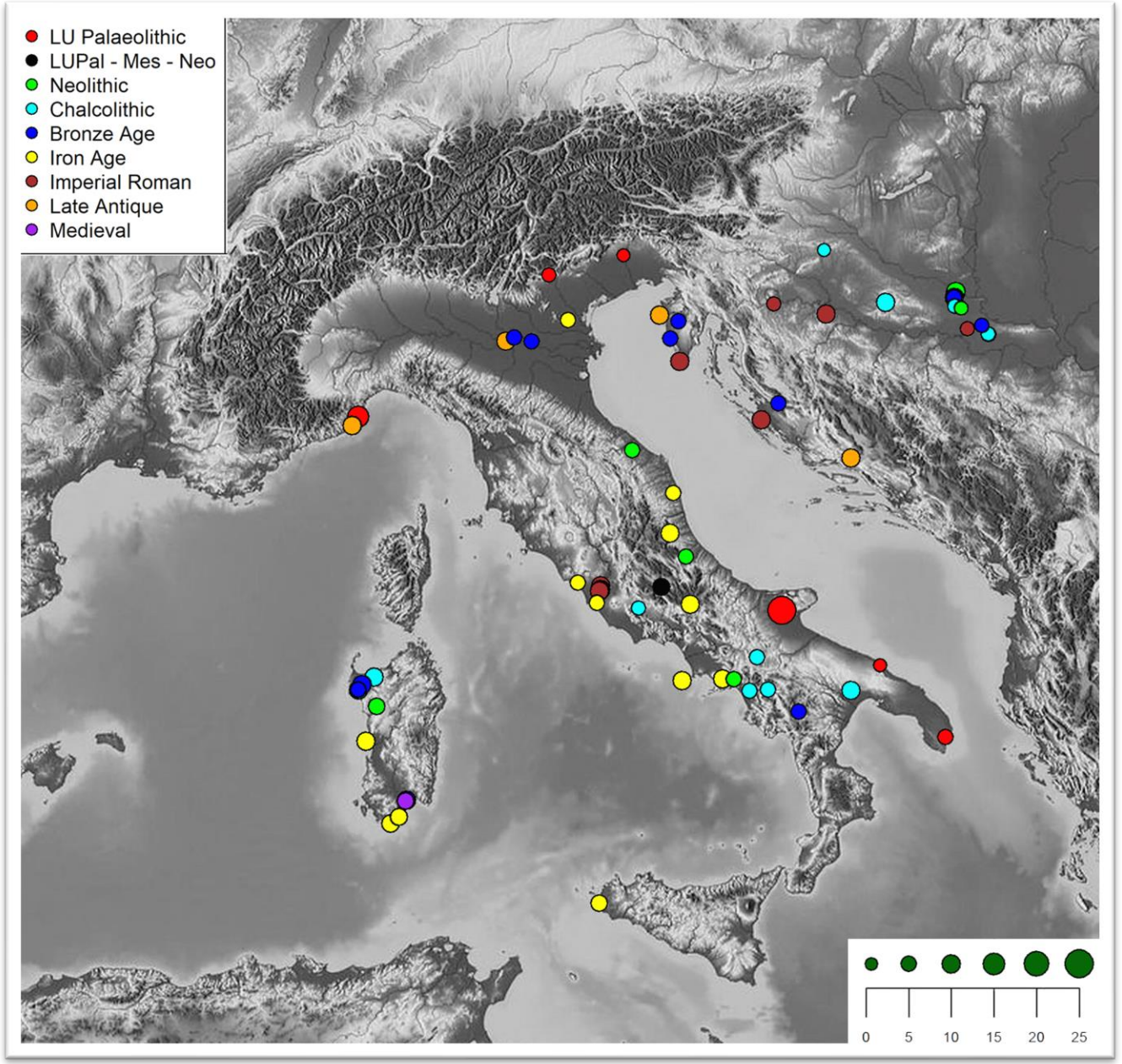
www.erc-mothers.eu

Started 1st March 2023 - Dipartimento di Scienze Odontostomatologiche e Maxillo Facciali – Sapienza Università di Roma

When, Where, and How

- From Upper Palaeolithic to Medieval Time
- Italian and Croatian skeletal series
- Histology and biogeochemistry of teeth (human and herbivores)

Chronology	N
LU Palaeolithic-Mesolithic	57
Neolithic	55
Chalcolithic	65
Bronze Age	63
Iron Age	98
Imperial Roman	66
Late Antique-Medieval	47
Total	**451**

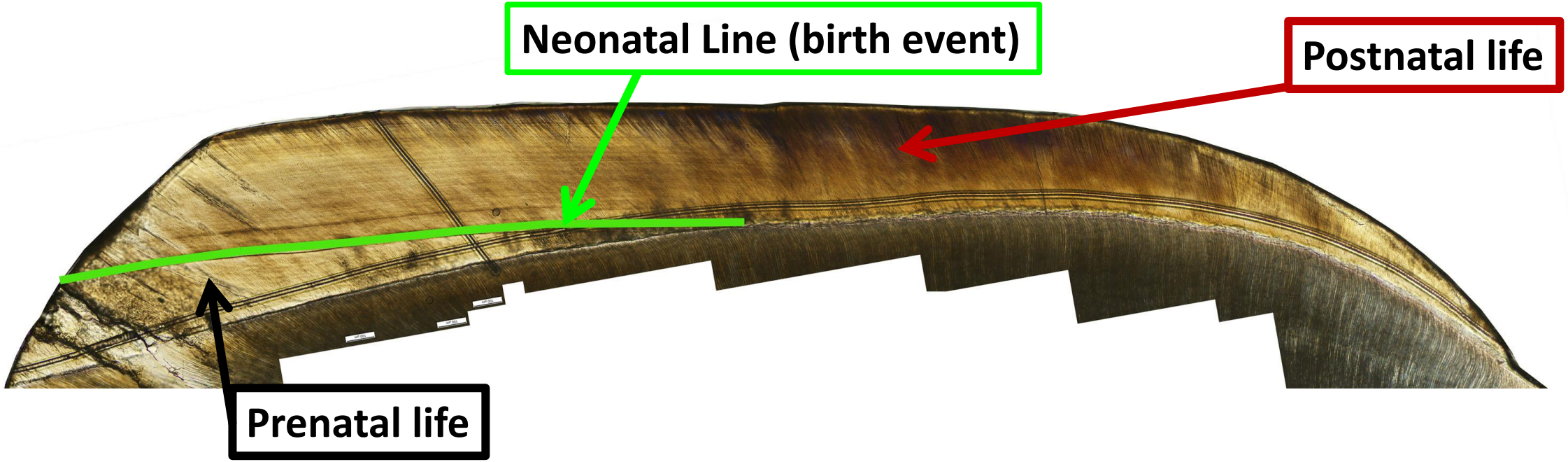


Teeth: time-resolved archives

Permanent record of:

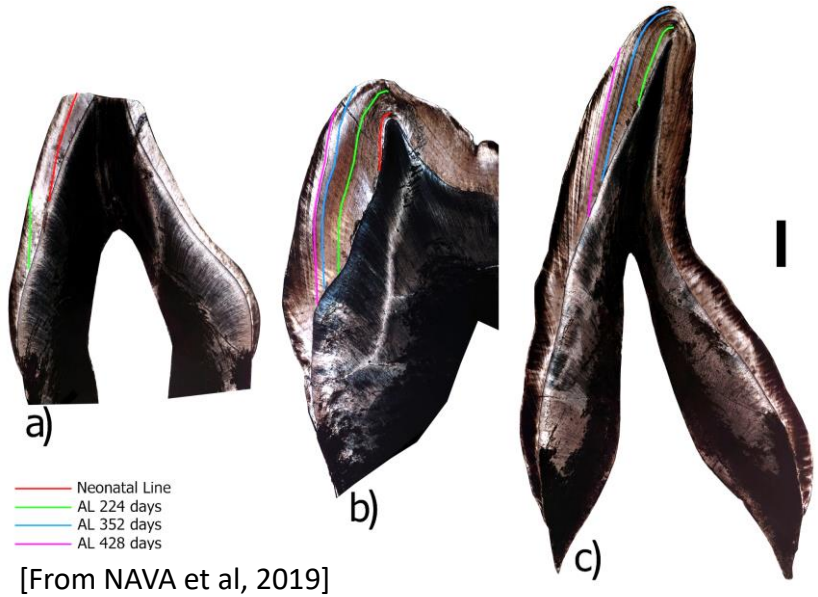
- **growth** (formation rates)
- **health** (growth disruption indicators)
- **diet** (changes in the elemental composition across the crown)
- **mobility** (changes in $^{87}Sr/^{86}Sr$ isotopic ratios)

Information on the **mother's health, diet, and mobility** during pregnancy

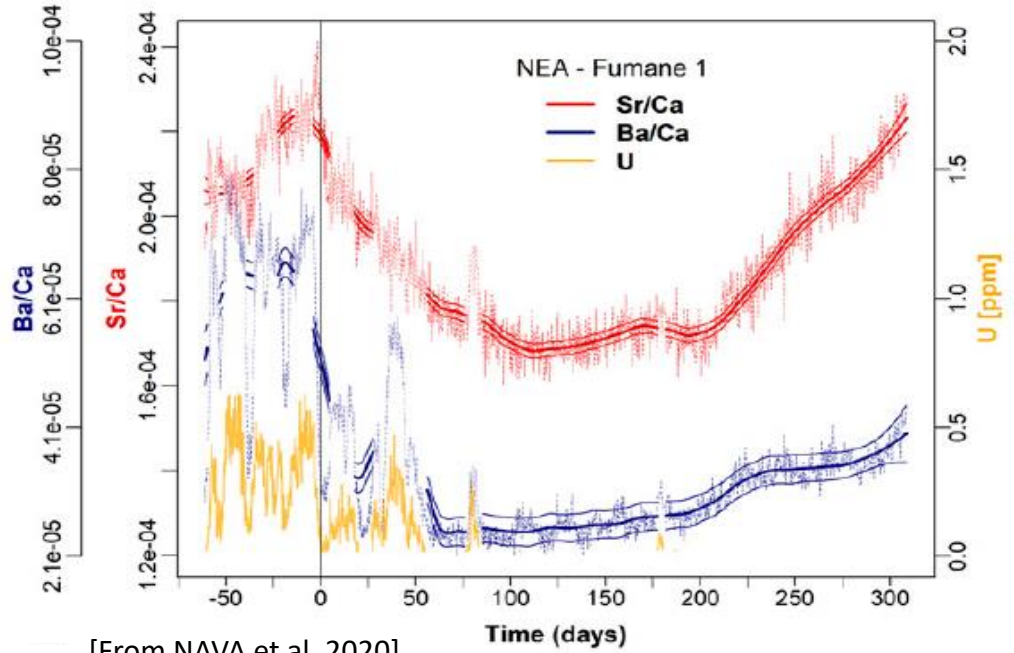


Methods

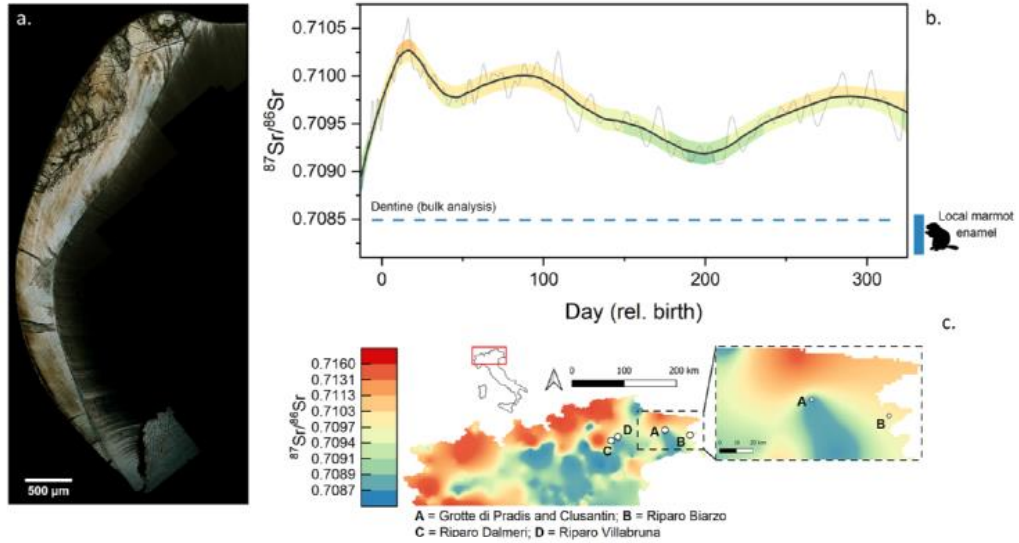
- Dental histology: Infant growth and mother-infant health
- Trace element profiles: Diet, diagenesis, mineralization
- Isotopic ratios ($\delta^{44/40}Ca$, $\delta^{66/64}Zn$): Diet
- Isotopic ratios ($\delta^{87/86}Sr$): Mobility



[From NAVA et al, 2019]



[From NAVA et al, 2020]

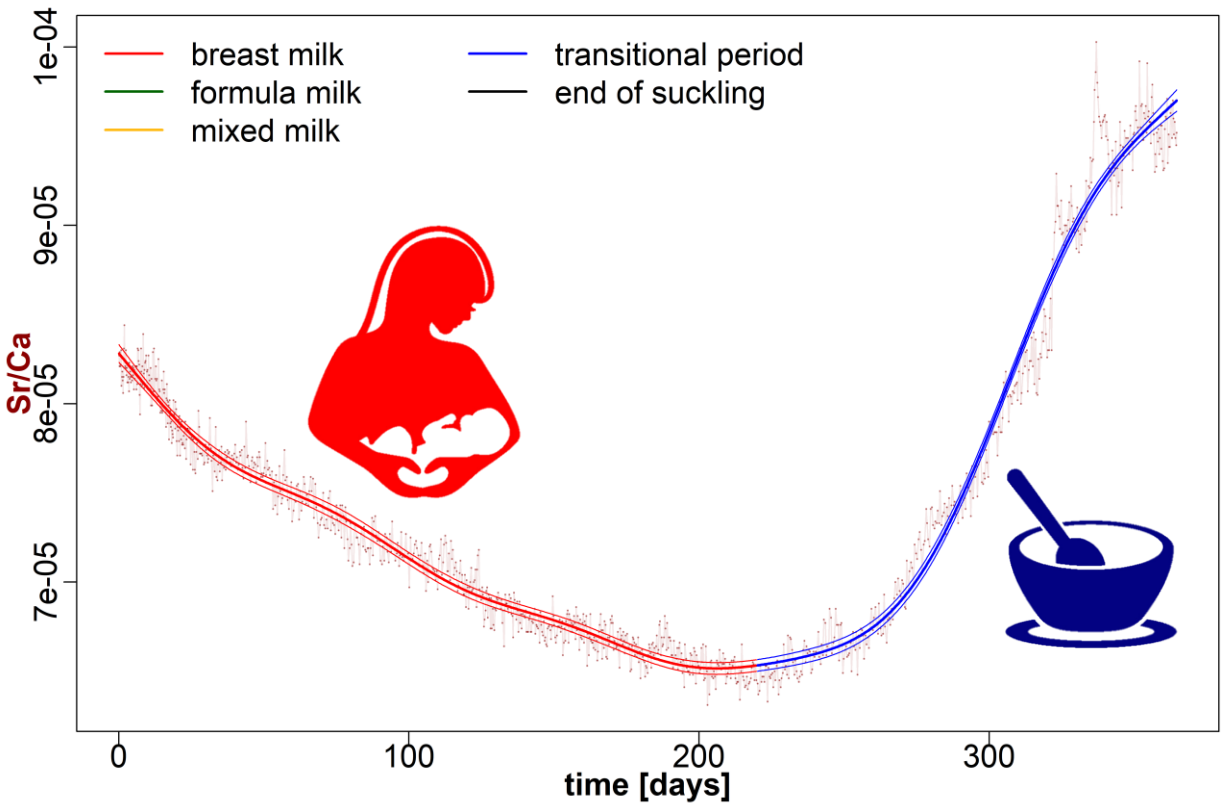


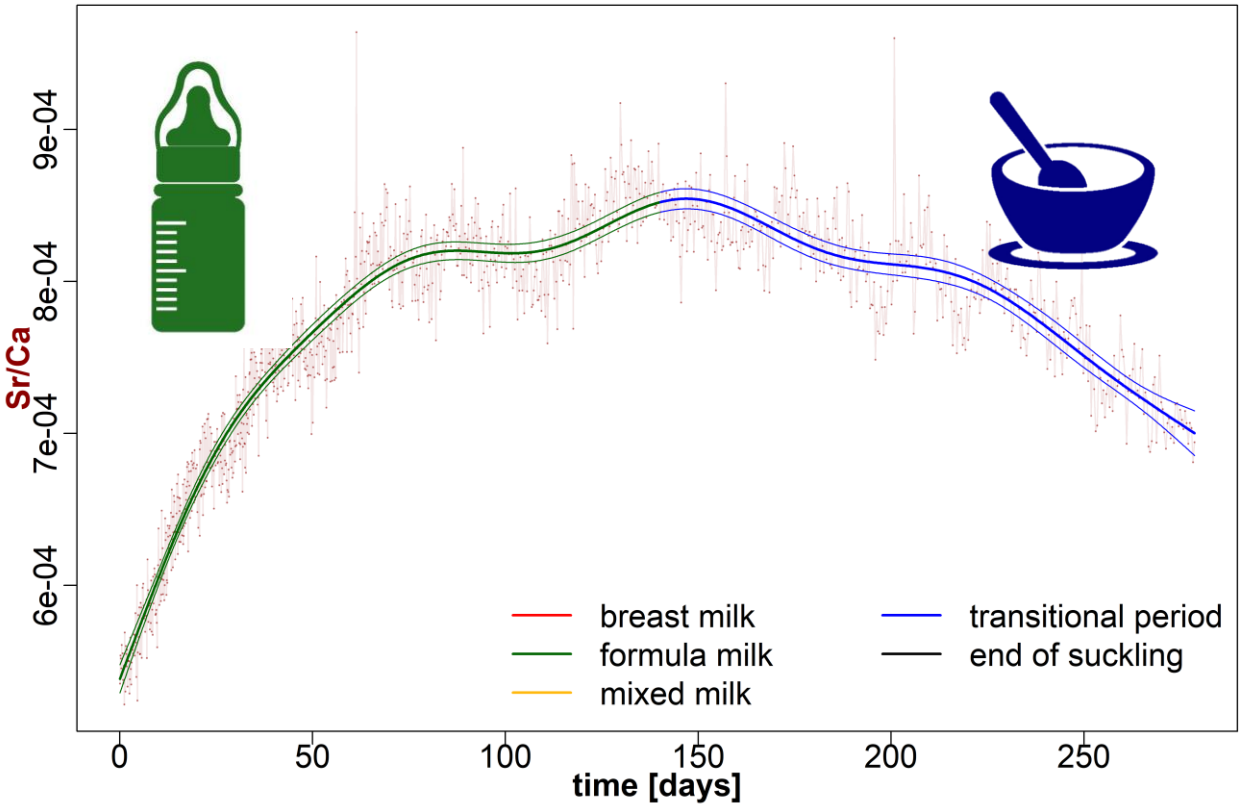
[From Lugli, NAVA et al, 2022]


Diverse dietary behaviours
Dental Histology
Biogeo-chemistry
WP1
Dietary models in dental enamel
Dental Histology
Biogeo-chemistry
Diagenesis
WP2
Archaeological and palaeoanthropological samples
Birth
5 mm
500 µm
The mother-infant nexus
Chemical signal of the end of weaning
WP3
End of weaning weaning
WP4
Rise of herbivore domestication
^{13}C analysis
Archaeo-zoology
Biogeo-chemistry
a
b
c
EB
TP
EW
EF
MBB
BIRTH
Sr/Ca x 10^{-3}
Time (days)

Research objectives

RO1: Define comparative trace elements variation dietary models in contemporary infants (N=100)

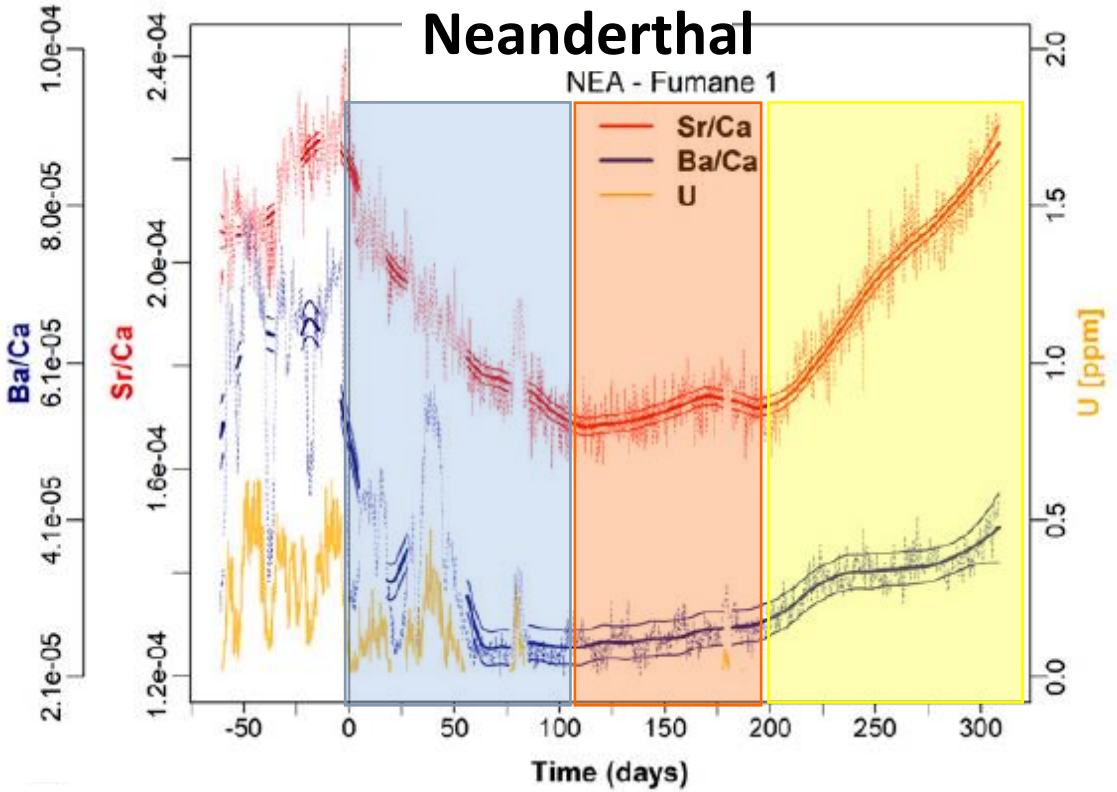




[Ongoing study]

Research objectives

RO2: Reveal the mother-infant nexus in past humans (N=451)



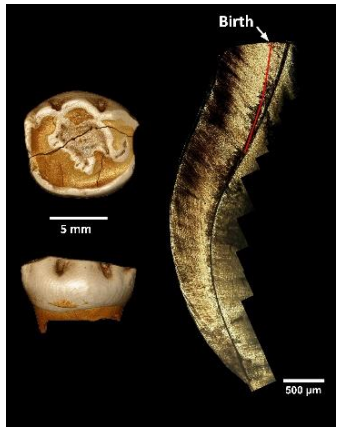
Exclusive breastfeeding

First introduction of solid food

Strongly reduced breastfeeding

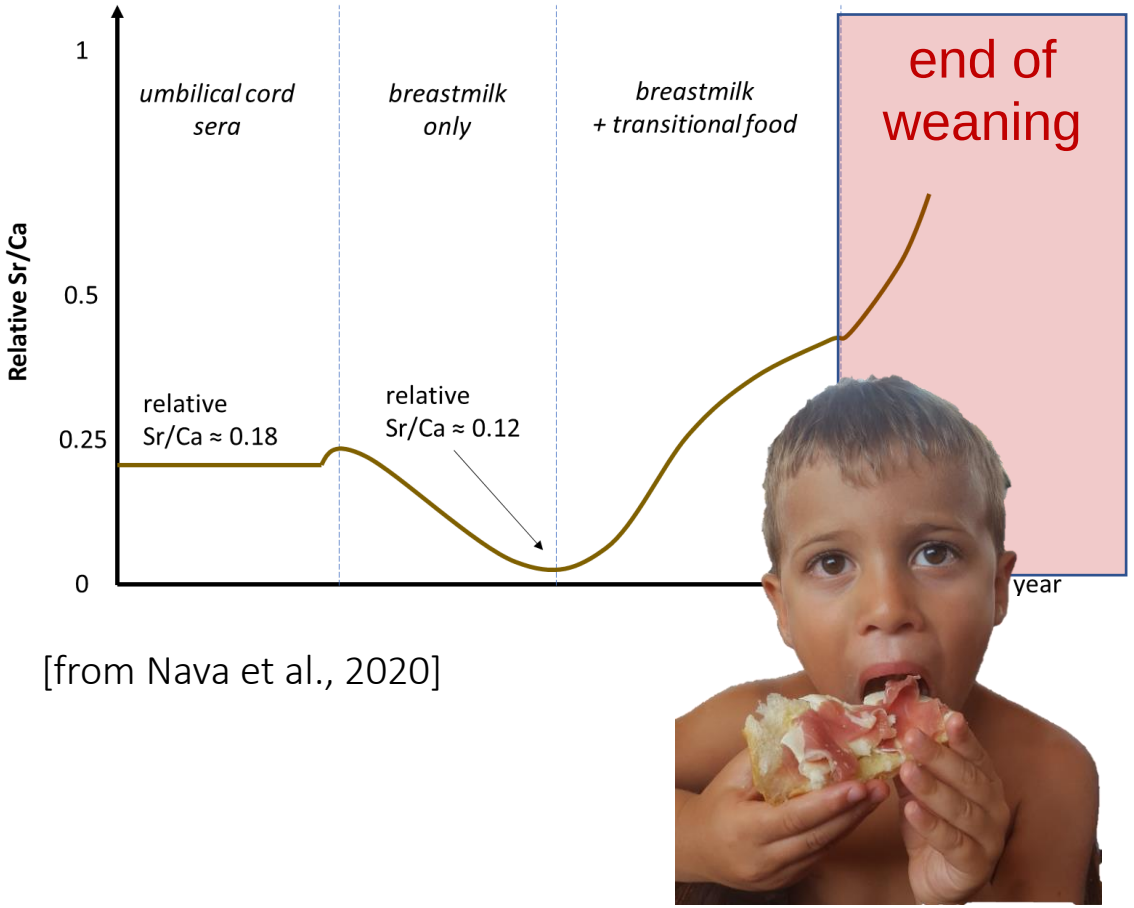
[from Nava et al., 2020]

- ✓ **Diet:** nursing behaviour
- ✓ Infants' **sex**
- ✓ Infants' **growth** rates
- ✓ Maternal-infant **health**



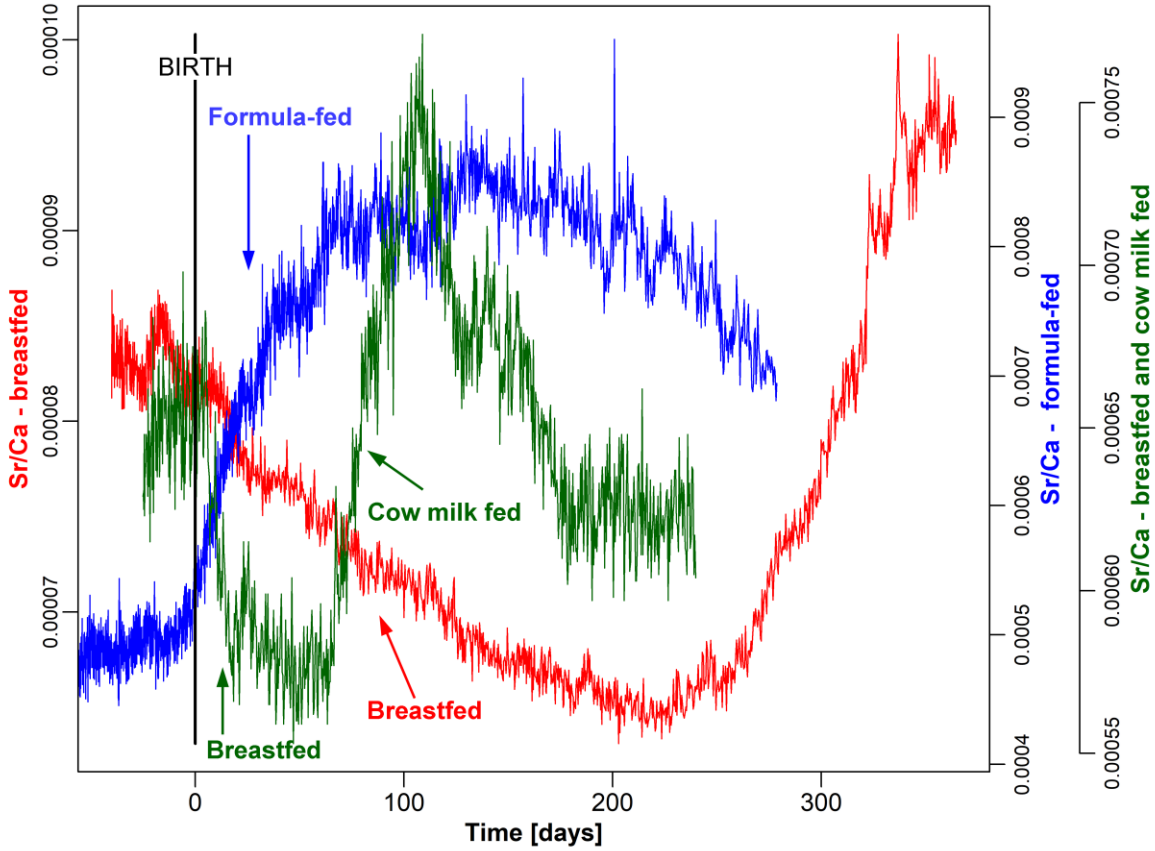
Research objectives

RO3: Detect the end of weaning signal



[from Nava et al., 2020]

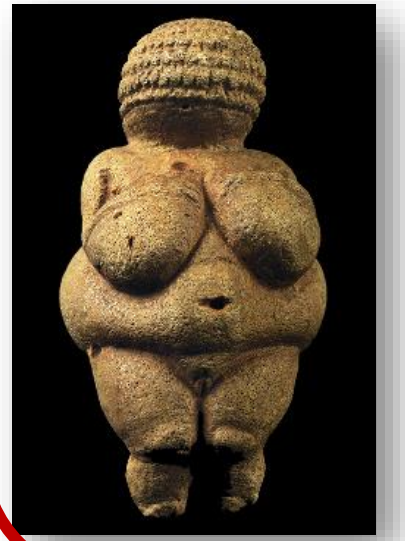
RO4: Explore the earliest non-human milk use

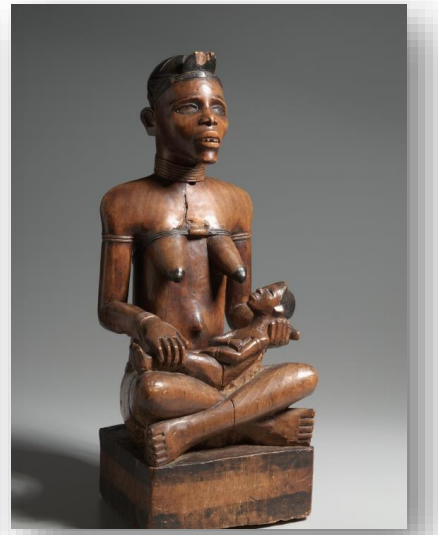


[Modified from NAVA et al, 2020, PNAS & preliminary data]

Impact

Reconstruction of mother infant nexus for the past 20,000 years






Broader implications

- Methodological advancement in the life history studies of fossil hominins
- New clues on the history of herbivore domestication
- Contribution to present-day nursing policies in public health

Key points

- Beyond the state of the art
- High risk/high gain
- Feasibility
- Risks and mitigation strategies





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Grazie per l'attenzione

Thanks for your attention

alessia.nava@uniroma1.it

Roma 21 Luglio 2023

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