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The composition of a Neandertal social group revealed by the hominin footprints at Le Rozel (Normandy, France)

Jérémy Duveau[a,1], Gilles Berillon[a], Christine Verna[a], Gilles Laisné[b], and Dominique Cliquet[b,c,d,1]

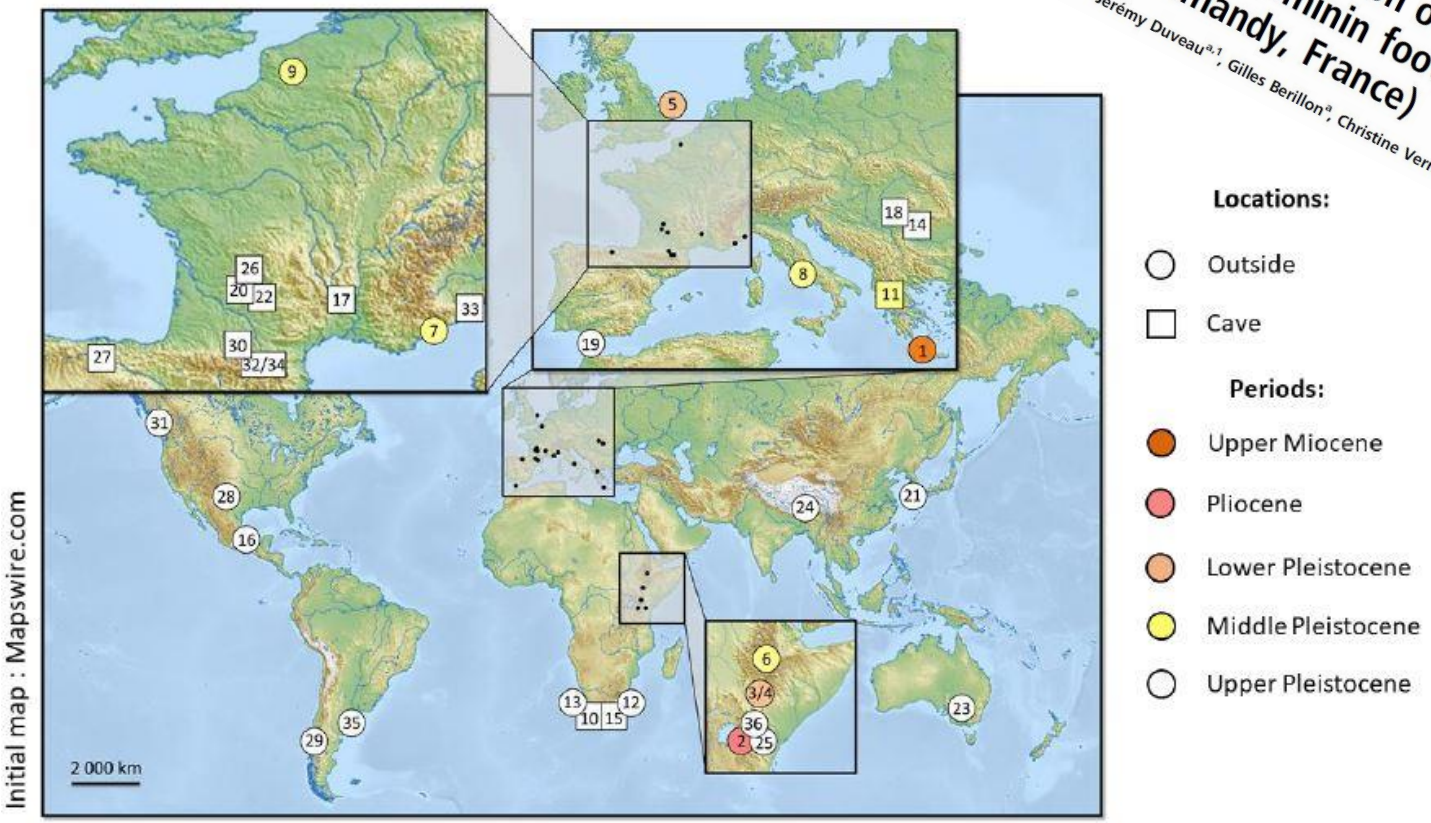


Fig. S1. Geographical distribution of pre-Holocene sites with potential hominin footprints

Legends: 1-Trachilos (Greece), 2-Laetoli (Tanzania), 3-Ileret (Kenya), 4-Koobi Fora (Kenya), 5-Happisburgh (Great-Britain), 6-Gombore II-2 (Ethiopia), 7-Terra Amata (France), 8-Roccamonfina (Italia), 9-Biache-Saint-Vaast (France), 10- Still Bay (South Africa), 11-Theopetra (Greece), 12-Nahoon (South Africa), 13-Langebaan (South Africa), 14-Vârtop (Romania), 15-Brenton-on-Sea (South Africa), 16-Valsequillo (Mexico), 17-Chauvet (France), 18-Ciur-Ibzuc (Romania), 19-Catalan Bay (Gibraltar), 20-Cussac (France), 21-Jeju Island (South Korea), 22-Pech-Merle (France), 23-Willandra Lakes (Australia), 24-Tibetan plateau (China), 25-Engare Sero (Tanzania), 26-Lascaux (France), 27-Ojo Guareña (Spain), 28-White Sands National Monument (USA), 29-Monte Verde (Chile), 30-Tuc d'Adoubert (France), 31-Calvert Island (Canada), 32-Niaux (France), 33-Tana della Basura (Italia), 34-Fontanet (France), 35-Pehuen-Co (Argentina), 36-Lake Bogoria (Kenya).

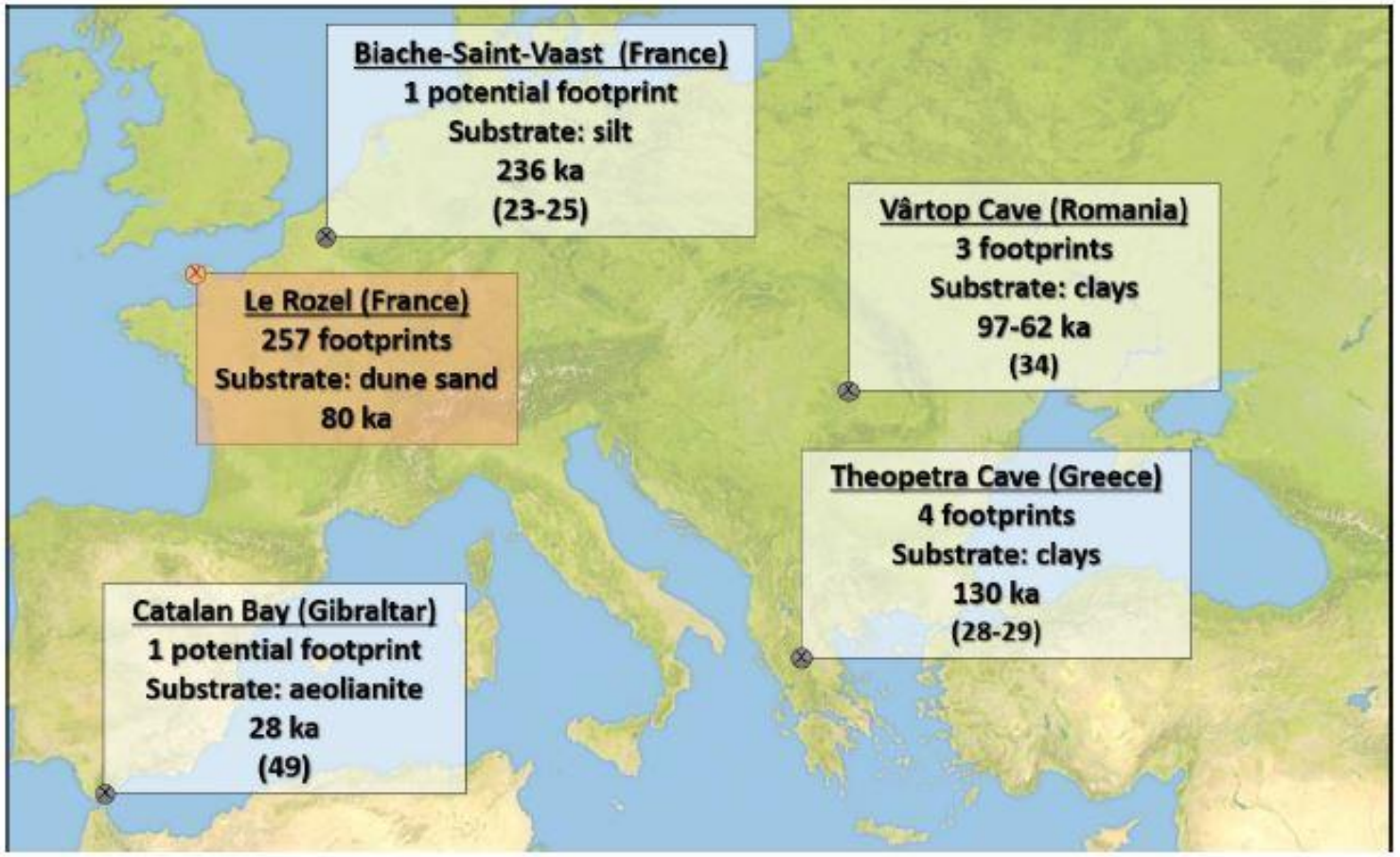
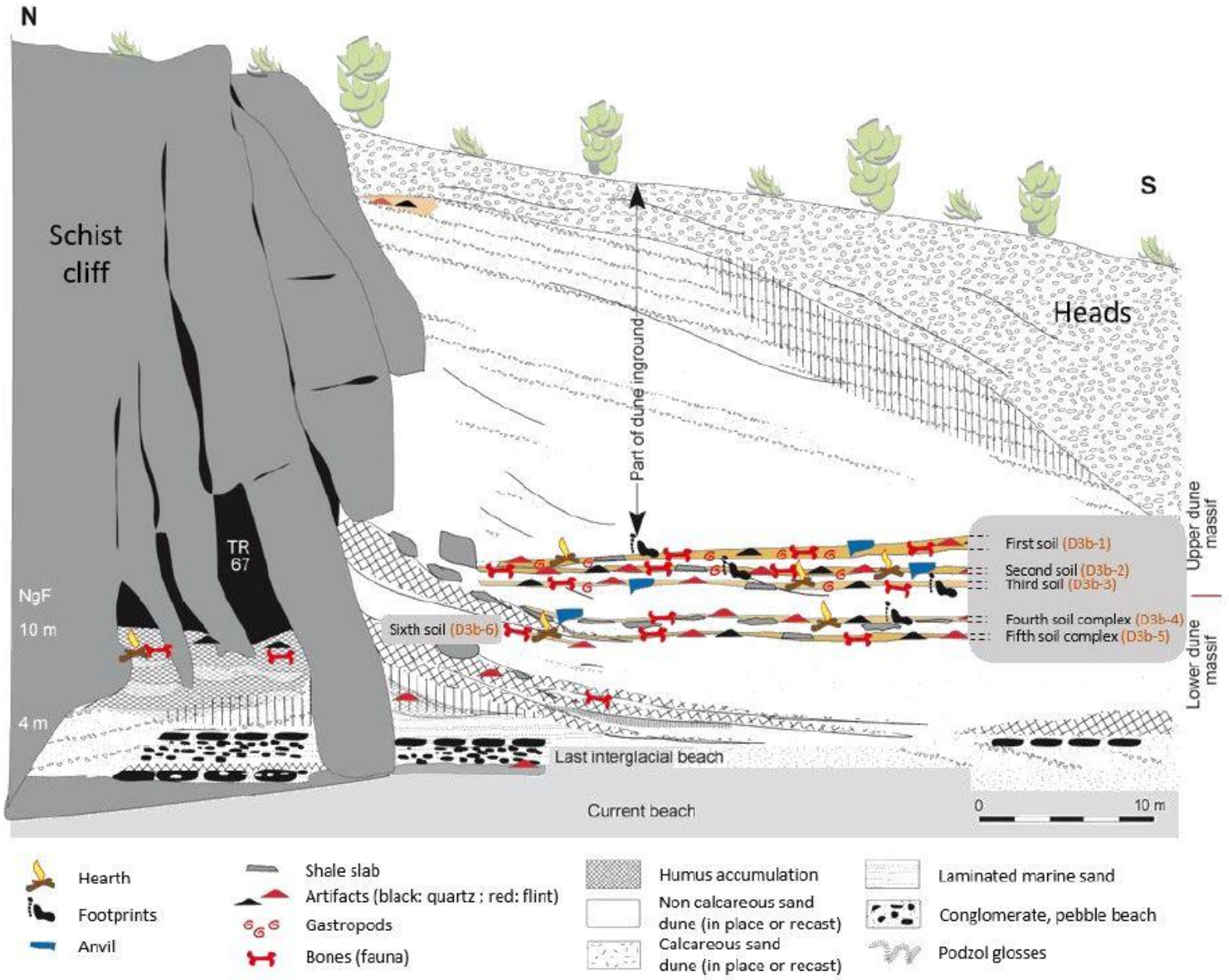
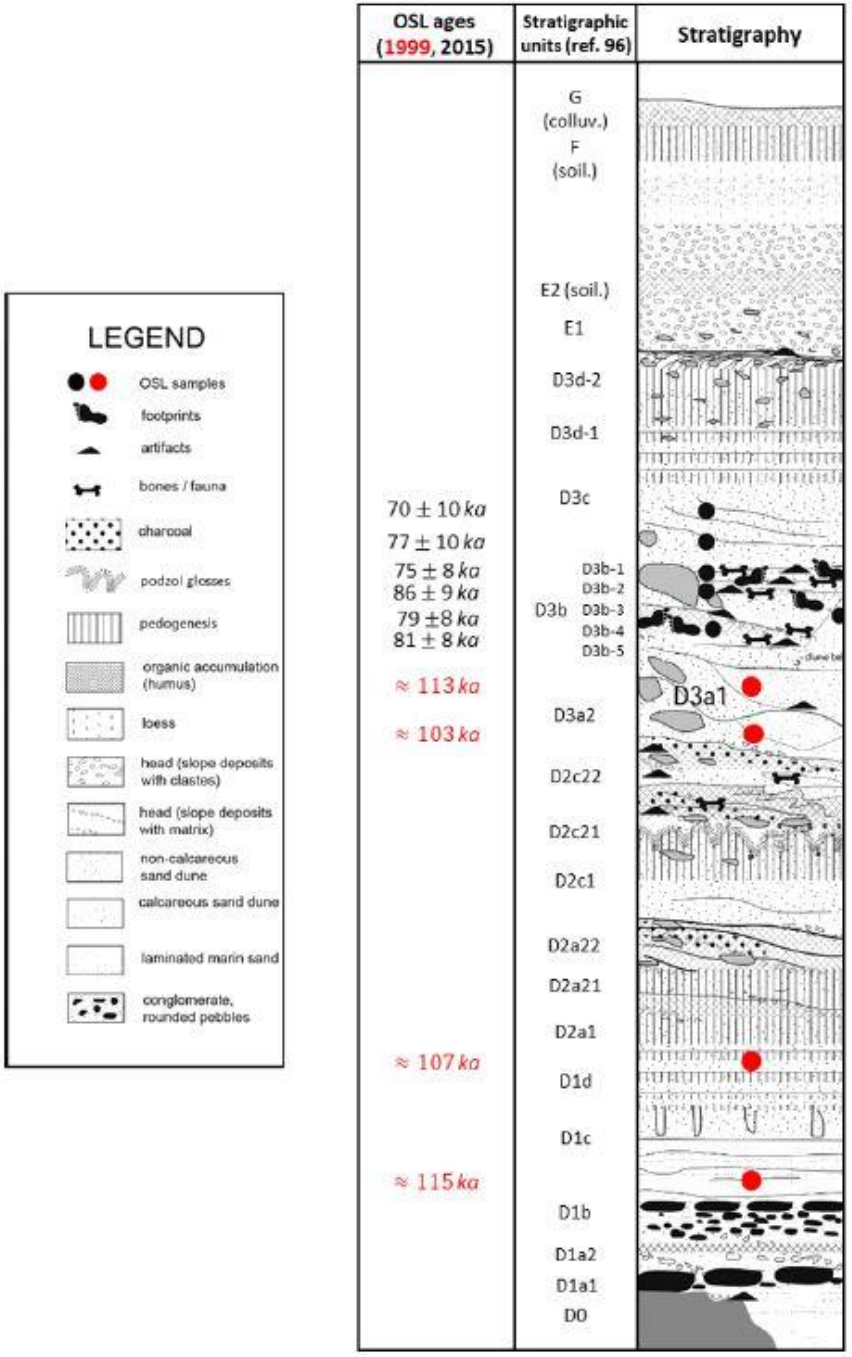


Fig. S2. Geographical distribution of sites with footprints attributed to Neandertals

Fig. S3. Geographical location of the archaeological site at Le Rozel

Fig. S4. View of Le Rozel site: during the first excavations in 1969 (left) and in 2014 (right).
The riprap at the base of the dune was built in order to limit the tidal sapping action


N
S
Schist cliff
Heads
Part of dune inground
TR 67
NgF
10 m
4 m
Sixth soil (D3b-6)
First soil (D3b-1)
Second soil (D3b-2)
Third soil (D3b-3)
Fourth soil complex (D3b-4)
Fifth soil complex (D3b-5)
Upper dune massif
Lower dune massif
Last interglacial beach
Current beach
0
10 m
Hearth
Footprints
Anvil
Shale slab
Artifacts (black: quartz ; red: flint)
Gastropods
Bones (fauna)
Humus accumulation
Non calcareous sand dune (in place or recast)
Calcareous sand dune (in place or recast)
Laminated marine sand
Conglomerate, pebble beach
Podzol glosses


LEGEND
OSL samples
footprints
artifacts
bones / fauna
charcoal
podzol glosses
pedogenesis
organic accumulation (humus)
loess
head (slope deposits with clastes)
head (slope deposits with matrix)
non-calcareous sand dune
calcareous sand dune
laminated marin sand
conglomerate, rounded pebbles
OSL ages (1999, 2015)
Stratigraphic units (ref. 96)
Stratigraphy
G (colluv.)
F (soil.)
E2 (soil.)
E1
D3d-2
D3d-1
D3c
D3b
D3b-1
D3b-2
D3b-3
D3b-4
D3b-5
D3a2
D2c22
D2c21
D2c1
D2a22
D2a21
D2a1
D1d
D1c
D1b
D1a2
D1a1
D0
70 ± 10 ka
77 ± 10 ka
75 ± 8 ka
86 ± 9 ka
79 ±8 ka
81 ± 8 ka
≈ 113 ka
≈ 103 ka
≈ 107 ka
≈ 115 ka
D3a1

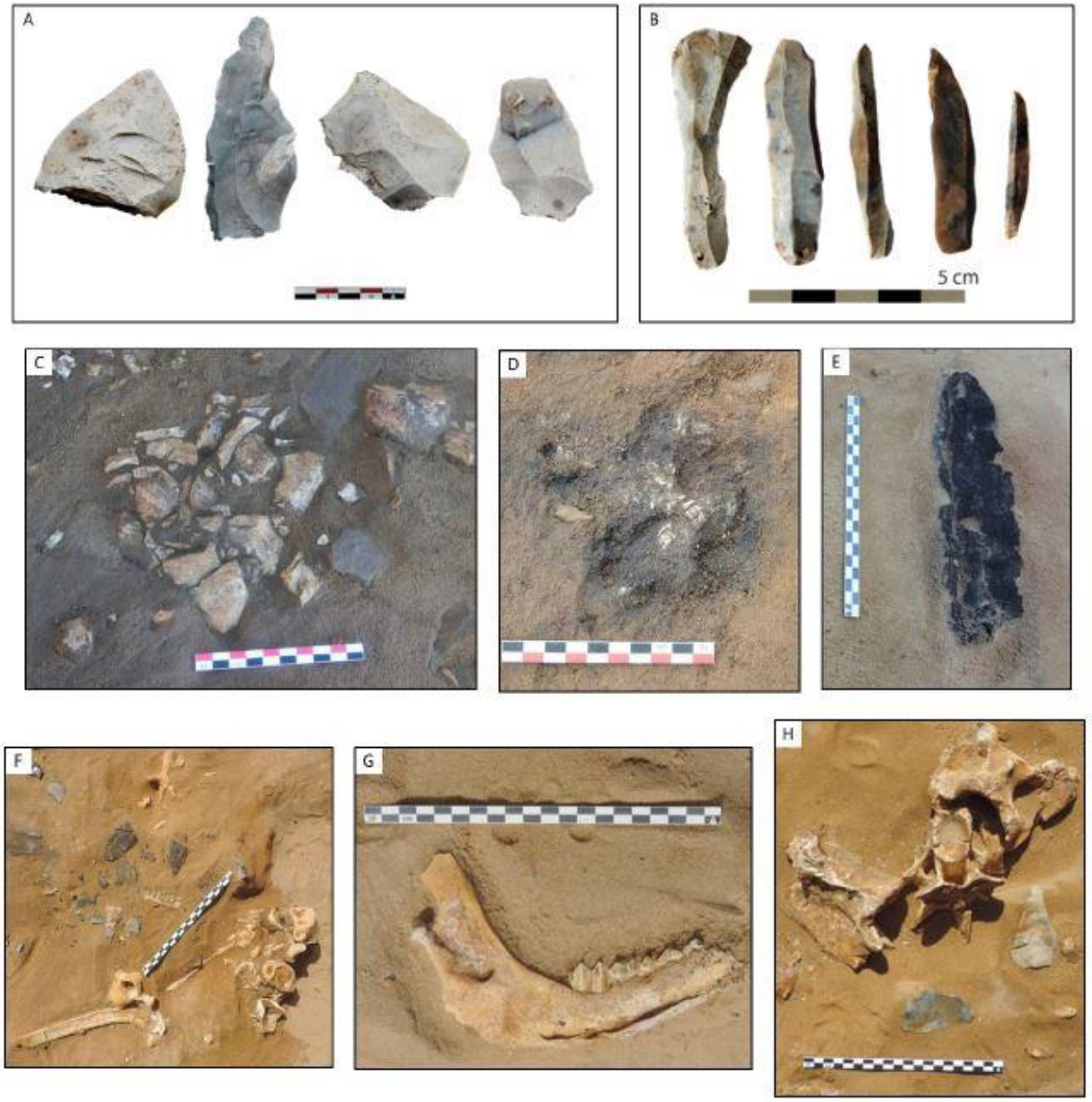


Fig. S9. Archeological material associated with the footprints:
A-Levallois flakes, B-blades, C-knapping spot, D-hearth, E-Burnt log, F-butchery area,
G-deer's lower jaw, H-deer's vertebrae

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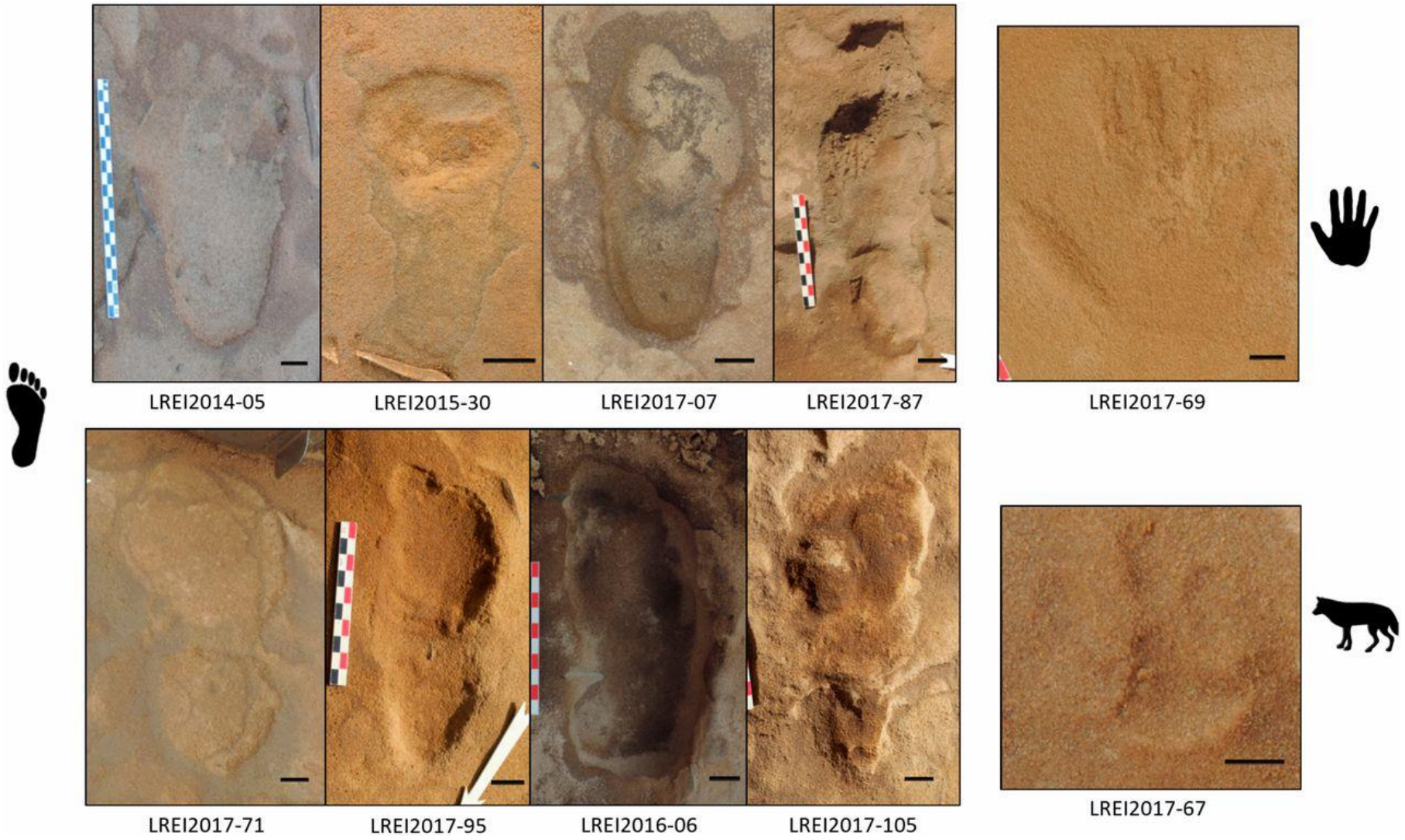

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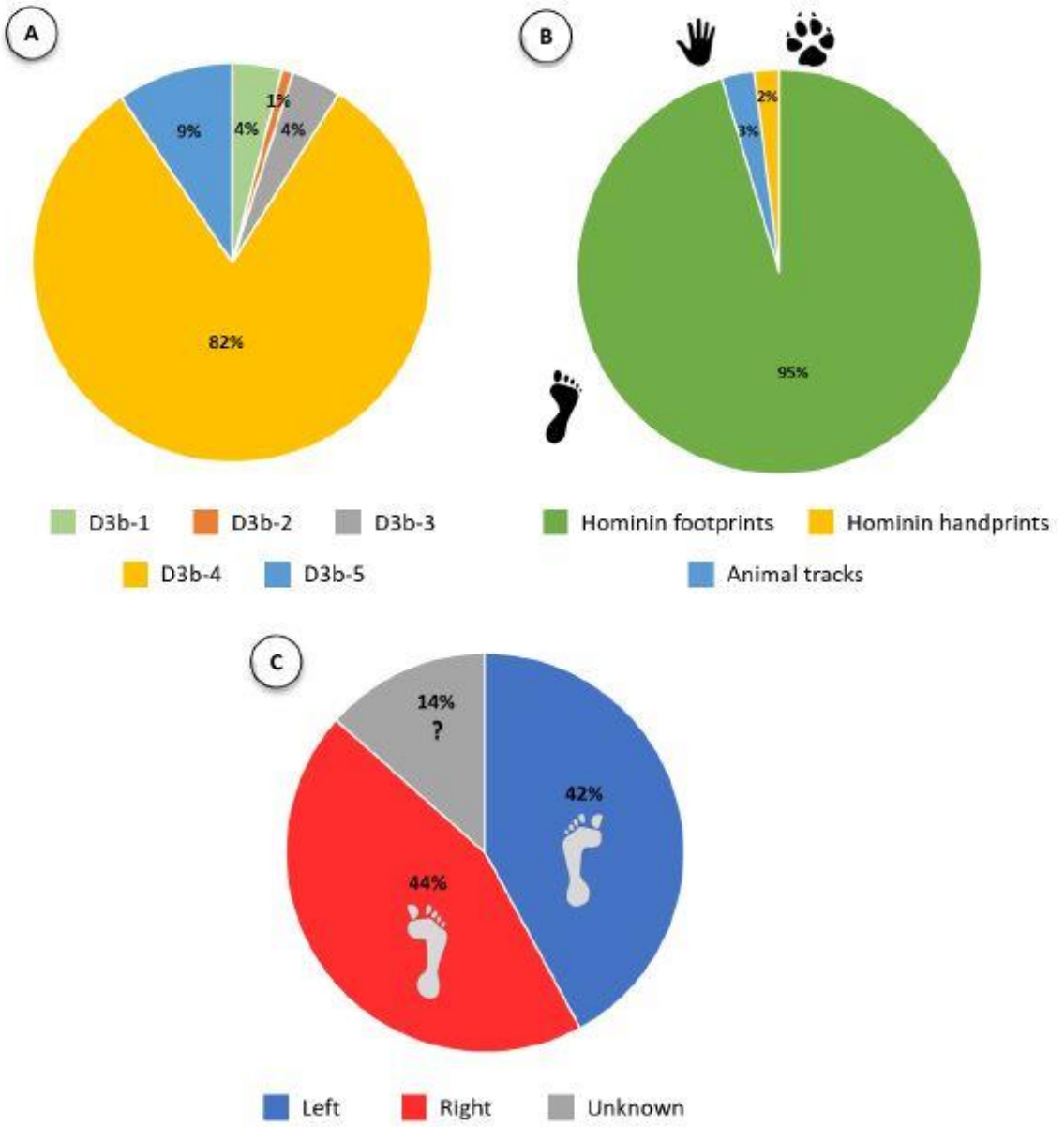
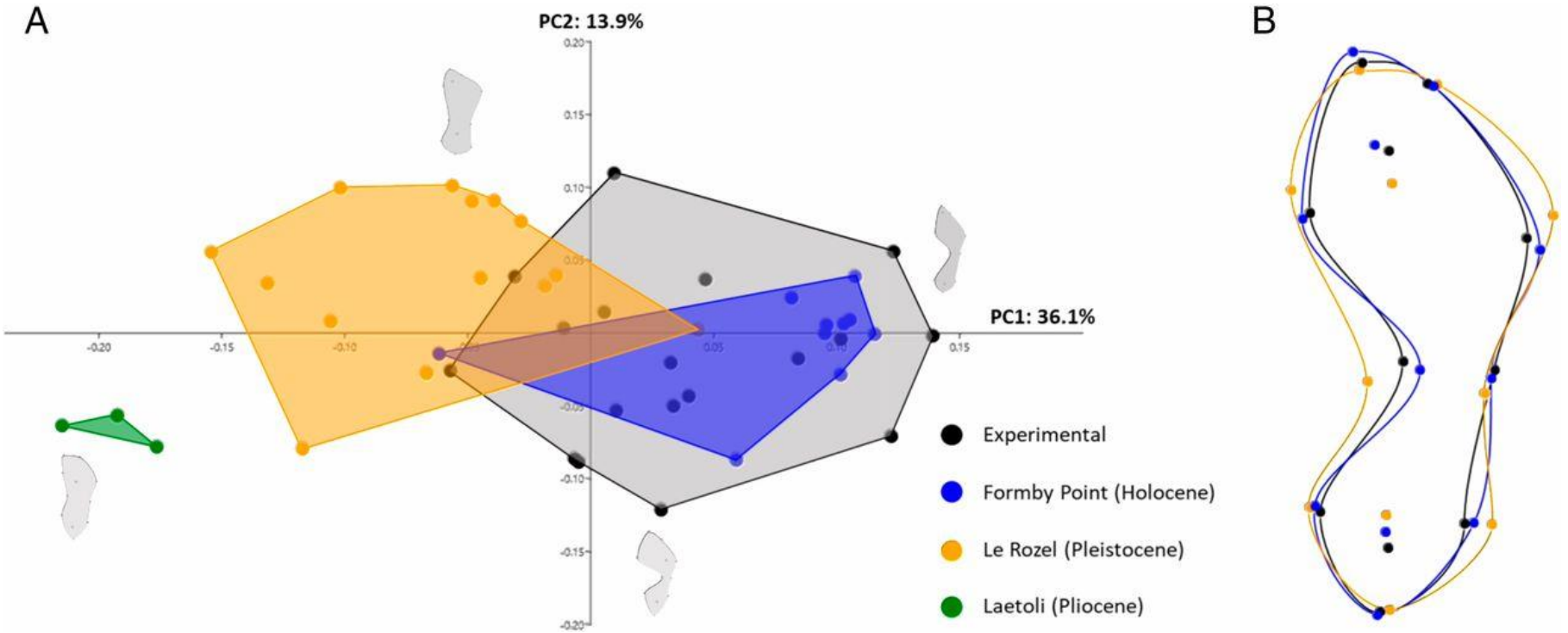


Fig. S10. Relative frequencies of the Le Rozel tracks (n = 271) from stratigraphic subunits (A), types of tracks (B) and laterality of hominin footprints (n = 257) (C)

Geometric morphometric analysis based on the 2D coordinates of 11 landmarks indicating the footprint outline and the locations of the deepest areas (SI Appendix, Text S6, Fig.



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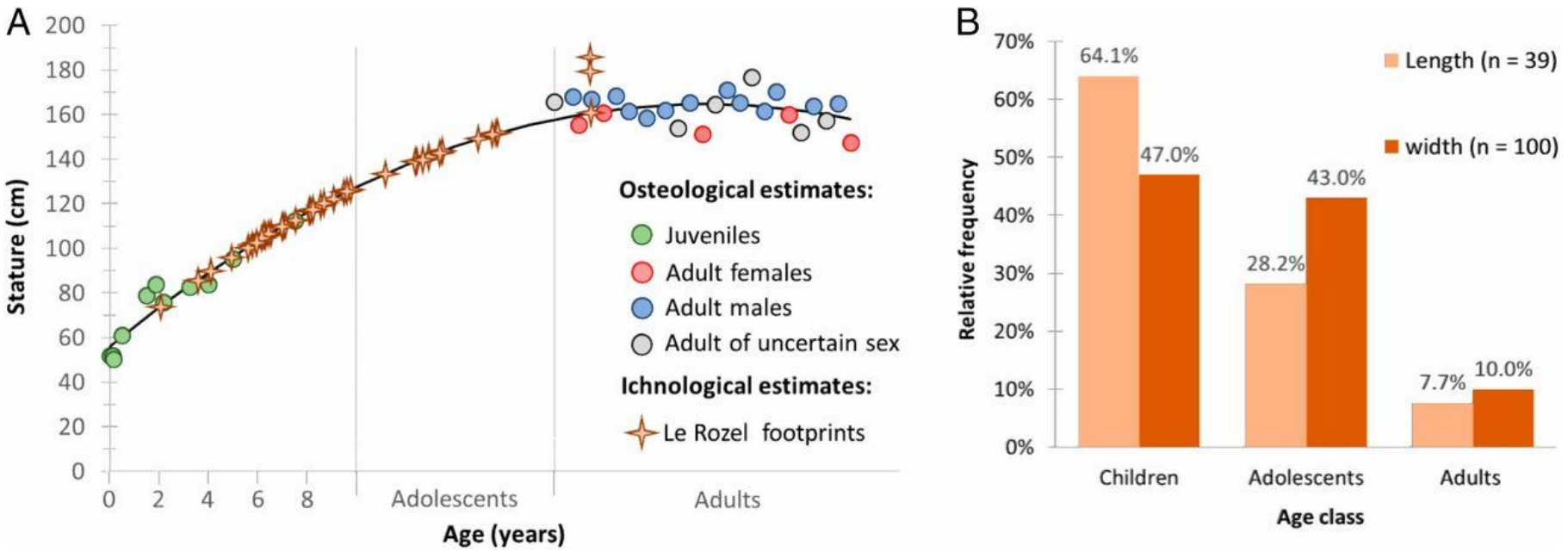
Distribution by age class.



Distribution by age class. (*A*) Positions of the 39 longitudinally complete footprints from the D3b-4 subunit placed on an age-to-stature regression curve from estimates based on Neandertal osteological remains (*SI Appendix*, Table S10). The curve was made using 2 relationships: the first for Neandertal children (in green) and the second, representing a constant mean stature, for adult Neandertals (in gray, red, and blue). (*B*) Relative frequencies per age class from both types of estimated statures (from footprint length and width).

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Table 1. Dimensions and estimated statures for the footprints from the D3b-4 stratigraphic subunit

Dimensions and associated statures	Total	Average metric class (MNI = 4)			
		I	II	III	IV
Length (cm)					
Interval	11.4 to 28.4	11.4 to 14.8	15.4 to 18.8	19.2 to 23.4	24.7 to 28.4
Mean	19.0	13.2	17.0	21.5	26.9
Number of footprints	39	4	18	14	3
Relative frequency (%)		10.3	46.2	35.9	7.7
Estimated stature (cm)					
Interval	73.8 to 184.8	73.8 to 96.0	100.2 to 122.3	124.9 to 151.9	160.7 to 184.8
Mean	123.5	86.2	110.4	140.0	174.8
Width (cm)					
Interval	4.5 to 12.8	4.5 to 6.6	6.6 to 8.6	8.6 to 10.7	10.7 to 12.8
Mean	8.5	5.5	7.6	9.5	11.8
Number of footprints	100	16	31	43	10
Relative frequency (%)		16.0	31.0	43.0	10.0
Estimated stature (cm)					
Interval	65.8 to 189.3	65.8 to 93.2	97.6 to 127.2	128.6 to 156.7	164.1 to 189.3
Mean	125.6	81.4	112.6	140.1	174.5

The metric classes for footprint length define the Minimum Number of Individuals as 4. The metric classes for width measurements are determined from the quartiles of their dispersion (4.5 to 12.8 cm).