

Supplementary material for
“A tale of two turkeys: Assessing the domestication status
and origins of turkey remains (*Meleagris gallopavo*) from the
18th century *Machault* shipwreck through ancient DNA and
stable isotope analysis”

Luke S. Jackman^{1,*}, Tom Vaughan², Thomas C.A. Royle^{1,3,*}, Eric J. Guiry^{2,4}, Charles Dagneau⁵,
Camilla F. Speller⁶, Stéphane Noël⁷, Dongya Y. Yang¹

¹Ancient DNA Laboratory, Department of Archaeology, Simon Fraser University, Burnaby, British Columbia, Canada

²School of Archaeology and Ancient History, University of Leicester, Leicester, United Kingdom

³Department of Archaeology and Cultural History, NTNU University Museum, Norwegian University of Science and Technology, Trondheim, Norway

⁴Department of Anthropology, Trent University, Peterborough, Ontario, Canada

⁵ Underwater Archaeology Team, Archaeology and History Branch, Parks Canada, Ottawa, Ontario, Canada

⁶ ADαPT Facility, Department of Anthropology, University of British Columbia, Vancouver, British Columbia, Canada

⁷ Ville de Québec, Québec City, Québec, Canada

Corresponding Authors: lsj3@sfu.ca (L.S. Jackman), troyle@sfu.ca (T.C.A. Royle)

This PDF file includes:

Tables S1 to S6

Supplementary Material References Cited

Table S1. Contextual information, element information, stable isotope compositions, and elemental compositions for the specimens analyzed in this study.

Isotope Lab No.	aDNA Lab No.	Site	Site Code	Element	Side	Context	$\delta^{13}\text{C}$	$\delta^{15}\text{N}$	%C	%N	C:N
IUBC-3382	TUM1	<i>Machault</i>	2M	Tibiotarsus	Right	2M3A2-A	-13.0	5.0	42.9	14.8	3.38
IUBC-3387	TUM2	<i>Machault</i>	2M	Ulna	Right	2M48D1-B	-15.9	6.8	43.5	14.6	3.46
HEAL-1726	N/A	Îlot des Palais	CeEt-30	Femur	Right	Lot 57B4, Box 1144	-20.5	6.6	42.6	15.4	3.23
HEAL-1740	N/A	Îlot des Palais	CeEt-30	Tarsometatarsal	Left	Lot 57B5, Box 1145	-19.6	5.9	43.6	15.9	3.20
HEAL-1741	N/A	Îlot des Palais	CeEt-30	Tarsometatarsal	Left	Lot 57B5, Box 1145	-20.0	6.5	42.4	15.6	3.17
HEAL-1742	N/A	Îlot des Palais	CeEt-30	Tarsometatarsal	Left	Lot 57B5, Box 1145	-20.3	6.9	43.9	16.1	3.18
HEAL-1743	N/A	Îlot des Palais	CeEt-30	Tarsometatarsal	Left	Lot 57B5, Box 1145	-21.4	6.8	44.0	15.8	3.25
HEAL-1744	N/A	Îlot des Palais	CeEt-30	Tarsometatarsal	Left	Lot 57B5, Box 1145	-20.0	6.3	43.3	15.7	3.21
HEAL-1772	N/A	Îlot des Palais	CeEt-30	Humerus	Left	Lot 57C5, Box 1148	-14.0	7.5	43.6	16.0	3.18
HEAL-1773	N/A	Îlot des Palais	CeEt-30	Humerus	Left	Lot 57C5, Box 1148	-13.8	7.4	42.6	15.7	3.17
HEAL-1774	N/A	Îlot des Palais	CeEt-30	Humerus	Left	Lot 57C5, Box 1148	-20.6	5.9	42.6	15.5	3.20
HEAL-1775	N/A	Îlot des Palais	CeEt-30	Humerus	Left	Lot 57C5, Box 1148	-14.5	7.3	43.6	16.0	3.19
HEAL-1776	N/A	Îlot des Palais	CeEt-30	Humerus	Left	Lot 57C5, Box 1148	-20.8	5.5	42.8	15.4	3.23
HEAL-1794	N/A	Assemblée nationale du Québec	CeEt-740	Ulna	No data	Lot 2B6, Box 87	-20.6	6.6	43.2	15.6	3.22
HEAL-1809	N/A	Assemblée nationale du Québec	CeEt-740	Humerus	Same side	Lot 2B7, Box 87	-21.2	6.5	42.3	15.4	3.20
HEAL-1810	N/A	Assemblée nationale du Québec	CeEt-740	Humerus	Same side	Lot 2B7, Box 87	-20.9	5.3	44.4	16.2	3.20
HEAL-1828	N/A	Assemblée nationale du Québec	CeEt-740	Ulna	Right	Lot 2B11, Box 88	-20.0	5.9	42.5	15.6	3.18
HEAL-1865	N/A	rue Saint-Vallier	CeEt-745	Tarsometatarsal	Right	Lot 5F6 ext., Box 1553	-22.3	6.7	42.1	15.4	3.19

Table S2. Primers used to amplify fragments of the turkey mitochondrial control region. All primers are from Speller et al. (2010).

Primer	Sequence (5' to 3')
TK-F2 ¹	AATTTATTCCCGCTTGGATAAGCC
TK-F143 ¹	GCATAATCGTGCATACATTTATATACC
TK-F315 ¹	ACATGCCAATGACATTAACCTCCTTC
TK-R261 ²	AGGGAGRAATGGGGTAAAGGTTGT
TK-R405 ²	TGTATATGGTCTCTTGRGGGTTGG
TK-R670 ²	CAGATGACTTCGTGAAAAGTGAGGAG

¹Forward primer; ²Reverse primer

Table S3. Accepted (calibration) and observed long-term (check) isotopic compositions and standard deviations (1 σ) for standards used in this study (Qi, et al., 2003; Qi, et al., 2016; Schimmelmann, et al., 2016)

Name	Material	Number	$\delta^{13}\text{C}$ (‰, VPDB)	$\delta^{15}\text{N}$ (‰, AIR)	Standard Type
USGS40	Glutamic acid	NA	-26.39±0.04	-4.52±0.06	Calibration standard
USGS41a	Glutamic acid	NA	+36.55±0.08	+47.55±0.15	Calibration standard
USGS66	Glutamic acid	NA	-0.67±0.04	+40.83±0.06	Calibration standard
MET	Methionine	1608	-28.61±0.10	-5.04±0.13	Check standard
SRM-1	Caribou bone collagen	837	-19.39±0.09	+1.85±0.19	Check standard
SRM-2	Walrus bone collagen	369	-14.80±0.07	+15.58±0.18	Check standard
SRM-15	Deer bone collagen	329	-26.89±0.08	+6.91±0.18	Check standard
SRM-16	Seal bone collagen	273	-14.78±0.08	+16.93±0.19	Check standard
SRM-26	GH marine collagen	786	-16.17±0.10	+14.69±0.18	Check standard
SRM-28	Alanine	353	-16.27±0.09	-1.94±0.18	Check standard

Table S4. Means and standard deviations for calibration standards for all analytical sessions.

Standard	Analytical Session	Number	$\delta^{13}\text{C}$ (1σ)	$\delta^{15}\text{N}$ (1σ)
USGS40	CN22-13	6	-26.39 \pm 0.04	-4.52 \pm 0.34
USGS40	CN22-14	6	-26.39 \pm 0.03	-4.52 \pm 0.18
USGS40	CN17-26	9	-26.39 \pm 0.04	-4.52 \pm 0.05
USGS41a	CN17-26	6	36.55 \pm 0.03	47.55 \pm 0.15
USGS66	CN22-13	6	-0.67 \pm 0.13	40.83 \pm 0.25
USGS66	CN22-14	9	-0.67 \pm 0.13	40.83 \pm 0.20

Table S5. Means and standard deviations for check standards for all analytical sessions.

Standard	Analytical Session	Number	$\delta^{13}\text{C}$ (1σ)	$\delta^{15}\text{N}$ (1σ)
MET	CN17-26	7	-28.60 \pm 0.04	-5.03 \pm 0.04
SRM-1	CN17-26	6	-19.39 \pm 0.03	1.76 \pm 0.10
SRM-2	CN17-26	5	-14.84 \pm 0.06	15.56 \pm 0.02
SRM-15	CN22-13	3	-26.88 \pm 0.08	6.85 \pm 0.07
SRM-15	CN22-14	4	-26.92 \pm 0.04	6.84 \pm 0.08
SRM-16	CN22-13	4	-14.79 \pm 0.04	16.73 \pm 0.07
SRM-16	CN22-14	4	-14.71 \pm 0.01	16.73 \pm 0.09
SRM-26	CN22-13	7	-16.24 \pm 0.04	14.67 \pm 0.12
SRM-26	CN22-14	8	-16.19 \pm 0.04	14.64 \pm 0.10
SRM-28	CN22-13	5	-16.22 \pm 0.06	-1.96 \pm 0.17
SRM-28	CN22-14	5	-16.23 \pm 0.05	-1.94 \pm 0.13

Table S6. Means and standard deviations for sample replicates for all analytical sessions.

Sample	$\delta^{13}\text{C}$ (A)	$\delta^{13}\text{C}$ (B)	$\delta^{13}\text{C}$ (1σ)	$\delta^{15}\text{N}$ (A)	$\delta^{15}\text{N}$ (B)	$\delta^{15}\text{N}$ (1σ)
HEAL 1772	-14.07	-14.00	-14.03 \pm 0.05	7.50	7.49	7.50 \pm 0.01
HEAL 1809	-21.20	-21.19	-21.19 \pm 0.01	6.48	6.60	6.54 \pm 0.09

References

- Qi, H., Coplen, T.B., Geilmann, H., Brand, W.A., Böhlke, J., 2003. Two new organic reference materials for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ measurements and a new value for the $\delta^{13}\text{C}$ of NBS 22 oil. *Rapid Commun. Mass Spectrom.* 17 (22), 2483–2487. <https://doi.org/10.1002/rcm.1219>.
- Qi, H., Coplen, T.B., Mroczkowski, S.J., Brand, W.A., Brandes, L., Geilmann, H., Schimmelmann, A., 2016. A new organic reference material, L-glutamic acid, USGS41a, for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ measurements – a replacement for USGS41. *Rapid Commun. Mass Spectrom.* 30 (7), 859–866. <https://doi.org/10.1002/rcm.7510>.
- Schimmelmann, A., Qi, H., Coplen, T.B., Brand, W.A., Fong, J., Meier-Augenstein, W., Kemp, H.F., Toman, B., Ackermann, A., Assonov, S., Aerts-Bijma, A.T., Brejcha, R., Chikaraishi, Y., Darwish, T., Elsner, M., Gehre, M., Geilmann, H., Gröning, M., Hélie, J.-F., Herrero-Martin, S., Meijer, H.A.J., Sauer, P.E., Sessions, A.L., Werner, R.A., 2016. Organic reference materials for hydrogen, carbon, and nitrogen stable isotope-ratio measurements: Caffeines, *n*-alkanes, fatty acid methyl esters, glycines, L-valines, polyethylenes, and oils. *Anal. Chem.* 88 (8), 4294–4302. <https://doi.org/10.1021/acs.analchem.5b04392>.
- Speller, C.F., Kemp, B.M., Wyatt, S.D., Monroe, C., Lipe, W.D., Arndt, U.M., Yang, D.Y., 2010. Ancient mitochondrial DNA analysis reveals complexity of indigenous North American turkey domestication. *PNAS* 107 (7), 2807–2812. <https://doi.org/10.1073/pnas.0909724107>.