

2014

Animal Bones and Archaeology

Guidelines for Best Practice

Supplement I: Key reference resources



ENGLISH HERITAGE

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Preface

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Additional contributors and acknowledgements are provided in the main document.

SI.1 Comparative assemblage resources

Regional reviews of animal bone data

Albarella, U and Pirnie, T 2008 *A Review of the Animal Bone Evidence from Central England [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000317

Albarella, U and Pirnie, T forthcoming 'A review of the animal bone evidence from central England'. Research Department Report Series. Portsmouth: English Heritage

Allen, M forthcoming *A Review of the Animal Bone Evidence from the Roman Period in Southern England [2012 Dataset]*. Portsmouth: English Heritage

Dobney, K nd 'Review of environmental archaeology: Zooarchaeology in the north of England'. Unpublished report for English Heritage

Hambleton, E 2008 *Review of Middle Bronze Age: Late Iron Age Faunal Assemblages from Southern Britain*. Research Department Report Series **71–2008**. Portsmouth: English Heritage

Hambleton, E 2009 *A Review of Animal Bone Evidence from Southern England [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000102

Holmes, M forthcoming 'Southern England: A review of animal remains from Saxon, medieval and post-medieval archaeological sites'. Research Department Report Series. Portsmouth: English Heritage

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Serjeantson, D 2011a *Review of Animal Remains from the Neolithic and Early Bronze Age of Southern Britain (4000 BC–1500 BC)*. Research Department Report Series **29–2011**. Portsmouth: English Heritage

Serjeantson, D 2011b *A Review of Animal Remains from the Neolithic and Early Bronze Age of Southern Britain [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000396

Stallibrass, S 1995 'Review of the vertebrate remains', in Huntley, J P and Stallibrass, S (eds) *Plant and Vertebrate Remains from Archaeological Sites in Northern England: Data Reviews and Future Directions*. Research Report **4**. Durham: Architectural and Archaeological Society of Durham and Northumberland, 84–198

Online zooarchaeological datasets

Chicken Coop nd *The Chicken Project [Dataset]*. http://www.nottingham.ac.uk/~aczzoo/chicken_search/index.php, accessed May 2014

Dama International: Fallow Deer Project nd *Zooarchaeology @ Nottingham Deer Bone Database [Dataset]*. http://www.nottingham.ac.uk/zooarchaeology/deer_bone/search.php, accessed May 2014

Grimm, J 2008 *WAMAP: Wessex Archaeology Metric Archive Project [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000043

University of Southampton 2003 *Animal Bone Metrical Archive Project (ABMAP) [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000350

University of York 2008 *Environmental Archaeology Bibliography (EAB) [Dataset]*. York: Archaeology Data Service [Distributor], doi:10.5284/1000225

SI.2 Species biogeography and zoology

Species biogeography

O'Connor, T and Sykes, N (eds) 2010 *Extinctions and Invasions: A Social History of British Fauna*. Oxford: Windgather Press

Yalden, D W 1999 *The History of British Mammals*. London: Poyser Natural History

Yalden, D W and Albarella, U 2009 *The History of British Birds*. Oxford: Oxford University Press

Online zoological guides to species

Froese, R and Pauly, D (eds) 2011 *FishBase*. <http://www.fishbase.org>, accessed May 2014

Myers, P, Espinosa, R, Parr, C S, Jones, T, Hammond, G S and Dewey, T A 2014 *The Animal Diversity Web*. <http://animaldiversity.org>, accessed May 2014

SI.3 Zooarchaeological methods and conventions

General zooarchaeological texts (including quantification)

Davis, S J M 1987 *The Archaeology of Animals*. London: BT Batsford

Lyman, R L 2008 *Quantitative Palaeozoology*. Cambridge: Cambridge University Press

O'Connor, T 2000 *The Archaeology of Animal Bones*. Stroud: Sutton

O'Connor, T 2003 *The Analysis of Urban Animal Bone Assemblages: A Handbook for Archaeologists*. York: Council for British Archaeology/York Archaeological Trust

Reitz, E J and Wing, E S 1999 *Zooarchaeology*. Cambridge: Cambridge University Press

Serjeantson, D 2009 *Birds*. Cambridge: Cambridge University Press

Wheeler, A and Jones, A K G 1989 *Fishes*. Cambridge: Cambridge University Press

Published bone inventory/recording databases and spreadsheets

Harland, J F, Barrett, J H, Carrott, J, Dobney, K and Jacques, D 2003 'The York System: An integrated zooarchaeological database for research and teaching'. *Internet Archaeology* **13**, <http://dx.doi.org/10.11141/ia.13.5>

NABO 2010 *NABONE*. <http://www.nabohome.org/products/manuals/fishbone/nabo.htm>, accessed May 2014

Zone conventions

Cohen, A and Serjeantson, D 1996 *A Manual for the Identification of Bird Bones from Archaeological Sites*, revised edn. London: Archetype Publications

Davis, S J M 1992 *A Rapid Method for Recording Information about Mammal Bones from Archaeological Sites*. Ancient Monuments Laboratory Report **19/92**. London: English Heritage

Dobney, K and Reilly, K 1988 'A method for recording archaeological animal bones: The use of diagnostic zones'. *Circaea* **5**, 79–96.

Serjeantson, D 1996 'The animal bones', in Needham, S and Spence, T (eds) *Runnymede Bridge Research Excavations. Volume 2. Refuse and Disposal at Area 16 East, Runnymede*. London: British Museum, 194–223

Smith, I and Halstead, P 1989 'The animal bone from medieval and post-medieval Doncaster', in Buckland, P C and Magilton, J R (eds) *The Archaeology of Doncaster 2*. British Archaeological Reports British Series **202**. Oxford: Hadrian Books, 432–46

Watson, J P N 1972 'Fragmentation analysis of animal bone samples from archaeological sites'. *Archaeometry* **14**, 221–7

Age at death

Tooth development

Brown, W A B and Chapman, N G 1991 'Age assessment of fallow deer (*Dama dama*): From a scoring scheme based on radiographs of developing permanent molariform teeth'. *Journal of Zoology* **224**, 367–79

Brown, W A B and Chapman, N G 1991 'Age assessment of red deer (*Cervus elaphus*): From a scoring scheme based on radiographs of developing permanent molariform teeth'. *Journal of Zoology* **225**, 85–97

Carter, R J 1997 'Age estimation of the roe deer (*Capreolus capreolus*) mandibles from the Mesolithic site of Star Carr, Yorkshire, based on radiographs of mandibular tooth development'. *Journal of Zoology* **241**, 495–502

Carter, R J 1998 'Reassessment of seasonality at the early Mesolithic site of Star Carr, Yorkshire based on radiographs of mandibular tooth development in red deer (*Cervus elaphus*)'. *Journal of Archaeological Science* **25**, 851–6

Carter, R J 2001 'New evidence for seasonal human presence at the early Mesolithic site of Thatcham, Berkshire, England'. *Journal of Archaeological Science* **28**, 1055–60

Carter, R J 2005 'A method to estimate the ages at death of red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*) from developing mandibular dentition and its application to Mesolithic NW Europe', in Ruscillo, D (ed) *Recent Advances in Ageing and Sexing Animal Bones*. Oxford: Oxbow, 40–61

Carter, R J and Magnell, O 2007 'Age estimation of wild boar based on molariform mandibular tooth development and its application to seasonality at the Mesolithic site of Ringkloster, Denmark', in Albarella, U, Dobney, K, Ervynck, A and Rowley-Conwy, P (eds) *Pigs and Humans: 10,000 Years of Interaction*. Oxford: Oxford University Press, 197–217

Magnell, O and Carter, R J 2007 'The chronology of tooth development in wild boar (*Sus scrofa*): A guide to age determination of linear enamel hypoplasia in prehistoric and medieval pigs'. *Veterinarija ir Zootechnika (Veterinary Medicine and Zootechnics)* **40**, 43–8

Tooth eruption and wear

Brown, G T 1913 *Dentition as Indicative of the Age of Animals of the Farm*, 6th edn. London: John Murray

Brown, W A B and Chapman, N G 1990 'The dentition of fallow deer (*Dama dama*): A scoring scheme to assess age from wear of the permanent molariform teeth'. *Journal of Zoology* **221**, 659–82

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Ewbank, J K M, Phillipson, D W and Whitehouse, R D 1964 'Sheep in the Iron Age: A method of study'. *Proceedings of the Prehistoric Society* **30**, 423–6

Goody, P C 1983 *Horse Anatomy: A Pictorial Approach to Equine Structure*. London: Allen

Grant, A 1982 'The use of tooth wear as a guide to the age of domestic ungulates', in Wilson, B, Grigson, C and Payne, S (eds) *Ageing and Sexing Animal Bones from Archaeological Sites*. British Archaeological Reports British Series **109**. Oxford: Hadrian Books, 91–108

Greenfield, H and Arnold, E 2008 'Absolute age and tooth eruption and wear sequences in sheep and goat: Determining age-at-death in zooarchaeology using a modern control sample'. *Journal of Archaeological Science* **35**, 836–49

Jones, G G 2006 'Tooth eruption and wear observed in live sheep from Butser Hill, the Cotswold Farm Park and five farms in the Pentland Hills, UK', in Ruscillo, D (ed) *Recent Advances in Ageing and Sexing Animal Bones*. Oxford: Oxbow Books, 155–78

Jones, G G and Sadler, P 2012 'A review of published sources for age at death in cattle'. *Environmental Archaeology* **17**, 1–10

Jones, G G and Sadler, P 2012 'Age at death in cattle: Methods, older cattle and known age reference material'. *Environmental Archaeology* **17**, 11–28

- Levine, M A 1982 'The use of crown height measurements and eruption-wear sequences to age horse teeth', in Wilson, B, Grigson, C and Payne, S (eds) *Ageing and Sexing Animal Bones from Archaeological Sites*. British Archaeological Reports British Series **109**. Oxford: Hadrian Books, 223–50
- Payne, S 1973 'Kill-off patterns in sheep and goats: The mandibles from Asvan Kale'. *Anatolian Studies* **23**, 281–303
- Payne, S 1984 'The use of early 19th century data in ageing cattle from archaeological sites and the relationship between the eruption of M3 and P4'. *Circaea* **2**, 77–82
- Payne, S 1987 'Reference codes for wear states in the mandibular cheek teeth of sheep and goats'. *Journal of Archaeological Science* **14**, 609–14
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- O'Connor, T 1988 *Bones from the General Accident Site, Tanner Row*. London: Council for British Archaeology/York Archaeological Trust
- Fusion**
- Carden, R F and Hayden, T J 2006 Epiphyseal fusion in the postcranial skeleton as an indicator of age at death of European fallow deer (*Dama dama*, Linnaeus, 1758)', in Ruscillo, D (ed) *Recent Advances in Ageing and Sexing Animal Bones*. Oxford: Oxbow Books, 227–36
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- Noddle, B 1974 'Ages of epiphyseal closure in feral and domestic goats and ages of dental eruption'. *Journal of Archaeological Science* **1**, 195–204
- Popkin, P, Baker, P, Worley, F, Payne, S and Hammon, A 2012 'The Sheep Project (1): Determining skeletal growth, timing of epiphyseal fusion and morphometric variation in unimproved Shetland sheep of known age, sex, castration status and nutrition'. *Journal of Archaeological Science* **39**, 1775–92
- Silver, I A 1969 'The ageing of domestic animals', in Brothwell, D and Higgs, E (eds) *Science in Archaeology*. London: Thames and Hudson, 283–302
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- Zeder, M 2006 'Reconciling rates of long bone fusion and tooth eruption and wear in sheep (*Ovis*) and goat (*Capra*)', in Ruscillo, D (ed) *Recent Advances in Ageing and Sexing Animal Bones*. Oxford: Oxbow Books, 87–118
- Standard biometric conventions**
- Albarella, U and Payne, S 2005 'Neolithic pigs from Durrington Walls, Wiltshire, England: A biometrical database'. *Journal of Archaeological Science* **32**, 589–99
- Davis, S J M 1987 'The dentition of an Iron Age pony', in Ashbee, P and Hook, P 'Warsash, Hampshire excavations, 1954'. *Proceedings of the Hampshire Field Club and Archaeological Society* **43**, 21–62, 52–5
- Davis, S J M 1996 'Measurements of a group of adult female Shetland sheep skeletons from a single flock: A baseline for zooarchaeologists'. *Journal of Archaeological Science* **23**, 593–612
- Ericson, G P and Storå, J 1999 *A Manual to the Skeletal Measurements of the Seal Genera Halichoerus and Phoca (Mammalia: Pinnipedia)*. Stockholm: Swedish Museum of Natural History
- Morales, A and Rosenlund, K 1979 *Fish Bone Measurements*. Copenhagen: Steenstrupia
- Payne, S and Bull, G 1988 'Components of variation in measurements of pig bones and teeth and the use of measurements to distinguish wild from domestic pig remains' *Archaeozoologia* **2**, 27–66
- von den Driesch, A 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites*. Peabody Museum Bulletin **1**. Cambridge, MA: Harvard Peabody Museum of Archaeology and Ethnology
- Withers heights conversion factors**
- Various species**
- von den Driesch, A and Boessneck, J 1974 'Kritische Anmerkungen zur Widerristhöhenberechnung aus Längenmassen vor- und frühgeschichtlicher Tierknochen'. *Säugetierkundliche Mitteilungen* **22**, 325–48
- Cattle**
- Foch, J 1966 'Metrische Untersuchungen an Metapodien einiger europäischer Rinderrassen'. Unpublished dissertation, University of Munich
- Matolsci, J 1970 'Historische Erforschung der Körpergröße der Rindes auf Grund von ungarischem Knochenmaterial'. *Zeitschrift für Tierzucht und Züchtungsbiologie* **87**, 89–137
- Sheep**
- Teichert, M 1975 'Osteometrische Untersuchungen zur Berechnung der Widerristhöhe bei Schafen', in Clason, A T (ed) *Archaeological Studies*. Amsterdam: Elsevier, 51–69
- Pigs**
- May, E, Teichert, M and Hannemann, K 1996 'Allometric aspects to the determination of the withers height in pigs on the basis of the data of M. Teichert'. *Anthropozoologica* **8**, 125–39
- Teichert, M 1969 'Osteometrische Untersuchungen zur Berechnung der Widerristhöhe bei vor- und frühgeschichtlichen Schweinen'. *Kühn-Archiv* **83**, 237–92
- Horses**
- May, E 1985 'Wideristhöhe und Langknochenmasse bei Pferd – ein immer noch aktuelles Problem'. *Zeitschrift für Säugetierkunde* **50**, 368–82
- Dogs**
- Clarke, K M 1995 'The later prehistoric and protohistoric dog: The emergence of canine diversity'. *Archaeozoologia* **2**, 9–32
- Harcourt, R A 1974 'The dog in prehistoric and early historic Britain' *Journal of Archaeological Science* **1**, 151–75
- Palaeopathology**
- General texts**
- Baker, J and Brothwell, D 1981 *Animal Diseases in Archaeology*. London: Academic Press
- Bartosiewicz, L and Gál, E 2013 *Shuffling Nags, Lame Ducks: The Archaeology of Animal Disease*. Oxford: Oxbow
- Miles, A E W and Grigson, C 1990 *Colyer's Variations and Diseases of the Teeth of Animals*, revised edn. Cambridge: Cambridge University Press
- Thompson, K 2007 'Bones and joints', in Maxie, M G (ed) *Jubb, Kennedy and Palmer's Pathology of Domestic Animals. Volume 1*, 5th edn. Philadelphia, PA: Elsevier Saunders, 1–184

General recording guides

Brothwell, D 2008 'Paleoradiology in the service of zoopaleopathology', in Chhem, R K and Brothwell, D (eds) *Paleoradiology: Imaging Mummies and Fossils*. Berlin: Springer, 119–45

O'Connor, T P and O'Connor, S 2005 'Digitising and image-processing radiographs to enhance interpretations in avian palaeopathology', in Grupe, G and Peters, J (eds) *Feathers, Grit and Symbolism: Birds and Humans in the Ancient Old and New Worlds*. Documenta Archaeobiologiae **3**. Rahden: Marie Leidorf Verlag, 69–82

Vann, S and Thomas, R 2006 'Humans, other animals and disease: A comparative approach towards the development of a standardised recording protocol for animal palaeopathology'. *Internet Archaeology* **20**, <http://dx.doi.org/10.11141/ia.20.5>

Dental recording guides

Brothwell, D 1991 'Malocclusion and methodology: The problem and relevance of dental malalignment in animals'. *International Journal of Osteoarchaeology* **1**, 27–37

Dobney, K, Ervynck, A and La Ferla, B 2002 'Assessment and further development of the recording and interpretation of linear enamel hypoplasia in archaeological pig populations'. *Environmental Archaeology* **7**, 35–46

Levitan, B 1985 'A methodology for recording the pathology and other anomalies of ungulate mandibles from archaeological sites', in Fieller, N R J, Gilbertson, D D and Ralph, N G A (eds) *Palaeobiological Investigations: Research Design, Methods and Data Analysis*. British Archaeological Reports International Series **266**. Oxford: Hadrian Books, 41–54

Upex, B, Balasse, M, Tresset, A, Arbuckle, B and Dobney, K 2014 'Protocol for recording enamel hypoplasia in modern and archaeological caprine populations'. *International Journal of Osteoarchaeology* **24**, 79–89

Joint disease recording guides

Bartosiewicz, L, Van Neer, W and Lentacker, A 1994 'Metapodial asymmetry in draft cattle'. *International Journal of Osteoarchaeology* **3**, 69–75

Bartosiewicz, L, Van Neer, W and Lentacker, A 1997 *Draught Cattle: Their Osteological Identification and History*. Annales Sciences Zoologiques **281**. Tervuren: Musée Royal de l'Afrique Centrale

Bendrey, R 2007 'Ossification of the interosseous ligaments between the metapodials in horses: A new recording methodology and preliminary study'. *International Journal of Osteoarchaeology* **17**, 207–13

Thomas, R and Johannsen, N 2011 'Articular depressions in domestic cattle phalanges and their archaeological relevance'. *International Journal of Paleopathology* **1**, 43–54

Taphonomy

General introduction

Brain, C K 1981 *The Hunters or the Hunted? An Introduction to African Cave Taphonomy*. London: University of Chicago Press

Denys, C 2002 'Taphonomy and experimentation'. *Archaeometry* **44**, 469–84

Lyman, R L 1994 *Vertebrate Taphonomy*. Cambridge: Cambridge University Press

Tooth marks and digestion

Dominguez-Rodrigo, M and Piqueras, A 2003 'The use of tooth pits to identify carnivore taxa in tooth-marked archaeofaunas and their relevance to reconstruct hominid carcass processing behaviours'. *Journal of Archaeological Science* **30**, 1385–91

Greenfield, H J 1988 'Bone consumption by pigs in a contemporary Serbian village: Implications for the interpretation of prehistoric faunal assemblages'. *Journal of Field Archaeology* **15**, 473–9

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Pobiner, B 2008 'Paleoecological information in predator tooth marks'. *Journal of Taphonomy* **6**, 373–97

Bone weathering

Behrensmeier, A K 1978 'Taphonomic and ecologic information from bone weathering'. *Paleobiology* **4**, 150–62

Conard, N J, Walker, S J and Kandel, A W 2008 'How heating and cooling and wetting and drying can destroy dense faunal elements and lead to differential preservation'. *Palaeogeography, Palaeoclimatology, Palaeoecology* **266**, 236–45

Madgwick, R 2014 'What makes bones shiny? Investigating trampling as a cause of bone abrasion'. *Archaeological and Anthropological Sciences* **6**, 163–73

Madgwick, R and Mulville, J 2012 'Investigating variation in the prevalence of weathering in faunal assemblages in the UK: A multivariate statistical approach'. *International Journal of Osteoarchaeology* **22**, 509–22

Bone diagenesis

Hedges, R 2002 'Bone diagenesis: An overview of processes'. *Archaeometry* **44**, 319–28

Huisman, D J 2009 *Degradation of Archaeological Remains*. Den Haag: Sdu Uitgevers bv

Accumulation processes

Bochenski, Z M 2005 'Owls, diurnal raptors and humans: Signatures on avian bones', in O'Connor, T (ed) *Biosphere to Lithosphere*. Oxford: Oxbow, 31–45

Butchery

Binford, L R 1981 *Ancient Men and Modern Myths*. New York: Academic Press

Boschin, F and Crezzini, J 2011 'Morphometrical analysis on cut marks using a 3D digital microscope'. *International Journal of Osteoarchaeology* **22**, 549–62

Dominguez-Rodrigo, M 2008 'Conceptual premises in experimental design and their bearing on the use of analogy: An example from experiments on cut marks'. *World Archaeology* **40**, 67–82

Dominguez-Rodrigo, M and Yravedra, J 2009 'Why are cut mark frequencies in archaeofaunal assemblages so variable? A multivariate analysis'. *Journal of Archaeological Science* **36**, 884–94

Fairnell, E 2008 '101 ways to skin a fur-bearing animal: The implications for zooarchaeological interpretation', in Cunningham, P, Heeb, J and Paardekooper, R (eds) *Experiencing Archaeology by Experiment*. Oxford: Oxbow, 47–60.

Grant, A 1987 'Some observations of butchery in England from the Iron Age to Medieval period'. *Anthropozoologica Special Edition* **1**, 53–9.

Lauwerier, R C G M 1988 *Animals in Roman Times in the Dutch Eastern River Area*. Nederlandse Oudheden 12/Project Oostelijk Rivierengebied **1**. Amersfoort: ROB

Maltby, M 2007 'Chop and change: Specialist cattle carcass processing in Roman Britain', in Croxford, B, Ray, N and Roth, R (eds) *TRAC 2006: Proceedings of the 16th Annual Theoretical Roman Archaeology Conference, Cambridge 2006*. Oxford: Oxbow, 59–76

Otárola-Castillo, E 2010 'Differences between NISP and MNE in cutmark analysis of highly fragmented faunal assemblages'. *Journal of Archaeological Science* **37**, 1–12

Seetah, K 2006a 'Butchery as an analytical tool: A comparative study of the Romano-British and medieval periods'. Unpublished PhD thesis, University of Cambridge

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Seetah, K 2008 'Modern analogy, cultural theory and experimental replication: A merging point at the cutting edge of archaeology' *World Archaeology* **40**, 111–8

Swatland, H J 2004 *Meat Cuts and Muscle Foods*, 2nd edn. Nottingham: Nottingham University Press

Willis, L, Eren, M I and Rick, T C 2008 'Does butchering fish leave cut marks?' *Journal of Archaeological Science* **35**, 1438–44

SI.4 Identification resources

Virtual comparative collections

All classes

Virtual Zooarchaeology of the Arctic Project (VZAP) 2012 Version 2.1.5.15. <http://vzap.iri.isu.edu/ViewPage.aspx?id=230>, accessed May 2104

Birds

Aves3D 2011 <http://aves3d.org/>, accessed May 2104

Fish

Böhme, M and Ilg, A 2004 *Osteo*. <http://www.wahre-staerke.com/osteo/>, accessed May 2014

Lombarte, A, Chic, Ò, Parisi-Baradad, V, Olivella, R, Piera, J and García-Ladona, E 2006 'A web-based environment from shape analysis of fish otoliths. The AFORO database'. *Scientia Marina* **70**, 147–52. http://www.cmima.csic.es/aforo/startDB_en.jsp, accessed May 2104

Perdikaris, S, Krivogorskaya, Y, McGovern, T and Lahtiperä, P 2004 *FISHBONE 1.1 Identification Manual for Gadid Fish in the N Atlantic*. <http://nabohome.org/products/manuals/fishbone/fish/fish.html>, accessed May 2104

Tercerie, S, Bearez, P, Vignes-Lebbe, R, Pruvost, P, Bled, L, Jacquez, K and Bailly, N 2014 *Osteobase*. <http://osteobase.mnhn.fr/>, version April 2014, accessed May 2014

University of Nottingham, Department of Archaeology 2011 *Archaeological Fish Resource*. <http://fishbone.nottingham.ac.uk/index.aspx>, accessed May 2014

Identification guides: amphibian and reptile remains

Bailon, S 1999 *Différenciation Ostéologique des Anoures (Amphibia, Anura) de France*. Fiches d'Ostéologie Animale pour l'Archéologie Série C: Varia **1**. Antibes: Association pour la Promotion et la Diffusion des Connaissances Archéologiques

Böhme, G 1977 'Zur Bestimmung quartären Anuren Europas an Hand von Skelettelementen, Wissenschaftliche Zeitschrift der Humboldt-Universität zu Berlin'. *Mathematisch-Naturwissenschaftliche Reihe* **3**, 283–99

Glastra, R 1980 *Osteologische Determinatie van de Inheemse Herpetofauna: Handleiding bij de Hepetologische Vergelijkingscollectie van het IPP*. Amsterdam: Albert Egges van Giffen Instituut voor Prae-en Protohistorie

Identification guides: bird remains

Cohen, A and Serjeantson, D 1996 *A Manual for the Identification of Bird Bones from Archaeological Sites*, revised edn. London: Archetype Press

Gilbert, B M, Martin, L and Savage, HG 1981 *Avian Osteology*. Wyoming: B Miles Gilbert

Stewart, J R 2007 *An Evolutionary Study of Some Archaeologically Significant Avian Taxa in the Quaternary of the Western Palaeartic*. British Archaeological Reports International Series **1653**. Oxford: Archaeopress

Tomek, T and Bocheński, Z M 2009 *A Key for the Identification of Domestic Bird Bones in Europe: Galliformes and Columbiformes*. Kraków: Institute of Systematics and Evolution of Animals, Polish Academy of Sciences

Tomek, T and Bocheński, Z M 2009 *A Key for the Identification of Domestic Bird Bones in Europe: Preliminary Determination*. Kraków: Institute of Systematics and Evolution of Animals

Guides to distinguishing morphologically similar bird species

Galliforms

Erbersdobler, K 1968 'Vergleichend morphologische untersuchungen an einzelknochen des postcranialen skeletts in mitteleuropa vorkommender mittelgroßer hühnervögel'. Unpublished PhD thesis, Ludwig-Maximilians-Universität München

MacDonald, K 1992 'The domestic chicken (*Gallus gallus*) in sub-Saharan Africa: A background to its introduction and its osteological differentiation from indigenous fowls (*Numidinae* and *Francolinus* sp.)'. *Journal of Archaeological Science* **19**, 303–18

Tomek, T and Bocheński, Z M 2009 *A Key for the Identification of Domestic Bird Bones in Europe: Galliformes and Columbiformes*. Kraków: Institute of Systematics and Evolution of Animals, Polish Academy of Sciences

Swans, geese and ducks

Bacher, A 1967 'Vergleichend morphologische untersuchungen an einzelknochen des postcranialen skeletts in mitteleuropa vorkommender schwäne und gänse'. Unpublished PhD thesis, Ludwig-Maximilians-Universität München

Columbids

Fick, O K W 1974 'Vergleichend morphologische untersuchungen an einzelknochen europäischer taubenarten'. Unpublished PhD thesis, Ludwig-Maximilians-Universität München

- Tomek, T and Bocheński, Z M 2009 *A Key for the Identification of Domestic Bird Bones in Europe: Galliformes and Columbiformes*. Kraków: Institute of Systematics and Evolution of Animals, Polish Academy of Sciences *Corvids*
- Tomek, T and Bocheński, Z M 2000 *The Comparative Osteology of European Corvids (Aves: Corvidae), with a Key to the Identification of their Skeletal Elements*. Kraków: Institute of Systematics and Evolution of Animals, Polish Academy of Sciences
- Identification guides: fish remains**
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