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14. Curriculum Vitae

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15. Reference

- Albrecht, G. (1972). Soziologie der geographischen Mobilität: Zugleich ein Beitrag zur Soziologie des sozialen Wandels. Stuttgart, Enke.
- Ambrose, S. H. (1990). "Preparation and characterization of bone and tooth collagen for isotopic analysis." *Journal of Archaeological Science* 17(4): 431-451.
- Ambrose, S. H. (1993). Isotopic analysis of palaeodiets: methodological and interpretative considerations. *Investigations of ancient human tissue: chemical analyses in anthropology*. M. K. Sandford. Langhorne (Pennsylvania), Gordon and Breach: 59-130.
- Ambrose, S. H. and L. Norr (1993). Experimental evidence for the relationship of the carbon isotope ratios of whole diet and dietary protein to those of bone collagen and carbonate. *Prehistoric Human Bone: Archaeology at the Molecular Level*. J. B. Lambert and G. Grupe. New York, Springer-Verlag: 1-37.
- Anthony, D. W. (1990). "Migration in Archeology: The Baby and the Bathwater." *American Anthropologist* 92(4): 895-914.
- Anthony, D. W. (1992). "The Bath Refilled: Migration in Archeology again." *American Anthropologist* 94(1): 174-176.
- Balasse, M. and A. Tresset (2002). "Early weaning of Neolithic domestic cattle (Bercy, France) revealed by intra-tooth variation in nitrogen isotope ratios." *Journal of Archaeological Science* 29(8): 853-859.
- Balasse, M., A. Tresset, et al. (2006). "Stable isotope evidence (^{13}C , ^{18}O) for winter feeding on seaweed by Neolithic sheep of Scotland." *Journal of Zoology* 270: 170-176.
- Bentley, A. (2006). "Kinship and mobility during the prehistoric spread of farming: isotope evidence from the skeletons." *General Anthropology* 13(1): 1-10.
- Bentley, R. A. (2006). "Strontium isotopes from the earth to the archaeological skeleton: a review." *Journal of Archaeological Method and Theory* 13(3): 135-187.
- Bentley, R. A. and C. Knipper (2005). "Geographic patterns in biologically available strontium, carbon and oxygen isotope signatures in prehistoric SW Germany." *Archaeometry* 47: 629-644.
- Bentley, R. A., R. Krause, et al. (2003). "Human mobility at the early neolithic settlement of Vaihingen, Germany: Evidence from strontium isotope analysis." *Archaeometry* 45: 471-486.

- Bentley, R. A., T. D. Price, et al. (2002). "Prehistoric migration in Europe: Strontium isotope analysis of early neolithic skeletons." *Current Anthropology* 43(5): 799-804.
- Bentley, R. A., T. D. Price, et al. (2004). "Determining the 'local' Sr-87/Sr-86 range for archaeological skeletons: a case study from Neolithic Europe." *Journal of Archaeological Science* 31(4): 365-375.
- Bentley, R. A., T. D. Price, et al. (2004). "Determining the 'local' $^{87}\text{Sr}/^{86}\text{Sr}$ range for archaeological skeletons: a case study from Neolithic Europe." *Journal of Archaeological Science* 31: 365-375.
- Bocherens, H., C. Polet, et al. (2007). "Palaeodiet of Mesolithic and Neolithic populations of Meuse Basin (Belgium): evidence from stable isotopes." *Journal of Archaeological Science* 34(1): 10-27.
- Bogaard, A. (2004). *Neolithic Farming in Central Europe*. London, Routledge.
- Bonsall, C., G. Cook, et al. (2004). "Stable isotopes, radiocarbon and the Mesolithic-Neolithic transition in the iron gates." *Documenta Praehistorica XXVII*: 119-132.
- Borić, D., G. Grupe, et al. (2004). "Is the Mesolithic-Neolithic subsistence dichotomy real? New stable isotope evidence from the Danube Gorges." *European Journal of Archaeology* 7(3): 221-248.
- Boutton, T. W. (1991). Stable carbon isotope ration of natural materials: atmospheric, terrestrial, marine and freshwater environments. *Carbon isotope techniques*. D. C. Coleman and B. Fry. San Diego, Academic Press: 173-186.
- Brill, R. H. (1970). "Lead and Oxygen Isotopes in Ancient Objects." *Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences* 269(1193): 143-164.
- Budd, P., J. Montgomery, et al. (2000). "Differential diagenesis of strontium in archaeological human dental tissues." *Applied Geochemistry* 15: 687-694.
- Burger, J., M. Kirchner, et al. (2007). "Absence of the lactase-persistence-associated allele in early Neolithic Europeans." *Proceedings of the National Academy of Sciences of the United States of America* 104(10): 3736-3741.
- Burmeister, S. (2000). "Archaeology and Migration: Approaches to an Archaeological Proof of Migration." *Current Anthropology* 41(4): 539-567.

- Canfield, D. E. (2001). "Biogeochemistry of Sulfur Isotopes." *Reviews in Mineralogy and Geochemistry* 43(1): 607-636.
- Champion, T., C. Gamble, et al. (1984). *Prehistoric Europe*. London, Academic Press.
- Chenery, C., G. Müldner, et al. (2010). "Strontium and stable isotope evidence for diet and mobility in Roman Gloucester, UK." *Journal of Archaeological Science* 37(1): 150-163.
- Chiaradia, M., A. Gallay, et al. (2003). "Different contamination styles of prehistoric human teeth at a Swiss necropolis (Sion, Valais) inferred from lead and strontium isotopes." *Applied Geochemistry* 18(3): 353-370.
- Craig, O. E. (2002). "The development of dairying in Europe: potential evidence from food residues on ceramics." *Documenta Praehistorica* 29: 97-107.
- Craig, O. E., R. Ross, et al. (2006). "Focus: sulphur isotope variation in archaeological marine fauna from northern Europe." *Journal of Archaeological Science* 33(11): 1642-1646.
- Daux, V., C. Lécuyer, et al. (2008). "Oxygen isotope fractionation between human phosphate and water revisited." *Journal of Human Evolution* 55: 1138-1147.
- DeNiro, M. J. (1985). "Postmortem preservation and alteration of in vivo bone collagen isotope ratios in relation to palaeodietary reconstruction." *Nature* 317: 806-809.
- DeNiro, M. J. and S. Epstein (1978). "Influence of diet on the distribution of carbon isotopes in animals." *Geochimica et Cosmochimica Acta* 42: 495-506.
- DeNiro, M. J. and S. Epstein (1981). "Influence of diet on the distribution of nitrogen isotopes in animals." *Geochemica et Cosmochimica Acta* 45: 341-351.
- Dürrwächter, C., O. E. Craig, et al. (2006). "Beyond the grave: variability in Neolithic diets in Southern Germany?" *Journal of Archaeological Science* 33(1): 39-48.
- Ericson, J. E. (1985). "Strontium Isotope Characterization in the Study of Prehistoric Human Ecology." *Journal of Human Evolution* 14: 503-514.
- Evans, J. A., J. Montgomery, et al. (2010). "Spatial variations in biosphere $^{87}\text{Sr}/^{86}\text{Sr}$ in Britain." *Journal of the Geological Society* 167(1): 1-4.
- Evershed, R. P., S. Payne, et al. (2008). "Earliest date for milk use in the Near East and southeastern Europe linked to cattle herding." *Nature* 455(7212): 528-531.
- Faure, G. and T. Powell (1972). *Strontium isotope geology*. New York, Springer-Verlag.

- Fischer, A., J. Olsen, et al. (2007). "Coast-inland mobility and diet in the Danish Mesolithic and Neolithic: evidence from stable isotope values of humans and dogs." *Journal of Archaeological Science* 34(12): 2125-2150.
- Fornander, E., G. Eriksson, et al. (2008). "Wild at heart: Approaching Pitted Ware identity, economy and cosmology through stable isotopes in skeletal material from the Neolithic site Korsnas in Eastern Central Sweden." *Journal of Anthropological Archaeology* 27(3): 281-297.
- Fuller, B. T., J. L. Fuller, et al. (2006). "Detection of breastfeeding and weaning in modern human infants with carbon and nitrogen stable isotope ratios." *American Journal of Physical Anthropology* 129(2): 279-293.
- Geyh, M. A. (2001). "Bomb radiocarbon dating of animal tissues and hair." *Radiocarbon* 43(2B): 723-730.
- Ghazi, A. M. (1994). "Lead in archaeological samples: an isotopic study by ICP-MS." *Applied Geochemistry* 9(6): 627-636.
- Giesemann, A. J. H., A. L. Norman, et al. (1994). "On-line sulfur-isotope determination using an elemental analyzer coupled to a mass spectrometer." *Analytical Chemistry* 66: 2816-2819.
- Graustein, W. C. (1989). *87Sr/86Sr ratios measure the sources and flow of strontium in terrestrial ecosystems. Stable isotopes in ecological research.* P. W. Rundel, J. R. Ehleringer and K. A. Nagy. New York, Springer-Verlag: 491-512.
- Grupe, G., T. D. Price, et al. (1997). "Mobility of Bell Beaker people revealed by strontium isotope ratios of tooth and bone: a study of southern Bavarian skeletal remains." *Applied Geochemistry* 12(4): 517-525.
- Halstead, P. (1998). "Mortality models and milking: Problems of uniformitarianism, optimality and equifinality reconsidered." *Anthropozoologica* 27: 3-20.
- Harding, A. F. (2000). *European Societies in the Bronze Age.* Cambridge, Cambridge University Press.
- Harding, A. F. (2002). *The Bronze Age. European Prehistory - A Survey.* S. Milisauskas. New York, Kluwer Academic: 271-334.
- Heaton, T. H. E., J. C. Vogel, et al. (1986). "Climatic influence on the isotopic composition of bone nitrogen." *Nature* 322: 822-823.

- Hedges, R., A. Saville, et al. (2008). "Characterizing the diet of individuals at the neolithic tomb of Hazleton North , Gloucestershire, England, using stable isotopic analysis." *Archaeometry* 50(1): 114-128.
- Hedges, R. E. M. (2009). Studying human diet. *The Oxford handbook of archeology*. B. Cunliffe, C. Cosden and R. A. Joyce. Oxford, Oxford University Press: 484-518.
- Hedges, R. E. M. and L. M. Reynard (2007). "Nitrogen isotopes and the trophic level of humans in archaeology." *Journal of Archaeological Science* 34: 1240-1251.
- Herrscher, E. and G. Le Bras-Goude (2010). "Southern French Neolithic populations: Isotopic evidence for regional specificities in environment and diet." *American Journal of Physical Anthropology* 141(2): 259-272.
- Hoppe, K. A., P. L. Koch, et al. (2003). "Assessing the preservation of biogenic strontium in fossil bones and tooth enamel." *International Journal of Osteoarchaeology* 13: 20-28.
- Humphrey, L. T., M. C. Dean, et al. (2008). "Unlocking evidence of early diet from tooth enamel." *Proceedings of the National Academy of Sciences of the United States of America* 105(19): 6834-6839.
- Iacumin, P., H. Bocherens, et al. (1996). "Oxygen isotope analyses of co-existing carbonate and phosphate in biogenic apatite: a way to monitor diagenetic alteration of bone phosphate?" *Earth and Planetary Science Letters* 142: 1-6.
- Jones, M. K. and S. Colledge (2001). Archaeobotany and the transition to agriculture. *Handbook of archaeological science*. D. R. Brothwell and A. M. Pollard. Chichester, John Wiley & Sons: 393-401.
- Katzenberg, M. A. and S. Pfeiffer (1995). Nitrogen isotope evidence for weaning age in a nineteenth century Canadian skeletal sample. *Bodies of Evidence*. A. L. Grauer. New York, John Wiley& Sons: 221-235.
- Kellner, C. M. and M. J. Schoeninger (2007). "A simple carbon isotope model for reconstructing prehistoric human diet." *American Journal of Physical Anthropology* 133(4): 1112-1127.
- Koch, J. K. and K. Kupke, Eds. (in print). Life course-reconstruction of mobile individuals in an Early Bronze Age society in Central Europe. Concept of the project and first results to the cemetery of Singen (Germany). Population dynamics in Pre- and Early History. New Approaches by using Stable Isotopes and Genetics. Berlin.

- Koch, P. L., N. Tuross, et al. (1997). "The effects of sample treatment and diagenesis on the isotopic integrity of carbonate in biogenic hydroxylapatite." *Journal of Archaeological Science* 24: 417-429.
- Kohn, M. J. (1999). "You Are What You Eat." *Science* 283(5400): 335-336.
- Kohn, M. J., M. J. Schoeninger, et al. (1999). "Altered states: Effects of diagenesis on fossil tooth chemistry." *Geochimica Et Cosmochimica Acta* 63(18): 2737-2747.
- Körner, C., G. D. Farquhar, et al. (1991). "Carbon isotope discrimination by plants follows latitudinal and altitudinal trends." *Oecologia (Berlin)* 88: 30-40.
- Krause, R. (1988). *Die endneolithischen und frühbronzezeitlichen Grabfunde auf der Nordstatterrasse von Singen am Hohenwiel I.* Stuttgart, Theiss.
- Krause, R. (2003). *Studien zur kupfer- und frühbronzezeitlichen Metallurgie zwischen Karpatenbecken und Ostsee.* Rahden/Westf., VML.
- Kupke, K. (2010). *Ernährungsrekonstruktion mittels Kohlenstoff- und Stickstoffisotopen aus dem frühbronzezeitlichen Gräberfeld von Singen, Kr. Konstanz und den früheisenzeitlichen Gräbern im Magdalenenberg bei Villingen, Schwarzwald-Baar-Kreis.* Magister, Leipzig.
- Le Bras-Goude, G., r. D. Binde, et al. (2006). "Stratégies de subsistance et analyse culturelle de populations néolithiques de Ligurie: approche par l'étude isotopique (13C et 15N) des restes osseux." *Bulletins et Mémoires de la Société d'Anthropologie de Paris* 18: 45-55.
- Le Huray, J., H. Schutkowski, et al. (2006). La Tène dietary variation in Central Europe: a stable isotope study of human skeletal remains from Bohemia. The social archaeology of funerary remains. R. Gowland and C. Knüsel. Oxford, Oxbow Books: 155-167.
- Le Huray, J. D. and H. Schutkowski (2005). "Diet and social status during the La Tène period in Bohemia: Carbon and nitrogen stable isotope analysis of bone collagen from Kutná Hora-Karlov and Radovesice." *Journal of Anthropological Archaeology* 24(2): 135-147.
- Liden, K., G. Eriksson, et al. (2004). ""The wet and the wild followed by the dry and the tame" - or did they occur at the same time? Diet in Mesolithic Neolithic southern Sweden." *Antiquity* 78(299): 23-33.
- Lillie, M., C. Budd, et al. (2011). "Stable isotope analysis of prehistoric populations from the cemeteries of the Middle and Lower Dnieper Basin, Ukraine." *Journal of Archaeological Science* 38(1): 57-68.

- Lillie, M. C. and M. Richards (2000). "Stable Isotope Analysis and Dental Evidence of Diet at the Mesolithic–Neolithic Transition in Ukraine." *Journal of Archaeological Science* 27(10): 965-972.
- Longinelli, A. (1984). "Oxygen isotopes in mammal bone phosphate: a new tool for paleohydrological and paleoclimatological research?" *Geochimica et Cosmochimica Acta* 48: 385-390.
- Longinelli, A. and A. Peretti Padalino (1980). "Oxygen isotopic composition of water from mammal blood: first results." *Mass Spectrometry in Biochemical, Medical and Environmental Research* 1: 135-139.
- Lösch, S., G. Grupe, et al. (2006). "Stable isotopes and dietary adaptations in humans and animals at pre-pottery Neolithic Nevallı Çori, southeast Anatolia." *American Journal of Physical Anthropology* 131(2): 181-193.
- Lubell, D., M. Jackes, et al. (1994). "The Mesolithic-Neolithic Transition in Portugal: Isotopic and Dental Evidence of Diet." *Journal of Archaeological Science* 21(2): 201-216.
- Lyman, R. L. (1994). *Vertebrate taphonomy*. Cambridge Cambridge University Press.
- Minagawa, M. and E. Wada (1984). "Stepwise enrichment of ^{15}N along food chains: further evidence and the relation between ^{15}N and animal age." *Geochimica et Cosmochimica Acta* 48: 1135-1140.
- Montgomery, J., P. Budd, et al. (2000). "Reconstructing the Lifetime Movements of Ancient People: A Neolithic Case Study from Southern England." *European Journal of Archaeology* 3(3): 370-385.
- Morrison, J., F. Fourel, et al. (2000). "Isotopic sulphur analysis by continuous flow isotope ratio mass spectrometry (CF-IRMS)." *Micromass Application Note 509*.
- Murray, M. L. and M. J. Schoeninger (1988). Diet, status, and complex social structure in Iron Age Central Europe: Some contributions from bone chemistry. *Tribe and Polity in Late Prehistoric Europe: Demography, Production and Exchange in the Evolution of Complex Social Systems*. D. B. Gibson and M. N. Geselowitz. New York, Plenum Press: 155-176.
- Nehlich, O., D. Boric, et al. (2010). "Sulphur isotope evidence for freshwater fish consumption: a case study from the Danube Gorges, SE Europe." *Journal of Archaeological Science* 37(5): 1131-1139.

- Nehlich, O., J. Montgomery, et al. (2009). "Biochemische Analyse Stabiler Isotope an prähistorischen Skelettfunden aus Westerhausen." Jahresschrift für mitteldeutsche Vorgeschichte 91: 329-350.
- Nehlich, O., J. Montgomery, et al. (2009). "Mobility or migration: a case study from the Neolithic settlement of Nieder-Morlen (Hessen, Germany)." Journal of Archaeological Science 36(8): 1791-1799.
- Nehlich, O. and M. Richards (2009). "Establishing collagen quality criteria for sulphur isotope analysis of archaeological bone collagen." Archaeological and Anthropological Sciences 1(1): 59-75.
- Nehlich, O. and J. Wahl (2011). "Binnengewässer – eine unterschätzte Nahrungsressource – Stabile Kohlenstoff-, Stickstoff- und Schwefelisotope aus dem Kollagen menschlicher und tierischer Knochenreste aus der urnenfelderzeitlichen Nekropole von Neckarsulm." Fundberichte aus Baden-Württemberg 31: 97-113.
- Noe-Nygaard, N., T. D. Price, et al. (2005). "Diet of aurochs and early cattle in southern Scandinavia: evidence from N-15 and C-13 stable isotopes." Journal of Archaeological Science 32(6): 855-871.
- O'Dowd, C. D., M. H. Smith, et al. (1997). "Marine aerosol, sea-salt, and the marine sulphur cycle: a short review." Atmospheric Environment 31(1): 73-80.
- Oelze VM, Siebert A, Nicklisch N, Meller H, Dresely V, and Alt KW (2011a). Early Neolithic diet and animal husbandry: stable isotope evidence from three Linearbandkeramik (LBK) sites in Central Germany. *J Arch Sci* 38 (2):270-279.
- Oelze VM, Nehlich O, and Richards MP (2011b). 'There's no place like home' - No isotopic evidence for mobility at the Early Bronze Age cemetery of Singen, Germany. *Archaeometry*, doi: 10.1111/j.1475-4754.2011.00644.x
- Oelze VM, Koch JK, Kupke K, Nehlich O, Zäuner S, Wahl J, Weise SM, Rieckhoff S, Richards MP (in print): Multi-isotopic analysis reveals individual mobility and diet at the Early Iron Age monumental tumulus of Magdalenenberg, Germany. *American Journal of Physical Anthropology*, *accepted manuscript*.
- Ogrinc, N. and M. Budja (2005). "Paleodietary reconstruction of a Neolithic population in Slovenia: A stable isotope approach." *Chemical Geology* 218(1-2): 103-116.

- Papathanasiou, A. (2003). "Stable isotope analysis in Neolithic Greece and possible implications on human health." *International Journal of Osteoarchaeology* 13(5): 314-324.
- Pare, C. (1992). "Das Bürgle bei March-Buchheim: ein Riesengrabhügel der Späthallstattzeit." *Archäologisches Korrespondenzblatt* 22: 503-514.
- Pearson, J. A., H. Buitenhuis, et al. (2007). "New light on early caprine herding strategies from isotope analysis: a case study from Neolithic Anatolia." *Journal of Archaeological Science* 34(12): 2170-2179.
- Peterson, B. J. and B. Fry (1987). "Stable Isotopes in Ecosystem Studies." *Annual Review of Ecology and Systematics* 18: 293-320.
- Pollard, A. M., M. Pellegrini, et al. (2011). "Technical note: Some observations on the conversion of dental enamel $\delta^{18}\text{Op}$ values to $\delta^{18}\text{Ow}$ to determine human mobility." *American Journal of Physical Anthropology* 145(3): 499-504.
- Price, T. D., Ed. (2000). *Europe's First Farmers*. Cambridge Cambridge University Press.
- Price, T. D., J. H. Burton, et al. (2002). "The characterization of biological available strontium isotope ratios for the study of prehistoric migration." *Archaeometry* 44(1): 117-135.
- Price, T. D., G. Grupe, et al. (1994). "Reconstruction of migration patterns in the Bell Beaker period by stable strontium isotope analysis." *Applied Geochemistry* 9(4): 413-417.
- Price, T. D., C. Knipper, et al. (2004). "Strontium Isotopes and Prehistoric Human Migration: The Bell Beaker Period in Central Europe." *European Journal of Archaeology* 7(1): 9-40.
- Price, T. D., J. Wahl, et al. (2006). "Isotopic Evidence for Mobility and Group Organization Among Neolithic Farmers At Talheim, Germany, 5000 BC." *European Journal of Archaeology* 9(2-3): 259-284.
- Price, T. D., J. Wahl, et al. (2003). "Das bandkeramische Gräberfeld vom 'Viesenhäuser Hof' bei Stuttgart Mühlhausen: Neue Untersuchungsergebnisse zum Migrationsverhalten im frühen Neolithikum." *Fundberichte aus Baden-Württemberg* 27: 23-58.
- Rehren, T. H. and E. Pernicka (2008). "Coins, artefacts and isotopes_ archaeometallurgy and archaeometry." *Archaeometry* 50(2): 232-248.
- Richards, M. P., B. T. Fuller, et al. (2001). "Sulphur isotopic variation in ancient bone collagen from Europe: implications for human palaeodiet, residence mobility, and modern pollutant studies." *Earth and Planetary Science Letters* 191: 185-190.

- Richards, M. P., B. T. Fuller, et al. (2001). "Sulphur isotopic variation in ancient bone collagen from Europe: implications for human palaeodiet, residence mobility, and modern pollutant studies." *Earth and Planetary Science Letters* 191(3-4): 185-190.
- Richards, M. P., B. T. Fuller, et al. (2003). "Sulphur isotopes in palaeodietary studies: a review and results from a controlled feeding experiment." *International Journal of Osteoarchaeology* 13: 37-45.
- Richards, M. P., J. A. Pearson, et al. (2003). "Stable isotope evidence of diet at Neolithic Catalhoyuk, Turkey." *Journal of Archaeological Science* 30(1): 67-76.
- Richards, M. P., T. D. Price, et al. (2003). "Mesolithic and Neolithic subsistence in Denmark: New stable isotope data." *Current Anthropology* 44(2): 288-295.
- Richards, M. P., R. J. Schulting, et al. (2003). "Sharp shift in diet at onset of Neolithic" *Nature* 425: 366.
- Rummel, S., S. Hözl, et al. (2007). Isotopensignaturen von Bio- und Geo-Elementen in der Forensik. Biologische Spurenkunde. B. Herrmann and K.-S. Saternus, Springer Berlin Heidelberg: 381-407.
- Sakai, H. (1957). "Fractionation of sulphur isotopes in nature." *Geochimica Et Cosmochimica Acta* 12(1-2): 150-169.
- Schoeninger, M. J. and M. J. DeNiro (1984). "Nitrogen and carbon isotopic composition of bone collagen from marine and terrestrial animals." *Geochimica et Cosmochimica Acta* 48: 625-639.
- Schoeninger, M. J., M. J. DeNiro, et al. (1983). "Stable nitrogen isotope ratios of bone collagen reflect marine and terrestrial components of prehistoric human diet." *Science* 220: 1381-1383.
- Schulting, R. J. and M. P. Richards (2002). "The Wet, the Wild and the Domesticated: the Mesolithic— Neolithic Transition On the West Coast of Scotland." *European Journal of Archaeology* 5(2): 147-189.
- Schurr, M. R. (1998). "Using stable nitrogen isotopes to study weaning behavior in past populations." *World Archaeology* 30(2): 327-342.
- Smits, E., A. R. Millard, et al. (2010). "Isotopic Investigation of Diet and Residential Mobility in the Neolithic of the Lower Rhine Basin." *European Journal of Archaeology* 13(1): 5-31.

- Spindler, K. (2004). Der Magdalenenberg bei Villingen im Schwarzwald - eine Bilanz nach 30 Jahren. *Parerga praehistorica*. B. Hänsel. Bonn, Habelt. 100: 135-160.
- Stary, P. F. (1993). "Der Mittelgebirgsraum als Transit- und Vermittlungszone hallstatt- und latènezeitlicher Kulturelemente aus Mitteleuropa ins westliche Ostseegebiet." *Berichte der Römisch-Germanischen Kommisssion* 74: 537-564.
- Stephan, E. (2009). Rekonstruktion eisenzeitlicher Weidewirtschaft anhand archäozoologischer und isotopenchemischer Untersuchungen. *Beiträge zur Archäozoologie und Prähistorischen Anthropologie*. N. Benecke. Langenweißbach, Beier & Beran. VII: 65-79.
- Tafuri, M. A., O. E. Craig, et al. (2009). "Stable isotope evidence for the consumption of millet and other plants in Bronze Age Italy." *American Journal of Physical Anthropology* 139(2): 146-153.
- Tauber, H. (1981). "13C evidence for dietary habits of prehistoric man in Denmark." *Nature* 292: 332-333.
- Tieszen, L. L. (1991). "Natural variations in the carbon isotope values of plants: implications for archaeology, ecology and paleoecology." *Journal of Archaeological Science* 18: 227-248.
- van der Merwe, N. J. and E. Medina (1991). "The canopy effect, carbon isotope ratios and foodwebs in Amazonia." *Journal of Archaeological Science* 18: 249-259.
- Van Der Merwe, N. J. and J. C. Vogel (1978). "13C Content of human collagen as a measure of prehistoric diet in woodland North America." *Nature* 276(5690): 815-816.
- van Klinken, G. J. (1999). "Bone collagen quality indicators for palaeodietary and radiocarbon measurements." *Journal of Archaeological Science* 26: 687-695.
- van Klinken, G. J., M. P. Richards, et al. (2000). An overview of causes for stable isotopic variations in past European human populations: Environmental, ecophysiological, and cultural effects. *Biogeochemical approaches to palaeodietary analysis*. S. Ambrose and A. Katzenberg. New York, Kluwer Academic/Plenum publishers: 39-63.
- Vika, E. (2009). "Strangers in the grave? Investigating local provenance in a Greek Bronze Age mass burial using $\delta^{34}\text{S}$ analysis." *Journal of Archaeological Science* 36(9): 2024-2028.
- Vogel, J. C. and N. J. van der Merwe (1977). "Isotopic Evidence for Early Maize Cultivation in New York State." *American Antiquity* 42(2): 238-242.

- Wells, P. (2008). Trade and Exchange in later Prehistory. *Prehistoric Europe: theory and practice*. A. Jones. Oxford, Wiley-Blackwell.
- Wells, P. S. (2002). The Iron Age. *European Prehistory - A Survey*. S. Milisauskas. New York, Kluwer Adademic: 335-385.
- White, C. D., M. W. Spence, et al. (1998). "Oxygen Isotopes and the Identification of Geographical Origins: The Valley of Oaxaca versus the Valley of Mexico." *Journal of Archaeological Science* 25(7): 643-655.
- Whittle, A. and V. Cummings, Eds. (2007). *Going over: the Mesolithic-Neolithic transition in north-west Europe*. London, British Academy.
- Wild, E., K. Arlamovsky, et al. (2000). "14C dating with the bomb peak." *Nuclear Instruments and Methods in Physics Research B* 172: 944 - 950.
- Wright, L. E. and H. P. Schwarcz (1998). "Stable carbon and oxygen isotopes in human tooth enamel: Identifying breastfeeding and weaning in prehistory." *American Journal of Physical Anthropology* 106(1): 1-18.