KU LEUVEN

De betrouwbaarheid van wetenschappelijke publicaties

Jan Bollansée – Linda Stoop (KU Leuven)

Inforum 2016

Brussel, 12 mei 2016

Programma

1. Wetenschappelijk versus populair-wetenschappelijk
2. Wetenschappelijk versus populair-wetenschappelijk: vormkenmerken
3. Wetenschappelijk versus populair-wetenschappelijk: inhoudelijk
4. Betrouwbaarheid van wetenschappelijke publicaties: *peer review*
5. Wetenschappelijke deontologie onder vuur
6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf
7. Conclusie

1. Wetenschappelijk vs. populair-wetenschappelijk

Populair-wetenschappelijk artikel

- Betrouwbaar?
- Criteria?

Neanderthal chefs spiced up their diet

Catherine Brahic

THE image of a Stone-Age man grasping the bony end of a bloody mammoth leg and chomping down on it with powerful gnashers is taking a bit of a battering. We already know that Neanderthals were partial to delicacies such as fish and small birds, with a healthy helping of plants. Now some are saying they might have flavoured their meaty feasts with wild herbs, too.

"Neanderthals were probably well versed in the art of roasting, and may have even made stew"

Without a time machine to take us back 40,000 to 50,000 years, the suggestion remains highly speculative. But our long-lost cousins were clearly not the carnivorous beasts we once assumed them to be.

The idea that they were partial to a handful of herbs comes from the hardened plaque – or dental calculus – chipped off the teeth of a 50,000-year-old Neanderthal from El Sidrón in Spain. A few years ago, Karen Hardy of the University of Barcelona and colleagues found traces of camomile and yarrow in the calculus – both plants with strong flavours but no nutritional value (*Naturwissenschaften*, doi.org/h33). They argued that the plants were eaten for medicinal purposes. Self-medication is common in the animal world, says Hardy, and it's very likely Neanderthals did the same.

Sabrina Krief of the French natural history museum in Paris, thinks differently, based on her observations of wild chimpanzees in Kibale National Park in Uganda. After a hunt, these chimps can eat up to three different types of leaf with their prey (*Antiquity*, doi.org/3mk). Chimps are thought to self-medicate with leaves, but Krief says some scoff leaves to spice up their food. Her rationale is that all the chimps in a group ate them at the same time, and it's unlikely that every chimp needed the same remedy. Also, different chimp tribes opt for different leaves.

If chimps flavour their food, why not Neanderthals? The palaeontologists contacted by *New Scientist* say this is possible but highly theoretical. What is clear is that Neanderthals were not simple carnivores. All hominins must eat carbohydrates to survive, says Hardy. Meat just doesn't provide enough energy.

There's also a limit to the amount of animal protein we should have in our diet – too much meat is not good for us, says Hardy. So at the very least, we know that Neanderthals liked some veg with their steak – though what kind of veg is still up for debate. Remains at a site in Gibraltar suggest they also liked nuts and wild olives.

And they clearly liked a variety of meats. Geoff Smith of the Monrepos archaeological research centre in Germany says they were more likely to eat bovids, horses and deer than larger game – mammoth and rhino were occasional treats. Signs that they broke up the bones of their game suggest that they sucked out the rich, fatty marrow, says Smith, who presented evidence for this at the Paleoanthropology Society meeting in San Francisco this week.

And what of their cooking techniques? Some Neanderthal sites have hearths, and Hardy's study showed signs of smoke from a wood fire and desiccated starches. They were probably well versed in the art of roasting.

Perhaps Neanderthals even boiled their food, boiling bones to extract the juices and nutrients, a bit like making a stew. "They may have done," says Wil Roebroeks of Leiden University in the Netherlands. "Who knows?" The trouble, says Hardy, is we've never found a Neanderthal pot. ■

I'm having the Neanderthal platter

PALAEO TOOTHPICKS AND GRASSY FLOSS

CANDY floss it's not, but the Neanderthals' starchy, vegetable-rich diet was not quite what the palaeo dentist ordered. It came with a healthy helping of glucose - a fabulous source of energy to power both your brain and the bacteria that live in your mouth. Dental plaque has always been a nuisance for hominins, says Karen Hardy of the University of Barcelona in Spain.

That plaque is now allowing Hardy and other researchers to study the diets of early humans in some detail. What might Neanderthal dental hygiene have been like?

It turns out early humans were probably no strangers to the toothpick. Chimps, bonobos, orangutans, long-tailed macaques and Japanese macaques have all been seen using twigs for this purpose. And in 2013, a team wrote that grooves in the teeth of a 1.77 million year old hominin found in Georgia were probably made by a lifetime of wielding toothpicks (*PNAS*, doi.org/3mm).

Hardy says early humans are thought to have used bits of wood, bone, sinew and grass to pick and even floss between their teeth.

Their risk of tooth decay might also have been offset by a diet of wild plants. Farmed cereal grains tend to stick to the teeth more easily than wild foods, which can be very abrasive, says Amanda Henry of the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. This suggests the palaeo diet came with its very own in-built toothbrush.

1. Wetenschappelijk vs.

Wetenschappelijk artikel

- Betrouwbaar?
- Criteria?

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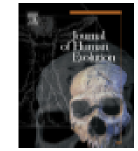

Plant foods and the dietary ecology of Neanderthals and early modern humans

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ABSTRACT

One of the most important challenges in anthropology is understanding the disappearance of Neanderthals. Previous research suggests that Neanderthals had a narrower diet than early modern humans, in part because they lacked various social and technological advances that lead to greater dietary variety, such as a sexual division of labor and the use of complex projectile weapons. The wider diet of early modern humans would have provided more calories and nutrients, increasing fertility, decreasing mortality and supporting large population sizes, allowing them to out-compete Neanderthals. However, this model for Neanderthal dietary behavior is based on analysis of animal remains, stable isotopes, and other methods that provide evidence only of animal food in the diet. This model does not take into account the potential role of plant food. Here we present results from the first broad comparison of plant foods in the diets of Neanderthals and early modern humans from several populations in Europe, the Near East, and Africa. Our data comes from the analysis of plant microremains (starch grains and phytoliths) in dental calculus and on stone tools. Our results suggest that both species consumed a similarly wide array of plant foods, including foods that are often considered low-ranked, like underground storage organs and grass seeds. Plants were consumed across the entire range of individuals and sites we examined, and none of the expected predictors of variation (species, geographic region, or associated stone tool technology) had a strong influence on the number of plant species consumed. Our data suggest that Neanderthal dietary ecology was more complex than previously thought. This implies that the relationship between Neanderthal technology, social behavior, and food acquisition strategies must be better explored.

Introduction

The dietary behavior of Neanderthals has frequently been tied to explanations of their extinction. Results from faunal profiles (e.g., Stiner, 2006; Stiner et al., 2000), nitrogen and carbon isotope analyses (e.g., Bocherens, 2009; Richards and Trinkaus, 2009), and energy requirement estimations (e.g., Froehle and Churchill, 2009), together with a lack of complex technology (e.g., Shea, 2006), have suggested that Neanderthals ate almost exclusively large animal game, with very little contribution from plants, small game or aquatic foods. In a behavioral ecology context, this narrow diet is a reflection of an environment where encounter rates with highly-ranked prey are high, human population sizes are low, and the pressure to create new, complex social structures, such as a sexual division of labor, and complex technology to increase the capture and processing of foods, such as atlatls and dedicated plant grinding implements, is low (Bright et al., 2002; Kuhn and Stiner, 2006; O'Connell, 2006).

In contrast, analyses of modern human diets have suggested that their dietary breadth has increased through time, beginning in the African Middle Stone Age (MSA). These groups consumed more marine and fish resources (Drucker and Bocherens, 2004; Marean et al., 2007; McBrearty and Brooks, 2000; Richards et al., 2001; O'Connor et al., 2011), developed specialized technologies, such as complex projectile weapons and fishing (Yellen et al., 1995;

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1. Wetenschappelijk vs. populair-wetenschappelijk

1. auteurs met affiliatie

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2. introductie

3. abstract

verwijzingen

4. onderzoeksmethode

Materials and methods

Plant microremains are microscopic remnants of plants that preserve taxon-specific morphology. They can be recovered from a variety of archaeological contexts, and have been used to explore plant use in a variety of time periods across human history (Henry and Piperno, 2008; Henry et al., 2011; Pearsall et al., 2004; Zarrillo and Kooyman, 2006; Piperno and Dillehay, 2008; Yang et al., 2009; Revedin et al., 2010; Wesolowski et al., 2010).

We examined the microremains preserved in 209 samples from 30 populations from 20 sites in the Near East, Europe and Africa. These samples included representatives of Middle Paleolithic (MP) Neanderthals, Middle Stone Age (MP/MSA) modern humans, and Upper Paleolithic/Later Stone Age (UP/LSA) modern humans, and spanned the period between c.130–10 ka, with a few outliers (Table 1; SOM Table 1).

5. onderzoeksresultaten

Results

We recovered microremains from many but not all of the samples, and identified several types to plant taxon or plant organ (Table 1). The preservation of microremains does not appear to have been significantly affected by non-dietary processes. Across all samples, there is no correlation between geological age and microremain numbers (SOM Fig. 1; $r^2 = 0.02$; $p = 0.41$). Among teeth, there was no correlation between the weight of calculus removed and the number of recovered microremains (though not all samples were weighed) (SOM Fig. 2; $r^2 = 0.04$; $p = 0.23$). There was also no correlation between microremain numbers and formal tool classification (SOM Fig. 3; Kruskal–Wallis $p = 0.20$). With a few exceptions (see Shanidar and Skhul, below), phytoliths were very rare in comparison with starch grains. The general paucity of phytoliths strongly suggests there has been no contamination from burial sediments, since phytoliths are much more prevalent in sediments than are starches (SOM Text). The overall lack of phytoliths also suggests that the starch grains come from primary consumption of plant material rather than

6. discussie

Discussion

Our results indicate that Middle Paleolithic Neanderthals probably consumed as many plant species as modern humans did. This lack of evidence for a shift in diet breadth between Neanderthals and modern humans contrasts with the results from studies of animal foods (e.g., Stiner et al., 2000; Richards and Trinkaus, 2009). The generation of a sizable amount of data on plant exploitation from the microremains records suggests a more complex picture of

Conclusion

This picture of Neanderthals subsistence as oriented toward routinely pursuing big game and collecting plants is still compatible with the idea that the overall diet and more sophisticated toolkit of modern humans gave them a competitive advantage as they moved into the Near East and Europe. When early modern humans moved into Neanderthal areas and were directly competing with them for food, Neanderthals probably had several options that enabled them to obtain more calories. They could copy

7. conclusie

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jhevol.2013.12.014.

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8. bibliografie

2. Wetenschappelijk vs. populair-wetenschappelijk: vormkenmerken

	Populair	Wetenschappelijk
Doelgroep	Breed publiek	Wetenschappers
Auteur	Journalist (niet-wetenschapper)	Wetenschapper
Woordenschat en schrijfstijl	Verondersteld geen voorkennis	Verondersteld wetenschappelijke achtergrond
Verwijzingen naar andere bronnen	Geen of beperkt	In de tekst of in voetnoten en bibliografie op het einde
Systematische opbouw	Geen, doorlopende tekst met uitgebreide algemene uitleg	Abstract, onderzoek, resultaten, conclusie, bibliografie
Uitgever	Commerciële uitgevers	Commerciële uitgevers met wetenschappelijke inslag (Elsevier…)

3. Wetenschappelijk vs. populair-wetenschappelijk: inhoudelijk

	Populair	Wetenschappelijk
Correctheid	Onderzoek?	Resultaten gebaseerd op wetenschappelijk onderzoek
Controleerbaarheid	Geraadpleegde bronnen?	Beschrijving onderzoeksmethode + vermelding geraadpleegde bronnen
Betrouwbaarheid	Geen controle door peer-review	Peer-review door collega-wetenschappers
Actualiteit	?	Recentste ontwikkelingen
Focus	Klaar afgelijnd onderwerp met duidelijke conclusie en boodschap	Onderwerp in al zijn fa-cetten behandeld; con-clusie niet noodzakelijk definitief, mogelijke aanzet naar verder onderzoek

4. Betrouwbaarheid van wetenschappelijke publicaties: *peer review*

Beoordeling vóór publicatie

- Een aantal experts uit het vakgebied van de auteur beoordelen samen met de uitgever het te publiceren artikel.
- Het kwaliteitslabel bij uitstek voor wetenschappelijk betrouwbare informatie.
- Is het onfeilbaar?

4. Betrouwbaarheid van wetenschappelijke publicaties: *peer review*

Who's Afraid of Peer Review?

John Bohannon

Science 04 Oct 2013:
Vol. 342, Issue 6154, pp. 60-65
DOI: 10.1126/science.342.6154.60

4. Betrouwbaarheid van wetenschappelijke publicaties: *peer review*

A spoof paper concocted by *Science* reveals little or no scrutiny at many open-access journals.

On 4 July, good news arrived in the inbox of Ocorrafoo Cobange, a biologist at the Wassee Institute of Medicine in Asmara. It was the official letter of acceptance for a paper he had submitted 2 months earlier to the *Journal of Natural Pharmaceuticals*, describing the anticancer properties of a chemical that Cobange had extracted from a lichen.

In fact, it should have been promptly rejected. Any reviewer with more than a high-school knowledge of chemistry and the ability to understand a basic data plot should have spotted the paper's short-comings immediately. Its experiments are so hopelessly flawed that the results are meaningless.

By the time *Science* went to press, 157 of the journals had accepted the paper and 98 had rejected it. Of the remaining 49 journals, 29 seem to be derelict: websites abandoned by their creators.

overgenomen van: http://science.sciencemag.org/content/342/6154/60.full

4. Betrouwbaarheid van wetenschappelijke publicaties: *peer review*

Kritiek vanuit de academische wereld:

- gevestigde wetenschappers worden bevoordeeld (Mattheüs-effect)
- de peers zouden bevooroordeeld zijn om het onderzoek in een richting te sturen die hen past
- de peers zouden hun eigen carrièrekansen willen vergroten
- het proces duurt soms wel 2 jaar en tegen het verschij-nen van het artikel kan de inhoud al achterhaald zijn

"De betrouwbaarheid van een publicatie is niet afhankelijk van één enkel criterium of betrouwbaarheidslabel, maar van een set van interne en externe criteria. Hoe meer criteria vervuld zijn, hoe betrouwbaarder de publicatie is.

- (bron afbeelding:http://virtueelpresent.nl/hoe-betrouwbaar-jouw-website/)

5. Wetenschappelijke deontologie onder vuur

Farmaceutische industrie brengt medicijnen op de markt die onvoldoende getest zijn of manifest gevaarlijk bleken te zijn

5. Wetenschappelijke deontologie onder vuur

Voedingsindustrie past tactieken van tabaksindustrie toe

THE LANCET

Volume 381, Issue 9867, 23 February–1 March 2013, Pages 670–679

Series

Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries

Prof Rob Moodie, MBBS[a], David Stuckler, PhD[b], Carlos Monteiro, PhD[c], Nick Sheron[d], Bruce Neal, PhD[e], Thaksaphon Thamarangsi, PhD[f], Paul Lincoln, BSc[g], Sally Casswell, PhD[h], on behalf of The Lancet NCD Action Group

- http://dx.doi.org/10.1016/S0140-6736(12)62089-3

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5. Wetenschappelijke deontologie onder vuur

Verschillende vormen van fraude: onderzoeksresultaten

- "stelen" (plagiaat)
- verzwijgen
- verzinnen
- manipuleren / "masseren"

- R. Verbeke, Fraude bij één op de twaalf medische wetenschappers, in: *EOS-Magazine* 30,4 (2013) (geraadpleegd op 23 april 2016).
- J.K. Tijdink – R. Verbeke – Y.M. Smulders, Publications Pressure and Scientific Misconduct in Medical Scientists, in: *Journal of Empirical Research on Human Research Ethics* 9 (2014) 5, pp. 64-71 (doi: 10.1177/1556264614552421)

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5. Wetenschappelijke deontologie onder vuur

Niet alleen biomedische wetenschap: ook sociologen, psychologen, anthropologen, filosofen, … ontslagen wegens fraude

Verschillende oorzaken:

- publicatiedwang (publish or perish): baanbrekend onderzoek & veel publicaties bevorderen carrière
- economische belangen van industrie

5. Wetenschappelijke deontologie onder vuur

Alsmaar toenemende bezorgdheid van onderzoekers, onderzoeksinstellingen, subsidiërende instanties en de maatschappij

- Vlaamse Commissie voor Wetenschappelijke Integriteit (VCWI) – ingesteld 2013 onder de hoede van de Koninklijke Vlaamse Academie van België
- European Network of Research Integrity Offices (ENRIO)
- InterAcademy Council: Doing Global Science: A Guide to Responsible Conduct in the Global Research Enterprise
- RetractionWatch.com

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Recensies (≠ *review articles*!)

- Kritische besprekingen door een onafhankelijke wetenschapper, vertrouwd met de materie

Citaties

- Verwijzingen in andere publicaties naar de originele publicatie:
  - *Kwalitatief: nieuwe publicaties verhogen de betrouwbaarheid van de originele publicatie door ze te vermelden of de resultaten ervan over te nemen*
  - *Kwantitatief: hoe groter het aantal verwijzingen naar een bepaalde publicatie, hoe groter de impact (MAAR opgelet voor rechtzettingen of weerleggingen)*

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Bibliometrie

- het gebruik van mathematische en statistische methoden bij onderzoek naar ontwikkeling en verspreiding van kennis
- alsmaar grootschaliger naarmate de automatisering van het informatiebeheer toeneemt
- objectief (?) criterium voor het vaststellen van de populariteit of impact van publicaties, onderzoekers en instellingen binnen een bepaald onderzoeksdomein
- vandaar instrument voor het meten van onderzoeks-output in het kader van evaluaties en beleids-ondersteuning

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6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Citatie-analyse en impactfactor van een tijdschrift

- *Impactfactor:* geeft aan hoe vaak de artikels uit dat tijdschrift gemiddeld geciteerd werden in een bepaald jaar
- *Berekening:* IF Tijdschrift T in jaar x =

$$\frac{\text{Totaal \# citaties in jaar x van tijdschriftartikels in year x-1 en x-2}}{\text{Totaal \# tijdschriftartikels gepubliceerd in jaar x-1 en x-2}}$$

- *Doel:* tijdschriften vergelijken *binnen een bepaald vakgebied*; hoe hoger de impactfactor, des te belangrijker het tijdschrift. Multidisciplinaire tijdschriften hebben verschillende IF per vakgebied

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

h-index **van een onderzoeker**

- Jorge Hirsch: productiviteit en invloed van een onderzoeker kwantificeren op basis van diens meest geciteerde publicaties en het aantal keren dat die in andermans publicaties geciteerd zijn
- *Berekening*: h-index onderzoeker X waarbij

  h = h aantal publicaties met h aantal citaties
- *Doel*: verder kijken dan numeriek aantal publicaties en citaties; corrigeert het disproportionele effect van publicaties met heel veel of juist geen citaties
- geen statische/absolute waarde

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Beschikbaarheid citatiegegevens

- Citatiedatabanken die niet alleen publicaties indexeren, maar ook de publicaties (boeken en artikels) die in de geïndexeerde publicaties geciteerd worden
  - Web of Science (Thomson Reuters)
  - Scopus (Elsevier)
- Google Scholar
- Uitgeversplatformen: beperkt tot eigen publicaties

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Journal rankings

- Commerciële bedrijven
  - JCR/Journal Citation Reports (op basis van WoS-data)
  - SJR/SCImago Journal Ranking (op basis van Scopus-data)
- Organisaties & Instellingen (Open Access)
  - Eigenfactor.org
  - SCImago Journal & Country Rank
  - ECOOM: VABB-SHW
  - ERIH Plus
  - …

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Traditionele *metrics* bloot aan kritiek

- Impactfactor vertrekt zuiver van *aantal* citaties, zonder kwalitatief onderscheid (op niveau van citatie, onderzoekers en tijdschriften)
- Impactfactor zegt alleen iets over tijdschrift, niet over individuele artikels (beperkt aantal artikels is vaak verantwoordelijk voor groot aantal citaties)
- h-index houdt onvoldoende rekening met particuliere artikelgegevens
- h-index neemt toe naargelang ouderdom van onder-zoeker / nadelig voor jongere onderzoekers
- IF & h-index beide gevoelig voor manipulatie

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Traditionele *metrics* bloot aan kritiek

- Houden geen of onvoldoende rekening met nieuwe communicatie- en publicatievormen op het internet
  - Open Access Journals & Books
  - Sociale netwerken (Facebook, Twitter, LinkedIn, Reddit, …)
  - Datasets (figshare)
  - Online bibliografische beheertoepassingen
  - Blogs, websites & discussiefora
  - Presentaties (Slideshare)
  - Software (GitHub)
  - …

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Altmetrics: nieuwe manieren om verspreiding en impact te meten op artikelniveau – binnen én buiten de academische wereld

- *Mentions, links, likes*
- *Database imports, recommendations/shares, full text uploads*
- *Web page views, record/abstract/article views*
- *Pdf downloads, full text links*

zie ook: Hannelore Vanhaverbeke, What is (scientific) impact? And can we measure it? (October 2013), dia 59@ http://www.kuleuven.be/english/research/bibliometrics/pfd/impact2013 (laatst geraadpleegd op 30 april 2016)

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Altmetrics: nieuwe manieren om verspreiding en impact te meten *op artikelniveau* – binnen én buiten de academische wereld

- Open Access: BioMed Central, ImpactStory, PLOS One (ALMs = Article-Level Metrics)
- Bedrijven: Altmetric, Plum Analytics
- En ook de leveranciers van de traditionele *metrics*: Thomson Reuters, Elsevier, …

6. Betrouwbaarheid van wetenschappelijke publicaties: beoordeling achteraf

Altmetrics ook voorzichtig te gebruiken

- Ontberen nog wetenschappelijke fundering: verder wetenschappelijk onderzoek nodig
- Context-informatie is essentieel voor correcte kwalitatieve interpretatie (positieve/negatieve aandacht)
- Niet alle disciplines zijn even actief op de verschillende internet-fora

- R. Kwok, Research impact: Altmetrics make their mark, in: *Nature* 500 (2013) 491-493 (http://dx.doi.org/10.1038/nj7463-491a)

7. Conclusie

Betrouwbaarheid, validiteit en impact van wetenschappelijke publicaties beoordelen

- geen eenvormig proces dat rechtlijnig naar een klaar en duidelijk antwoord leidt…
- Niet één alleenzaligmakende oplossing
- Hele reeks van tools: intrinsieke en extrinsieke kenmerken, traditionele én nieuwe instrumenten

- … en alle input aftoetsen aan eigen bedenkingen tijdens en na lectuur!

KU LEUVEN

Bedankt!

Vragen?

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