

Parasite eggs from ancient latrines hint at people's past diets

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Ancient latrines. Credit: Sjøe et al (2018)

DNA in parasite eggs recovered from ancient latrines provides new clues to the foods eaten by past populations, as well as their animal

domestication and hunting practices, according to a study published April 25, 2018 in the open-access journal *PLOS ONE* by Martin Sørensen of the University of Copenhagen, Denmark, and colleagues.

Parasitic worms that infect the human intestine lay [eggs](#) that are later excreted in feces. These parasites might spread from human to human, or they may be passed from intermediate animal hosts, such as pigs or fish, via meat consumption or contaminated soil.

Previous studies have investigated past diets by using microscopy to identify parasite eggs in ancient waste, but the advancement of DNA sequencing technology has opened up new opportunities in this field. In the new study, Sørensen and colleagues used a novel approach to examine DNA in parasite eggs from ancient latrines in Bahrain, Jordan, Denmark, the Netherlands, and Lithuania.

Departing from previous studies, the researchers first filtered and concentrated the [parasite eggs](#) in their samples, which spanned a period from 500 B.C. (Bahrain) to 1700 A.D. (the Netherlands). This initial step ensured they would have sufficient amounts of DNA for a technique known as shotgun sequencing. The resulting DNA sequences reflected which parasite species were represented by the eggs.

Most of the egg DNA came from parasites known to spread from human to human, but much came from parasites that are transmitted via raw or undercooked fish and pork. The egg DNA also revealed which animals—domesticated or not—may have lived among humans, such as sheep, horse, dog, pig, and rats.

To complement the egg analysis, the researchers also examined animal and plant DNA in the samples. Animal DNA reflected domestication as well as hunting and fishing practices; some of the Danish samples (1018 to 1400 A.D.) contained DNA from fin whales, roe deer, and hares.

Plant DNA reflected different areas' diets, including an abundance of cabbages and buckwheat in Northern Europe.

The shotgun sequencing results also enabled the research team to fully reconstruct several ancient parasites' mitochondrial genomes—DNA in energy-producing structures known as mitochondria, which are found in many organisms' cells. Mitochondrial DNA can reveal evolutionary relationships, and the researchers anticipate that, in future studies, this novel strategy could yield further insights into ancient parasites and their spread among hosts.

"Ancient DNA from latrines was used to identify the remains of a broad range of human and animal [parasites](#) as well as animals and plants," says Martin Sjøe. "This allows novel and unique insights into parasitism, diet and subsistence patterns of past populations."

More information: Sjøe MJ, Nejsum P, Seersholm FV, Fredensborg BL, Habraken R, Haase K, et al. (2018) Ancient DNA from latrines in Northern Europe and the Middle East (500 BC-1700 AD) reveals past parasites and diet. *PLoS ONE* 13(4): e0195481. doi.org/10.1371/journal.pone.0195481

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