# University of Brighton cracks dog whelk genome to reveal sea pollution’s genetic impact



Researchers at the University of Brighton have successfully completed the world's first genome sequencing of the dog whelk, a marine species essential for monitoring sea pollution. This significant achievement was led by Professor Rameen Shakur, a noted expert in genomics and precision medicine at the university.

The dog whelk, scientifically referred to as *Nucella lapillus*, plays a crucial role within marine ecosystems and the human food chain. It serves as a bioindicator for assessing the presence of hazardous pollutants, such as raw sewage and tributyltin (TBT), which can disrupt the hormone systems of various marine organisms. Chronic exposure to these pollutants has been linked to imposex, a condition where female dog whelks develop male sexual characteristics. This alarming phenomenon leads to sterility and a decline in population numbers, which can have wider implications for marine biodiversity and fisheries.

Despite its ecological importance, the absence of a reference genome for the dog whelk has historically constrained researchers' abilities to utilise modern genomic tools for studying its biology and responses to pollution. The University of Brighton's study sought to address this gap by sampling wild dog whelks collected from the Isle of Islay in Scotland over an 18-month period.

The findings provide new insights into the potential risks posed to the seafood industry and human health. They illuminate how harmful chemicals can modify the reproductive system of dog whelks and, by extension, may impact other marine organisms, including shellfish that are commonly consumed by humans.

In an interview with *The Argus*, Professor Rameen Shakur remarked, "By deciphering the dog whelk's genetic code, we've opened a window into how pollution disrupts marine life. This new resource will enable researchers worldwide to investigate the genetic mechanisms behind imposex and explore broader questions about marine adaptation, climate stress, and sea pollution."

The project was conducted in collaboration with the University of Edinburgh, with key contributions from Andrew Hesketh of the University of Brighton and Juned Kadiwala, Heleen De Weerd, and Helen Ritch from the University of Edinburgh. The research team employed advanced sequencing technologies, including PacBio HiFi and Oxford Nanopore sequencing, achieving an impressive 84 per cent assembly completeness for the genome.

The genome assembly is now publicly available through Springer Nature, representing a valuable resource for marine biologists, ecotoxicologists, and conservationists worldwide. Professor Shakur further stated, "Pollution in the ocean doesn’t just harm sea creatures—it can make its way into the food we eat. By understanding how pollutants affect dog whelks at a genetic level, we can also learn more about how these chemicals might impact human health."

The implications of this research extend beyond academic interest, as it may inform strategies aimed at making seafood safer and protecting both marine life and human populations. The research team looks forward to collaborating with global partners to further explore the effects of climate change and human activity on marine ecosystems.

Source: [Noah Wire Services](https://www.noahwire.com)

## References

* <https://www.cambridge.org/core/journals/journal-of-the-marine-biological-association-of-the-united-kingdom/article/abs/male-genital-defect-in-the-dogwhelk-nucella-lapillus-neogastropoda-favouring-survival-in-a-tbtpolluted-area/0078B2EFCAB7490FE19BC65509204488> - This study discusses how tributyltin (TBT) pollution has led to imposex in dog whelks, causing female whelks to develop male sexual characteristics, leading to sterility and population decline.
* <https://link.springer.com/article/10.1007/s10661-015-4961-0> - This research presents a 22-year monitoring study of imposex in dog whelks, highlighting the effectiveness of legislation in reducing TBT pollution and its impact on marine life.
* <https://marine.gov.scot/sma/content/biological-effects-contaminants-use-imposex-dogwhelk-nucella-lapillus-bioindicator> - This report describes the use of dog whelks as bioindicators for TBT contamination, emphasizing their role in detecting marine pollution.
* <https://pubmed.ncbi.nlm.nih.gov/33341076/> - This study investigates the effects of copper contamination on dog whelks, demonstrating how metal pollution can alter ecological interactions and community dynamics.
* <https://pubmed.ncbi.nlm.nih.gov/36330941/> - This research analyzes heavy metal concentrations in dog whelk shells over 130 years, illustrating the species' role in monitoring long-term pollution trends.
* <https://www.cambridge.org/core/journals/journal-of-the-marine-biological-association-of-the-united-kingdom/article/regional-recovery-of-nucella-lapillus-populations-from-marine-pollution-facilitated-by-manmade-structures/C7173B3BB09F268EB2305174D1C6066A> - This study examines the recovery of dog whelk populations from TBT pollution, facilitated by man-made structures, highlighting the species' resilience and the impact of pollution mitigation efforts.
* <https://www.theargus.co.uk/news/25122926.university-brighton-researchers-make-breakthrough-sea-pollution/?ref=rss> - Please view link - unable to able to access data