

UWE Bristol researcher plays key role in DNA bar-coding of native flowering plants in Wales

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A researcher from UWE Bristol has contributed to a groundbreaking project that has succeeded in generating DNA barcoding for all the native flowering plants in Wales.

Wales is the first nation in the world to have DNA barcoded all of its native [flowering plants](#) and conifers.

Dr. Joel Allainguillaume from the University of the West of England (UWE Bristol) has been actively involved in the conception and designing of this exciting [project](#) which has been published this month in [Plos One](#). The project has been viewed by more than 40,000 researchers and is already making significant [waves](#) amongst the research community engaging with this peer review website.

Dr. Allainguillaume explains, “I was involved with this project from the outset. I helped design a range of universal DNA sequencing tests which were a prerequisite to characterise unique DNA barcodes for each individual plant species.

“Involvement in this project opens up the way for a wide variety of applied research collaboration projects with Dr. Natasha De Vere of the National Botanic Garden of Wales, the leading author of the project that will use this resource for biodiversity, conservation and human health studies.”

“Imagine you could identify any plant species from the tiniest fragment of plant material; this is possible using [DNA barcoding](#). Once reference barcodes are in place, unknown DNA sequences can be compared to these in order to find out what they are.”

Species can be identified from pollen grains, fragments of seeds or roots, wood, dung, stomach contents or environmental samples collected from the air, soil or water. Projects are now underway throughout the world to DNA barcode all living things and ensure that these barcodes are freely available online as a global resource. The scientific community have agreed on sections of two genes called rbcL and matK to act as the DNA barcodes for plants. These genes can be used to catalogue plant life as they have a slightly different code between species but are very similar within a species.

Over the last four years the Barcode Wales project has created a reference database of DNA barcodes based on the 1143 native flowering plants and conifers of Wales. The project has assembled 3304 DNA barcodes for the rbcL gene and 2419 for matK. In total 98% of the Welsh flora now have DNA barcodes for rbcL and 90% for rbcL and matK, giving the most complete coverage of plant DNA barcodes for any nation in the world. So how effective are the DNA barcodes?

Looking at the whole of Wales the DNA barcodes can distinguish up to 75% of species. Looking at smaller scales, for any 10 km area of Wales, on average 82% of species can be distinguished and this rises to 93% on average for the species within any 2km area.

The creation of this DNA barcode library is reported in the journal [PLoS ONE dx.plos.org/10.1371/journal.pone.0037945](https://doi.org/10.1371/journal.pone.0037945) and all of the DNA barcodes are freely available on the Barcode of Life Database (BOLD) so that they can be used by researchers throughout the world.

The project has been led by Dr. Natasha de Vere of the National Botanic

Garden of Wales and Dr. Tim Rich from the National Museum Wales with project partners from University of the West of England, Aberystwyth University, Glamorgan University and the Botanical Society of the British Isles, with high performance computing support from HPC Wales.

Natasha explains the importance of the technique, “Wales is now in the unique position of being able to identify plant species from materials which in the past would have been incredibly difficult or impossible. The value of the Barcode Wales project is that we have created a powerful platform for a broad range of research from biodiversity conservation to human health.”

The DNA database is already being used for a range of projects including an investigation to barcode honey for drug discovery and another project to help find out more about the crisis facing pollination by investigating hoverflies part in pollination. The project team will also join forces with more partners to DNA barcode the rest of the UK native and alien flora.

Provided by University of the West of England

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