

25 species revealed for 25 Genomes Project

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To commemorate the Wellcome Trust Sanger Institute turning 25 in 2018, the Institute and its collaborators are sequencing 25 new genomes of species in the UK. The final five species have now been chosen by thousands of school children and members of the public around the globe, who participated in the 25 Genomes Project online vote.

The project could reveal why some brown trout migrate to the open ocean, whilst others don't, or tell us more about the magneto receptors in robins' eyes that allow them to 'see' the magnetic fields of the Earth. It could also shed light on why Red Squirrels are vulnerable to the squirrel pox virus, yet Grey Squirrels can carry and spread the virus without becoming ill.

All of the results will be made publicly available and will lead to future studies to understand the biodiversity of the UK and aid the conservation and understanding of these species.

The Sanger Institute was founded in 1993 by Professor Sir John Sulston as part of the Human Genome Project. The Institute made the largest single contribution to the gold- standard sequence of the first [human genome](#), which was published in 2003.

A genome is an organism's complete set of genetic instructions written in DNA. Each genome contains all of the information needed to build that organism and allow it to grow and develop.

Since the landmark completion of the human genome, the Sanger

Institute has become a globally recognised leader in the field of genomics. Many more important reference genomes have already been sequenced - from the mouse and zebrafish genomes to the pig, gorilla, mosquito and many others. Beyond animal species, infectious diseases and bacteria also feature prominently on the list of reference genomes, from salmonella and MRSA to chlamydia and malaria. All of these have offered up important insights about these species in health and disease.

Now, the Sanger Institute and its partners are comprehensively sequencing 25 species from the UK. This project is a small contribution to a much larger undertaking, where scientists from around the world are coming together to form a plan to sequence all life on Earth.

This project has been made possible by PacBio® long-read sequencing technology, which generates high-quality genomes. The Institute is partnering with PacBio and other leaders in the technology sector, 10x Genomics and Illumina, to create the most comprehensive view of these genomes.

The high-quality genomes will open doors for scientists to use this information, and researchers could discover how UK species are responding to environmental pressures, and what secrets they hold in their genetics that enables them to flourish, or flounder.

The 25 species are divided into five categories depending on the qualities they share: Flourishing, species on the up in the UK; Floundering, endangered and declining species; Dangerous, invasive and harmful species; Iconic, quintessentially British species that we all recognise; Cryptic, species that are out of sight or indistinguishable from others based on looks alone.

The 25 species that will have their genomes sequenced are:

Flourishing species:

- Grey Squirrel
- Ringlet Butterfly
- Roesel's Bush-Cricket
- Oxford Ragwort

Floundering species:

- Red Squirrel
- Water Vole
- Turtle Dove
- Northern February Red Stonefly

Dangerous species:

- Giant Hogweed
- Indian Balsam
- King Scallop, also known as Great Scallop, Coquilles Saint-Jacques
- New Zealand Flatworm

Iconic species:

- Golden Eagle
- Blackberry
- European Robin
- Red Mason Bee

Cryptic species:

- Brown trout
- Common Pipistrelle Bat

- Carrington's Featherwort
- Summer truffle

Five species chosen by the public:

- Common Starfish
- Fen Raft Spider
- Lesser Spotted Catshark
- Asian Hornet
- Eurasian Otter

Professor Sir Mike Stratton, Director of the Wellcome Trust Sanger Institute, said: "Twenty five years ago the field of genomics was a budding idea and its implications only dreamed of. Today the reality of genomics and biodata is that it is transforming our understanding, diagnosis, and treatment of diseases, ranging from cancer and heart disease to malaria and infections. The science and technology that is driving this era of discovery is accelerating our understanding of the human body, but also of the world around us.

This project has come after many thoughtful conversations around the world with regard to how many of the species on our planet could be sequenced in the coming decades - in principle, all of them. We are embarking on our contribution to sequencing all life on Earth."

Dr Julia Wilson, Associate Director of the Wellcome Trust Sanger Institute, said: "Through sequencing these 25 genomes, scientists will gain a better understanding of UK species, how they arrived here, their evolution, and how different species are adapting to a changing environment. The results could reveal hidden truths in these species, and will enable the scientific community to understand how our world is constantly changing and evolving around us. We want to celebrate the 25th anniversary of the Sanger Institute in a special 'Sanger' way, and I

am excited to see how the 25 Genomes Project unfolds."

Ken Skeldon, Head of Public Engagement at the Wellcome Genome Campus, said: "Giving the public the opportunity to choose which species have their genomes sequenced in the 25 Genomes Project has brought new perspectives to the project. We are delighted to see that so many people and school children across the UK and beyond have actively engaged in online chats with the scientists and voted for the final five [species](#)."

Tim Littlewood, Head of Life Sciences at the Natural History Museum said: "The Natural History Museum is proud to be collaborating with the Sanger Institute to celebrate their 25th birthday and also to celebrate the advances that molecular techniques such as [genome](#) sequencing can bring to the study of UK wildlife. The 80 million specimens we care for, from around the world, hold a wealth of genetic information that enables us to conduct innovative research, addressing global challenges. A focus on UK biodiversity with cutting edge technology is particularly welcome."

More information: www.sanger.ac.uk/science/collaboration/25-genomes-25-years

Provided by Wellcome Trust Sanger Institute

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