PhD placement/PIPS: Using genomics to tackle threats to tree health

Placement supervisor:
Laura Kelly, (L.Kelly@kew.org) but other members of the group might provide day-to-day supervision, depending on the topic of the project

Placement department:
Plant Health and Adaptation

Placement overview and objectives:
My group uses evolutionary and genomic approaches to tackle critical threats to plant health, with much of our work focusing on trees – this includes analyses to uncover the genomic basis of resistance to current major pests and pathogens, and to predict future risks from novel biotic threats. The results of these analyses help to provide the evidence needed by policy makers to make informed decisions about how best to protect our plants in the future and ensure the resilience of UK trees and woodlands.

This work contributes to Priority 2 of the Kew Science Strategy, and in particular initiatives 2.1 (Adaptation & Resilience) and 2.2 (Biointeractions & Bioactive Molecules).

Tasks to be undertaken/possible projects:
Possible projects that could be undertaken include:

- Assembling and annotating genomes of key tree species
- Analysis of the resistance gene content of tree genomes
- Identification of susceptibility genes contributing to tree disease epidemics
- Constructing pan-genomes for key tree species
- Analysis of genomic data from polyploid tree species
- Analysing threats from the UK Plant Health Risk Register in a phylogenetic context

Required skills and experience:
Some prior experience with bioinformatics (e.g. use of command-line tools and of working with programming languages such as Python or R) would be advantageous.

An interest in and basic background knowledge of the fields of genomics and/or evolutionary biology is also required.

Skills and areas of knowledge that can be developed:

- The use of high-performance computing clusters and how to write scripts and manage data as part of a bioinformatics-focused project.
- A range of generic bioinformatics skills will be learnt, which are applicable to many different study systems.
- Training will also be provided in the use of a suite of specific programmes for genomics and evolutionary analysis.
• Opportunity to develop skills in presenting research findings to policymakers, in written and/or oral format, and to non-specialist audiences (e.g. such as through writing a “Read & Watch” piece for the Kew website).

**Location of work:**
Kew (can be hybrid)

**Length of placement:**
3 months