# Pollen Analysis

Dr Daisy Spencer & Dr Karen Molloy

Palaeoenvironmental Research Unit

University of Galway

The Basics of Pollen Analysis

- Produced annually & dispersed

- Mixes in atmosphere and deposited within a context

- Accumulates in peat/lake sediments – ANAEROBIC CONDITIONS

- Sporopollenin withstands degradation – survives across archaeological timescales

- Primary technique for inferring past vegetation & environments
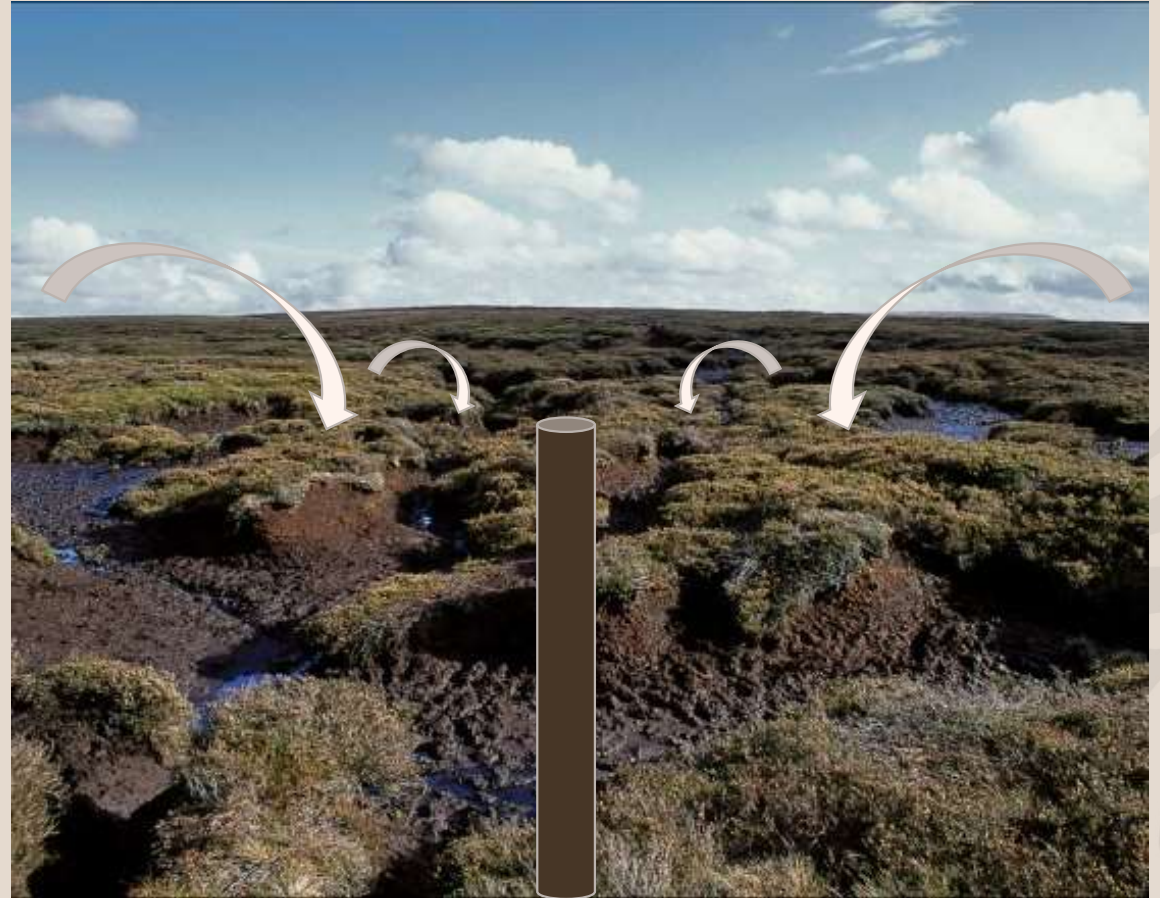
- Unique sculpturing features – pores & furrows

- Count the number of each taxa under the microscope

- Pollen sum = c. 1000 grains (excluding bog or lake taxa)

- Divide results into categories – trees, shrubs, pastoral indicators, arable indicators, bog & aquatic

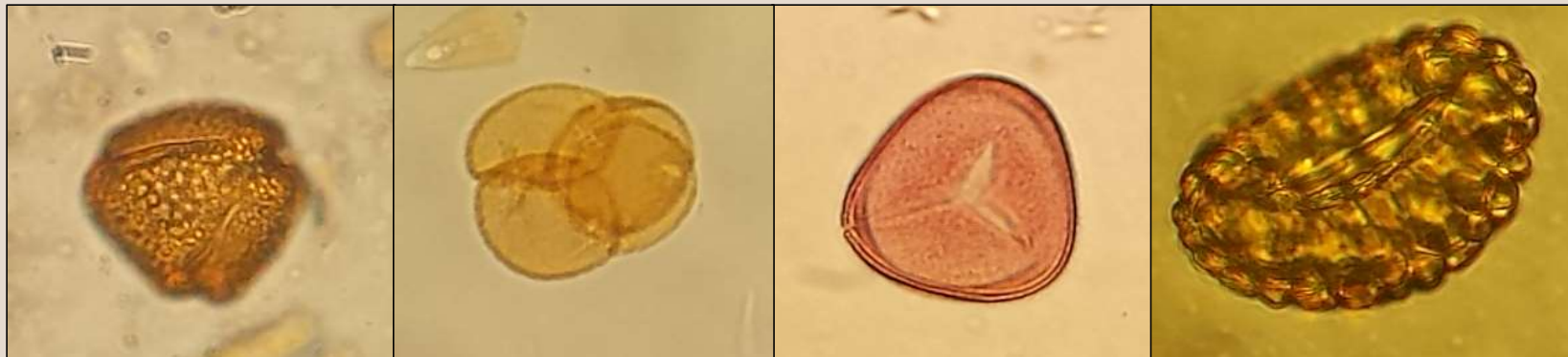- Micro-charcoal & fungal spores give extra information
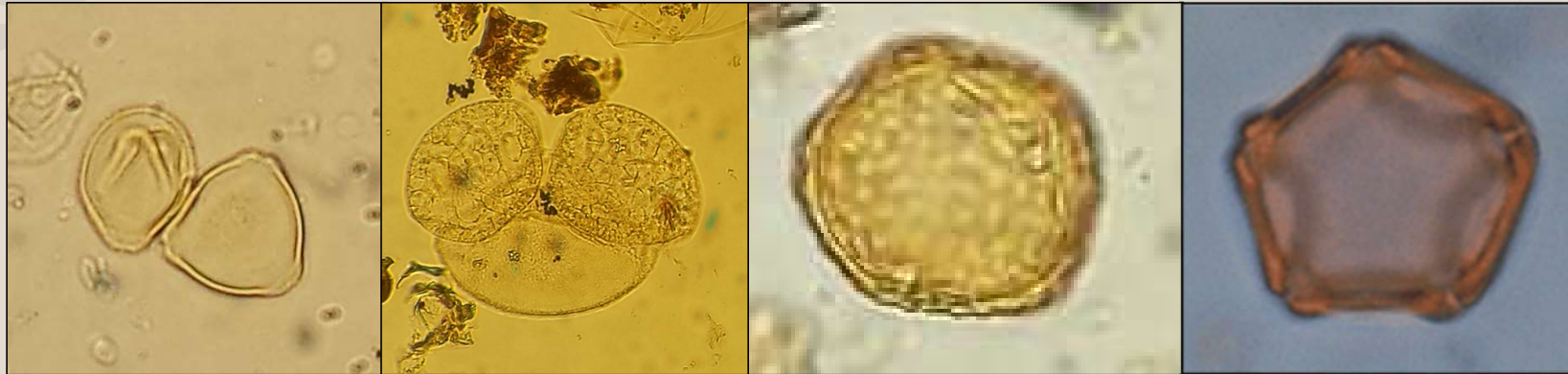
Hazel   Pine   Elm   Alder

Ivy   Heather   Bracken   Polypody

What Can it Tell Us?

- Past vegetation
- Woodland clearance
- Pastoral farming
- Arable farming
- Duration & intensity
- Timing of environmental change

Features in Irish Pollen Records

- Elm Decline
- Neolithic *Landnam*
- First introduction of cereals
- Late Bronze Age *Landnam*
- Late Iron Age Lull
- Cultivation of Rye in early medieval

Anthropogenic Indicators

- Indicator species – thrive in disturbed environments

- Low dispersal

- *Plantago lanceolata* + suite of pastoral taxa

  = human activity → farming

- *Landnam*

  = decrease in tree pollen

  + increase in pastoral indicators

Arable Indicators

GOOSEFOOT
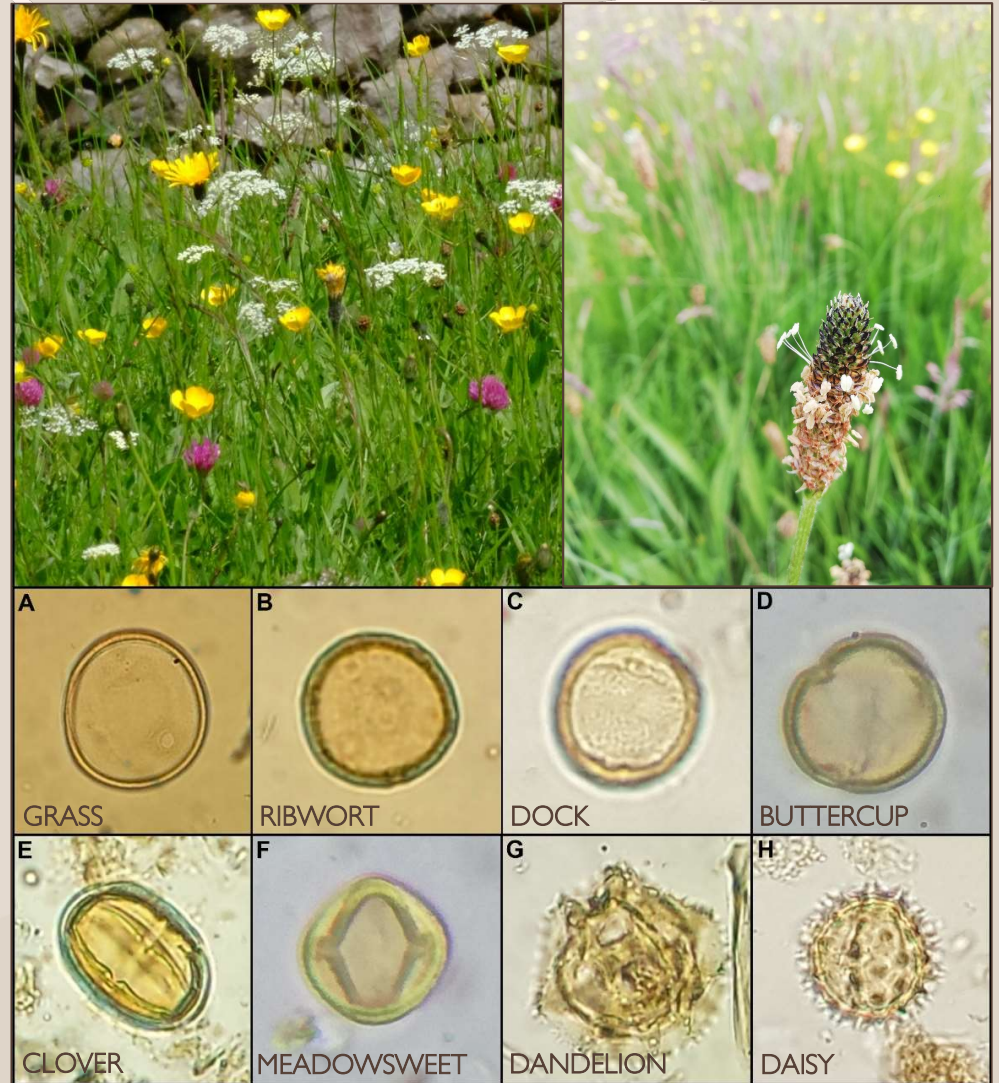
- Characteristics of cereal-type grains

   = large size + large, distinct pore & annulus

- Cereals are self-pollinating

   = under-represented in pollen records

- Arable weeds

- Introduction of Rye in early medieval

RYE

Coring for Archaeological Projects

- Bogs or lakes – catchment can be **local** to **regional** depending on size of basin
- Chose a site close to archaeology - gouge auger can be used to test locations
- Usinger piston corer/ Livingstone/ Russian peat corer
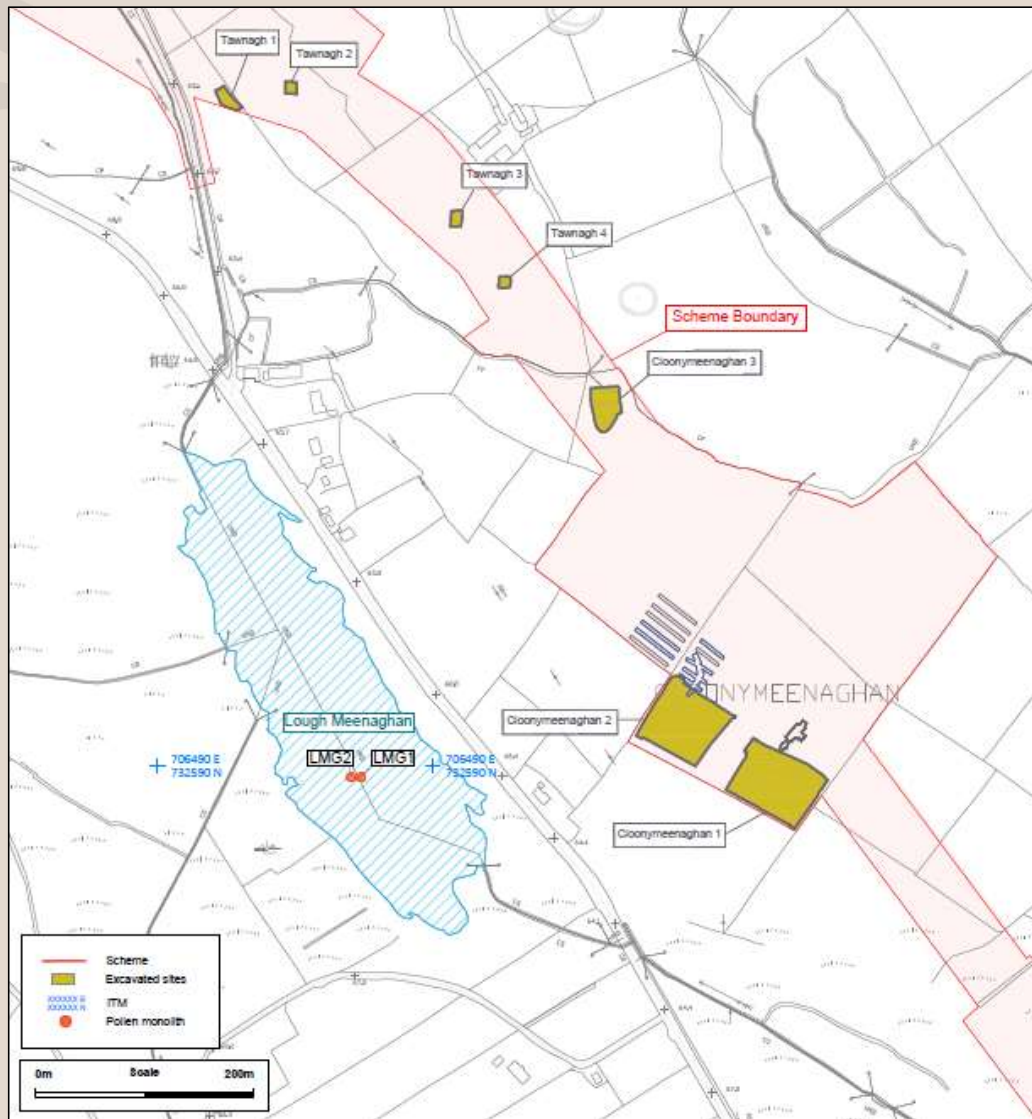
An example of **off-site** sampling for pollen analysis

- E.g. road schemes

- When no suitable sediment on-site

- Generally good preservation

On-site Sampling

RCSI, Dublin City Centre

Drumclay Crannóg

- Target **waterlogged, organic** material
  - Ditches
  - Cess pits
  - Section faces

- Monolith tins (c. 0.5m length)
- Spot samples of contexts (only analyse 2cm^3)

- Wrap samples in **strong** plastic
- Label **top** and **bottom**
- **Precise** location should be recorded (survey)
- Take photos of sampling
- Cold storage
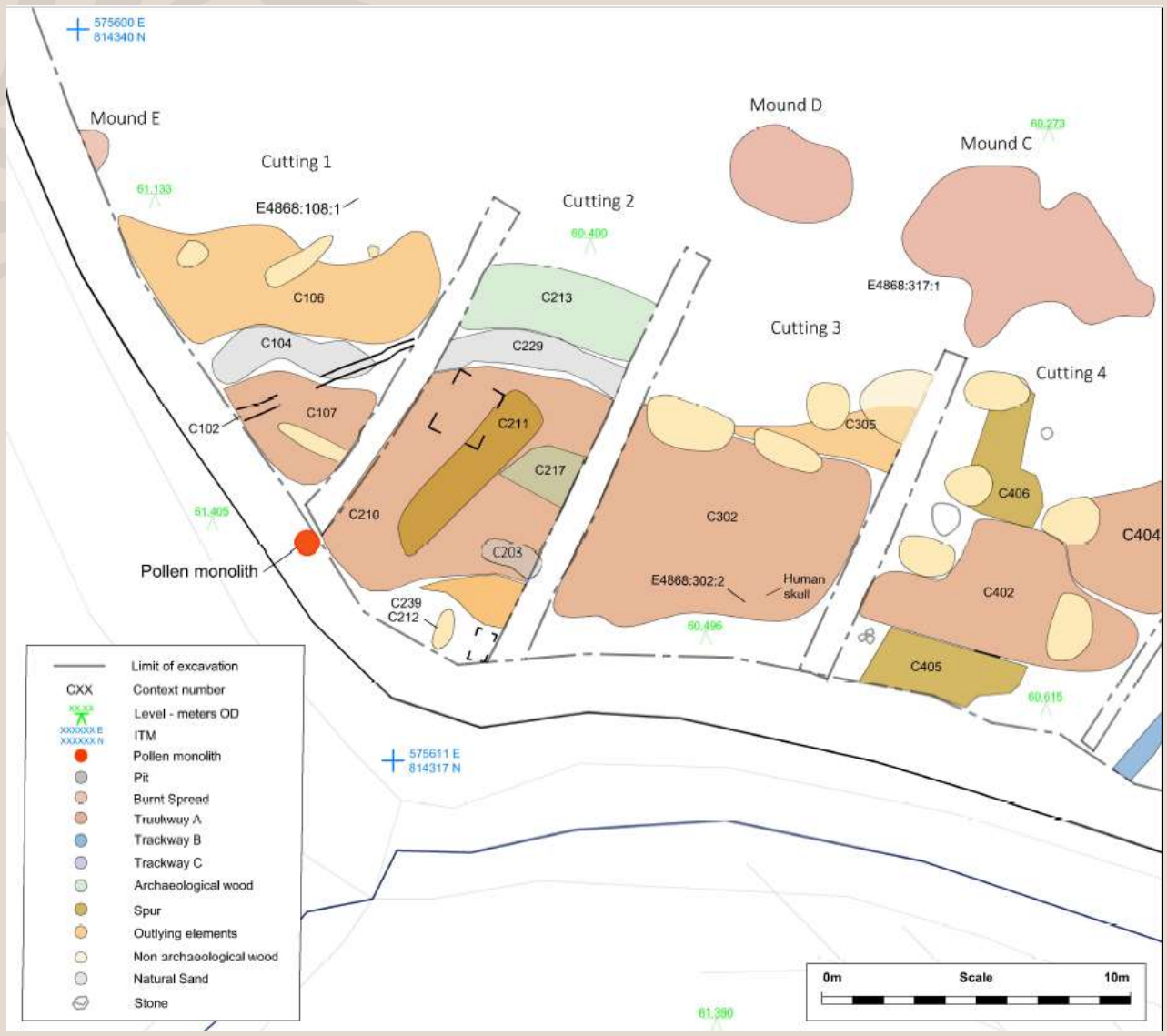
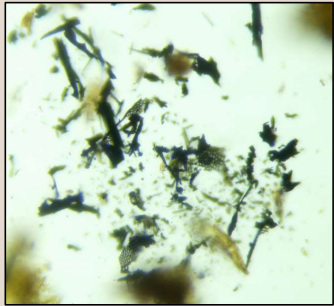Examples of on-site sampling for pollen analysis
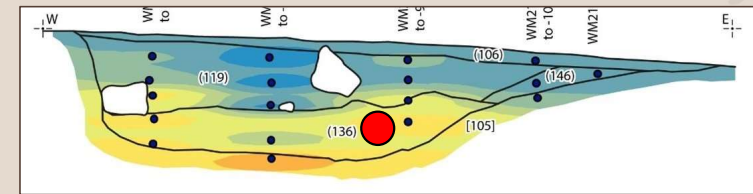
Adding a Chronology to Pollen Records

- ^{14}C dating of sediment core

- Initially provide chronological overview of entire core

- Target periods/features of interest

- Create age/depth Bayesian model = estimates a calibrated age for each cm of core

Non-Pollen Palynomorphs (NPP)

Micro-charcoal
Woodland clearance through fire
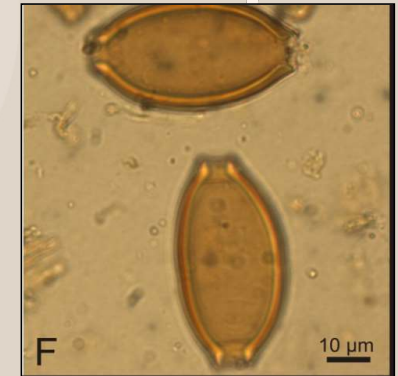*e.g. Lough Meenaghan, Sligo*

Assulina
Dry conditions

Amphitrema flavum (arcella)
Wet conditions

e.g. Ceide Fields, Mayo

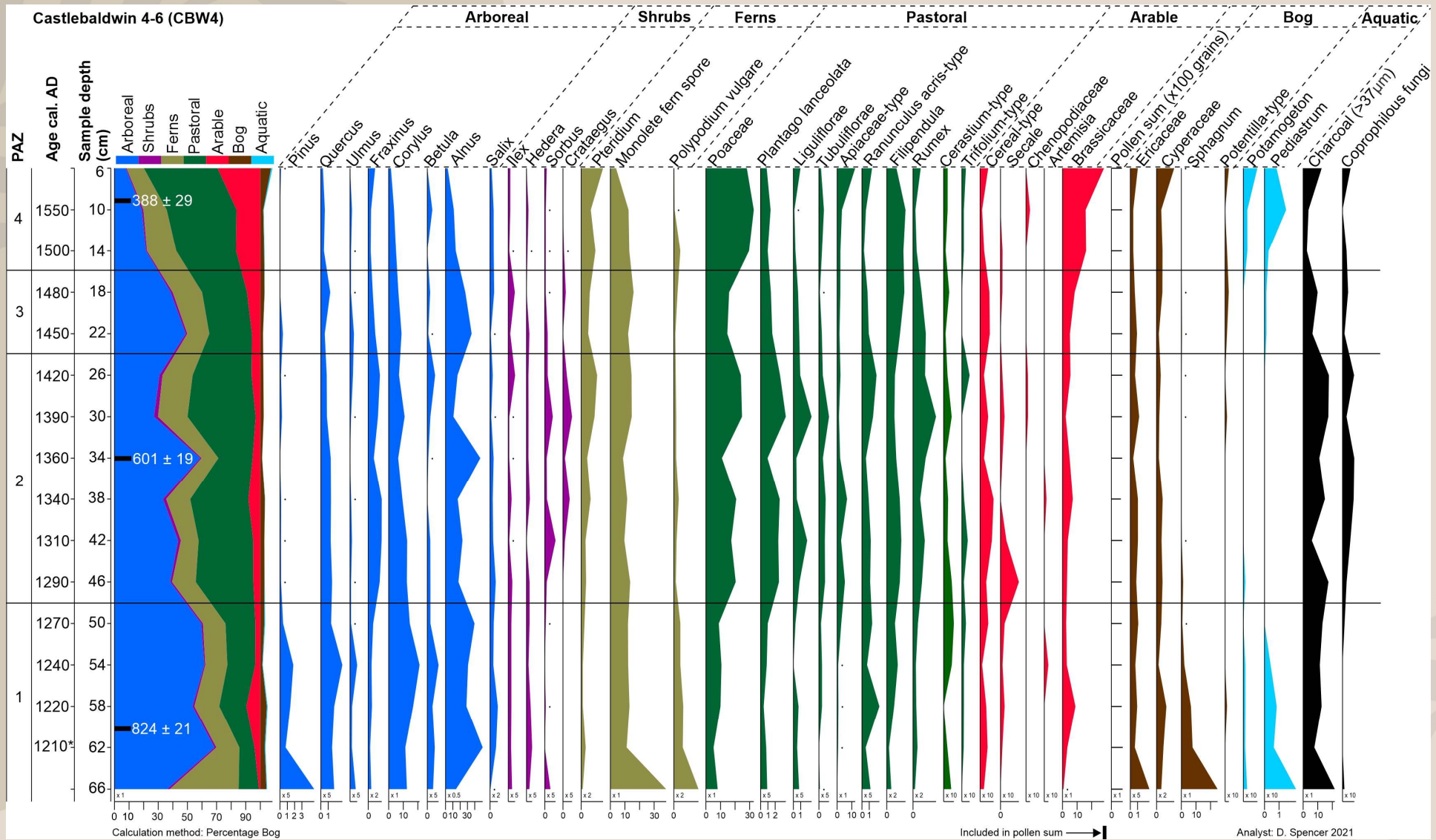Sordaria-type

10 μm

Sordaria   **Podospora**
Coprophilous fungal spores – grazing animals
e.g. Drumclay, Fermanagh

F   10 μm

Whipworm
Intestinal parasite of humans
e.g. Quay Street, Galway

Lough Meenaghan, Co. Sligo (LMG1)

Off-site pollen record

Castlebaldwin 4-6 (CBW4)

On-site pollen record

Calculation method: Percentage Bog

Included in pollen sum ➞▮

Analyst: D. Spencer 2021

Timeline for Pollen Projects

INITIAL SCOPING	Gouge auger of area to locate suitable sampling locations
CORING	Coring on-site/off site
PHASE 1	Skeleton diagram at regular intervals + initial ^{14}C dating
PHASE 2	Focused analysis at smaller intervals + further targeted ^{14}C dating
REPORTING	Production of pollen report Incorporation of pollen data into archaeological report

Thank You

daisy.spencer@universityofgalway.ie

Palaeoenvironmental Research Unit
@PalaeoGalway