

Cloud-computing in anthracology – developing the WODAN online database in Ireland



Ingelise Stuijts

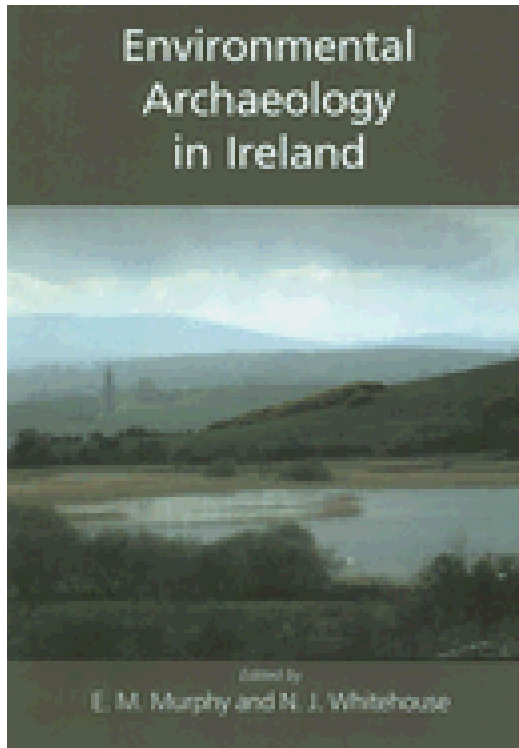
The Discovery Programme, Dublin

INSTAR project 16679, 16705 and AR01042

An Chomhairle Oidhreachta
The Heritage Council



Overview wood and charcoal research in Ireland



- Written before the 'boom' in archaeology
- Wish wood specialists to share information
- IWAA (Irish Wood Anatomist Association)
- INSTAR unique opportunity





DIT/TCD



INSTAR team



Rijksdienst Cultureelerfgoed

Ranketing



IWAA



BIAX-Consult



Interested parties



WODAN: important Germanic/Viking god
Wednesday named after him
Attributes: ravens Huginn and Muninn
(thought and memory)



Existing Wood and Charcoal ‘Databases’

Ireland:

Lorna O'Donnell and Ingelise Stuijts: Access

Otherwise Excel or paper notes

Europe:

Dominique Marguerie, Rennes, Access/Excel, charcoal with pollen

Stéphanie Thiébault, Paris, ArboDat, archaeobotany with Charcoal

Peter Hambro Mikkelsen, Moesgaard, Denmark, index no database

Claus Malmros, National Museum Copenhagen, personal database

Gaetano di Pasquale, Naples, Italy, charcoal Excel

Thomas Ludemann, Germany, Excel and paper notes

Biax Consult, Netherlands, Excel and paper notes

Andreas Heiss, Austria, Excel

Allan Hall, UK, personal database

Often individual databases or paper notes.



General Research ‘Databases’

- No agreed standard for recording or presenting information
- Databases often developed for personal or internal use
- Differing priorities of funding arrangements
- Inappropriate software choices

MS Excel (not a database)

MS Access (little transaction control)

- Flat inventories
- Sharing the data a problem – who has the new copy?
- Final destination? – Long term archive and dissemination -
not discussed at all



Database Aims

DATA STANDARDS

Recognised (Irish & International)
Classification , but not too restrictive

ACCESS

Free , widely available

SECURE & ROBUST TECHNOLOGY

Single central database
Cost effective
Easily implemented & maintained

Note: Irish aims might be different from European aims but standardization and free movement of information is crucial.



Online Archaeology Tools

- Democratising access to research data
 - Open data movement
- Democratising tools for archaeologists
- Cloud computing



Application Architecture

Open Source

Web Enabled

Web Hosted – Black Knight

CSS

XHTML

Presentation

RoR

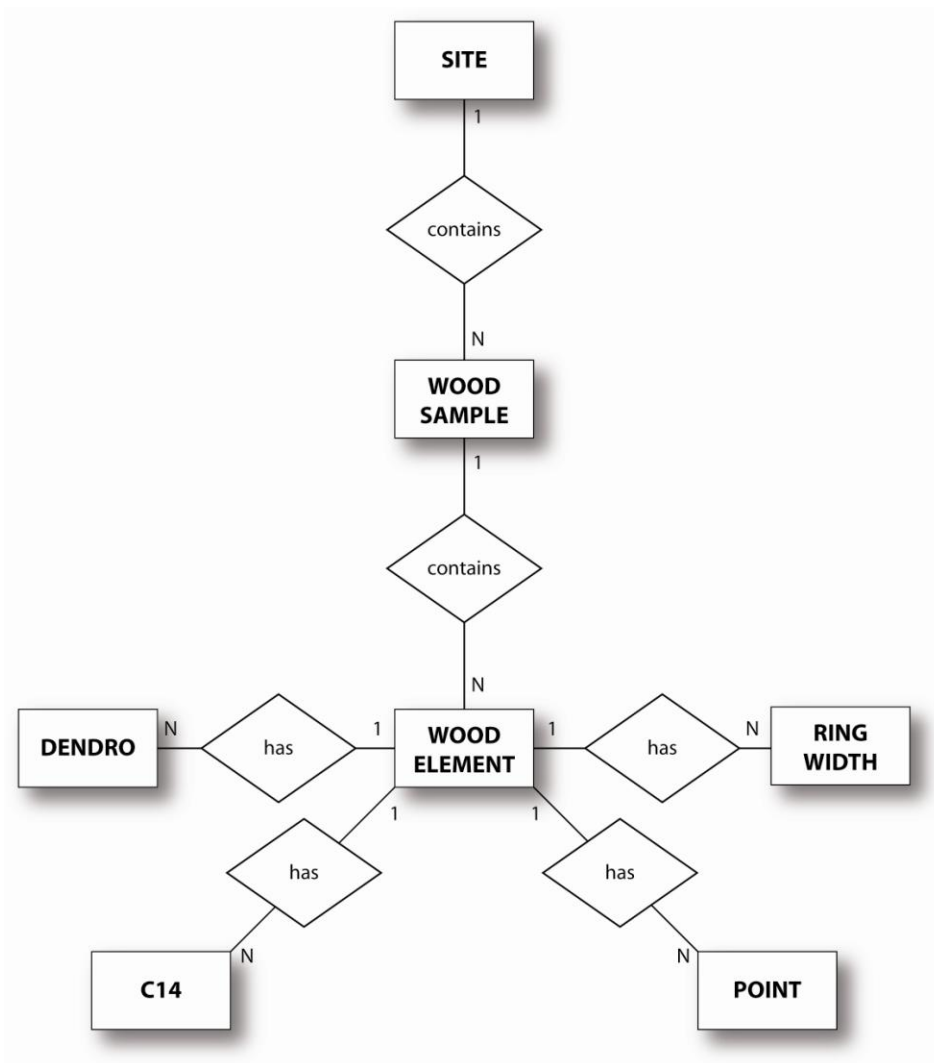
Application

MySQL

Database



Database Basics



Various illustrations/help functions



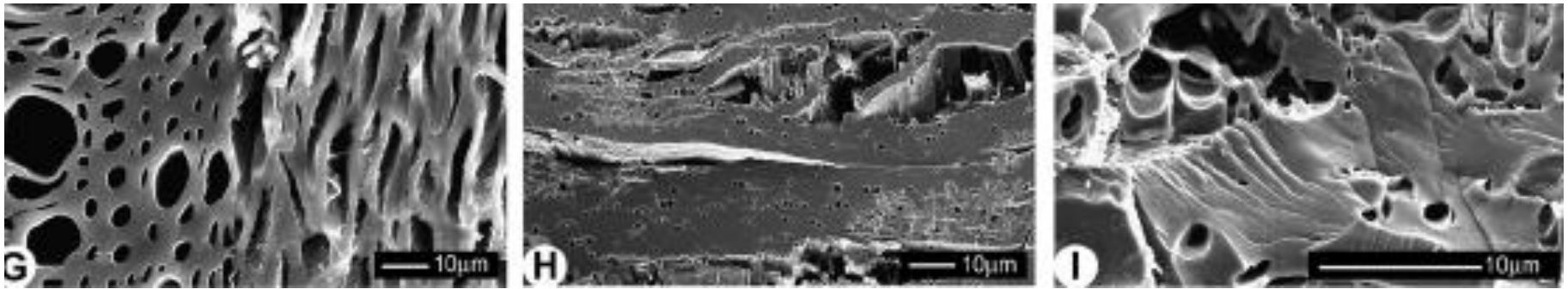
Photography by John Sunderland

(Concave Facet) After Coles et al (1984) Figure 12, P. 12

Coles, J.M., Orme, B.J. and Roullard, S.E. (1984) Somerset Levels Papers 10. Stephen Austin and Sons Ltd: Hertford

Standardization: very important!

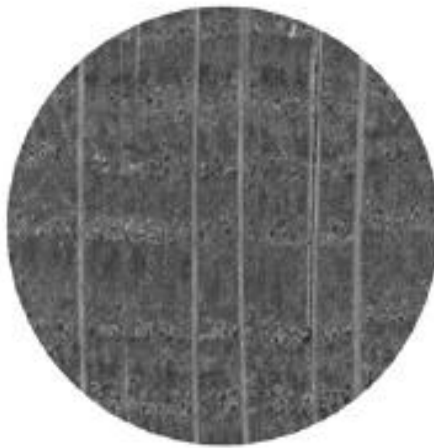
**Agreed archaeological metadata
and wood charcoal characteristics**



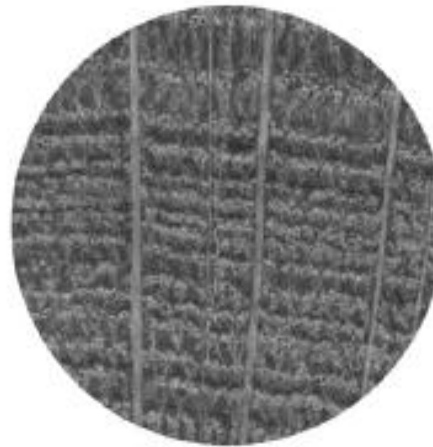
**Example: Different degrees of vitrification in charcoal
(Marguerie and Hunot 2007)**



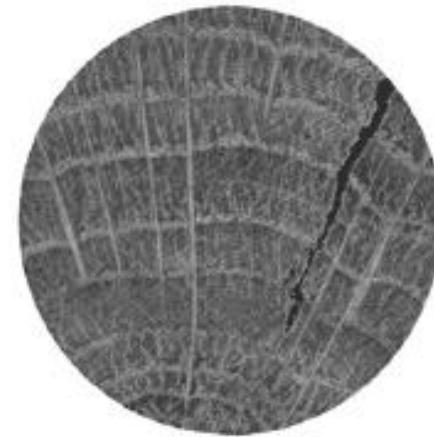
Curvature: (Marguerie and Hunot 2007)



Weakly curved rings



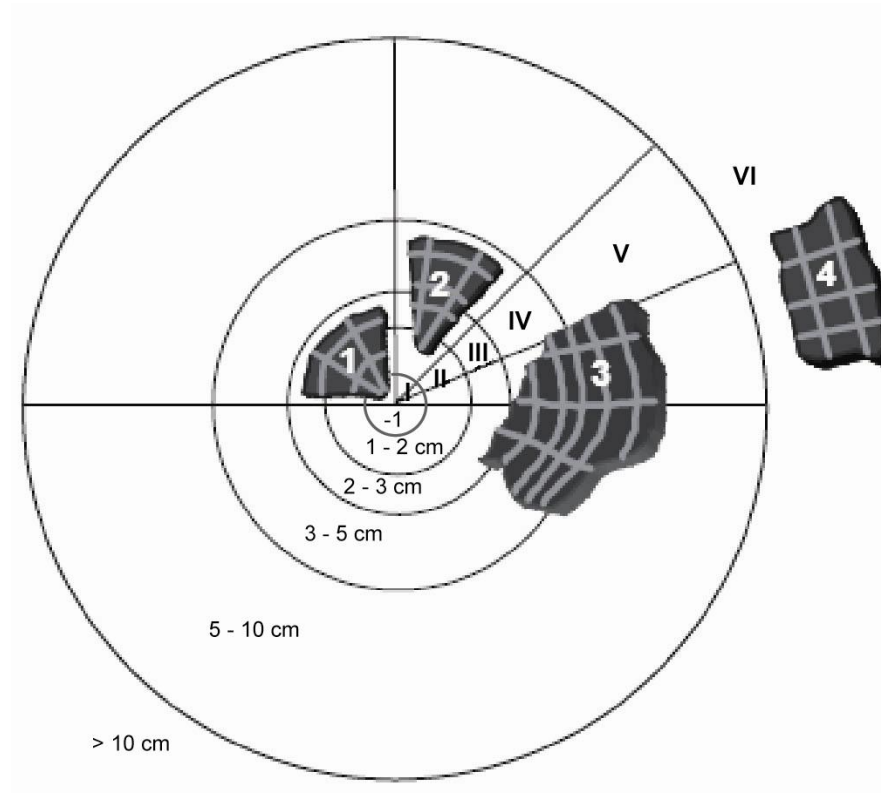
Moderately curved rings



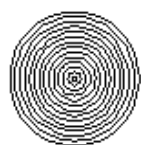
Strongly curved rings



Curvature template method



Ludemann and Nelle, 2006



1



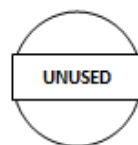
6



11



16



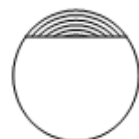
21



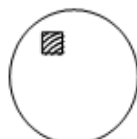
2



7



12



17



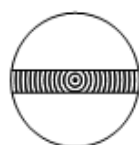
22



3



8



13



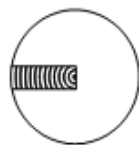
18



4



9



14



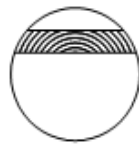
19



5



10



15



20

Conversion codes

After BIAx Consult

Wood species list, link to anatomy website www.wsl.ch (242 types)

Wood species	Family	Botanical names	Anatomy link: www.wsl.ch	English names (when known)
Abies alba	Pinaceae	Abies alba Mill.	Abies alba Mill.	Silver Fir
Abies sp.	Pinaceae	Abies sp.		Firs
Acer campestre	Aceraceae	Acer campestre L.	Acer campestre L.	Field Maple
Acer platanoides	Aceraceae	Acer platanoides L.	Acer platanoides L.	Norway Maple
Acer platanoides/pseudoplatanus	Aceraceae	Acer platanoides/pseudoplatanus		Maple type
Acer pseudoplatanus	Aceraceae	Acer pseudoplatanus L.	Acer pseudoplatanus L.	Great Maple, Sycamore Maple
Acer sp.	Aceraceae	Acer sp.		Maples
Aesculus hippocastanum	Hippocastanaceae	Aesculus hippocastanum L.	Aesculus hippocastanum L.	Horse Chestnut
Alnus cordata	Betulaceae	Alnus cordata Desf.		Italian Alder
Alnus glutinosa	Betulaceae	Alnus glutinosa (L.) Gaertn.	Alnus glutinosa Gaertn.	Black Alder
Alnus incana	Betulaceae	Alnus incana (L.) Moench	Alnus incana DC.	Grey Alder
Alnus sp.	Betulaceae	Alnus sp.		Alders
Alnus viridis	Betulaceae	Alnus viridis (Choix) DC.	Alnus viridis DC.	Green Alder
Alnus/Betula	Betulaceae	Alnus/Betula		Alder/Birch type
Alnus/Corylus	Betulaceae	Alnus/Corylus		Alder/Hazel type
Amelanchier ovalis	Rosaceae	Amelanchier ovalis Medik.	Amelanchier ovalis Med.	Pomaceous Fruit: Serviceberry, Shadbush
Amelanchier sp.	Rosaceae	Amelanchier sp.		Pomaceous Fruit: Juneberry

Forms for general site info

ID & Location	Environment & Notes
Site name:	Excavation year:
Licence:	Analysis year:
Ministerial code:	Analyst:
Licence holder:	Notes:
Company:	
Project code:	
Archaeological period:	
NGR E & NGR N:	
Latitude & Longitude:	
Co-ords source:	
Altitude:	
Country:	
Place name:	
County:	
Townland:	
Classification:	
SMR no.:	



www.wodan.ie

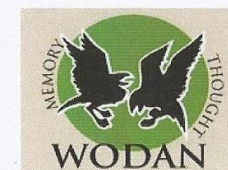
Publications
Author:
Year:
Title:
Vol.:
Pages:
ISBN:
Availability:
Full reference:
Comments:

[illegible]

Recording sheets for charcoal

WWW.WODAN.IE

Licence no.	Site	Analyst	Sample	Context	Date
-------------	------	---------	--------	---------	------



Degradation: **Hyphae**; **Thyllae**; **Hollow**; **Roots**

Quality: **Flattened**; **Acentric**; **Curl Wood**; **Reaction Wood**; **Partly Charred**; **Radial Cracks**

CH no.	Taxon	Age	Ray width	Bark	Pith	L / N curve	Twig	M / H curve	Total rings	on x mm	Growth	Carbonisation	Degradation	Quality	Channels	Worked	Condition	Comments
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		





WODAN

Archaeological Wood & Charcoal Database

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Welcome to the Wodan Database

This is the new integrated wood and charcoal database with results from Irish archaeological sites.



WODAN will facilitate access to the extraordinary quantity of wood and charcoal data that was produced during the boom in commercial archaeology in the past decade.

WODAN also aims for individual wood specialists to create their own personal on-line archive via MyWODAN.



WODAN is open to wood specialists from other countries. They are invited to create their own archive using MyWODAN thereby allowing cross country comparisons. This project is supported by the **Heritage Council** under the **Irish National Strategic Archaeological Research (INSTAR)** Programme 2008 (Grant No. 16679) - 2009 (Grant No. 16705) - 2010 (Grant No. AR01042)..

Site Stats

524 sites added
21 users
2701 charcoal samples
1614 wood samples

Sites Overview



Latest Site Added

Brackbaun

**Browse
Sites**

**Query the
Database**

**Add/Edit
Sites**

go ▶

go ▶

go ▶



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ingelise

Qualifications

Expertise

wood and charcoal, palynology, non-pollen palynomorphs, general advice for environmental sampling strategies

Secondary expertise

Member

Institute of Archaeologists of Ireland (IAI), Association for Environmental Archaeology (AEA), Irish Quaternary Research Association (IQUA), Irish Wood Anatomists Association (IWAA), European Association of Archaeologists (EAA), Agricultural History Society of Ireland, Kilkenny Archaeological Society (KAS), Irish Environmental History Network member

Contact

eMail: Ingelise@discoveryprogramme.ie

Phone: 00353-1-6393039

MySite Stats

327 sites added

488 charcoal samples

1248 wood samples

MyLatest Site Added

Lisdermot 49

Biography

I studied at the Biologisch-Archaeologisch Institute in Groningen, Netherlands, with one year in Utrecht at the Geological Institute specialising in animal fossil remains and at the Soil Institute on soil zoology. I worked with the late Dr Wil Casparie on wood and charcoal projects starting as student assistant. After finishing palaeo-biology studies I joined a pollen research project in Indonesia for Prof. Wim van Zeist. This PhD-research followed the request of Professor R.P. Soejono, the Director of the Archaeological Institute in Jakarta. The resulting book related the forest history of the last 17,000 years in West Java. I came to Ireland in 1997 to join the Lisheen Archaeological Project in Co. Tipperary as a wood specialist for Margaret Gowen & Co. Ltd. In 2002 I joined the Lake Settlement Project of the Discovery Programme in Dublin as environmentalist. Since 2004, I am involved in all projects.



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TIPS: Click the Tabs to add/Edit data

Site Edit/Create

[Back to Site List](#)

ID & Location	Environment & Notes	Publications	Admin	Save Site +	Delete Site -	Cancel x
Site Name Derragh Island	Archaeological Period [1 or more] unknown Palaeolithic Prehistoric Early Prehistoric Late Prehistoric Mesolithic Neolithic	Country Ireland	Place Name Lough Kinale	County Longford	Classification [1 or more] Lacustrine site	
License 03E0492	NGR E 	NGR N 				
Ministerial Code n/a	Convert to Lat Long Lat 53.772812	Long -7.406974				
License Holder Christina Fredengren	Co-ord. Source Other					
Company Discovery Programme	Altitude (m) 					
Project Code DP - LSP						
My Wodan ☐	Wodan colleagues ☐	Completed ☐				



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TIPS: Click the Tabs to add/Edit data

Site Edit/Create

[Back to Site List](#)

ID & Location	Environment & Notes	Publications	Admin
Topography unknown Mountain and Hill Upland hill Ridged lowland Drumlin			
Landform unknown Mountain Col Corrie Gully			
Landform Element unknown Summit Slope Shoulder Back slope			
Slope Angle [90 degrees max] ☐			
Geology Limestone			
Soil Gley			
Soil Description balbla			
Deposits unknown Clay Silt Fen peat Sphagnum peat Marl			
Excavation Year 1954			
Analysis Year 2010			
Analyst balbla			
Notes blabla			

[Save Site](#) [Delete Site](#) [Cancel](#)



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Site: Tusk

Sample Edit/Create

[Back to Sample List](#)

Description		Saturation Curve		Save Sample +		Delete Sample -		Cancel X	
Sample Type	Sample No.	Volume Processed (l)	Min. Sieve Size	Archaeological Date	C14	Dendro			
Charcoal ?	5441 ?	?	unknown ?	?	☐ ?	☐ ?			
Context Classification		Sample Weight (g)	Flot/Residue weight (g)	Record created by	On Date (dd/mm/yyyy)				
Agricultural ? Bank ? Burnt spread ? Cave/mine ? Cess pit ? Excavation ?		?	?	?	? ? ?				
Sub-sample Layer		Archaeological Period(s) [1 or more]		Authenticated		☐			
☐ ?	?	unknown ? Palaeolithic ? Prehistoric ? Early Prehistoric ? Late Prehistoric ? Mesolithic ?							
Area	Feature No.	Climatic Period(s) [1 or more]							
3D ?	?	unknown ? Subatlantic ? Subboreal ? Atlantic ? Boreal ? Preboreal ?							
Cut No.	Fill No.								
?	?								
Context No.	Process Method								
3625 ?	unknown ?								
Recovery Method									
unknown ?									



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Site: balbla » Sample: 234

TIPS: Click the Tabs to add/Edit data

Taxon Edit/Create

[Back to Taxon List](#)

ID & Character

Growth

Admin

Save Taxon +

Delete Taxon -

Cancel

First occurred at (max 4 digits)

1

Taxon

Abies sp.

cf

☒

Weight (g)

23.5

Fragment Count

45

Shape (avg.)

unmodified

Diameter (avg.)

Max. (mm)

23

Min. (mm)

23

Part Preserved (avg.)

Branch

Conversion Code (avg.)

17

Bark % (avg.)

100%

Bark Position (avg.)

Both Sides

Pith Type (avg.)

unknown

Quality (avg.)

unknown
flattened
acentric
hollow
curl wood
fungal hyphae
reaction wood
partly charred
brittle
tyloses

Carbonisation (avg.) (M-H Method)

low brilliance

Insect Channels

very many

Frass

☒

Channel Size

large

Modified

☒

Condition

blabla



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TIPS: Click headings to sort columns | Click for a preview | Click to drill down | Click *Taxon Name* to Edit

Site

All Tulsk

Sample

All 5441 (Charcoal)

Taxa

Create Taxon

	Taxon Name	Weight (g)	Fragment Count	First Occurred At
	Quercus sp.	6.27	28	1
	Corvus sp.	8.63	37	3
	Salix sp.	1.08	7	10
	Fraxinus sp.	2.87	17	12
	Prunus spinosa	0.31	3	26
	Maloideae	0.76	5	28
	Bark	0.21	2	32
	Taxus baccata	0.84	1	33

Pages: 1



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Site: balbla » Sample: 234 » Taxon: Abies sp.

TIPS: Click the Tabs to add/Edit data

Charcoal Fragment Edit/Create

[Back to Charcoal Fragments List](#)

ID & Dimensions		Character & Growth	Modified	Additional	Admin	Save	Delete	Cancel
Taxon Abies sp.								
Fragment Number 1	Artefact no. 134							
Material Type Natural								
Object Classification armour and weapons								
Object Sub-Classification arm guard								
Length (mm) 234	Width (mm) 234	Depth (mm) 234						
Max. Diameter (mm) 234	Min. Diameter (mm) 234	Image ☒						
Remarks blabla								



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Site: balbla » Sample: 234 » Taxon: Abies sp.

TIPS: Click the Tabs to add/Edit data

Charcoal Fragment Edit/Create

[Back to Charcoal Fragments List](#)

ID & Dimensions	Character & Growth	Modified	Additional	Admin	Save +	Delete -	Cancel X																																				
Shape unmodified ?	Part Preserved Trunk ?	Insect Channels None ?	Channel Size medium ?	Frass ☒ ?	Recent Roots Unknown ?																																						
Conversion Code 6 ?	Bark Percentage 75% ?	Growth Comment blabla ?																																									
Bark Location One side ?	Knotty Wood frequent knots ?	M-H Ring Measurement Method																																									
Pith type Not Present ?	Quality unknown flattened acentric hollow ?	No. of full Rings / Age 2 ?	Measured length (mm) 25 ?	Radius Width (mm) 25 ?																																							
Carbonisation (M-H method) strong brilliance ?	Preservation Condition Zone lines ?	Variable? ☒ ?	Grad. Slower? ☒ ?	Last years slower? ☐ ?																																							
GROWTH SPEED																																											
<table border="1"><tr><td>5</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td>4</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr><tr><td>3</td><td>☐</td><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr><tr><td>2</td><td>☐</td><td>☒</td><td>☐</td><td>☒</td><td>☐</td></tr><tr><td>1</td><td>☒</td><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr><tr><td colspan="6">1st 2nd 3rd 4th 5th</td></tr></table>					5	☐	☐	☐	☐	☐	4	☐	☐	☐	☐	☐	3	☐	☐	☒	☐	☐	2	☐	☒	☐	☒	☐	1	☒	☐	☐	☐	☒	1st 2nd 3rd 4th 5th								
5	☐	☐	☐	☐	☐																																						
4	☐	☐	☐	☐	☐																																						
3	☐	☐	☒	☐	☐																																						
2	☐	☒	☐	☒	☐																																						
1	☒	☐	☐	☐	☒																																						
1st 2nd 3rd 4th 5th																																											
RINGS centre outwards ▶																																											
Felling Season unknown ?					Growth very slow ?																																						
Ring Curvature (M-H Meth.) weakly curved ?																																											
Curvature Group (L-N Meth.) Twig iii ?					☒ ?																																						
Ring Measurements (mm) ?																																											
					Add																																						



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Site: Ballydrehid » Sample: 1 » Taxon: Fraxinus sp.

TIPS: Click the Tabs to add/Edit data

Charcoal Fragment Edit/Create

[Back to Charcoal Fragments List](#)

ID & Dimensions	Character & Growth	Modified	Additional	Admin
Save Delete Cancel Sample Code Radiocarbon date Add C14				
Lab Code UB-3024		Sample Code Ballydrehid, S4		
On Date (dd/mm/yyyy) 2 February 2007		Date Information		
Remarks/Condition Friable pieces of charcoal		Radiocarbon date (BP) 	Measurement error (1 σ) 	
		Calibrated date range (1 σ) 	Calibrated date range (2 σ) 	
		Organic C content (%) 	Calibration Curve Used 	
		δ 13 	δ 13 error (1 σ) 	
		Save Cancel		

C14
Media



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Outputs-Queries

- **Pre-formatted tables (enhances standardisation)**
- **Overall fragment and weights calculated (saves time and reduces user error)**
- **Query that produces both mean diameter and mean width**
- **Saturation curves drawn automatically**
- **Flexible query builder allows all data to be searched and calculates results**
- **More queries can be added subject to funding**



Outputs: standardization

- Query 2 used to present recent PhD research (O'Donnell 2011, O'Carroll 2012)

Appendix 1		Table 26		Lissava (E2296 99.1)				
Sample No.	1	Cut No.		Fill No.				
Context No.		Feature No.	5	Flot. Weight (g)		177.4		
Context Classification	Pit							
Taxon	No. Frag.	Weight (g)	Diam (mm) (min-max)	Rings / Age	Growth	Curv. (M-H)	Insect Chann.	Comment
Fraxinus sp.	14	1.06	5 - 10	1 - 2	fast	strongly curved	none	
Corylus sp.	65	4.32	5 - 10	1 - 8	other	unknown	none	Slow to 8 years, then med/fast.
Quercus sp.	16	0.93	5 - 10	2 - 8	slow	weakly curved	none	2-3 strongly curved fragments also
Ulmus sp.	4	0.33	5 - 10	3 - 5	medium	unknown	none	
Maloideae	1	0.08	- 5	-	medium	unknown	none	



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Queries

Charcoal

Advanced

Wood

4 Charcoal queries are currently available:

1 Fragment Count by Taxa

-- Select Country --

-- Choose Sites --

MyWodan only

COUNT

RESET

2 Results per Site

-- Select Country --

-- Choose Sites --

MyWodan only

SHOW RESULTS

RESET

3 Marguerie/Hunot Graph

-- Select Country --

-- Select Site--

-- Select Sample --

-- Select Taxon --

MyWodan only

MAKE GRAPH

RESET

4 Ludemann/Nelle Query

-- Select Country --

-- Select Site --

-- Select Sample --

MyWodan only

RESULTS

RESET



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Country

Project Code

Samp. Context

Sample Period

unknown
Palaeolithic
Prehistoric

Taxon

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RUN **CLEAR**

Query Results

Total Selected Records: 0

Site Name	Townland	County	Cre.	Inh.



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Case study: Tulsk in County Roscommon



Tulsk mound, with excavator Dr Niall Brady (in garderobe chute)



Medieval child burial early medieval ringfort wall below tower building



Early Christian section with corn drying kiln, hearths and habitation levels with many finds



Case study: total results

Queries

Charcoal

Advanced

Wood

Results (Query 1): Fragment Count by Taxa



Site Name	License Code	Taxon	Weight (g)	Frag. Count
Tulsk	04E0850	Alnus sp.	38.01	375
Tulsk	04E0850	Bark	8.10	75
Tulsk	04E0850	Betula sp.	23.08	203
Tulsk	04E0850	Calluna sp.	1.83	41
Tulsk	04E0850	Corylus sp.	571.59	2995
Tulsk	04E0850	Crataegus sp.	0.64	3
Tulsk	04E0850	Euonymus europaeus	2.65	12
Tulsk	04E0850	Fraxinus sp.	98.25	800
Tulsk	04E0850	Hedera helix	25.98	24
Tulsk	04E0850	Ilex aquifolium	1.39	17
Tulsk	04E0850	Maloideae	95.51	719
Tulsk	04E0850	Prunus spinosa	38.45	297
Tulsk	04E0850	Quercus sp.	1182.58	2595
Tulsk	04E0850	Rhamnus sp.	0.01	1
Tulsk	04E0850	Salix sp.	40.45	429
Tulsk	04E0850	Sambucus sp.	3.33	23
Tulsk	04E0850	Taxus baccata	14.09	50
Tulsk	04E0850	Ulmus sp.	34.07	67
Tulsk	04E0850	Unidentifiable	9.75	12
Tulsk	04E0850	Unidentified Angiosperm	2.32	18
Tulsk	04E0850	Viburnum opulus	0.12	1



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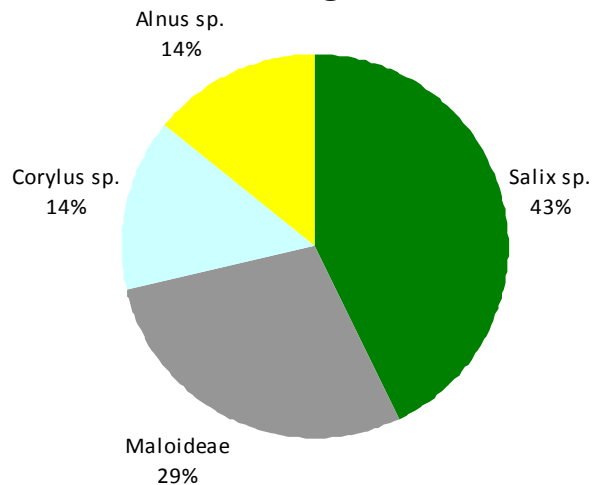


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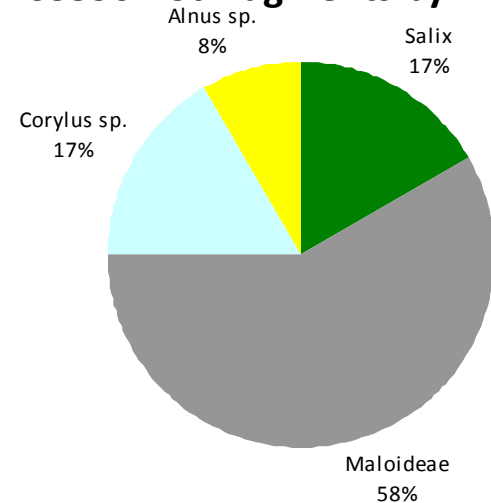


Flot fragments: count versus weight

S3590 flot fragment count

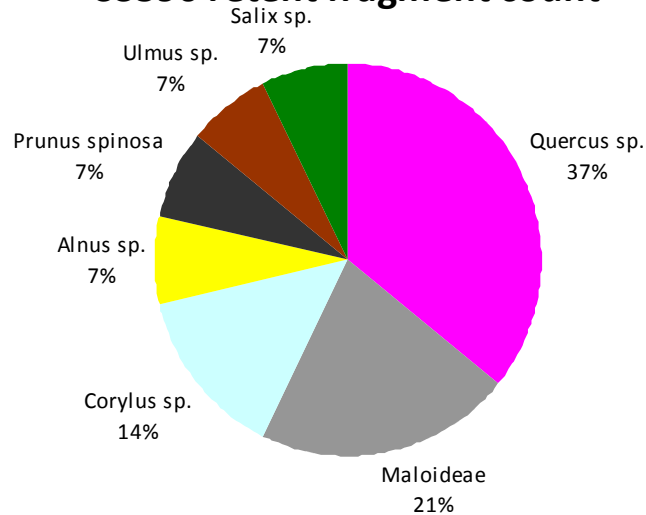


S3590 flot fragments by weight

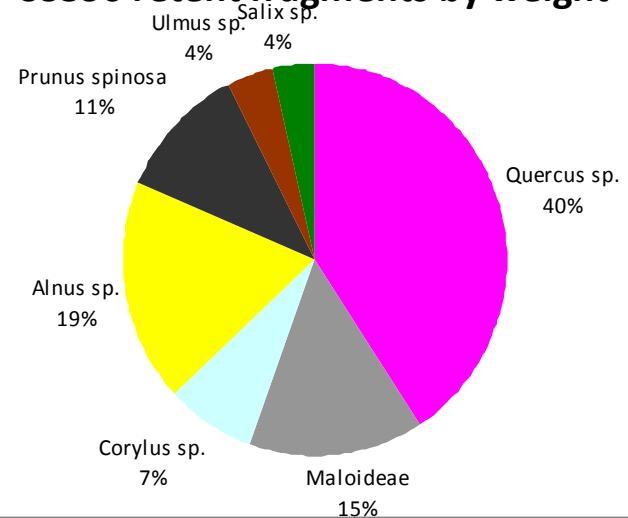


Retent fragments: count versus weight

S3590 retent fragment count



S3590 retent fragments by weight



Saturation curves



WODAN

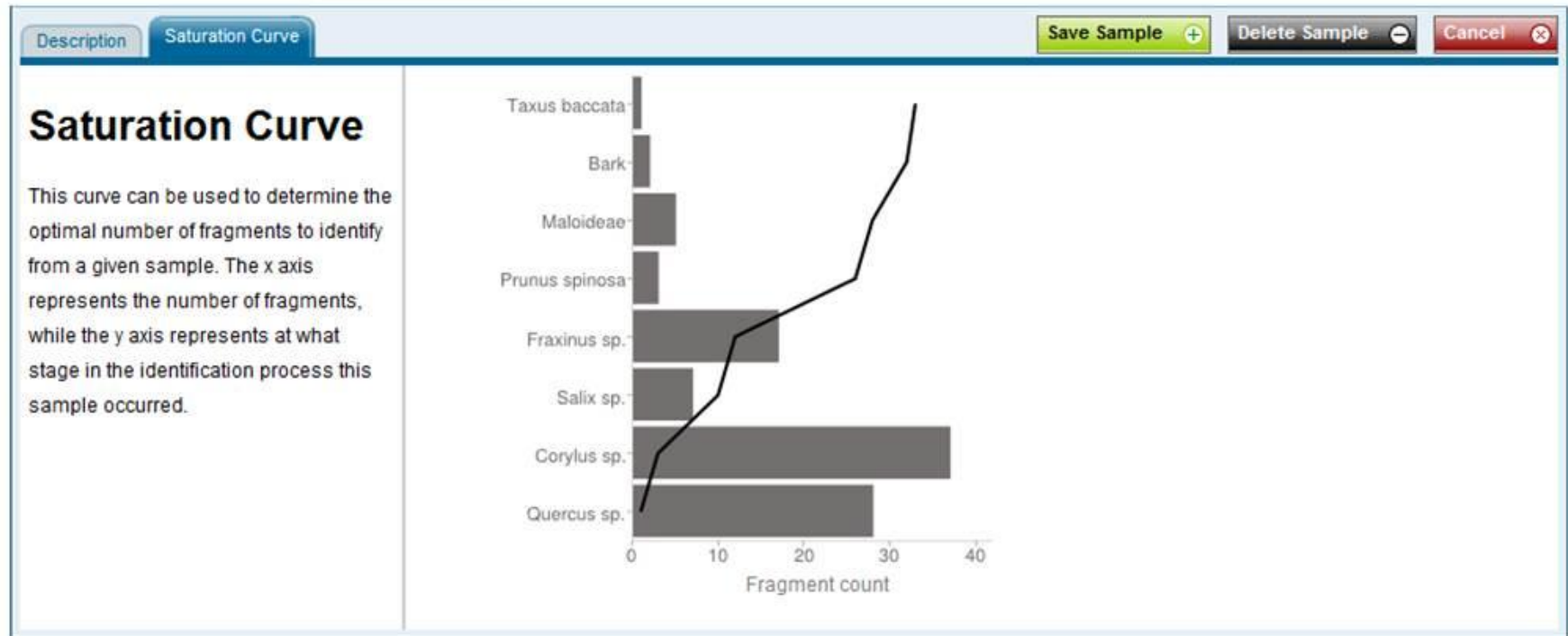
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Site: Tulske

Sample Edit/Create [Back to Sample List](#)



Future funding ... and development

- Wood specialists join to archive data
- Populate the database
- Integrate with other databases (i.e. pollen, plant remains, dendrochronology)
- Further development of queries
- Trusted digital repository in Ireland needed (e.g. DANS/ADS-DP are researching this through ArcLand project)

