



Alien Plants in Scotland

Mick Crawley

5 November 2016

Perth

What are they?

What are they?

- Species moved to Scotland by people

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- Early introductions are Archaeophytes

What are they?

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- Early introductions are Archaeophytes
- Introductions since Columbus are Neophytes

Alien doesn't mean bad



Ted Green suggests that we should re-christen Sycamore as Celtic Maple



Status

- They can be Naturalised
 - form self replacing populations

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 - form self replacing populations
- They can be Casual
 - depend upon repeated introduction

Why are they interesting?

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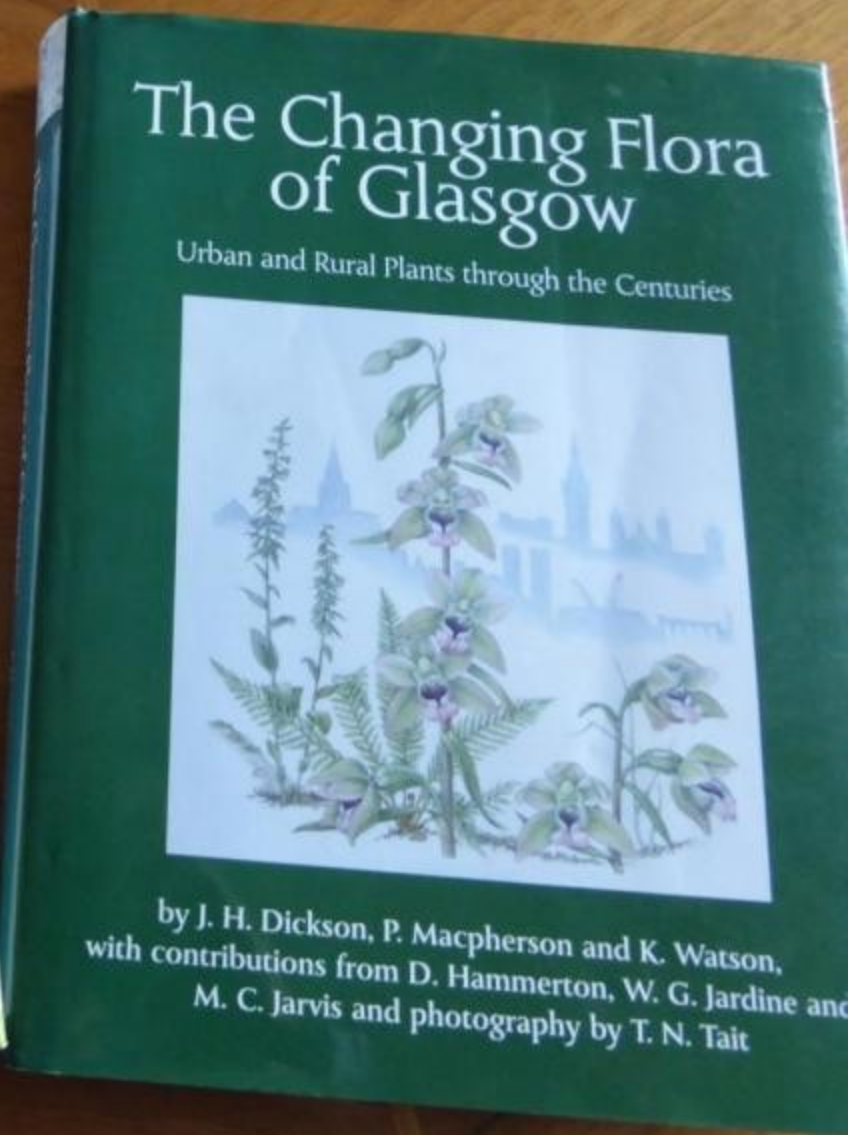
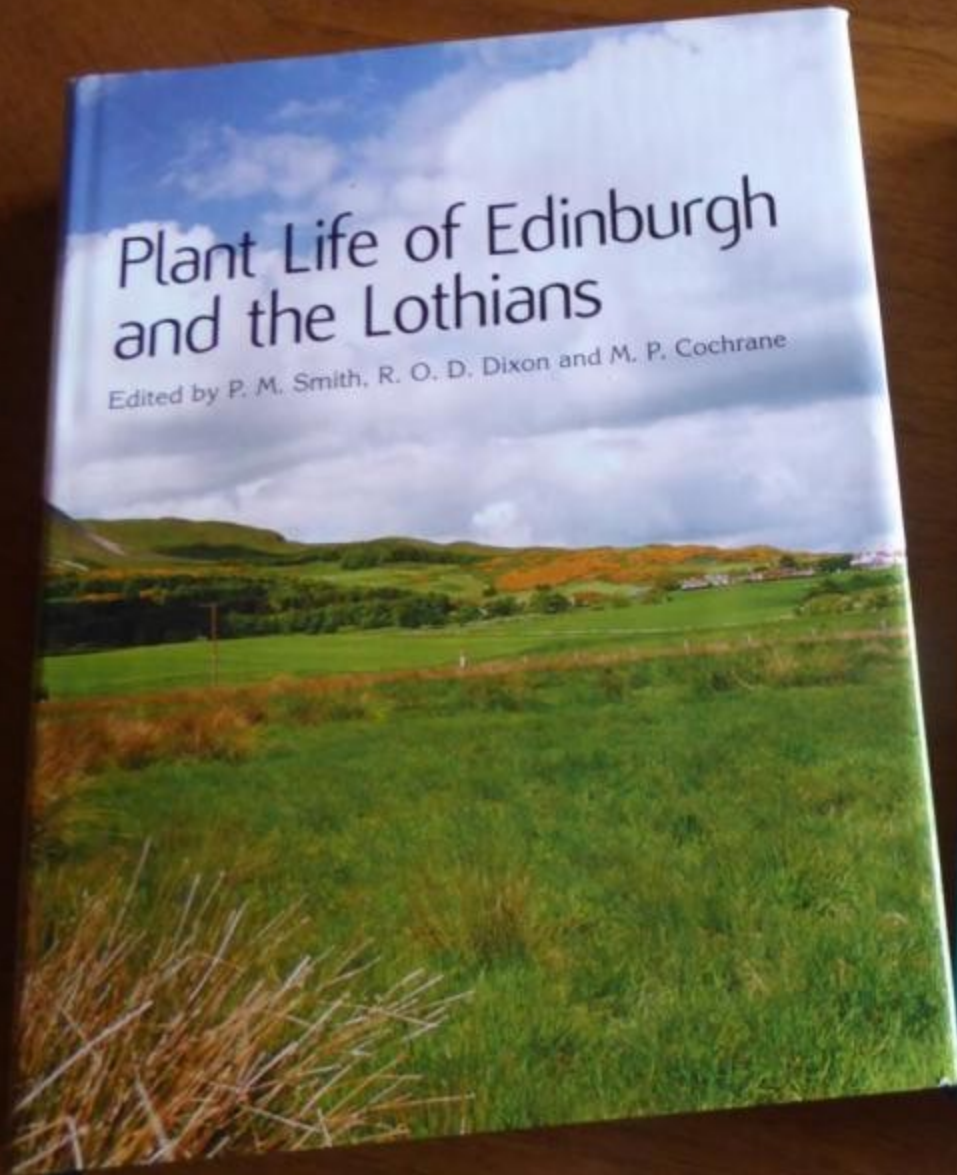
- Large-scale unplanned experiments in ecology and evolution

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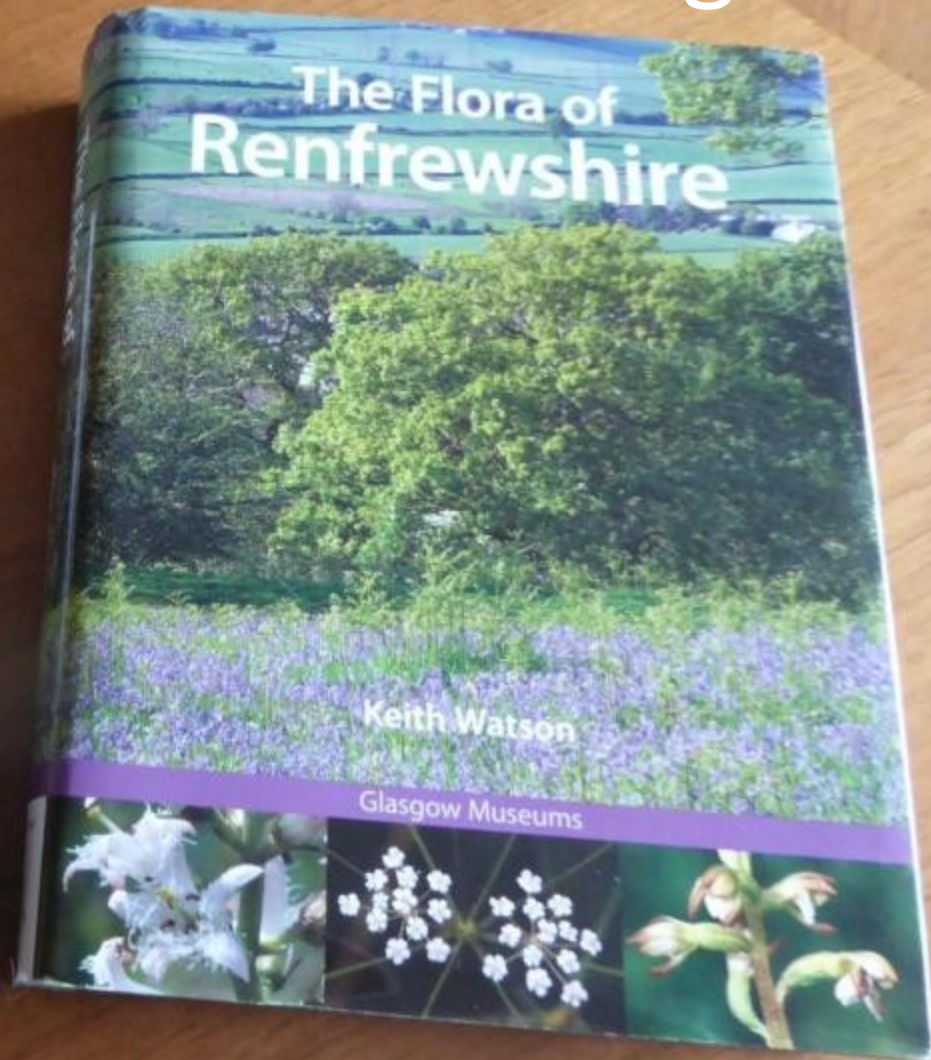
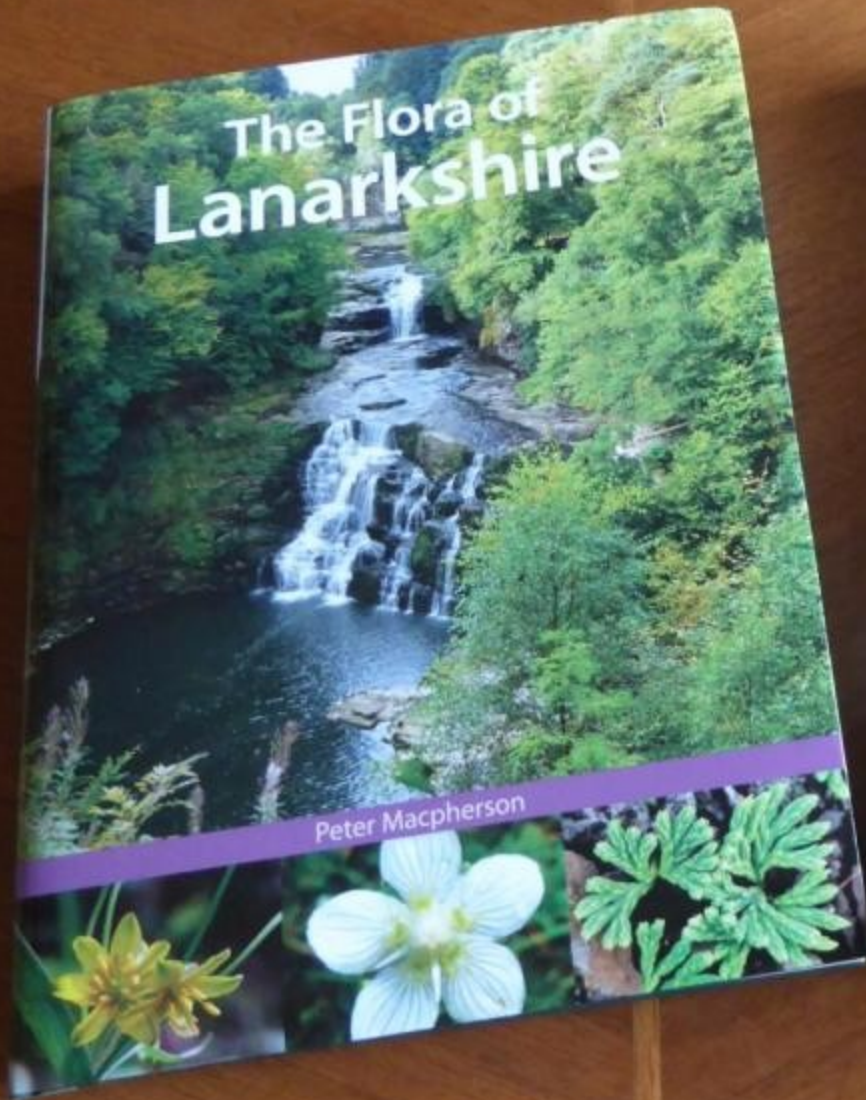
- Large-scale unplanned experiments in ecology and evolution
- Aliens interact with native species, and with other alien species, with which they share no recent evolutionary history

Scotland is well-served
with information on alien species

Both major cities have recent floras

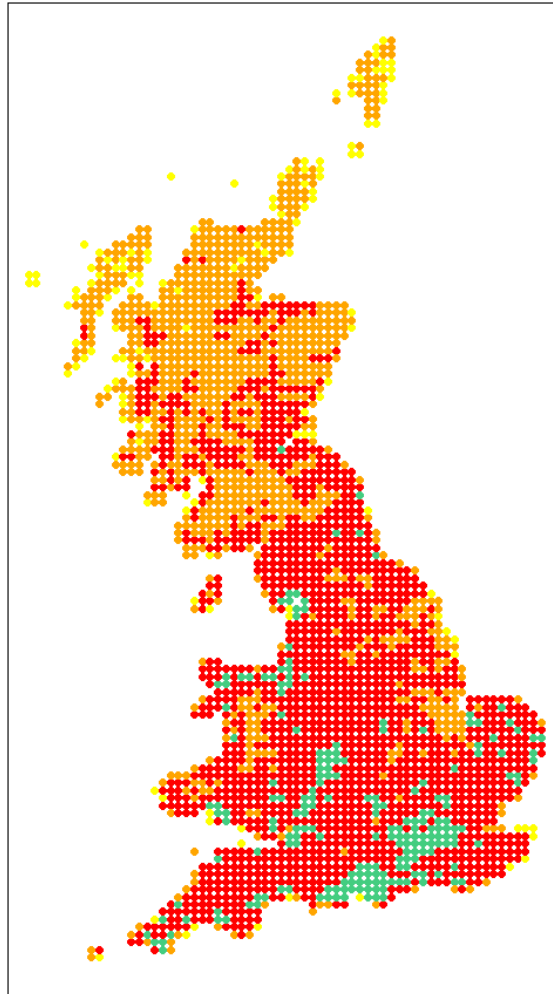


Two new county floras cover Glasgow



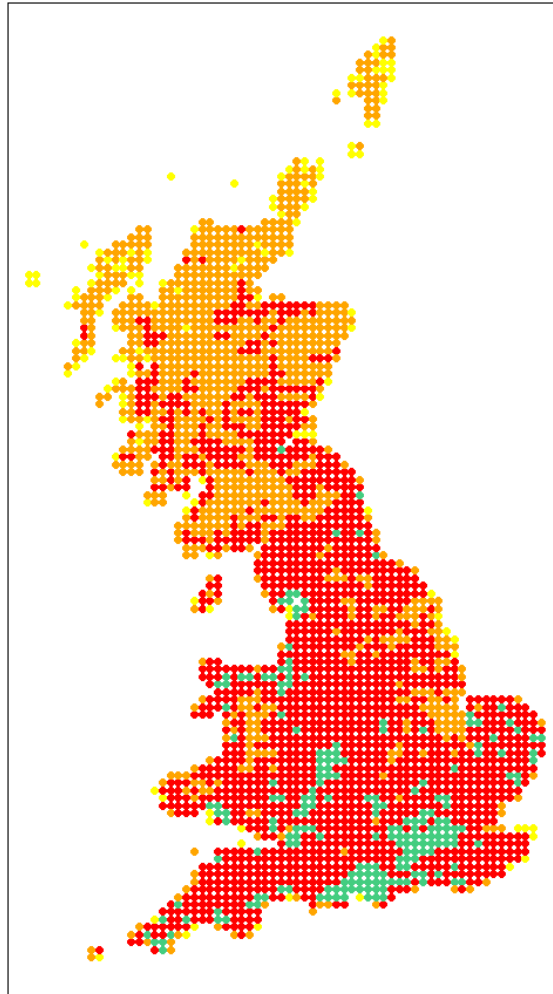
What determines
alien species richness?

Geography: Natives



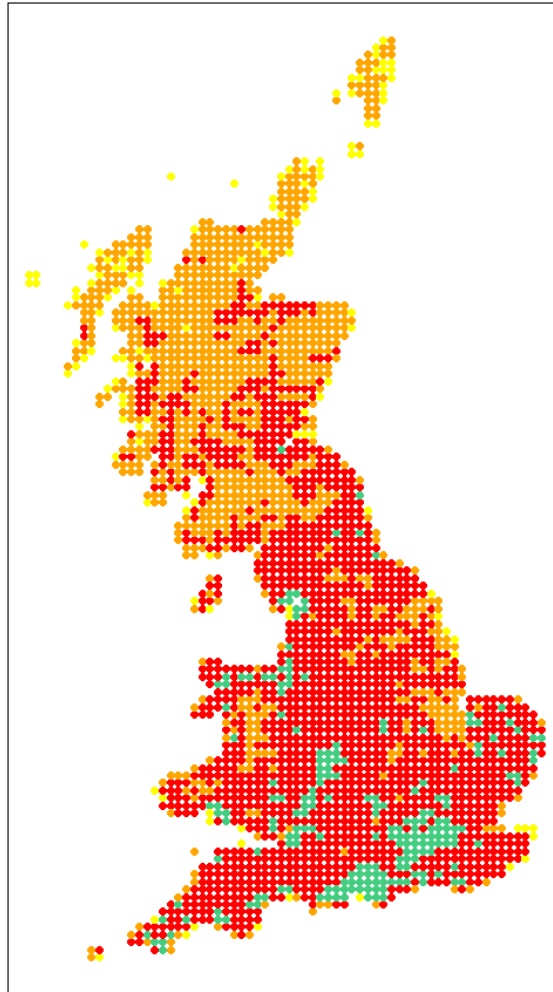
Geography: Natives

St Kilda with 178



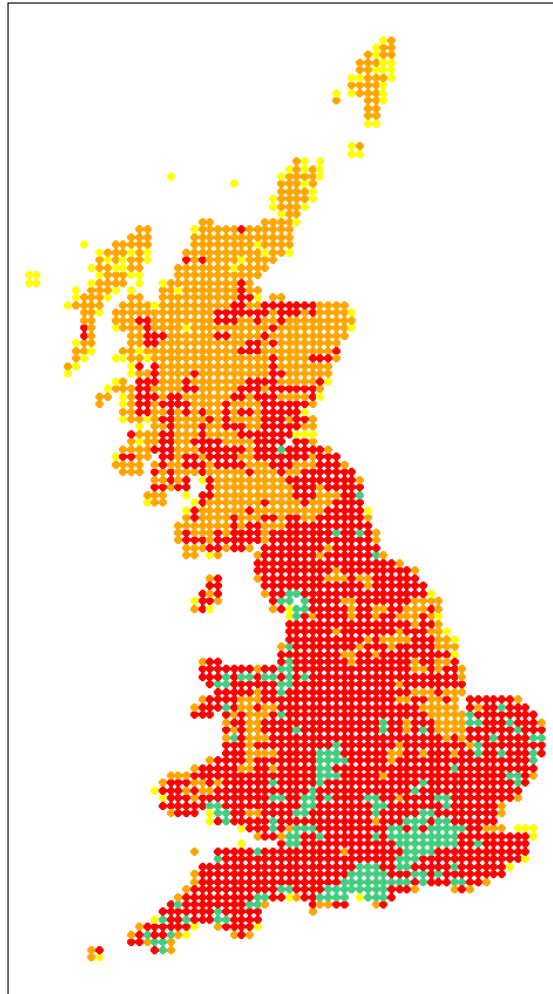
Geography: Natives

Silverdale with 700+



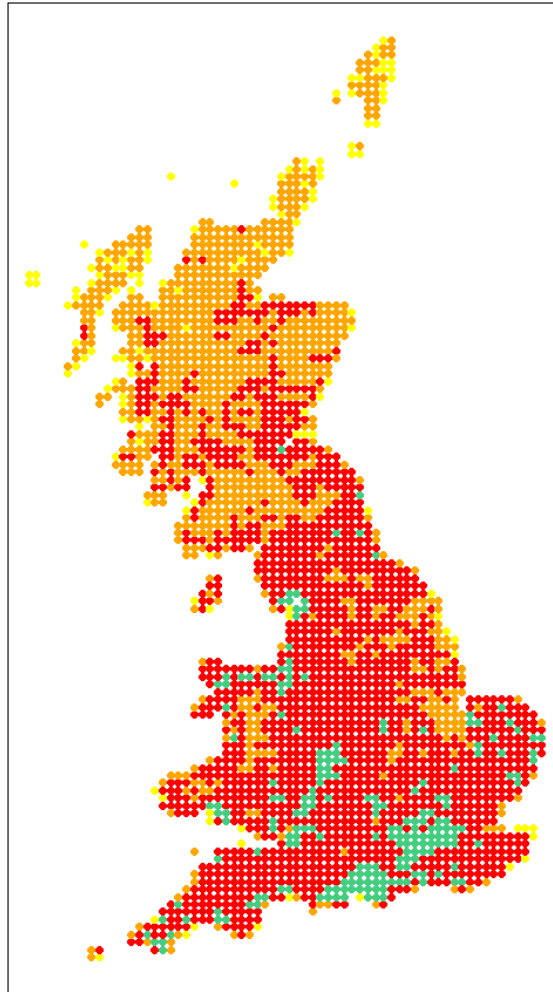
Geography: Natives

- Temperature



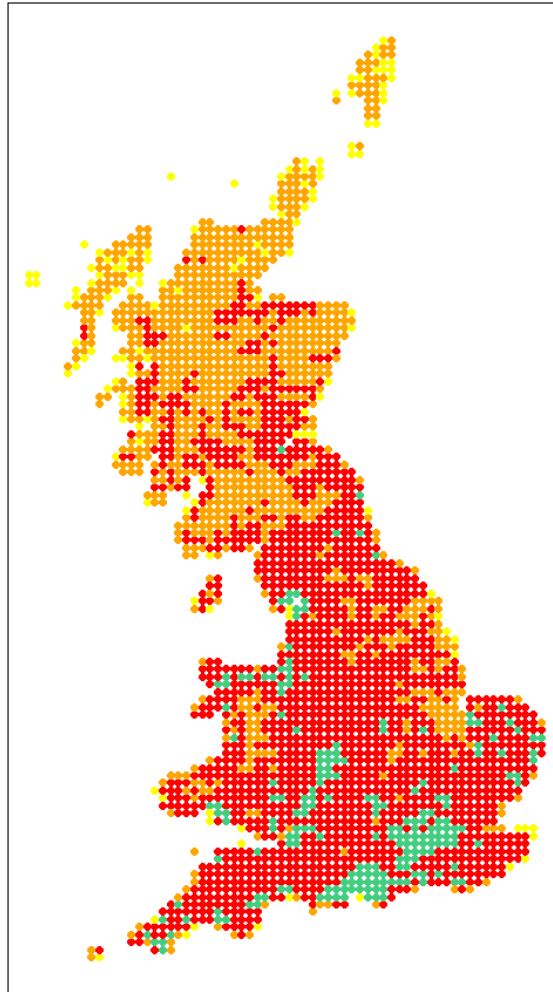
Geography: Natives

- Temperature
- Rainfall



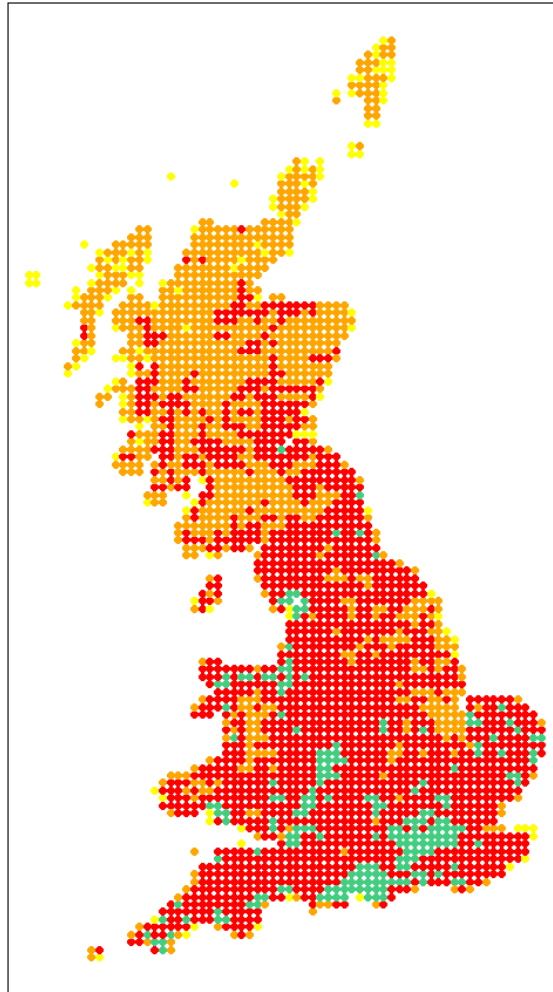
Geography: Natives

- Temperature
- Rainfall
- **Geology**

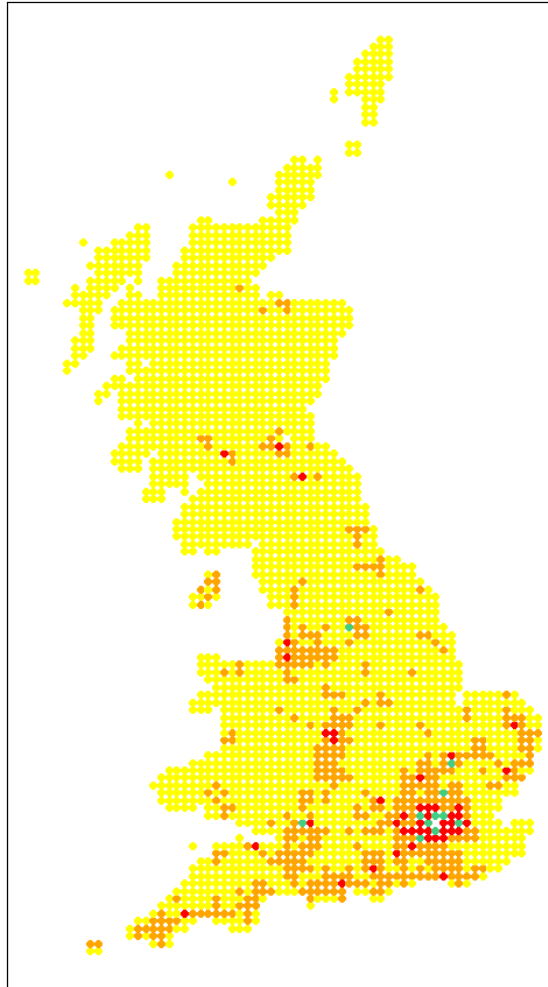


Geography: Natives

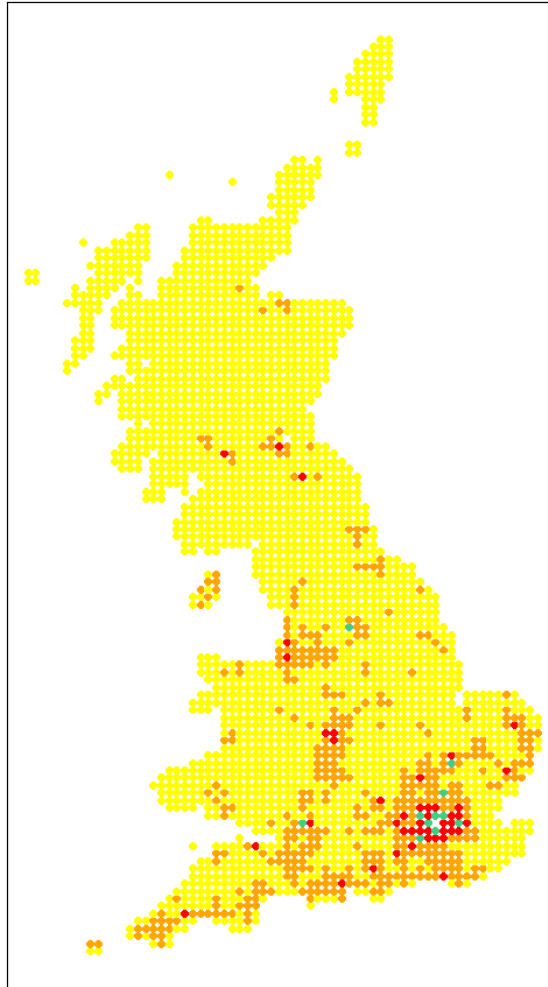
- Temperature
- Rainfall
- Geology
- People



Geography: Neophytes

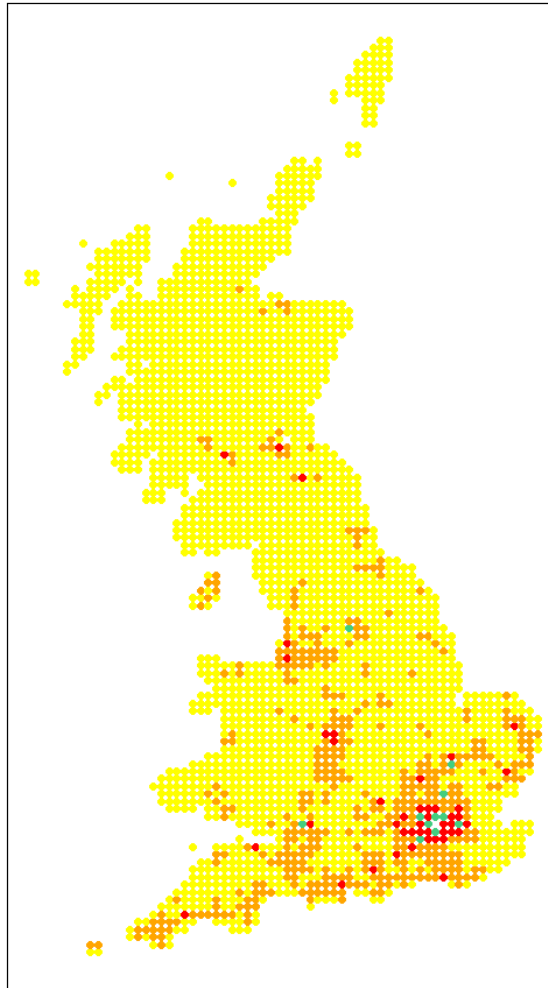


Geography: Neophytes



Cities

Geography: Neophytes



Southern coasts

Distribution across habitats

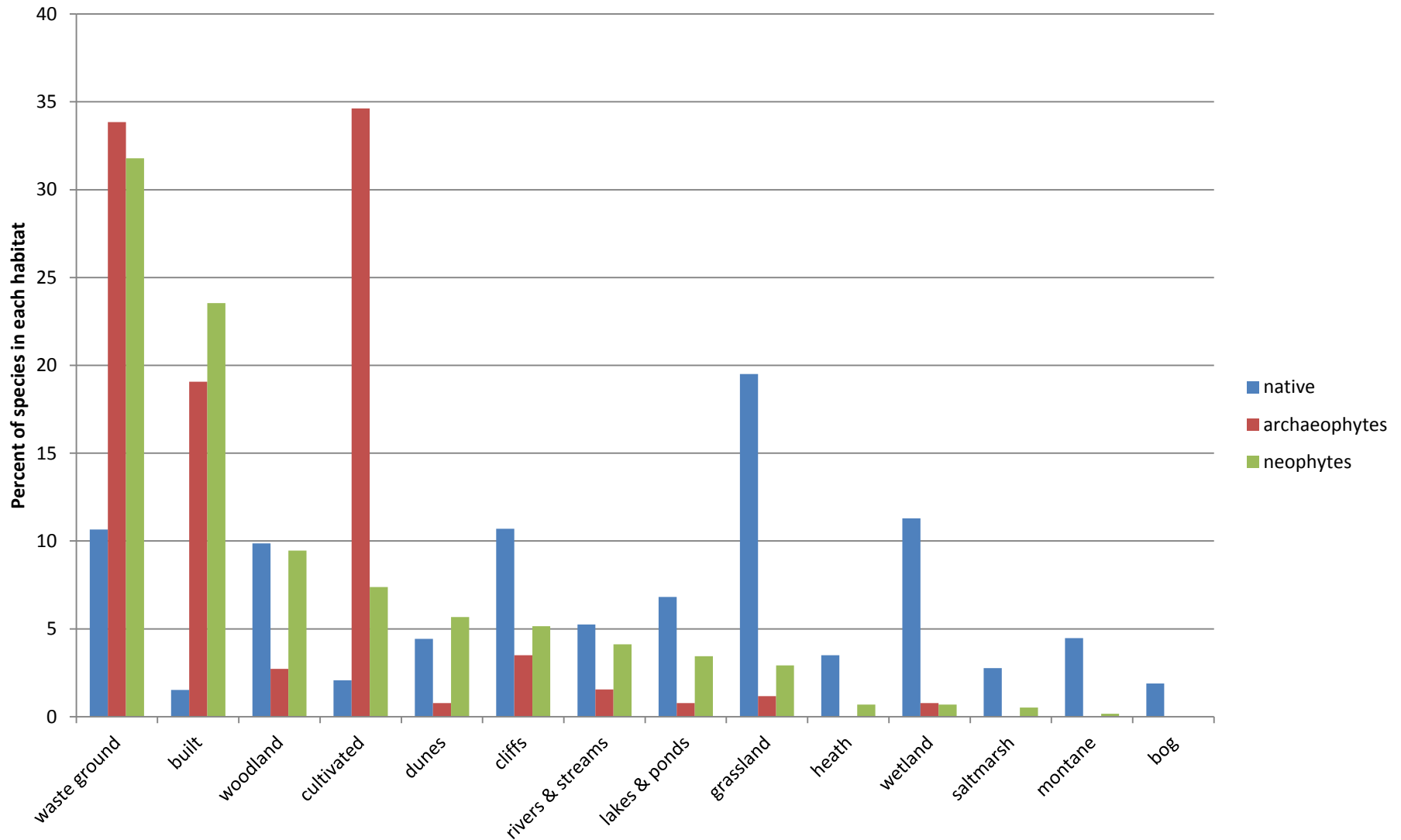
Habitats: highly invasible



Habitats: uninvaded



Habitats



Propagule Pressure

- The principal determinants of alien plant species richness

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- The number of people

Propagule Pressure

- The principal determinants of alien plant species richness
- The number of people
- The extent of physical disturbance

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- No agreed protocol for assessing impact
- Some idea, for some species, of control costs

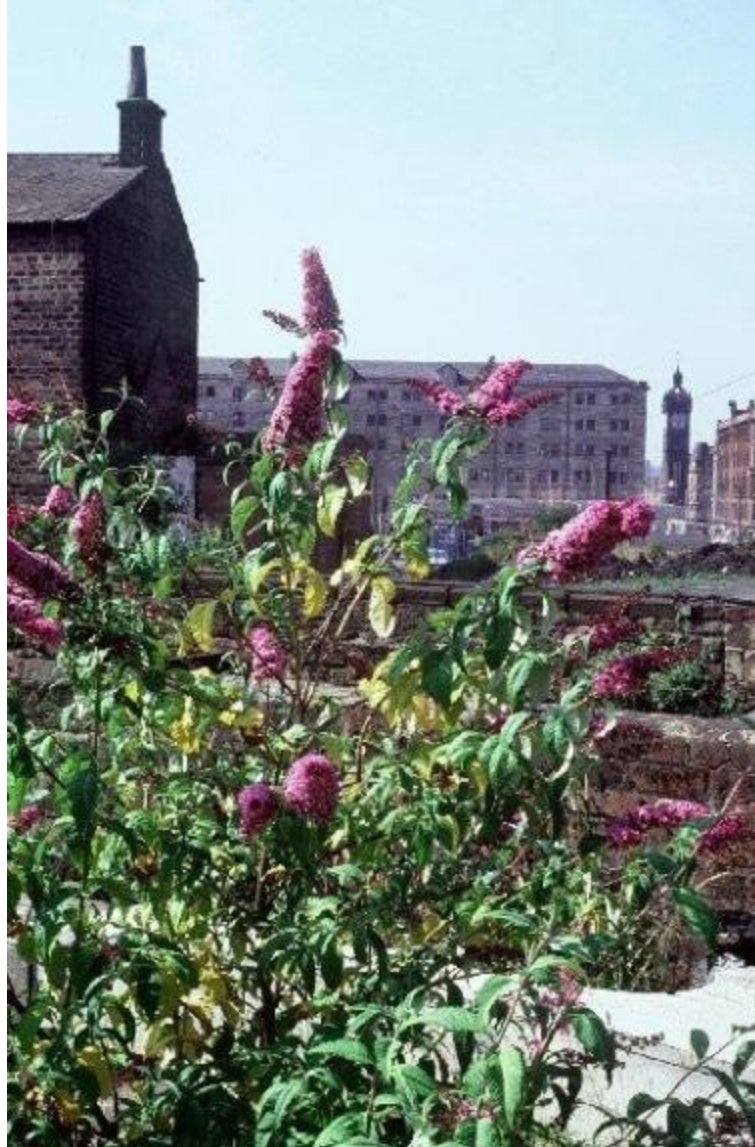
Olympic Site at Stratford



The Olympics Site at Stratford

- An amazing £70 million was spent on clearing *Fallopia japonica* from the site
- 137,500 tons of soil was cleaned of roots by hand on site

Buddleja davidii



Buddleja destroying brickwork



When did Scotland's
principal alien species arrive?

Pilosella aurantiaca subsp. *carpathicola*



1825 from Arniston Wood in VC83 Midlothian



Hesperis matronalis



1831 at East Reston Mill in vc 81 Berwickshire



Symphytum x uplandicum



1834 from Dunglass Dean in vc 81 Berwickshire



Rhododendron ponticum



1839 from Rhu parish in VC99 Dumbartonshire



Claytonia sibirica



1874 at Helensburgh in vc 99 Dunbartonshire



Fallopia japonica



1889 from Borgue Church in vc73 Kirkcudbrightshire



Heracleum mantegazzianum



before 1890, from Glenferness House
in VC96 Easternness



Impatiens glandulifera



1904 from Gelly Burn in VC94 Banff



Epilobium brunnescens



1904 from Craigmillar Gardens in VC83 Midlothian



Crocosmia x crocosmiiflora



1910 from VC79 Galashiels



Allium paradoxum



before 1933 from VC86 Stirlingshire



Cicerbita macrophylla



1939 from VC96 Nairn



Lysichiton americanus



1956 from Carberry Tower in VC83 Midlothian



Haunts of alien hunters

Bings and Coups

Fundamentally different in their
modes of plant introduction

Bings



Erucastrum gallicum before 1969 from VC77 Lanarkshire



Coups



Fly-tipping



Discovering Scottish Aliens

Ida Margaret Hayward



George Claridge Druce



Early Study of Aliens was Difficult

- No idea where they came from
- So no idea where to start looking for an identification



Wool mills of Tweedside

Wool from
Argentina
South Africa
California
New Zealand
India
Australia
Mediterranean





JUNCTION OF THE GULL AND THE TWEED

THE ADVENTIVE FLORA OF TWEEDSIDE

BY
IDA M. HAYWARD, F.L.S.,
AND
GEORGE CLARIDGE DRUCE,
Hon. M.A. (Oxon), LL.D. (St Andrews), F.L.S.,
Fickling Curator in University of Oxford; Hon. Secretary, Botanical
Society and Exchange Club of the British Isles.

ABINGDON: T. BUNCE & CO.
1919.

Hayward and Druce 1919

The intriguing biology of aliens

Creation of Neonatives

Speciation in action

Mimulus (Phrymaceae)

- No native species
- Several horticultural introductions from the Americas
- The commonest is *M. guttatus*

Mimulus guttatus



Mimulus luteus



Mimulus (Phrymaceae)

- Their sterile hybrid *M. x robertsii* is frequent in Southern Scotland and northern England, spreading vegetatively

Mimulus x robertsii



Mimulus

- Chromosome doubling in *M x robertsii* has produced a new species *M. peregrinus*
- Discovered by Mario Vallejo-Marin (University of Sterling) by Shortcleuch Water in The Lowther Hills, Lanarkshire vc 77

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- Discovered by Mario Vallejo-Marin (University of Sterling) by Shortcleuch Water in The Lowther Hills, Lanarkshire vc 77
- This is a neonative: a Scottish endemic with alien parents

Shortcleuch Water vc 77 Lanarkshire in 2011



Mimulus peregrinus

D.



Mimulus peregrinus

Since been recorded in Orkney (2014)

D.



Interesting Ecology

Enemy Release

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- A successful alien species must obviously be able to deal with the resident generalist herbivores in its new environment:
- Slugs, snails, rabbits, sheep, soil pathogens

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- The benefit this represents is called “Enemy Release”

Conyza sumatrensis in 1995



Conyza sumatrensis in 2016



Competitive exclusion of *C. sumatrensis* by *C. floribunda*



Invasive aliens

Invasive aliens

- These are naturalised aliens that reach levels of abundance that have an appreciable (though very loosely defined) impact on local ecosystem processes

Rhododendron ponticum



Loch Hourn in vc 97 Westernness



Herbicide stem-injection



Lysichiton in spring



Lysichiton in summer



Pentaglottis sempervirens





Hypericum x inodorum





Ones to watch

Gunnera tinctoria



Robin Payne and Roddy MacMinn (SNH) visiting Urgha
on North Harris to assess the invasion
(first 1884 on Rum; first noted as invasive in late 1960s)



Cortaderia richardii



Cortaderia spp.

Cortaderia richardii



Cortaderia selloana



The most recent addition to the Flora of Scotland

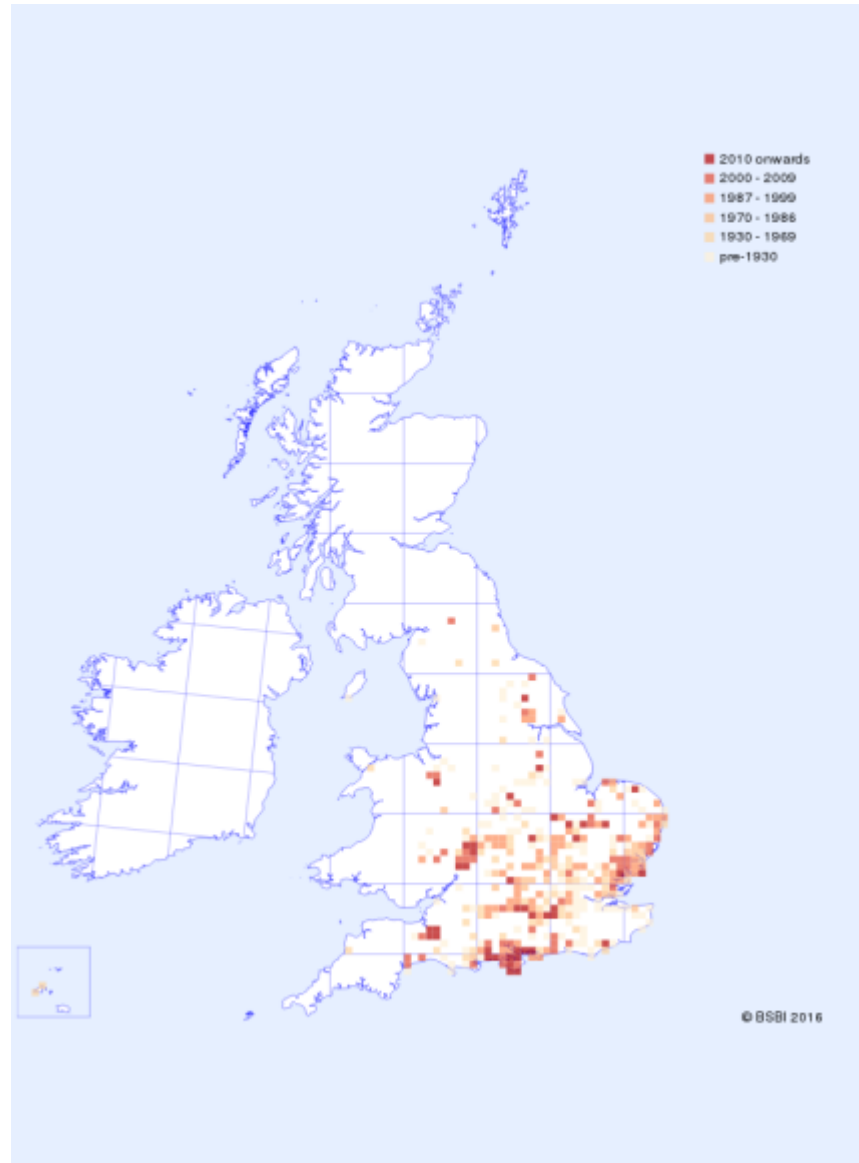
Lairg Auction Mart vc 107



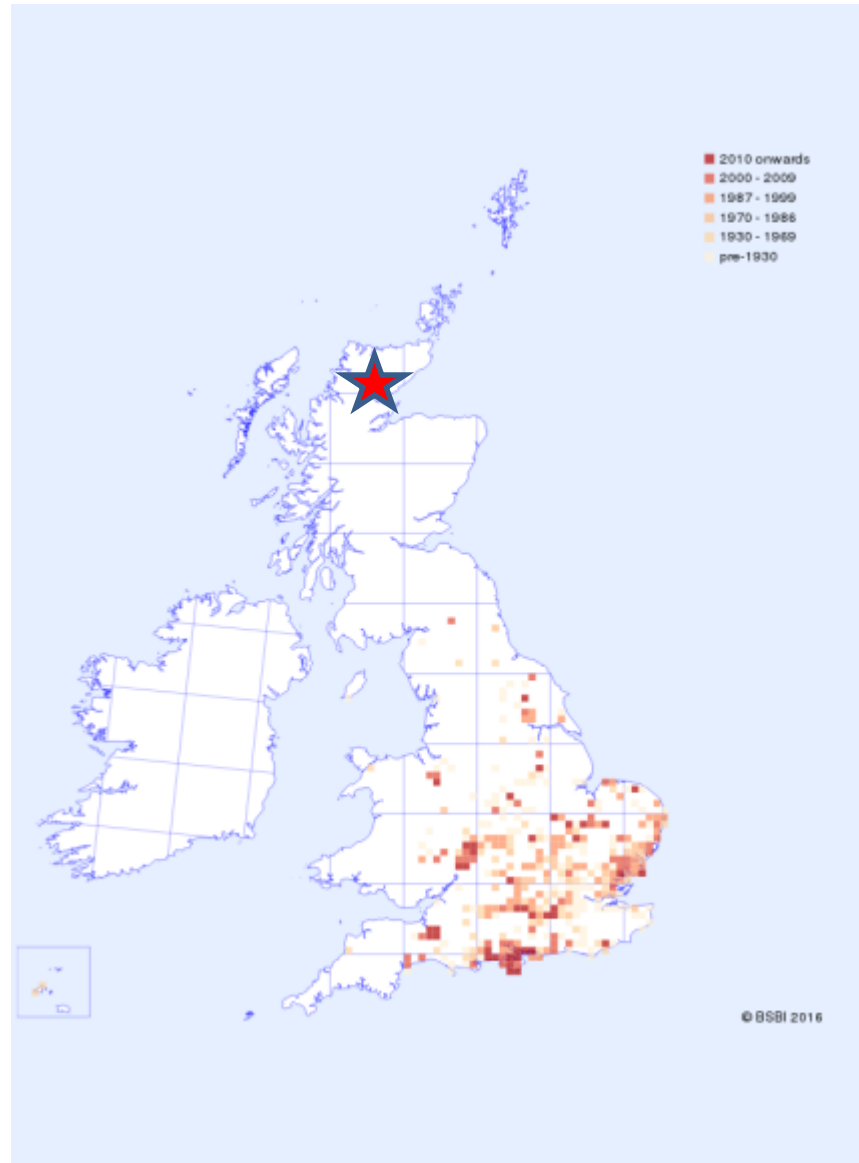
Myosurus minimus



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Myosurus minimus



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- 30 species dropped in the 3rd Edition of the Red Data Book, no longer thought to be native
- Several charismatic species now considered to be neophytes

Fritillaria meleagris (1736)



Leucojum aestivum (1788)



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- A few alien species are likely to prove to be extremely expensive
- Studying aliens is highly productive of insights in both ecology and evolution



A BRAIN-CHILLING
TALE OF TOMORROW
HAPPENS IN OUR
WORLD TODAY!

IN
CINEMASCOPE
AND
EASTMAN **COLOR**

THE DAY OF THE TRIFFIDS



*From the greatest
science-fiction novel
of all time!*

STARRING **HOWARD KEEL**
NICOLE MAUREY

Executive Producer: **PHILIP YORDAN** - GEORGE PITCHER

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Screenplay by **JOHN WYNDHAM**
From the novel by **JOHN WYNDHAM**
Author of "VILLAGE OF THE DAMNED"

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