Museum Collections
just a load of dead stuff?

OXFORD UNIVERSITY MUSEUM OF NATURAL HISTORY

UNIVERSITY OF OXFORD

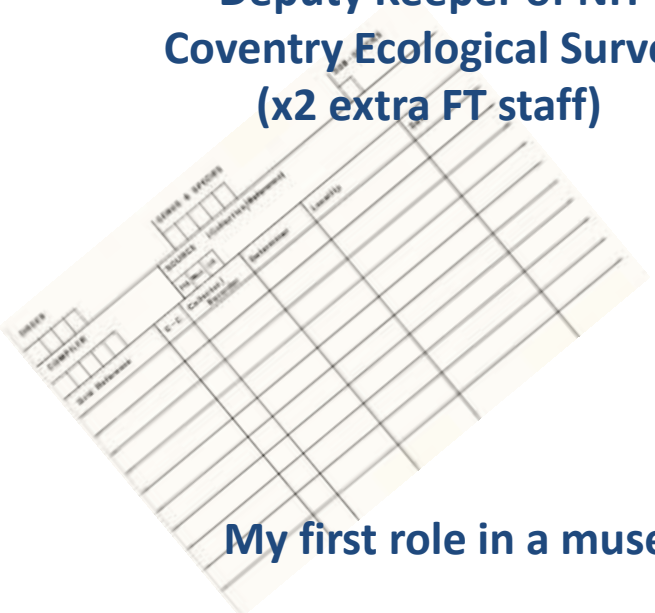
Darren Mann
Oxford University Museum of Natural History

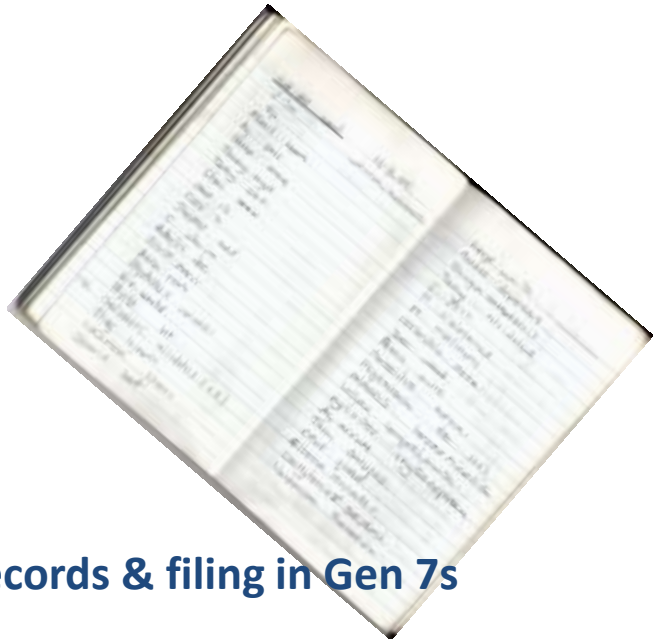
Once Upon a Time

140,000 insect specimens

Keeper of NH
Deputy Keeper of NH
Coventry Ecological Survey
(x2 extra FT staff)

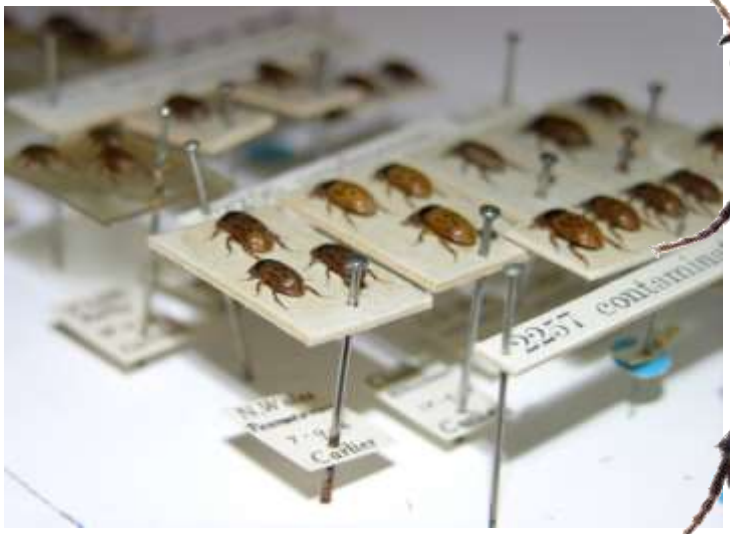
info@theherbert.org



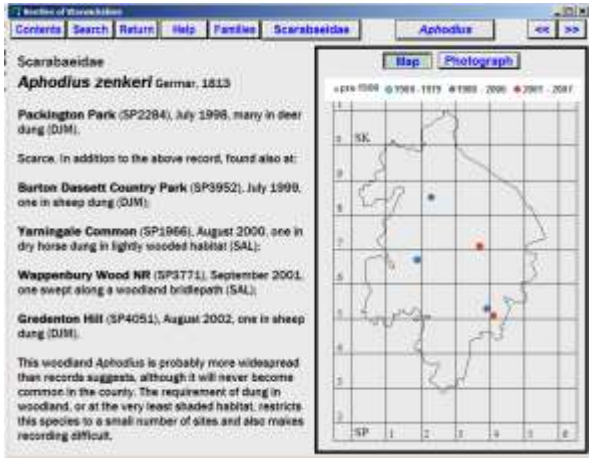


My first role in a museum was extracting hoverfly records & filing in Gen 7s

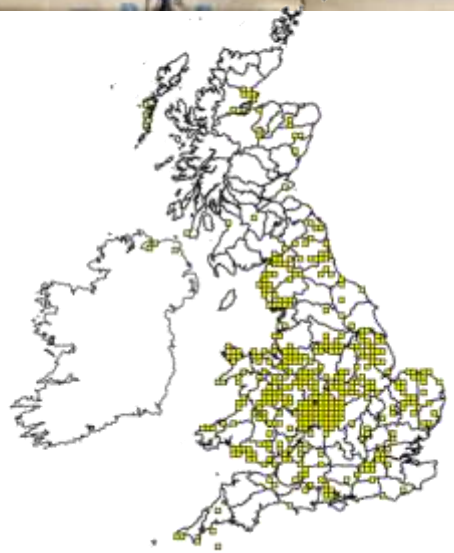
Warwickshire Dung Beetle Recording



Paper Records for VC 38



Beetles of Warwickshire
Lane, Right & Forsythe, 2008



NBN Gateway Map

Oxford University Museum of Natural History

Insects, Arachnids, Myriapods

Dried & Spirit collections

>6 Million specimens

32,000 drawers of insects

>30,000 types

www.oum.ox.ac.uk/

http://morethanadodo.com/

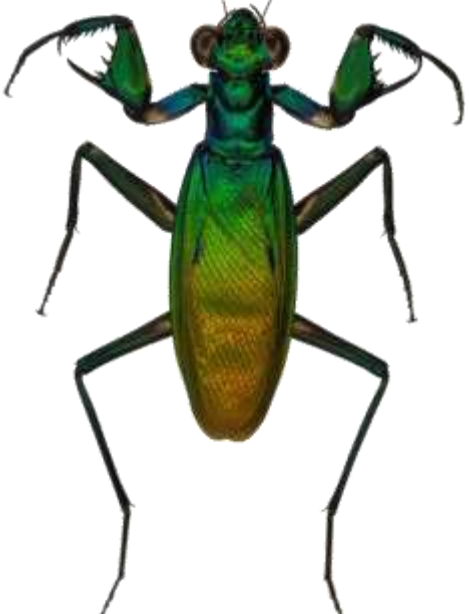
@morethanadodo

Life Collections

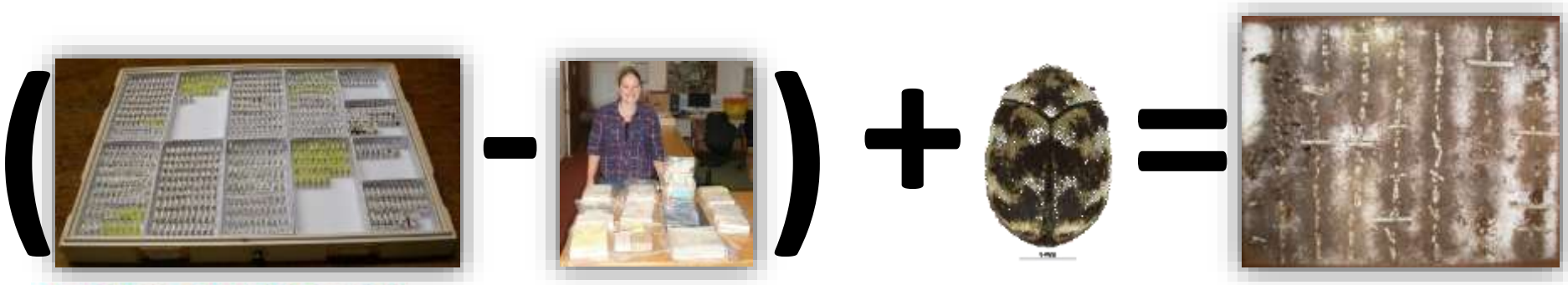
Earth Collections

Library & Archives

Public Engagement



35% Decline in Natural History Curators



Is a decline in specialist curators bad for museums?

Rebecca Atkinson, 02.04.2013

Vote in our poll and have your say

Are specialist curators a dying breed? And, if they are, does it matter?

A recent survey carried out for Museums Journal found that the number of natural history curators has declined by more than 35% in the past decade.

The number of art curators has also fallen by over 23%, while "human history" (archaeology, world cultures and social history) curator decreased by over 5% in the same period.

This loss of expertise has implications for specialist knowledge and collections care, but to what extent does this matter to the wider role of museums and the public they serve?

Vote in our poll and have your say

Poll

Is a decline in specialist curators bad for museums?

Yes 91%

No 9%

MUSEUMS ASSOCIATION

This poll is now closed

http://www.museumsassociation.org/museums-journal/news/02042013-poll-is-a-decline-in-specialist-curators-bad-for-museums

Natural History Near You

Putting natural history collections on the map advocacy@natsca.org

Natural history collections are vital for understanding and safeguarding our planet.

To make the most of them we need to know where they are held, how they are cared for and how people can access them.

This is where NatSCA needs your help!

We're crowdsourcing a map of collections in Britain & Ireland. Please help us by adding collections that you know about or correcting existing entries by visiting:

natsca.org/NHNearYou

NatSCA

Natural Sciences Collections Association

http://www.natsca.org/NHNearYou

Times have Changed

"every museum cannot expect to have a curator who has been endowed with ten talents"

W.E. Hoyle, Presidential Address, Museums Association Conference, Bristol, 1906

Trained staff
Furniture & Space
Time
£ MONEY £

What Can Museums offer?

Lots of dead things
- Associated data
- Associated archives

Dead things to compare with your dead things
- Reference material
- Taxonomic guidance & support (in some cases)

Microscopes to make dead things look bigger

Books on how to tell dead things apart
- ID guides, European Literature
- Historic literature
- Long runs of journals, local & National

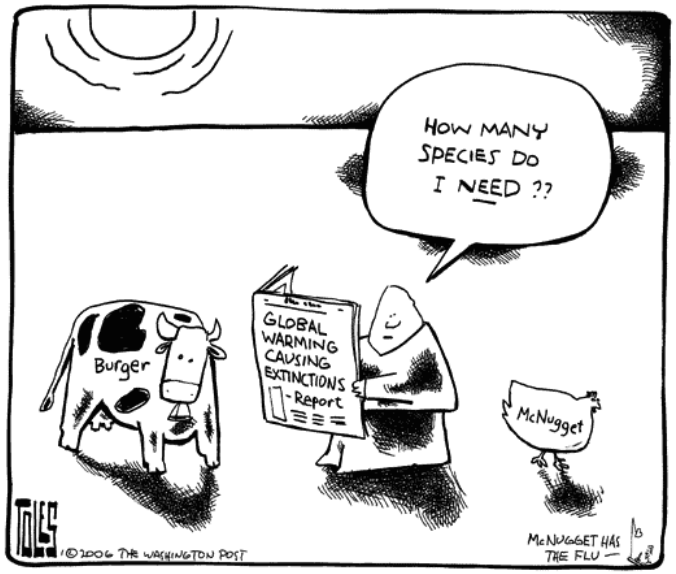
A safe environment with people who understand your unusual ways
- Hosting visitors
- Hosting subject specialist groups

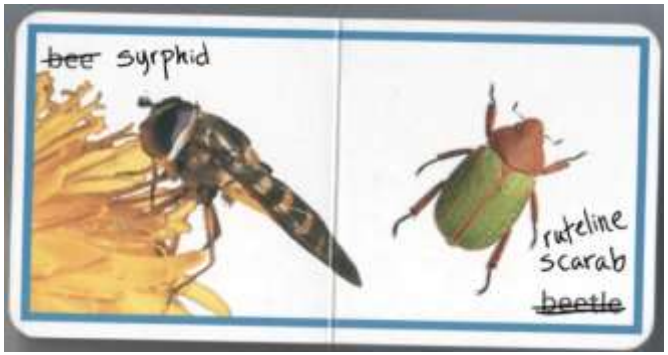
Thousands of Unpublished Data Points

Access to Reference Collections and Scopes

Taxonomy & ID Skills

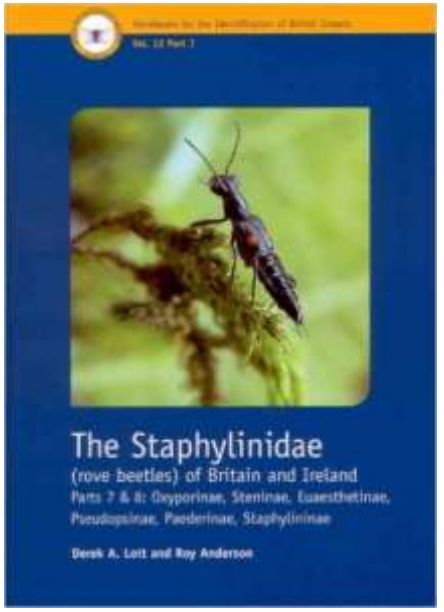
Ecologists are often ill informed of both the value and the problems of systematics. That is true even though ecologists have long been parasitic on taxonomists'.
Ehrlich 1997, p. 23.

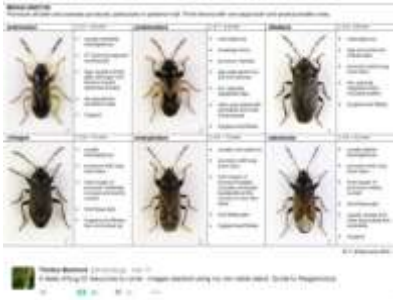




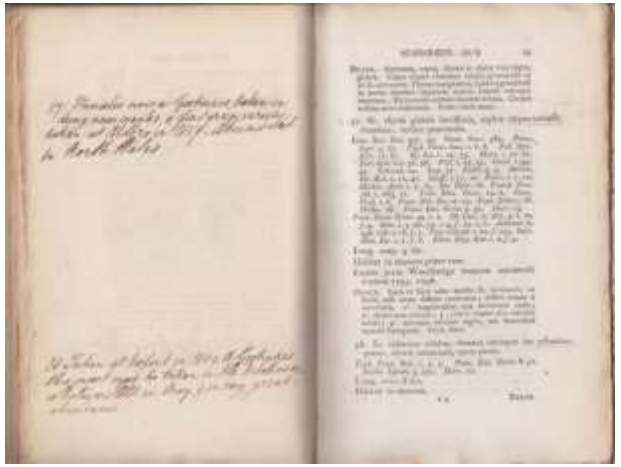
"Wisdom begins with calling things by their right names"
Chinese Proverb

Source of Reliably Identified Specimens for ID Guides





Literature, Journals and Archives



The library collection now amounts to some 7,500 monographs

462 journals of which 100 are current titles, and 66,000 off-prints.

Smith, A.Z. (1986) *A history of the Hope Entomological Collections in the University Museum, Oxford.* Oxford. Clarendon Press. 172pp. – download PDF on our website

Raphael, S. (1977) *Natural history books and manuscripts in Oxford University libraries. Journal of the Society for the Bibliography of Natural History* 8 (2): 108-119.

Societies AGM's, Members Days & Events

Coleopterists Day

Ashmolean Natural History Society, Bees, Wasps & Ants Recording Scheme (BWARS), British Dragonfly Society, British Ecological Society – Tropical Forest Group, British Entomological & Natural History Society, The Bug Club, Butterfly Conservation, Coleopterists' Day, Dipterists Forum, Frewen Club, Julian Housing, Natural History Museum, London, Oxford Beekeepers Association, Oxford Brookes, Oxfordshire Mind, Shotoverover Wildlife, University of Derby, University of Oxford, U3A

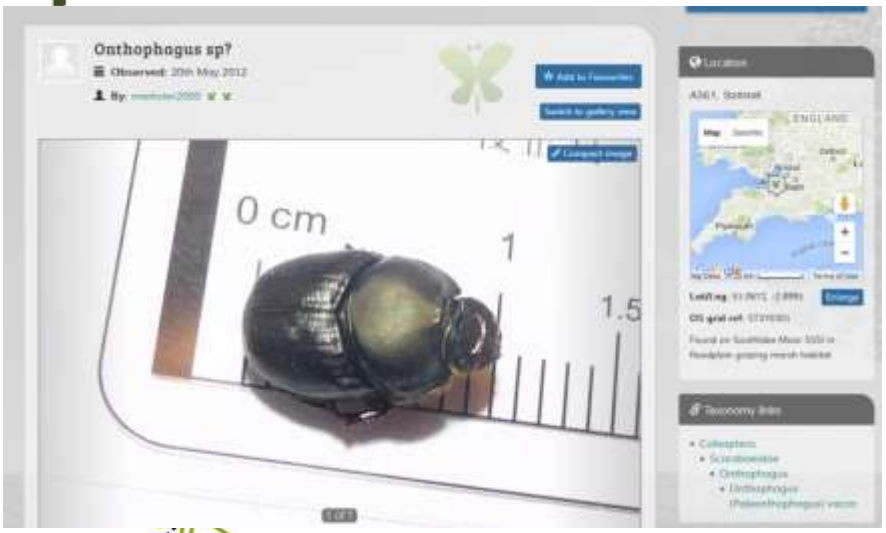
Networking, Show & Tell - Behind the scenes tours - Talks

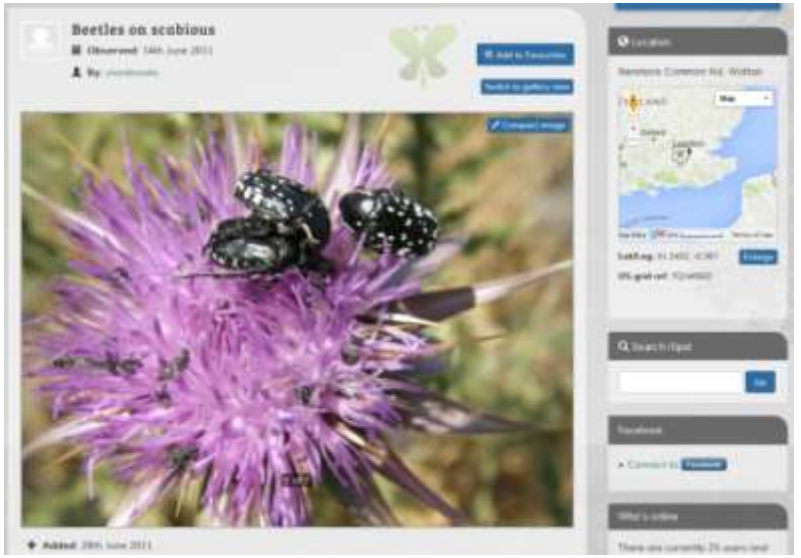
Collections = Verifiable Biodiversity Data

Collections equate to a biodiversity database, with each drawer not only containing valuable long term data, but more importantly the associated voucher specimen that can be used to validate an identification

“A Picture Paints a Thousand Words”

iSpot

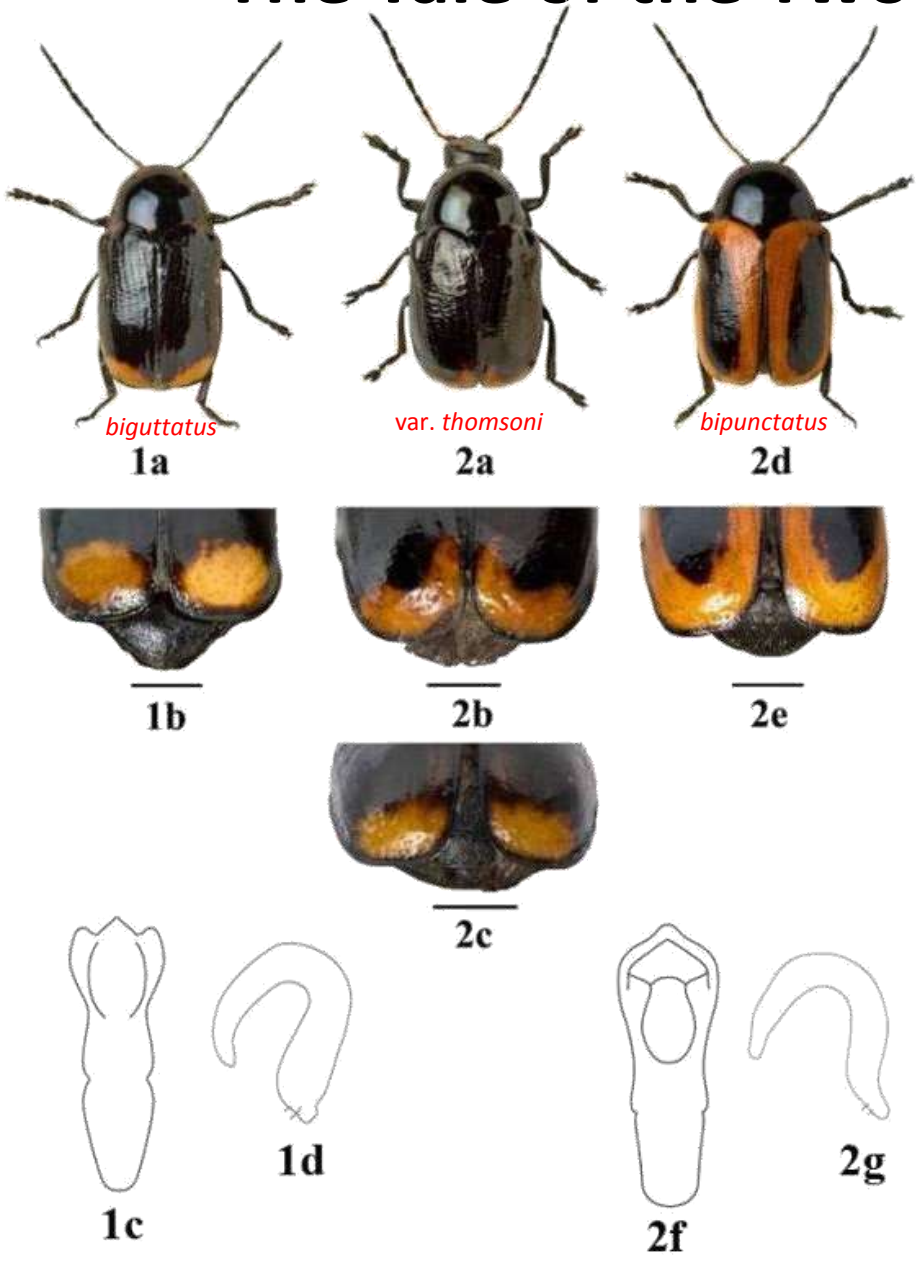




iRecord

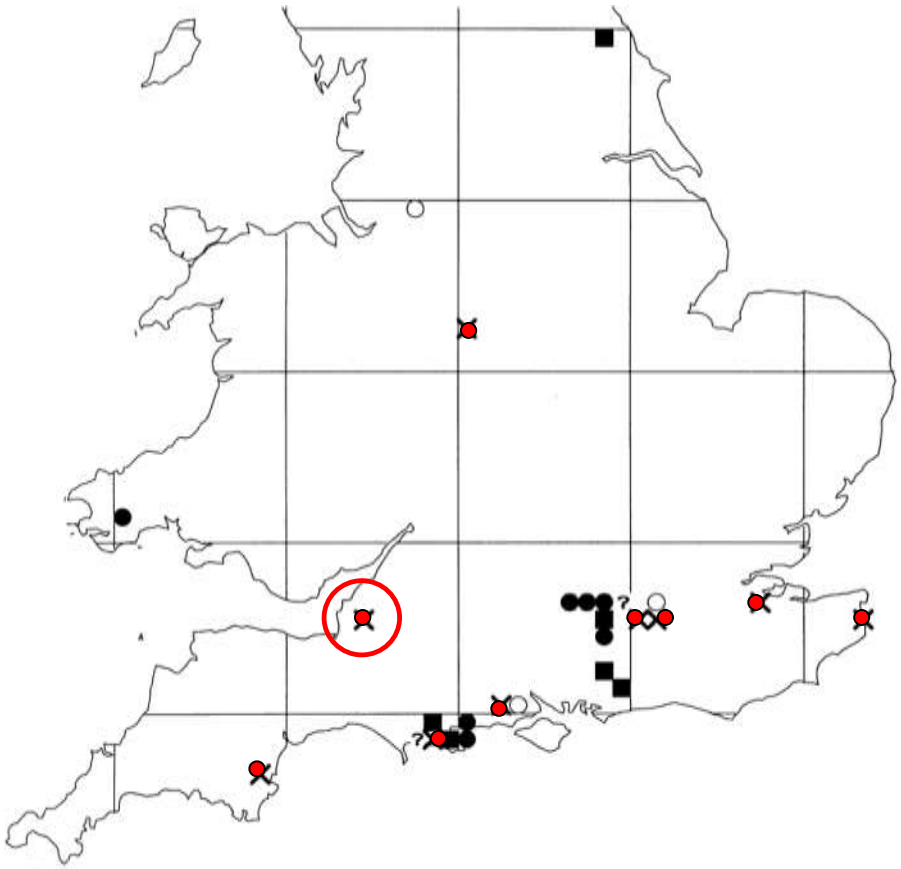
Sadly, most of these don’t describe the ID features

The Tale of the Two Two-Spot Pot Beetles



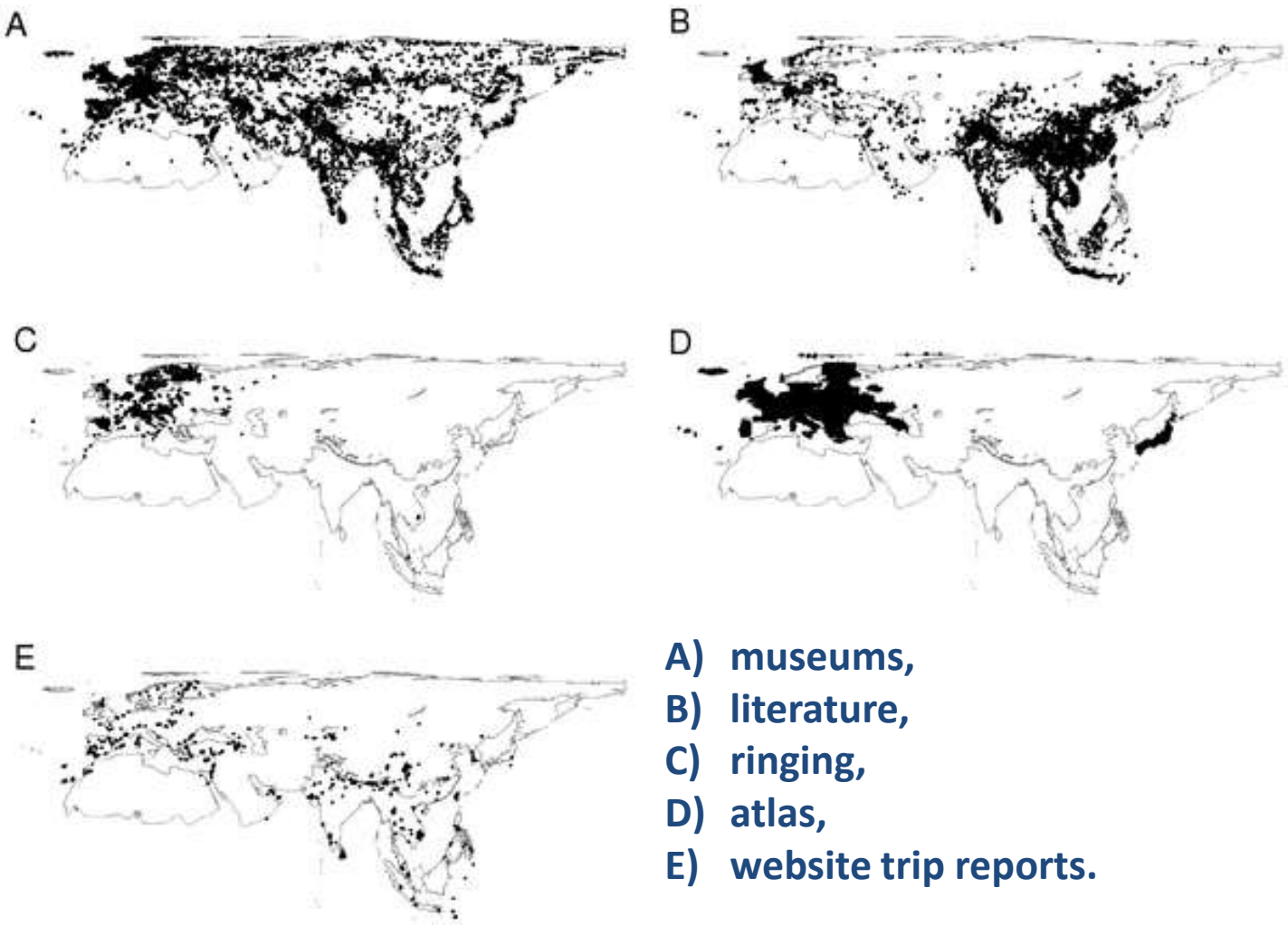
Voucher specimens were examined from most collections.

C. Biguttatus **was found to be not as widely distributed as previously thought.**



Mann, D.J. & Barclay, M.V.L. 2009. The identification and distribution of *Cryptocephalus biguttatus* (Scopoli, 1763) and *Cryptocephalus bipunctatus* (Linnaeus, 1758) var. *thomsoni* Weise, 1881 in Britain, *The Coleopterist,* 18(3): 166-181.

Spatial Distribution of Records from Different Sources



A) museums,
B) literature,
C) ringing,
D) atlas,
E) website trip reports.

Boakes EH, McGowan PJK, Fuller RA, Chang-qing D, Clark NE, et al. (2010) Distorted Views of Biodiversity: Spatial and Temporal Bias in Species Occurrence Data. PLoS Biol 8(6): e1000385. doi:10.1371/journal.pbio.1000385
http://journals.plos.org/plosbiology/article?id=info:doi/10.1371/journal.pbio.1000385

Genomics for Conservation

PLOS | ONE

RESEARCH ARTICLE

Microsatellite Analysis of Museum Specimens Reveals Historical Differences in Genetic Diversity between Declining and More Stable *Bombus* Species

Kevin Maebe[1]*, Ivan Meeus[1], Maarten Ganne[1], Thibaut De Meulemeester[2], Koos Biesmeijer[2], Guy Smagghe[1]*

1 Department of Crop Protection, Faculty of Bioscience Engineering, Ghent University, Coupure links 653, Ghent, Belgium, 2 Naturalis Biodiversity Center, Darwinweg 2, Leiden, the Netherlands

* kevin.maebe@ugent.be (KM); guy.smagghe@ugent.be (GS)

MOLECULAR ECOLOGY

Molecular Ecology (2011) 20, 2888–2900 doi: 10.1111/j.1365-294X.2011.05139.x

Reconstructing demographic events from population genetic data: the introduction of bumblebees to New Zealand

G. C. LYE, O. LEPAIS and D. GOULSON
School of Biological and Environmental Sciences, University of Stirling, Stirling, FK9 4LA, UK

Biological Journal of the Linnean Society, 2006, **88**, 447–452. With 1 figure.

Analysis of museum specimens suggests extreme genetic drift in the adonis blue butterfly (*Polyommatus bellargus*)

G. L. HARPER[1]*, N. MACLEAN[2] and D. GOULSON[2]

[1]*School of Applied Sciences, University of Glamorgan, Llantwit Road, Treforest, Mid Glamorgan CF37 1DL, UK*
[2]*Biodiversity and Ecology Division, School of Biological Sciences, University of Southampton, Bassett Crescent East, Southampton SO16 7PX, UK*

Received 20 February 2005; accepted for publication 5 December 2005

We amplified microsatellite DNA from museum specimens over 100 years old of the adonis blue butterfly, *Polyommatus bellargus*. These results were compared with butterfly samples taken from the same site near Folkestone in southern UK in 1998/9, 200 generations later, and with samples from other extant UK populations. Dramatic changes in allele frequencies have occurred over time, which is indicative of substantial genetic drift or extinction/recolonization. Patterns of heterozygosity in the 1998/9 sample are indicative of a past bottleneck, and one was known to have occurred in the late 1970s to this and many other UK populations. One allele present at high frequency in 1896 was not detected in any extant UK population, suggesting that it may have been lost from the UK (a 'ghost' allele), although the allele may well persist elsewhere within the range of the species. Although the present study is relatively small in scale (20 museum specimens from one site), it serves to reinforce the enormous potential of museum specimens in well represented taxa such as butterflies for examining the effects of demographic events spanning many years. © 2006 The Linnean Society of London, *Biological Journal of the Linnean Society*, 2006, **88**, 447–452.

ADDITIONAL KEYWORDS: bottleneck – genetic drift – Lepidoptera – Lycaenidae – microsatellites – Museum specimens.

INTRODUCTION

Neutral theory predicts that if a population undergoes a significant demographic contraction, there will be considerable losses of genetic diversity (Wright, 1969; Nei, Maruyama & Chakraborty, 1975; Chakraborty and Nei, 1977; Lacy, 1987). On this basis, low levels of genetic diversity have frequently been used to infer past population bottlenecks (Barrett and Schaller, 1976; O'Brien *et al.*, 1983; Ellegren *et al.*, 1996). However, this apparently obvious conclusion may be erroneous and ignores other alternative explanations, such as selective sweeps (Bazzaz, Lewis & Page, 1998b). In attempts to further elucidate causal factors for observed allele frequency distributions, a number of statistical methods have been devised based on theoretical effects of population declines. For example, it has been proposed that an excess of heterozygosity relative to allelic diversity at individual loci can be used to infer a recent population decline (Cornuet and Luikart, 1996; Luikart, Cornuet & Allendorf *et al.*, 1999). To date, many studies concerning changes in population structure have used this type of indirect methodology to infer demographic changes that populations may have undergone (Mallet *et al.*, 1993; Le Page *et al.*, 2000; Spencer, Neigel, and Leberg, 2000; Weiss *et al.*, 2000).

Recent advances in molecular biology allow the extraction of DNA from historic and even ancient tissue specimens (Thomas *et al.*, 1989; Hauswirth, 1994; Roy *et al.*, 1994; Bazzaz *et al.*, 1998a). Where suitable museum samples exist, we can now reconstruct population structures, and measure changes in allele frequency and gene coalescence that resulted from founder events and bottlenecks. Two previous studies that have directly compared allele frequencies in

*Corresponding author. E-mail: gharper@glam.ac.uk

BMC Evolutionary Biology

Reconstructing eight decades of genetic variatic in an isolated Danish population of the large bl butterfly *Maculinea arion*

Ugelvig et al.

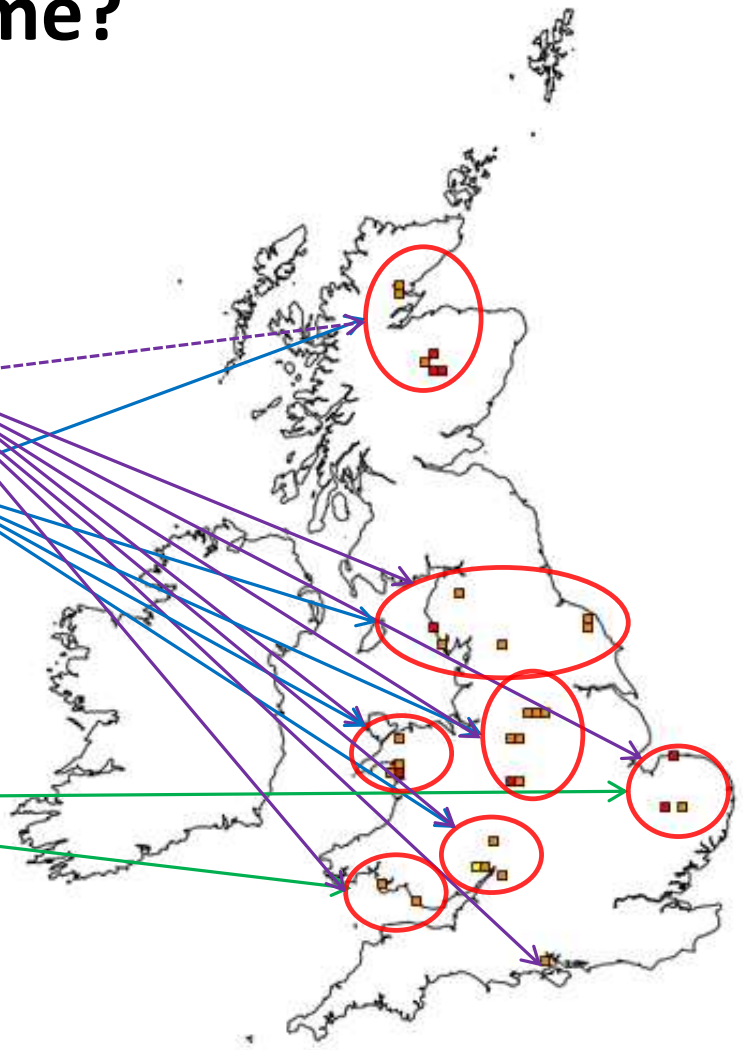
BioMed Central

What's in a Name?

Subfamily APHODIINAE Leach, 1815
APHODIUS Hellwig, 1798

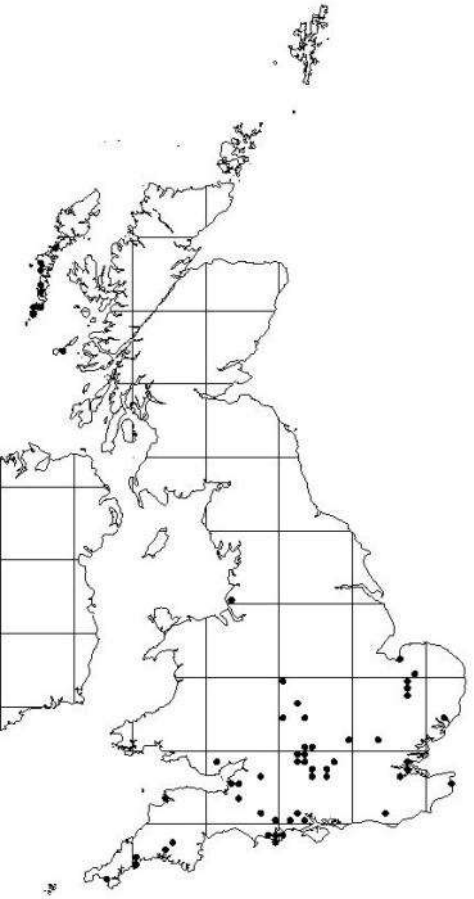
Subgenus PLANOLINUS Mulsant & Rey, 1870
borealis Gyllenhal, 1827
putridus sensu (Sturm, 1805) non (Geoffroy in Fourcroy, 1785)
fasciatus (Olivier, 1789)
putridus sensu (Herbst, 1789) non (Geoffroy in Fourcroy, 1785)
foetidus (Fabricius, 1792) non (Herbst, 1783)
uliginosus Hardy, 1847
tenellus sensu auctt. non Say, 1823

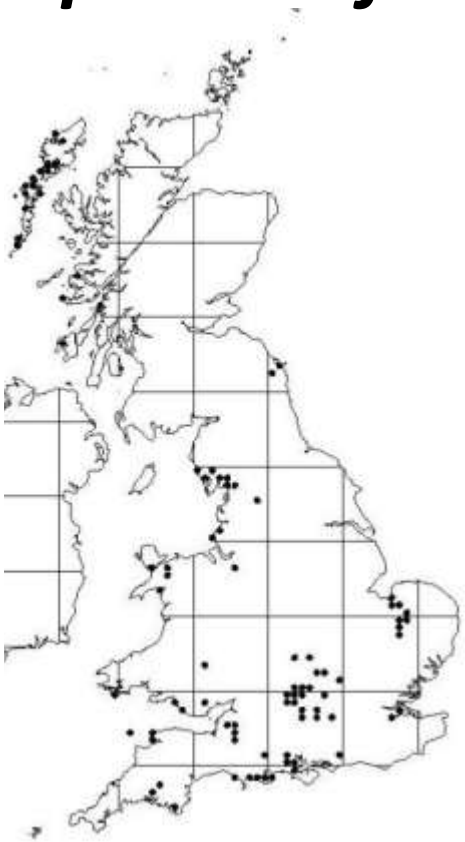
Subgenus PLAGIOGONUS Mulsant, 1842
arenarius (Olivier, 1789)
putridus (Geoffroy in Fourcroy, 1785)
rhododactylus (Marsham, 1802)

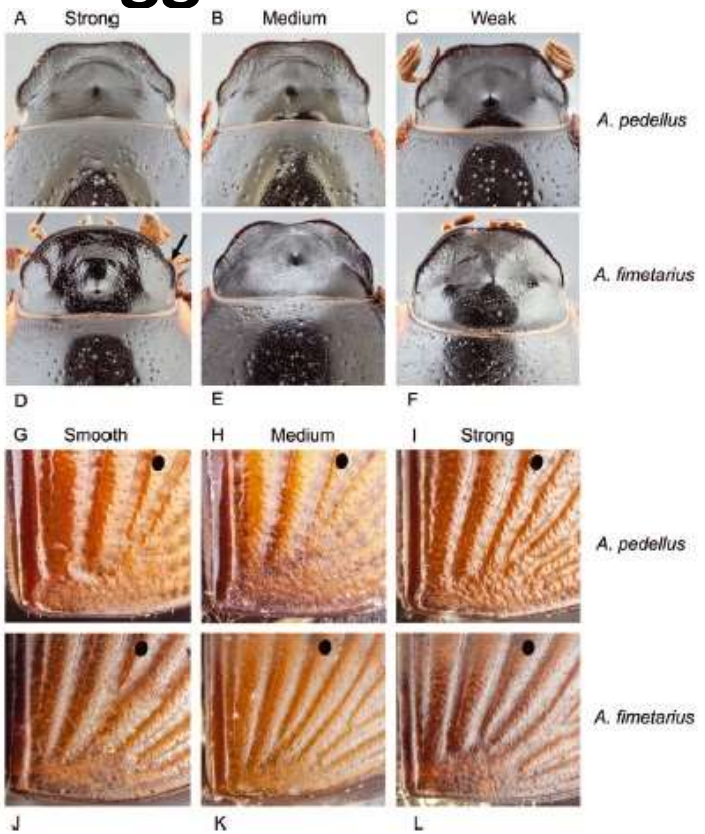


NBN Gateway - Grid map for *Aphodius* (*Planolinus*) *fasciatus* (Olivier, 1789) https://data.nbn.org.uk/Taxa/NHMSYS0001716958/Grid_Map - accessed Jan 2016

Splitting Species
Aphodius fimetarius agg.







fimetarius

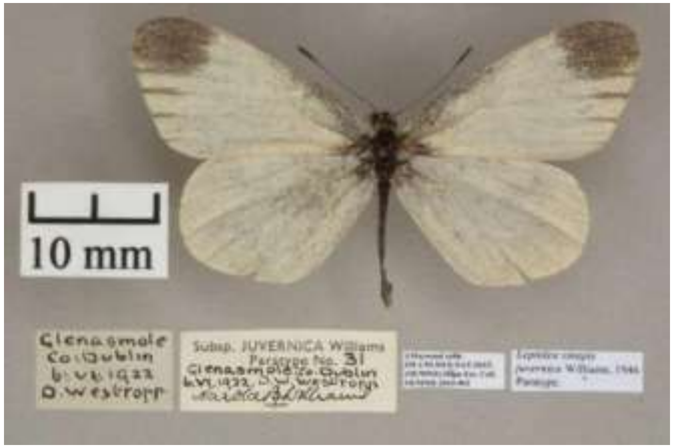
pedellus

Wilson, C.R. (2001). *Aphodius pedellus* (DeGeer), a species distinct from *A. fimetarius* (Linnaeus) (Coleoptera: Aphodiidae). *Tijdschrift voor Entomologie* **144,** 137-143.

Miraldo, A., Krell, F.T., Smalen, M., Angus, R.B., & Roslin, T. (2014). Making the cryptic visible–resolving the species complex of *Aphodius fimetarius* (Linnaeus) and *Aphodius pedellus* (de Geer)(Coleoptera: Scarabaeidae) by three complementary methods. *Systematic Entomology*, **39**(3), 531-547.

Fery, H. & Rössner, E. (2015). Notes on the *Aphodius* (s.str.) *fimetarius*-complex – morphology, taxonomy, nomenclature and worldwide distribution (with emphasis on the Iberian Peninsula, Austria and Germany) (Scarabaeoidea: Scarabaeidae: Aphodiinae). *Linzer biol. Beitr*. **47**(1), 459-489.

The Wood Whites



Wlliams. 1964. The Irish form of *Leptidea sinapis* L. Entomologist 79: 1-3

Past and present distribution of the cryptic species *Leptidea sinapis* and *L. reali* (Lepidoptera: Pieridae) in Poland and its implications for the conservation of these butterflies

NATURE COMMUNICATIONS | DOI: 10.1038/ncomms1329

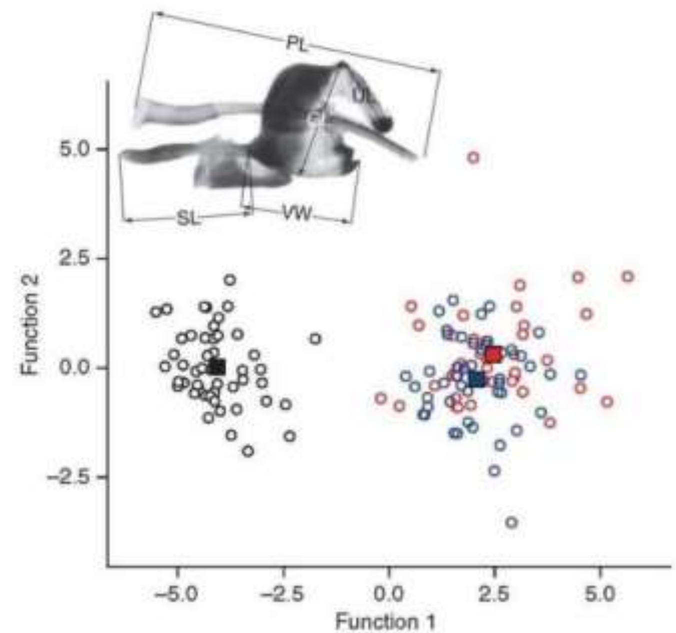


Figure 4 | Discriminant analysis based on male genitalia morphometry. *L. sinapis* (black) is identifiable based on male genitalia, but there is broad overlap between *L. reali* (red) and *L. juvernica* stat. nov. (blue). Circles represent individuals and squares represent centroids for each species. Elements of the male genitalia measured were PL, SL, VW, GL and UL. The discriminant variables were PL and SL for function 1 and SL and VW for function 2. The upper left corner image indicates the variables measured for *Leptidea* male genitalia.

Unexpected layers of cryptic diversity in wood white *Leptidea* butterflies Vlad Dincă, Vladimir A. Lukhtanov, Gerard Talavera & Roger Vila. Nature Communications 2, doi:10.1038/ncomms1329

Museum Collection Discoveries

19th C. specimens – Lost, Destroyed or No data

Species Discovered New from Collections

New localities & Data from Collections

Onthophagus fracticornis

IUCN UK – Vulnerable - 11 sites in the UK

Mendips – 5 recent sites, 3 historic

Wales – 3 historic records

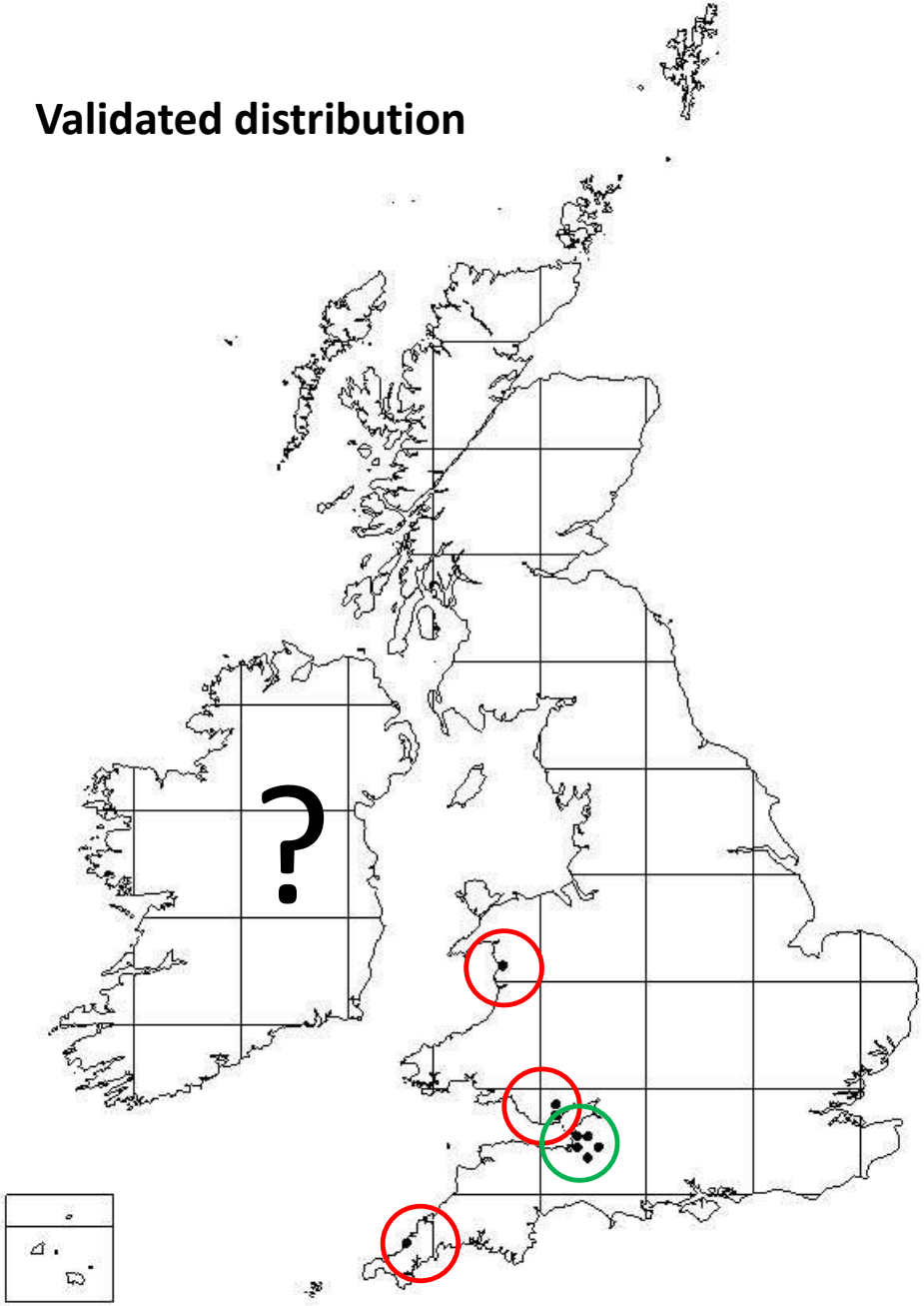
Cornwall – 1 historic record

- **Matley Bog, New Forest – re-determined as *O. similis***
- **Johnson, 1991: N. Wales**
- **1998: Museum specimens in Cardiff & Oxford dating from 1898-1928**
- **Gibbs, 2000: 1st modern record**
- **Duff, 2006: D.G. Brown specimen recognised**
- **Duff et al. 2007 published**
- **2009-2015: additional sites on the Mendips**
  - **Survey of >25 sites**
- **2015: Bristol City Museum specimens - historic records**

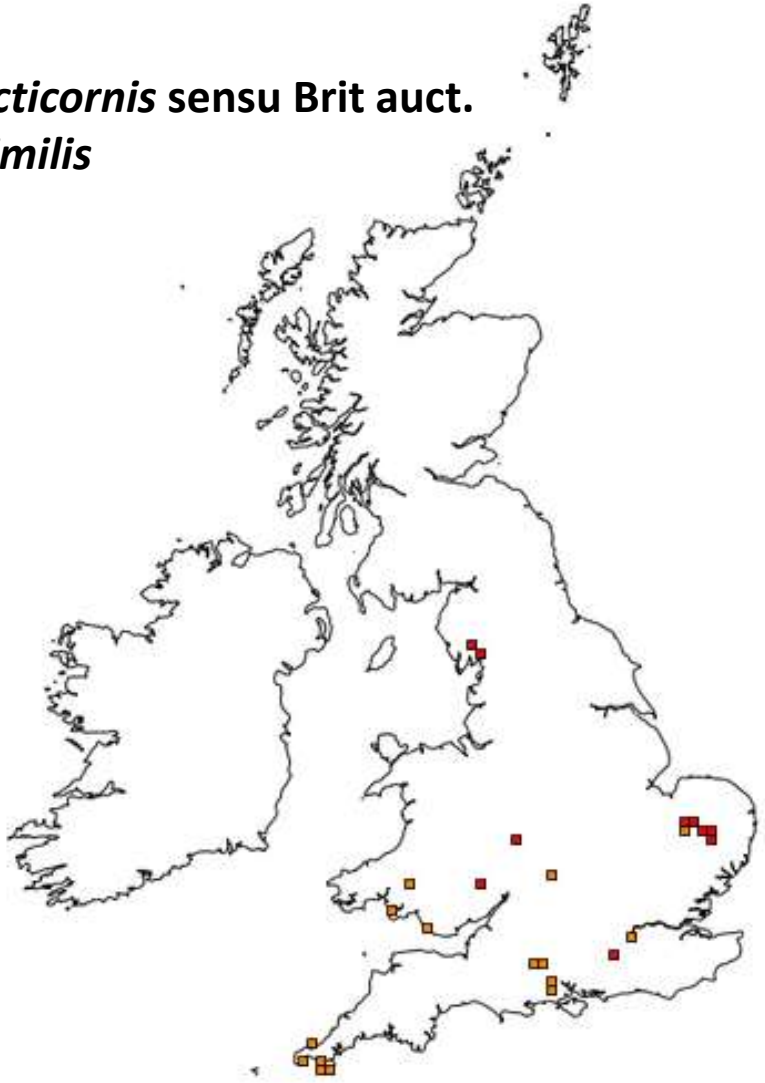
Duff, A.G., Mann, D.J. & Gibbs, D.J. 2007. *Onthophagus fracticornis* (Preyssler) is alive and well in western Britain. *The Coleopterist* **16**(3): 131-133.

Onthophagus fracticornis

Validated distribution



***fracticornis* sensu Brit auct.**
= *similis*



NBN Gateway - Grid map for *Onthophagus* (*Paleonthophagus*) *fracticornis* (Preyssler, 1790)
https://data.nbn.org.uk/Taxa/NHMSYS0001719301/Grid_Map - accessed Jan 2016

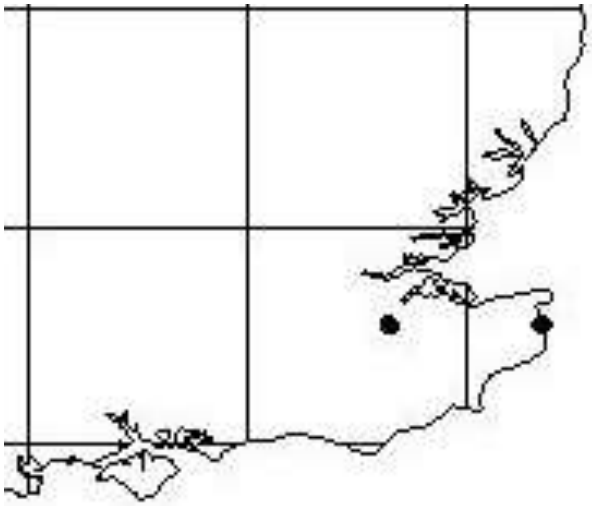
Aphodius punctatosulcatus

1998 – BENHS Collection, Ryarsh (TQ65) Kent, 1938

Further specimens Collections from Deal (TR35) in NMW, Cardiff, WM, Liverpool, OUMNH (20 in total)

Deal – 1890-1910

Confused with *A. sphacelatus* & *A. prodromus*



Mann, D.J. 2000. 1999 Annual exhibition, Imperial College, London SW7. 27 November 1999. Winter Breeding Aphodius (Scarabaeidae). *British Journal of Entomology and Natural History* **13**: 179.

Mann, D.J. 2002. Changes to the British Coleoptera List published in 2000 and 2001. *The Coleopterist* **11**(2): 52-63.

Psammoporus insularis

Described as a New Species to Science in 2006

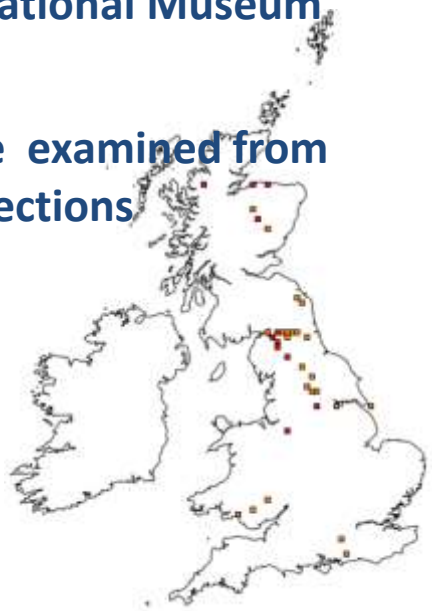
One of our only true endemic Insects

Widespread with a primarily north –western distribution.

River shingle, sandy river banks

Described from material in the National Museum Wales, Cardiff

602 specimens of the genus were examined from across most major European collections



Pittino, R. 2006. A revision of the genus *Psammoporus* Thomson, 1859 in Europe, with description of two new species (Coleoptera Scarabaeoidea: Aegialiidae). *Giornale Italiano di Entomologia* 11: 325-342.

Dung beetle UK Mapping Project
DUMP

@Team_DUMP

#DungBeetle #dungisfun #dungathon #DUMP

Acknowledgements

Special thanks to - Steve Lane, Sally-Ann Spence, Ceri Watkins, Sarah Beynon, Amoret Spooner, Zoë Simmons, Clive Turner, Toby Turner & Jon Webb.

Helen Roy and all at BRC

Data Provision - Martin Albertini, Keith Alexander, Tony Allen, Robert Angus, Tristan Bantock, Charlie Barnes, Paul Brock, Dave Buckingham, Martin Collier, Jonty Denton, Andrew Duff, Graham Finch, Adrian Fowles, David Hanse, Martin Harvey, Robert Hawkes, Peter Hodge, Trevor James, Andy Jukes, Mike Lawn, Martin Luff, Steve McWilliam, Adrian Mylward, Bruce Philp, Nancy Read, Matt Smith, Mark Telfer, Jim Thomas, John Walters, Adam Wright and Richard Wright.

In addition, Jay Hands, Charlie Rose, Sally-Ann Spence and Ceri Watkins helped with data extraction from literature, Museum collections and with some survey work.

Thanks to the following museum curators for access to collections under their care: Guy Knight (World Museum, Liverpool); Mark Pavett & Mike Wilson (National Museums, Wales); Rhian Rowson (Bristol Museum & Art Gallery); Max Barclay (Natural History Museum, London); Dmitri Logunov (Manchester Museum); Jeanne Robinson (The Hunterian (Zoology), University of Glasgow), Peter Chandler (BENHS Collections).