TCBR
Trinity Centre
for Biodiversity Research

Newsletter

Issue 3. December 2011 Edition

NEWS

Message from TCBR Director

The TCBR has come a long way in the last 12 months: we launched our new website, formed the postgraduate-led Biodiversity Forum, developed regular Newsletters, hosted workshops and even chatted to HSH the Prince of Monaco about the importance of biodiversity and ecosystem services when he paid an official visit to Trinity in April. Despite the difficult funding climate, research within the Centre has been going strong too – some of which is described on the following pages. 2012 promises to be equally exciting with various events planned as part of the "Dublin City of Science" initiative, amongst other activities.

I would like to acknowledge the work of former Director, Professor Mike Jones, in initiating the Centre and thank him for his contribution to its development. In addition, much of the work of the Centre over the past year and or so has been driven by Dr. Ainhoa González Del Campo, who has tirelessly worked behind the scenes, organizing meetings and workshops, updating the website, putting the newsletters and annual reviews together and generally motivating everyone to keep the Centre going. Ainhoa's work was initially funded for a short period by the School of Natural Sciences, for which we are very grateful, but mostly she has been working in a voluntary capacity. Thus I want to extend my personal thanks, and on behalf of the Centre, for Ainhoa's commitment and enthusiasm for the TCBR.

Over the coming months we will be finalizing the TCBR Strategic Plan and developing our City of Science initiatives, and I welcome help, contributions and activity by all TCBR members. In the mean time, Merry Christmas!

Jane Stout

TCBR Internship

PhD student Aoife O'Rourke has been appointed as the new TCBR intern. She is assisting the TCBR Steering Committee in organizing and coordinating TCBR activities.

Aoife is part of the plant-animal interactions research group. The focus of her research is on the plant-insect ecology of fixed dunes. She is currently investigating the importance of early flowering creeping willow (*Salix repens, Salicaceae*) as forage for spring bees in fixed dunes, the relationship between floral diversity and plant-insect interaction structure in fixed dunes of different sizes, the effects of microhabitat and macrohabitat complexity on pollinator diversity and also the ecology of the declining bumblebee species *Bombus muscorum* in the fixed dune ecosystem. She has a passion for conservation ecology, interest in complex ecosystem interactions and special love for invertebrates.

Photograph courtesy of Aoife O'Rourke

Workshop on Integrated Biodiversity Impact Assessment

A workshop was held on the 7th of October as part of the EPA-funded 'GIS-supported Methodology for Integrated Biodiversity Impact Assessment (IBIA)' in which TCBR members Dr. Ainhoa González and Professor Mike Jones are collaborating with UCD and ScottCawley Ltd. The aim of the project is to develop a methodology that integrates the requirement of the Habitats Directive for Appropriate Assessment (AA) with Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA), in order to enhance the efficiency of legal, administrative and operational procedures.

The workshop was well attended by key governmental, scientific and consultancy representatives, including biodiversity officers from the Dept. of the Environment, Community and Local Government, the National Parks and Wildlife Services and the National Biodiversity Data Centre, among others.

It provided an opportunity to discuss research findings, review the draft IBIA methodology and gather feedback from key stakeholders and practitioners. There was strong support for integrating and improving procedures; however, the need to distinguish between SEA/EIA and AA was underlined, given the stronger statutory powers of AA. Also, concerns were raised in relation to resources and biodiversity data gaps, and recommendations were made to improve in-house expertise for AA screening, as well as to promote spatially-specific data collection and creation of a biodiversity data sharing mechanism among practitioners.

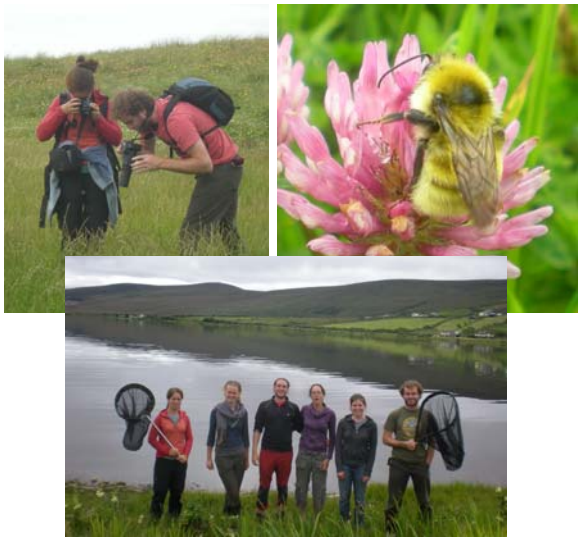
More information can be found at: www.ucd.ie/ibia

NEWS

Rare Bumblebee Trip

A team of bumblebee enthusiasts from the TCBRs Plant-Pollinator Interactions research group organised a fieldtrip to the Mullet peninsula, County Mayo, at the end of July to search for Ireland's rarest bumblebee – the great yellow bumblebee (*Bombus distinguendus*). In the UK, *B. distinguendus* has undergone an 80% loss of range in 100 years and is protected by law. In Ireland, it has been classified as endangered in the red list of Irish bees, and has been pushed to the edge of its range due to its association with machair, flower rich sand dunes and dry calcareous grassland. It is now limited to a handful of sites along the west coast, but current data on its distribution is lacking.

The aim of the trip was to visit known *B. distinguendus* sites in the Mullet that had not been surveyed since 2004, as part of the National Biodiversity Data Centre Pollinator Initiative "Rare species watch". *B. distinguendus* was found in good numbers at almost all previously recorded sites, and a new site was also recorded. Notable records of the vulnerable red-shanked carder bee (*B. ruderarius*) and some of the rarer cuckoo bees including the endangered red-tailed cuckoo bee (*B. rupestris*) were also made over the weekend. Good fun was also had by all! Thanks to Chloe Galley, Shane McGuinness, Miles Newman, Aoife O'Rourke, Dara Stanley and Erin-Jo Tiedeken.



Photographs courtesy of Dara Stanley

12th European Ecological Federation Congress

The 12th European Ecological Federation Congress was held in Avila, Spain from 25th to 29th September 2011 with the focus on "Responding to rapid environmental change". Three members of the TCBR travelled to this meeting.

TCBR members David Bourke and Jane Stout along with Jens Dauber (now at the Johann Heinrich von Thünen-Institut, Germany), convened a session on the "Impacts of climate change mitigation measures on biodiversity and ecosystem services". Dr Pam Berry from the Environmental Change Institute at the University of Oxford was invited to open the session. Dr Berry delivered a thought-provoking talk entitled "The ABC of Adaptation, Biodiversity and Climate change", examining the complementarity of the relationships between climate change and biodiversity, as well as how adaptation can be effectively implemented in a more holistic manner to strengthen the role of biodiversity in climate mitigation.

TCBR PhD researchers Dara Stanley and Jesko Zimmermann delivered presentations on "Bioenergy crops: drivers of pollinator decline or favourable alternatives to conventional crops?" and "Soil organic carbon under Miscanthus - Assessing the impacts of land-use change from grassland to a perennial bioenergy crop". David Bourke delivered a talk on the impacts of wind farm developments on biodiversity and ecosystem services. Overall, the conference was a great success with thirty six sessions in total providing an excellent array of talks on all things ecological.

More information on the European Ecological Federation can be found at www.europeanecology.org. The next EEF meeting is planned to link up with INTECOL (www.intecol2013.org) in London in August 2013.

Public Consultation on the Nagoya Protocol

Public Consultation is being carried out by the EU Commission on the implementation and ratification of the Nagoya Protocol on Access to genetic resources and Benefit Sharing arising out of their utilization.

The Nagoya Protocol was agreed at the Conference of the Parties to the Convention on Biological Diversity in October 2011 but must be ratified by individual countries. Ireland will consider ratification, along with the EU and other Member States in the coming months. This consultation is an important step in gauging awareness and the level of interest amongst different sectors on the matter.

The public consultation is open until 19-12-2011. The consultation document is available at:
http://ec.europa.eu/environment/consultations_en.htm

Second National Biodiversity Plan Published

'Actions for Biodiversity 2011-2016', Ireland's 2nd National Biodiversity Plan, was launched on the 9th November 2011 by Jimmy Deenihan, Minister for Arts, Heritage and the Gaeltacht.

NEWS

This National Biodiversity Plan has been developed in line with the EU and international Biodiversity strategies and policies.

It builds upon the achievements of the previous plan, focusing on actions that were not fully completed and addressing emerging issues under seven strategic objectives. Such objectives cover biodiversity conservation in the wider countryside and the marine environment, both within and outside protected areas; biodiversity mainstreaming across the decision-making process; strengthening the knowledge base; increasing public awareness and participation; and Ireland's contribution to international biodiversity issues.

The Plan also highlights the importance of ecosystems, including: the provisioning services (production of food and water, etc.), regulating services (e.g. the control of climate and disease), supporting services (e.g. nutrient cycling and crop pollination), and cultural services (such as spiritual and recreational benefits).

Further details can be found at:
http://www.pobail.ie/en/Publications/HeritagePublications/NatureConservationPublications/Actions%20for%20Biodiversity%202011%20-%202016.pdf

PUBLICATIONS

Journal Articles

Delêtre M, McKey DB, Hodkinson TR (2011). Marriage exchanges, seed exchanges, and the dynamics of manioc diversity, *PNAS*, 2011.

Dermody BJ, Tanner CJ and Jackson AL (2011). The evolutionary pathway to obligate scavenging in Gypsvultures. *PLoS ONE* ,6(9) e24635.

Dietzsch AC, Stanley DA, Stout JC (2011). Relative abundance of an invasive alien plant affects native pollination processes. *Oecologia*, 167:469-479.

Duffy KJ, Stout JC (2011). Effects of conspecific and heterospecific floral density on the pollination of two related rewarding orchids. *Plant Ecology*, 212: 1397-1406.

Egan PA (2011). Meconopsis autumnalis and M. manasluensis (Papaveraceae), two new species of Himalayan poppy endemic to central Nepal with sympatric congeners, *Phytotaxa*, 20, 47-56.

Egan PA, Pendry CA and Shrestha, S (2011). Papaveraceae. In: Watson, MF et al. (eds), *Flora of Nepal*, Volume 3, Royal Botanic Garden Edinburgh, pp 78 - 95.

Hodkinson TR, Jones MB, Waldren S, Parnell JAN (2011). Climate Change, Ecology and Systematics. *The Systematics Association Special Series*, 78, Cambridge University Press.

Jackson AL, Parnell AC, Inger R and Bearhop S (2011). Comparing isotopic niche widths among and within communities: SIBER – Stable Isotope Bayesian Ellipses in R. *Journal of Animal Ecology*, 80, 595-602.

Jackson ALR (2011). Renewable energy vs. biodiversity: Policy conflicts and the future of nature conservation. *Global Environmental Change*, 21: 1195-1208.

Jones K, Jackson AL and Ruxton GD (2011). Prey jitters; protean behaviour in grouped prey. *Behavioral Ecology*, 22(4), 831-836.

Mayer C, Adler L, Armbruster S, Dafni A, Eardley C, Huang SQ, Kevan P, Ollerton J, Packer L, Ssymank A, Stout J, Potts (2011). Pollination ecology in the 21st century: key questions for future research. *Journal of Pollination Ecology*, 3, 8-23

Mitchell FJG (2011). Exploring vegetation in the fourth dimension. *Trends in Ecology and Evolution*, 26, 45-52.

Moora M, Berger S, Davison J, Öpik M, Bommarco R, Bruelheide H, Kühn I, Kunin WE, Metsis M, Rortais A, Vanatoa E, Vanatoa A, Stout JC, Truusa M, Westphal C, Zobel M, Walther GR(2011).Alien plants associate with widespread generalist arbuscular mycorrhizal fungal taxa: evidence from a continental-scale study using massively parallel 454-sequencing. *Journal of Biogeography*, 38, 1305-1317.

Power EF, Stout JC (2011). Organic dairy farming: impacts on insect-flower interaction networks and hawthorn pollination. *Journal of Applied Ecology*, 48, 561-569.

Tanner CJ and Jackson AL (In press). Social structure emerges via the interaction between local ecology and individual behavior. *Journal of Animal Ecology*.

Tanner CJ and Jackson AL (In press). The combination of social and personal contexts affects dominance hierarchy development in shore crabs (Carcinus maenas). *Animal Behaviour*.

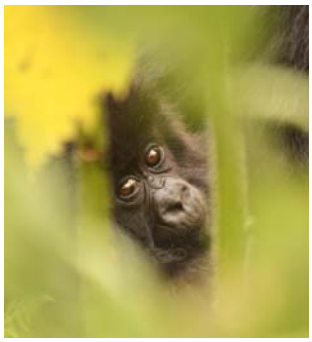
Tanner CJ, Salalı GD and Jackson AL (In press). The ghost of social environments past: dominance relationships include current interactions and experience carried over from previous groups. *Biology Letters*.

RESEARCH FOCUS

Organic Farming and Biodiversity

The Virungas Massif Transboundary Protected Area of eastern central Africa forms part of the Albertine Rift Biodiversity Hotspot, having been relatively isolated for much of its existence. As a result, these highly diverse highlands of Rwanda, Uganda and DRC are extremely valuable yet delicately placed in one of the most densely populated regions of mainland Africa. Consequently, an increasing amount of human-wildlife conflict is arising between local subsistence farmers and Volcanoes National Park (the Rwandan portion of this protected area) valued for the endangered species they harbour, including mountain gorilla and golden monkey, and the tourist revenue they generate. Recognising the right of these people to farm this land, and the value of local knowledge in conservation decision making, this project aims to characterise the issue by measuring the level of crop damage perpetrated by gorilla, buffalo, duiker and porcupine in the region, assessing current efforts to mitigate the damage done and exploring local perceptions of a national park which generates $80million annual revenue. Is enough being done to support these people and does the shared revenue from the forest, in the form of infrastructure, healthcare and education, compensate for the losses?

Over the coming 8 months Shane Mc Guinness hopes to address these questions by involving local at-risk communities in finding a solution, as well as assessing current defences, such as trench-and-wall, designed to stop buffalo.



Photographs courtesy of Shane Mc Guinness

The initial focus group phase of this project has begun in 6 of the 12 park-adjacent sectors. This will be followed by an intensive survey period and the establishment of long-term monitoring of crop raiding occurrences by local volunteer night guards. It is hoped this will build the capacity required to enable local people to continue the conservation of their national park and the sustainable use of farmland encompassing it. This project has been kindly funded by the Irish Research Council for Science, Engineering and Technology (IRCSET).

Hairy Snails (and other facts from the world of Irish molluscs)

Maria Long began working on land snails in 2006 when it came to her as some surprise that there are hairy snails in Ireland (see photo), and that they are quite common! And that was not the only surprise - she made many discoveries during her PhD project.

There are almost 180 species of non-marine mollusk in Ireland, of which around 70 are native land snail species (the remainder are either slugs, freshwater/aquatic species or aliens). The terrestrial molluscs found in Ireland belong to the class *Gastropoda*, the only molluscan group to have colonised land. Most, though not all, are characterised by having a single shell (many species have lost the shell and these are known as slugs). The size range of gastropods in Ireland is from <1mm to about 4cm. The main thing that struck her when she began sorting through mollusc samples was the tiny size of the snails. The vast majority of the snails were less than 4mm in size, and very many were less than 2mm. There are so many small species (well smaller that the ones we are accustomed to see in our vegetable gardens).

In fact, most people only ever see a very few species – those which are best adapted to living close to man. These species include the common (or garden) snail, *Cornu asperum*, the white- and brown-lipped snails, *Cepaea hortensis* and *C. nemoralis*, the strawberry snail, *Trochulus striolatus*, and a battery of slug species too. The reality is that there are dozens of other species in Ireland which have no interest in eating vegetables. In fact, most species prefer to eat dead and rotting plant material, rather than juicy living plants, fruits or vegetables. In doing so, they provide the hugely important ecosystem service of breaking down and recycling nutrients. Molluscs are more efficient than many other invertebrates at assimilating dead plant material, a fact attributed to the presence of cellulases and other polysaccharidases in their guts which enable them to decompose structural polysaccharides found in plants.

Unfortunately for man, however, those few pest species that do like to eat crops are very good at it, and exist in large numbers. But do spare a thought for the countless other species which exist, and are both fascinating and indispensible facets of our environment.

RESEARCH FOCUS

Toxic Nectar and Pollen: Consequences for Pollinator Communities

Secondary plant compounds help plants defend against herbivores and competitors, but why are these toxic substances sometimes present in nectar and pollen? This paradoxical phenomenon occurs in invasive *Rhododendron ponticum* in Ireland and is currently being investigated by PhD student Erin Jo Tiedeken. The nectar of *R. ponticum* contains grayanotoxins, grayene diterpenoids which interfere with the transmission of the action potential by blocking sodium channels and preventing cells from hyperpolorizing. Toxic nectar could have particularly potent consequences for pollinating insects that rely on nectar and pollen for nutrition. Pilot studies reveal that *R. ponticum* nectar toxins have differential effects on Irish pollinators; honeybees die within 24 hours of consuming *R. ponticum* rewards while *Bombus* species use both nectar and pollen as a major forage resource, apparently able to tolerate the toxins.

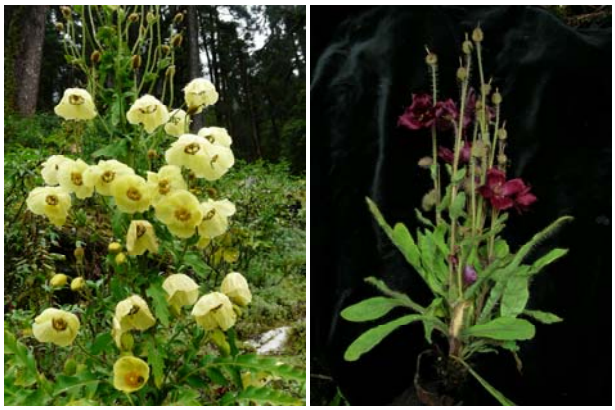
Erin Jo will look for sublethal effects on native *Bombus* species such as post-ingestional malaise, negative effects on brood, or changes in parasite load. The effects of grayanotoxins on antagonist species associated with *R. ponticum*, such as nectar robbers, will also be investigated. The aim of the project is to investigate what, if any, adaptive function toxic nectar plays in this system and how the presence of this plant trait influences invasion success and affects plant-pollinator community structure. This interdisciplinary project is being studied by Erin Jo and fellow PhD student Paul Egan under the supervision of Dr. Jane Stout and several additional PI's: Dr. Geraldine Wright (Newcastle University), Dr. Phil Stevenson (Royal Botanic Gardens, Kew), and Dr. Mark Brown (Royal Holloway University).

For more information, please visit:
http://www.tcd.ie/Botany/research/stout/people%20erin.php

Documenting and Conserving Nepal's Biodiversity

Owing to its unique climatic conditions, complex topography and broad habitat variation, Nepal represents a large share of global biodiversity and packs a punch well above its weight in terms of landmass to biodiversity ratio. Both floral and faunal diversity are of global significance, particularly groups such as pteridophytes (4.7% of global biodiversity), gymnosperms (5.1%), angiosperms (2.7%), birds (9.5%) and mammals (4.5%). However, despite having declared nearly 25% of the country under 'protected status', the critical lack of a national floristic inventory for Nepal has to date hampered efforts to safeguard this treasure-trove of biodiversity.

In response to this dilemma the Flora of Nepal project was initiated in 2003 with the purpose to produce the first comprehensive account of the estimated 7,000 species of vascular plants. As part of this multi-institutional initiative, work at the TCBR by Paul Egan and Man Kumar Dhamalahas included preparation of the family account for *Papaveraceae*, recently published in Volume 3 of the Flora in September 2011. The account also features two new endemic species of the iconic Himalayan poppy genus *Meconopsis,* discovered in 2008 on fieldwork in the vicinity of the Ganesh Himal (7422m) and Mount Manaslu (8156m).



Meconopsis Autumnalis (left) and M, Manasluensis (right)
Photograph courtesy of Paul Egan

Research currently on-going is focused upon delineating 'Important Plant Areas' in east Nepal, in order to prioritize regional biodiversity hotspots for conservation (more information here). Amongst the promising outputs so far have been 14 new national species records for Nepal.

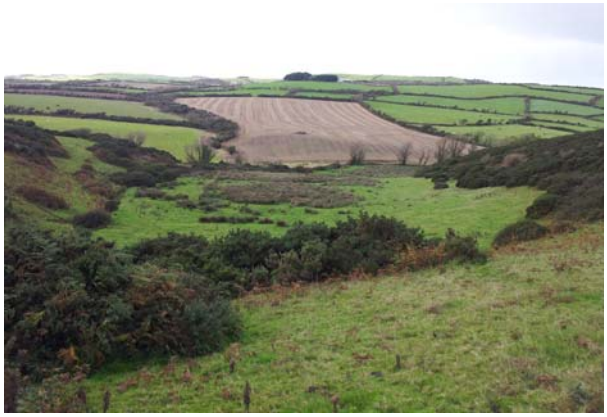
For more information, please visit:
http://rbg-web2.rbge.org.uk/nepal/floraofnepal/

Progress on SIMBIOSYS

The SIMBIOSYS Project, funded by the EPA, co-ordinated by TCBR Director (Jane Stout) and involving four other members of the TCBR (Mike Jones, David Bourke, Dara Stanley and Jesko Zimmermann), has been running since April 2008 and is entering its final year, with the project due for completion in October 2012. The project aims to quantify the impacts of a range of sectors on biodiversity at genetic, species and landscape scales and assess the consequences on ecosystem functioning and service provision. The research falls into three main work packages, bioenergy crops, road landscaping and aquaculture, and, with partners in UCD, UCC and NUIG, is using pollinators, carabid beetles, plants, introduced oysters and marine invertebrates as model taxonomic groups.

RESEARCH FOCUS

TCBR PhD researcher, Dara Stanley has been investigating how the introduction of bioenergy crops such as *Miscanthus x giganteus* and oilseed rape into agricultural landscapes contributes to changes in pollinator (solitary bees, bumble bees, butterflies and syrphids) richness and abundance and population structure. Her work to date shows that in existing agricultural systems, land use change from conventional crops to bioenergy crops on a small scale does not cause declines in pollinator groups in individual fields, and may even facilitate increases in important groups such as solitary bees. Recently, Dara has been focusing on the impacts of growing oilseed rape on colony densities of bumblebees using molecular methods, and on the loss or enhancement of pollination services in agroecosystems.



Surveyed landscape in Dunmore East, Co. Waterford
Photograph courtesy of David Bourke

A second TCBR PhD researcher, Jesko Zimmerman has been focusing more on the ecosystem services provision associated with bioenergy crops comparing soil carbon sequestration under Miscanthus, tillage, and grassland treatments. Jesko has just published a paper in Global Change Biology Bioenergy entitled "Soil carbon sequestration during the establishment phase of *Miscanthus x giganteus*: a regional-scale study on commercial farms using 13C natural abundance" which shows that the loss of soil organic carbon due to soil disturbance caused by the introduction of *Miscanthus x giganteus* does not contribute to the overall carbon losses.

TCBR postdoctoral research fellow, David Bourke, is the SIMBIOSYS project manager and has focused his research efforts this summer at the landscape scale, assessing the effect of surrounding landscape structure on field scale biodiversity to disentangle crop type and landscape effects. The structure of the agricultural landscapes was characterized using remotely sensed data and habitat survey, combined with GIS based landscape metrics. Preliminary results show that on average 3% of these agricultural landscapes in south east Ireland are composed of semi-natural habitats while each 1x1 km landscape had 10 km of hedgerow. A full analysis of these data is hoped to reveal the importance of landscape complexity on species richness, diversity and community structure. This work was undertaken with the help of research assistant Florence Hecq and Environmental Science MSc student Evie Flynn. David is also conducting a strategic review on the influence of wind farm developments on biodiversity and ecosystem services.

Resulting habitat map of the landscape surveyed in Dunmore East, Co. Waterford.
Image courtesy of David Bourke

The end-of-project final meeting will be on June 28th 2012 at TCD. For more information please check out the website: www.simbiosys.ie or contact Jane Stout or David Bourke.

EVENTS

The Irish Environmental Networks' (IEN) Biodiversity Showcase can be visited at The Greenhouse until December 7th 2011. The showcase features displays of a selection of biodiversity projects undertaken in 2011 by IEN members, and funded by the National Parks and Wildlife Service.

The Ecology and Evolution Seminar Series 2011-2012 takes place on Friday's at 3pm in the Botany Lecture Theatre, Botany Building, TCD. For details on speakers and seminar titles, please see:

http://www.tcd.ie/tcbr/assets/pdf/E&E%20Seminar%20series_2011.pdf

REQUESTS

Please send in information concerning current research, calls, news, publications and wildlife photos from field trips for inclusion in our next quarterly newsletter.

Please donate biodiversity books to the TCBR library.

Trinity Centre for Biodiversity Research
22 Hamilton Building
Westland Row
Dublin 1
biodiversity@tcd.ie / www.tcd.ie/tcbr