



Centre for Ecology and Conservation

# Annual Report 2017



# Welcome

## Still growing in size and reputation



This year was yet again one of great success for the Centre for Ecology and Conservation. In the Student Guild Awards we were crowned Department of the Year for the Cornwall Campuses. This not only evidences the excellence of our staff but the strength of the relationship with our students, particularly our student representatives, who engage so strongly in our agenda of codevelopment and improvement of educational content and process.

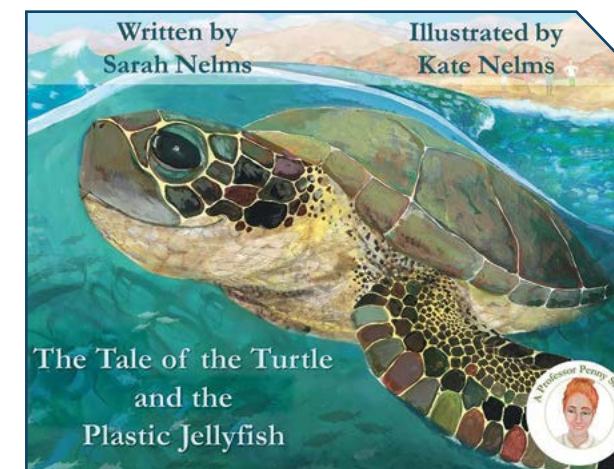
We have grown into a very strong department with nearly 1,000 undergraduates, nearly 100 MSc students and over 150 graduate research students. As the news of our growth and success spreads around the world, so more students from other countries join us. We are now proud to host students from all over the world as well as very many fellow Europeans. We seek to ever increase the diversity of our student body as we go forward. We are building strategic relationships with an ever-growing group of elite international institutions including University of Queensland and Chinese University of Hong Kong.

The degrees of our large student body are all focussed on aspects of whole organism biology – matching well our research strengths in ecology, conservation, behaviour and evolution. Many staff undertake marine research across these themes. This leads to a tremendous critical mass of interest in shared extracurricular activities through our

wonderful student societies and organisations (see **Student Societies**). New for 2018 will see an expedition containing a number of our students, *Sail Against Plastic: A Message from the Arctic* which seeks to identify levels of non-visible pollution in the Barents sea and create awareness through art, media and film. Our students really do a great deal to make the CEC the marvellous department it has become.

We are a research-intensive unit and this year saw over £8 million in research funds awarded from research councils, government departments and charities as well as some significant prizes and fellowships (see **Funding Awards**). We also appointed a large group of research intensive faculty members and were particularly proud to receive a record number of successful EU Horizon 2020 Marie Skłodowska-Curie Fellowships (seven in total). It's a good job our new buildings are well underway, they will be filled the day they open.

The CEC continues to be an exemplar in sharing science with our community (see **Science in the Community**). Our school's programme continued apace reaching 4,000 students across 20 schools. We were again represented at the Cornwall Show and Penryn Day. In Falmouth Week our flagship event, Science in the Square saw 3,000 visitors treated to a veritable cornucopia of accessible science and then to end the year, the fourth annual Science of Christmas event was hosted by Falmouth Polytechnic. 2017 saw the fruition of the Professor Penny Stories which are a series of children's books written by our staff and students. Each with a unique style and appropriate for a range of ages, these stories bring scientific research and natural history to life – from microbiology to animal behaviour and conservation. They are freely available to download on the university website where they have been read thousands of times.



*The Tale of the Turtle and the Plastic Jellyfish*, by Sarah Nelms

One of the books, *The Tale of the Turtle and the Plastic Jellyfish* has already been translated into French and Greek, with other languages pending.

As the year ends, it sees me passing the baton of leadership of the Centre for Ecology and Conservation and CLES Cornwall to Professor Dave Hodgson



(pictured right). It has been my honour to serve as Director and work for such an amazing group of students and staff. I have every confidence that Dave will help take the Centre forward to even better things. I will now lead the #ExeterMarine strategy across the University, an endeavour of which the students and staff in the CEC will form an important part.

**Professor Brendan Godley**  
Director, Centre for Ecology and Conservation  
Head of Discipline, CLES Cornwall



Brendan as a turtle. Photo Andy Young



# Research Highlights

## Marine turtles dying after becoming entangled in plastic rubbish



Entanglement in anthropogenic debris is recognised as a cause of mortality in marine turtles however quantitative knowledge gaps remain. A global summary, using expert opinion, reported entanglement across all species, life stages and ocean basins, with particular vulnerability in pelagic juveniles. Numbers of stranded turtles

encountered were in the thousands per year, the majority dead with many experts considering this could be causing population level effects. Ghost gear contributed to most of reported entanglements. Collaboration among stakeholder groups as well as addressing research needs will facilitate the development of mitigating actions to begin to resolve and further understand the issue. **Published in *Endangered Species Research* by Emily Duncan, Zara Botterell and Professor Brendan Godley.**

## Forecasts help predict future of UK birds



Forecasts that predict how climate change will affect wildlife are improving, as demonstrated by research into UK birds. The accuracy of these models had never been tested before. The research tested how accurately different types of ecological models predicted range contraction and expansion of 20 UK bird species over the last 40 years. The latest generation of models, which directly account for important ecological responses to climate change, do much better at forecasting recent range shifts. For example, the Sparrowhawk has colonised the eastern UK since 1970, and this was captured by sophisticated models that included population growth rates and how far birds travel from where they are born. This means we now have tools that not only better forecast climate-driven range movements, but can be used to target conservation more effectively. **Published in *Global Change Biology* by Dr Regan Early.**

## Diversity and immigration increase productivity in microbial communities

From a first kiss to a pipe discharging sewage into the sea, community coalescence (blending of multiple microbial communities into one) is common and therefore – possibly an important process. Using methane producing communities (MPCs) of microorganisms, we tested what happens when two (or more) ecosystems become one. Using MPCs allowed us to estimate, which communities (and their mixes) performed well: the more methane they produced, the healthier they were. Results show that the more communities we put in the mix, the better it functions. It produces as much methane as its best component community and also has a similar composition. If this is true for other systems, it can be used to optimise any process relying on microbial communities. **Published in *Current Biology* by Dr Pawel Sierocinski, Florian Bayer and Professor Angus Buckling.**



## Fish have complex personalities, research shows

Individuals of the same species, and of the same population, can differ consistently in the way they behave – a phenomenon known as ‘animal personality’. While personality has been demonstrated in many species, researchers are only beginning to appreciate its complexity. Observing individual Trinidadian guppies repeatedly under conditions of varying stress (exposure to an unfamiliar environment, and to model predators), we found remarkable variation in their behaviour, including multiple strategies for coping with stressful situations. The predator models caused all fish to become more cautious, but individuals still retained their distinct personalities. Behaviour is flexible, enabling populations – and individuals – to respond rapidly to environmental changes, yet we also found that personality can be strongly conserved across such contexts. **Published in *Functional Ecology* by Dr Thomas Houslay, Maddalena Vierbuchen, Andrew Grimmer, Dr Andrew Young and Professor Alastair Wilson.**



## Otters learn by copying each other

Many animals copy others to tackle life's challenges, but they are selective in whom to copy and when. Social learning research has focused on fish, birds and primates, while the dexterous, socially diverse and threatened otter species have remained neglected until now. Zosia Ladds, William Hoppitt and **Dr Neeltje Boogert** showed for the first time that otters can learn by copying each other: in smooth-coated otters, youngsters were 6x faster than their parents to solve novel food puzzles, and they were more likely to learn socially, suggesting a ‘copy when young’ social learning strategy. Reintroduction efforts might benefit from facilitating the social learning of survival skills in these vulnerable species. **Published in *Royal Society Open Science* by Dr Neeltje Boogert.**



## How camouflaged birds decide where to blend in



Smooth-coated otters (photo credit: Nicole Duplaix)

Many animals, and even some plants, rely on camouflage to avoid detection and recognition. This often involves looking like the general colour and pattern of the background environment. It's been known for a long time that some species and morphs of moth can select resting sites and orientations to optimise their concealment, but little is known regarding whether individual animals have behaviours that enable them to do this based on their own specific appearance. Work by **Professor Martin Stevens, Dr Jolyon Troscianko, Jared Wilson-Aggarwal** and Professor Claire N. Spottiswoode shows that wild ground-nesting birds like plover and nightjars choose locations to nest that improve the camouflage of their own eggs and plumage. They can do this over a wide range of spatial scales, showing that behavioural modification of camouflage can be highly refined. **Published in *Nature Ecology and Evolution* by Professor Martin Stevens, Dr Jolyon Troscianko and Jared Wilson-Aggarwal and Professor Claire N. Spottiswoode.**

## Drowsy dormice doze into decline



Even when a threatened species is protected, a major challenge for conservation is understanding how populations vary and whether conservation measures are doing any good. PhD researcher **Cecily Goodwin** has been working on a project supported by the Forestry Commission and Natural Environment Research Council to understand the conservation requirements of hazel dormice in British woodlands. Cecily has worked alongside the National Dormouse Monitoring Programme to analyse the records provided by dedicated dormouse monitors who have been counting the rodents in 26,000 nest boxes in 400 woodlands for more than 20 years. She identified a 72% decline from 1993 to 2014, despite their protection. This rate of decline may mean that dormice should be classified as Endangered in the UK. Dormice are likely to face a range of problems: Climate change and habitat loss are important but woodland management could also be key. One possibility, that Cecily is currently researching, is that more active woodland management may be needed, not less. Our further research is working with foresters to better understand the needs of dormice and how these can be integrated with active woodland management. **Published in *Mammal Review* by Cecily Goodwin, Professor David Hodgson and Professor Robbie McDonald.**

## Exeter researchers help to protect Peru's river dolphins



© Sebastián Castañeda / WWF - Perú

The boto *Inia geoffrensis* and the *tucuxi Sotalia fluviatilis* are two species of river dolphin endemic to the Amazon. They are threatened by climate change, habitat degradation from dams, pollution and boat traffic and, more significantly, harmful interactions with fisheries. Since 2013, ProDelphinus, a Peruvian NGO led by **Dr. Joanna Alfaro-Shigueto**, who completed her PhD at Exeter, under supervision of Dr. Brendan Godley based in Cornwall Campus, began a project investigating these species in southern Ucayali, a major branch of the

Amazon River. Ucayali holds both species of dolphins, in a region of their distribution previously unstudied. This study led to MSc student Elizabeth Campbell's dissertation work, recently published in Latin American Journal of Aquatic Research LAJAR. Recently both researchers worked closely with the Peruvian government agency PRODUCE (Ministry of Fisheries), to draft the Action Plan for the Conservation of River Dolphins and the Amazonian Manatee. The Action Plan has been prepublished and priorities identified in the document are under implementation, with participation of government, and local agencies, as well as academia and NGOs. **Published by Dr Joanna Alfaro-Shigueto and Dr Jeffrey Mangel.**

## Global warming kills gut bacteria in lizards

Recent climate change is a threat to biodiversity, and while many studies focus on climate-driven extinction risk of charismatic vertebrates such as birds, none to our knowledge has studied the consequences of climate change on gut microbial communities. **Dr Elvire Bestion** et al experimentally studied how future climate change affects the diversity of gut microbiota in a small vertebrate ectotherm, the common lizard. They found that warmer temperatures led to a large loss in bacterial diversity, with potential further consequences on hosts' survival to climate change. By focusing on charismatic animals and forgetting microbial diversity within their guts, we might be underestimating climate-driven biodiversity loss. **Published in *Nature Ecology and Evolution* by Dr Elvire Bestion.**



## Climate change risk for animals living in prime conditions


As climate changes, many species will have to either move to new locations, or evolve to adapt to changing conditions at their current locations. This study examined whether 12 European bird species might be able to evolve to adapt to climate change within different parts of their geographic ranges. The populations that had the least evolutionary potential were those that currently live in the most favourable conditions, usually at the centre of the species' range, and those that live in the toughest conditions were found at the very edges of the range. The populations that displayed the greatest potential to evolve with changing conditions were found living between the two extremes. **Published in *Proceedings of the Royal Society B* by Dr Regan Early and Dr Jesus Martinez-Padilla**





# Research Highlights

## Insecticide-resistant flies ‘rubbish’ at courting females

 Insecticide resistance sounds like a superpower for the average male fruit fly – but there’s a catch. Recent research by **Professor Nina Wedell** and **Professor David Hosken** have shown that the single genetic change which protects the flies from the pesticide DDT also makes males smaller, less aggressive and “rubbish” at courting females. Resistant males are also more prone to “decamping” – the technical term for giving up midway through a mating attempt. As a consequence resistant males have lower mating success than susceptible males. It is remarkable that such a trivial genetic change to a single allele can have such a dramatic impact on the morphology and behaviour of male flies. If carrying resistance genes is generally costly for males, then this will have an impact on the spread and persistence of resistance alleles in nature. If we can figure out why resistant males have become reproductively less competitive, we could use this knowledge to develop methods to suppress insect pest populations. **Published in *Behavior Genetics* by Professor David Hosken and Professor Nina Wedell.**

## Computer game helps scientists understand animal camouflage

Could there be an advantage to being colour-blind? Colour vision varies markedly between species, and often within-species, and searching for camouflaged prey is thought to be a task where limited colour vision could actually help a predator. We used online “citizen science” games to pit people with ‘normal’ colour vision against simulated red-green colour blind people when searching for camouflaged nightjars or eggs. Contrary to our expectations, colour-blind participants were slower at catching the camouflaged prey than people viewing normal colours. However, over time the colour-blind participants learnt to overcome this disadvantage, even performing on a par with normal-vision participants. You can play the games at: [www.sensoryecology.com/games](http://www.sensoryecology.com/games). **Published in *Behavioural Ecology* by Dr Jolyon Troschianko, Jared Wilson-Aggarwal and Professor Martin Stevens.**



Nightjar shown in ‘normal’ colour on the left and red-green colour-blind simulation on the right

## Climate change and fishing create ‘trap’ for penguins

When environments are degraded by human actions, animals may mistakenly select habitats that lower survival or reproduction. These “ecological traps” can have profound consequences, but it had been unclear whether they operate in the oceans. **Dr Richard Sherley** and **Dr Stephen Votier** showed how juvenile penguins disperse across a large marine ecosystem, targeting cues that should indicate high prey abundance. Doing so compromised their survival because fishing and climate change have degraded fish stocks in the region. The study is the first to reveal the extent and effect of a marine ecological trap, and highlights the importance of matching conservation action to the scale of ecological processes. **Published in *Current Biology* by Dr Richard Sherley and Dr Stephen Votier.**



## Climate change has mixed effects on migratory geese

Migratory species are thought to be particularly vulnerable to climate change, with those living at high latitudes under most threat. Our long-term study of light-bellied Brent geese shows that environmental conditions during a critical period in early summer play a central role in driving the demography of this migratory population. While warmer conditions are better for breeding success because of better rearing conditions, they are bad for female survival, because the ground nesting females carry out all incubation and are more vulnerable to predation. With warmer years on the increase it seems likely that at some point in the future the increases in breeding success will not be enough to offset the loss of adult females. **Published in the *Journal of Animal Ecology* by Dr Ian Cleasby, Dr Thomas Bodey, Dr Freydis Vigfusdottir, Dr Jenni McDonald and Professor Stuart Bearhop.**



Nightjar shown in ‘normal’ colour on the left and red-green colour-blind simulation on the right

### CASE STUDY

## Year of the Mongoose

For the last 22 years, a group of researchers from the Centre for Ecology and Conservation, Penryn Campus and a team of Ugandan researchers have been following 10 families of wild banded mongooses living on the Mweya Peninsula in Queen Elizabeth National Park, western Uganda (Figure 1). This long-term study has been investigating the evolution of animal societies and is revealing the tensions that arise in even the most cooperative of family groups. Banded mongooses are unusual among mammals because multiple females in each group give birth together, usually on the same day.

The communal litter is raised by adult helpers called ‘escorts’, who form one-to-one caring relationships with particular pups (Figure 2). We’ve long wondered whether escorts direct care towards their close kin, but we showed this year that neither parents nor other escorts preferentially escort their own offspring, or discriminate between pups on the basis of genetic relatedness. Rather, this is a situation where pups gain from concealing their identity to avoid being attacked by infanticidal females. The importance of remaining anonymous can also explain why breeding females exhibit such extreme birth synchrony in this species - giving birth on the same morning mixes up the cues that mothers usually use to distinguish their own offspring from others<sup>1</sup>.

Since extreme birth synchrony masks the maternity of offspring, dominant female banded mongooses cannot use infanticide to suppress reproduction in their subordinates, as occurs in meerkats, African wild dogs, and many other mammalian cooperative breeders. Instead, dominant females use another strategy to limit the amount of competition faced by their offspring: they violently evict multiple young females from the group. These evictions are sudden, chaotic and highly aggressive affairs. Females that are targeted for eviction are repeatedly attacked, driven out of the group and often wounded in the process. We showed this year that, to our great surprise, dominant individuals target their closest female kin for violent eviction, while allowing unrelated females to remain in the group. Using a game theoretical model, we showed that this type of ‘negative kin discrimination’ can evolve in cases where the recipients of aggression can put up a fight. In these circumstances, dominant individuals may do best to target closer kin for aggression because these individuals are less likely to fight back. Our theoretical and empirical results add to a growing recognition that patterns of aggression and cooperation in nature depend on the extent to which animals can anticipate each other’s actions, and adjust their own behaviour accordingly<sup>2</sup>.

Finally, this year we turned our attention to another very conspicuous feature of mongoose life – the violent battles that occur between neighbouring groups on the peninsula (Figure 3). Groups of banded



Figure 2

mongooses fiercely defend their territory from rivals, and will kill the pups of neighbouring groups if they get the chance. Intergroup conflict is more severe in banded mongooses than in meerkats, chimpanzees, or (to our knowledge) any other non-human mammal. Only human societies rival banded mongooses in terms of the lethality and violence of their intergroup conflicts. This year we showed that intergroup fights are driven by competition over food and territory, and conflict over matings. Fights are more frequent when food availability is low and population density is high, and when females are in oestrus<sup>3</sup>. We think that oestrus females are often the initiators of intergroup fights because they lead their group into rival territory in search of matings with neighbouring males. Inbreeding is a real problem for banded mongoose females because dispersal is so rare – over 70% of adults never leave their natal group. By mating with neighbouring males, females are able to produce more outbred pups, which grow faster and survive better<sup>4</sup>. The downside for males is that they suffer the costs of fighting. Males account for nearly all of the fatalities that occur during intergroup fights. Intergroup conflict is a major force shaping individual behaviour, survival, and collective decision making in banded mongooses. We are currently using specially designed GPS collars and drones to explore these effects, and to test current theory about how intergroup fighting may promote the evolution of cooperation and teamwork, even among non-relatives.

*Dr Faye Thompson and Professor Mike Cant*

1. Vitikainen EIK, Marshall HH, Thompson FJ, Sanderson JL, Bell MBV, Gilchrist JS, Hodge SJ, Nichols HJ, Cant MA (2017). Biased escorts: offspring sex, not relatedness explains alloparental care patterns in a cooperative breeder. *Proceedings of the Royal Society B: Biological Sciences*, 284(20162384)
2. Thompson FJ, Cant MA, Marshall HH, Vitikainen EIK, Sanderson JL, Nichols HJ, Gilchrist JS, Bell MBV, Young AJ, Hodge SJ, Johnstone RA (2017). Explaining negative kin discrimination in a cooperative mammal society. *Proceedings of the National Academy of Sciences of the United States of America*, 114(20), 5207-5212
3. Thompson FJ, Marshall HH, Vitikainen EIK, Cant MA (2017). Causes and consequences of intergroup conflict in cooperative banded mongooses. *Animal Behaviour*, 126, 31-40
4. Nichols HJ, Cant MA, Sanderson JL (2015). Adjustment of costly extra-group paternity according to inbreeding risk in a cooperative mammal. *Behavioral Ecology*, 26(6), 1486-1494



Figure 1



Figure 3

Figure 1: The Mweya Peninsula in Queen Elizabeth National Park, western Uganda. **Image courtesy of Feargus Cooney.**

Figure 2: Adult ‘escorts’ form one-to-one caring relationships with pups, but they do not preferentially direct care towards their own offspring. **Image courtesy of Feargus Cooney.**

Figure 3: Fights between neighbouring groups are violent and often result in injury and death. Intergroup conflict occurs over food, territory, and matings, and females are regularly observed mating with rival males during these aggressive encounters. **Image courtesy of Dave Seager.**



# Student Societies

## EcoSoc

This year, EcoSoc has been running even more events for our members and working with many external organisations on important conservation work! We are continuing our long-term monitoring project on the small mammals, bird ringing and moth trapping on campus. This information is more important than ever with the current developments on campus. EcoSoc are collaborating with Cornwall Bat Group on hibernation and bat box surveys, Butterfly Conservation and the National Trust doing habitat management, and Cornwall Wildlife Trust carrying out biodiversity surveys. EcoSoc has been lucky to be involved with the Cornwall Beaver Reintroduction Project at Woodland Valley Farm too!

We are carrying out various surveys at the reintroduction site to assess how the ecology of area is changing due to the beavers. We aim for all our events to improve the skills and employability of our members. Through these experiences members can complement their academic studies with necessary field experience.

This year EcoSoc have been promoting the 'Species Awareness Stall', to raise

awareness about some of the most important environmental issues we are facing today. At the moment, we are raising awareness about plastic waste and suggesting how people can make simple switches to reduce their use of single-use plastic. We are currently in the process of taking this further by working with staff and campus services to reduce plastic waste from outlets on campus. EcoSoc has had an extremely productive year and we have a lot more planned for the coming year so hope to continue our success!

## Wildlife Documentary Society

Wild Doc Soc have had another busy year! We started running regular film nights in collaboration with other awesome societies, screening great films such as The Ivory Game, Before the Flood, Chasing Ice and The Silent World. We have also held live screenings of Blue Planet II every Sunday night – a real highlight! One of our biggest ventures in autumn term has been setting up filming workshops to allow members to get hands-on experience with making their own documentaries – we look forward to seeing their films in a few months' time. We were lucky to welcome BBC Planet Earth II

producer Chadden Hunter, who delivered a thought-provoking talk on conservation in the media and provided great insight into filming Planet Earth II. To finish off the year we all got into the Christmas spirit at Polar Ball, hosted at Gylly Beach Café. We are looking forward to kicking off 2018 with a visit from Miranda Krestovnikoff!

## Bioscience Student Employability Committee

Throughout 2017 we have continued to provide a variety of employability and networking opportunities for students. This year we have had the pleasure of hosting a diverse mix of exciting speakers in our seminar series, from the local area and further afield including Dartmoor National Park Authority, Marine Conservation Society and Cloudbridge Nature Reserve in Costa Rica! Our annual careers fair was a huge success; it was the biggest and most varied fair to date with a wide range of organisations visiting to chat to students about careers and all things employability related. We can't wait to see what 2018 brings!

## Athena SWAN Penryn Campus

**This year has seen many changes in how we view gender equality, with a review of Working Parent policies, Gender Pay Gap Report and a university-wide move towards inclusivity and gender equality within the department.**

Since November 2017, CLES Cornwall have been working hard to reapply for the Silver Award, following on from previous successes. This has seen the Athena Swan Working Group broadening the focus beyond just academic staff to ensure that all who work within the CEC department are represented and supported. 2017 witnessed the launch of the new Cornwall Inclusivity Group, who work closely with the team to bring about positive impact for our staff and students; making the university a more inclusive place to work and study.



## Funding Awards

CEC enjoyed many research funding successes during 2017, securing awards totalling over £8million. Funders include the EU, Natural Environment Research Council (NERC), Biotechnology and Biological Sciences Research Council (BBSRC), Royal Society, British Academy, Human Frontiers in Science Programme, Darwin Initiative, Ascension Island Government, Department for Environment, Food and Rural Affairs (DEFRA), Met Office, Science and Technology Facilities Council (STFC), Forestry Commission, Natural Resources Wales, MAVA Foundation, Carter Centre, Wellcome Trust, Animal and Plant Health Agency (APHA), Marine Conservation Society, Sealife Trust, British Horse Racing Authority, Racing Foundation, Rentokil, Wildlife Conservation Society, Songbird Survival, Centre for Agriculture and Bioscience International CABI, Vincent Wildlife Trust and the British Ecological Society. Awards were made to Dr Edze Westra, Professor Tom Tregenza, Professor Kevin Gaston, Professor Robbie McDonald, Professor Martin Stevens, Dr Jason Chapman, Professor Annette Broderick, Professor Brendan Godley, Professor Mike Boots, Dr Alex Thornton, Professor Juliet Osborne, Dr Ilya Maclean,

Dr Lena Bayer Wilfert, Professor Dave Hodgson, Dr Neeltje Boogert, Dr Shakti Lamba, Dr Karl Wotton and Dr Regan Early.

A few highlights include: a European Research Council project spearheaded by Dr Edze Westra exploring the evolutionary ecology of bacterial immune mechanisms; a NERC award to Professor Tom Tregenza to investigate how sexual selection affects how populations evolve in response to change; a NERC award to Professor Kevin Gaston whose team will be using images taken by astronauts aboard the International Space Station to gain insights into the severity of ecological impacts of artificial lighting on the nighttime environment; a study by Professor Robbie McDonald supported by the Carter Centre investigating infection and transmission of Guinea worms in domestic dogs in Chad; another to Professor McDonald from the Songbird Survival Trust to explore the role of predation by cats on songbird population dynamics; an industry collaboration between Professor Martin Stevens and Qinetiq funded by the BBSRC on optimising camouflage; an award to Professor Annette Broderick from the MAVA foundation to look at

the conservation of marine turtles in the Mediterranean region and an international collaboration between Dr Alex Thornton and partners in the US and Canada, funded by the Human Frontiers in Science Programme, to investigate collective behaviour and information transmission in heterogeneous societies.

We again celebrate the successes of our growing number of prestigious early career fellowship holders including Drs Laura Kelley and Neeltje Boogert (Royal Society Dorothy Hodgkin Fellowships), Dr Stineke Van Houte (BBSRC), Dr Camille Coye (British Academy) and Dr Jolyon Troschianko (NERC Independent Research Fellowship). We also saw huge successes with the EU Horizon 2020 Marie Skłodowska-Curie Fellowship scheme, with 7 awards made to fellows at CEC and their supervisors: Dr Thomas Bodey (supervisor Professor Robbie McDonald), Dr Maxime Derex (supervisor Dr Alex Mesoudi), Dr Mathieu Giraudeau (supervisor Dr Camille Bonneaud), Dr Maximiliano Tourmente (supervisor Professor Dave Hosken), Dr Keiko Oku (supervisor Professor Nina Wedell), Dr Uli Klumper (supervisor Professor Angus Buckling) and Dr Cecilia Nilsson (supervisor Dr Jason Chapman).





# Field Course Fortnight

**285** students. **35** academics. **8** field courses. **6** countries.  
**4** continents. **1** challenging fortnight.

One of our core principles is that shared learning about natural systems should be immersive and extraordinary. Hence, we take all of our BSc finalists and all MSc students every year on international field trips to biodiversity hotspots and regions where intense interactions between humans and wildlife occur. These trips serve a crucial purpose; to immerse students in real-world issues of biodiversity and conservation.

The trips meet all of the university's education priorities: to train talented, active, engaged students; to provide excellent employment experiences and capabilities; to deliver research-inspired, inquiry-led learning; to

deliver international experiences; to deliver first-class education and technology; and to provide multidisciplinary learning for global challenges.



***A once in a lifetime experience, full of incredible people, experiences and wildlife.***

*Laura Tuke, current student*



Many of our field courses take place in January, in a concentrated fortnight; with students

travelling to the Bahamas, Borneo, Costa Rica, South Africa, Tenerife, and Kenya. The wider impact of these field courses is delivered by a social media campaign. During this fortnight, students and staff document their experiences through various social media outputs, using the hashtag #fieldcoursefortnight to spread the word across the globe.

The final awards evening ceremony celebrated the social media campaign that took place during field course fortnight, where posts during the field courses were given prizes for certain awards such as the best wildlife shot and best blog.



Umoja woman's camp, Kenya



***Choose a huge life lesson. Choose incredible people both as companions and who you meet on the way. Choose #FieldKenya***

*Peter Cooper, Zoology graduate*



Galapagos-Abi Gwynn



***After completing my Fieldcourse Fortnight at the Cape Eleuthera Institute during the Bahamas fieldcourse I was luckily offered a masters position which changed so much in terms of my career.***

*Rebekah Trehern, Biosciences graduate*



Costa Rica, Chloe Cargill



Jack Barton and an immense Io Moth, Ben Porter



Kenya, Richard Turner



Kenya, Rosie Walker



Africa, Beth Mathias



## Science with the Community

### Schools Outreach

During 2017, CEC researchers, staff and student ambassadors were involved with numerous outreach events across Cornwall and beyond. We reached over 4,000 students through partnerships with over 20 schools and colleges in Cornwall. We have also conducted mini research talks at some of our local schools delivered by CEC PhD students, which have been a great success and we hope to continue with more in 2018. We were also delighted to have presence at large events such as the Cornwall Careers Show and the Royal Cornwall Show, where the University had a stand for the third year, talking about our research, and running hands-on science activities with live invertebrates on the scene. For the third time we ran a Bioscience strand of the Exeter Progression Scheme, a programme designed for Year 12 students to develop their knowledge and passion for a subject. 40 students from Devon and Cornwall took part in seven practical lab and field sessions, all led by academics and students from the Centre of Ecology and Conservation, including a trip to Gyllyngvase beach where they conducted their own research project. We have already met with our 40 students for 2018 at the Progression Conference in Exeter, and have lots of exciting plans! We also have plans for another Maritime Museum outreach event early in 2018 which we hope to be even bigger and better than last year's event.

### Science in the Square

'Why on Earth?' was the theme for our 6th annual Science in the Square, during which over 3000 visitors attended the free family event held in August as part of Falmouth Week! Through a series of engaging talks, visitors of all ages explored topics including why on earth animals have friends and why on earth sea turtles cross oceans. 'Brenda' the turtle was a very popular character! Seven interactive zones offered chances for close encounters with rockpool creatures, microscopic organisms and exotic

animal skulls. In 'Earth Zone' we joined forces with the renewable energy team, with their mesmerising interactive sandbox capturing how landscapes are formed. Vice-Chancellor Sir Steve Smith attended and thoroughly enjoyed the afternoon. Thank you to all staff and students who worked hard to ensure the event was once again a remarkable success!

### Science of Christmas

This was our fourth year of Science of Christmas which is a family friendly event and aims to discover the science of Christmas! It was, once again, a festive success and the whole audience were engaged throughout. Prof Brendan Godley acted as the compere and kept everyone in the Christmas spirit with some great singalongs! One of our PhD students, David Sünderhauf, delivered a talk on 'How to separate the naughty from the nice?'; Dr Kimberley Hockings gave a very amusing talk on why we give gifts at Christmas; Dr Jason Chapman asked the question who is faster in the Christmas dash, which ended with a sonic boom; Dr Helen Smith explained how we can use the power of the sea to power our Christmas lights, complete with great penguin demonstrations from our volunteers!; Dr Neeltje Boogert explained that not only humans sing carols, and lastly Angela Bartlett from the ESI showed us how Santa can track and find you using cool GIS remote sensing technology! We had a fantastic turnout and thank you to all our amazing speakers and for inspiring all generations about science.

### Students as Change Agents

Students As Change Agents is a scheme that allows students to play an active part in improving their student experience. Penryn Campus was particularly engaged with the scheme, with projects applying for the scheme including: Sci-Fest, a science communication festival, a photography course, and a seminar/discussion group.

### Wild Film Fest

In March 2017 the third annual Wild Film Fest returned to showcase top student wildlife film-making and photography! The event included an afternoon seminar series with renowned professionals in wildlife documentary and conservation featuring Gillian Burke (BBC Presenter) and Dr Heather Koldewey (ZSL). Elizabeth White (BBC Natural History Unit Producer) joined us to present the overall competition winner and to introduce the evening awards ceremony, which was hosted by University of Exeter alumna Lizzie Daly. There was not a spare seat in house on the night! It was a fantastic event enjoyed by all, celebrating amazing student talent in the field of science communication.

### Generation Wild

Generation Wild is a student-led volunteering project that delivers weekly environmental outreach sessions for local primary schools and children's groups. From rockpool rambles and evening bug hunts to designing sustainable homes and restoring a hedgerow, 2017 was an incredible year for us! In the autumn term alone we worked with over 500 children through 16 outreach sessions and a large external event. We also coordinated multiple training courses for students throughout the year, including a trip to Camp Kernow to learn about sustainability education, and in May we were honoured to be shortlisted at the NUS National Societies Awards for Best Local Community Contribution. We've had so much positive feedback from group leaders and parents this year, and it's been so heartwarming to see the positive impacts of environmental education on the local community. With exciting developments in the pipeline, including a partnership with Cornwall Wildlife Trust, 2018 is set to be another fantastic year!

**More information about our outreach activities can be found at:**  
[lifesciences.exeter.ac.uk/outreach/cornwall](https://lifesciences.exeter.ac.uk/outreach/cornwall)



# Awards and Prizes

## Prize Winners

See also Selected Highlights for accolades to **Prof Curtis Creighton, Prof Tim Caro, Prof Monique Burgerhoff-Molder, Prof Alastair Wilson, Prof Andy Russell** and **Prof Martin Stevens**.

British Ecological Society's photography competition  
"Capturing Ecology" – *Christopher Beirne*

BBSRC Innovator of the Year award for Social Impact  
*Professor Juliet Osborne and the BEEHAVE team*

British Ecological Society research competition – *Catherine McNicol, Sarah Nelms and Sara Mynott*

### The FXU and Students' Guild Teaching Awards

Best Subject Cornwall – *Biosciences (Penryn)*

Most Outstanding Student Led Volunteering Project  
Committee Members – *Ellen Whitby*

Most Outstanding Society Event or Project – *Wild Film Fest*  
(collaboration between Eco Soc and Wild Doc Soc)

### Graduation Awards

Congratulations to the following CEC students who were awarded PhDs in 2017:

*Maria Eugenia Correa Cano* – Macroecological Patterns of Plant Species and Anthropogenic Activities

*Philip David Doherty* – Basking Shark Movement Ecology in the North-east Atlantic

*Sarah Catherine Paul* – The Price of Defence: Maternal Effects in an Aposematic Ladybird

*James Ian Leonard Rapkin* – The Importance of Nutrition in Sexual Selection

*Elizabeth Sophie MacLeod Robinson* – The Spread and Impacts of Invasive Non-Native Plants in a Human-Dominated Landscape: The Case of Japanese Knotweed

*Jack Charles Oliver Rumkee* – Modelling the Impact of Stressors on the Honeybee Colony

*Lucy Charlotte Steward* – Badger social networks and their implications for disease transmission

*Faye Jacqueline Thompson* – Conflict Within and Between Groups of Cooperative Banded Mongooses

*Richard David Woods* – Collective Responses to Acoustic Threat Information in Jackdaws

## Graduation Awards

Prizes were awarded to the following students:

### Undergraduate

Stage 1 Dean's Commendations:

**Charlotte Cross**  
**Grace Hunt**  
**Max Shepherd**  
**Stephanie Trapp**  
**Joseph Phillips**  
**Camille Burton**  
**Ella McCulla**  
**James Williams**  
**James Harris**  
**Jaimie Barnes**  
**Cai Bishop-Guest**  
**Cameron Goodhead**  
**Eleanor Hackett**  
**Rahul Jaitly**  
**Laura Overton**  
**Jessica Stokes**  
**Samuel Thompson**  
**Alexandra Dell**  
**Ellen Knight**  
**Katie Smith**  
**Rebecca Brett**  
**Leonard D'Aranjo**  
**Matthew Doyle**  
**Robyn Hickman**  
**Maisy Inston**  
**Alex Newland Pow**  
**Andriana Michaeloudis**

Stage 2 Dean's Commendations:

**Henry Slessler**  
**Sophie Corrigan**

Stage 3 Dean's Commendations:

**Luke Lear**  
**Isabel May Driscoll**  
**Isabella Endacott**  
**Zoe Hughes**  
**Emily Elizabeth Carter**  
**Emma Elizabeth Rogan**

Centre for Ecology and Conservation Commendations:

**Emily Fergusson**  
**Oscar Furness**  
**Charlotte Bain**  
**Russell Barnett**  
**Harriet Lavender**  
**Sophia Fraser**  
**Hannah Pollock**  
**Jamie Unwin**  
**Sophie Gould**  
**Megan Addicott**  
**Mollie Kemsley**  
**Lowenna Jones**  
**Flora Rendell-Bhatti**  
**Laura Tuke**  
**Thomas Kent**

Top Project Mark:  
**Claire Cumner**

Oxford University Press –  
Most Improved Student Award:  
**Holly Frances Cole**

Royal Society of Biology Award  
for Top Overall Marks:  
**Jack Taylor Orford**

Highest Overall AWCM:  
**Jack Taylor Orford**

### Postgraduate

Centre for Ecology and Conservation Commendations:

**MSc Applied Ecology 2016/17:**  
**Shari Mang – Best Overall Mark**  
**Shari Mang – Best Research Project Mark**

MSc Conservation and Biodiversity 2016/17:  
**Susannah Gold – Best Overall Mark**  
**Susannah Gold – Best Research Project Mark**

MSc Evolutionary and Behavioural Ecology 2016/17:  
**Karen Keegan – Best Overall Mark**  
**Julia Slezacek – Best Research Project Mark**

School's Commendation  
for Exceptional Academic Achievement:

**Shari Mang**  
**Emma Korein**  
**Ben Murphy**  
**Emily Strong**  
**Tess Handby**

School's commendation for  
Excellent Academic Achievement  
and Outstanding Contribution to  
the Student Experience despite  
Adversity:  
**Katya-Rose Zaki**

School's commendation for  
Outstanding Contribution to  
Student Experience:  
**Peter Cooper**  
**Karen Keegan**  
**Alex Szczurek**  
**Ellen Whitby**

# Selected Highlights

## Tim Caro and Monique Burgerhoff-Molder



The CEC was thrilled to host world-leading researchers Monique Burgerhoff-Mulder and Tim Caro from the University of California Davis on a three-month sabbatical from September to December 2017.

Monique, Professor of Anthropology at UC Davis, is a pioneer in the application of behavioural ecology to humans. In December she gave the annual CEC Christmas Conservation Lecture on her efforts to apply evolutionary theories of cooperation to wildlife and forest conservation in Africa. She also lectured on the 3rd year undergraduate module Human Behavioural Ecology, a fieldwork training session to our human-focused graduate students, and led sessions in the HuBCEG seminar series.

Tim, a Professor of Wildlife Biology at UC Davis, has conducted innovative research into animal coloration, in particular the adaptiveness of coat colour in animals ranging from zebras to anteaters. In October Tim gave our annual Darwin Landing Day seminar where we were treated to a fascinating journey through his quest to discover how the zebra got its stripes. He also contributed to Martin Stevens' Sensory Ecology module and participated in Martin's lab meetings.

Both Monique and Tim proved hugely stimulating to our human behaviour and sensory ecology groups, and their presence is testament to CEC's leading research strengths in these areas. We hope this is not their last visit to CEC!

## Congratulations!

This past year saw a number of key promotions: **Annette Broderick, Andy Russell, Alistair Wilson**, and **Martin Stevens** to Professors; **Sasha Dall, Stephen Votier** and **Edze Westra** to Assistant Professors; **Kelly Moyes** a Senior Lecturer and **Ben Longdon** a Senior Research Fellow.

## Curtis Creighton

We were pleased to host Professor Curtis Creighton from Purdue University, Indiana, USA for a four month sabbatical from August to December in 2017. Prof. Creighton works on life-history evolution, parental care and conservation of burying beetles. He was hosted by Dr Nick Royle, who also works on burying beetles. Curtis was an active participant in CEC daily life and during his stay gave a departmental research seminar about his recent work and collaborated with Nick on some research experiments. They are planning to apply for research funding in 2018 to develop their collaboration further.



## Inaugural Professorial Lectures

We were lucky enough to have three professorial lectures this year. In October Andy Russell and Alastair Wilson gave a combined talk on "Plastic perspectives on adaptation: from behaviour to genes". Andy



is a behavioural ecologist whose work focuses on the role of mothers whilst Alastair is an evolutionary biologist studying how genetic and environmental processes interact with each other. At the drinks reception afterwards guests enjoyed a display of photographs featuring Andy and Alastair in their early years as young researchers.

In December Martin Stevens gave a talk on "Animal vision and the art of concealment". Martin studies sensory ecology and evolution with an emphasis on vision and adaptive coloration. Martin was ably assisted during the lecture by his son who took charge of the slide show.



These events are always hugely enjoyable and a highlight of our year. They represent an opportunity for us to come together and celebrate individual success whilst acknowledging the importance of collaboration in the scientific community.



Selected CEC Publications from 2017



Yukon, Jalal Khan



South Africa, Megan Bruce

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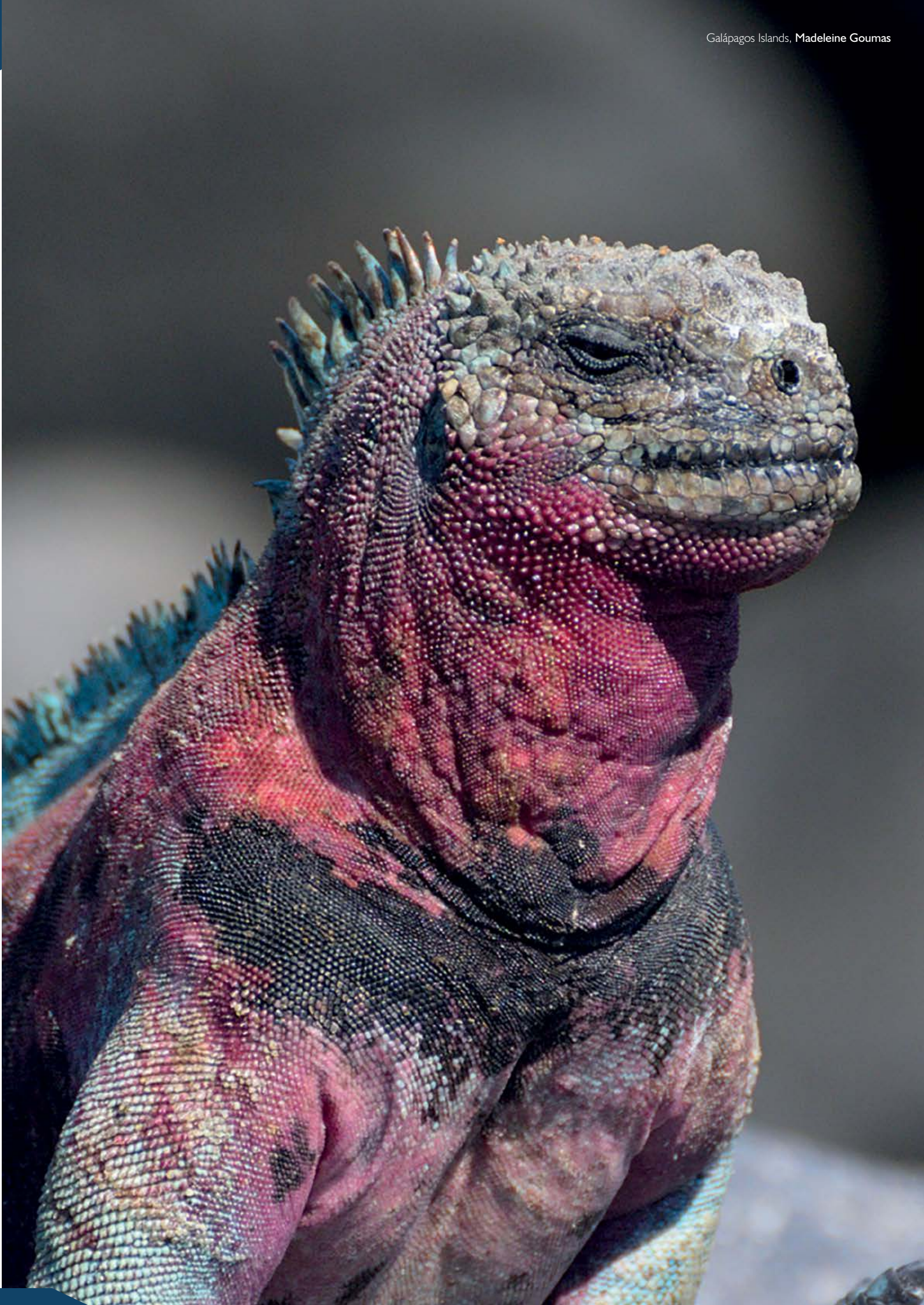
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Galápagos Islands, Madeleine Goumas





South Africa, Lauren Bailey



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