GALAPAGOS MATTERS

SPRING/SUMMER 2012

› Finches › Urbanisation
› Biodiversity hotspots

Galapagos Conservation Trust

FINCHES 6-7

8-9 URBAN GALAPAGOS

14-15 ARTISTS IN RESIDENCE

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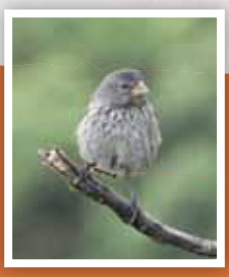

Cover shot:

Ron Sorkness took this photo of a Small Tree Finch (*Geospiza parvula*) in the highlands of Santa Cruz in July 2008. "It was a gloomy day with off/on drizzle," he recalls. "The finch landed briefly to inspect our group - I was able to get a quick shot of him on that unusually shaped branch before he went off on his business."

This issue of *Galapagos Matters* is dedicated to the memory of **Margaret Rose**. Because Galapagos mattered to Margaret, she selflessly gave her time as a volunteer in the GCT office for 4 years. She will be greatly missed.

Contributors

Peter and **Rosemary Grant** are evolutionary biologists at Princeton University and have dedicated their professional lives to studying Darwin's Finches. They have received countless awards for their work, including the Linnean Society of London's prestigious Darwin-Wallace Medal, which acknowledges "major advances in evolutionary biology".

Samantha Singer is a project manager with the Prince's Foundation and currently working full time in Galapagos. Her background is in International Planning and Urban Design.

Jyll Bradley is an internationally acclaimed artist, her works incorporating photography, text and sculptural elements. She has exhibited in many notable venues, including the Hayward Gallery in London and the Walker Art Gallery in Liverpool and is an award-winning writer for BBC Radio (www.jyllbradley.net).

Alexis Deacon is a celebrated author and illustrator of children's books. His first book, Slow Loris (2002), was shortlisted for the Blue Peter Book Award and his second, Beegu (2003), was shortlisted for the Kate Greenaway Medal in 2004.


© GCT

Galapagos Matters

It seems just like yesterday that I wrote a welcome to our first *Galapagos Matters*. During the past few months we have continued to work with some wonderful partners.

This year will see the culmination of a 5-year partnership with the Calouste Gulbenkian Foundation, which involved sending 12 artists with widely different skills and ideas to represent Galapagos in their own visual language. Their inventiveness has been extraordinary and a selection of the works will be show-cased at the Bluecoat Gallery in Liverpool in May, and then at the Fruitmarket Gallery in Edinburgh in November.

Included in *Galapagos Matters* are articles by two of the artists, Alexis Deacon and Jyll Bradley (pp. 14-15).

GCT has also been working collaboratively with the Prince's Foundation for Building Community, one of Prince Charles' charities. A team of two has been engaged in developing building codes for a new development in Puerto Ayora and on the island of Floreana: read Samantha Singer's article on pages 8-9.

Thank you to each of you who donated to our LoveGeorge Valentine's Day fundraising initiative (p.11). GCT's continuing ability to fund many important projects in Galapagos and to raise awareness in the UK of the fragility of the Archipelago depends on you and we are deeply grateful for your continuing support, especially in these tough economic times.

Robert Silbermann *Interim Chief Executive*


© Credit

Common name: Galapagos Dove
Latin name: *Zenaida galapagoensis*
Described by: John Gould
Date: 1841

DISCOVERING GALAPAGOS

When a specimen-laden Charles Darwin returned from the Beagle voyage in 1836 it fell to the Zoological Society of London's expert ornithologist, taxidermist and artist John Gould to describe the Galapagos birds. His illustration of the Galapagos Dove accompanies its formal description as "one of the most abundant birds in the Archipelago."

Galapagos Conservation Trust
Registered Charity No. 1043470

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The information in this issue was obtained from various sources, all of which have extensive knowledge of Galapagos, but neither GCT nor the contributors are responsible for the accuracy of the contents or the opinions expressed herein.

ISSN 1468-8514 *Galapagos Matters* is printed on paper made from 100% recovered fibre.
Editor: Henry Nicholls Chief Executive: Robert Silbermann Editorial Assistant: Abigail Rowley
Designer: Nicholas Moll Design Printer: Barnwells of Aylsham

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NEWS IN BRIEF


© Yale University

FLOREANA TORTOISE IS ALIVE

A species of Galapagos tortoise – thought to be extinct for over 150 years – may, in fact, be alive and well on a different island, according to a recent study by geneticists at Yale University.

After the arrival of humans in Galapagos in the 16th century, the tortoises of Floreana were hit particularly hard by hungry pirates and whalers in search of fresh meat. Since about 1850, there has not been a single sighting of *Chelonoidis elephantopus* and for nearly a century and a half the species has been considered extinct. But recent research provides strong evidence that purebred Floreana tortoises are still alive on Isabela's Wolf Volcano.

Back in 2008, a team of geneticists and rangers from the Galapagos National Park (GNP) managed to collect DNA from 1,669 tortoises found on Wolf Volcano, estimated to be 20% of the volcano's population. In amongst these, they have found many hybrid tortoises, of which 84 animals had to have had a purebred *C. elephantopus* as one of their parents. Many of these were young, estimated to be just 15 years old, and since giant tortoises can live for more than 150 years, there's a good chance that their purebred Floreana parents are still out there.

"To our knowledge, this is the first report of the rediscovery of a species by way of tracking the genetic footprints left in the genomes of its hybrid offspring," says Ryan Garrick, a geneticist at the University of Mississippi and first author of the study published in the journal *Current Biology*. A follow-up expedition to Isabela is planned, raising the possibility that some of the Floreana survivors might be located. "We would have to be very lucky to directly sample one of them," admits Garrick. But their more numerous hybrid descendants could still prove useful for Galapagos conservationists, acting as key individuals in a breeding programme to bring Floreana-like giant tortoises back to the island.

"We are now exploring the possibility of starting a captive breeding programme to revive the species," says Washington Tapia, GNP's head of the Department of Conservation and Sustainable Development. These could then be used to repopulate Floreana with direct descendants of its original tortoise, he says.

NEW ROUTES

As of February this year, tourist vessels have been following new itineraries set out by the GNP. This means that vessels will not be able to visit the same site more than once in any 14-day period, though most operators still have the flexibility to let passengers on and off to cater for customers wanting shorter trips. "The new itineraries are a great step forward for both enhancing the visitor experience and reducing impacts at the individual visitor sites," says Linda Cayot, science advisor to Galapagos Conservancy, USA.

FUNDING BOOST

The Charles Darwin Foundation (CDF) and WildAid Galapagos are to receive support from the International Galapagos Tour Operators Association (IGTOA)'s Traveler Funding Program for 2012. Some of the $28,000 awarded to CDF will be used to cover operational costs and some spent on improving the visitor experience at the Charles Darwin Research Station. "Our goal is for visitors to the Station to receive personal attention to make their visits as pleasant and informative as possible," says CDF's executive director Swen Lorenz. By encouraging their customers to donate to the fund, IGTOA members have generated several hundred thousand pounds for Galapagos conservation since the programme began almost a decade ago.

WATER TREATMENT

Construction of a new sewage and water treatment plant has begun on San Cristobal. Up until now, 70% of the island's population has relied on a system that discharges waste directly into the sea. The new plant will use the latest technology to reduce the potential damage to public health and the environment, and enable some water to be recycled for use in the municipal gardens.

PHILORNIS WORKSHOP

An international team of specialists gathered in Galapagos in February to work on a plan to control *Philornis downsi*, the invasive parasitic fly that is attacking more than a dozen Galapagos species, including the critically endangered Mangrove Finch, Medium Tree Finch and Floreana Mockingbird. The workshop, co-funded by the Galapagos Conservation Trust and Galapagos Conservancy, raised awareness of this parasite, identified priorities for further research into its biology and established a five-year plan to develop new methods of control.

© Jessica Crawford

PELICAN RESEARCH

Research is underway to study the Brown Pelican, an endemic Galapagos species about which surprisingly little is known. As of January, GNP and CDF staff have been capturing the birds in Pelican Bay, Puerto Ayora, fitting them with rings and taking several measurements, including a sample of blood for further analysis.

DEEPWATER CATSHARK

Scientists conducting deep-sea research in Galapagos have described a new species of catshark and given it the name *Bythaelurus giddingsi*. The new shark is approximately a foot long and has a chocolate-brown colouration with pale, irregularly distributed spots on its body. "The discovery of a new shark species is always interesting, particularly at this time when sharks are facing such incredible human pressure," says John McCosker of the California Academy of Sciences, one of two researchers who first observed the species from a submersible in the late 1990s. "Since this catshark's range is restricted to the Galapagos, its population is likely limited in size, making it more susceptible than more widely distributed species," he says.

© California Academy of Sciences

© US Department of Defence

CONTROLLED EXPLOSION

World War II bombs found in Galapagos have been destroyed in a controlled explosion carried out earlier this year. For more than half a century, these devices lay buried on the island of Bartolome, left over from when the US Air Force used Galapagos as a miltary base during the war. But in October 2010, they were discovered by local fishermen, since when they have been kept on Santa Cruz. In January, the Ecuadorian Armed Forces successfully detonated the bombs – eleven in total – on Baltra.

© Martin Wikelski

Walking with finches

By Peter and Rosemary Grant

In Galapagos – as elsewhere – the animals and plants we see do not appear to change from year to year. Or do they? Does evolution take place so slowly, as Darwin believed, that it's impossible to see? Or can it be witnessed, seen in action, as it happens? Galapagos is a wonderful place to ask that question, and finches on the small island of Daphne Major have given us an answer. They have shown us that evolution can in fact be witnessed if we are in the right place, at the right time, and know what to look for.

The right time was 1977 when a severe drought gripped the Archipelago. It caused widespread death, with over 80% of Medium Ground Finches (*Geospiza fortis*) on Daphne perishing. The few that survived were the ones with large beaks. The reason? They were the only ones able to crack the large and hard seeds of a plant called caltrop (*Tribulus cistoides*) that remained in relative, though not absolute, abundance after the majority of small and soft seeds had been eaten. It was a clear example of natural selection taking place before our very eyes.

Natural selection leads to evolutionary change in the next generation if, and only if, the selected trait, beak size, is heritable. Beak size is indeed heritable. Just as human children tend to resemble their parents in height because of genetic factors, so in the world of the finches parents and the offspring they produce have similar-sized beaks. As a result of natural selection in 1977 the survivors produced a generation of finches with large beaks in 1978. Thus beak size, being inherited, had evolved through natural selection in response to an environmental change.

© Sarah Knutie

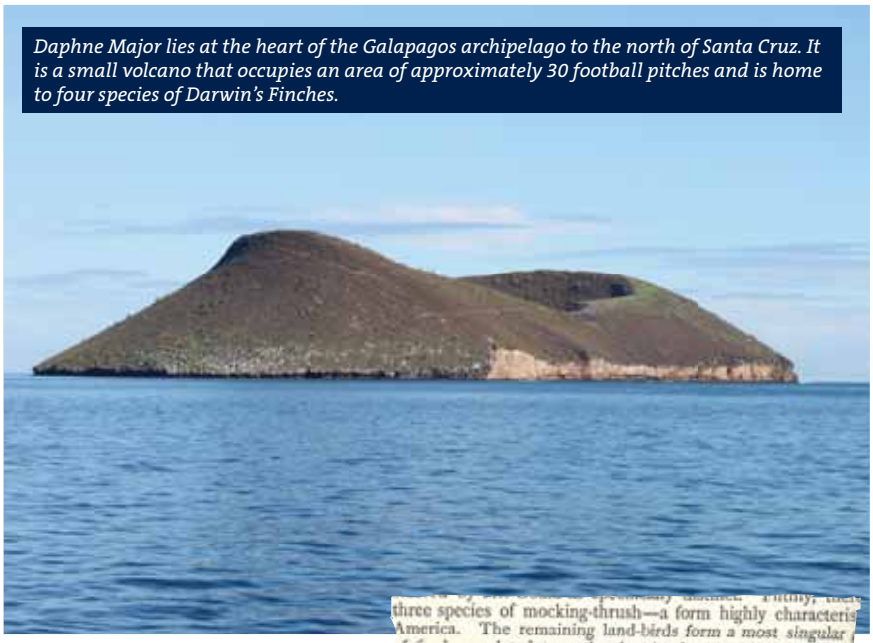
The bill size of the Medium Ground Finch population can change dramatically from one year to the next, a direct consequence of evolution by natural selection.

By continuing the study on Daphne we discovered that selection oscillates in direction depending upon the size and abundance of available seeds during droughts. Changes in the abundance of one species can also put pressures on others, changing the abundance and hence genetic makeup of other species. Remarkably, finches are not the same now as they were at the beginning of our study. They have changed significantly in beak shape and size as a result of each population tracking environmental changes through the process of natural selection. More surprises are sure to follow. Laboratories have already begun to investigate the genomes of finches to decipher the messages of evolution written in the DNA code.

"It was a clear example of natural selection taking place before our very eyes."

There is a clear biodiversity message from our experience on Daphne, and it is this: to conserve the environment for the long-term we should be thinking in evolutionary terms as well as ecological terms. This means protecting the biological richness of Galapagos in such a way that both organisms and the environment they live in are capable of further, natural, change.

The future of the iconic finches is at risk. *Philornis downsi* is a parasitic fly that can kill up to 100% of all chicks produced in a breeding season. Support GCT's Love George, Love Galapagos appeal to help fund vital research to find a biological control against this harmful insect (**www.lovegeorge.org**).



Daphne Major lies at the heart of the Galapagos archipelago to the north of Santa Cruz. It is a small volcano that occupies an area of approximately 30 football pitches and is home to four species of Darwin's Finches.

© Sally Taylor

In his Journal of Researches, *first published in 1839, Charles Darwin drew attention to "insensibly graded beaks" of the Galapagos Finches. "Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that...one species had been taken and modified for different ends."*

three species of mocking-thrush—a form highly characteris
America. The remaining land-birds form a most singular
of finches, related to each other in the structure of their
short tails, form of body, and plumage: there are thi
species, which Mr. Gould has divided into four sub-gr
All these species are peculiar to this archipelago; and
the whole group, with the exception of one species of the
group Cactornis, lately brought from Bow Island, in the
Archipelago. Of Cactornis, the two species may be often

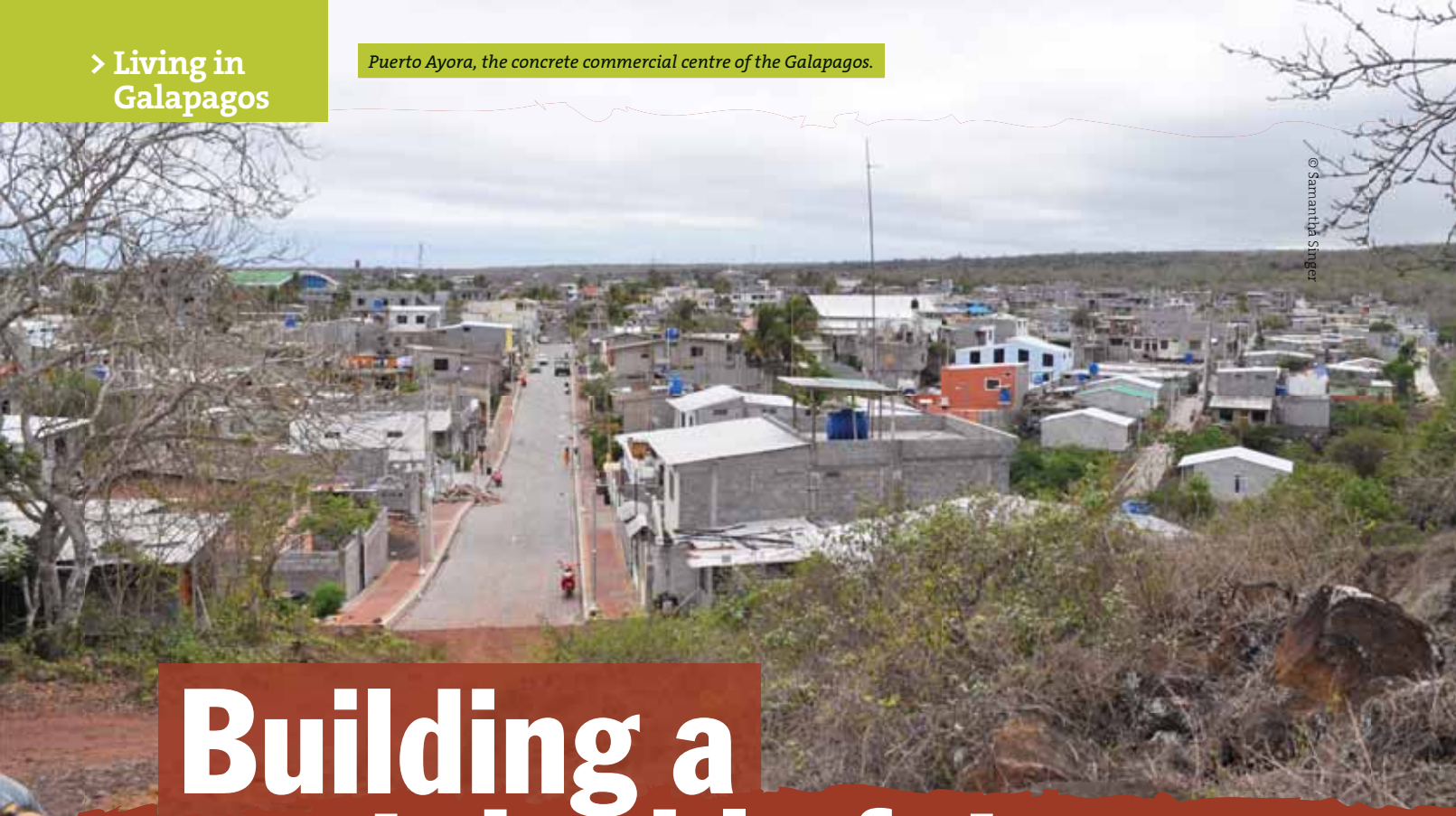
1. Geospiza magnirostris. 2. Geospiza fortis.
3. Geospiza parvula. 4. Certhidea olivacea.

climbing about the flowers of the great cactus-trees; but
the other species of this group of finches, mingled together
flocks, feed on the dry and sterile ground of the lower distr
The males of all, or certainly of the greater number, are
black; and the females (with perhaps one or two excepti
are brown. The most curious fact is the perfect gradation

© GCT

There are at least 14 species of Darwin's Finch, each with a slightly different bill size and shape, occupying a slightly different ecological niche. The Large Cactus Finch (pictured), found only on more arid, low-lying islands where food is relatively scarce, has an elongated beak that helps it to tackle the prickly Opuntia *cactus.*

© Gerald Corsi



Puerto Ayora, the concrete commercial centre of the Galapagos.

Building a sustainable future

By Samantha Singer

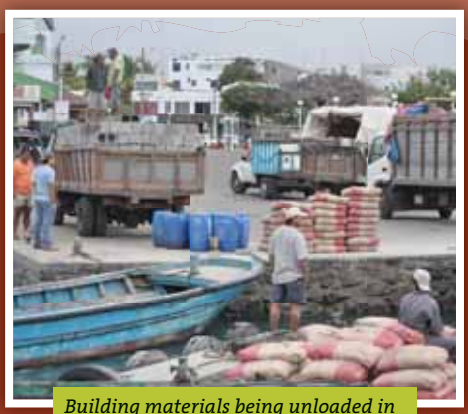
My first emotion on arriving in Galapagos was one of shock. Although well aware of the many challenges that tourism and urban development pose for the Islands, I had expected that given Galapagos' reputation as the best-preserved tropical archipelago in the world, the human environment would show greater respect for the natural environment. Instead, I found myself escorted from the airport on Baltra across Santa Cruz amidst a steady stream of pick-up trucks en route to Puerto Ayora, a bustling town in which too many people live and work in concrete-sealed, air-conditioned boxes.

The rapid growth in Galapagos tourism – there are now more than 170,000 visitors to the Islands each year – has resulted in unprecedented population expansion and economic growth. There are nearly 30,000 people living across the Archipelago, creating an extraordinary demand for urban development and posing serious threats to the natural environment, the very reason so many people are drawn to the Islands in the first place. Much of this development is inevitable, but there is a choice: with planning and careful coordination Galapagos could act as an example to the world of how humans can live in harmony with nature. Without these measures, Galapagos could become an illustration of the devastation that human settlement can have on the natural environment.

These two alternative visions have been brought into sharp focus by El Mirador, a new development of 1,133 separate lots that will see Puerto Ayora's geographical footprint almost double in size. As things stand, the town's infrastructure is already stretched. Water is being pumped from a well of unknown capacity; residents depend on diesel generators for their electricity; and the majority of the sewage is handled by septic tanks that leak into the water table. Unless solutions to these problems can be found and implemented, El Mirador will only make matters worse than they already are.

In 2009, HRH The Prince of Wales visited Galapagos and was deeply concerned by this dilemma. So when the Galapagos Conservation Trust approached The Prince's Foundation to help the Municipality create a more sustainable long-term vision for development in El Mirador and across the Archipelago, the

En route from the airport to Puerto Ayora


© Samantha Singer

Building materials being unloaded in Academy Bay, Puerto Ayora.

response was favourable. In autumn of last year, I arrived in Galapagos at the invitation of the Consejo de Gobierno – the Galapagos regional government – as half of a two-person team sent out to provide support and recommendations on urban planning and the design of appropriate housing across the four populated islands.

As part of our continued commitment to Project Floreana, GCT funded a workshop on Floreana in March run by the Prince's Foundation for Building Community to help local authorities incorporate planning and sustainability into their codes of practice.

In collaboration with many local partners, The Prince's Foundation Galapagos Initiative is working in three main areas. First, a change in building practice is needed. Currently, there is too much reliance on importing building material to construct the kind of concrete air-conditioned box-type buildings found in Guayaquil on the mainland Ecuadorean coast. Rather, we would like to see structures more suited to island life. Eaves to protect against rain and sun, windows positioned on opposing walls to let in indirect light and improve ventilation, and careful use of trees to generate shade should all reduce dependence on air-conditioning. LED lights can be wired to small solar panels to generate electricity and minimise use of diesel generators. Cisterns can collect rainwater. Space can be set aside to grow non-invasive vegetables.

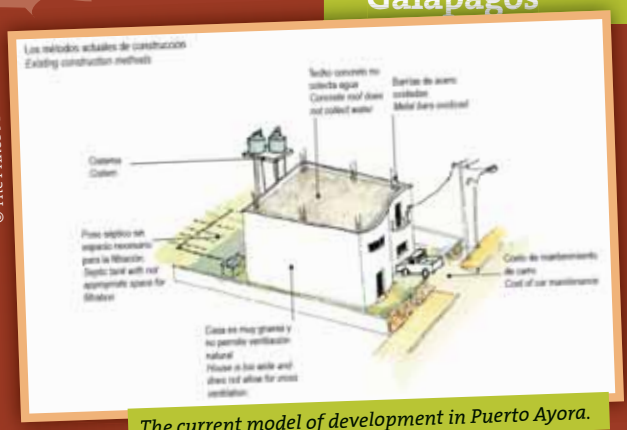
Neighbourhood, closed-loop waste water systems can be used to treat sewage. Flexible and modular house designs are both simpler and cheaper to build and generate less waste.

Second, there needs to be more strategic use of land to contain consumption of scarce resources and careful planning regulation to prevent development beyond where it is absolutely necessary.

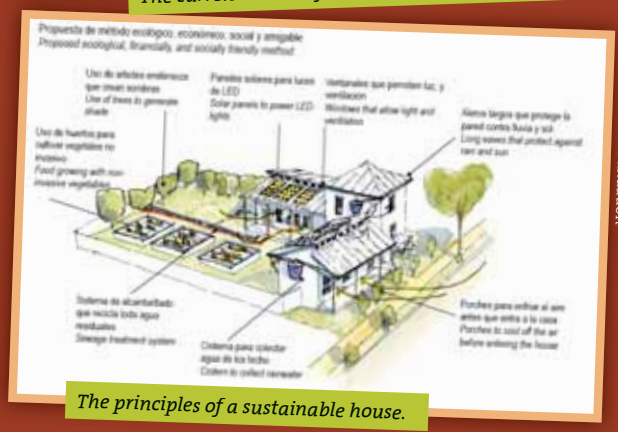
"With planning and careful coordination Galapagos could act as an example to the world of how humans can live in harmony with nature."

At present, for instance, there is no mechanism to encourage the identification and exploitation of underdeveloped spaces within existing settlements. One consequence of this is that as soon as a town reaches its geographical limit, there is pressure to expand into areas of the Galapagos National Park. In addition, there are few restrictions on development in agricultural highlands. The gradual erosion of the area available for local food production will only increase dependence on imports from mainland Ecuador with the inevitable introduction of yet more invasive plants and pests.

Finally, sustainable planning and development will only be possible if local, national and international institutions work together to achieve this goal. We have been asked by the


© The Prince's Foundation

The current model of development in Puerto Ayora.


© The Prince's Foundation

The principles of a sustainable house.

Parish of Floreana and the Municipality of Isabela to help develop standards for their Islands. The regional government is currently developing its policy for the entire Archipelago and has asked us to participate in incorporating planning and sustainability into their codes of practice.

The Prince's Foundation transforms lives through engaging, educating and empowering people. To find out more or become a member please visit **www.princes-foundation.org.**

There is much work to do to adapt the building culture in Galapagos, blending practices of sustainable living into the national agenda of Buen Vivir or 'Good Living'. Although we are only at the start of our time here, I look forward to coming back in the distant future to experience a built side of Galapagos in harmony with the wider natural environment. From my short experience here and all the people I have met and worked with, there is the will, passion and determination to realise this goal, conserving the Islands for wildlife and humans alike.

Share your love for Galapagos

© Gordon Chambers

Why not recommend membership of the Galapagos Conservation Trust (GCT) to one of your friends? As a member your friend will receive their very own copy of *Galapagos Matters*; monthly updates via our email bulletin, bringing all the news from GCT and Galapagos; as well as invitations and priority booking for certain Galapagos events, like our annual lecture. Plus we'll send you a Galapagos Gift as a thank you! Just ask your friend to mention your name and quote the code MGM with their order (phone **020 7629 5049** or visit **www.savegalapagos.org/membership**).

> Contact details

GCT has finally grown out of its shell and it is time to relocate to a new home.

Please note our new contact details:

Galapagos Conservation Trust
Charles Darwin Suite,
28 Portland Place
London W1B 1LY
Tel: 020 7629 5049

Diary Dates

EVENT	WHERE?	WHEN?
Galapagos Exhibition	The Bluecoat, Liverpool	4 May to 1 July
Galapagos Exhibition Tour with co-curator Bergit Arends	The Bluecoat, Liverpool	12 May, 2pm
Artists' Talk with some of the exhibiting artists	The Bluecoat, Liverpool	23 May, 6pm
Tourism and Galapagos Talk with Dr Henry Nicholls	The Bluecoat, Liverpool	14 June, 6pm
Lecture	TBC	TBC
Photo competition closing date		31 October
Galapagos Exhibition	The Fruitmarket Gallery, Edinburgh	2 November to 12 January
Galapagos Exhibition	Centro de Arte, Moderna, Lisbon	April 2013

For more details visit our website **www.savegalapagos.org** or telephone the office **020 7629 5049**.

Photo competition

Congratulations to all the winners of our 2011 Photo Competition. Check out the Judges' winner, **Caroline Marmion,** who took this delightful image of a Marine Iguana practising her leg lifts on the lava rocks of Isabela island. To see the rest of our winners, visit the photo competition pages on the website. All of our winners feature in our 2013 calendar – available for pre-order now (p 19).

Our 2012 Photo Competition has already been launched so be sure to get your entries in (**www.savegalapagos.org/getinvolved**)!

© Caroline Marmion

Spending in 2011

In 2011 your fantastic support (totalling over £800,000) helped us to fund almost 20 vital projects, which are listed below. For more information on any of these, please visit our website (**www.savegalapagos.org/projects**) or contact the office.

SCIENCE

- Monitoring of the Galapagos Marine Reserve
- Research into the movement ecology of the Galapagos Tortoise (below right)
- Evaluation of the population size and possible decline of Blue-footed Boobies
- Safeguarding the future of the Galapagos Penguin and Flightless Cormorant (p. 12)
- Emergency response to mass mortality of Galapagos Sea Lion pups on San Cristobal
- Recovery of the Floreana Mockingbird
- Investigating the influence of the parasitic fly *Philornis downsi* on the Warbler Finch
- Controlling *P. downsi* and helping to save Darwin's Finches
- Support for Rachel Atkinson, Interim Head of Restoration at the Charles Darwin Foundation

EDUCATION AND CULTURE

- Regulation and awareness of appropriate lighting on cruise ships
- Support for PhD student Jorge Renteria
- Internship at Christ's College, Cambridge for Washington Tapia and Patricia Jaramillo (p. 17)
- Providing advice on the development of El Mirador
- Capacity Building on Isabela (p. 13)
- Researching the potential impacts of recreational fishing
- Building conservation consciousness on Floreana through gardening with native plants
- Educating the Floreana population about the importance of their island and its conservation
- Support for volunteers to teach English to Floreana residents
- Developing a community tourism model for Floreana

Love George, Love Galapagos

Many of you will have read in our recent appeal that it is 40 years since Lonesome George – the sole surviving giant tortoise from Pinta – was brought to Santa Cruz. To mark this anniversary and to reflect on the vulnerability of Galapagos wildlife more generally we asked you to Love George, Love Galapagos to help safeguard the Islands' future.

It is not too late to support our appeal. Please help us to ensure that no other Galapagos species suffer the same fate as George by making a donation. Simply return the form at the back of this newsletter or telephone the office (**020 7629 5049**). Every penny counts towards making a difference in Galapagos.

Learn all about the story of Lonesome George and Galapagos Giant Tortoises on the Love George website (**www.lovegeorge.org**).

> Project Update

Giant Tortoise Monitoring

Giant Tortoises are just one of the species to benefit from our Love George, Love Galapagos appeal. These iconic creatures – icons of Galapagos and the largest terrestrial reptile on Earth – are unusual among reptiles in that they undertake seasonal migrations from upland feeding grounds to lowland nesting sites. Owing to the impact they have on vegetation, they can be thought of as ecosystem engineers that shape the terrestrial ecology of the Archipelago. There is, however, much we do not know creatures, including their distribution, migration routes, diet and the impact they have upon other species. It is crucial that we fill these gaps in our knowledge if we are to implement successful conservation measures to counter the threats that poaching, introduced species, agricultural development and urbanisation may pose to some populations.

Since the start of the Giant Galapagos Tortoise Monitoring Programme, researchers in the Islands have fitted dozens of tortoises with satellite transmitters, initially on Santa Cruz and more recently on Isabela and Espanola. With more than a year's worth of data, answers to some of the questions are already emerging and an education programme that has been operating in parallel is raising awareness of the environment amongst local school children.

For more information, visit the project website (**www.gianttortoise.org**).

Galapagos National Park ranger Freddy Villalba captures a Cormorant. All pictures © Volker Koch.

Penguin & Cormorant monitoring

In early 2011, GCT's supporters helped to secure funding to carry out essential research work, for two years, on two of the Islands' endemic and threatened species – the Galapagos Penguin and Flightless Cormorant. Because such small numbers of each species exist – approximately 1,500 – it is important to keep a close eye on them.

Here are some photos taken during two of the field trips that took place last year. Work will continue into 2012 and 2013 and we look forward to sharing some of the findings with you. Thank you again for helping us to ensure that this vital work can take place.

Project coordinator Gustavo Jiminez and his CDF colleagues weighing a Galapagos Penguin.

Penguins await their turn to be weighed. When it is time to release them, they are set down on the back of the boat from which they can hop back into the water when they are ready.

This Penguin is having its tag scanned.

Each Penguin is weighed, has an electronic tag fitted to its foot and is marked with a pen to ensure it is not collected again.

The team at work with the Flightless Cormorants of Fernandina.

This cormorant is having its beak measured, which gives the scientists an idea of the health of the bird.

Great care is taken to ensure that no harm or distress is caused to the birds during these important monitoring trips.

Capacity building on Isabela

The growing number of tourists and population has slowly but severely impacted the Islands, mainly because of the lack of basic infrastructure and organised, institutional environmental management. There is no means to control the burden that personal and commercial consumption has on the environment, resulting in the unsustainable use of energy and water, contamination of soil, air and water resources and an increased risk of infectious disease and other public health concerns.

Following the successful WWF initiative to create the first Environmental Department on the island of Santa Cruz with the local Municipality, GCT has teamed up with WWF to replicate the model in the Municipality of Isabela. Maximilian Martin, an expert in environmental management, is working to support the newly created Municipal Environmental Department of Isabela to provide technical assistance in situ.

Already recycling bins have been distributed to the local population and plastics, glass, cartons and paper are being recycled as well as organic waste being composted. This work is being carried out alongside an education campaign, which has involved house visits, an advertisement on television, recycling competitions and presentations to schools, public organisations and the tourism sector. In June 2011, more than 100 participants celebrated World Environment Day, learning about the recycling project, reforestation and local biodiversity.

The next steps are to strengthen the new department on Isabela to create a local environmental legal framework and a municipal environmental policy. Maximilian will also go through the process required to construct a new sanitary landfill site. Finally, there is a plan to recycle used oil within Puerto Villamil.

This project has been made possible thanks to new Corporate Gold members Hotel Albemarle, ISS partners and all of our supporters.

All pictures © Maximilian Martin

Artistic inspiration

Jyll and Alexis are two of 12 artists who took part in the Gulbenkian Galapagos Artist's Residency Programme (GGARP). You can read about all of the artists and their work at www.artistsvisitgalapagos.com and see their work in forthcoming exhibitions (p. 11).

Stepping ashore

By Jyll Bradley

500 years or so ago, after weeks drifting off course, Fray Tomas de Berlanga, the Bishop of Panama, stepped ashore on Galapagos. His was not a triumphal step (though he was part of the Spanish colonial machine), for by the time his ship had reached the Islands he and his crew had run out of water and all aboard were half mad with thirst. They were saved, he later wrote in a letter to the King of Spain, by the Opuntia cacti whose prickly limbs they broke apart to suck at the sappy flesh.

Fray Tomas and his crew left the first recorded human footsteps on Galapagos. Compared to many scenes from times past, their presence, by turns desperate and redeemed, is not hard to imagine, or so I felt when I visited Galapagos three years ago. This is because, unlike nearly every other part of the globe, the place has not really changed that much. As we, a motley crew of 21st-century sailors on our plentifully stocked little vessel found, there are still the curious sea-lions that Fray Tomas encountered, the iguanas that stay put when you sidle up to them, the lumbering tortoises, the darting finches. And, thanks to Galapagos National Park rules, there are vistas devoid of houses or human industry. We were the only vertical life on the horizon.

This is, to me, what makes Galapagos particular. The unhindered horizon makes every little group of people look like survivors of this ship called life. This view is humbling. It humbled me. As we stepped ashore on different islands as part of our cruise I started to hang back from the group to drink this in. In so doing, I eschewed the plentiful information offered by our guide on this plant or that bird, watching my fellow travellers becoming smaller and smaller to my eye, increasingly creaturely and vulnerable beneath the vast sky. Like brightly dressed back-packer pilgrims.

In the biology lab at my old school, there was a large wall poster that showed the march of evolution like a hymn to progress writ left to right: from the amphibians that hauled their bodies from primordial seas and grabbed at air, through to the apes.

> "I watched my fellow travellers becoming smaller and smaller to my eye, increasingly creaturely and vulnerable beneath the vast sky."

Until, knuckles no longer scraping the ground, we humans stood proud. Over the millennia, we have become the 'I' in the landscape, the ego on the horizon. But with our right to roam comes responsibility. If we are to stand tall, then, I think, we must be upright about it. Maybe we should try to walk the earth as though everywhere were Galapagos. Tread softly, as though we were stepping ashore for the very first time - as if, like Fray Tomas, our lives depended upon it.

The tortoise and the egg

By Alexis Deacon

During his trip to Galapagos in 2009, Alexis did not take a single photograph, preferring instead to sketch as he went. All the illustrations here were made on the day of his visit to the Fausto Llerena Tortoise Breeding Centre at the Charles Darwin Foundation on Santa Cruz.

Whilst I was in staying in Puerto Ayora on Santa Cruz, I was taken around the Fausto Llerena Tortoise Breeding Centre by Fausto Llerena himself. His knowledge and experience in the workings of the Centre are second to none so I understood the privilege of such an opportunity.

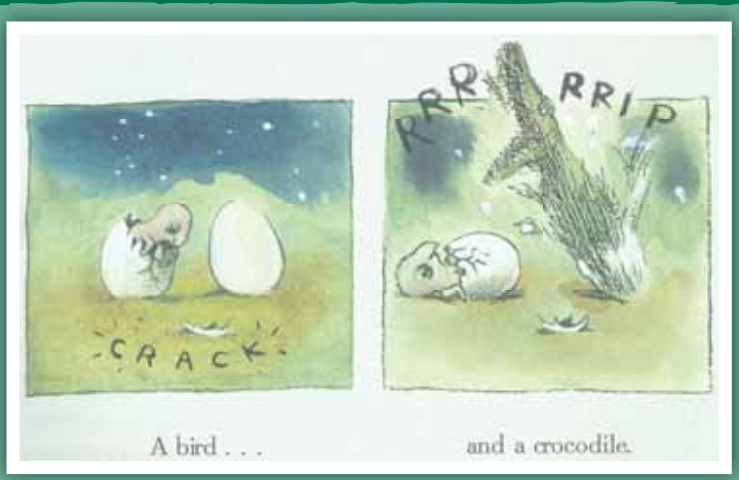
It was feeding day when I visited and Senor Llerena and his assistants were travelling from pen to pen, hacking slices from plant stems with machetes. The youngest tortoises are kept in a central zone of terraced enclosures within a larger corral. Each enclosure in this section houses young of a different island species and the individuals are distinguished by numbers painted onto their shells. The smallest tortoises move around at surprising speeds and the anticipation of a meal only seems to spur them on. I saw several crashes and many mass pile-ups. With their numbered shells and sand-filled enclosures they looked a lot like a series of tiny demolition derbies.

At this point in their life the features that distinguish one species from another are slight but as they grow the differences become more apparent. I struggled to tell one batch from another in the terraced pens but the larger juveniles roaming around the surrounding corral were already beginning to show differences in their shells. They were also a lot slower!

"With their numbered shells and sand-filled enclosures they looked a lot like a series of tiny demolition derbies."

When the feeding was done, I was taken to the hatchery, actually a kind of bunker with a desk and two large wardrobes at one end. Each wardrobe is kept at just the right temperature by a cunning arrangement of hairdryers: a little cooler, around 28°C, to produce males on one side; and warmer, just below 30°C, for females on the other. Inside the wardrobes and stored in Tupperware boxes, there are dozens of smooth, white eggs, round like tennis balls.

At first I was shown boxes of eggs like these, packed in sand, then to my great delight Senor Llerena pulled out one of the boxes to reveal the amazing spectacle of giant tortoises hatching! This isn't quite as serendipitous as it might seem as it can take up to two days for them to free themselves. That being said, I will count myself very, very lucky if I ever see it happen again.



Alexis used his first-hand experience of hatching tortoises as inspiration for this scene from his latest book Croc and Bird *(see p. 18).*

Hotspot or not?

By Ana Rodrigues

Ana Rodrigues is a conservation biologist at the Centre for Functional and Evolutionary Ecology in Montpellier, France. Her research focuses on the identification of global priorities for conservation of biodiversity.

Over the course of several million years, a volcanic hotspot beneath the Pacific Ocean caused island after island to erupt from beneath the waves. Galapagos was born. So fascinated are we by the plants and animals that colonised and subsequently evolved in the isolation provided by these Islands that we have come to refer to them as a hotspot of an altogether different kind, as a hotspot of biodiversity.

When the idea of "biodiversity hotspots" was first proposed in the 1980s, it was embraced by the conservation world. Yet with its growing popularity, the term became progressively fuzzier and is now liberally employed to refer to any geographical region considered of conservation importance.

When British scientist Norman Myers first coined the term in 1988, he was referring to large biogeographic regions with two characteristics: exceptional concentrations of endemic species (that cannot be found anywhere else) and exceptional degrees of threat to biodiversity. Just over a decade later, the definition became even more precise, with hotspots defined as regions that have at least 0.5% (1,500) of the world's 300,000 vascular plants as endemic species and that have lost at least 70% of their primary vegetation. Together, these two conditions are a recipe for a conservation disaster: these are regions where many species are vanishing from the face of the Earth. Biodiversity hotspots defined in this way became the core global conservation strategy of the US-based conservation organisation Conservation International, resulting in substantial investment to protect regions such as Madagascar, the Philippines and the tropical Andes.

In the 1990s, however, other meanings of hotspots emerged: sites of exceptional species diversity ("diversity hotspots"); sites with many rare species ("rarity hotspots"); and sites with high concentrations of threatened species ("threatspots"). As if this weren't confusing enough, many other kinds of hotspot began to appear in the literature, including "environmental hotspots" (sites with high environmental diversity), "forest clearing hotspots" (with active deforestation) and "conservation planning hotspots" (intense conservation activity).

Where does this leave Galapagos? Is it a hotspot or not? With fewer than 1,500 endemic plant species, Galapagos is too small to meet the original definition of a "biodiversity hotspot" adopted by Conservation International, though they are an important part of the wider "Tumbes-Chocó-Magdalena" hotspot, a region that occupies the coastal flank of the Andes from Panama to Peru. But in the broadest sense of a "hotspot" as a region of high conservation value, Galapagos is certainly up there. The Islands feature in most schemes that highlight conservation priorities at a global scale, including UNESCO's list of World Heritage Sites, WWF's Global 200 ecoregions and BirdLife International's Endemic Bird Areas. What there can be no doubt about is that Galapagos biodiversity is at risk and without sustained conservation action could become one of the world's hotspots of species extinctions.

© Paula LeVay

The Galapagos hotspot at work, causing the eruption of Fernandina in 2009. Today, many people consider Galapagos to be a hotspot of biodiversity.

Islanders

Washington (Wacho) Tapia and Patricia (Patty) Jaramillo ...

Washington is the director of conservation and sustainable development for the Galapagos National Park and Patricia is curator of the Charles Darwin Foundation's herbarium. In 2011, they were beneficiaries of the Charles Darwin and Galapagos Islands Fund Scholarship Scheme and spent several months at the University of Cambridge. Their two children came too.

Why did you apply for this scholarship?

Wacho: Cambridge University is one of the best if not the best in the world and I was very keen to work in its famous department of zoology with Professor Bill Sutherland. Within just a few months, I was able to develop several important ideas that could be of profound importance to Galapagos. One of these is a new ecological monitoring strategy for the Archipelago. Of course, monitoring is not new but normally we focus on emblematic species. The new strategy will allow us to monitor at the level of an entire ecosystem, which should help conserve the dynamic processes on which all the species, including the human population living in Galapagos, depend. Within a couple of years, we might be able to use this monitoring tool to anticipate adverse changes to ecosystems, allowing us to implement appropriate conservation measures to prevent them happening.

© Catherine Twilley

Patty and Wacho (right) and their children at Christ's College Cambridge, with Frank Kelly (Master of Christ's College) and David Norman (Director of the Sedgwick Museum) standing to the left of a seated bronze of the young Charles Darwin.

Patty: I was working in the University's department of botany on historical collections that contain Galapagos plants. In amongst these, there were specimens collected by James Macrae, a botanist on board HMS *Blonde*, which spent just over a week on Isabela island in 1825. There were also lots of specimens collected by Charles Darwin, some of which had never been catalogued. Working on historical collections is incredibly important as they help us to establish which species are native to the Islands and which are not. I found it very emotional handling these precious specimens. It would be for any biologist but it's even greater if you are from Galapagos.

How did you find it coming from Galapagos to Cambridge?

Wacho: It has been amazing. There is a lot that Galapagos can learn from other cultures. The Cambridge population of around 120,000 is served by a really good waste management system. In Galapagos there are far fewer people, but I think it's possible to adapt the same system to the four inhabited islands. We could also learn from the careful urban planning and development in a city like Cambridge. On the other hand, we have been struck by the levels of consumerism in the UK.

Did your children enjoy being in the UK?

Patty: During our visit, they attended local schools. Their English was already very good but it has improved a lot. Our son loved it so much it was difficult to get him onto the plane home. He has set his heart on studying at Cambridge University. It was great for our daughter too, though she did not like the obsession with materialism. Her classmates, for example, asked her what make her clothing was. She didn't even know about brands. There are elements of this in Galapagos, where there is a huge demand for more and bigger cars. But the time away – and the different culture – has helped to remind us what is so special about Galapagos.

Reviews

THROUGH ARTISTS' EYES

Galapagos

Edited by Bergit Arends and Siân Ede, Calouste Gulbenkian Foundation, 2012, £10.99, ISBN 9781903080153

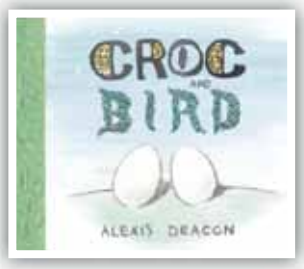
Visiting Galapagos is the most fantastic experience and privilege. What these Islands mean for artists is as wide-ranging as their work. In my case, after the joy of sculpting a large bronze figure of the young Charles Darwin for his alma mater Shrewsbury School (which portrays him standing astride a pockmarked lump of Galapagos volcanic rock, fauna all around him), I finally got to see the Archipelago for myself. I responded with a collection of small bronze animals to be sold in support of GCT. So it was with great interest that I opened Galapagos, a new book that reveals the reactions of the twelve contemporary artists selected for the Gulbenkian Galapagos Artists' Residency Programme.

Some artists were deeply troubled, almost frozen, during their time in Galapagos: the degradation of the natural landscape, the ever-increasing pressure on species and the contradiction of being there at all can seem quite crushing. Others understood these bewitching paradoxes, yet managed to use their creative skill and curiosity to 'give back' during their stay, getting involved in conservation campaigns and education or simply inspiring local people. Without exception their focus was on the relationship and ultimate collision between man and nature – Galapagos being a microcosm, of course, for the wider world.

This book, which will accompany the Gulbenkian Galapagos exhibition to three venues over this year and next, is an original, important and gritty exploration of Galapagos through the artists' collective eye and thought-provoking even to those familiar with the Islands' issues. At the Calouste Gulbenkian Foundation's heart is the hope that projects like this help us to look afresh at our local natural environments. It is clear that the presence of people in Galapagos poses a huge problem. Yet people can also be the solution.

Available from GCT, see order form.

Reviewed by Jemma Pearson



SCALES AND FEATHERS

Croc and Bird

By Alexis Deacon, Hutchinson, 2012, £10.99, ISBN 9780091893323

This is the latest charming book from children's author and illustrator Alexis Deacon. When croc and bird hatch out together, the unlikely pair assume they are brothers and set out to explore the big wide world. Deacon's illustration of the two protagonists emerging from their eggs was inspired by his visit to the Charles Darwin Research Station in 2009 as part of the Gulbenkian Galapagos Artists' Residency Programme (see page 14).

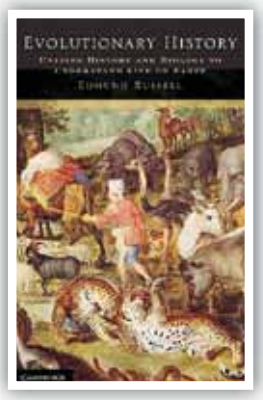
Available from GCT, see order form.

Reviewed by Henry Nicholls

THE HAND OF MAN

Evolutionary History: Uniting History and Biology to Understand Life on Earth

By Edmund Russell, Cambridge University Press, 2011, £16.99, ISBN 9780521745093

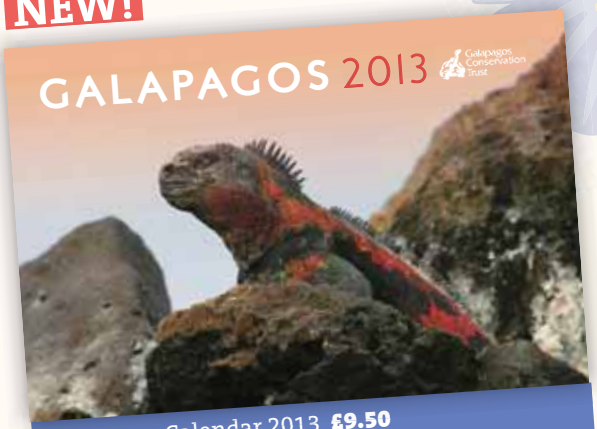


How should we make sense of the past? By studying evolutionary biology or history? Both, argues academic Edmund Russell, as he makes an engaging case for "evolutionary history", "a new field that unites history and biology to create a fuller understanding of the past than either field of study can produce on its own." Though instinctively we know that *Homo sapiens* has changed the face of the earth, Russell's many lively examples still come as a surprise, showing clearly just how widespread and radical our influence on nature has been.

Reviewed by Henry Nicholls

Galapagos Gifts:
The Spring Selection

NEW!



Galapagos Calendar 2013 **£9.50**

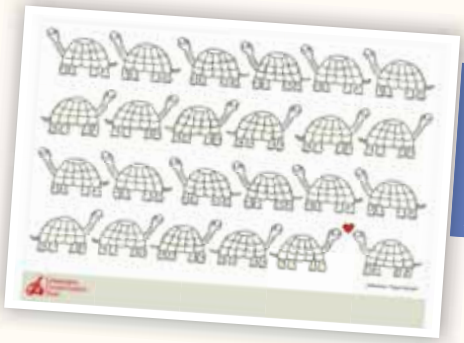
Twelve evocative images of Galapagos to see you through 2013 – a great start for the year ahead. Our 2013 calendar sponsored by Steppes Travel is available to pre-order now!

Interested in a bulk order for your company? Email us for a special discount at ***gct@gct.org*** *(min. order 10).*

NEW!

Notelets **£8.50**

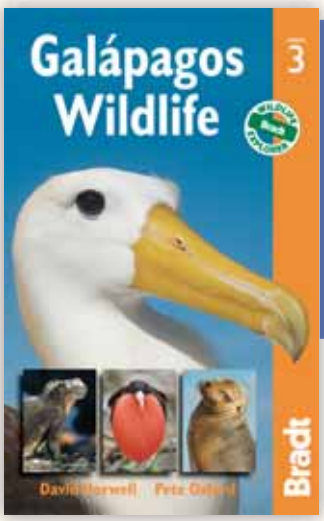
Write in style with a beautiful notelet set from artist and GCT supporter Mary Ellen Taylor. Available as a pack of six featuring endangered bird species of Galapagos. A great gift idea!



NEW!

GCTea Towel **£8.00**

Show your love for George and Galapagos in your kitchen with our brand new tea towel designed by author and artist, Johanna Angermeyer.



Galapagos Wildlife **£16.99**

Know anyone visiting Galapagos soon or want to identify the wildlife in your photos? Grab a copy of David Horwell's new 3rd edition of Wildlife of Galapagos – a field guide to the main tourist areas.

Galapagos Chart **£9.95**

Adorn your wall with this beautiful Fitzroy chart of the Archipelago – a great conversation piece to show others where you visited on your trip of a lifetime!

Cuddlekins Galapagos Tortoise **£12.00**

Who could resist giving this cuddly Galapagos Giant Tortoise a home? Suitable for ages 3+

Albatross Adoption **£50.00**

Spring is nesting season for the critically endangered Waved Albatross – in our special adoption offer, receive an adoption pack and a copy of the beautiful hardback book Albatross, a stunning insight into the lives of these magnificent birds.

Gift items that are not featured on this page are also available for order on the attached form and can be viewed and purchased through our website (www.savegalapagos.org).

‘Take only photographs, leave only footprints’ *and a gift in your Will to Galapagos*

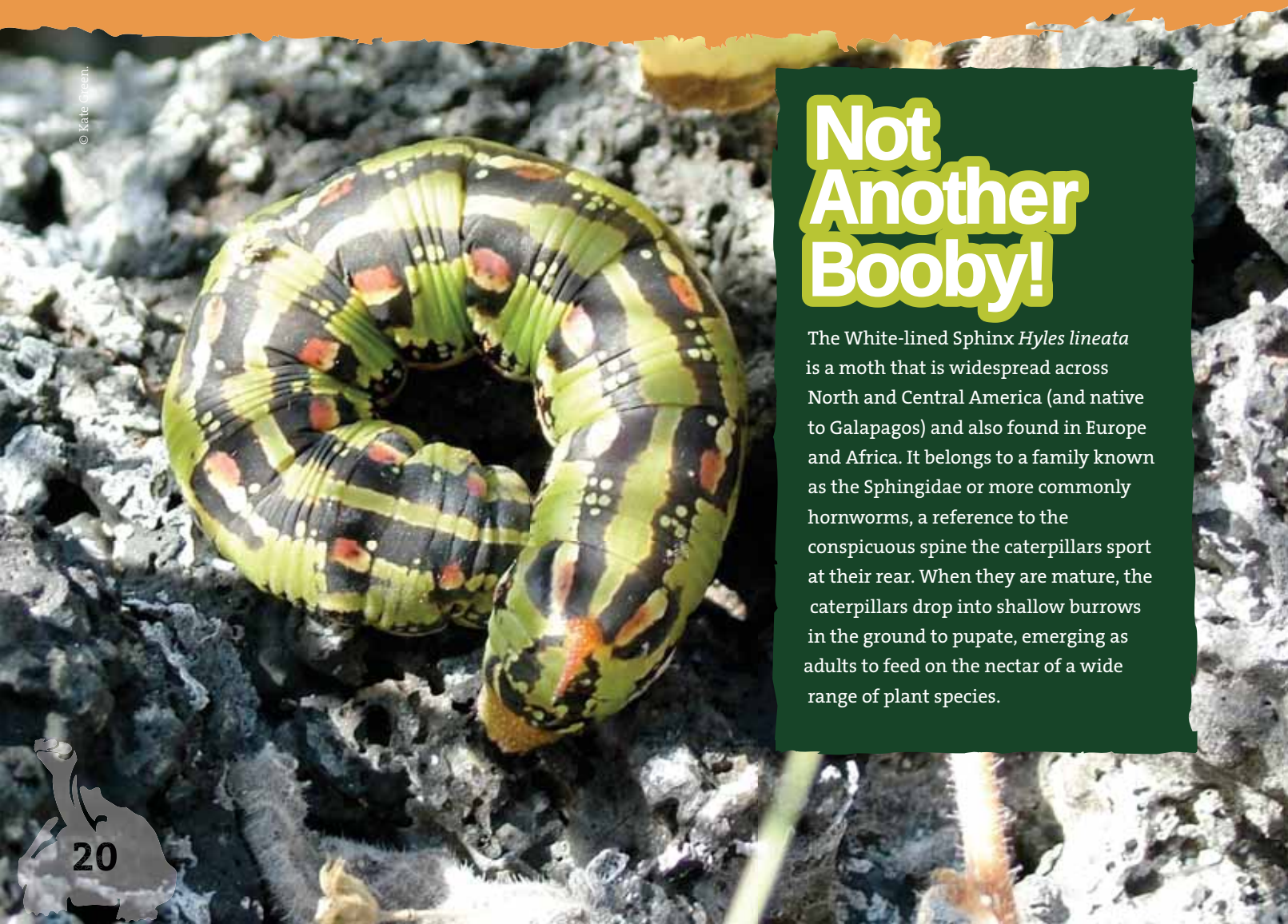
© Vanessa Green

For those who have visited Galapagos, the words ‘take only photographs, leave only footprints’ will remind you of the rule set out by the Galapagos National Park, a simple and effective message to remind us to make sure we have a minimal impact on these fragile Islands when we come to visit. But each one of us could have a huge impact on the future of Galapagos, simply by remembering to leave a gift in our Will.

Over the last 17 years, GCT has received over £600,000 from gifts in Wills, which has funded vital work to protect Galapagos. We rely on these gifts and need more people to pledge their support by thinking of Galapagos in their Will.

Once you have visited Galapagos, why not give something back that will last well into the future? You could do this by updating your Will today and making your pledge.

For more information please visit our website (**www.savegalapagos.org/getinvolved**) or telephone Richard Moody (**020 7629 5049**). There are different ways to leave a gift in your Will and we would always recommend getting legal advice when writing or updating a Will. Please let us know when you have made your pledge. Thank you.



© Kate Green.

Not Another Booby!

The White-lined Sphinx *Hyles lineata* is a moth that is widespread across North and Central America (and native to Galapagos) and also found in Europe and Africa. It belongs to a family known as the Sphingidae or more commonly hornworms, a reference to the conspicuous spine the caterpillars sport at their rear. When they are mature, the caterpillars drop into shallow burrows in the ground to pupate, emerging as adults to feed on the nectar of a wide range of plant species.