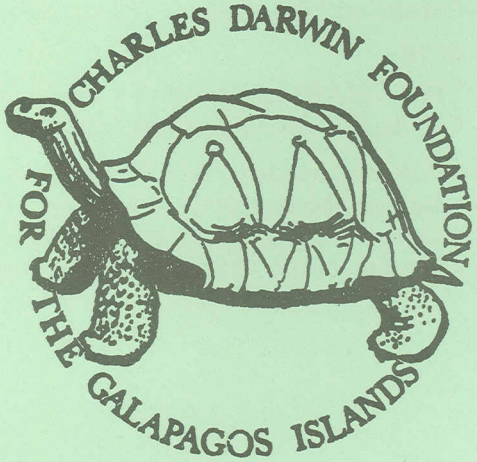
noticias de GALAPAGOS



No. 45 (1987)

INFORMATION FOR SUPPORTERS
of the
CHARLES DARWIN FOUNDATION

The Charles Darwin Foundation for the Galapagos Islands is supported by several national and international institutions but nevertheless remains largely dependant on the generosity of individual donors for the funds needed to finance its programmes.

In the United States, contributions, which should be accompanied by a note indicating that they are to be used *"for conservation and science in the Galapagos Islands"*, may be made out to the following organizations who support these programmes:

SMITHSONIAN INSTITUTION, c/o Secretary for the Americas (Administration), P.O. Box 37481 — OBC, Washington DC 20013.

WORLD WILDLIFE FUND — U.S., 1601 Connecticut Avenue, N.W., Washington DC 20009.

U.S. citizens contributing through either of these organizations are entitled to tax reductions. No administrative fees or overheads are charged.

Elsewhere contributions earmarked *"for the Galapagos"* may be made through the donor's *national* W.W.F. organization (where this exists) or through the:

W.W.F. — INTERNATIONAL, Avenue du Mont Blanc, CH-1196 Gland, Switzerland

or through the

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CHARLES DARWIN FOUNDATION,
Greensted Hall, Ongar, Essex, England.

or to

THE CHARLES DARWIN RESEARCH STATION, Santa Cruz, Galapagos
Casilla 58—39, Guayaquil, Ecuador.

While emphasizing that the continuing success of conservation in the Galapagos is directly dependant on the receipt of future contributions, we wish once again to place on record our deep gratitude to all those supporters whose generosity has made it possible to achieve so much since the establishment of the Charles Darwin Research Station.

NOTICIAS DE GALAPAGOS

Published by

THE CHARLES DARWIN FOUNDATION FOR THE GALAPAGOS ISLES

An International Organization

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THE GOVERNMENT OF ECUADOR

UNESCO

THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE

CONTENTS

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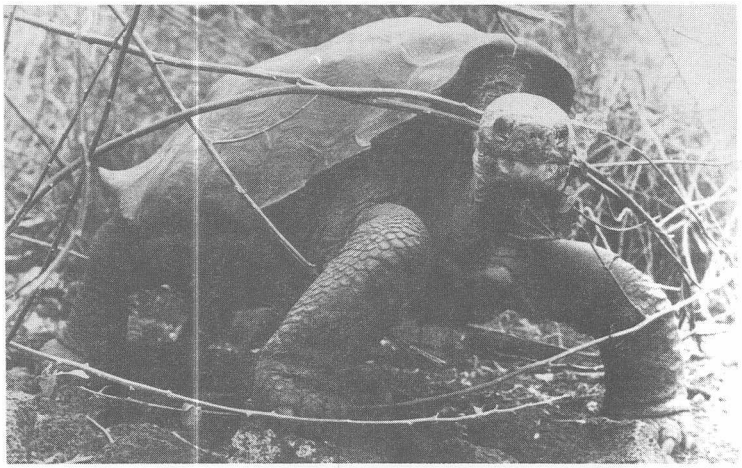
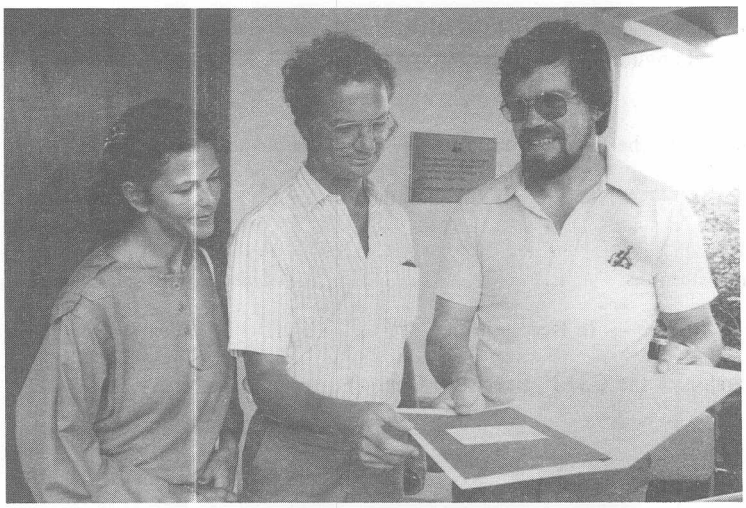
NEWS FROM ACADEMY BAY

ROYAL VISIT

Their Majesties King Carl Gustav and Queen Sylvia of Sweden made a tour of the Galapagos Islands in November-December 1986. While on Santa Cruz Island they visited the headquarters of the National Park Service and the Charles Darwin Research Station's laboratories and the installations where endangered races of giant tortoises and land iguanas are being bred in captivity. Their Majesties were particularly interested in "Lonesome George", who was the sole survivor of the Pinta race of tortoises when the Charles Darwin Foundation was organised in 1959. He is therefore doomed to be the last of his kind, *Geochelone elephantosis abingdonensis.* All the other races of giant tortoises surviving in 1959 have been preserved for posterity.



The generosity of Swedish conservationists has been of critical importance to the Charles Darwin Foundation on several occasions during the last quarter of a century and they are currently financing a major tortoise survey and conservation project. Only last year a new Swedish Foundation, Svenska Galapagos Stiftelsen, was created and King Carl Gustav formally handed over a donation of 700,000 Swedish crowns to the Charles Darwin Foundation. His Majesty is Honorary President of WWF — Sweden.

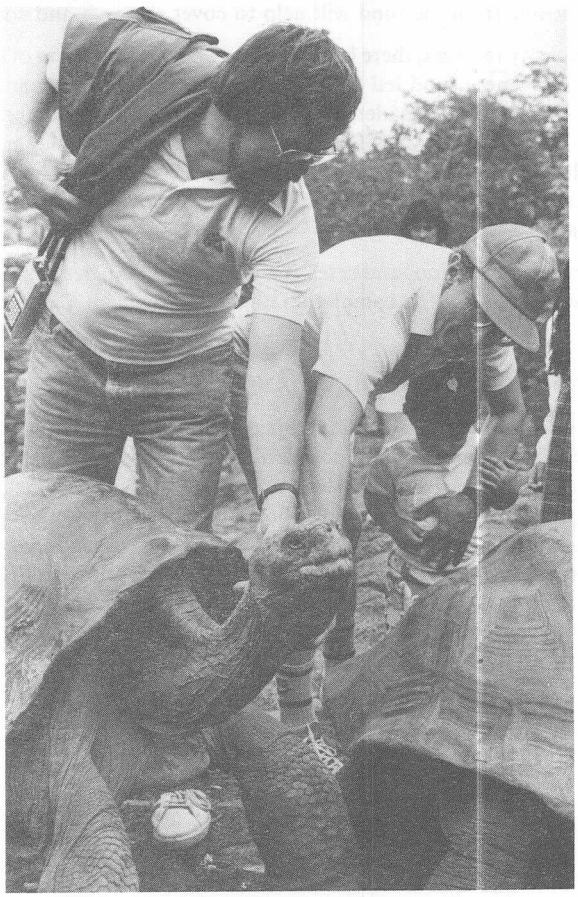


King Carl Gustav and Queen Sylvia presenting a cheque to Juan Black
Secretary General of the Charles Darwin Foundation
Photo by Andy Wilson

THE VICE PRESIDENT OF ECUADOR IN THE GALAPAGOS

In 1986, Dr. Blasco Peñaherrera Padilla, Vice President of the Republic, took his family for a vacation in the Galapagos. He visited a number of islands, escorted by Humberto Ochoa, Chief Conservation Officer of the National Park, Juan Black, Secretary General of the Charles Darwin Foundation, and Günther Reck, Director of the Charles Darwin Research Station. In this way he was able not only to see the wildlife but also to receive authoritative information on conservation management problems, the development of tourism, the education of young Ecuadorean biologists and the research projects of international scientists. He also found time for discussions with staff and students and for visits to the incubators and corrals where the GNPS and the CDRS rear endangered races of tortoises and iguanas. During his stay, Dieter Plage and Sylvia Harcourt arrived with copies of four of the "Survival" films they had made for Anglia Television during the previous three years and these films gave the Vice-President an even more comprehensive picture of wildlife and conservation in the archipelago and its surrounding seas. Dr. Peñaherrera was deeply impressed by the unique qualities of the Galapagos and emphasized his concern for their continued protection against threats of every kind. Before leaving he expressed his enthusiasm in a message he wrote in the Station's visitors' book:

"Pocas institutiones como la Fundación Charles Darwin corresponden tan apropriademente a su denominación. El ilustre cientifico que ubicó la especie humana como parte de un cosmos con el que se interrelaciona, que señorea pero del que vitalmente depende. Así es Galápagos; así son, asi deben entenderse y cuidarse estas Islas Encantadas; no como un lugar al que se llega y admira, sino como una suerte de caleidoscopico reflejo de los orígines, el ancestro y el destino de el hombre."



Dr. Peñaherrera introducing his son to a giant tortoise under the watchful eye of Günther Reck, Director of the CDRS.
Photo by Andy Wilson

THE GALAPAGOS MARINE RESOURCES RESERVE

The decree promulgated by President Léon Febres-Cordero in April 1986 (Noticias 44) established a Commission representing the seven ministries and institutions with responsibilities in this vast area and charged it with the task of preparing a management plan for the Galapagos Marine Reserve. The Commission, under the chairmanship of the Ministry of Agriculture, the government department responsible for the National Park, has sought technical advice and assistance from a number of international organizations with varied experience in the field of marine resources. These include the Great Barrier Reef National Park in Australia, the Woods Hole Oceanographic Institution and the National Oceanic and Atmospheric Administration in the U.S.A.

At the same time, a Technical Committee was set up to work out a detailed management plan for the reserve. The Charles Darwin Research Station (CDRS) and the Galapagos National Park Service (GNPS) are deeply involved in these planning operations. The plan is to be completed by June 1987. On it depends the future of an area of the greatest significance to world science.

THE CHARLES DARWIN FOUNDATION ENDOWMENT FUND

By the end of 1986, The Nature Conservancy International Program was able to announce that the Campaign for the Galapagos Islands was within sight of its target of a 1,500,000 dollar endowment fund. Although the interest from this fund will not be nearly enough to cover the running expenses of the Research Station, it will provide a vital element of stability. All too frequently in the past, important conservation projects have suffered costly interruptions because of unpredictable fluctuations in the CDF's cash flow. The income from the fund will help to cover research and conservation expenses.

As the CDF had never had any reserves, there had previously been no problem of managing investments, but the prospect of an endowment fund led Kitty and John Lastavica to recommend that a Delaware Corporation be formed. Under Kitty's leadership, The Darwin Scientific Foundation, Inc., (DSF) has now been incorporated. The first Chairman of the Board is Mr. S. Dillon Ripley and the members are Mr. Charles J. Hedlund, Chairman of the Board of the Nature Conservancy; Mr. Robert McC. Adams, Secretary of the Smithsonian Institution; Mr. Craig MacFarland, President of the CDF; John Eaton, Esq., and Mr. John Lastavica.

In order to avoid certain legal restrictions and taxes, it is important, though not mandatory, that the fund-raising process should continue after the completion of the Endowment Campaign.

REPATRIATION OF CAPTIVE-BRED LAND IGUANAS

A decade ago feral dogs invaded the colony of Land Iguanas (*Conolophus subcristatus*) on Cerro Cartago, Isabela Island, and it appeared that the entire population would be exterminated. To prevent this, two projects were mounted. Such survivors as could be found were transferred to the Darwin Station where, with improvised equipment, successful captive breeding methods were eventually evolved. A complementary project eliminated the wild dogs in the Cerro Cartago area. Repatriation of captive-bred youngsters could then proceed. Over the years, 245 iguanas have been released in their ancestral territory.

First Land Iguana to be hatched in captivity at the Charles Darwin Research Station
Photo by Heidi Snell

Their development has been carefully monitored by National Park and Darwin Station staff. Although a complete count is impossible in this rugged terrain, 70 healthy repatriates were found, examined and weighed in 1986, so the programme is obviously succeeding. During the search, the scientists were pleasantly surprised to find remnants of the original population that had somehow eluded the dogs. The captive-bred iguanas are all individually marked so that they cannot be confused with descendants of the survivors. There are still problems: the dogs are gone but cats, which eat the small youngsters, are still present and are more difficult to control. Nevertheless the situation is improved to an extent that could hardly have been believed ten years ago. A GNPS warden, a CDRS herpetologist and a scholarship student were left on Cerro Cartago for a month with this year's release of young iguanas, to study their progress and assess the success so far of the restocking programme.

THE 1987 FLAMINGO CENSUS

Since 1967, the CDRS and the GNPS have conducted censuses of the Galapagos Greater Flamingo, *Phoenicopterus ruber.* The population has remained relatively stable with approximately 400 adults. From statistical analysis of the previous censuses, we found that it was possible to census at fewer sites and still estimate the total population.

On January 24, 1987 Arnaldo Tupiza, the CDRS Representative on Isabela, co-ordinated the Isabela census. Felipe Cruz, an Associate Investigator, co-ordinated the census on Floreana. Census numbers in these two sites were similar to previous years, with a population of approximately 350 adult Flamingos.

Flamingos are very sensitive to human disturbance and their nests are vulnerable to predation from introduced mammals. Tourism has been growing on Isabela. An airport is currently being considered for the town of Villamil, and tourism there will probably increase more rapidly should the airport be constructed. As the majority of the Flamingos nest near Villamil, it will become of increasing importance to keep a careful eye on our Flamingo population.

EXPERIMENTAL PLANTATIONS TO PROVIDE BUILDING TIMBER

The rapid expansion of the village of Puerto Ayora since the establishment of the Darwin Station and the development of the tourist industry has caused an alarming increase in the demand for wood for building and fuel (Noticias 43 and 44). Since the creation of the National Park the local residents have been allowed continued access to their traditional sources of supply of wood, sand and salt but this has now begun to threaten the ecological balance on Santa Cruz Island. To meet the rising demand for timber, while sparing the National Park, the Park Service and the Darwin Station established tree nurseries and five local farmers are now forming plantations on unused areas of their land. These consist chiefly of the native *Piscidia cartagenensis* but experiments are also being made with *Tectona grandis,* a useful tree introduced to the Galapagos in 1937, which shows no tendency to expand naturally and compete with the endemic species.

VISITORS AND EVENTS AT THE CHARLES DARWIN RESEARCH STATION (CDRS)

1986

January

Fernando Pinos, scholarship student from Central Univ., Quito, begins study of the repatriation of giant tortoises to Española, (Hood Island).

Sandra Abedrabbo, scholarship student from Catholic Univ., Quito, begins study of invertebrate communities in the area affected by the great fire on Isabela.

William Chavez, geologist from Univ. of Guayaquil, comes to study the beaches of northern Santa Cruz.

Cicely Blair and Angela Newton arrive from England to study epiphytes on Santa Cruz.

Census of flamingos carried out.

Sven Gillsaeter and party of Swedish supporters of the Charles Darwin Foundation (CDF) visit the Charles Darwin Research Station (CDRS).

Italian television film team visits CDRS.

Visit by Rafael Macías, Director of the National Institute of Fisheries.

February Malcolm Coulter, assisted by Micheline Manceau and Danielle Dirion, continues his blue-footed booby researches.

Blanchy Solórzano, Univ. of Guayaquil, takes up post as volunteer botanical assistant.

Peter Glynn, Fernando Rivera and René Espinosa arrive from U.S.A. to continue their studies of corals affected by El Niño, 1982-1983.

Belgian entomologists Léon Baert, Jean-Pierre Maelfait and Konjen Desender are joined by Sonia Sandoval and Giovanni Onore from Catholic Univ., Quito.

Magdalena Macías, Liliana Bohórquez and Amanda Rocafuerte from Univ. of Guayaquil, come to help with the study of marine turtles nesting on Espumilla beach.

Robert Ricklefs, Univ. of Pennsylvania, to supervise studies of blue-footed and masked boobies on Española.

Inauguration of the restored Cristóbal Bonifaz administration building.

March Galo Terranova, Univ. of Guayaquil, volunteers to assist in the campaign to control the feral pigs on Santiago.

Susanna Pérez, Catholic Univ., Quito, begins investigation of the recovery of bird communities in the burnt-out area of Isabela.

Fritz Trillmich (Max-Planck Inst.), supported by Phil Thorson, Thomas Dellinger, Paul Ponganis and David Hennemann, returns to continue his long-term study of the fur seals.

Roger Zimmermann and Thomas Minello come to monitor the National Institute of Fisheries projects in Galapagos.

Miguel Cifuentes. Head of Galapagos National Park Service (GNPS), Juan Black (Sec. Gen. CDF), and Günther Reck (Director of CDRS) leave for CDF Council meeting at WWF International HQ, Switzerland.

April Ana Puyol leaves CDRS on relinquishing her post as advisor on environmental education.

Andrew Laurie, assisted by Andrew Balmford, arrives from England to continue his long-term research on marine iguanas.

Dieter and Mary Plage, Friedemann Köster and Sylvia Harcourt conclude their three years of filming Galapagos wildlife for Survival/Anglia Television.

Corley Smith, Sec. Gen. of the CDF, 1972-1982, spends a week at the station.

Maria Patiño, secretary to CDRS Director retires.

British Council representative comes to advise on exhibition of Charles Darwin pictures.

May Gayle Davis arrives to take charge of exhibitions and publications.

Michael Hollmann takes up post as Librarian.

Mario Hurtado, Deputy Director of CDRS, returns to the National Institute of Fisheries on completion of his period of secondment to the Darwin Station.

Bella Muzzio, Fanny Pinos, Blanchy Solórzano, Liliana Bohórquez, Maria Prieto, Amanda Rocafuerte, Galo Terranova, Guillermo Molina and César Zeballos, all students at Univ. of Guayaquil, end their tour as volunteer assistants at CDRS.

Chris Vanbeueren arrives from Belgium to assist with cartography.

Catherine Erbaugh joins CDRS staff.

Dennis Proctor comes from Botswana to study invertibrates.

June Peter Pritchard visits CDRS with his camera crew.

Mónica Fabara, Univ. of Guayaquil, comes to help Felipe Cruz with the protection of the breeding colonies of Hawaiian Petrels on Santa Cruz and Santiago.

Jaime Valarezo, Univ. of Guayaquil, to collaborate with the National Institute of Fisheries in collecting samples of "bacalao" and "lisa".

Miguel Cifuentes and Humberto Ochoa (GNPS), Günther Reck (CDRS), Jorge García (Directorate of Tourism) and Luis Maldonado (Metropolitan Touring) visit various islands in search of additional sites suitable for tourist visits.

William and Lois Pitt (Univ. of California) were joined by Carole Shickman, Jere Lipps, Jonathan Rider and Richard Gore in developing their palaeontological studies (molluscs).

Marco Hoyos arrives from Tech. Univ. of Ambato to study land iguanas on Isabela.

Wilson Alcívar and Luis Ortiz, scholarship students from Tech. Univ. of Esmeraldas, begin mapping woodland species and experiments on planting trees to meet Santa Cruz needs for timber.

The Commission on Agricultural Science and Technology holds discussions with CDRS Director, Günther Reck.

Olga Sotomayor takes up duties as Director's secretary.

A National Institute of Fisheries commission, composed of Mario Hurtado, Leonardo Maridueña and Jorge Barragán, with Oscar Aguirre of the National Institute for Galapagos, holds discussions with CDRS Director.

Kristen Nelson, Tom Will and Robert Podalsky, of Peter Grant's team doing long term research on Darwin's finches, return to U.S.A.

June Howard Snell, CDRS consultant on land iguana problems, returns from U.S.A. with Adam Asquist and Katelijne Flies.

July Carlos Vacacela takes up his post as deputy Director and chief education officer of CDRS.

Guy Coppois and Chantal de Ridder return from Belgium to continue their studies of snails.

Diana Córdova succeeds Olga Sotomayor as Director's Secretary.

John Faaborg and Leslie Donaldson continue their study of the Galapagos Hawk. Susana Struve, Catholic Univ., Quito, will help them.

Dan Rosenberg volunteers to serve on the ornithology programme and Ana Sancho will assist with herpetology.

Ramón Andracle takes up his post as public relations officer.

August CDRS scientists and GNPS officials go to Quito to attend CDF Executive Council Meeting.

Thomas Fritts, consultant on giant tortoises, arrives from U.S.A.

Peter Glynn, Robert Richmond and Paula Scott continue their studies of coral communities assisted by Fernando Rivera and René Espinoza.

Syuzo Itow and Kunito Nehira (Nagasaki Univ.) arrive from Japan to pursue their botanical researches.

Marsha Sitnik, Executive Secretary, CDF Secretariat for the Americas, visits CDRS with her son.

The Vice-President of the Republic and family visit CDRS.

Dieter Plage and Syvlia Harcourt return from England to present copies of Anglia Television's series of Galapagos wildlife and conservation films.

Sylvia Harcourt takes up post as assistant to CDRS Director.

Ruth Garcés, Central Univ., Quito, comes to help Fernando Pinos with his monitoring of the captive bred tortoises released on Española.

September

Craig MacFarland and Juan Black (President and Secretary General of the CDF) survey the work of the CDRS.

The GNPS and CDRS begin their annual training course for naturalist guides.

A party from the French research ship *Jean Charcot* visits CDRS.

Commander Cousteau and members of the crew of the *Calypso* pay a return visit after 13 years.

Official party arrives to consider problems arising from the increasing numbers of tourists.

October

Sylvia Harcourt, Dan Rosenberg and Hernán Vargas set out in *Beagle IV* to make a census of penguins and flightless cormorants.

Hendrik Kastelyn takes up his post as CDRS marine ecologist.

Karen Petersen arrives from Denmark as volunteer assistant in the botanical programme.

Luis Ortiz joins CDRS as research assistant in the botanical programme.

Marcia Wilson leaves for Quito to take part in the International Conference on Crocodiles.

Jorge Espinosa, Sandra Serrano, Miguel Zanipatín, Eduardo Amador, Miguel Rosero and Indira Cedeño (all of Guayaquil Univ.) and Raul Salazar (Tech. Univ. of Esmeraldas) come to serve as volunteer assistants in various CDRS programmes.

CDRS Director, Günther Reck, goes to Quito to take part in the seminar on Planning and Management of the Galapagos.

Prof. Stephen Shohet and a group of students arrive from Univ. of California to study proteins in the blood of lizards.

Visit of the U.S. ship *Seaward Johnson* of the Harbord Branch Foundation searching for organisms that might have pharmaceutical uses.

María de Lourdes Cabreram (Univ. of Guayaquil) joins the terrestrial ecology programme as volunteer assistant.

Malcolm Coulter continues his blue-footed booby investigations.

Officers of the three branches of the Ecuadorean Armed Forces visit the GNPS and CDRS.

Jonas Lawesson, Justine and Felipe Cruz, Sandra Abedrabbo, Susana Pérez and Bosko Nowak leave for Guayaquil to take part in the 10th Ecuadorean Biology Conference.

Party from the San Diego Zoological Society visits the CDRS.

Group from the International Monetary Fund and the World Bank visits the CDRS.

December

The King and Queen of Sweden visit CDRS and announce the creation of the Swedish Trust for Galapagos with funds donated by Mr. Thomas Fisher.

Michaella Hainich arrives from Germany to serve as a volunteer in the herpetological programme.

Lorrie Lagasse and Chris Williams come as volunteer helpers with the education programme.

After their meeting in Guayaquil, members of the conference on marine mammals tour the Galapagos on board the research vessel *Sirius.*

Howard and Heidi Snell resume their long-term studies of the land iguanas, assisted by Jim Seely.

Alexander McBirney, William White and Bruno Barroux begin their geological investigations.

Heinz and Irene Schatz return from Austria to continue their study of terrestrial invertibrates.

Hal Whitehead and his team resume their studies of the social organization of the sperm whales in the Galapagos Grounds.

Marvin Green of Nature Conservancy, visits the Station and the islands on board the yacht *Nirvana.*

Rev. Julio Terán Dutari and Rev. Manuel Corrales of the Catholic Univ. of Quito, come to co-ordinate the programme of student scholarships.

Daniel Boorstin, Director of the Library of Congress, visits CDRS.

Anne Heise, Jim Waltman, Dave McCullough and Greg Keys come to continue the long-term study of Darwin's finches by Peter Grant's team.

1987

January

Rosemary and Thalia Grant arrive from U.S.A. to join the Darwin's finches study team.

Mitchell Colgan, Sain Chai Colgan, David Malmquist, Christie Sadler and Tom Smalley continue their study of the coral situation in Urbina Bay.

A party from Cornell Univ. visits CDRS.

Barbara Hooper of Nature Conservancy tours the islands.

José Calvopiña leaves CDRS to study management of natural resources in Costa Rica.

Günther Reck (CDRS) and Humberto Ochoa (GNPS) examine sites on Isabela where another captive breeding centre for tortoises and iguanas could be set up.

David Quammen, editor of "Outside", comes to acquire material for an article on the captive breeding programme.

Mary Clark, a benefactor of the Darwin Foundation, and a party from Long Island Nature Conservancy visit the station.

Andrew Laurie returns from England for yet another stage in his study of the population dynamics of the marine iguanas. He is assisted by Thomas Dellinger from Germany.

David Anderson, Lori Willimont, Mary Becker, Peter Niewiarowski and Catherine Carroll return from U.S.A. for further study of the boobies.

Peter Grant, accompanied by Stoffan and Astrid Ulfstrand, continues the study of Darwin's finches which he began a decade ago.

February

Elizabeth Pillaert arrives as volunteer assistant in the exhibition hall.

Barry Cohen, Australia's Minister of the Environment, is taken on a conducted tour of the islands, by the Director of CDRS and the Chief Naturalist of the GNPS.

A group from the National Development Council and another from the National Secretariat for Public Information visit the Darwin Station.

Señora María Eugénia de Febres-Cordero, wife of the President of the Republic, visits Galapagos escorted by senior civil and military personnel.

Leo Laporte and Margaret Liniecki join the team investigating the Urbino Bay corals.

Kruger Loor, Univ. of Guayaquil, joins the staff as a volunteer.

February *continued*

Amos Ettinger (Israeli Television), Bradley Graham (Washington Post) and Col. Concha, Chilean Military Attaché, visit CDRS.

Amrit Work Kendrick comes to draw up a Plan of Environmental Education for the GNPS.

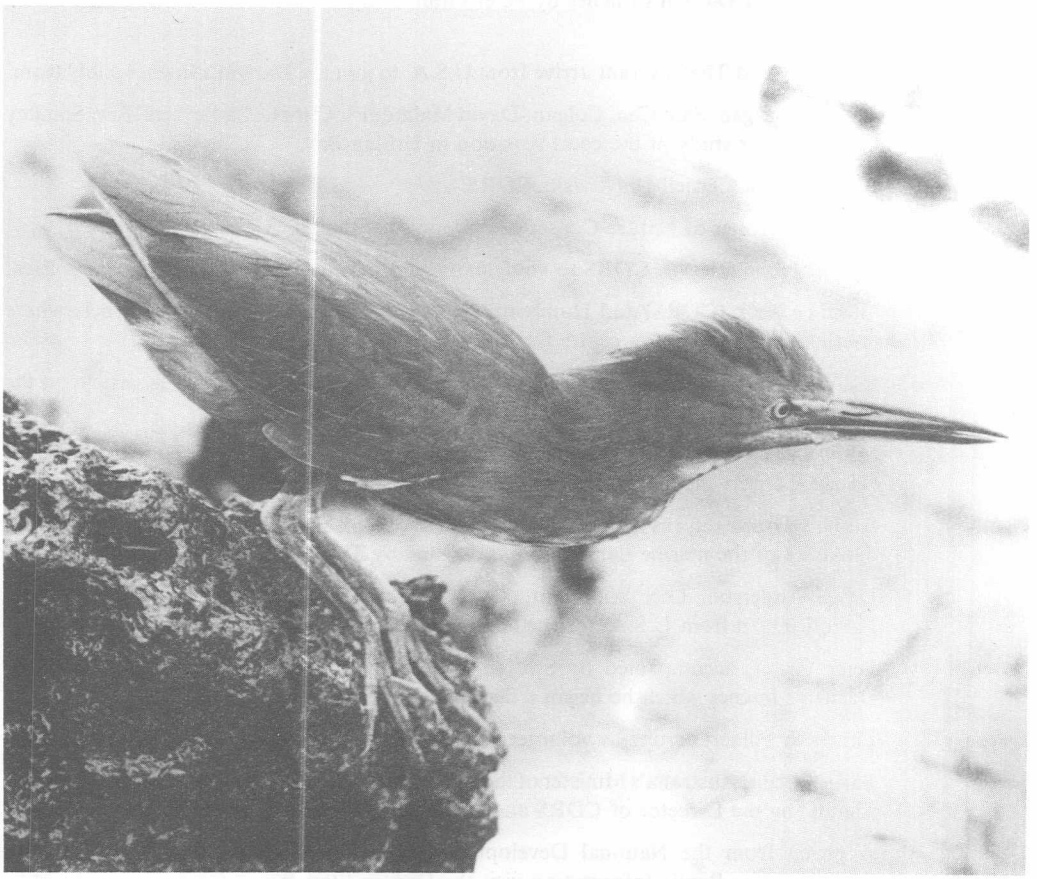
Toshimitsu Wada of the Mitsubishi Corporation holds discussions with the Station Director.

Martha Reyes of the Central Bank Museum examines the possibility of establishing an archeological museum in Galapagos.

Canadian television team comes to make a documentary film for children.

Oliphant Jackson and a group from British Chelonia study blood samples from tortoises and iguanas in the captive breeding centre with a view to diagnosing possible causes of disease.

Henning and Anne Adsersen continue their botanical investigations in the area devastated by the great fire of Isabela.



Lava Heron (*Butorides sundevalli*)
Photo by Fritz Pölking

CHANGE OF EDITORSHIP FOR NOTICIAS

Future issues of NOTICIAS DE GALAPAGOS will be prepared under the editorship of Dr. Thomas H. Fritts, Department of Biology, University of New Mexico, Albuquerque, New Mexico 87131, U.S.A. Correspondence relating to submission of articles, photographs and news items should be sent to the New Mexico address. Until further notice, donations from CDF supporters may continue to be sent to G.T. Corley Smith at Greensted Hall, Ongar, Essex, CM5 9LD, England.

* * * * *

LOOKING BACK

Some personal recollections and reflexions on two decades of service with the Charles Darwin Foundation for the Galapagos Islands

by

G.T. Corley Smith

When I arrived in Quito in 1962, I did not know that either the Galapagos Islands or the Charles Darwin Foundation (CDF) existed, an ignorance I shared with most of the rest of humanity. Because of Darwin, a limited number of scientists had heard of the archipelago but even they were mostly unaware that it formed part of the Republic of Ecuador.

In those days it was difficult to visit the islands but early in 1964 the Galapagos International Scientific Project and the United States Embassy in Quito arranged transport to enable a number of Ecuadorean and foreign scientists and personalities to attend the official inauguration of the Charles Darwin Research Station (CDRS) on Santa Cruz Island. There was not much of a station at that date and no building big enough to accommodate the party, so we met outdoors among the cactus. The dignitaries, in jackets and ties, had chairs and sat under a scanty canvas canopy, while the less formally attired scientists received the full benefit of the scorching equatorial sun. Later that year, Prince Philip invited Aubrey Buxton and myself to accompany him on a short tour of the islands. All three of us became "hooked" and ever since have remained devoted defenders of the Galapagos. One immediate result was that Aubrey (now Lord) Buxton sent a crack camera team (Alan and Joan Root) to make a remarkable film for Anglia Television, in which Prince Philip spoke the commentary. This gave millions of people all over the world their first introduction to the Galapagos.

Joan Root making friends with the Galapagos Mockingbirds
while her husband was making his famous 1966 television film "The Enchanted Isles"
Photographed by Alan Root

My initial involvement in Galapagos conservation had little to do with the Charles Darwin Foundation as such. It had no representative in Quito in those days. I did visit the station and knew its successive directors but, during my five years in Ecuador, the only correspondence I had with Jean Dorst, the CDF's President, was on the subject of a high altitude Andean hummingbird in which we were both interested. It was in my capacity as British Ambassador that I became involved when I was requested by the Ecuadorean Government to arrange with our Department of Overseas Development in London to send a small expert mission to draw up a plan for the development of the proposed Galapagos National Park. I presented the report (by Ian Grimwood and David Snow) to President Yerovi Indaburu and for the rest of my service in Eucador discussed with the authorities how best the plan might be implemented. Among its many recommendations were proposals that a National Park Service should be established; that the extent and boundaries of the Park should be clearly and speedily defined; that a modest marine zone should be included in the Park; and that tours should be organized by ship with the visitors sleeping on board. Today all this seems obvious. It was not so in 1966. There were many difficulties including the fears of fishermen and farmers that their interests would be harmed. The idea of wildlife conservation was novel and there was great scepticism about the possibility of developing a tourist trade, as communications with Galapagos were infrequent, irregular and primitive. But from the beginning it was recognized that there could be no long-term prospect for tourism without rigorous conservation of the islands' only true asset — the unique wildlife which alone would attract visitors from the four corners of the earth.

It was largely due to chance that I joined the Darwin Foundation. Shortly after my retirement in 1967, its executive council happened to be meeting in Charles Darwin's old home, Down House, in Kent, not far from where I was staying. I was invited to give its members an account of my recent discussions with the Ecuadorean authorities. I expected to spend an hour with them and had not the remotest suspicion that I was condemning myself to twenty years hard labour as Council member, Secretary General and editor of Noticias.

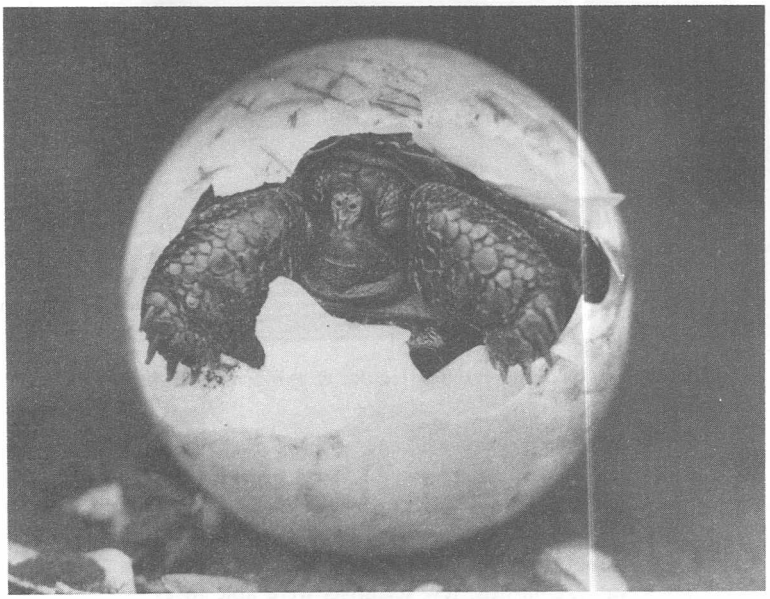
Looking back across these years, I realize with regret that so much of the time and energy of the Foundation's council used to be spent on raising funds, a task for which it was ill-adapted as its members were mostly scientists and conservationists. There have been so many desperate financial crises that they have by this time become one huge blur in my mind. The things that stand out in my memory are very different. I do not have the space, nor is this the moment, to write a history of the Darwin Foundation. I can only select a few examples from a vast store of memories and this selection, like my views, is bound to be purely personal.

Left to right:
Roger Perry, CDRS Director (1964-70), Miguel Castro, the first Galapagos Conservation Officer, and Eric Shipton, mountaineer and explorer
Photo by Sven Gillsäter

One morning I received a postcard from Mike Harris at the CDRS with the laconic message that a clutch of Española (Hood Island) tortoises had hatched in the station's incubator. This was a great moment. The founders of the CDF hoped to halt the long-term degradation of the Galapagos but I doubt whether any of them believed that they could actually reverse the tide. Yet that was what this news implied. For half a century or more, the dozen elderly survivors of the Española race (*Geochelone elephantopus hoodensis*) had failed to breed, perhaps partly from malnutrition but more probably because they were too widely scattered to meet: so the race was doomed to extinction. In 1965, Roger Perry took as many of these tortoises as he could find to the CDRS and kept them in corrals: there they bred. By trial and error, he and his successors developed methods of hatching, rearing and repatriating young *hoodensis* to their ancestral island. As a result, the tortoise population of Española today consists entirely of captive-bred youngsters and, although I do not enjoy the life expectation of a giant tortoise, I still hope that I may yet receive another postcard telling me that these products of the Darwin Station's captive breeding experiment have produced young of their own in the wild. This will be a landmark in the history of conservation; the only other case known to me being the Arabian Oryx, whose wild population today is entirely the result of captive breeding.

Captive breeding was only one part of the Española success story. It was also necessary to restore the tortoises' habitat. David Snow, CDRS Director 1962-64, reported gloomily that "only one tortoise was found on Hood (Española) in the course of searches by three men for two days. The vegetation has been terribly ravaged by goats; when the tortoise was found it was feeding in company and in competition with 15 goats." At that time, the elimination of goats on such a rugged island was considered impossible. But after years of struggle success was eventually achieved. The vegetation has since recovered and now provides food for the young repatriated tortoises. One of my happiest memories is the award of medals to the team of hardy hunters who finally cleared the island of this introduced species, which was destroying Española's unique ecosystem.

The rescue of the Española tortoise is no doubt the most spectacular of the breeding successes of the Darwin Station and the Galapagos National Park Service (GNPS) but it is only one of many. All the races of giant tortoise existing when the CDF was established now seem safe for posterity with the exception of "Lonesome George", the sole survivor of the Pinta Island race. All the King's horses and all the King's men, not to mention all the skills of the scientists, could not enable him to continue his dynasty without female assistance. The success with breeding, rearing and repatriating tortoises is now being repeated with endangered populations of land iguanas.

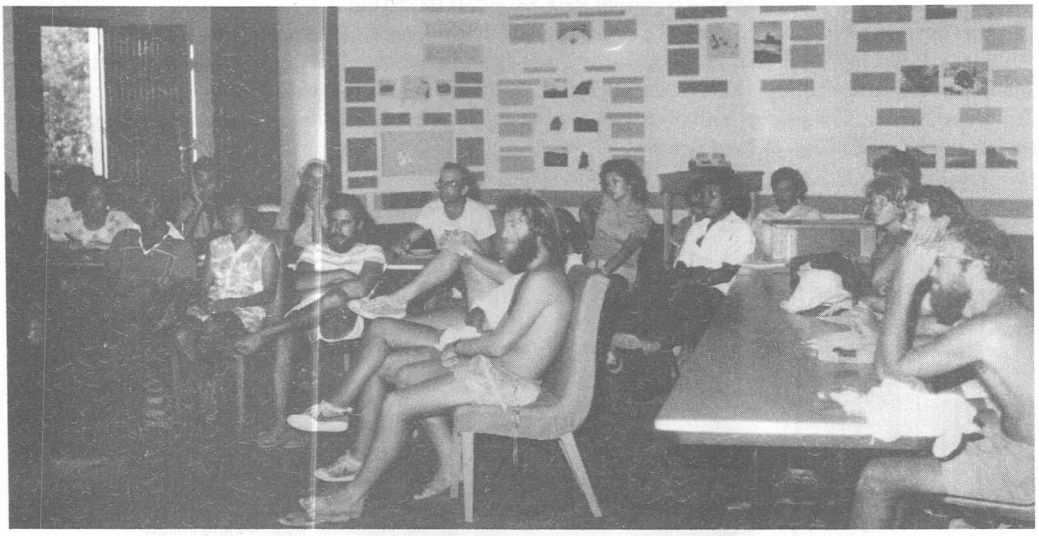


Española tortoise emerging from its egg at the Darwin Captive Breeding Center.
Photo by Andy Wilson

The establishment of the purely Ecuadorean "Galapagos National Park Service" in 1968 and the appointment of a Park Superintendent in 1972, marked another decisive step in the history of the islands. By that time an organized tourist traffic was developing and it was clear that henceforward control should be visibly in the hands of the sovereign power, as such responsibility was inappropriate to an international scientific body such as the Darwin Foundation, however useful it might continue to be in an advisory capacity. That the two organizations have worked side by side is a tribute to all concerned and has been of critical importance to the promotion of Galapagos conservation. With the organization of the GNPS, it became possible to define firmly the limits of human settlement, leaving 97% of the land area of the archipelago and 90% of its coastlines as National Park, entirely free from residents, private property or commercial development. It was not until 1986 that a marine resources reserve was established but, when this was finally decreed, it covered not the one kilometre coastal band originally requested by the CDF but the entire Galapagos internal waters of 80,000 square kilometres.

A moment I recall vividly was when Eugénia del Pino, a lecturer in the Catholic University of Quito, congratulated Peter Kramer and the CDF Council on their farsighted policy of instituting scholarships to enable Ecuadorean students to work at the Research Station, and then gently explained why this scheme was neither good enough nor big enough. Things have changed since then. Additional resources have somehow been found and education has become one of the main concerns of the CDRS. If I had to choose a single symbol to illustrate change in the Galapagos in the last quarter of a century, it would be a young Ecuadorean student with a back-pack almost as big as herself, striding off into the wilderness on a scientific mission.

This is the twenty-fourth and last issue of Notícias that I shall edit. My worst chore has been compiling the list of visitors and events at the Darwin Station, which is probably as big a bore for the reader as for the editor. But do give it a quick glance. At least it shows what a beehive of activity the CDRS has become and how Ecuadorean youth as well as international science is making use of this extraordinary institution. Unbelievable twenty years ago!



Seminar in the Van Straelen (lecture & exhibition) Hall, CDRS

Conservation and education are only two of the CDF's preoccupations. Another is scientific investigation; the Station with its laboratories, research vessel, library and other facilities, provides a base from which visiting scientists from all over the world can study in the islands. Before the CDF was formed, the Galapagos Islands had suffered a century and a half of degradation but they are still ecologically the least disturbed of the world's major oceanic groups and the best suited for evolutionary studies. Until the CDRS was established, few scientists were able to exploit the seemingly endless possibilities for research but now they arrive in a constant stream. Years ago, someone calculated that the Station had received over 500 visiting scientists but goodness knows what the total is now.

When Charles Darwin made his historic visit, he was lucky to stay as long as five weeks. Today that would be considered a relatively short spell. Projects vary but a few, involving research in depth, last for years. A later issue of Noticias will include a review of Peter Grant's big new book on Darwin finches*; in it he summarises the results of the first ten years of his research, supported by successive teams of scientists from Canada and the U.S.A. Fritz Trillmich of the Max-Planck Institute and his assistants have been studying the endemic fur seals for a comparable period. On other pages, Andrew Laurie of Cambridge University sums up his six years of concentrated investigation into the population dynamics of the marine iguanas before handing over the project to successors from the Max-Planck Institute for a further three years. Such prolonged researches provide a firm basis for conservation policy. Inevitably these long-term studies are exceptional, but hundreds of shorter projects have resulted in papers published in the specialist journals and together must form a tremendous contribution to knowledge. In addition there has recently been a great flood of books on Galapagos, both strictly scientific volumes and more general works.

These publications have done much to make the world better acquainted with the Galapagos but the main impact on the popular mind has been through films and particularly television. Heinz Sielman, Alan Root, David Attenborough and most recently Dieter Plage, to mention only a few of the great wildlife photographers, have brought the Galapagos into the homes of millions. There is an astonishing contrast between the ignorance and indifference of twenty years ago and the world-wide concern shown by the media during the great fire on Isabela in 1985, although I am bound to admit that their reports often contained more imagination than truth.

For some years past I have received persistent laments from well-wishers who were alarmed that tourist traffic would soon bring ruin to the islands, if it had not already done so. These fears had earlier been a dominant pre-occupation of the Darwin Foundation and a considerable share of our limited resources had been devoted to the scientific study of "tourist impact". The conclusion was that the impact has so far been minimal. In 1986 I paid what was probably my last visit to the CDRS and, while I was there, joined a commercial cruise to see for myself what the National Park was like from the tourists' point of view. I saw nothing to cause immediate disquiet. Tourists do not visit the vast areas defined as "primitive" or "primitive scientific" zones. They land only at a number of "intensive use" zones, which are of outstanding interest to visitors and where they are shepherded by naturalist guides, trained and licenced by the GNPS. So far, so good. The trouble is that the sites suitable for intensive use are limited and, if the numbers of tourists should increase beyond a certain point, they would begin to destroy the very things that they go to enjoy, particularly the atmosphere of wilderness. The major tourist organizations are aware of the dangers. They have shown great responsibility and have co-operated closely with the Park authorities. Given this community of interest, it should be possible to avoid excessive expansion. At present, introduced species of alien plants and animals are the most serious threat to the archipelago's unique ecosystems.

There have from time to time been threats of a much more damaging form of commercial exploitation, with hotels and conventional beach attractions within the National Park. Any such developments would definitely be destructive and have hitherto been rejected by successive governments. In the twenty two years between my first and last visits, the tourist industry has become an important factor in the economy of Ecuador and the need for increased earnings of foreign exchange, never more acute than in 1987, naturally provokes efforts to expand the revenues from tourism. The Galapagos have been the key to the rise of this national industry but the excessive exploitation of the wild but fragile environment of the archipelago, which alone has attracted visitors from distant lands, could quickly lead to permanent damage. This would be the equivalent of killing the goose that lays the golden eggs. The final guarantee against any such enormity is the great pride of Ecuadoreans in their island possession and their growing international reputation as leaders in the field of conservation.

In 1959, the novel formula for preserving the Galapagos — an alliance between national government and international science — was completely untried. That it has succeeded has been due to a variety of factors. Of course there have been obstacles, alarms and crises but I see no point in recounting them here as they have been overcome. There has been a good deal of plain bad luck such as the 1982-1983 El Niño event and the great fire on Isabela, not to mention population explosions of harmful introduced species of both animals and plants. On the other hand it is good to remember how much *good* luck we have had over the years. First and foremost, the Darwin Foundation has enjoyed the support of successive Governments of

* Ecology and Evolution of Darwin's Finches: Princeton Univ. Press.

the Republic. The tolerance and understanding that the authorities of this developing country have shown for a body of international scientists, dedicated to conservation rather than to development, is quite remarkable. It is true that material advantage has followed in the form of a growing tourist industry, scientific education and improved living standards for the people of the islands, but none of this was evident when the Eucadoreans gave their blessing to the experiment. It is an acknowledgement of their high ideals that the Galapagos should have been one of the first four natural areas to be awarded World Heritage status.

The CDF was likewise fortunate in its founding fathers. Its pioneers included Irenëus Eibl-Eibesfeldt, Robert Bowman and its Honorary President, Sir Julian Huxley; its first committee counted among its members J-G. Baer, Cristóbal Bonifaz, François Bourlière, Harold Coolidge, Jean Dorst, Luis Jaramillo, S. Dillon Ripley and Peter Scott. The chief architect of the organization was its first President, Victor Van Straelen, whose dynamic force set the Foundation on its course, although he died only days after inaugurating the Darwin Research Station and signing the basic agreement with the Government of Ecuador. These founders won international distinction in the world of conservation and those of them who are still with us can look back with deep satisfaction on their achievement. I am happy that I was able to know them. I am equally happy to have known their successors, a strange band of men and women, differing in origin and outlook, but held together by a single thread — their devotion to the Galapagos. I am proud to have served with them.

Victor Van Straelen and Robert Bowman at the inauguration of the Charles Darwin Research Station in 1964
Photo by A. Gille

THE GIANT TORTOISE CONSERVATION PROGRAM

by

Cruz Marquez, Marcia Wilson and Solanda Rea, Charles Darwin Research Station
and
Fausto Cepeda and Fausto Llerena, Galapagos National Park Service

Over the last two centuries an estimated 100-200,000 Galapagos giant tortoises (*Geochelone elephantopus*) were slaughtered by whalers, fur sealers and colonists for their meat or oil (MacFarland et. al. 1974a). Along with man's arrival on the islands came the introduction of black rats and domestic animals which quickly established feral populations. The presence of mammalian predators and competitors on this fragile ecosystem was devastating for many of the tortoise populations. Black rats on Pinzon Island eat all the hatchlings so that virtually no natural recruitment of young tortoises into this population occurs (MacFarland and Reeder 1974). On other islands, pigs and dogs prey on tortoise eggs and young, while goats, cattle and burros compete with the tortoises for the limited food resources and trample their nests.

Today less than 15,000 tortoises have survived. Three races of the original 14 have gone extinct and one race (*G.e. abingdoni*) has only one known survivor in existence, "Lonesome George". Of the remaining 10 races probably those from the three volcanoes on northern Isabela (Alcedo, Darwin and Wolf) have relatively stable populations under natural conditions. The others are still very much threatened by the presence of feral mammals or have a drastically reduced population.

The conservation program for the giant tortoises began in 1965 when tortoise eggs from Pinzón were brought to the Charles Darwin Research Station (CDRS) for incubation. Since 1968 the program has been a co-operative effort between CDRS and the National Park Service (GNPS). To protect those tortoise populations which have an adequate number of reproductive adults but with few or no surviving young due to predators, the park wardens make regular trips to the nesting zones. Wardens mark nests and, if pigs are a threat, build lava walls around them to protect the eggs. They return to dig up the nests just before hatching and transport the eggs to the solar incubators at the CDRS.

The tortoises from Española (Hood) Island (*G.e. hoodensis*) are a special case. A thorough search of the island in the 1960's revealed that the few surviving adults were so dispersed that no reproduction had occurred for decades (MacFarland et. al. 1974). The remaining individuals (12 females and 2 males) were therefore brought to CDRS. In 1977, a third male from the San Diego Zoo captive herd was identified and presented to the CDRS (Bacon 1978). The two corrals where the Española tortoises are housed have small nesting areas where the females lay their clutches from July through November. In order to prevent destruction, the eggs are dug up within 24 hours after they are laid and placed in solar heated incubators. Since 1971 the Española females have laid a total of 1717 eggs and 384 tortoises have hatched: a hatching success of 22%.

Fom July to October, the average temperature inside the solar incubators varies between 25 and 26C. When incubation is complete in March the average temperature is between 32 and 34C. We suspect the low hatching success is the result of cool incubator temperatures. During the El Niño of 1982-1983 the incubators were several degrees warmer than normal and hatching success was higher. A possible complicating factor may be that the sex of giant tortoises is temperature-dependent as is the case with marine turtles (Bull 1980). Currently, we are examining the impact of constant temperatures in electric incubators on the hatching success and sex of hatchlings.

After hatching, tortoises are placed in the rearing center for their first year. This has a cement floor to facilitate the daily cleaning. However, this artificial environment is particularly cold during the "*garua*" season and we have experienced a high mortality of small tortoises during their first year, e.g. 49% mortality in 1984. However this compares favourably with breeding in the wild where, owing to the rigorous environment, only a small percentage of young survive to adulthood. In January 1985, an experiment was initiated to determine whether rearing hatchlings outside on a soil surface under natural light conditions would improve growth and survival. Three races were selected (Española, Santiago, Sierra Negra); half were reared outdoors and the other half inside the center. The first year's data are now being analyzed. Preliminary results suggest that those reared outside have a faster growth rate.

Solanda Rea checking weight of young tortoise.
Part of an experiment to compare growth inside the pen and outside in the open air.
Photo by Andy Wilson

The 1 and 2 year olds are kept outside in enclosures which are covered at night to prevent rat attacks. Then at about 3 years of age they are placed in a corral with a lava floor so that they become accustomed to a more natural environment. All small tortoises kept in captivity are measured and weighed every three months in order to determine growth rates. They are raised at the CDRS until the age of 4-5 years, when they are no longer vulnerable to pigs, rats, or feral dogs.

The first captive-reared tortoises were returned to Pinzón Island in December 1970. Over the last 16 years 893 young tortoises, from 8 different races, have been released into their native habitats. After their release, the GNPS wardens monitor their growth and survival at least once a year.

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MARINE IGUANA PROJECT TO CONTINUE

by

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This is the last of a series of reports by Andrew Laurie on his long-term investigation into the situation of the Marine Iguana. International co-operation in Galapagos science and conservation is illustrated by the fact that the study was funded for the first four years by the Leverhulme Trust and the Royal Society and has since been adopted by the Max-Planck Institute.

Little did I think in January 1981 when I arrived in Galapagos to begin a three year study of marine iguanas, that I would still be there six years later. Now the project is about to be extended, for the fourth time. In March 1987 I had completed my part of the fieldwork and had spent a month introducing Thomas Dellinger and Eliecer Cruz to the animals, the study areas and the methods. The Max-Planck-Institute für Verhaltensphysiologie has agreed to fund the study for a further three years from September 1987. Marine iguanas are long-lived animals whose life histories and population fluctuations take time to investigate fully. Females marked as hatchlings are already nesting, but none of the males marked as hatchlings or yearlings in 1981 is yet territorial. Much has been learned but there is still plenty to discover by continuing to monitor a population with such a large proportion of individually marked animals, most of them of known age and breeding history.

The study was initiated following an investigation by Dr. H. Kruuk into the problem of predation by introduced species, which pointed out the lack of basic knowledge about the population dynamics of several endemic species. Marine iguanas had already disappeared from several areas and the Caleta Webb population was being predated at the rate of approximately 27% per year by feral dogs. Obviously the iguanas could not withstand such heavy predation for long, and steps were taken to eliminate the dogs; but how quickly could a drastically reduced population recover? Were other populations in danger? There was little or no information on natural fluctuations in numbers, potential rates of population growth, factors determining population density, growth rates, age at sexual maturity, reproductive success, and natural mortality rates.

RESULTS

Now, after an intensive study of marked animals on Santa Fe, an island free from introduced predators, and comparative work on other islands, and with the help of the spectacular natural experiment provided by the 1982-83 El Niño event, we know much more about marine iguana population dynamics and social organization. The analysis is still under way of a massive amount of data on food, growth, behaviour, reproduction and mortality.

El Niño 1982-83

The study was dominated by the extraordinary 1982-83 El Niño event, which had devastating effects on the marine algae and led to the death by starvation of 70% of the iguanas over the whole archipelago. The normal food species of red and green algae (e.g. *Gelidium, Centoceras* and *Spermothamnium* spp) largely disappeared and an almost indigestible brown alga, *Giffordia mitchelliae,* not previously recorded in Galapagos, colonized the intertidal and splash zones. Feeding was made even more difficult by rough seas and high sea levels. During the first half of 1983 the coastlines were strewn with emaciated corpses of thin, weakened creatures, half their former weights, starving to death on a diet of sea lion faeces, crab skeletons and iguana skin.

Mortality Rates

Annual mortality rates before the 1982-83 El Niño varied from 4% in adult females to 46% in hatchlings. They shot up over the El Niño period to 53% in adult females, 63% in adult males and 85% in hatchlings, but have since returned again to approximately pre-El Niño levels. Thus population density decreased sharply during the first half of 1983 and, as El Niño passed, the marine algal flora started to return to normal during the second half of the year. By the end of 1983 there was a lush growth of red and green algae, and the invading *Giffordia* had almost disappeared. There was effectively more food available for each individual.

Selection

There was selection for large body size and weight among juveniles in 1983, and there were also significant differences in their 1981 weights between juveniles which subsequently survived and those that did not survive the 1982-83 El Niño.

Condition

The survivors of El Niño were still in very poor condition at the end of 1983, and very few of them bred in the 1983-84 season; less than 1% of females nested on Santa Fe. However, condition improved rapidly from then on, and growth rates too. The mean condition index (logWT — 3logSVL : where WT = body weight and SVL = snout-vent length) of females with SVL of between 23 and 24cm dropped from 54 in 1981 to 34 in mid 1983 and then rose to 59 by 1984, 65 by 1985 and started to drop again towards pre-El Niño levels, reaching 56 by early 1987. The high El Niño mortality is now being compensated for by increased growth rates, earlier breeding, more frequent breeding, and larger clutch sizes.

Growth Rates

Growth rates were clearly depressed during El Niño, but rapidly increased afterwards and are now decreasing again towards or below pre-El Niño levels. Immediately after El Niño, one and two year-olds were growing at almost twice pre-El Niño rates. The highest mean first year growth (56mm) was recorded in 1985 hatchlings; it has decreased for the 1986 cohort to 51mm, whereas the rates for 1981 and 1982 hatchlings were 40 and 35mm respectively.

Although juveniles continued to grow during El Niño, albeit at a reduced rate, many of the adults, particularly the largest ones ceased growth entirely. Also, juveniles responded to the return of normal algal flora in the first few months after El Niño by immediately almost doubling their growth rates, whereas the reaction of the adults was delayed. Adult growth rates did not exceed pre-El Niño rates until 1985. During 1984, adults appear to have put their excess energy into reproduction rather than into growth. For example, young adult females of between 23 and 24cm snout-vent length grew at mean annual rates of 19mm in 1981, 5mm in 1982, 9mm in 1983, 21mm in 1984 and 33mm in 1985. The 1986 rate has dropped now to 16mm. For the largest males the equivalent growth rates are 12, 0, 0, 15, 21 and 0mm respectively.

Earlier Breeding

There was considerable overlap in size distribution between the 1981 and 1982 cohorts, and the 1982 and 1983 cohorts, during their early growth. 1985 hatchlings were on average larger at two years old than 1981 hatchlings were at 3 years old. Comparison of the mean predicted growth curves of all size classes for using 1981 and 1985 incremental growth data shows that there is a clear shift in the growth curve, such that both males and females could be expected to reach the mean size of 1981 breeding animals about two years earlier than in 1981. Increased adult growth rates also indicate a greater maximum attainable size. As predicted, one of the consequences of the increased post-El Niño growth rates was that females started breeding at 2.5 years of age in 1985, compared with 4.5 years or more in previous years.

More Frequent Breeding

Furthermore, before El Niño females nested approximately every two years with c.40% of females nesting each year. Immediately after El Niño there was hardly any nesting on most islands, but since then about 85% of females have nested each year (1985, 1986 and 1987), and the mean clutch size has risen from 2 to 3 on Santa Fe and from between 3 and 4 to between 5 and 6 on Isabela. In the 1985-86 nesting season, 1981 hatchlings nested for the first time, but 1982 and 1983 hatchlings also nested for the first time, both cohorts having attained adult size by very fast growth after El Niño. The 1985 hatchlings are expected to nest for the first time in 1988, but if growth rates continue to decrease, a gradual increase in age at first reproduction would be expected over the next few years.

Population Composition

Yearlings in February 1987 comprised 39% of the population at Cabo Hammond, 28% at Cabo Douglas and 38% at Caleta Webb, compared with 7%, 11% and 6% respectively in 1981. The recovery has been rapid. Increased food intake, I suspect, has been responsible, but quality may also have improved. Would it be possible that minerals leached from the islands during the El Niño rains improved the quality of the marine algae as iguana food afterwards?

El Niño Again

The effects of the disappearance of the preferred algal food species during the 1982-83 El Niño were devastating, but such severe El Niño events are infrequent, not more than once a century probably. There is evidence that the last event of comparable magnitude to the 1982-83 El Niño occurred in 1877-78, with very strong events also in 1925-26 and 1891; but there are no reports of widespread iguana mortality during previous El Niño events. 1987 saw a return to El Niño conditions, but to a minor degree compared with 1983. However, the rainfall on Santa Fe in February 1987 was higher than in February 1983, with 392mm falling during the first 18 days. Rivers flowed again, and the mean sea-surface temperature was 27.3 degrees centigrade, compared with 27.9 degrees in 1983, when it was 2.5 degrees above the running mean for February. The algae were affected again: there was a reduction in the standing crop of red algae, with the rocks of the intertidal zone barer than usual, and at a few points high on the shore, which always receive splashes from the waves, *Giffordia mitchelliae* was recorded again in February 1987.

Population Regulation

No increased mortality has been observed yet and there is unlikely to be any unless El Niño conditions persist for a long time, as they did in 1982-83. However, condition and growth rates are likely to be decreased by even minor El Niño events, and thus lead to lower reproductive output and possibly higher mortality, so all El Niño events may be important in population regulation.

As population density increases again following the heavy 1983 mortality, growth rates and condition are already decreasing and eventually age at first breeding, nesting frequency and clutch size will probably revert to pre-El Niño levels. Even within the Santa Fe study site, between adjacent stretches of coastline, there are clear differences in iguana growth rates related to food availability and accessibility. Much of the variation in body size between populations may be due to differences in food type, food availability and feeding behaviour. Even if there is no feed limitation in terms of the biomass of algae in the sea, there can be limitation in terms of its availability, because the iguana's feeding time is limited, determined by regular tides and irregular rough seas. Also, as larger animals do more subtidal feeding, large and small animals are affected in different ways by the same sea conditions. Although there is no direct competition for food on the feeding grounds, iguanas feed on 'lawns' of algae maintained by their own and other species' grazing; with high population density, and hence grazing pressure, animals have to move further to feed efficiently, so there is indirect competition which can lead to density-dependent growth rates. Furthermore, as hatchlings typically feed right at the top of the intertidal zone, they are effectively in competition only with other hatchlings, independently of what is happening to the rest of the population. The 1985 hatchlings suffered high first year mortality (c. 60%) when compared with pre-El Niño first year mortality of the 1981 hatchlings (c. 46%), but, as there were approximately 1.8 times as many 1985 hatchlings as the average annual production between 1981 and 1983, there were more surviving yearlings of the 1985 cohort than of the 1981 cohort. This has meant that population density has remained high for juveniles but has fallen sharply for adults. Thus, increased recruitment to an iguana population after heavy mortality can lead to increased pressure on the hatchling's food resources at the same time as there is decreased pressure on the adult's food supply.

Predation

Although iguanas appear to be food-limited, predation on land by introduced species has probably been the main cause of the gross changes in distribution and abundance of the species over the past 150 years. There is some evidence that native predators, e.g. the blue heron, can also limit populations locally, but they cannot do so on a wide scale. Cats are the main culprits among the introduced predators, and Isabela, San Cristóbal and Santa Cruz the worst affected islands.

Dogs have been successfully eradicated by poisoning from critical coastal areas, although populations remain in the highlands. Complete eradication has proved impossible so far, and in the case of cats it is probably an unrealistic aim at this stage. Local control around nesting areas of marine iguanas and other species is probably the best plan. Elsewhere the control of feral cat populations has proved exceptionally difficult and expensive. In New Zealand, after 10 years of continuous control operations they had been eradicated from only three small islands, the largest with an area of 3000 ha. Extermination was achieved by the introduction of feline enteritis, followed by shooting and trapping. The task on Galapagos, especially on Isabela, is much more difficult because of the treacherous lava shores along which it is often difficult, or even impossible, to walk, let alone operate a cat control programme. A pilot control project is

needed in locations where cat predation is particularly serious. Even a one year operation would allow the eventual recruitment of another year class to the breeding population.

Galapagos Marine Reserve

Although predation on land is the most immediate problem for the marine iguanas on islands with introduced predators, the long term security of the food supply is obviously vital, and the establishment of the Marine Reserve an essential step for the long term conservation of the species. Totally dependent on the red and green algae of the intertidal and upper subtidal zones, iguanas are particularly vulnerable to marine pollution. As the species composition of the algal flora is important there may be pollutants which, although not fatal to all algae, lead to a decrease in the availability of iguana food species.

Threats

Large oil spills would be fatal. Already there have been reports of minor oil slicks. One came ashore on the south coast of Santa Fe in January 1986 and killed the algae on a small part of the intertidal zone. There is a constant danger of more spills and major accidents. Nesting beaches could also be affected, and hatchlings might be particularly at risk, being restricted by their size to feeding at the very top of the intertidal zone. Much of the pollution which may affect Galapagos waters, particularly that originating outside territorial waters, will not be made any easier to control by the establishment of the Marine Reserve. However, the legal liability of ship owners and captains for pollution within the reserve should be used, in addition to conservation arguments, to encourage correct maintenance and safety procedures, and all that is possible to reduce the risk of such accidents. Iguanas are particularly vulnerable due to their relatively low reproductive rate. Every possible precaution must be taken to avoid pollution of any sort, and this includes provision of equipment in Galapagos for fighting oil slicks e.g. detergent sprayers if and when they are considered preferable to the oil.

Future of the Project

It will be very valuable, from both the conservation and the scientific standpoints, to continue to monitor the mortality, natality, individual growth rates and breeding histories of the marine iguanas, and this could be done in conjunction with new studies. The value of long term studies has been demonstrated to me several times by a subsequent year's data explaining puzzling results from previous years. The first known-aged males will probably become territorial within the next one or two years, and this will help to answer some long outstanding questions about the effects of territorial defence and mating on growth rates. Having a large number of known-aged animals with known breeding histories will also help in investigating breeding cycles, and the reasons for males and females taking years off from reproduction. The contribution of the various year classes to the breeding population will also become clearer as more and more known-aged animals reach breeding age. As a result of El Niño only one year class (1983) out of five (1980 to 1984) is present in large numbers, and these animals started breeding in 1985-86 in the same year as the 1981 and 1982 animals. Selection was particularly severe, however, on the older animals, and the survivors are all large and in excellent condition. Eventually an estimate of longevity would be possible, based on actual life histories, rather than the fluctuating mortality rates available. The El Niño period of starvation has been followed by a boom in growth rates, body condition and reproductive rates, which is now passing. Combined with further monitoring of the algal flora and food availability, further records of growth rates, condition, frequency of breeding and clutch sizes will demonstrate clearly the density-dependent effects on the population.

Finally one puzzle to be investigated further: in late February 1987, we found hatchlings on Cabo Douglas and Caleta Webb which were far smaller and lighter than usual. There were in effect two groups of "yearlings": one with a mean SVL of about 140mm and a mean weight of about 180g, the other with a mean SVL of about 125mm and a mean weight of about 90g. Were there two breeding seasons last year, or one very prolonged one with two peaks? Or did some animals just grow slowly? But, then why was there such a clear bimodality and not a continuous variation about one mean? I am sorry that I will not be returning this year to look again and learn some more.

THE REFORESTATION PROJECT ON SAN CRISTOBAL ISLAND

by

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and

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San Cristóbal is the easternmost island of the Galapagos and also one of the largest. Rising to more than 700 metres above sea level, it has a wide range of vegetation types due to the variety of climate and edaphic conditions. It stands out among the archipelago's arid islands in having a relatively cool and humid climate and, in consequence, a plentiful supply of fresh water. It is the only island with permanent streams. The aptly named Freshwater Bay was one of the few reliable sources of supply for the whalers and other mariners. Even during the severe drought of 1984 and 1985, some creeks such as La Honda still had running water and indeed some of this water was transported to Santa Cruz when the usually adequate supplies from its own highlands failed.

The streams contain unique fauna including endemic shrimp and fish species as well as special algae. The terrain is also distinct from all the other islands; it has narrow gorges and waterfalls, where an abundance of mosses, ferns and flowering plants are found. The strong south-east trade winds carry humidity from the ocean up the ravines where their moisture condenses and forms dense mists, irrigating the lush vegetation and nourishing the streams.

Visitors accustomed to the heat and dryness of the other Galapagos islands can hardly believe the beautiful landscape, greened and cooled by mists. As they climb higher, the dense evergreen forest gives way to tall reddish shrubs with an abundance of purple flowers and blueberry-like fruits. These shrubs are the famous *Miconia robinsoniana,* found nowhere outside the Galapagos and even there, only on San Cristóbal and the highlands of Santa Cruz. At this altitude the climate is quite chilly and the strong wind which blows most of the year makes the survival of plants difficult; even with the help of high humidity and a number of sunny days, only Miconia and a few other shrubs manage to grow at this height.

At the very highest altitudes, conditions are too harsh for any shrubby plants, so herbs and ferns predominate. The only tall plant is the endemic Tree Fern, *Cyathea wetherbyana.* Due to the low temperature and extreme humidity, peat bogs are found in protected places.

If the vegetation around the creeks is removed, the humid air will no longer condense so effectively; the previously abundant water flow will be reduced and the catchment area disturbed if not destroyed as the humid air sweeps past over the devegetated ground. Unfortunately this is what has happened in some parts of San Cristóbal, which lie outside the National Park. Due to felling, the forests of endemic evergreen Sunflower trees (*Scalesia pedunculata*) of the Daisy family have almost vanished, while extensive grazing by cattle and goats has destroyed the unique highland vegetation of Miconia and Cyathea. In consequence there has been a dramatic decrease in recent years in the flow of some streams including La Toma, which supplies the human population of the island with fresh water. Expensive dams and pipes were constructed to ensure that the towns of Progreso and Puerto Baquerizo had a sure supply of water throughout the year but even this failed completely during the recent prolonged drought. So the local authorities and the Charles Darwin Research Station together embarked on a reforestation project to create ecological conditions that would guarantee an adequate supply of water even during dry periods. They were joined in 1985 by the Technical University of Esmeraldas and more recently by the CDRS scholarship student who is the junior author of this article. The area chosen for the first reforestation scheme was in the La Toma catchment area, close to the Cerro San Joaquin, the highest point in the island. This large area at an altitude of some 600 metres is now dominated by cattle pasture and the introduced Common Guava (*Psidium quajara*). The composition of the original vegetation cannot now be ascertained with any certainty but there are still a few remnants of Miconia shrubs in the higher parts and of Scalesia lower down. It was decided to try to reforest the area with these two species. A small nursery was established in early 1986, and a shelter was constructed and four workers permanently employed. The main aims for that year were to discover the optimal conditions for producing seedlings and to make small experimental plantations. This should reveal the preferred altitude for raising each of the two species. In 1987 it is planned to establish much larger pilot plantations, each of several hectares. The first results at the nursery were very promising, indicating that the propagation of both Miconia and Scalesia from seeds is possible. Seeds of the former are plentiful but seeds of Scalesia are sparse as so few specimens have been left in the island. But production of both species has begun and there is confidence that the ambitious plans for the next few years will be realised.

POPULATION SIZES AND POTENTIAL CONSERVATION PROBLEMS OF THE ENDEMIC GALAPAGOS PENGUIN AND FLIGHTLESS CORMORANT

by

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The Galapagos penguin (*Spheniscus mendiculus*) and the flightless cormorant (*Nannopterium harrisi*) represent 2 of the 5 endemic sea bird species in the Galapagos Islands (Snow and Nelson 1984), the latter being one of the rarest sea birds in the world (Harris 1974) and belonging to a monotypic genus. The breeding range of both species is limited to less than 400 kilometres along the coastlines of Fernandina and Isabela (Harris 1974, Boersma 1977).

Censuses of these two species have been part of the Charles Darwin Research Station's seabird monitoring program since 1977; additional censuses of the penguin were made by Boersma (1977) in 1971 and 1972. Prior to the extraordinary El Niño event of 1982-1983, population sizes were estimated to be 6,000-15,000 penguins (Boersma 1977), and 1,000 adult cormorants (see review in Rosenberg and Harcourt 1986). The effects of El Niño were extremely severe; populations were reduced by approximately 80% for penguins and 50% for cormorants (Valle and Coulter, in press). The rate of recuperation of the two species has been quite different: the flightless cormorants returned to their original numbers after 1.5 years (Valle and Coulter, in press), while the Galapagos penguin has made a very slow recovery, with numbers still estimated to be 70% below the pre-El Niño population. Here, we report on their present status and discuss potential threats.

RESULTS

We censused the coastline of northern Isabela and the entire coastline of Fernandina from 6-13 October, 1986. We counted 719 adult and 28 juvenile cormorants, 464 adults occurring on Isabela and 255 on Fernandina. A total of 546 adult and 38 juvenile penguins were counted, 307 on Fernandina, and 239 along the coastline of Isabela.

DISCUSSION

Cormorants

The number of adult cormorants counted during this census was slightly lower than 1985 numbers, which may only reflect a difference in the accuracy of the census. Using Harris's (1979) and Valle and Coulter's (unpubl. MS) estimate of the accuracy of censusing this species, the population of adults was 800-1,000.

Penguins

The effects of the 1982-1983 El Niño on the penguin population are still apparent. The current population size is still approximately 70% below 1982 numbers. The 9% decline since 1985 noted in this census may be due either to a slight decline in the population or to the inaccuracies of the census. Based on Boersma's (1977) estimate that 12.5%-22.5% of the population is censused using similar methods to ours, the population size is estimated to be 2,400-4,400 adults. Although recovery has been slow, the population apparently increased by ca.50% in 1985 from the previous census (Sept. 1984) including a high percentage of juveniles (Valle 1985), which demonstrates that the current population does have the capacity to increase. It therefore seems probable that sea conditions have not been favourable for breeding since the season of 1985. This view is supported by the fact that the sea temperatures we recorded during this census were often above the 24C that Boersma (1977) believed to be the upper temperature limit at which breeding occurs in the Galapagos penguin.

POTENTIAL THREATS

Before their elimination from the coastline of Isabela, feral dogs were considered a possible factor explaining the lower number of penguins found in 1980 than in 1971 (Harcourt 1980), due primarily to lower numbers in zone 7. However, this area contained the greatest number of penguins for all zones in our and previous censuses and there is no indication that the percentage of the population censused there (zone 7) has increased since the eradication of the dogs in 1981 (Rosenberg and Harcourt 1986). It appears that the penguins are presently safe from the dogs and that their numbers may not have suffered appreciably from predation even in the years when the dogs were there.

Nevertheless, because of the presence of penguins in the diet of feral dogs (33%, Barnett and Rudd 1983), any renewed invasion by dogs could be very dangerous. Feral cats are another potential predator and do occur on the coastline of Isabela (Boersma 1977, Valle 1986, pers. obs.): however, no reports yet exist of predation on penguins by cats. Fortunately the penguins on Fernandina, which represent ca.53% of the entire population, are not threatened by any feral mammals; no introduced animals are known on this island.

At the present time both the flightless cormorant and the Galapagos penguin seem relatively safe. Although the number of visitors to Galapagos is increasing, the habitat of these two species is inhospitable to tourists (Lévèque 1963). Currently, large scale fishing and lobstering do not exist there but if present artisanal methods were to be superceded by commercial exploitation there would be serious threats to both birds through their getting caught in nets and traps (Holthius and Loesch 1967, Hays 1984 for *Spenicus humboldti*) as well as by a possible reduction in the available supply of their food (see Duffy 1983). In view of the potential threats from feral animals and fishing interests, we strongly urge the regular monitoring of these two small and vulnerable endemic species.

This will also aid our understanding of their population dynamics and the influence of the El Niño phenomenon, which so drastically reduced their numbers in 1982-83.

ACKNOWLEDGEMENTS

We thank H. Vargas for field assistance, and the crew of Beagle 4, Wilson Cabrera, Rogel Edilberto and Francisco (Panchito) Moran, all of whom made the census run smoothly. Many thanks to A.C. Valle for discussions about previous censuses, and to M.H. Wilson for helpful comments on an earlier report. This work was funded by a WWF grant to the Charles Darwin Research Station (project no. 1719), and to them we are especially grateful.

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THE MYSTERY OF THE FERNANDINA "MOUSE"

by

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In Noticias 44, Fritz Trillmich contributed an article on the danger to the endemic rice rats of Fernandina (Narborough) Island if alien black rats should be introduced. He pointed out that two species had been recognized, *Nesoryzomys narboroughi,* which was present in good numbers, and *N. fernandinae,* a smaller species which was known only from skulls recently found in fresh owl pellets. No mouse has hitherto been identified on Fernandina, an island still considered free from introduced species. Dr. Trillmich's article has provoked comment — which is just what he intended. Ed.

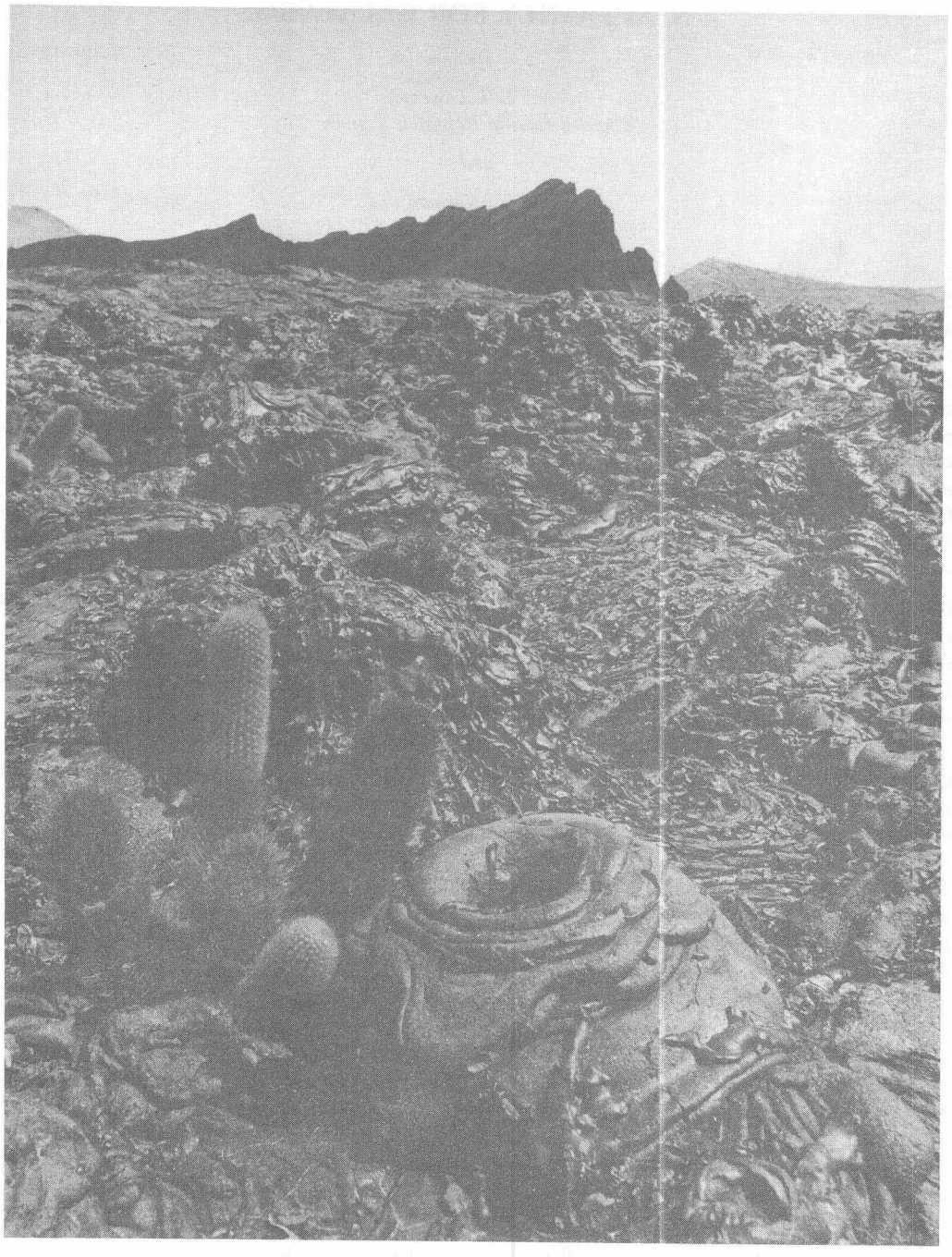
Debbie Clark's chapter on the native mammals in the Galapagos volume in the Key Environments series (Pergamon Press, Oxford) and Fritz Trillmich's recent plea in Noticias for captive breeding of the Fernandina endemic rat have revived memories of observations we made 13 years ago.

In late May 1974, Beagle III set us ashore at Cape Hammond, together with the Belgian malacologist, Guy Coppois. There we had plenty of opportunity to get acquainted with rice rats, not only at night but even in the morning when we had to drive them out of the tents. After some days on the coast, we had to begin the wearisome task of carrying supplies of water to our secondary camp at the base of the main slope of the volcano. On one of these shuttles we found it convenient to stay the night in the middle of a vast lava field; it was an area where large lava plates offered a rough but even surface for spending a night under the stars.

A few tall *Jasminicereus* cacti stood guardian over us. One of them had lost one of its cylindrical segments, and this lay on the lava as a hollow tube as the soft tissue inside had decayed. During our frugal breakfast we suddenly noticed a small rodent probing around the dead cactus tube. We were immediately convinced that it was not the same species as our furry tent-mates at the coast. Then it ran into the hollow cactus and we were able to catch it by holding our hands on both ends of the tube. Its capture presented problems because we were only equipped to collect plants and snails. While we were considering what to do, it escaped and disappeared into a fissure in the lava. To cut down weight on these tiring water treks we had brought no camera and so we cannot produce any proof of our observation. In view of this and of the passage of 13 years, the following description should be treated with great caution.

The animal had a distinctly mousy appearance and was only half the size of the rats we knew at the coast. It was more slender; its fur was less dense, more grey and lacked the brown tinge of the other. Its ears were larger and they were naked; we are fairly certain that it was this last fact which immediately persuaded us that this was a different kind of animal. It did not seem particularly scared of us and we believe that it disappeared into the lava crack to avoid the sunlight rather than to escape from us. Our immediate reaction was to think that Fernandina had got its first introduced mammal but, on further consideration, it struck us as unlikely that recently introduced mice would have traversed the several kilometres of sterile lava that separated us from the coast. It seemed more likely that this little animal had come from one of the clumps of vegetation that occur in the south-western part of Fernandina's lava fields.

When we returned to the CDRS and reported our observation, we were met with solid scepticism and ended up by concluding that what we had seen must have been an immature Fernandina rat. However, now that there is recent evidence of another species of rodent on the island, we are left with little doubt in our minds that this was the animal we actually saw alive. Furthermore we believe that there should be a fair chance of capturing a specimen in, or close to, the islands of vegetation in the sea of lava that covers south-western Fernandina.



Lava Flow with Cactus — *photographed by* Alan Root

BUDDLEJACEAE
A NEW FAMILY FOR GALAPAGOS

by

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and

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During a recent survey of the vegetation on Floreana Island by Jonas E. Lawesson, resident botanist at the Darwin Research Station, Yolanda Carvajal, scholarship student, and Halle Zederkof, field assistant, some unfamiliar tallish trees with many small, fragrant, yellow flowers were found in the area of Cerro de Naranjos (Orange-trees Mountain). The population of this tree seemed to be well adapted to the higher more humid part of the island, even though it was surrounded by the introduced common guava. Later the same species was also found in the area east of Cerro Pajas, close to the Wittmers' farm, in a *Scalesia pedunculata* forest. The species is *Buddleja americana* L., of the Buddlejaceae, a fairly common plant on the continent, occuring from Mexico to Bolivia and on some Caribbean islands (Norman 1982). *Buddleja* is not mentioned in the Flora of the Galapagos Islands by Wiggins and Porter (1971) and in fact represents a new family for the archipelago. The only other collection of this species from the Galapagos was made near the Wittmers' farm by S. Itow of Japan in 1970. Itow's collection is in the herbarium of the California Academy of Sciences. His finding has not been reported previously (pers. comm.).

It is strange that this species was not collected prior to 1970, as older settlers report that this *Buddleja* was already quite common some 50 years ago (F. Cruz. pers. comm.). Apparently Floreana has never been sufficiently investigated by botanists, although several endemic and interesting species grow there, such as *Lippia salicifolia, Psychotria angustata, Scalesia villosa* and *Lecocarpus pinnatifidus.* It would seem that *Buddleja* was simply overlooked by earlier visitors.

Whether the *Buddleja* is native to Floreana or not is difficult to say. As is the case with so many species in Galapagos, the route by which they arrived in the archipelago is open to speculation. In some cases it is almost impossible to say whether the plant came by natural means (floating, by wind or carried by animals) or was introduced by man. Examples of such doubtful cases are *Sapindus saponaria, Solanum erianthum* and *Trema micrantha.* Floreana was the first island to be colonized by man (Hickman 1985) and *Buddleja* could have been introduced accidentally with soil, etc., by early settlers. *Buddleja americana* is not known as an ornamental. On the contrary, in the southern provinces of Ecuador it is a weed, invading pastures and therefore eradicated whenever it appears (F. Cruz, pers. comm.). Thus it seems unlikely that *Buddleja* was introduced deliberately.

There is a strong probability that *Buddleja* is native to Floreana, i.e. it was transported from the South American continent to Galapagos by natural means. Supporting this view is the fact that the fruits and seeds of the *Buddleja* on Floreana are commonly eaten by the local finches, such as the Small Tree Finch *(Carmarhynchus parvulus),* Medium Tree Finch (C. pauper) and Warbler Finch *(Certhidea olivacea).* Moreover the seeds are easily spread by wind as they are only about 1mm. long, fusiform with short wings at the two extremities. In fact *Buddleja americana* is the most widespread of New World Buddlejas, occurring naturally on islands such as Cuba and Jamaica. That *Buddleja* appears to be limited to one island in the Galapagos may indicate that it is a fairly recent arrival which has not had a chance to colonize suitable habitats on other islands. In any case, the record adds a new family to the flora of Galapagos.

The fact that such a large plant as *Buddleja* was overlooked stresses the necessity for further botanical research on the island. Many more interesting findings and surprises might come to light. However, unless active conservation measures are instituted, the possibility of further botanical research on Floreana may soon disappear. Because of the serious problems caused by introduced plants and animals, which threaten the local flora and fauna (Cruz et al. 1986), the situation on the island is alarming. Something must be done now if the island's native biota is to be saved.

"NO HAY ESTAMPAS"

by

Lauran Emerson Dundee

It has been six months since we sailed on westwards from Puerto Ayora, but the images of that day remain. The sights, the sounds, and the heat still come to the senses, as sharp as sunlight, hot as lava sand.

Before dawn, on the last morning in the Galapagos, the heat was still over the horizon. In the pre-dawn darkness, day-trippers gathered at the Ninfa Restaurant. They were, as always, a bit nervous, a bit excited, and completely festooned with binoculars and cameras. The wind came up. Anticipation grew. Individuals merged into happy, chattering groups as they were ferried out to the waiting boats. A new adventure had begun; a new day had dawned in Puerto Ayora.

Those of you who have been to this small town on the island of Santa Cruz, and who fear the changes that time has wrought, may put your fears at ease. Change comes slowly in Puerto Ayora. It follows the timeless pace of the giant tortoises for which the islands are named. Change is slow, but life is punctuated by bursts of activity.

Dawn finds the town at work. A crowd bustles around the butcher shop. Coffee brews next door at La Garapata. Hammers, saws and planes are put to work on the tour boat under construction up the road. Workmen fit the final pieces into the cabin. The boat is a beauty — hand-hewn from the keel up, built to sleep twelve passengers, and as solid as the men who scramble over her decks.

There is other activity in the early morning. The fishermen arrive to offload their catch. Crowds gather, at the Ninfa and near the SolyMar, to see what the sea has provided. Men, women and children are joined by iguanas, pelicans, sea lions and lava gulls to inspect the day's catch. Some come to buy, some to clean, some to carry, and some to view for the leftovers. When the boats are empty, the frigatebirds dive to catch the last scraps. The boats go back to their moorings. The trucks suck their own dust clouds through the town, and the wharf is deserted.

In the wake of the trucks, the dust settles. It swirls again as a family of seven bounces by on a motorcycle. It settles again on the hats and bags of the tourists who stand in the morning heat, waiting for the bus. It settles outside the post office, where an amazed American has just learned the meaning of the Postmistress's words: "No hay estampas. Ese tarde, creo, hay estampas." (There are no stamps. This afternoon, I believe, there will be stamps.)

The pace of change is slow, but change occurs. Before the founding of the Charles Darwin Research Station, before their classification as a National Park of Ecuador, the Galapagos Islands did not sustain a tourist industry. The quiet fishing village of Puerto Ayora lived from the sea. That has changed. Now, there is a road leading to the Baltra Channel and from there to the airport where daily flights from the mainland are filled to capacity with people from all over the world.

The airplanes also bring fresh produce for residents and visitors. A weekly freighter arrives to unload a huge cargo of supplies. Tiny barges ply the waters of Academy Bay, manned by skilled pilots who wind their loads of 50-gallon drums through a maze of yachts and tourboats to the dock.

There are new sights among the old. At the main wharf, newly planted trees and newly made benches frame a quiet park. There are new faces. But the old families are still in residence. Karl Angermeyer's iguanas still scramble over the roof of his house and studio. Miguel Giarno can still fix just about anything in his shop on the hill. Families of Andean Indians sit in quiet shops, selling their beautiful crafts to the tourists waiting for the bus. Life slows for a moment.

Then, it is time for the bus to depart. Passengers are crammed aboard. Those who can't fit are given a place in the auxilliary "bus", a large dump truck. As the vehicles lurch down the main street, happy children follow in hot pursuit. The local dog population races in hot pursuit of the children.

When it is quiet again, and the dust has settled, the newly planted flowers in the park wear a coat of gray. The day grows hot. People and animals take shelter in the shade of the trees and buildings. Iguanas sun themselves, and the birds continue their activity, boobies diving offshore and frigatebirds soaring over the island.

From the vantage point of a six-week stay in the Galapagos, it appears that what is new in Puerto Ayora is

usually good, and usually strong. New people, who have moved there by choice from the Ecuadorean mainland, work hard to preserve the fundamental nature of their new home. New houses are built of the old materials, the lava and bamboo and wood of the island. New shops and restaurants are simply built and warmly staffed. To the visitor, it is a warm and friendly place.

Our lasting impressions are those of a place whose people move in the rhythm of their environment. Constant learning is fostered by the guide training programs and the Darwin Research Station. The encroachment of man into the protected islands is kept under tight rein. The land and sea and their inhabitants are respected.

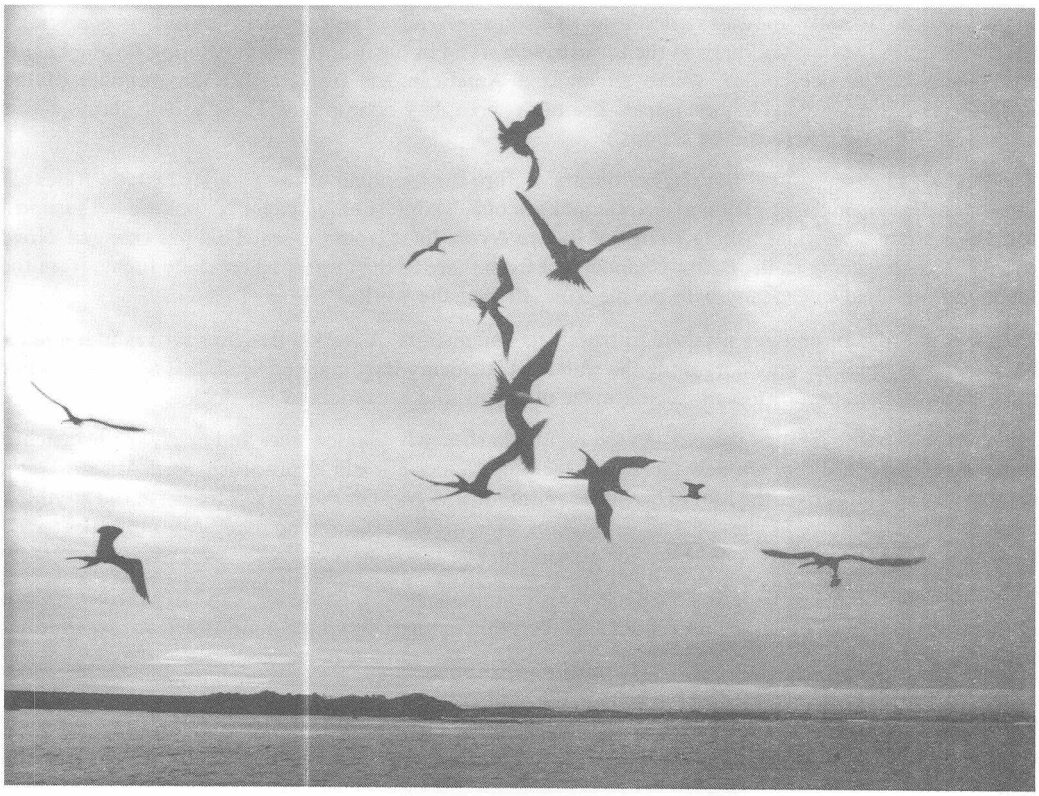
The rhythm is a peaceful one, but the peace is often interrupted. Four laughing children race by on a bicycle. A film crew arrives to begin a documentary. A storm drops a deluge on running shoppers. Boatmen scramble to the shops as a fresh load of produce is delivered from Baltra. And another sailing family readies its boat for departure.

Our time is up. After six weeks, with our guides in the islands, and anchored in Academy Bay, it is time for "Cassiopeia" to leave.

And so we sailed away from Puerto Ayora. We carried our bunch of bananas down to the dinghy, said goodbye to our friends, and left the Customs dock for the last time.

We stowed the last provisions. A small boat carrying a late passenger raced by to catch "Poseidon II" as she steamed out towards San Cristóbal. We disentangled and hoisted the anchor. A film crew waved from the pilot-house of the Darwin Station's boat. We eased past "Isabela", "Tigress" and "Bronzewing", and headed out to sea.

We were gone, beginning a 3000-mile voyage to the next lands to the west. Puerto Ayora disappeared quickly as we rounded the point, but its image remains. Six months have not dimmed the memory of the sunlight, hot as lava, pouring down on all God's creations, in this town and in these islands of evolution.



MIGUEL CIFUENTES — IN RECOGNITION

by

Thomas H. Fritts

Prior to accepting a new position, Miguel Cifuentes served as Superintendent of the Galapagos National Park over a ten-year span from 1976 to 1986 interrupted only by a two-year period during which he successfully completed a Master of Science Degree in natural resource management with a specialization in reserves and protected areas at the Centro Agronomico Tropical de Investigación y Enseñanza (CATIE) in Turrialba, Costa Rica.

Miguel's initial involvement with Galapagos began in 1972 when he served as a student researcher participating in a study of the green sea turtle populations in Galapagos. He subsequently worked in the Darwin Station's Education Program and as an assistant to the station director. Miguel's enthusiasm, maturity, and ability to work under difficult conditions, which were evidenced in his work on the remote turtle nesting beaches, were equally apparent when he began to serve as head of the Galapagos National Park.

During Miguel's tenure, the National Park and the entire socioeconomic status of Galapagos experienced a significant maturation. The challenges were numerous ranging from economic crises caused by delays in the transfer of money to Galapagos from national and international sources to ecological problems caused by diluvial rains, increasing feral animal problems, or wildfires. Miguel provided competent leadership on diverse issues: when the impacts of tourism needed to be assessed, when major commitments of park personnel were essential to the elimination of the last goats from Española and Marchena, and when new problems developed requiring reprioritization of the resources and personnel of the Galapagos National Park Service.

Miguel worked closely with the Charles Darwin Research Station and visiting scientists and effectively weighted their assessments, but he was not hesitant to adopt his own course of action when it was appropriate to the situation.

Miguel Cifuentes has given much to the park, the archipelago, and the international community interested in conservation, natural resources, and tourism. His expertise in problem solving, planning, administration, and management of natural areas, which has been so effective in Galapagos, has resulted in his being offered a role in training others to work with similar problems throughout Latin America and the rest of the world. His new position is the Central American Regional Representative for the WWF — International in the Wildlands Programme at CATIE. His absence from Galapagos will certainly be regretted, but the best wishes of the park, station and scientific communities who have known and worked with him go out to Miguel and his family with expectations for his success in the position in Costa Rica and the new challenges that this move will produce.

CONGRATULATIONS TO HUMBERTO OCHOA

Humberto Ochoa, a long-term employee in the Galapgos National Park, has been appointed to replace Miguel Cifuentes as Superintendent of the park. Humberto came to the park in 1978, and until his new appointment, headed up the Protection Program aimed at the control of introduced plants and animals throughout the park. He is trained as an agronomist (Ingeniero Agronomo) and has participated in numerous postgraduate training programs in conservation and land-management practices. Most recently Humberto completed a three-month graduate course in wildland management at CATIE in Costa Rica. The entire Galapagos community welcomes Humberto as the new head of the Galapagos National Park and wishes him success in this very important post.

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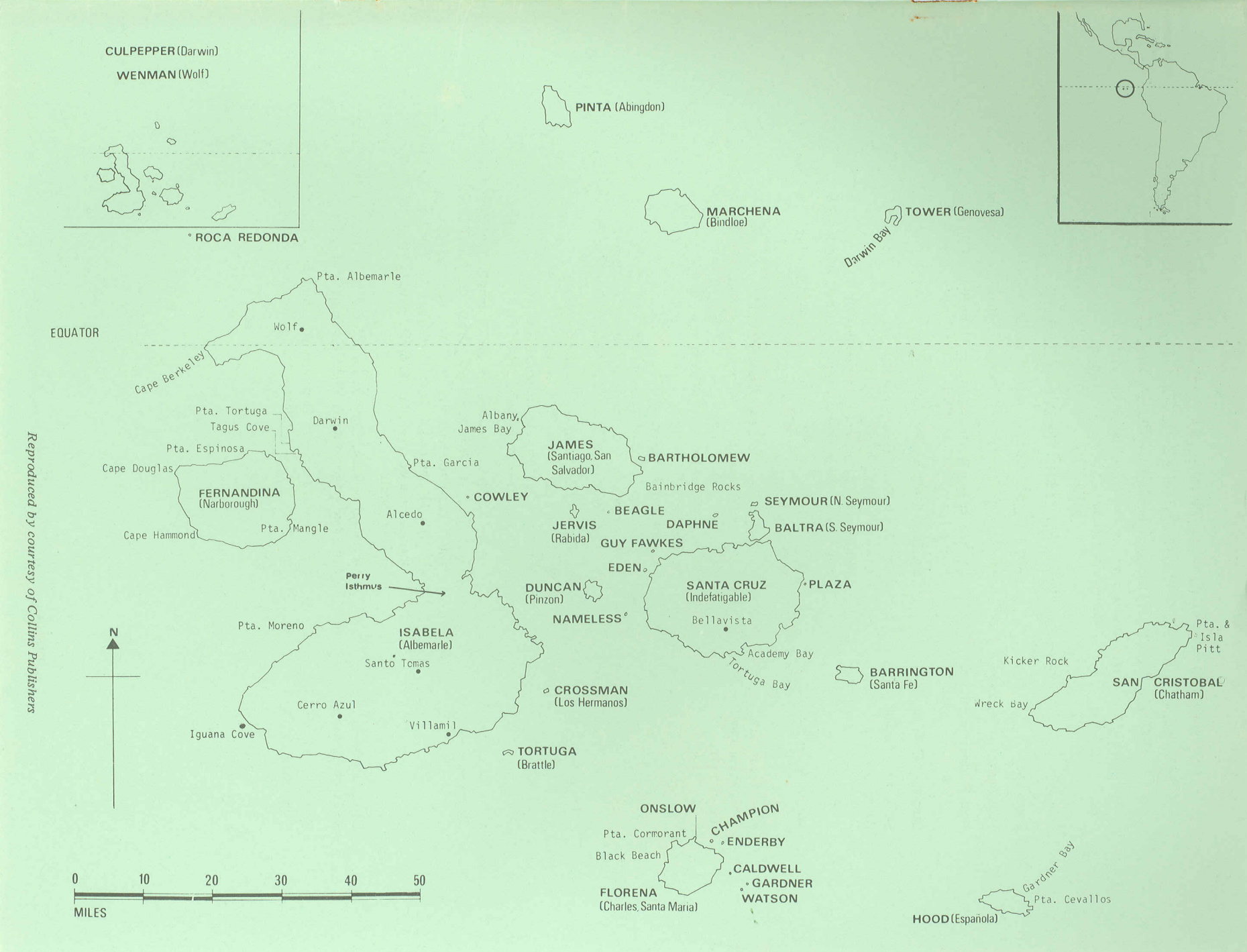

Medium Ground Finch (Geospiza fortis)
Drawing by Godfrey Merlen

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