

N O T I C I A S   D E   G A L A P A G O S

G A L A P A G O S   N E W S

N O U V E L L E S   D E S   G A L A P A G O S

Publicado por

la

FUNDACION CHARLES DARWIN PARA LAS ISLAS GALAPAGOS

Creada bajo los auspicios de la UNESCO

Con ayuda económica de la Organización de las Naciones Unidas  
para la Educación, la Ciencia y la Cultura (UNESCO)

NOTICIAS DE GALAPAGOS , N° 14

SOMMAIRE

	Page
NECROLOGIE - Robert L. Usinger	3
Election de nouveaux membres du Conseil de la Fondation	4
Jean DORST - Baptême du "BEAGLE III"	5
Deux décrets concernant la conservation de la nature aux Galapagos	10
Scientific Programme of the Charles Darwin Foundation	13
Composition du Conseil Exécutif. Art.2 des Statuts de la Fondation Charles Darwin	22

---

NOTICIAS DE GALAPAGOS - 1, rue Ducale, BRUXELLES-1, Belgium.

---

- N é c r o l o g i e -

---

Robert L. USINGER

1912 - 1968

---

Nous avons appris avec beaucoup de peine la disparition de notre collègue le Dr Robert L. USINGER, mort le 1er octobre 1968 d'un mal implacable.

Ce n'est pas ici la place de rappeler la carrière de cet entomologiste de grand renom international, qui était chef de la Division d'Entomologie de l'Université de Californie, Berkeley, et occupait diverses fonctions officielles, notamment au Pacific Science Board. Auteur de plus de 250 articles, mémoires et ouvrages, il était depuis longtemps un spécialiste incontesté de la systématique et de la biologie des Hémiptères dont il avait étudié les groupes les plus difficiles. Sa monumentale monographie des Cimicidae parue en 1966 témoigne à elle seule des talents et des connaissances de l'auteur. Les Réduvidés avaient également retenu son attention, car plusieurs travaux fondamentaux sont consacrés à ce groupe d'insectes.

Le Dr Usinger parcouru le monde non seulement pour participer à des congrès et réunions scientifiques ou pour consulter les collections des grands musées (ses séjours au British Museum et au Muséum de Paris furent fréquents et prolongés), mais aussi pour travailler sur le terrain. Depuis le début de sa carrière il manifesta un intérêt particulier pour la région pacifique. Dès 1935 il résidait aux îles Hawaii et servait pendant la guerre dans le Sud-ouest du Pacifique comme entomologiste de l'armée américaine. C'est sans doute ce qui l'incita à visiter les Galapagos. En 1964 il y passait 2 mois dans le cadre du Galapagos International Scientific Project. Ses collectes permirent de doubler le nombre d'Hémiptères connus de cet archipel et de préciser de nombreux points touchant à la systématique et à l'évolution de ces insectes.

C'est à ce moment qu'il rallia les scientifiques qui travaillent à la prospection et à la défense du patrimoine naturel des Galapagos. Il le fit avec l'énergie et l'enthousiasme qu'il témoignait dans toutes ses activités. Nommé membre du Comité scientifique dès la création de celui-ci, il en fut un des éléments les plus actifs jusqu'à sa mort prématurée.

Le Dr Usinger n'était pas qu'un entomologiste de grand talent. Il était aussi un homme cordial, sympathique dès le premier abord, animé d'une énergie et d'une faculté de travail peu communes. Sa perte est durement ressentie par notre Fondation à laquelle il consacrait beaucoup de son temps d'une manière aussi discrète qu'efficace.

Nous prions Mrs Usinger et ses enfants d'accepter notre sympathie attristée.

Jean DORST.

## ELECTION DE NOUVEAUX MEMBRES DU CONSEIL DE LA FONDATION

Au cours de notre Assemblée générale tenue à l'UNESCO, Paris, le 28 novembre 1968, deux nouveaux membres du Conseil ont été élus sur proposition de celui-ci.

Le premier est le Dr Luis Ayora, Président de la Comision de Valores, Corporacion Financiera Nacional. Celui-ci a depuis longtemps manifesté le plus grand intérêt à notre Fondation, en lui accordant son appui moral et la faisant bénéficier d'un crédit important sous forme d'un contrat en vue de l'établissement du Parc National en cours d'étude. Il joue un rôle prépondérant au Comité équatorien des Galapagos. La présence à notre Conseil du Dr Ayora, dont l'influence est très grande en Ecuador, renforce les liens établis entre la Fondation et nos amis de ce pays.

Le second est le Professeur Jean Bouillon, de l'Université Libre de Bruxelles. Zoologiste de réputation mondiale, il s'est rendu lui-même aux Galapagos il y a peu de temps pour y diriger et installer une mission d'études des invertébrés marins du groupe des hydrozoaires dont les résultats sont fort importants. Sa connaissance des lieux, sa science et son enthousiasme ne peuvent que nous être très utiles. Par ailleurs sa présence dans la ville même où se trouve notre siège est très précieuse dans la gestion de la Fondation.

A sa dernière séance notre Conseil a par ailleurs proposé de présenter au suffrage des membres le nom de Mr G.T. CORLEY SMITH, Naturaliste de vocation, cet éminent diplomate fut pendant de longues années Ambassadeur du Royaume Uni à Quito. Son rôle fut déterminant dans de difficiles négociations avec le Gouvernement de l'Ecuador et ses avis seront des plus utiles dans l'administration de la Fondation.

Nous sommes gré à ces trois personnalités d'avoir bien voulu accepter de siéger à notre Conseil et de nous permettre de bénéficier ainsi de leur collaboration.

## BAPTEME DU "BEAGLE III"

par

Jean DORST,  
Président.

Au lendemain de la dernière séance du Conseil de la Fondation, tenue à Downe, dans la maison même de Charles Darwin, a eu lieu le 24 avril 1969 à Strood, Kent, la cérémonie de baptême de notre nouveau bateau, le "Beagle III". La construction de ce bateau, destiné à remplacer celui qui nous avait servi si loyalement en dépit de sa vétusté et de son manque de commodité, avait pu être envisagée dès qu'une généreuse bienfaitrice, Mrs Vincent Astor, et l'organisation d'un gala à Londres, en présence de S.M. la Reine et de S.A.R. le Prince Philip nous eurent permis de disposer des fonds nécessaires.

La mise au point d'un bateau répondant à des spécifications précises et divers obstacles techniques retardèrent la mise en chantier du "Beagle III". Celui-ci est néanmoins maintenant en état de construction très avancé. Les participants à la cérémonie purent constater les lignes harmonieuses du bateau, sa robustesse et l'heureuse disposition de ses ponts et de ses cabines, répondant parfaitement aux usages auxquels il est destiné dans les mers baignant les Galapagos.

L'état d'avancement ne permettait sans doute pas de procéder à son lancement. La traditionnelle bouteille de champagne n'en fut pas moins brisée sur la grève par Madame Van Straelen qui avait bien voulu accepter d'être la marraine de notre bateau.

Parmi les membres de notre Conseil qui assistaient à la cérémonie on remarquait particulièrement Senor Cristobal Bonifaz, venu tout exprès de Quito, et qui était de plus le représentant personnel de S.E. Monsieur le Président de la République de l'Equateur. Le Dr Harold J. Coolidge figurait également parmi nous en qualité de Président de l'Union Internationale pour la Conservation de la Nature; tous les participants se rappelaient la part qu'il avait prise dans la matérialisation de ce projet, en sachant notamment susciter de généreux mécénats. Le Professeur S. Dillon Ripley représentait également l'International Council for Bird Preservation, dont on sait l'aide matérielle et morale apportée par cette organisation à notre Fondation, de même d'ailleurs que la Smithsonian Institution dont il est le Secrétaire Général.

On retrouvait également parmi nous le Dr Gerardo Budowski, représentant l'UNESCO et plusieurs membres du World Wildlife Fund, dont il est inutile de rappeler ici l'aide généreuse et constante. La Royal Society, qui assure la présence du Royaume-Uni sous forme d'une table de chercheur établie à

la Station, et la Royal Zoological Society s'étaient fait représentes, de même que la Fauna Preservation Society.

Il serait trop long d'énumérer tous les autres participants qui ont tous longuement visité le bateau en bénéficiant des explications techniques du constructeur, Mr J.I. Perry. Ils ont été unanimes à féliciter celui-ci de la haute qualité de son travail.

Cette cérémonie a aussi permis à nos membres de faire plus ample connaissance avec le Commandant du "Beagle III", le Cdr Anderson qui en prendra la charge avec son épouse. Celui-ci a brièvement exposé ses plans pour mener le bateau vers les Galapagos et le mettre au plus vite au service de la Station Charles Darwin.

Notre Président a prononcé avant le baptême une allocution qui nous croyons utile de reproduire ci-dessous :

"The Charles Darwin Foundation has been looking forward to this day for a long time. When our last vessel, Beagle II, had to be disposed of, we knew that we must quickly find a successor for her. The Station cannot exist without a ship to take the staff and visiting scientific expeditions around the islands. The islands are widely scattered and are separated by a hundred miles and more. If the Station is to carry out effectively its responsibility to the Government of Ecuador and to science throughout the world, for supervising wildlife and safeguarding the habitat, then we must have adequate means of transport.

"We decided that we should build a vessel specially suited for our needs, - the old Beagle had served us well, but a number of features could have been better, and now was the time to make sure that for the future we should have the ship we needed. But of course, we had to have the money. And it was here that Mrs Vincent Astor came to our rescue. Through the initiative of Dr Harold Coolidge she arranged that a very substantial part of the cost should be given to the Foundation from the Trust created by her late husband, Commodore Vincent Astor, and she supplemented this amount by a personal gift of her own. Both she and her husband have a particular interest in the Galapagos Islands because he had visited them in his yacht "Nourmahal" on a scientific expedition in the twenties. This splendid gesture of support allowed the Foundation to proceed at once with its plans for the building of the ship. It is therefore most sad that Mrs Astor is not with us today. She had accepted our invitation to come, and when we saw her in Washington in February she was looking forward immensely to the prospect of the trip. But only last week she fell ill, and her doctors have forbidden her to attempt the transatlantic flight. I am sure you will join me in wishing her a very speedy recovery, and perhaps she will find an opportunity to see the new ship on her way to the Islands, later in the year. Our sorrow at Mrs Astor's absence is made bearable, however, by the fact that it gives us the opportunity to welcome Madame Van Straelen to take part in the ceremony. Madame Van Straelen really needs no introduction to the members of the Darwin Foundation. It was the enthusiasm of Professeur Van Straelen

for the Islands, and his devotion to the memory of Charles Darwin that led to the idea of a Research Station, and a Foundation that would work to preserve the conditions there that had made Darwin's observations possible. I feel sure he would have approved of this ship, bearing an honored name, designed to enable the Station to do its work more effectively. Madame Van Straelen has continued to take the keenest interest in the activities of the Foundation, and it is tribute to this interest, as well as in recollection of Victor Van Straelen himself, that we welcome her here today.

"We also make our thanks for another signal contribution to the funds which have made the new Beagle a possibility. A year ago there was shown for the first time a very beautiful and striking film about the Galapagos, "The Enchanted Isles". The film was produced by Anglia Television, and the photography was done by Alan Root and his wife. Its first showing was graced by the presence of Her Majesty Queen Elizabeth and Prince Philip. The Foundation received the very considerable sum which those who attended the occasion had contributed, and this added to the funds which were available in such a way that the building of the ship could be assured.

"I could go on to tell you about the discussions we had to decide whether the ship should be built of fibre glass or steel, whether she should have one or two engines, and how many sails. We were fortunate in having the benefit of the advice of Peter Scott and Sir Thomas Barlow, both of whom have such wide experience in nature conservation and ships as well. You can really see the answer for yourselves. We decided that steel was still the best material, and with two reliable engines we could reduce the sails to an emergency outfit, and feel quite confident that the old gruesome stories of boats whose engines had broken down drifting away into the Pacific, need have no consequences for us.

"At this stage we were introduced by our consultant, Commander Hundy, to Ian Perry, who is now building the ship for us. We feel we have been very fortunate in joining forces with Perry Marine. Their enthusiasm and hard work have enabled all manner of difficulties to be overcome. Inevitably building a vessel to a new design and to special characteristics in an extension of his shipyard which he only occupied as the ship was ordered, presented Mr Perry with problems. From his side he was handicapped by the local authorities who delayed him starting work, while we found it necessary to alter several of the specifications which we had originally included, and this was bound to lead to delays. We had hoped to show you the ship much more nearly completed, or even perhaps in the water. But this could not be. Nevertheless you will be able to get a good idea of what she will look like. It is clear from what we can see, and from the drawings that here we shall have a vessel in which we can place every confidence, and I feel sure that we shall have cause to be grateful to Perry Marine for the fine vessel they are building.

"There are many others whom I must thank for the part they have played. First of all there is the World Wildlife Fund itself, both in England and in the United States. They have helped us with money, and with the benefit

of their experience, and we are glad that the Director of the English Appeal is here with us. Then we welcome UNESCO and the IUCN, who acted; I can say, as foster parents for Victor Van Straelen's infant Society when it was founded in 1959. We are particularly indebted to Dr Harold Coolidge, President of IUCN and member of the Executive Board, who took great interest in our project, and made use of his influence in order to raise funds.

"Then there is the Royal Society, which not only gives us its valuable support annually, but has also made a special contribution towards this ship.

"We also have to welcome one of our most distinguished members, Señor Cristobal Bonifaz, who came specially from Quito for this occasion. He is the representative of the President of the Republic of Ecuador, and his presence today emphasises the great interest of the Government of Ecuador in our work, and the close and enthusiastic co-operation that exists between us.

"I feel I must mention, too, Mrs Frances Perry, who is of course, mother of Roger Perry, Director of the Station. And there is one other personality whom I should introduce, and that is Commander W. St G. Anderson, who is to be Captain of the ship. He served in the Navy during the War, and since then has been in Africa and the Pacific as an administrator for the British Colonial Service. He has also had many years' experience owning and handling yachts in the Mediterranean. The Foundation is fortunate to have found an officer with such wide experience, and we hope that the association which he and his wife form with Beagle will be long and happy. Certainly the Foundation wishes them every success.

"Today is enabling the members of the Council of the Foundation to make the acquaintance of the new ship in perhaps rather an elementary stage, but at least we can see for ourselves the strength of the workmanship which is going into her. We are pleased to meet the firm of John Perry Marine, and talk to the men who are actually doing the work. We can see that we shall have a very fine ship. We hope that our guests will enjoy, too, this glimpse of the ship, not the usual one for visitors, but the timing of today's ceremony was forced on us by when we could gather people together. It is usual to christen a ship as she enters the water, but as there were many who could not have come to England at the moment when the builders were ready for this, we felt that we could well show the confidence we have in them by holding the ceremony on dry land.

"I should like to thank you all for coming here to take part in this small ceremony, and now it is my pleasant task to invite Madame Van Straelen to name our new Research Vessel for us".

Après la cérémonie, quelques verres furent bus sur le chantier, puis les participants se réunirent pour un déjeuner amical, au cours duquel de nombreux toasts furent proposés avec la plus grande cordialité. A son issue



fut projeté le film "The Enchanted Islands". Cela fut l'occasion de revoir l'image quelque peu nostalgique du Beagle II et se remettre en mémoire les mers que sillonnera bientôt notre nouveau bateau. Ce fut aussi pour nous l'occasion de nous rappeler ce que nous devons à Anglia Television, à Sir Robert Adeane et à Mr Aubrey Buxton, dont les efforts furent à l'origine de la construction du bateau baptisé ce jour.

Le Beagle III partira cet été vers les Galapagos. Il emportera les espoirs des naturalistes et des conservationnistes du monde entier. Il servira utilement une grande cause et contribuera puissamment à préserver un capital naturel inestimable que le glorieux navire dont il porte le nom aura permis de découvrir il y a 134 ans.

## DEUX DECRETS CONCERNANT LA CONSERVATION DE LA NATURE AUX GALAPAGOS

Le Ministère de l'Agriculture et de l'Elevage de la République de l'Ecuador vient de publier deux décrets fort importants, qui complètent de la manière la plus heureuse l'appareil législatif déjà en vigueur, en augmentant l'efficacité de la protection de la nature et des espèces menacées aux Galapagos.

Le premier (n°601) a été pris en rapport avec le projet d'une route touristique à travers l'île de Santa Cruz, reliant la côte nord en face de l'île de Baltra où est situé l'aéroport, et la localité de Puerto Ayora, dans la Bahia de la Academy. Au moment où les îles vont commencer à s'équiper en vue d'un développement du tourisme, on pouvait craindre que la construction d'une telle route n'entraîne une colonisation dans le secteur oriental de Santa Cruz et une dégradation des habitats. Le décret déclare "Zone de réserve naturelle" toute la partie située à l'est de cette route. Des populations d'iguanes, de tortues et de flamants ainsi que des biotopes fort intéressants, notamment des forêts de Scalesia se trouvent ainsi protégés. Cette mesure permet de mettre à l'abri une partie importante de l'île en attendant la délimitation et la promulgation du Parc national actuellement à l'étude.

Le second (n°602) interdit l'exportation d'animaux et de végétaux en voie d'extinction, et notamment de tortues géantes. Depuis quelque temps, un commerce plus au moins clandestin de tortues s'effectuait à partir de l'Ecuador continental. De diverses sources on nous avait signalé la mise en vente de spécimens dont la collecte illégale ne pouvait faire de doute. Le présent décret permettra aux autorités équatoriennes de mettre fin à un trafic constituant une menace pour les populations de tortues et une source de profit pour des braconniers pour la plupart étrangers au pays.

Nous sommes reconnaissants au Gouvernement équatorien, et plus particulièrement au Ministre de l'Agriculture, d'avoir pris des mesures immédiates pour pallier à des menaces qui auraient pu devenir très graves.

Ajoutons que ces décrets ont été pris à l'instigation de nos deux membres équatoriens les plus actifs, le Dr Luis Ayora et Señor Cristobal Bonifaz, qui ont une fois de plus manifesté leur efficacité et leur grand intérêt à une cause qui est l'objectif essentiel de notre Fondation.

Les textes de ces deux décrets sont les suivants :

N°601

EL MINISTRO DE AGRICULTURA Y GANADERIA

CONSIDERANDO :

QUE el Art. 2° del Decreto Supremo N°1472 del 8 Julio de 1964, pro mulgado en el Registro Oficial N°296 de 22 del mismo mes y ano, faculta a este Ministerio la détermination de areas que deben ser consideradas como de "Bosques Protectores", cuando razones de caracter tecnico asi lo aconsejen;

QUE mediante Acuerdo suscrito el 14 de Febrero de 1964 entre el Gobierno del Ecuador y la Fundacion "Charles Darwin" con el fin de establecer la Estacion Biologica del mismo nombre en la isla Santa Cruz, llamada a realizar los estudios cientificos necesarios para las labores de Conservacion de la Flora y Fauna Silvestre del Archipiélago;

QUE la Ley Forestal en su Art. 10° dice : "Es funcion primordial del Departamento de Forestacion (actualmente Servicio Forestal), declarar reservas nacionales, de acuerdo con los reglamentos, los bosques que, por su constitucion, ubicacion o interes nacional, deben ser conservados como tales por motivos de defensa nacional o conveniencia economica, o destinados a parques nacionales o a investigacion y experimentacion;

QUE en el plan de fomento de turismo para el Archipiélago de Galapagos, la Corporacion Ecuatoriana de Turismo (CETURIS) proyecta la construccion de una carretera que une el aeropuerto de la Isla Baltra con Puerto Ayora :

QUE tal construccion atraviesa una importante zona de conservacion con especies náticas de iguanas terrestres, flamencos y tortugas, asi como un bosque unico de Scalesias en la zona; de acuerdo a la informacion presentada por los miembros ecuatorianos del Consejo Directivo de la Fundacion - "Charles Darwin", mediante oficio 1431 de Marzo 17 ultimo;

A C U E R D A :

Art. 1° - El plan de construccion de la via antes descrita debera ser sometido a consideracion del Ministerio de Agricultura y Ganaderia.

Art. 2° - La zona comprendida entre el mar y el Este de la carretera a construirse se declara "Zona de Reserva Natural Especial".

Art. 3° - El Ministerio de Agricultura y Ganaderia a traves del Servicio Forestal y demas Dependencias, realizara el control y proteccion de la flora y fauna en la zona antes descrita.

COMUNIQUESE Y PUBLIQUESE

DADO en QUITO, a 11 Abr. 1969

Dr. Angel Duarte Valverde,  
MINISTRO DE AGRICULTURA  
Y GANADERIA

Econ. Jorge Naranjo Fiallo,  
SUBSECRETARIO DE AGRICULTURA  
Y GANADERIA.

N°602

EL MINISTRO DE AGRICULTURA Y GANADERIA

CONSIDERANDO :

QUE mediante el Decreto Ley de Emergencia N°17 de 4 de Julio de 1959, publicado en el Registro Oficial N°873 de 20 de Julio del mismo ano se declararon Parques Nacionales de Reserva, para la preservacion de la fauna y la flora, las islas del Archipiélago de Colon ;

QUE igual declaratoria de la Zonas de Reserva o Monumentos Naturales se ratifico en el Decreto Supremo N°523 de 12 de Marzo de 1964, promulgado en el Registro Oficial N°234 de Abril del mismo ano;

QUE en el Art. 10° del Decreto Supremo N°2527-A de 5 de Noviembre de 1965, promulgado en el Registro Oficial N°631 de 22 de Noviembre de 1965 y en la Disposicion Transitoria del mismo se faculta al Ministerio de Agricultura y Ganaderia para prohibir la exportacion de las especies naturales que afecten a la conservacion de la riqueza agro pecuaria nacional;

A C U E R D A :

Art. 1° - Queda terminantemente prohibida la exportacion de las especies de la flora y fauna silvestre en peligro de extinction, correspondientes al territorio insular o continental de la Republica del Ecuador, especialmente las galapagos del Archipiélago.

Art. 2° - En caso de requerirse tal exportacion solamente para fines cientificos, el organismo interesado elevara su correspondientes solicitud al señor Ministro de Agricultura, el mismo que previo el analisis del caso, lo resolvera.

Art. 3° - En conformidad al Art. 1° de este Acuerdo, para determinar las especies de vida silvestre en vias de extinction, el Ministerio de Agricultura, previo los estudios tecnicos correspondientes, elaboratras el Reglamento necesario.

COMMUNIQUESE Y PUBLIQUESE  
DADO en QUITO, a 11 Abr. 1969

Dr. Angel Duarte Valverde,  
MINISTRO DE AGRICULTURA  
Y GANADERIA

Econ. Jorge Naranjo Fiallo  
SUBSECRETARIO DE AGRICULTURA  
Y GANADERIA.

SCIENTIFIC PROGRAMME  
OF THE CHARLES DARWIN FOUNDATION

Introduction

It is logical to divide the Charles Darwin Foundation's scientific programme into two parts : a practical programme of research for conservation, and a programme of fundamental research. At least for the next few years, the staff of the Charles Darwin Research Station will be primarily concerned with the first of these divisions, while the more fundamental research will be undertaken primarily by visiting scientists.

The aim of the following notes is to suggest the topics to which preference should be given, in both of the divisions mentioned above. The importance of having priorities established in regard to practical conservation research is obvious. The value of having a programme for fundamental research perhaps calls for some comment, since the Foundation itself is unlikely to have resources to devote to such work in the near future.

It is not the Charles Darwin Foundation's policy to attempt to exercise close control over investigations carried out in the Galapagos by visiting scientists, except for ensuring that they are compatible with the aims of the Charles Darwin Foundation. On the other hand, if it becomes necessary to allocate limited laboratory space among a number of different applicants with different research programmes, a choice must be made, and preference will be given to those whose programmes are directed towards evolutionary problems in general or problems relating to the evolution of the Galapagos fauna and flora in particular, rather than to problems which could equally well be investigated elsewhere.

It is also hoped that these notes will help those who are exploring the possibilities of a visit to the Galapagos to decide on a worthwhile programme of research.

I - CONSERVATION RESEARCH

For convenience two divisions may be made, though there is overlap between them : the conservation of ecosystems, and the conservation of particular species.

## Conservation of ecosystems

The factors affecting Galapagos ecosystems now, and most likely to be important in the future, are : direct human interference; the introduction and spread of alien plants and animals; climatic variations (not of primary importance, since Galapagos ecosystems are adapted to marked climatic vicissitudes, but potentially important if ecosystems are already degraded by man); and vulcanism (potentially important, but not controllable).

Direct Human interference. This is mainly a political and administrative problem, intimately connected with Ecuadorian policy on colonisation and land settlement. On the part of the C.D.F., it demands routine surveillance, with a view to reporting infringements of laws and regulations, rather than scientific research.

When organised tours of the Galapagos begin, it will be important to study the possible effects of increased human disturbance on various of the animals, especially the breeding colonies of sea-birds and pinnipedes.

The Darwin Station will try to advise the tour organisers about the periods when it is best to visit the various places of interest, so as to minimise disturbance and at the same time allow visitors to see as much as possible.

Introductions. Gross ecological changes due to the introduction and spread of alien species must be avoided, by detecting changes at an early stage and taking appropriate action. Where gross changes have occurred, the aim should be to take measures that will restore the situation.

### Methods :

1) Surveys of all introduced species (plant and animal) on all islands at regular intervals. Records must be maintained in a central file at the Darwin Station. Depending on the availability of competent workers, studies of introduced plant and animal pathogens, brought in with agricultural materials or in other ways, would be desirable (cf. Hawaiian Islands, where it has been shown that the disappearance of the endemic birds was apparently caused by the introduction of a mosquito). Public health studies of the human population are also relevant in this connection.

2) Long-term monitoring of vegetation changes by surveys of fixed transects or quadrats. Periodic air-photo coverage (perhaps every 5 years) would be highly desirable if it could be arranged.

3) Experimental :

a) Control measures. Some are urgently needed and should be undertaken as resources become available (the political aspect also has to be taken into account). The most urgent problems are the control of goats on Barrington, Hood and Abingdon, and the control of rats on Duncan.

As well as control by shooting and trapping, the possibility of making use of specific poisons or viruses (especially for rats) needs investigation. The use of Norbormide for rats might be investigated.

b) Enclosures, to study the effects of excluding introduced animals from selected areas, especially as regards the regeneration of native plants. Such studies should begin on Barrington and Hood.

Lists of areas which should be given priority for study of gross ecological changes caused by introduced species :

Abingdon (Pinta). Changes caused by recent introduction of goats.  
Barrington (Santa Fé). Changes caused by long-continued presence of goats.

Chatham (San Cristobal). Changes caused to the upland flora by long-continued introduction of alien plant species.

Albemarle (Isabela). Changes caused to the upland flora of the two southern volcanoes by the introduction of cattle and other domestic animals.

Hood (Espanola). Changes caused by long-continued presence of goats.

Indefatigable (Santa Cruz). Changes caused to the Scalesia, Miconia and moorland zones by the long-continued presence of various domestic animals and by continued introduction of alien plants.

Climatic variations. If it were not for the simultaneous alteration of Galapagos ecosystems by man, climatic vicissitudes, though interesting from the evolutionary viewpoint, would not be of immediate importance in conservation research (the Galapagos fauna and flora have withstood such vicissitudes for thousands of years, and must have become adapted to them). But combined with changes due to other causes, climatic variations may have disastrous effects; for instance, the progressive desiccation of low-lying zones will be more rapid and more severe during dry periods if goats have already eaten down much of the cover, and the change may become irreversible. Certain plant species may then disappear completely. The vegetation of Barrington and Hood at present seems to be in danger of suffering in this way.

Effects of vulcanism. This is of minor practical importance under present conditions, but would be worth study if a suitable worker were available. Man-made fires are more important on most of the inhabited

islands; this problem needs prevention or control (see under Direct Human interference dealt with above) rather than research.

### Conservation of particular species

A basic need is regular surveys. These should be carried out as part of the routine work of the Station.

The mistake must be avoided of treating too many species as "threatened" when they are not (e.g. Flightless Cormorant, Penguin, Albatross). Such species need to be surveyed regularly, but to devote special conservation measures to them would be a waste of resources. (The I.U.C.N. Red Data Book includes several species which are not, according to available evidence, declining or threatened, though they are certainly vulnerable).

Plants. Only two genera are seriously threatened, but they are among the most important.

Scalesia spp. (a) Scalesia woodland. Surveys are needed of the alteration of its extent on the larger islands, due to the human impact, and of its regeneration. Linked with this, the regeneration of the other, mostly very slow-growing, trees of Scalesia woodland, should be carried out (esp. Pisonia, Psidium).

(b) Shrubby species (dry zone). Some of these species exist in extremely small numbers (less than 10 individual plants). Regeneration is probably hindered by goats. The evolutionary situation is of the greatest interest, and extinctions must be prevented. Some work has already been done on the evolutionary aspects, but the conservation problem urgently needs to be tackled.

Opuntia spp. Studies are needed of their status, and regeneration, in areas where goats are abundant. The situation of Hood is the most critical. The use of enclosures may be appropriate.

Reptiles. The tortoise populations need the most attention. The surveys already being carried out must be continued, combined with marking and growth studies. Special aspects which need study are :

Their relationship to the physical environment, especially temperature and water. Nest-site requirements need to be investigated (soil conditions, temperature, humidity), and nesting areas of many of the populations should be discovered.

Food : seasonal changes, changes with age, and competition with other animals.

Viability of the very small populations, in view of the possibility that the sex ratio is unbalanced and many individuals may be senile.



In the case of the hawk, occasional checks on the more flourishing populations (Albemarle, Duncan, James, Narborough) would be adequate; but the very small population on Barrington, and the remnant on Indefatigable, should be given more study.

The status of the rails Laterallus Gallinula and Neocrex needs to be determined.

Mammals. The status of the native rats and the possible competition from introduced Rattus, needs further study (already begun by Brosset).

Periodic surveys of the Arctocephalus populations are needed. As regards Zalophus, the main need is for a study of its food, in order to see whether the islanders' complaints that it harms their fishing are justified.

## II - PROGRAMME OF FUNDAMENTAL RESEARCH

The following is a brief listing of the main topics to which it is suggested that preference should be given in allocating facilities to visiting scientists and suggesting projects to prospective visitors, as discussed in the Introduction.

### Problems of the age, geological history, and past climatic changes of the Galapagos

#### Vulcanology

Dating of lavas by palaeomagnetism, potassium-argon method, etc.

Marine sedimentary deposits

Pollen-analysis and other studies of freshwater deposits

Study of recent lava flows, especially their colonisation by plants and animals

Evolution of Galapagos soils

Studies of present climate of the Galapagos

As a basic facility for all these studies, and for others mentioned in the sections following, a good reference collection, both of animals (especially invertebrates) and plants, should be maintained at the Station. However, this depends on adequate provision for storing and maintaining the collections, and full facilities do not yet exist. Nevertheless, scientists who plan to work at the station on any particular group of animals or plants should be asked to leave at the Station, if possible, a representative collection of named material for the benefit of future workers, provided that such material can be adequately housed.

Experimental breeding in captivity (already started on a small scale) may be important. Populations concerned : Chatham, Hood, James, Abingdon ?, Narborough?

Breeding success, which should include : seasons of laying, clutch-size, hatching success (and factors affecting it), survival of young stages (and causes of death). The hatching and rearing of young in captivity and subsequent release (already started for the Duncan population) may be important.

Movements, especially : possible territorial behaviour of adults, seasonal movements in connection with feeding and breeding.

Nearly all the populations of Marine Iguanas are flourishing, and it is not considered necessary to devote research to them from the viewpoint of conservation. However, the various island populations of Land Iguanas need more attention. In particular, their status on James (where they were considered extinct until recently). Indefatigable and parts of Albemarle needs determining. (The single specimen found on Hood was probably introduced by man, but it would be worth checking whether there may be others). After the initial studies of status, it would be desirable to investigate the relationship of the Land Iguanas to their food supply, especially where the vegetation has been degraded by goats (e.g. Barrington, parts of Indefatigable); also their breeding success, and the survival of the young iguanas.

Studies of the other reptiles (snake, lava lizard and gecko) are not urgent; but the first two have become rare locally (e.g. the snake on Indefatigable) or even extinct locally (lava lizard on Charles), and special studies of their biology and ecology would be worth encouraging if a suitable worker were available.

Birds. Regular monitoring of the status of the following species should be part of the routine work of the Darwin Station :

Penguin  
Flightless Cormorant  
Albatross  
Galapagos Hawk  
Flamingo

In the case of the first three of these, periodic counts, as complete as possible, at intervals of about 5 years would be adequate. This would be feasible, although certainly not easy, and would probably be more valuable than occasional checking of parts of the population only.

In the case of the Flamingo, more detailed studies of their movements, breeding, etc....., should be undertaken as a matter of some urgency, and the effects of human interference should be investigated.

### Speciation, and adaptation to different insular environments

This is a wide field, and a few examples only can be given. Apart from the well-worked groups (Darwin's finches, reptiles, *Opuntia* spp.), the following may be mentioned :

Scalesia, Mollugo, Euphorbia, Acalypha, Borreria are perhaps the most important genera for botanical study.

The terrestrial molluscs may be the most interesting group of land invertebrates in this respect, though the insects should also be mentioned, especially the Lepidoptera which show inter-island variations that have not been studied.

There has been a good deal of work on several groups of vertebrates. Of those that have been comparatively neglected, Mimus is the most important. In vertebrates especially, studies of the micro-evolution of behaviour are likely to be very fruitful, along the lines pioneered by Curio in Darwin's finches.

Studies of the evolutionary changes associated with the feralisation of introduced domestic animals also come under this heading. Sociological and demological studies of human communities in the Galapagos should not be excluded, especially as the growth of the human population is bound to have an important bearing on the success of conservation measures.

### Special aspect of plant evolution relating to oceanic islands

Dispersal mechanisms  
Pollinating mechanisms, self-fertilisation  
Evolution of flower structure

### Plant-animal relationships

This is also a wide field, overlapping with others, but the following topics may be suggested :

Germination of seeds, dependence on passage through animal digestive tracts (Lycopersicon, perhaps others)

Pollination mechanisms (included under previous heading)

Relationships between phytophagous animals and their food supply (especially critical in the very simple Galapagos eco-systems)

Evolution of animals in association with their food plants (e.g. Pterophorid moths in association with *Scalesia* spp.)

### Adaptation of physiological cycles to climate

Of the few reproductive cycles in Galapagos animals that have been investigated, several have turned out to be of unique types. The plants have not yet been studied. The special interest of such studies derives from the fact that the islands are equatorial (no change in day-length) and are subject to an extremely erratic climate. The two obvious fields for study are :

Phenological studies of plants, and controlling factors.  
Reproductive cycles of animals, whether annual or non-annual;  
inter-island differences in cycles; climatic or other controlling factors.

### Population studies of animals

Galapagos eco-systems, especially on the smaller islands, tend to be very simple, and there has been little interference by man. The conditions are ideal for fundamental studies of the factors controlling populations, but so far no such studies have been carried out in the Galapagos.

### Evolution of subterranean faunas

Follow-up of studies already begun by Leleup

### Studies of the coastal fauna and flora, and the marine environment

a) The intertidal and near-shore zones. Many subjects need investigation, only a few of which can be listed.

Comparative studies of the marine flora, between islands and between the Galapagos and the mainland of South America.  
Effect of marine iguanas on the intertidal vegetation.  
Ecological and physiological studies of intertidal organisms.  
Evolutionary aspects, endemism, etc. of the coastal fauna,  
especially as they bear on the problem of the age and past history of the Galapagos.

b) The off-shore zone. Pelagic studies are fundamental to an understanding of the biology of the Galapagos seabirds and pinnipedes, but their pursuit hardly falls within the scope of individual workers or small teams operating from the Charles Darwin Research Station. Further advances are likely to come from oceanographic vessels working out of

FUNDACION CHARLES DARWIN PARA LAS ISLAS GALAPAGOS  
CHARLES DARWIN FOUNDATION FOR THE GALAPAGOS ISLANDS  
FONDATION CHARLES DARWIN POUR LES GALAPAGOS

Créée sous les auspices de l'Organisation des Nations-Unies pour l'Education, la Science et la Culture (UNESCO)

1, rue Ducale, BRUXELLES 1, Belgique

Président d'honneur : Sir Julian Huxley

Président : Prof. Jean Dorst, Muséum National d'Histoire Naturelle,  
55, rue de Buffon, 75-Paris 5e, France.

Vice-Président : Dr. Luis Jaramillo, Délégation permanente de la République de l'Equateur auprès de l'Unesco, Place de Fontenoy, Paris 7e, France.

Secrétaire-général : Capt. Thomas E. Barlow, Pednor Close, near Chesham, Bucks., England.

Secrétaire pour les Amériques : Dr. J. Laurens Barnard, Smithsonian Institution, U.S. National Museum, Washington, D.C. 20560, U.S.A.

Membres du Conseil exécutif : MM. Luis Ayora (Quito), Jean-G. Baer (Neuchâtel), Cristobal Bonifaz Jijon (Quito), J. Bouillon (Bruxelles), François Bourlière (Paris), Harold J. Coolidge (Washington), Kai Curry Lindahl (Stockholm), Irenäus Eibl-Eibesfeldt (Seewiesen), Peter Scott (Slimbridge), Jean-Paul Harroy (Bruxelles), S. Dillon Ripley (Washington).

Commission scientifique consultative

Président : Dr. Ira L. Wiggins (Stanford, Cal., U.S.A.)

Secrétaire-général : Dr. David Snow (Tring, England).

Buts et objectifs de la Fondation Charles Darwin pour les Galapagos (Art.2 des Statuts, Bruxelles, 23 juillet 1959).

L'Association est chargée de l'organisation et de la gestion de la Station de recherches "Charles Darwin", dont le gouvernement de la République de l'Ecuador a autorisé l'établissement dans l'archipel des Galapagos à l'occasion du centenaire de l'énoncé de la doctrine de l'évolution (1858-1958).

L'Association propose aux autorités compétentes toutes mesures propres à assurer, dans l'archipel des Galapagos et dans les mers qui l'entourent, la conservation du sol, de la flore et de la faune, et la sauvegarde de la vie sauvage et de son milieu naturel. Elle arrête le programme de recherches de la Station biologique et la charge de toutes études scientifiques en rapport avec les objets ci-dessus.

Elle recueille et gère les fonds destinés au fonctionnement de la Station et à la promotion des recherches qui y ont leur base.

L'Association veille à la diffusion, par tous moyens appropriés, du résultat des travaux de la Station et de toutes informations scientifiques relatives aux réserves naturelles.

Guayaquil, California, or even Japan. The main need is to understand the complexities of seasonal changes in the abundance and availability of food organisms, and alterations in the patterns of upwelling and circulation around the Galapagos. Limited work on these problems might be possible for a worker based at the Darwin Station, and any programme of this sort that appears realistic should be encouraged.

January, 1969.