



Submit by 21 January 2005

**DARWIN INITIATIVE APPLICATION FOR GRANT ROUND 13 COMPETITION:STAGE 2**

Please read the Guidance Notes before completing this form. Applications will be considered on the basis of information submitted on this form and you should give a full answer to each question. Please do not cross-refer to information in separate documents except where invited on this form. The space provided indicates the level of detail required. Please do not reduce the font size below 11pt or alter the paragraph spacing. Keep within word limits.

**1. Name and address of organisation**

<b>Name:</b> Royal Botanic Gardens, Kew	<b>Address:</b> Kew, Richmond, Surrey TW9 3DS
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**2. Project title (not exceeding 10 words)**

Conservation and Monitoring of Meso-American Orchids (y/Ref 337)
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**3. Project dates, duration and total Darwin Initiative Grant requested**

<b>Proposed start date: 1 June 2005</b>		<b>Duration of project: 3 years</b>			
<b>Darwin funding requested</b>	<b>Total (£)151900</b>	<b>2004/5 (£)52100</b>	<b>2005/6 (£)60200</b>	<b>2006/7 (£)39600</b>	<b>2007/8 (£)</b>

**4. Define the purpose of the project in line with the logical framework**

To develop in Costa Rica new expertise for biodiversity research and conservation of meso-American orchids: (a) Provide measures of biological diversity and establish long-term monitoring sites. (b) Develop the necessary strategies, policies and material transfer agreements (MTAs) for conservation and sustainable use of orchids (including use of genetic material, propagation and potential commercialisation). (c) Undertake a pilot study on DNA barcoding for conservation and trade surveillance. (d) Achieve high standards for research and training in orchid biology and link with global efforts to build the orchid tree-of-life. (e) Increase awareness in societal, academic, and politic sectors of the necessity of conserving the epiphytic flora. (f) Help implement CBD's Global Strategy for Plant Conservation (GSPC) and the orchid action plan of the IUCN/SSC.

**5. Principals in project. Please provide a one page CV for each of these named individuals**

Details	Project Leader	Other UK personnel (working more than 50% of their time on project)	Main project partner or co-ordinator in host country
<b>Surname</b>	Savolainen		Warner
<b>Forename (s)</b>	Vincent		Jorge
<b>Post held</b>	Plant Molecular Systematist (band F)		Director
<b>Institution</b>	Royal Botanic Gardens Kew		University of Costa Rica
<b>Department</b>	Jodrell Laboratory		Lankester Botanic Garden

**6. Has your organisation received funding under the Darwin Initiative before? If so, give details**

Kew has received 15 grants from the Darwin Initiative since 1992. We will use past experience and Darwin material in this project (e.g. teaching using 'The CBD for botanists').

**7. IF YOU ANSWERED NO TO QUESTION 6 describe briefly the aims, activities and achievements of your organisation. (Large institutions please note that this should describe your unit or department)**

**Aims (50 words)** N/A

**Activities (50 words)** N/A

**Achievements (50 words)** N/A

**8. Please list the overseas partners that will be involved in their project and explain their roles and responsibilities in the project. Describe the extent of their involvement at all stages, including project development. What steps have been taken to ensure the benefits of the project will continue despite any staff changes in these organisations? Please provide written evidence of partnerships.**

Prof Jorge Warner, Director of Lankester Botanical Garden (LBG), University of Costa Rica (UCR), is the overseas project coordinator. Prof Franco Pupulin is researcher at UCR/Lankester, orchid specialist & scientific advisor. Jorge Warner and Franco Pupulin have developed the project with Kew's partners, meeting for this purpose in April 2004; both are long-term collaborators of Kew. Other partners are also Dr Robert Dressler, orchid curator, Dr Carlos Morales, Keeper of the USJ Herbarium at UCR, Dr. P. Chavarría, who is UCR/CBD's focal point coordinator with Sistema Nacional de Áreas de Conservación (SINAC), and Mr José Joaquín Calvo, CITES Costa Rican Administrative Authority at Ministerio de Ambiente y Energía (MINAE). Dr Federico Albertazzi from the Research Institute for Cellular and Molecular Biology (CIBCM) at UCR will co-supervise the DNA barcode work. Finally, Ms S. Salazar, UCR/CBD legal advisor, will help with the material transfer agreements (MTAs).

**9. What other consultation or co-operation will take place or has taken place already with other stakeholders such as local communities? Please include details of any contact with the government not already provided.**

We have the support of Conservation NGO Tropical Science Center in Costa Rica, and its Executive Director Dr Enrique Ramirez, who will provide access and facilities to set up one of the monitoring sites at Monteverde Cloud Forest Preserve, a 10K hectares of pristine rainforest. LBG has also already signed agreements with MINAE (Costa Rican Environment Ministry Lic. Carlos Manuel Rodriguez) in order to facilitate access to Costa Rican National Parks for the survey of epiphyte diversity (see question 12). We have the support of the Charles Lankester Foundation (partner of the agreement with MINAE) who has been providing its logistic and financial support for the inventory of orchid diversity in Costa Rica's conservation areas. For DNA barcoding of orchids as proposed here, we have the full support of Drs Nelson Zamora (Tropical Studies Organization) and Jesús Ugalde (INBio, Costa Rica), and Dr John Kress (Smithsonian Institution, USA, Secretariat of the Consortium for Barcodes of Life, CBOL <http://barcoding.si.edu>), with who we will fruitfully collaborate with the aim of barcoding all biodiversity in Costa Rica in the near future. Kew chairs the Plant Working Group of CBOL to be launched in February 2004 in London.

**PROJECT DETAILS**

**10. Is this a new initiative or a development of existing work (funded through any source?) Are you aware of any other individuals/organisations carrying out similar work, or of any completed or existing Darwin Initiative projects relevant to your work? If so, please give details explaining similarities and differences and showing how results of your work will be additional to any similar work and what attempts have/will be made to co-operate with and learn lessons from such work for mutual benefits.**

Although the Charles Lankester Foundation has been supporting the work from the Lankester Botanical Garden in financing the botanical exploration of epiphytic orchid flora in Costa Rica's conservation areas, and besides the fact that Kew and LBG have been collaborating on orchid ecological and systematic research for several years, the scope of the present project goes far beyond any previous work, and, to our knowledge, is not being done by any other party (see 9 for

DNA barcoding). Several Darwin projects focus on managing plant diversity (e.g. Liberia and Peru, round 12) and one current Darwin project focuses on 'genetic forensic to reduce South Africa's illegal trade' in animals; we will link with these projects as explained under question 17.

**11. How will the project assist the host country in its implementation of the Convention on Biological Diversity? Please make reference to the relevant article(s) of the CBD thematic programmes and/or cross-cutting themes (see Annex C for list and worked example) and rank the relevance of the project to these by indicating percentages. Is any liaison proposed with the CBD national focal point in the host country? Further information about the CBD can be found on the Darwin website or CBD website.**

The project will help Costa Rica implement the CBD, by: (i) Evaluating best measures of biodiversity, through a pilot study on DNA barcodes, phylogenetic diversity and surveys and inventories of the orchid flora. DNA barcodes are short DNA sequences from a uniform part of the genome used for species-level identification (e.g. psbA-trnH/ITS genes); DNA barcodes will enable expertise to be more accessible to conservation users (e.g. IPPC, CITES authorities), potentially using handheld electronic DNA analysers. DNA barcoding could also have great implications for other species in trade and all results will be sent to the CITES Plants Committee. (art 7, 8, 9, 16, GSPC Target 3 and potentially 11). (ii) Providing a multi-site research facility for scientists and policy makers (endorsed by CBD's NCP) to work in partnership and develop new strategies for benefit-sharing associated with sustainable use of genetic resources, e.g. DNAs and micro-propagated orchids (art 10, 15, 18, GSPC Target 8 & 16). (iii) Setting up long-term monitoring sites at Coco Island (the world's largest uninhabited island), Tapanti National Park, and Tropical Science Center-Monteverde Cloud Forest Preserve, for reporting changes in biodiversity (art 7, GSPC Target 7) (iv) Duplicate (by digital scanning) at UCR the Lankester's orchid herbarium and all Meso-American orchid type specimens that are only held at Kew, thereby overcoming a significant taxonomic impediment for local orchid botanist and facilitating access to systematic, ecological and biogeographical information by Costa Rican scientists and others working on Meso-American biodiversity conservation (art 17). (v) Training existing staff, a new generation of conservationists and the general public in biodiversity issues (art 12,13, GSPC Targets 14 & 15). Due to the interdisciplinary nature of this project, it supports many areas of the CBD: articles 7 (5%), 8 (5%), 9 (5%), 10 (5%), 12 (10%), 13 (5%), 15 (5%), 17 (5%), 18 (5%), with particular emphasis on Access and Benefit sharing (10%), GSPC (20%; targets 3, 8, 11, 14, 15, 16), Indicators (10%), and Sustainable use and biodiversity (10%) themes. It also fits into the framework of the 2010 Biodiversity Target, particularly addressing focal area (a) (i-iii) and indicators (trends in extent of selected habitats; trends in abundance/distribution of selected species), and focal area (b) on sustainable use.

**12. How does the work meet a clearly identifiable biodiversity need or priority defined by the host country? Please indicate how this work will fit in with National Biodiversity Strategies or Environmental Action Plans, if applicable.**

In Costa Rica, MINAE is the legal authority for biodiversity, and more specifically SINAC has responsibility for conserving and promoting the sustainable use of biodiversity. In its second National CBD report, MINAE-SINAC explain that they have entered the first stage of biodiversity inventory and highlight the need for training, surveys at the genetic level and increased focus on large taxonomic groups. UCR and INBio are designated institutes to work within these avenues. MINAE has also developed with UCR/LBG an Agreement of Cooperation whereby LBG is in charge of documenting and helping conserve the orchid flora (agreement annexed to this project); Costa Rica has one of the world's richest orchid floras, with >1,300 orchid species. By working closely with UCR/LBG and in collaboration with INBio, our project provides the necessary support and expertise to help these institutes fulfil their CBD targets as agreed with MINAE/SINAC.

**13. If relevant, please explain how the work will contribute to sustainable livelihoods in the host country.**

In addition to hiring a scientist in Costa Rica for 3 years (for collecting, monitoring, MTA development and training), who will subsequently become a permanent member of staff at UCR, the project will train a new generation of multidisciplinary and modern conservationists. Costa Rica has ca 20% of its territory under a national park system; we believe that our project will help to further evaluate these fantastic resources. Our research might lead to identify new areas that need conservation status and directly benefit land-owners and local inhabitants, e.g. via eco-tourism.

**14. What will be the impact of the work, and how will this be achieved? Please include details of how the results of the project will be disseminated and put into effect to achieve this impact.**

Three long-term monitoring sites will help meet the CBD targets of reporting on the rate of biodiversity loss by 2010, and after. These permanent plots, to be set up in some of the most famous and pristine areas of the world, will be the subject of detailed field studies but also with new cutting-edge conservation and wildlife forensic tools such as DNA barcoding. One of the first electronic field guides, with images (some deriving from digitalised herbarium specimens) and DNA barcode identification, will be produced with the aim of facilitating trade surveillance and conservation assessments. Other high-profile scientific papers will be reporting on the research to be done along the project, and scientific outcomes will be linked to policy-making via intersectorial workshops with all stakeholders (academics, governmental and private). Culminating in the organisation of the World Orchid Conservation Conference in 2007 by project partners, our work will set high standards for a modern and sustainable approach to the conservation of the tropical epiphytic flora.

**15. How will the work leave a lasting legacy in the host country or region?**

Governmental Conservation and Environmental authorities (MINAE) are partners in the project and have endorsed its outputs and outcomes as key components of the national efforts to implement the CBD. The training activities and networking opportunities will enable Costa Rican partners to continue with all aspects of this project, including species monitoring and DNA barcoding: a new facility will be staffed and up & running at Lankester. UCR has also committed itself to work closely with MINAE and Kew to develop MTAs (including model agreements to deal with potential propagation/commercialisation) and an overall CBD implementation strategy.

**16. Please give details of a clear exit strategy and state what steps have been taken to identify and address potential problems in achieving impact and legacy.**

All stakeholders have already committed themselves to work together towards the project goals; all expertise is present among partners and collaborators but what is now needed is to coordinate actions and transfer knowledge. Should some partners not be able to perform their job (e.g. resignation, health, etc), deputies have already been designated (e.g. M. Powell and F. Pupulin are deputy leaders). The CBD researcher in Costa Rica will be permanently hired at LBG/UCR after the Darwin funding period to ensure the continuity of the work.

**17. How will the project be advertised as a Darwin project and in what ways would the Darwin name and logo be used?**

The Darwin Initiative will be duly acknowledged in all project publications, and the Darwin logo will be used in newsletters, the orchid e-field guide, and relevant UCR and Kew & JBL's web pages, along with links to the Darwin website. We will also organise a Darwin Project stand at the World Orchid Conservation Conference (San José 03/07), to be well publicised in the media, and where we will invite all recipients of Darwin projects relevant to the conservation of the epiphytic flora and forensic to join us, including for a Darwin poster and press release; another exhibition will be organised in Lankester in 03/08. Finally, we will establish a permanent monitoring plot on Coco Island for the CBD 2010/GSPC targets; since this uninhabited island has been made famous with the filming of the 'Jurassic Park' movies, it is likely that this will help publicise even more the present Darwin project.

**18. Will the project include training and development? Please indicate who the trainees will be and criteria for selection and that the level and content of training will be. How many will be involved, and from which countries? How will you measure the effectiveness of the training and will those trained then be able to train others? Where appropriate give the length and dates (if known) of any training course. How will trainee outcomes be monitored after the end of the training?**

Costa Rican partners will attend 24 person-weeks worth of training at intersectorial workshops. At least 45 university students will receive 2 weeks training. Training will focus on CBD, CITES, biodiversity monitoring, biotechnology for conservation, and orchid taxonomy; these new courses will be evaluated and integrated in the curriculum of UCR. A panel comprising project leader and 2 partners will review CVs and letters of motivation from applicants. Short written/oral tests will monitor training at the end of courses. 1 Costa Rican Project Implementation Officer will be based at Lankester Garden but trained both at Kew and in Costa Rica for 3 years, and subsequently train others. One person at Kew for 2 years will assist with the project, incl herbarium digitalisation and DNA work, but he/she will also receive training in plant conservation.

## LOGICAL FRAMEWORK

19. Please enter the details of your project onto the matrix using the note at Annex B of the Guidance Note. This should not have substantially changed from the Logical Framework submitted with your Stage 1 application. Please highlight any changes.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
<b>Goal:</b> <b>To draw on expertise relevant to biodiversity from within the United Kingdom to work with local partners in countries rich in biodiversity but poor in resources to achieve</b> <ul style="list-style-type: none"> <li>• the conservation of biological diversity,</li> <li>• the sustainable use of its components, and</li> <li>• the fair and equitable sharing of benefits arising out of the utilisation of genetic resources</li> </ul>			
<b>Purpose</b> To create in Costa Rica a multi-site expert centre for biodiversity research and conservation on meso-American orchids by: (a) establishing long-term monitoring sites for CBD 2010 targets & GSPC, (b) increasing capacity building in 6 overseas biodiversity institutes, (c) developing material transfer agreements and new conservation strategies for the epiphytic orchid flora.	1. Research and training activities in partnership with public and private sectors increase 2. In-country strategy and CBD policies in place; MTA in use; 2010 targets monitored 3. Collections & DNA barcodes used for taxonomy and forensics 4. Awareness of biodiversity issues increase	1. Joint supervision and research documents and correspondence between Lankester, UCR, MINAE, NGOs & RBG Kew 2. MTA, conservation & CBD documents updated @ MINAE 3. Records of requests and visits to collections 4. Records of visits & participation by public to conservation activities	Strategies developed throughout the project are of high quality and are in demand by wider scientific and nature conservation authorities Joint programme of activities has proven useful and partnership continues Public interest in conservation, especially of orchids, continues to be high enough to support in-country biodiversity initiatives & reserves
<b>Outputs</b> 1. Staff & students trained 2. Habitat/spp assessments and monitoring plots 3. Publications 4. Species/DNA reference collections & DNA barcodes established/enhanced 5. Dissemination 6. Meso-American orchid network enhanced 7. New research & education facility @ UCR	1. 2(1) training weeks to 15 students & 8 staff p.a. 2. Coco & Tapanti plots & orchids assessed 3. e-field guide + 4 papers accepted 4. DNAs orchid (600), ex situ collection (ca 1/2 of orchid flora) & herbarium available for use 5. Conference organised + 3 workshops + 4 press releases 6. Network activities increase 7. Facility running	1. Attendees lists 2. Conservation assessments documents 3. Correspondence 4. DNAs duplicated according to MTA & online databases @ Lankester 5. Registration and attendees lists, press 6. Correspondence & joint documents from partners 7. Annual reports from Lankester & other partners	There is a broad interest from staff, researchers and students for training and networking in orchid biology, biodiversity and conservation, and to attend conference and workshops Material produced is of good quality & accepted for publication Collecting permits are issued by MINAE Lankester Garden's statutory mission continues to be supported by UCR
<b>Activities</b> 1. Specific training 2. Assessing conservation status 3. Collecting 4. Setting up policies and strategies for in and ex situ orchid conservation and sustainable use (incl MTA & CBD 2010) 5. Research & education networking	Yr1: MoU (07/05); Conserv assessment Tapanti (02/06); Univ training (11/05); 200 orchid spp collected (04/06); web site launched (03/06); staff hired (08/05). Yr2: Workshop (02/06); Conserv assessment Coco/Monteverde (03-04/06); Training (11/06); orchid pollination work and re-assess Tapanti (03/07); 200 spp collected (04/07); DNA barcoding (07/06). Yr3: International Orchid Conservation Congress (03/07); Conservation re-assessments (04/07); training (11/07); Collect 200 spp (03/08); global conservation strategy (02/08); e-field guide (02/08); exhibition (03/08)		

20. Provide a project implementation timetable that shows the key milestones in project activities.

Project implementation timetable			
Date	Financial year	Key milestones	
2005/Jun	Apr-Mar 2005/6	Project launch	
2005/Jul		Workshop at K, MoU set up & signed by Kew and UCR	
2005/Aug		New staff hired at Kew and UCR	
2005/Oct		1 international press release (Kew)	
2005/Nov		15 students receive training in orchid/conservation	
2006/Jan		Conservation assessment at Tapanti Natl Park	
2006/Jan		Intersectorial CBD Workshop at UCR (DNA Barcodes)	
2006/Jan		Project website launched	
2006/Jan		1 press release (Costa Rica)	
2006/Jan		Apr-Mar 2006/7	At least 200 orchid species samples collected
2006/Jan			MTAs in place
2006/Jan			Conservation Assessment at Coco Isl and Monteverde
2006/Jan			1 international conference attended
2006/Jan	200 DNA barcodes produced		
2006/Jan	15 students receive training in orchid/conservation		
2006/Jan	2 scientific papers submitted		
2006/Jan	CBD Workshop at Lankester: Field Long-term Monitoring		
2006/Jan	3 <sup>rd</sup> World Orchid Conservation Conference organised		
2006/Jan	1 press release (Costa Rica)		
2006/Jan	Apr-Mar 2007/8	Kew's and Lankester's and Meso-American Orchids Herbaria digitalised and duplicated at USJ and Lankester	
2006/Jan		At least 200 orchid species samples collected	
2006/Jan		Monitoring sites reassessed (Coco, Tapanti, Montever.)	
2006/Jan		1 international conference attended	
2006/Jan		200 DNA barcodes produced	
2006/Jan		15 students receive training in orchid/conservation	
2006/Jan		2 scientific papers submitted	
2006/Jan		Monitoring sites analysed for CBD 2010 targets and new measures for reporting on the rates of biodiversity loss established; 'Costa Rican response to the GSPC' prepared	
2006/Jan		At least 200 orchid species samples collected, barcodes	
2006/Jan		Orchid e-field guide published (web-accessible database for species identification, plus DNA barcodes for lab identification)	
2006/Jan		Intersectorial CBD Workshop at UCR: Measuring biodiversity loss	
2006/Jan		MSc viva on orchid ecology/conservation at UCR	
2006/Jan		Orchid Conservation exhibition at Lankester	
2006/Jan	Darwin Project Officer hired permanently at UCR		
2006/Jan	1 press release; scientific papers published or accepted		
2006/Jan	Orchid Research, Education, Conservation and Forensic Facility in use at Lankester		

**21. Set out the project's measurable outputs using the separate list of output measures.**

<b>PROJECT OUTPUTS</b>		
<b>Year/Month</b>	<b>Standard output number (see standard output list)</b>	<b>Description (include numbers of people involved, publications produced, days/weeks etc.)</b>
2008/Mar	2	1 MSc at UCR on orchid ecology & conservation
2005-6-7/Nov	4A/B	10 undergrads for 2 weeks per year (UCR)
2005-6-7/Nov	4C/D	5 postgrads for 2 wks per year (orchid course)
2008/Mar	5	1 CBD Project Officer for 3 years
2008/Mar	6A/B	8 staff receive 3x1 wks training (CBD/barcodes)
2006/Oct	7	2 (barcodes; GSPC monitoring)
2006-7-8/Feb-Apr	8	27 person weeks
2006-7-8/Feb-Apr	9	6 (Coco Island, Tapanti, Monteverde; + all 3 sites reassessed)
2008/Feb	10	1 orchid e-field guide
2006-7/Dec	11A/B	At least 2 papers published and 2 submitted in high profile journals (impact factor > 2)
2008/Mar	12A	2 (monitoring; barcodes)
2008/Mar	12B	1 (Kew's <a href="http://www.rbgekew.org.uk/data/dnaBank">www.rbgekew.org.uk/data/dnaBank</a> )
2008/Mar	13A	3 (plots; DNAs; Lankester Living Collection)
2008/Mar	13B	3 (USJ @ UCR, and Kew DNA bank & Herbaria)
2007/Mar	14A	International Orchid Conservation Congress (IOCC 3, Costa Rica)
2006-7/Jun	14B	2 International Conferences, COP8 in Brazil
2006-7-8/Mar	15A/B	3 (Epidendrum, Lankesteriana)
2005/Oct	15C	1 (Kew Scientist)
2008/Mar	17A	1 (Costa Rica orchid conservation & monitoring)
2008/Mar	17B	1 (BCOL, <a href="http://www.barcodinglife.org">www.barcodinglife.org</a> )
2007/Mar	18/19	Wide media coverage of International Orchid Conservation Congress
2008/Mar	20	£2500
2008/Mar	21	1, 'Orchid Research, Education, Conservation and Forensic Facility' at Lankester Bot Garden
2008/Mar	22	3 (Coco Island, Tapanti, Monteverde)
2008/Mar	23	>£1m, IOCC, BCOL & Moore Foundation

**MONITORING AND EVALUATION**

**22. Describe, referring to the Indicators in the Logical Framework, how the progress of the project will be monitored and evaluated, including towards delivery of its outputs and in terms of achieving its overall purpose. This should be during the lifetime of the project and at its conclusion. Please include information on how host country partners will be included in the monitoring and evaluation.**

A monitoring web site will be jointly set up for the project by Kew and UCR/Lankester and all following figures will be updated quarterly against the targets of the project; actions will be taken if targets are not met:

- (a) Number of students and staff trained, university degrees attained.
- (b) Species collected and voucher reference collections made, herbarium vouchers scanned;
- (c) Habitat assessments made and monitoring plots set up;
- (d) Publications in preparation, submitted and published; progress on MTA and e-field guide;
- (e) DNAs extracted and number of DNA barcodes produced;
- (f) Report produced and press releases;
- (g) Workshops organised, Number of visitors to facility.

Partners will also exchange e-bulletin on a monthly-basis and have regular informal telephone meetings to discuss and review progress.