



DARWIN INITIATIVE

APPLICATION FOR DARWIN SCHOLARSHIP PROGRAMME 2003

Please read the Guidance Notes before completing this form. Give a full answer to each section; applications will be considered on the basis of information submitted on this form. Please note the additional information requirements (CVs and letters of support as detailed in the Guidance for Applicants)

Submit by 22 April 2003

1. Contact Details

<i>Ref. (Defra/ECTF only):</i>
Name and address of UK applicant organisation Professor Michael W. Bruford, School of Biosciences, Cardiff University, PO Box 915, Cathays Park, Cardiff CF10 3TL

2. Darwin Scholar. A one page CV must be enclosed.

Name and official address of proposed Darwin Scholar Mireille Johnson-Bawe, Assistant Ingénieur de Recherche, Unité de Génétique des Ecosystèmes Tropicaux, Centre International de Recherches Médicales de Franceville (CIRMF), Gabon. CV attached.
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3. Project summary (no more than 100 words)

The Darwin Scholar will undertake the first region-wide population genetic study of forest elephants (<i>Loxodonta africana cyclotis</i>), a keystone species of Afrotropical rain forests. The status of forest elephant populations is unclear, with little information available on genetic structure. Experience gained during the Darwin grant will be adapted with the Scholar creating a genetic database, permitting analyses of genetic diversity throughout the region, and identifying potentially threatened or isolated populations. This support will provide training in the development, management and evaluation of scientific projects, in addition to consolidating Gabon's capacity in conservation genetics and molecular ecology of its tropical ecosystem.
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4. Principals in Project. Please give the details of the individuals from the UK host organisations who would be directly involved in supervising/working with the Darwin Scholar. A 1 page CV on each must be enclosed.

Details	Main UK expert	Other UK expert	Other UK expert	Other UK expert
Surname	Bruford	Goossens		
Forename(s)	Michael William	Benoît Robert Marie		

Post held	Professor	Research Associate		
Institution (if different to above)				
Department	Biosciences	Biosciences		
Telephone				
Fax				
Email				

5. Describe briefly the aims, activities and achievements of the UK applicant organisation. (Large institutions please note that this should describe your unit or department)

AIMS: The aim of the Biodiversity and Ecological Processes Group (BEPG) is to carry out innovative, fundamental research into the processes which drive changes in biodiversity, both of an anthropogenic nature and as a result of natural evolution. The aim of our department is to achieve excellence in research and teaching across a range of disciplines within the biological sciences.

ACTIVITIES: Cutting-edge international research and teaching. BEPG has research strengths in global change biology, aquatic conservation, pest management and conservation genetics. Degree schemes in Biology, Ecology and Ecosystems Management are among those offered by the School of Biosciences, which comprises 90 faculty members. Professor Bruford serves as Head of the BEPG (19 faculty).

ACHIEVEMENTS: Cardiff University is a member of the Russell Group of universities and was ranked overall 7th in the 2001 Research Assessment Exercise, where Biosciences submissions were graded 4 and 5. Teaching is graded 'excellent' in over 20 subjects including biology. In 2001/2, Biosciences was awarded over £13 million and is the highest earning department within the University.

6. Describe briefly the aims, activities and achievements of the proposed Darwin Scholar's organisation. (Large institutions please note that this should describe your unit or department)

The Centre International de Recherches Médicales de Franceville (CIRMF) created the Unit of Genetics of Tropical Ecosystems (UGENET) in 1995 in response to an increased demand within Gabon (and the Central African region) for molecular genetic studies aimed at documenting the huge biodiversity found within the tropical rain-forests which cover over 80% of the country's surface. Work to date has focused on range-wide studies of genetic variability of key species, such as western lowland gorillas, mandrills and the colonising tree species, Okoumé. Ongoing work includes studies on mandrill and forest elephant population genetics, duiker distribution, studies of simian retrovirus transmission. The methodology developed within the laboratory focuses on techniques suitable for dealing with minute amounts of DNA extracted from non-invasively collected samples, such as hair and faeces. The facilities available at CIRMF are the only molecular ecology laboratories within the Central African tropical region, and we are ideally placed for conducting range-wide studies of fauna and flora across international boundaries recognised politically but not biologically, having invested heavily in developing a network of collaborations with conservation organisations and field ecologists throughout the region. The unit has an on-site international team of graduate and doctoral scientists with a commitment to identifying and training Gabonese students capable of attaining higher academic qualifications in biodiversity and conservation.

7. Describe briefly the proposed Darwin Scholar's current role within their organisation.

During the three years of the Darwin Initiative collaboration with Cardiff University, MJB received training in population genetic analyses of DNA variability (molecular techniques and data analysis) which were then, where appropriate, transferred to Gabon. She applied this training to faecal and hair samples collected from western lowland gorillas throughout their range, determining genetic variability in the mitochondrial and nuclear genome. In addition to her scientific activities, which now include collating the collection of elephant faecal material arriving from different sites across Central Africa, and the extraction of DNA from these samples, MJB is responsible for the day-to-day management of laboratory stocks, specifically those reagents and material shipped from Europe, which require long-term planning. Within the framework of the forest elephant population genetics study, MJB is the researcher designated to extract and analyse DNA from all incoming faecal samples, maintain a data base of animal origins and genetic results and liaise with scientists working at individual sites on the interpretation of the data. This project will take three or four years to complete.

8. Provide a concept note on the Darwin Scholarship. This should include:

- a clear outline of the aim and objectives of the Scholarship
- the programme of work, including key milestones through the duration of the Scholarship and their timing
- the role of the UK applicant organisation, and others where relevant (including contacts)
- where appropriate, how the Scholarships will contribute towards sustainable development or sustainable livelihoods

The scholarship will be aimed to consolidate the Darwin Initiative grant 162/08/044, which allowed us to identify and train a Gabonese research technician in laboratory techniques, aimed at identifying genetic differences between populations of western lowland gorillas throughout their range and specifically within Gabon. The same problems which confront gorillas affect forest elephant populations – poaching, habitat destruction and a lack of socio-ecological information on this cryptic subspecies. The Darwin scholar will develop a research programme in this area.

Gabon's extensive rain forests still harbour important populations of large mammals, and elephants contribute significantly to the maintenance of the forest ecosystem, modifying structure and dispersing seeds. The loss of significant numbers of elephants is likely to be detrimental to the ecosystem's integrity. Although large tracts of Gabonese forests are under logging concessions, sustainable forestry exploitation practices are being instigated, and a major effort is underway to create a network of thirteen national parks, which would encompass 11% of the country's area over the next two years. This presidential initiative shows Gabon's commitment to maintaining and protecting its biodiversity, and it is within this framework that CIRMF has committed resources to a conservation genetics laboratory, the only one of its kind within Central Africa. Environmental factors are implicitly linked to public health, as the emergence of HIV and Ebola within this area have so dramatically demonstrated.

The research unit at CIRMF, in conjunction with the University of Cardiff and other institutions, has high potential to develop conservation genetics activities within the central African tropical rainforest biome. An extensive network of field ecologists and conservation organisations has identified the need for such a regional facility, rather than exporting samples to northern laboratories, and provides invaluable logistical support in the collection and shipping of samples to Franceville. In order to consolidate the position of the Darwin technician, an additional period of collaboration would serve to carry out in-depth training in the theory, as well as the practice of conservation genetics, in reinforcing the links between field and laboratory, and in integrating the Scholar as a recognised expert within the conservation community.

In conjunction with National Parks programme, extensive census and sampling surveys are planned which will allow us to collect biological material from several mammalian species, including elephants. Faecal sampling will be possible in different forest types (logged and unlogged forest, savannah-forest mosaics, inundated forest, coastal forest), which we predict would influence distribution patterns and social organisation. Extensive sampling will reveal potentially isolated populations and identify physical barriers affecting gene flow. Current work in the research facility aims at mapping gene flow in different key forest species (mammals such as gorillas and mandrills, and flora) to identify factors (e. g. geographic features, historical climate changes) affecting current species' distributions. Analysis of elephant populations is important in this approach as initial ranging studies have indicated they can travel long distances, in contrast to more territorial species, and hence fewer physical barriers to gene flow may be identified. It is important to quantify the genetic differences between savannah and forest subspecies for the clarification of taxonomic status, in the understanding of potential hybridisation and the existence of different morphological types (specifically the pygmy elephant). The proposed genetic analysis using methodology compatible with that existing in the elephant literature, will contribute to a continent-wide genetic data base.

Over 200 samples are currently available for analysis, from 6 regions of Gabon, and sampling throughout Gabon should be completed by the end of 2003. Sampling is underway at an additional 7 sites in central Africa. Extraction of DNA and preliminary analyses determining the quality of material extracted, are underway. Mitochondrial DNA analysis will be carried out in Gabon. High throughput, high technology microsatellite analysis of samples for the determination of nuclear polymorphisms will be carried out in Cardiff. The Darwin Scholar will work in Cardiff for 8 months (October 2003 – May 2004), and will also attend university courses on conservation biology and molecular ecology, in order to obtain a solid background in these principles. The UK expert applicants will work in close collaboration with MJB throughout, and after her visit to Cardiff will reciprocate and provide support and training in Gabon during the third quarter of 2004. By the end of the 12 months corresponding to the scholarship, sufficient data will be available for phylogenetic and phylogeographic analysis to answer questions on gene flow and habitat influence.

9. Legacy. Provide information on how the Darwin Scholar will utilise, promote and disseminate the benefits of the Scholarship on return to his/her home country. Will a strategy be developed during the Scholarship to ensure this is achieved?

There are a number of legacies that the training of MJB will result in:

1. MJB will be responsible for training Gabonese students and technical personnel in UGENET and in doing so she will use the techniques learned during the project. She will also be the key staff member responsible for laboratory management, providing long-term continuity to the functioning of the laboratory.

2. MJB will develop her own research project on forest elephant population genetics. The elephant project will continue after the scholarship since the Scholar, in collaboration with UGENET and the host applicants, will apply for further funding from organisations such as US Fish and Wildlife Service and may register for a postgraduate degree.

During the Scholarship, MJB will be given the theoretical background underpinning the techniques she learned during the previous Darwin project as a technician and thus will be able to develop her own research project. The knowledge thus acquired will also improve her teaching skills.

MJB will also learn new laboratory and analytical techniques and put them in place in CIRMF. All techniques will be established by the end of the scholarship.

10. How will the Scholarship assist the Scholar's organisation and/or local communities and/or home country in working towards the objectives (or implementation) of the Convention on Biological Diversity? References to the Convention should be specific, for example, by referring to articles, cross-cutting or thematic issues¹.

The programme (both the previous project and the proposed scholarship) has proved key in helping Gabon fulfil its obligations under the Convention. In particular, the proposed project will assist in the following articles:

Article 7: Identification and monitoring of key species; Article 12: Research and training; Article 15: access to genetic resources – development of centralised facility for the Central African basin; Article 16: Access to and transfer of technology – north/south and within the region (for example between CIRMF and the local university); Article 18: Technical and scientific cooperation between partners – human resource development and institution building.

The cross-cutting issues in this proposal are several but chiefly they revolve around an integrated approach to characterising diversity in forest ecosystems for a number of species (we have worked on gorillas, mandrills, okoumé, elephants, bush pigs and duiker). The technology is generic and interactions with other disciplines entirely normal.

11. What collaboration has there been with the Darwin Scholar to date in developing the proposal, and what collaboration is planned for the duration of the Scholarship? Where relevant, describe any consultation or collaboration by the proposed Scholar within his/her own country.

The scholar's home and host institution have been seeking funding for this study for the previous 12 months, and the scholar has been identified as a key element in the development and implication of this work. International funding organisations and NGOs (eg US Fish and Wildlife Service, IUCN, ECOFAC - email attached, Wildlife Conservation Society - letter attached, WWF) increasingly recognise the necessity of involving trained in-country personnel.

For the type of work envisaged in this and other planned work, the participation of national scientists is essential. The Darwin scholar is working under the aegis of the Gabonese Ministry of Forest Economy (letter attached), and in consultation with other national research stations (IRET, Makokou, CENAREST, Libreville). WCS Gabon has promised logistical support ensuring the collection and shipment of samples.

12. Provide details of the Darwin Initiative project that the proposed Scholar was involved in, including his/her role in that project and any ongoing involvement.

¹ Refer to the Guidance Notes for Applicants for sources of further information

The Darwin Initiative grant which employed MJB was 162/08/044 (finished November 2002 - Final Report currently in review). The project, among other objectives, allowed us to identify and train a Gabonese research technician in laboratory techniques, aimed at identifying genetic differences between populations of western lowland gorillas throughout their range and specifically within Gabon.

During the project, in the laboratory she learned techniques to allow DNA extraction from degraded gorilla (Gorilla gorilla gorilla) faecal and shed hair samples from the field; microsatellite and mitochondrial DNA genotyping, cloning and sequencing using automated sequencers and analytical skills such as phylogenetics, population genetic and individualisation.

In addition to these core skills, she presented talks (for example at the Primate Society of Great Britain) with great clarity in her second language, learned laboratory administration and management and as previously mentioned, became essentially fluent in English.

13. Duration of the Scholarship: what is the intended start and finish date.

1st October 2003 - 30th September 2004

14. Where will the Darwin Scholar be based? Please be specific with organisational details and dates (where more than one location).

From October - May 2004 MJB will be based in Cardiff University, UK for microsatellite (laboratory) analysis, training in analytical methods and participation in MJB's final year undergraduate courses in conservation biology and molecular ecology;

From June - September 2004 MJB will be based in CIRMF, Gabon for mitochondrial DNA analysis to be carried out and further instruction on phylogenetics.

In addition, while in Gabon MJB will promote and disseminate the techniques she has learned and she will develop her research project on forest elephant population genetics.

15. Financial Aspects.

Scholar payment		
London: £1200/month	Number of months 0	Total £0.00
UK (outside London): £1000/month	Number of months	Total £
Overseas location £200.00/month*	Number of months	Total £
Host Organisations' costs		
UK: £200/month	Number of months	Total £
Overseas location: £500.00/month*	Number of months	Total £
A. Total Scholar & Host Organisation Costs		£

* Figures available from Darwin at darwin@defra.gsi.gov.uk

Actual travel costs	
Return airfare. <i>Details</i> Libreville - London return	£
Travel to/from airports. <i>Details</i> Franceville - Libreville and Cardiff - London	£
Visas etc. <i>Details</i> UK visa	£
B. Total Scholarship Travel Costs (Actual costs up to £2000 will be paid)	£

TOTAL SCHOLARSHIP COSTS (A + B)	£
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16. Other sources of funding: provide details and amounts

1) Small grant from the Royal Society of £9,930 towards sample extraction reagents and consumables. 2) WCS Gabon will provide additional aid with sample collection and transport (see letter) - estimated value \$XX. 3) CIRMF will provide laboratory facilities and logistical support.
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FCO NOTIFICATION

Please check the box if you think that there are sensitivities that the Foreign and Commonwealth Office will need to be aware of should they want to publicise details of the Darwin Scholarship and the resultant work in the UK or the Darwin Scholar's home country



Field Code Changed

CERTIFICATION

I certify that, to the best of our knowledge and belief, the statements made by us in this application are true and the information provided is correct. I am aware that this application form will form the basis of the project schedule should this application be successful.

I enclose a copy of the organisation's most recent audited accounts and annual report, CVs for project principals and letters of support.

Name (block capitals)	
Position in the organisation	

Signed

Date:

Please return completed form to The Edinburgh Centre for Tropical Forests (ECTF) by **22 April 2003** by e-mail to stefanie.halfmann@ed.ac.uk

Where it is not possible to send the full application in electronic form (for example if signed references are not available electronically), a hard copy of the full application should also be sent to ECTF, Darwin Monitoring & Evaluation Project, Stefanie Halfmann, John Muir Building, Kings Buildings, University of Edinburgh, Mayfield Rd, Edinburgh EH9 3JK.