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**Introduction**

Gabon is an important centre of tropical diversity with substantial tracts of closed canopy forest still remaining. These forests are among the most diverse in Africa with a rich assortment of endemic plants. Gabon is also a stronghold for some of the largest viable populations of large mammals remaining including western lowland gorillas, chimpanzees and forest elephants.

With the decline in the oil industry, Gabon's forests and their associated fauna are increasingly under threat from logging pressure and hunting. Gabon has few resources with which to plan conservation measures and monitor their impact. Furthermore, there is a considerable lack of national expertise in the domains of applied ecology and conservation. Research and training opportunities are also limited.

**Principal objectives**

Develop a sustainable program in conservation education at the national science university

Enhance capacity in applied conservation research through a network of collaborative institutions in the UK and Gabon

Implement a collaborative research program with practical scientific results applicable to the long-term conservation of western lowland gorillas

**Un nouveau cours ouvert à tous à l'USTM sur: LA DIVERSITÉ BIOLOGIQUE ET SA CONSERVATION**



Un projet en collaboration entre le Centre International de Recherches Médicales à Franceville, L'Université de Cardiff, et l'USTM

**Collaborating institutions**

School of Biosciences, Cardiff University, Wales (Research development, training and teaching)

Centre International de Recherches Médicales Franceville, Gabon (Technology transfer, research and training)

Station d'Etudes des Gorilles et des Chimpanzés, Lopé Reserve, Gabon (Research, teaching and field work)

Wildlife Conservation Society (Sample collection, teaching and field workshops)



The Centre International de Recherches Médicales, Franceville

**Conservation education:**

Establishment of a university module in conservation biology and integration of this course into the national university curriculum

Provision of research and training opportunities for students and USTM faculty during the summer vacation at CIRMF and also in Cardiff

Organisation and instruction of field courses in basic ecological/field survey techniques at the Lopé Reserve, Central Gabon.



*La "Biodiversité et sa conservation"*

An 8 week series of lectures, directed exercises and guest speakers

**Course contents included:**

Defining and measuring diversity  
Evolutionary biology and genetics  
Population ecology and demography  
Causes and processes of extinction  
Management applications



*Field course at the Lopé Reserve*

A week long course on basic principles of field ecology

Direct and indirect data  
Sampling and identification  
Estimating abundance  
Using navigation systems  
Radiotelemetry  
Faecal analysis and tracking

**Training and technology transfer**

Development of a non-invasive strategy for sampling DNA from gorilla hair and faeces

Identification and optimisation of mitochondrial and nuclear hypervariable microsatellite markers for population level analyses

Visualisation of DNA polymorphisms

silver staining  
fluorescent technology  
SSCP/RFLP analysis



**Technology transfer**

Intensive training of full time Gabonese research specialist  
Transfer of course materials and laboratory techniques to three USTM professors  
Three student internships in molecular ecology (lab and field techniques) at CIRMF

**Experimental approaches**

Genetic studies of threatened and endangered species in the wild need to use a non-invasive source of genetic material. In the present study, we have developed successful protocols for the amplification of mitochondrial and nuclear DNA markers from shed hairs and fresh faeces.



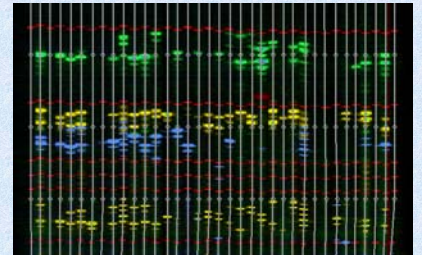
A fresh gorilla nest



Faecal collection at the Lopé

**Conservation research: Molecular ecology and conservation of gorillas:**

Local: group size, composition, relatedness, dispersal  
Regional: population structure, population dynamics  
Continental: population history, biogeographical history

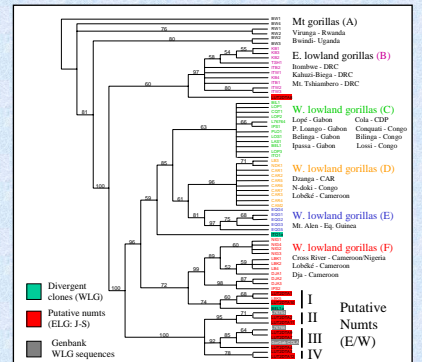


Microsatellite variation in gorillas

**Molecular markers**

**Mitochondrial DNA:** Sequence analysis of the hypervariable domain of the mitochondrial control region.

**Human microsatellite loci:** Co-amplification of seven polymorphic loci and a molecular sex locus

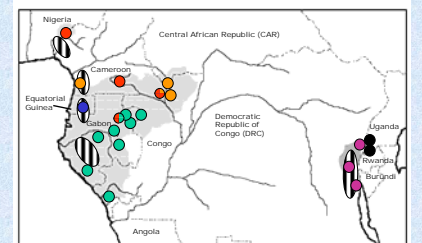


Three subspecies are traditionally recognised: *Gorilla gorilla gorilla* (western lowland); *G. g. graueri* (eastern lowland) and *G. g. beringei* (mountain). Phylogenetic analysis of mitochondrial control region variation across the current range of all three subspecies indicates:

western lowland gorillas are genetically diverse  
exhibit considerable geographic substructure  
haplogroups are predominantly reciprocally monophyletic  
four geographically distinct haplogroups can be identified:

- Gabon and adjacent Congo (C)
- Central African Republic (D)
- Equatorial Guinea (E)
- Eastern Nigeria, central and south-eastern Cameroon (F)

Gorilla population genetic structure and the localisation of Pleistocene forest refuges: allopatric fragmentation and population expansion?



**Implications for the present study**

Understanding population genetic structure and patterns of gene flow at different spatial scales is essential to the formulation of an effective conservation management strategy.

**At the local scale:** in collaboration with Kathryn Jeffery, a fine scale genetic analysis of patterns of relatedness within social groups will provide novel insights into group size, ranging behaviour and individual patterns of dispersal.

**At the regional scale:** a cross-section of genetic variability across the Gabon will give us a regional profile of population structure and gene flow at intermediate geographic scales.

**At the continental scale:** Examining geographic patterns of genetic variability in wild populations will allow us to interpret biogeographical history and identify potential management units for conservation. Results from this study will also contribute to an international action plan for western lowland gorilla conservation.