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Low Wall High Impact: Crisis Management in Virunga National Park

Infanticides by a Silverback in Kahuzi-Biega

Zoonotic Diseases Shared by Gorillas and Humans

Gorilla mtDNA – Sequences Unravelled and Secrets Revealed

BERGGORILLA & REGENWALD DIREKTHILFE

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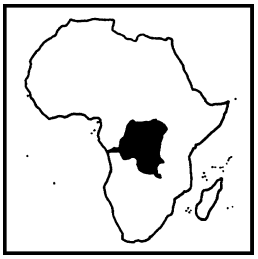

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Galit Zangwill was a tour guide and worked mostly in Israel and Jordan. She left to join LAGA and was its assistant manager in Cameroon.

Kahuzi-Biega and the "14-day War"

Bukavu, July 5th, 2004. The Tshivanga Station was looted after the recent conflict, the so-called "third liberation", which swept Bukavu and its surroundings from May 26th to June 9th. On June 2nd, Bukavu town fell under the control of dissidents from the national army. Following strong international political pressure, the dissidents retreated from Bukavu town and were replaced by loyalist forces.

These terrible events were accompanied by an organized bloodbath, the rape of girls and women, and the wilful destruction of the town's infrastructure, especially in the areas surrounding the town that were reached by the dissidents.

The Tshivanga Station could not escape the same fate: the post was occupied by the national army from May 26th to June 2nd, by dissidents from June 2nd to June 9th, and finally by the loyal army again from June 9th to date. During this series of occupations, our Land Cruiser patrol jeep, 5 radios, 10 batteries and 2 collapsible solar panels were taken.

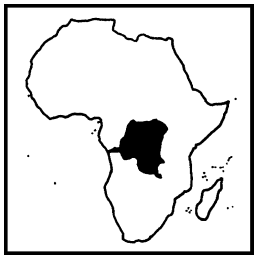
The dissidents completely looted the station. Wilful destruction engulfed the whole infrastructure, including the camp of the rangers (15 houses) and the dispensary, 3 computers, one printer, 2 typewriters, radios, the entire equipment of the dispensary including medical drugs, office furniture, administrative files, electrical installations – all of it was taken or ripped out; glass was broken, doors were forced, and so on. Currently, our staff members are still living in empty houses; most of them own nothing but a single pair of trousers.

Destruction in the health center
Photo: Carlos Schuler

Destruction in a ranger house
Photo: Carlos Schuler

After these events, we increased our contacts with the General Commander of the 10th military region, whom we had asked to visit the station. Thanks to the provincial governor of South Kivu, the people responsible within MONUC and the General Directorate/ICCN, to whom we reported these events, the patrol jeep was returned on July 2nd.

In spite of the atmosphere of insecurity and uncertainty that dominates the region at the moment, we have restarted the service and rangers have been deployed to all patrol posts. Contact has been re-established with all the monitored gorilla families. Their sizes are:



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Mugaruka group	10 individuals
Chimanuka group	20 individuals
Langa group	6 individuals
Mufanzala group	16 individuals
Mpungwe group	6 individuals
Birindwa group	9 individuals
Ganywamulume group	5 individuals

Other monitoring and development activities in the surroundings of the park are also continuing, in both the highland and the lowland areas. The personnel in the sub-stations at Nzovu and Itebero were not affected, and they were able to carry on normally with all social classes in their respective sectors. We appreciate the efforts of our partners who contribute to the preservation of this site.

Overall, we can say that luckily the park's fauna has not been significantly affected by the recent events.

Bernard Iyomi Iyatshi and Carlos Schuler

Fire in the High Altitude Sector of Kahuzi-Biega

6 July, 2004: A bushfire threatens several sectors of the high altitude region of Kahuzi-Biega National Park. Our information indicates that the burning hills are occupied by military factions and inaccessible to park officials (the central corridor of Nindja, Katasomwa in the north and Bunyakiri in the west). The premature and very long dry season, which began in March, was partly to blame. But it is worrying that we do not know the exact origin of the fire, which has destroyed large parts of some sectors of the park; recent studies indicate that 90% of neighbouring residents favour the existence of the park. According to our sources, the cause could be any of the following:

– unidentified passers-by,
– illegal farmers,

The fire on the hills of the national park *Photo: Carlos Schuler*

– Congolese soldiers needing to clear sight-lines to their observation posts,
– Interahamwe wandering in the park.

And yet, the people who are living near the park, ex Mai-Mai and other soldiers, are proving to be a grave concern to the park's integrity. It is nothing new that small groups are still in opposition to the park. In 1995, these detractors gave a rough time to the governmental commission charged with clarifying park boundaries around Ninja, and since this period, and with the arrival of the Interahamwe, park rangers have been unable to enter the area for fear of their lives.

We don't yet know the precise surface area or amount of material damage sustained. The worsening of poverty and misery is a major obstacle in the development of this area, and is undeniably related to this terrible destruction. Nevertheless, the ICCN *(Institut Congolais pour la Conservation de la Nature)* is having talks with local politico-military authorities in order to organize a coordinated over-flight to evaluate the situation on the ground. Rangers were sent off to attempt to extinguish the fires despite limited resources.

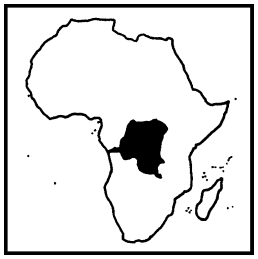
13 July, 2004: Park leaders informed local and national authorities and the international community about the damage and its consequences to the province, especially the drying up of the river feeding Bukavu, the erosion and climatic disturbances.

The population mobilized and successfully extinguished the fire in the accessible sectors. More than 400 people worked day and night, averting the risk that the tourist sectors might burn. MONUC Bukavu provided a 40-minute over-flight to verify the situation on the ground using cameras and other equipment. We are very thankful for their support. These are our observations:

– The Mt. Kahuzi area was heavily damaged by scattered fire.
– The southern part of the ecological corridor was devastated by fire.
– The bamboo sectors were more resistant to fire than previously thought.
– The farms and several hills are still burning.

For better conservation of this site, the following measures must be taken:

International level:
– Repatriate the Rwandan armed forces (Interahamwe) since their presence is causing serious harm to the local people and to the park.
– The international community must strongly involve itself in the rehabilitation of this World Heritage Site (especially reafforestation).



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– Adopt and enact efficient measures to reduce the poverty of the people living close to the park.

National level:
– Define, once and for all, the park's boundary, particularly that of the corridor.
– Delegate a commission to evaluate damage caused by destructive people in the corridors, and impose appropriate measures.
– Provide surveillance personnel with sufficient and efficient equipment for park patrols.
– Lobbying relevant authorities is of critical importance to resolving this problem.

Local level:
– Seriously involve the local authorities and local people in safekeeping of the park.
– Develop alternatives to exploitation of the natural resources in the park which are sought after by the surrounding populations.

Bernard Iyomi Iyatshi and Carlos Schuler

Involvement of Pygmy Women in Conservation

In 1998 the *Pole Pole Foundation* (POPOF) initiated a project in the Kahuzi-Biega National Park as a component of its programme for the integration of local communities into the conservation of natural resources. Funded by the *Dian Fossey Gorilla Fund-Europe* (DFGF-E), the project's target group is the Pygmy population living close to the park. One of the project's aims is to assist Pygmy women in the generation of alternative income in order to decrease their negative impact on the park. For this purpose, training courses have been established to teach Pygmy women how to tailor clothes, including the cutting of material and sewing. These training activities started in Buyungule village in 2001. During this initial course, 8 women were trained. The results of the course are still evident.

Pygmy women trained by POPOF
Photo: John Kahekwa

A Message from POPOF – Support is Needed!

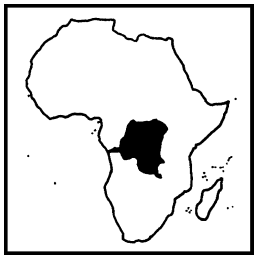
On 4 November 2004, we received an e-mail from John Kahekwa with an urgent call for help. He wrote to us:

"During the recent war of June in Bukavu town and surroundings, the POPOF office was looted. Thus the sewing machines used by the pygmy women, cameras, computers were looted. Until now it remains hard for us to reorganise the work again.
In case BERGGORILLA could have some equipment such as digital cameras and GPS or various materials to offer to POPOF, this will be very welcome in order to help grow with the activity of fighting against the destruction of the park's natural resources through creating jobs to people around it.
I look forward to hear from you."

Of course we would like to support POPOF with any material that they need for their work for the population living near the Kahuzi-Biega National Park, but we need additional funds for this support.

Please help POPOF to continue their activities. POPOF is a local NGO and their work is appreciated by the local people.

Bank Account:
Account number 353 344 315
Stadtsparkasse Muelheim, Germany
Bank code number 362 500 00
IBAN DE06 3625 0000 0353 3443 15
SWIFT-BIC SPMHDE3E



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During the second phase in 2003, the project was extended to two more Pygmy villages, Kashodu and Muyange. This increases to 3 the number of tailoring training centres already set up by POPOF as a new initiative for the conservation of the park. All three villages are located in the vicinity of important gorilla areas (of the Chimanuka, Mugaruka, Langa, Mishebere and Birindwa families), and the gorillas are therefore direct beneficiaries of the project.

The 2003 phase resulted in the training of 16 additional Pygmy women under the supervision of three Bantu tailors (equally distributed among the three centres). To date, 24 women have been able to profit from these tailoring courses, an opportunity that not many people in the region have had.

The results of the courses have a very noticeable, if small, effect on the improvement of the socio-economic conditions of the women. The various products that have resulted from these courses include shirts, trousers, shorts, etc. The situation in the gorilla areas in the vicinity of these villages (Buyungule, Kashodu and Muyange) has stabilized, including a decrease of the number of reported violations in this part of the park.

For the future, POPOF proposes to extend the project to three new villages, i.e. Tshibati, Lukananda and Cibumbiro, which are close to the territories of the Mufanzala, Mpungwe and Ganywamulume gorilla groups. In the long term, the project will need to be extended to other (i.e. non-Pygmy) communities in order to involve all the communities in the communal conservation of natural resources in the park. However, in order to succeed in this, POPOF needs the assistance of all individuals and all organizations concerned with the survival of the gorilla and its habitat.

John Kahekwa

First Observations of Infanticides by a Silverback in Kahuzi-Biega

Three cases of infanticide have recently been recorded in a group of eastern lowland gorillas inhabiting the montane forest of Kahuzi-Biega National Park. This group is called the Chimanuka group, and they have been habituated for tourism since 2003. The leading silverback, called Chimanuka (means "appearance"), was born in a habituated group (the Maheshe group) in 1986. Chimanuka left his natal group in 1998 when he was 12 years old. In December 2002, he was observed as a leading silverback with 2 females around another habituated group called the Mugaruka group.

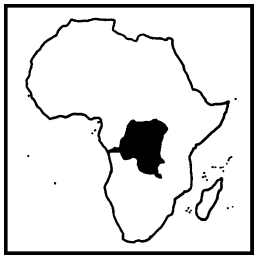
Mugaruka (means "winner") was also born in a habituated group (the Mushamuka group) in 1987. At the death of Mushamuka in 1997, Mugaruka was 10 years old (a blackback male). An older male (a maturing silverback) left the group, but Mugaruka remained with the females in the group, travelling without any silverback. After large-scale hunting of gorillas in 1998 and 1999, Mugaruka was observed to travel with 3 females and 2 immatures (Yamagiwa 2003). By 2003, he had acquired 11 females and lost 2 females. A male baby (called Chubaka, Mugaruka's first offspring with a female called Lushasha) was born in June, 2000 and another baby (called Maendeleo, Mugaruka's second offspring with a female called Mwinja) was born in April 2003.

The first interaction between the Chimanuka group and the Mugaruka group occurred in August 2003. After a fierce fight with physical contact, Mugaruka suffered wounds on his shoulders. Two females transferred into the Chimanuka group. The second inter-group interaction occurred in October, when 9 adult females transferred to the Chimanuka group. Mwinja (the mother of Maendeleo) transferred, while Lushasha (the mother of Chubaka) did not. At the transfer, Chimanuka stole Maendelo from the chest of its mother and killed it by biting its face and chest. The dead body of Maendeleo was abandoned on the ground. Mugaruka traveled with only Lushasha and her baby Chubaka.

Chimanuka *Photo: Ian Redmond*

Two females who transferred into the Chimanuka group gave birth in November and December 2003. A few days after their birth, Chimanuka killed the two babies. Based on direct observations by park trackers, the victims' mothers and the other females tried to prevent him from killing the babies but failed to stop him. In the first case, Chimanuka suddenly rose up during siesta and grabbed a baby being carried ventrally by its mother. He carried it away to bite its shoulders. The baby started crying loudly, and the rest of the group including its mother attacked Chimanuka, trying to take it back. But Chimanuka ran away fast, carrying the baby, and finally killed it. The dead baby was left on the ground. The mother picked it up and continued to carry it for a week until the body became decomposed.

In the latter case, the victim's mother and the other females chased Chimanuka, who carried the baby. The mother bit Chimanuka on the right foot to stop the killing; but the baby



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Maendeleo alive and dead
Photos: Carlos Schuler

was killed by Chimanuka's bite. The mother also carried her dead baby's body until decomposition.

In December 2003, a female who had been with Chimanuka since 2002 gave birth to a baby called Bonane (means "happy new year"). Chimanuka did not attack the baby, who has survived without any wound. He was probably the baby's father.

The third inter-group interaction occurred in January 2004. The last female in the Mugaruka group transferred into the Chimanuka group, while Chubaka, her 3-year-old son, did not transfer but remained in his natal group with Mugaruka. This is the first case observed in Kahuzi-Biega National Park that a silverback spent a long time together with only an immature male. Recently several females and immatures immigrated to the Mugaruka group from the Mishebere group, which previously consisted of 39 individuals and whose leading male disappeared (probably killed by poachers) in 2003. In September 2004 (at the time of writing this report), the Mugaruka group consists of 10 individuals.

From these observations, we found new behavioral tendencies of gorillas in Kahuzi-Biega National Park. Since the late 1960s when Adrian Deschryver, the first warden of the park, started to habituate gorillas for tourism, no infanticide had been observed until the three cases in 2003. We analyzed the demographic data on 2–4 habituated groups monitored by the park on a daily basis between 1972 and 1998 (Yamagiwa & Kahekwa 2001). Neither infanticide nor intense aggression toward any infant by a silverback male was observed during the 27-year period. Between 1983 and 1998, most of the individuals in the habituated groups were identified and monitored by the park. 10 females carried suckling infants and 4 females were accompanied by weaned juveniles when they transferred between groups during this period, but no immature was killed or wounded in any of the cases.

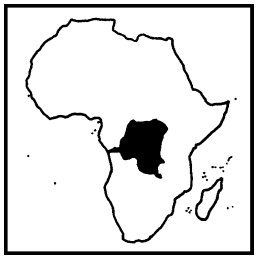
Infanticide did not follow either the death of the leading silverback, or takeover by an extra-group male, in Kahuzi. After the death of Mushamuka, a leading silverback of a habituated group, 3 females with infants immigrated into the group. They were accepted by two young males, and no wounds were observed on either immigrant female or their infants after joining.

After the death of Maheshe, the leading silverback of another habituated group, most of the females and immatures remained together and traveled without any silverback for 27 months. Then a young silverback (named Lambchop) joined the group as the new leading silverback. One year after his joining, 2 females with infants and a female with a juvenile immigrated into the group. Lambchop was very tolerant toward them, and no infanticide occurred.

Based on these results, we concluded that these aspects of new group formation and female transfers with dependent infants and juveniles were linked to the lack of infanticide in Kahuzi and were in pronounced contrast to the situation in the Virungas, where many occurrences of infanticide have been reported.

In the Virungas, located about 200 km north of Kahuzi, long-term demographic data on several habituated groups of mountain gorillas have been collected by the late Dian Fossey and the Karisoke Research Center since 1967, and 16 cases of infanticides were reported (Fossey 1984; Watts 1989). All of the victims were suckling infants or old infants less than 3 years of age, and the killers were extra-group males except for two cases (a group male and probably females). Infants were killed by extra-group males when their group encountered other groups or solitary males. When the leading silverback was present, infants were rarely killed (in 2 cases), but they were frequently attacked and occasionally killed by extra-group males after the death of the leading silverback. Infanticide accounted for 37% of infant mortality in the Virunga Mountain gorilla population. Watts (1996) argued that infanticide had a great influence on choice of group by females at the time of transfer and on multi-male group formation. Female mountain gorillas tend to transfer alone between groups and to join a large group containing more than 2 silverbacks. After the death of the leading silverbacks, females did not associate together but dispersed to join other groups. About half of the reproductive groups are multi-male groups, and no female group without any silverback has been observed in the Virungas. These features of female movements and group formation are probably shaped by the occurrence of infanticide.

The evolutionary implication of infanticide has been explained by the sexual selection hypothesis (Hrdy 1979). Infanticide by males has been reported for about 30 species of primates, and it functions as a male reproductive tactic to hasten the resumption of cycling by suckling females; it is likely to occur in species with relatively long lactation relative to gestation (van Schaik 2000). The life



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history of gorillas may provide the conditions that favour infanticide by extra-group males. In order to reduce infanticide risk, females have evolved counter strategies; one of these is females' prolonged association with protector males (Sterck et al. 1997). The large proportion of multi-male groups in the Virunga population is explained as a female strategy against infanticide by choosing the group offering the greatest male protection (Watts 1996).

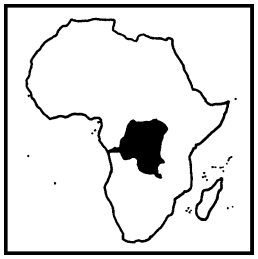
We examined the possible reasons for the absence of infanticide in the Kahuzi population and reached the conclusion that some unknown factors suppressed the occurrence of infanticide as a potential reproductive tactic by males in Kahuzi (Yamagiwa & Kahekwa 2001). The 3 infanticides by Chimanuka observed in 2003 may add new perspectives to our assessment. First, the large-scale poaching of gorillas in 1998 and 1999 may have produced conditions favouring infanticide. Thousands of refugees and soldiers roamed in the forest of Kahuzi during the civil war and hunted large mammals, frequently for bushmeat. Most of the elephants and about half of the gorillas were killed during this period (Yamagiwa 2003). All leading silverbacks in the 5 habituated groups were killed by poachers, and disintegrations of groups and female transfers frequently occurred after the death of the leading males. Gorillas tended to shift their range into the central sector of the park, where the park staff frequently patrolled. These situations may have stimulated unfamiliar groups to overlap their ranges and so frequently encounter each other. Infanticides in the Virungas also occurred after large-scale disturbance by human activities. In the 1960s, the Rwandan Government took 40% of the park for farm land. Cultivation and cattle encroachment forced the gorillas to shift their range into the central part of the Virunga Volcanoes. Schaller (1963) had never observed infanticide in 1959 and 1960. No infanticide has been reported in the 1990s or more recently. Unstable relationships between groups and between individuals within groups induced by large human disturbances may have produced conditions leading to infanticide.

Recent DNA analysis suggested that the silverbacks of neighbouring groups were related at Mondika, Central African Republic (Bradley et al. 2004). Western lowland gorillas possibly form a patrilocal social structure in which males remain in their natal region and potentially benefit from kin associations. In Kahuzi, several new groups were formed following group fissions caused by maturing silverbacks taking females out of their natal groups, before the large-scale hunting (Yamagiwa & Kahekwa 2001). The new groups overlapped their ranges with those of their natal groups, and these new group formations resulted in a local concentration of several groups in which the leading males were related to each other. Infanticide is unlikely to occur in these groups because all infants are more or less related to any adult male, even to extra-group males. Human disturbances during the civil wars probably destroyed these peaceful relationships among related males and thus increased encounters and hostility between unfamiliar males.

The second factor favouring infanticide would have been the recent increase in the proportion of young silverbacks, which may have increased agonistic interactions between groups and so caused infanticide. In the Virungas, most infanticidal males were solitary males, who were strongly motivated to attract females to establish their own groups (Fossey 1984; Watts 1989). After the large-scale hunting and disintegration of groups, young males dispersed as solitary males in Kahuzi. Most of the leading silverbacks were killed, and the proportion of young silverbacks in the population may have increased. These unmated males constitute a greater infanticidal threat than do breeding males. Chimanuka was observed as a solitary male just before he appeared in the range of the Mugaruka group in 2002. Both Chimanuka and Mugaruka were young (17 and 16 years old, respectively) and would be strongly motivated to attract females. They were born in different groups and were not related to each other. Although the details of interactions between Chimanuka and the victims' mothers before the infanticides were not known, Chimanuka's strong motivation for reproduction may have resulted in his killing these infants of transferred females.

Thirdly, it is worth noting that the occurrences of infanticides in Kahuzi were different from those in the Virungas. Chimanuka killed 2 newborn babies just after birth in his group. On the other hand, he did not kill a baby (Bonane) whose mother had remained for at least one year in his group prior to delivery. It seems likely that Chimanuka discriminated the infant he accepted from those he killed, probably based on his past interactions with their mothers. Was his decision on whether to kill based on the relatedness of the infants to him? It is difficult to answer this question because the interactions between Chimanuka and the victims' mothers remain unknown in detail. The absence of copulation or the short length of these mothers' stay in his group possibly influenced his decision.

When Chubaka's mother transferred into the Chimanuka group, Chubaka did not join his mother but remained with Mugaruka, his putative father. In most of the previous female transfers, immatures transferred with their mothers in Kahuzi. Chubaka's case suggests that he or his mother



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may have learned from the occurrences of infanticide. His mother probably noticed the risk of infanticide at her transfer and left her weaned infant, who could travel independently with Mugaruka. If this is the case, female gorillas may be able to quickly and effectively respond to the occurrence of infanticide by changing the patterns of association.

Fourthly, we can expect social changes in the Kahuzi population in the near future. If the female gorillas in Kahuzi can learn the proper strategy against the risk of infanticide, they will seek more protection from their partners, as did the female mountain gorillas in the Virungas. They will transfer alone to avoid competition with other females over a male mate and will choose a multi-male group to gain more protection. Maturing males will remain in their natal group after maturity and will start reproduction without spending time in solitary life. The proportion of multi-male groups will increase in the Kahuzi population.

Association among related males may be a common social feature within Homininae, including African great apes and humans. The genus *Gorilla* may have evolved two types of association among related males. One is association within a group, and the other is tolerance between males of neighbouring groups. The occurrence of infanticide may promote the former, and its absence may promote the latter. Populations of gorillas may have such flexibility between these two types of social organization.

Another population of mountain gorillas in the Bwindi Forest contains a large proportion of multi-male groups as observed in the Virungas, but no infanticide has been reported so far (Robbins 2001). This suggests that the Bwindi population may have already experienced infanticide in the past and may have succeeded in preventing it by shaping multi-male social structure. Future intensive research on eastern and western lowland gorillas and DNA analysis will examine this hypothesis.

We suspect, however, that the Kahuzi population is too small to sustain large social changes. In order to support them, we should realize the present conditions influencing them and make a wise conservation plan based on new knowledge about them. We hope this report will contribute to these urgent actions.

Juichi Yamagiwa and John Kahekwa

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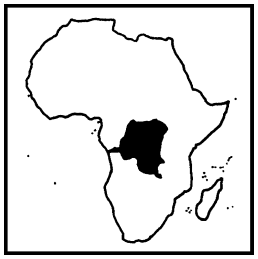
Low Wall High Impact: Crisis Management in Virunga National Park

While clashes between the former dissident rebel leader, General Laurent Nkunda, and forces loyal to the transitional government in the Democratic Republic of Congo brought renewed unrest to the troubled Kivu Region, an altogether different offensive was being played out in Congo's Virunga National Park. While the eyes of the world's media were drawn to the advance of Nkunda's troops on the town of Bukavu and the human rights atrocities that followed, thousands of Rwandan farmers entered the gorilla sector of the Virunga National Park and started cutting down the forest. On the 10th June 2004, park rangers sent a report to the Congolese Wildlife Authority (ICCN) who immediately called upon the international conservation community to intervene.

Results from the regular aerial reconnaissance carried out by the European Union (EU) and *Frankfurt Zoological Society* (FZS) confirmed that that the destruction was taking place at an estimated rate of up to 2 km^2 a day. This rapid deforestation of the Mikeno sub-sector was alleged to have been authorised by the Rwandan

Men are walking on the border between Rwanda (left) and the deforested Virunga National Park (on the right)

Photo: Robert Muir



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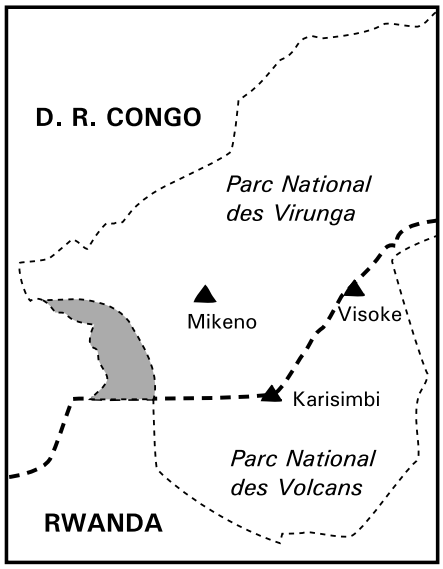


Grey area: deforested part of the Virunga National Park

military in order to reduce their vulnerability to attack along the sensitive border region. Investigations carried out on the ground revealed that a workforce of up to 6,000 Rwandans made the daily trip across the border, paying 1 US$ to the Rwandan military and local Chiefs to clear a hectare of land.

Within a month, 15 km^2 of forest had been either cut down or severely degraded, and trees were being felled as far as 10 km from the international border, apparently in the name of security. Once cleared, the land was then sold to Rwandan citizens, some of whom travelled from as far as Ruhengeri and Kigali, and paid up to 1,000 US$ per ha. There was outrage from the local Congolese community, who relied heavily on this forest for the collection of firewood, and as their only source of water during the dry season.

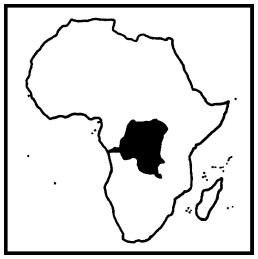
The information collected on the ground and through aerial surveys was used to inform the international conservation community, the *European Commission*, UNESCO, USAID, diplomats and foreign officials, who applied pressure on the Rwandan Government and local and regional authorities to bring a halt to the incursion and destruction of the forest. On the 27th June, 2 days before the UN DRC Group of Experts had scheduled an official onsite investigation, an order was given by the Rwandan military for all farmers to immediately evacuate the area.

With the area now clear, the ICCN requested that the international conservation community help fund the development of a 20 km long dry stone wall, 1 m high and 1 m wide, around the affected area to help re-establish the park limits. The wall would also prevent further movement of domestic livestock into the park, and would provide a strong visual response to the recent incursion. FZS and the EU immediately made funds available, but there were now concerns over the level of security at the site, given the presence of Rwandan military in the area. The United Nations Peace Keeping force for the Democratic Republic of Congo (MONUC) was asked to intervene and support the ICCN with a detachment of 15 UN Peace Keepers to assure the security of those involved in building the wall. At the time, MONUC was still smarting from the accusation that they had not taken decisive action in preventing the clashes in Bukavu, but despite considerable pressure from the EU, MONUC was unwilling to provide the necessary support, and alternative measures were therefore needed. After consultation with the UN's *Office for the Coordination of Humanitarian Affairs* (OCHA) it was agreed that only with the support of the Governor of North Kivu could security be guaranteed. During a meeting on the 29th June, attended by OCHA, the EU, WWF and FZS, the Governor gave the guarantees needed to ensure the safety of those building the wall.

Forest destruction on Mikeno
Photo: Robert Muir

A completed part of the wall with the people who built it – at the right is the park
Photo: Robert Muir

Work started on Tuesday 6th July, and by the 20th August over 7 km had been built. Funds from the *United Nations Environment Programme* (UNEP), the *International Gorilla Conservation Programme* (IGCP) and the *World Wide Fund for Nature* (WWF) had been pledged to complement those funds already provided by FZS and the EU. The IGCP developed a partnership with the *World Food Programme* (WFP) who provided 29 t of food as a salary supplement. The ICCN Community Conservation Officer engaged 42 local Congolese associations to build the wall, and the total workforce comprised 989 men and 1,051 women. Six Rwandan associations were also engaged to build the section of wall which ran along the international boundary, as this was



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considered by the Congolese to carry the greatest risk. This presented an opportunity to raise the awareness of the Rwandan military to the importance of park conservation, for the local people and the wildlife. It was also an opportunity to bring the Congolese and Rwandan people together at a local level; an initial step towards wider reconciliation. Over 12 km of the wall had been completed by the end of September with FZS overseeing much of the construction, and at the current rate of work it is expected that the wall will be completed by the end of November.

The rapid intervention by the NGO community, and other international bodies, which resulted in an agreement to fund the construction of the wall in the Mikeno sub-sector, has had a positive outcome. Above all it demonstrated to the communities living along the edge of the Mikeno forest the determination of those pledged to protect the World Heritage Site to respond quickly in an emergency and take appropriate action. The wall clearly demarcates the boundary of the park and will over time be accepted as the limit of cultivation. In the interim the ICCN will need to carry out regular patrols and inspections along the length of the wall to help establish its legitimacy and integrity.

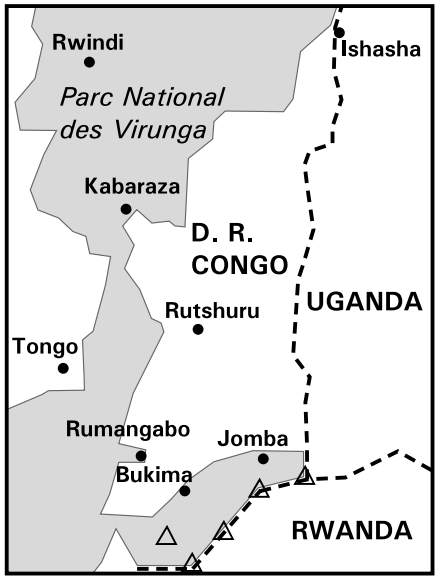
Perhaps the most positive aspect of the wall construction so far has been the integration of the various associations charged with its construction, including 6 from Rwanda, which has helped bring the communities together. It has also been a vehicle for conservation education. As the wall continues to be built, these two important aspects will be fostered, with the over-arching aim of providing long-term security to the Mikeno sub-sector of the Virunga National Park.

Robert D. J. Muir

Unconventional Warfare in the Virunga National Park

There are 480 park rangers based in stations and patrol posts throughout the Virunga National Park, an area of some 7,900 km^2 with one of the most diverse ecosystems in the world. The successful conservation of this park relies heavily on the efforts and dedication of its park rangers, who in the worst form of irony find themselves under attack and in desperate need of protection.

It was at 2:45 in the morning of the 7th September 2004, that more than 100 bandits and ex-militia launched a devastating attack on the 40 small houses that comprised the park station of Kabaraza. The Chief Warden was too late to escape, but outside he could hear his team of 33 rangers hurrying all the women and children into the bush while a few provided covering fire. The rangers quickly realised that they were outnumbered and outgunned, their AK47s proving no match for sophisticated heavy calibre weapons, so they too fled into the bush.



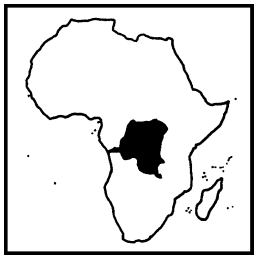
Position of Kabaraza in the park

In order to save his own life, the Chief Warden quickly opened all his doors to give the impression that he too had fled, before scrambling up into a hole in the ceiling of the food store, with a half sack of beans serving as a stepladder. Less than a minute later several armed men ran into his house and moved from room to room looting as they went. Only his mattress and bed were left untouched. They moved into the communications room and removed both the HF and VHF radio sets, the station's only link with the outside world.

One man entered the store room and noticed the sack of beans and the hole directly above it. He fired a shot piercing the hardboard ceiling. The bullet narrowly missed the warden and exited through the corrugated roof. Not satisfied that the shot would flush out anyone hiding in the roof, he climbed up through the hole and shone his torchlight around an apparently empty space. The warden was lying flat out on his stomach between two wooden beams which provided sufficient cover while the torch light darted from left to right before the bandit disappeared back down the hole.

Suddenly there was a scratching and tearing noise at the roof. They were not after the warden but the solar panels bolted onto the corrugated iron sheeting just a couple of feet from where he was lying. The panels came away from their steel frame leaving the roof intact and the warden undiscovered.

An hour or so after the attack began and some 15 minutes after the last of the bandits had left, the warden heard familiar voices coming from down below. The rangers had returned and were looking for him. He called down and asked them to move a table under the hole so that he could lower himself down.



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As he was re-grouping his men to establish who was missing and unaccounted for, a labourer ran into the station from the same direction the attackers had left. He told the Warden that he had been caught as he was trying to flee and that he had been ordered at gun point to carry a sack of ducks and chickens to a drop off point several kilometres away. As he returned he passed the sentry post where he found one ranger dead and another seriously injured. The Warden immediately sent a team of six rangers to bring back the guard who was alive as well as the body of his comrade.

In the meantime, the remainder carried out a quick check of the station to establish the extent of the damage. Each of the 40 houses had been broken into and anything that had a resale value or would serve their military operations had been taken. They ransacked the canteen and stripped the dispensary bare. The most damaging blow was the theft of ten AK47 rifles left behind by the rangers as they fled into the bush, reducing further their defensive capabilities against future attacks. The following morning the injured ranger was taken to a nearby hospital in Rutshuru while those who stayed behind mourned the body of the ranger who gave his life trying to protect his comrades in arms.

Sadly attacks like this in the Virunga National Park are not isolated. The park rangers have been systematically targeted over the last 10 months for the procurement of weapons and food by rogue militia and military groups operating within the park boundaries. Since January 2004, there have been 13 attacks on park stations and patrol posts and only three were successfully repulsed. Although the militias lack organisation and military discipline, they are greater in number and better equipped than the park rangers. The rangers simply do not have the training or the weapons to properly defend themselves, and the militias and military groups know this.

There are reports of militia groups working together to attack the larger patrol posts, in some areas assisted by the local population, many of whom are internally displaced and sought refuge in the park during the war. They see the removal of the rangers as an opportunity to increase the level of their own illegal exploitation of the park's resources, and are therefore willing to provide the militias with the intelligence necessary to carry out effective raids.

The injured ranger from Kabaraza has three bullets lodged in his skull, and as a result of this injury and a stab wound to the temple he has been left semi blind and paralysed down one side of his body. The rangers say that in this violent period of national reunification their work is more dangerous and unpredictable than it was during the recent civil war which involved

Support for Reconstruction Work in Kabaraza

Robert Muir has asked us urgently to support the rangers of the Virunga National Park. They lost everything during the attack. We want to provide as much help as we can to enable them to continue their conservation activities efficiently again. We cooperate closely with Robert Muir, *Frankfurt Zoological Society*, who works in Congo and knows exactly what the rangers need now.

We would be grateful for your help in this critical situation. If you make a donation for the Kabaraza rangers, you can be sure that we will use it to support their work. Please mention the keyword "Virunga" on your check or bank transfer.

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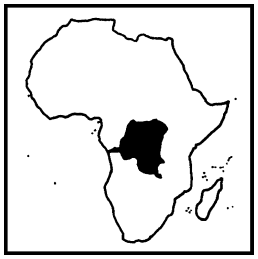

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The wounded ranger at Kabaraza
Photo: Robert Muir

nine African nations and directly affected the lives of 50 million Congolese.

Although the responsibility for the management of the park rests squarely with the ICCN and the Congolese authorities, the international community continues to play a key role in holding this fragile environment together. While the diplomatic see-saw continues between neighbouring states in an effort to reach a peaceful compromise, it remains a key responsibility for conservation organisations to deliver support to those few dedicated park rangers and their families who find their lives on the line in an attempt to protect this world heritage site for the benefit of us all.

Robert D. J. Muir

Report on a Fire in the Mikeno Sector of the Virunga National Park

At midday on July 8th, 2004, the Jomba dialogue committee was able to save the Mikeno sector from a bush fire that threatened to spread from Mugongo hill. The entire region, and Jomba in particular, had been suffering from a severe dry season: plants had dried out through the combined effect of the scorching sun and violent winds that robbed the air of its moisture. During midday hours the heat was intense.

The Jomba patrol post guards one part of the Mikeno sector that is regularly visited by 29 mountain gorillas belonging to three families. At 12 o'clock, the head ranger of the post alerted the chairman of the dialogue committee based at Bunagana by radio that a fire had started. As soon as he received the message, the chairman mobilised the committee members and villagers who were in the village at the time, together with the police, to go to the park. (At this time of the day, the villages are usually deserted, as everybody is either in the fields, in the market or at school. Apart from the sick and elderly, there are very few people in the village and even the shops close at this time.)

After this rapid mobilisation, everybody reached the site of the fire via a stony path, which is almost 4 km long and which winds between the fields from Bunagana village, where the committee has its headquarters, to the park. When they arrived, they found the fire was located at the forest edge and was in the process of spreading in the shape of a pentagon. Another appeal for help was made to the villagers who were working in the surrounding fields. In this way, a total of 26 people were mobilized.

The assembled people discussed a method to put out the fire. As the fire progressed only slowly and the volunteers had nothing but hoes and machetes as tools, they extinguished the fire with branches, soil and clods of earth. Branches were cut, plants still wet were torn from the earth by hand or with the help of hoes, soil was dug out. The 26 people quickly threw themselves into action and succeeded in putting out the fire.

The fire had been started in the camp of a man called Mulindahabi and had subsequently spread onto a small hill before arriving at the edge of the park. The fire spread into the forest for a distance of 25 m along a 20 m wide front.

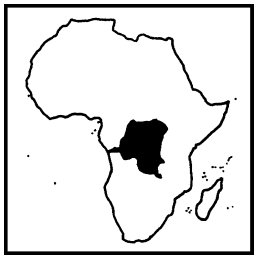
Claude Sikubwabo Kiyengo; from the report of the Jomba dialogue committee, August 30th, 2004

Confiscation of a Baby Gorilla in Goma

Some time ago, the trafficking of baby gorillas seemed all set to become the current fashion in certain towns of North Kivu (eastern Democratic Republic of Congo). Most of these rare animals come from the east of the Democratic Republic of Congo, especially from national parks such as Virunga, Kahuzi-Biega and Maiko. Many species of animals, such as mountain gorillas and chimpanzees, live in these three parks.

The reasons behind this illegal traffic are not far to seek: corrupt foreigners entice local people with colossal sums of money to capture gorillas from the forest and bring them back for sale. As soon as UGADEC (*Union des Associations de Conservation des Gorilles pour le Developpement a l'est de la Republique Democratique du Congo*/Union of Gorilla Conservation Associations for the Development of Eastern Democratic Republic of Congo) became aware of this horrible practice, they organized a public awareness campaign over the air-

The gorilla orphan with caretakers



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waves and in the newspapers, and by contacting the local authorities, the chiefs and the local people. They alerted regional airports, as well as those in Kigali, Entebbe and Nairobi, and organized a policing team.

In June 2003, a baby gorilla was captured in Bukonde and smuggled to Butembo. The local population, already well aware of the problem, did not hesitate to inform trackers from the Tayna Gorilla Reserve and helped them confiscate the animal. The gorilla was handed over to officials of the reserve who, after it had been examined by local veterinarians, placed it for observation in the compound of the residence of ”Maman Denise” in Butembo. Several days later, several other baby gorillas, captured for the same commercial purposes in the forest of Walikale, were successfully confiscated in the town of Goma. Three chimpanzees were also seized with the support of ICCN and were immediately transferred to the Lwiro orphanage in South Kivu.

In June 2004, another baby gorilla, from Itebero/Walikale, was smuggled into Goma to be sold. Fortunately, the local population shared the concerns of UGADEC, and organized its seizure. This time the confiscation was particularly difficult given that the thief had already received US$ 7,000 on account from the purchaser, who would pay the balance of the agreed sum of US$ 15,000 when he returned to collect the animal. Our trained informants in Goma were quick to contact us, and together we took measures to recover and save the gorilla.

In view of the delicacy of the operation, we requested the help of our colleagues at ICCN, and Conservateur Sebuke provided a much-appreciated armed escort. Captain Dienze of the local police also contributed to the success of the operation with valuable advice. The baby gorilla, which was confiscated on July 4th, 2004, after further examinations was identified as male (not female, as previously mistakably diagnosed). It was 7 months old when it was confiscated.

When it arrived in the enclosure at the office of "Landscape Graueri" (comprising UGADEC, the Maiko National Park and the Kahuzi-Biega National Park) in Goma, the *Mountain Gorilla Veterinary Project* (MGVP) joined with the *Dian Fossey Gorilla Fund International* (DFGF-I) and UGADEC to contribute technical, material and financial assistance. A complete physical examination was conducted on the gorilla as a priority, including parasite, microscopic, blood and chemical tests. The gorilla’s health continues to improve day by day. After less than 4 months, its weight has increased from 6.3 to 9.4 kg. The baby is remaining for the time being under the care of MGVP in collaboration with UGADEC, while awaiting the decision of the competent authorities.

In order to deal with problems of this nature in future, UGADEC is preparing to sign a memorandum of understanding with the sanctuary of Katoyo located at Kasugho. The advantage of this sanctuary is that it is situated close to the Tayna Center for Conservation Biology (TCCB), not far from the Tayna Gorilla Reserve. The sanctuary is very concerned about gorillas being illegally kept in the towns and already well prepared for this work. There is also a team of competent staff ready for this exercise added to the veterinarians only with some auxiliary agents. The population as well as this staff and the veterinarians only need to be encouraged to begin this work so that the sanctuary of Katoyo may be really fully operational. Their objective is to create a sanctuary that is capable of lodging captive gorillas.

We would like to take this occasion to thank ICCN and the politico-military authorities of North Kivu, and we salute the bravery and vigilance of our local populations. Our heartfelt thanks also go to DFGF-I and MGVP who say ”No to trafficking in baby gorillas!” and have supported us in all our activities.

Pierre Kakule Vwirasihikya

Another Gorilla Orphan

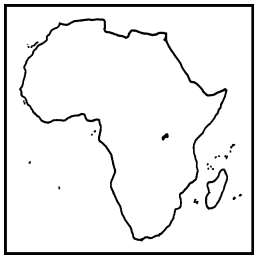
On 18th December 2004, Rwandan police arrested four suspected poachers and recovered a 3–4 year old mountain gorilla that was said to have been stolen from its family in Congo. The men had smuggled the young gorilla into Rwanda, hidden in a sack. It had been ordered by unknown buyers in Kenya. According to the suspects, the youngster was from a habituated gorilla group in Congo. They said that they had drugged adult members of the group by feeding them intoxicated bananas.

Summary of an AP press release

Update: *On 7th January, it was not yet clear what had happened. The habituated gorilla groups in the Congolese part of the Virunga Volcanoes are intact and no gorilla is missing. Although the forest was searched intensely, no hint was found that the animal is from the Bukima area, as the arrested persons had declared.*

Personal information from Fidele Ruzigandekwe, ORTPN, and Deo Mbula, ICCN

As soon as we receive more news, we will present it on our website – the direct link is ***www.berggorilla.de/english/aktuell/orphan.html***



RWANDA

Twin Mountain Gorillas

Twin births happen in gorillas with approximately the same frequency as in humans. On 19 May twins were born to 12-year-old Nyabitondore in the Susa group, Parc National des Volcans, Rwanda – a male and a female. The mother had had one infant before giving birth to the twins. When the babies were 5 months old, they were still very alert and active. Their mother was also doing well and had no problem eating and moving around while carrying her infants.

Although twins have been born already twice before in wild mountain gorillas, there has been no previous case of both babies surviving. The Susa group is habituated for tourists. It is a very large gorilla group with 37 members.

In 1991, there was a previous twin birth in the Susa group, by Umuhanga. One of her twins died soon after birth, and the other died soon after Umuhanga was killed by poachers in 2002. But this was not the first pair of twins observed in the mountain gorillas in Rwanda: in 1986 Walanza gave birth to two females, one of which died after one week and the other one two days later.

The only documented twin birth outside of the Virungas happened on 31 December 2003 in the Mufanzala group, Kahuzi-Biega National Park. As this group is not well habituated to humans, it is difficult to take photos. The group is monitored regularly, however, and at their first birthday both babys were developing well.

Nyabitondore with her twins in August *Photo: Siegbert Lapp*

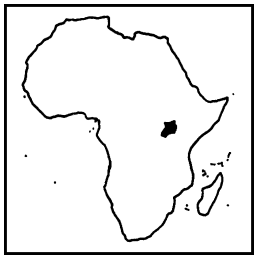
In the captive gorilla population, 8 twin births have been recorded in the studbook until 2003; 5 of the pairs were born alive. None of them was mother-reared. 8 twin births in 1066 gorilla births in captivity registered in the *International Gorilla Studbook* means that statistically there is one twin birth in 133 births. In humans, about one birth in 90 is a twin birth.

Latest zoo twin news: On 26 August 2004 Kena, one of the twins born in Barcelona Zoo in 1981, gave birth to a pair of twins – a male and a female (www.zoobarcelona.com). They are being hand-reared, like all the other zoo-born twins.

Compiled by Angela Meder with information from Undine Bender, Maryke Gray, Jörg Hess, Sabine Hilsberg and Carlos Schuler – many thanks!

Twin Gorilla Births in Zoos

18	September	1966	Kansas City: abortion (3 months)
3	May	1967	Frankfurt: 2 females
11	July	1981	Barcelona: 2 females
11	December	1981	Yerkes: stillbirth, 2 males
26	October	1983	Columbus: 2 males
16	August	1987	La Palmyre: stillbirth, 2 males
8	August	1994	New York Bronx: 2 males
21	March	1999	Oklahoma City: male + female



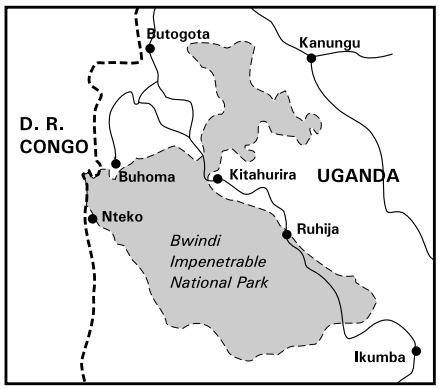
UGANDA

Variability in the Diet of Bwindi Gorillas

Studying the diet of gorillas can assist in our understanding of their foraging behavior, habitat utilization, population dynamics, and social behavior and it may also assist in conservation efforts. The diet of gorillas is likely to differ among gorilla populations because they are found in a diversity of habitats that vary in plant composition and availability (Doran & McNeilage 1998), so it is important to investigate their diets in a variety of habitats.

From the pioneering studies of mountain gorillas *(Gorilla beringei beringei)* at the Karisoke Research Center in Rwanda, gorillas were traditionally thought of as strict herbivores (Fossey & Harcourt 1977; Watts 1984). As researchers began investigating the diets of western gorillas *(Gorilla gorilla)* and Grauer's gorillas *(Gorilla beringei graueri)*, it became apparent that gorillas also consume a significant amount of fruit, as well as many different species of herbaceous vegetation (Tutin & Fernandez 1985; Yamagiwa et al. 1996; Doran et al. 2002). While much has been learned about the variability of dietary patterns between gorilla populations in recent years, less is known about how gorilla diets may vary within a small population (but see McNeilage 2001).

Bwindi Impenetrable National Park, Uganda is home to almost half of the world's remaining mountain gorillas (the other population is found in the Virunga Volcanoes and the majority of our knowledge of gorillas is derived from over 30 years of research at the Karisoke Research Center). Bwindi is at a lower altitude (1160–2607 m) than Karisoke (~2700–3700 m); correspondingly the two areas differ greatly in habitat types and plant species composition (Butynski 1984). Furthermore, the Bwindi Forest spans a wide range of altitudes that correspond to

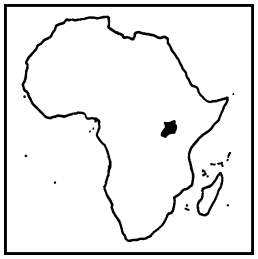


differences in temperature, rainfall, and plant species composition within the park (Nkurunungi et al. 2004). Because of the differences in altitude/habitats between the areas surrounding Karisoke and Bwindi, and also the differences within Bwindi itself, mountain gorilla diets in Bwindi are expected to differ from those at Karisoke, and also between different areas of Bwindi.

Over a one year period between September 2001 and August 2002, we conducted a study to investigate differences in diet among three gorilla groups at two different locations in Bwindi (separated by ~17 km). Two gorilla groups, Mubare and Habinyanja, at a low altitude site (Buhoma, 1450–1800 m) were compared with the Kyagurilo group at a high altitude site (Ruhija, 2100–2500 m). We studied the gorillas' diets by using fecal samples to record frugivory (samples collected from night nests on an approximately daily basis were examined to identify fruit seed species and the number of seeds found), and by following the gorillas' trails to record herbivory (examining food remains left behind is an indication of which herb, shrub, and tree plant parts were eaten).

The results of our study demonstrate that the diets between gorilla groups at the two study sites in Bwindi are notably different. The groups at the low altitude site consumed more species of both fibrous foods (non-fruit food from herbs, shrubs, and trees) and fruit than the group at the high altitude site (fibrous foods: 140 vs. 62 species; fruit: 36 vs. 11 species). Furthermore, there was little overlap in the actual species of foods eaten; the Mubare (low altitude) and Kyagurilo (high altitude) groups shared only 24.4% of their important fibrous food species (those species consumed on more than 5% of days) and 16.7% of their important fruit species (those species found in feces on more than 1% of days), while the Habinyanja (low altitude) and Kyagurilo groups shared only 12.7% of their important fibrous food species and 16.7% of their important fruit species. A surprising result was that the Mubare and Habinyanja groups shared only 46.3% of their important fibrous food species and 62.5% of their important fruit species, despite having overlapping home ranges.

By examining the availability and distribution of the plants consumed by the gorillas at each site, we found that the majority of differences in the diets



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between the groups at the two sites could be explained by differences in food availability, but the difference in diet between the groups with overlapping home ranges could not be entirely accounted for by differences in availability. We suggest that differences between these two groups could be possibly due to small scale differences in patterns of habitat utilization by the two groups, or due to "group traditions" (gorillas learn differently as to what plants to incorporate into their diet), or that gorillas choose different plant species with similar nutrient contents which would make them equally profitable to the gorillas. We are currently investigating the nutrient and chemical content of foods consumed by the three gorilla groups to examine the latter possibility in more detail.

How does the diet of Bwindi gorillas compare with the diets of other eastern gorilla populations? Eastern gorillas (Grauer's gorillas and mountain gorillas) live in a particularly wide range of habitat types and altitudes in Uganda, Rwanda, and the Democratic Republic of Congo. A comparison of the results of our study with those from the Virunga Volcanoes in Rwanda (Watts 1984; McNeilage 2001) and Kahuzi-Biega (Yamagiwa et al. 1996), shows that the gorillas in these three locations have very few species of plants in their diets in common. Furthermore, it is apparent that, as altitude increases, the number of plant species eaten and the degree of frugivory declines. Bwindi mountain gorillas are much more frugivorous than those in the Virungas, but less than gorillas of Kahuzi-Biega. Thus there is a great amount of variability in the dietary patterns of eastern gorillas.

Our study reveals new information about the dietary patterns of mountain gorillas in Bwindi and highlights the high degree of dietary flexibility within eastern gorillas. These results emphasize the importance of using a comparative approach across multiple sites and habitats when studying a species' dietary patterns, social system, and when making conservation plans.

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The full results of this study were published in the October 2004 issue of the International Journal of Primatology.

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Gorilla Park Fees Raised

Since August 2004, the price for a permit to visit gorillas in Uganda has been US$ 360 for foreign tourists. The *Uganda Wildlife Authority* (UWA) said the new rates, which include new entrance fees into parks, would match Rwanda's charges of US$ 375. East Africans pay US$ 340 and Ugandans USh 100,000. UWA has maintained a maximum of 6 permits per group, while in Rwanda 8 tourists may visit the same gorilla group.

The entrance fee to national parks remains at US$ 20 for foreign non-residents. Ugandan citizens pay USh 3,000. East Africans US$ 10 per night/day and US$ 20 for two days/nights. Passes for the individual category cost US$ 100/year for East African residents and US$ 50 for Ugandans. Passes for a couple cost now US$ 150/year for East Africans and US$ 75 for Ugandans. Passes for a family including only four children cost US$ 200 for East Africans, and US$ 100 for Ugandans. New categories for special passes have also been introduced, including the Annual Corporate Pass (US$ 500 for East Africans, US$ 400 for Ugandans). Members of the *Association of Uganda Tour Operators* (AUTO) will pay US$ 40/year.

The new structure will remain in use until 2006.

Summary of an article in The Monitor*, 12 July 2004 by Dorothy Nakaweesi*

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Zoonotic Diseases Shared by Gorillas and Humans

This paper provides a brief introduction into zoonotic diseases that affect gorillas and humans, and briefly outlines the ways in which the risk of disease transmission between gorillas and humans can be reduced or prevented. Of course, we cannot list all of the approximately 150 theoretically transmissible diseases between non-human primates (and therefore also between gorillas and humans).

The *World Health Organisation* (WHO) defines zoonotic diseases as naturally transmissible diseases between vertebrates and humans. The transmission of an infectious disease can be either direct through immediate contact, or indirect by exposure through inanimate objects (e.g. food, soil, leaves) or living organisms (e.g. ticks, mosquitoes, rodents). Zoonotic diseases are caused by infectious agents such as viruses, bacteria, fungi, parasites and presumably also through prions.

Infectious Diseases: an Existent Danger for Decimated, Small Populations

In the past, the threat of infectious diseases to wildlife was often underestimated; today, infectious diseases are recognised as a significant danger to wildlife species that have been decimated or artificially manipulated at their population level, habitat or geographic range. Acknowledging this role of infectious diseases and reducing the transmission risk is, therefore, of essential importance in wildlife conservation.

For a few years now, scientists have talked of *pathogen pollution*, the contamination of the environment with disease causing infectious agents. Although many infectious agents are species-specific, a number of pathogenic organisms can cross the species barrier and cause severe clinical diseases in the new host. The movement of humans into wild habitats leads to the occurrence of new infectious diseases which can be transmitted bidirectionally between wildlife and humans. Carriers of these infectious agents do not always have to be obviously sick.

As a result of these new diseases, the so-called emerging diseases, a number of wild animals have been pushed further towards extinction. *Pathogen pollution* is a global problem, which threatens all wildlife and also all humans. Historically, habitat destruction and chemical pollution were considered major threats to biodiversity; today, in fact, *pathogen pollution* is the largest danger for threatened animal species and hence for our planet's biodiversity. If members of a decimated population were infected with a pathogenic agent, for which this population was immunologically naive, then this population could decrease and eventually become extinct. Particularly infectious agents of humans can be lethal for rare animal species, especially for primates. Consequences would be fatal not only for the suffering individual, but also for the entire species. This is why infectious agents are such a real danger for small, threatened populations.

Zoonotic Diseases Shared by Gorillas and Humans

Because of its close genetic relationship with humans, the gorilla is, like all apes, susceptible to infectious diseases of humans and vice versa. The pathogenicity of an infectious disease depends on host and pathogen evolutionary mechanisms; for example, a disease that may be highly pathogenic to gorillas may be harmless to humans and vice versa. As the immune system of gorillas is naive to infectious agents of humans, transmissible human diseases can cause more severe clinical illness in the gorilla than in its original host, humans. The knowledge of zoonotic diseases between gorilla and man comes mostly from zoological institutions, but also from work on wild ranging mountain gorillas.

Gorillas can fall ill with viral diseases, such as the viral human childhood illnesses. In general, people and gorillas are susceptible for a number of bacterial infections; any bacterial disease in the gorilla as well as in humans should be considered zoonotic with a risk of mutual transmission. Parasitic diseases of zoonotic importance are those with protozoic (e.g. amoebiasis), helminthic (e.g. strongyloidosis) as well as arthropodic aetiology (e.g. scabies). In comparison to other infectious germs, fungi seem to play a lesser role as zoonotic agents.

Gorillas and people can be asymptomatic carriers for certain infectious agents. Such individuals then serve as the often unrecognized source of infection (e.g. human infected with the *Herpes simplex* virus, gorilla infected with *Strongyloides stercoralis*).

Gorillas Living in the Wild: Danger and Protection from Human Diseases

Beside habitat destruction and hunting, human infectious diseases are another major threat to wild ranging gorillas. These diseases cannot only be transmitted through tourists, gamekeepers, veterinarians and scientists, but also by the local people.

Vaccinating wildlife as a preventive measure is a controversial, often disputed issue. During an epidemic with fatalities in the 1980s in wild mountain gorillas which had shown heavy respiratory symptoms, antibodies for measles were detected. Suspecting the disease, some mountain gorillas were vaccinated against measles to prevent

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future disease. Scabies and yaws are other zoonotic diseases with severe clinical symptoms described for wild gorillas.

Today there are rules for tourists visiting habituated gorilla groups to protect the health of the gorillas: only a healthy person is allowed to go, a maximum number of participants is permitted, only one visit per gorilla group per day is allowed, minimum distance and minimum age are stipulated, and human faeces must be buried. But remember: one does not have to be diseased with tuberculosis to put the gorillas' health in danger, and a widely travelled tourist could be in the incubation period for flu and might already have spread infectious agents; this – to us – simple flu could then have severe consequences when transmitted to the gorilla group. Also scientists, veterinarians and gamekeepers have to act according to the rules of infectious disease prophylaxis when encountering gorillas.

There are good preventive measures for certain zoonotic diseases, such as vaccinations, deworming and treating skin parasites. We have the moral obligation to provide advantages of modern health care to people in so-called third-world countries including free examinations and, if necessary, treatment of the local people, which would also be a step towards protecting gorillas from potential zoonotic agents.

And what about Zoos?

Humans can also transmit diseases to gorillas in captivity. Gorillas are regularly infected by keepers with colds, particularly during spring and autumn, but this commonly does not threaten the lives of the gorillas. The zoo gorilla population of today is considered sustainable and its existence is not threatened by infectious diseases unlike their wild counterparts. Severe infectious diseases are extremely rare in zoos and they do not threaten the survival of the entire zoo population.

A gorilla in a zoo with Herpes simplex that was transmitted by the keeper

Photo: Wolfram Rietschel

Today, the zoo gorilla is protected from contact with visitors and so from their infectious germs through sheets of glass or wide moats. This did not use to be that way: before introducing these protective measures, tuberculosis in particular was a fear in primate holdings. Today, visitors are not at all or only in exceptional cases allowed to go behind scenes. Access for children to behind scenes is prohibited completely in most zoos as they bear the risk of transmitting childhood illnesses to the gorillas.

Gorillas, their keepers and veterinarians are protected through the rules of the hygienic outline plan of each zoo. These rules together with those of good animal keeping and management reduce the danger of disease transmission between gorillas and personnel. Hygiene, pest control, regular health checks and vacci-

Zoonotic Diseases of Gorillas in the Literature (Examples)

Zoonotic disease	Infectious agent	Clinical symptoms
Herpes	Herpes simplex virus	Vesicles on lips, death
Chickenpox	Varicella-Zoster virus	skin rash, fever
Influenza	Influenza virus	fever, cough, cold, pneumonia, weakness
Poliomyelitis	Poliomyelitis virus	paralysis
Hepatitis A, B	Hepatitis A and B virus	jaundice, fever
Tuberculosis	*Mycobacterium tuberculosis*, *M. bovis, M. avium*	mostly respiratory organs affected; often subclinical
Salmonellosis	*Salmonella* sp.	diarrhoea
Shigellosis	*Shigella* sp.	diarrhoea
Campylobacter infect.	*Campylobacter* sp.	diarrhoea
Whooping cough (Pertussis)	*Bordetella pertussis*	cough
Ring worm	*Trichophyton* sp.	circular hair loss, itching
Scabies	*Sarcoptes scabiei*	hair loss, itching
Infections with protozoa	*Amoeba* spp.	diarrhoea
	Giardia spp.	diarrhoea
	Balantidium coli	diarrhoea
Infestations with helminths	*Strongyloides* spp.	diarrhoea
	Enterobius vermicularis	diarrhoea
	Trichuris trichuria	diarrhoea
	Oesophagostomum spp.	diarrhoea
	Ascaris lumbricoides	diarrhoea

A gorilla in a zoo with Tonsillitis that was transmitted by the keeper
Photo: Wolfram Rietschel

nation of the personnel as well as wearing working clothes are all important, and employees are banned from work with apes if any suffers respiratory or gastrointestinal infections or skin or mucous membrane lesions; the disease prevention programme will include quarantine, parasite control, TB-testing and vaccinations of the gorillas.

And what about Humans?
It should not be forgotten that humans, in the wild as well as in zoos, can in turn contract infectious diseases from gorillas. There will always be a certain risk of infection through direct or indirect contact for people who work with gorillas. Many agents are transmitted by oro-faecal contamination or by aerosol. Certain parasites such as *Strongyloides* can find the way into their host through skin penetration. It is advisable to avoid contact with the gorillas' body fluids (blood, faeces, urine, nasal discharge) or, in the case of a vet, to take care not to hurt oneself with contaminated needles.

In today's zoos, there is only a minimal risk for the personnel of contracting zoonotic diseases from zoo gorillas. Overall, only a few individual cases of zoonotic diseases of humans through work with gorillas in captivity are published (e.g. amoebiasis, strongyloidosis, mycoplasmatic arthritis); as the experience of more than 100 years of gorilla keeping shows, there is no reason to be overly concerned in the zoo. Still, everyone who works with apes must be aware of a residual occupational risk, as some infectious agents may remain undiscovered for some time. Because of this, certain hygienic norms must be fulfilled to protect the personnel as much as the gorillas from each other's infectious agents.

In the wild, there is a risk of infection for tourists, rangers, veterinarians, scientists as well as for the local people. According to a recent publication a few local hunters in Central Africa were infected and then died of the Ebola virus which they contracted through the consumption of infected meat of dead gorillas. In the literature, infection of humans with the malaria protozoon *Plasmodium gorillae* has been described. In theory, humans could contract an infection with some gorilla-specific agents which were only recently discovered, especially the gorilla Herpes virus or the gorilla Spumavirus, or with gorilla-unspecific viruses, such as the Simian T-lymphotrophic virus 1 (STLV-1). The rate of dissemination of these viruses in gorillas so far remains unknown. To the best of our knowledge no known case of a gorilla infecting a human with such viruses has been reported.

To reduce the risk of contracting a zoonotic disease, in the wild as well as in the zoo, certain hygienic rules have to be followed. This is of course human self-protection, but primarily protection of the gorillas from humans and their pathogens.

K. Alexandra Dörnath Aguirre Alvarez and Jürg Völlm

For a detailed list of references please have a look at the section further reading *at* ***www.berggorilla.de/english/gjournal/texte/29zoonos.html***

Bushmeat in Africa as a Potential Threat to People's Health

Infectious diseases, which have been transmitted from animals to humans, constitute a major part of the catastrophic disease epidemics of modern times. The best-known example of this is AIDS, which has confronted humanity with one of the greatest health problems in history. In 2003, UNAIDS published statistics indicating that 3 million people had already died of AIDS. Africa south of the Sahara remains the centre of the AIDS epidemic and the damage done to the

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various countries' economies is enormous.

AIDS broke out at the start of the 1980s. It is a consequence of the transmission of the simian immunodeficiency virus (SIV) from primates to people, which probably took place several decades earlier. Based on genome and phylogenetic relationships, two AIDS viruses have been distinguished: HIV-1 and HIV-2. HIV-1 can be traced back to SIVcpz found in the central African chimpanzee; HIV-2 originated in SIVsm found in West African mangabeys (Barre-Sinoussi et al. 1983; Clavel et al. 1986). Because of the affinity of virus strains there seems to be no doubt that the virus has been transmitted from mangabeys to humans at least six times, independently of each other, whereas the virus was transmitted from chimpanzees to humans only once. HIV-2 infections seem to be restricted to West Africa, whereas HIV-1 has developed into a global threat.

But it is not only SIV that has infected humans via primates. The so-called HTLVs (human T-lymphotrophic viruses type 1 and 2) have their origins in STLV (simian T-lymphotrophic virus). In addition, Wolfe et al. (2004) recently reported that another retrovirus (i.e. a virus that carries RNA as its genetic information), the primate foamy virus, has been transmitted to the human population. Each primate foamy virus infection was contracted from a distinct lineage of the virus, involving cross-species transmissions from three different primate species.

The three virus groups share a common trait in that they don't have a pathogenic effect on their primary hosts, but cause symptoms of disease in their new host. However, while HIV-1 infections have spread globally, HIV-2 remains restricted to West Africa, whereas HTLV is most prevalent in tropical Africa. In contrast to HIV, only some carriers of the HTLV virus actually develop the disease – and this only after a long incubation period. To date, very little is known about the primate foamy virus and there is as yet no indication that the virus can be transmitted from humans to humans.

Pathogens that can cause acute disease symptoms also have great significance. Among them are the viruses that cause monkey smallpox and Ebola, which can kill non-human primates as well as humans. The Ebola virus caused havoc among gorillas and chimpanzees in Gabon and the Congo Republic and killed a major part of these populations; this is probably the most dangerous example of the threat it presents (Walsh et al. 2003; Leroy et al. 2004). It is probably responsible for the current dramatic decrease of gorillas in the Odzala National Park (press release by the *International Primatological Society*).

Contact with blood and body fluids, for example during hunting and cutting up of the animal prey, can lead to disease transmission. This is considered a primary mechanism of HIV transmission. The widespread African custom of keeping primates as pets also increases the risk of infection. By now, more than 30 primate species are known to be infected with SIV. Some of the SIV strains have already been transmitted from one primate species to another, which suggests that they could be transmitted to humans sooner or later (Peeters et al. 2002). This risk has been increasing at a constant rate ever since more stakeholders have become involved in the bushmeat trade. Animals have always been hunted in Africa, but not at current levels. There are many reasons for the increase in hunting and the bushmeat trade. Firstly, the well-to-do classes of the cities are willing to pay considerably more for bushmeat than for the meat of domesticated animals. Hence the demand increases. In addition, new roads, particularly logging roads, are opening rainforest areas that were formerly virtually inaccessible. Modern weapons make hunting easier and, at the same time, increase the pressure on the hunters, as they can pay for new guns and ammunition only if they bring down a sufficient quantity of prey. Lastly, many rainforest areas have accommodated migrants from climatically less favoured areas of Africa. These migrants do not obey local hunting taboos.

For all these reasons, the restriction of hunting activities is increasingly important – not only for the protection of many endangered primate species, but also to reduce the risk of disease transmission to humans.

Johannes Refisch

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Gorilla mtDNA – Sequences Unravelled and Secrets Revealed

Non-invasive genetics, the analysis of DNA variability using samples such as hair or fresh faeces collected in the field, has made enormous progress since the days of its infancy in the late

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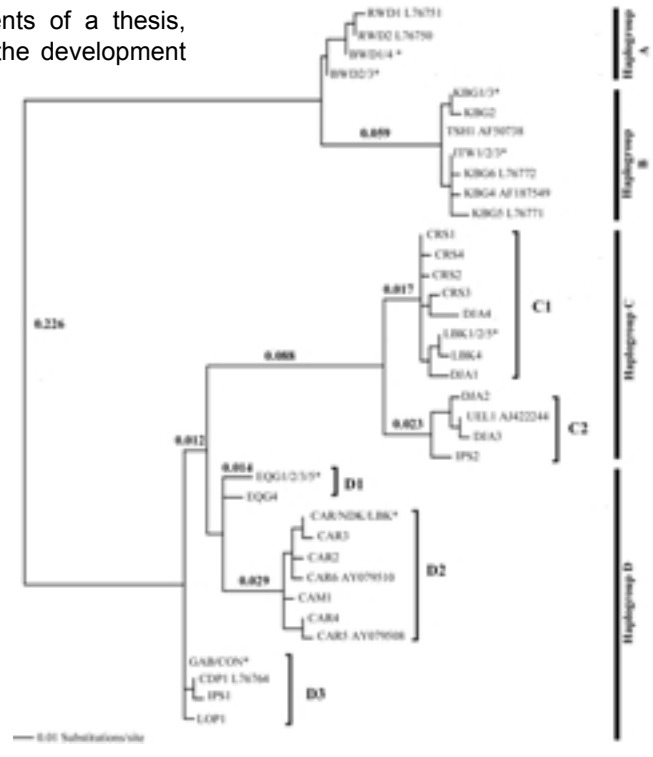
1980s and early 1990s (Higuchi et al. 1988; Constable et al. 1995). At this time, such genetic analyses held great promise for ecologists, with the capacity to explain all the mysteries of population structure and social organisation, degrees of relatedness and gene flow of species not amenable to direct study (Avise 1994). We were no less enthusiastic in our predictions of its power and our prowess. So much so that we convinced a pool of gorilla researchers and conservation organisations to help us collect material for the first range-wide study of genetic variability in the gorilla.

Traditionally three subspecies have been recognised within a single species, *Gorilla gorilla* (Groves 1967, 1970): western lowland *(G. g. gorilla),* eastern lowland gorillas *(G. g. graueri)* and mountain gorillas *(G. g. beringei)*. A more recent evaluation of the available data has led to a reclassification of the gorilla into two species (Groves 2001): the western gorilla *Gorilla gorilla* and the eastern gorilla *Gorilla beringei*. Within western gorillas, two subspecies have been proposed: *G. g. gorilla* (western gorillas except those in the Cross River area between Nigeria and Cameroon) and *G. g. diehli* (Cross River gorillas). Within eastern gorillas, three subspecies have also been proposed: *G. b. graueri* (eastern lowland), *G. b. beringei* (Virunga mountain gorilla) and, perhaps, an as yet unnamed third taxonomic unit from the Bwindi forest, Uganda.

Nearly 10 years later we believe we have achieved our goal (Clifford et al. 2004), and with this article I would like to acknowledge all the people who have been instrumental in this achievement (see list of field collaborators).

In fact our aims were three-fold: in parallel to the question of gorilla population genetics we were committed to developing a regional molecular ecology laboratory where African scientists could receive training and to providing a facility where samples could be treated without having to leave the region. The *Centre International de Recherches Médicales de Franceville* (CIRMF) still remains the only centre where such work can be carried out. Too many studies in the Central African region have involved the collection of material, its export to northern institutions and analyses carried out to satisfy the requirements of a thesis, without reference to the development of local expertise. Equally, having realised that it is not feasible to attempt automated genetic analyses in Gabon without the difficulties associated with equipment maintenance and delivery, we have developed a strategy, in collaboration with overseas laboratories, whereby fundamental molecular work is carried out at CIRMF, leaving costlier and more technologically challenging work to collaboration.

Through such collaboration, local scientists and students receive technical training and scientific support for their research both in-country and overseas. For example, sample extraction, species and sex determination, and mitochondrial DNA (mtDNA) screening are carried out in the UGENET laboratories at CIRMF, and DNA for automated sequencing and microsatellite techniques is analysed through collaborating laboratories. Such high cost, high throughput, technically challenging work on non-invasive material is best done through



Maximum Likelihood tree with branch lengths generated from unique mitochondrial HV1 haplotypes. Midpoint rooting is employed. Three letter taxa name with number correspond to samples sequenced in this study; Genbank accession numbers are given for those samples retrieved from the database. Taxa names labelled with an asterisks represent multiple individuals which shared a common haplotype.

Bwindi: BWD, Kahuzi-Biega: KBG, Itombwe: ITW, Tshiaberimu: TSH, Lobéké: LBK, Equatorial Guinea: EQG, Central African Republic/ Lobéké/Ndoki: CAR/LBK3/NDK1 and Gabon/Congo: GAB/CON, Belinga: BEL, Conkouati: CQT, Itombe: ITO, Lopé: LOP, Lastourville: LAS, Lossi: LOS, Petit Loango: PLO, Rabi: RAB. Haplogroups A to D and subgroups C1, C2, D1, D2 and D3 are indicated. Reproduced by permission of Blackwells Publishing from Clifford et al (2004)

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such collaborative networks. By this means, all samples can remain in the region providing valuable resources for further study without compromising future capacity for host country research and development.

Biological material collected non-invasively provides the only means of gleaning information on feeding ecology, habitat preference and now genetic population structure for a number of cryptic species living in habitat conditions unsuitable for direct study. Gorillas conveniently leave behind night nests and faecal deposits, which have, in other species, been used as a source of DNA for genetic work (Morin et al. 1994). Hairs collected from night nests were initially thought to be an ideal source of DNA, but forensic based work by Kathryn Jeffery (2003) in Cardiff, UK, has now shown that many shed hairs are in fact largely devoid of cellular material from which DNA could be extracted quantitatively. Molecular techniques, however, have advanced so far as to be able to amplify the tiny (pg) amounts of mitochondrial and genomic DNA associated with these hairs and faeces (Morin et al. 2001).

We now know, however, that these very small amounts of DNA, degraded into short fragments on exposure to humid forest conditions, can lead to genotyping errors from allelic dropout (stochastic non-amplification of one allele over the other; Taberlet et al. 1996), and false amplification of non-allelic artefacts. Mitochondrial DNA (mtDNA) analyses are further complicated by the translocation of mtDNA fragments into the nuclear genome (Numts), where they undergo a separate evolutionary history and can consequently confound the analysis of true mitochondrial phylogenies (Collura & Stewart 1995). Other errors in sequence interpretation can arise through *in vitro* recombination between mitochondrial and nuclear translocated fragments (Thalmann et al. 2004) and heteroplasmic mutations that appear common in the hyper-variable control region (e.g. Tully et al. 2000).

The presence of a poly-cytosine (poly-C) rich tract within the first hyper-variable region (HV-1) has also proved difficult to align and sequence, further complicating the analysis of this region. Recently, one research group has stated that, due to all these potential errors, it is impossible to place any confidence in studies using mtDNA to characterise genetic variability within gorillas (Thalmann et al. 2004; Vigilant et al. 2004).

So where does this leave us? What future is there for molecular ecologists without access to biological material yielding high quality DNA where longer sequences of DNA can be generated and authenticated? Or for studies of recent evolution of populations, based on sex-specific gene flow if maternally inherited mtDNA is deemed unreliable? Must we abandon all hope of studying the phylogeography of species for which we have no alternative but to use low quality DNA from non-invasive samples? Could we not put this knowledge of mtDNA variation present within one and the same individual to some use?

MtDNA sequence variation provides a powerful means of understanding genetic variation and evolution, and mtDNA sequences have been the primary source of data for resolving questions about modern human origins (Ruvolo et al. 1994) and the subspecific genetic variation of extant chimpanzees (Gagneux et al. 2001) and gorillas (Garner & Ryder 1996; Jensen-Seaman & Kidd 2001). In particular, analyses have focused on the control region that is involved in the control and initiation of replication. This region has an extremely high rate of mutation, and in most species has characteristic motifs that allow sequences to be aligned into specific haplogroups.

Rather than class nuclear translocation of mitochondrial genes as confounding factors in the interpretation of mtDNA variation, we have tried to profit from their existence, by recognition of the fact that they can be characterised into different groups, which can then be used as evolutionary markers in their own right. The methods we used for identifying Numts were as exhaustive as we could afford to make them and relied heavily on cloning of PCR products with sequencing of multiple clones from one individual. A combination of phylogenetic analysis, poly-C domain sequence motifs and diagnostic sites in the region flanking this domain allowed us to (i) discriminate between putative Numt DNA sequences and their presumed mtDNA counterparts, and (ii) classify Numts into different categories. We could provisionally identify Numts not only in the data set we generated ourselves, but also in sequences deposited in GenBank, the central repository for genetic sequence data, that were previously classified as authentic mtDNA.

From the several hundred hair samples received from 20 different sites of the gorilla range we were able to generate 53 complete sequences of 258 bp of the HV-1 region of the control region from gorillas throughout the eastern and western ranges. An additional 30 sequences from 3 new and 5 sampled sites were retrieved from GenBank. Of these 83 sequences, 59 were deemed to be true mtDNA sequences; 16 from eastern gorillas and 43 from western gorillas. The remaining 24 sequences (14 from GenBank) were classified as Numts. Work in progress is now examining an even larger data set using additional sequence data derived from sites in our initial study and additional sites throughout Gabon.

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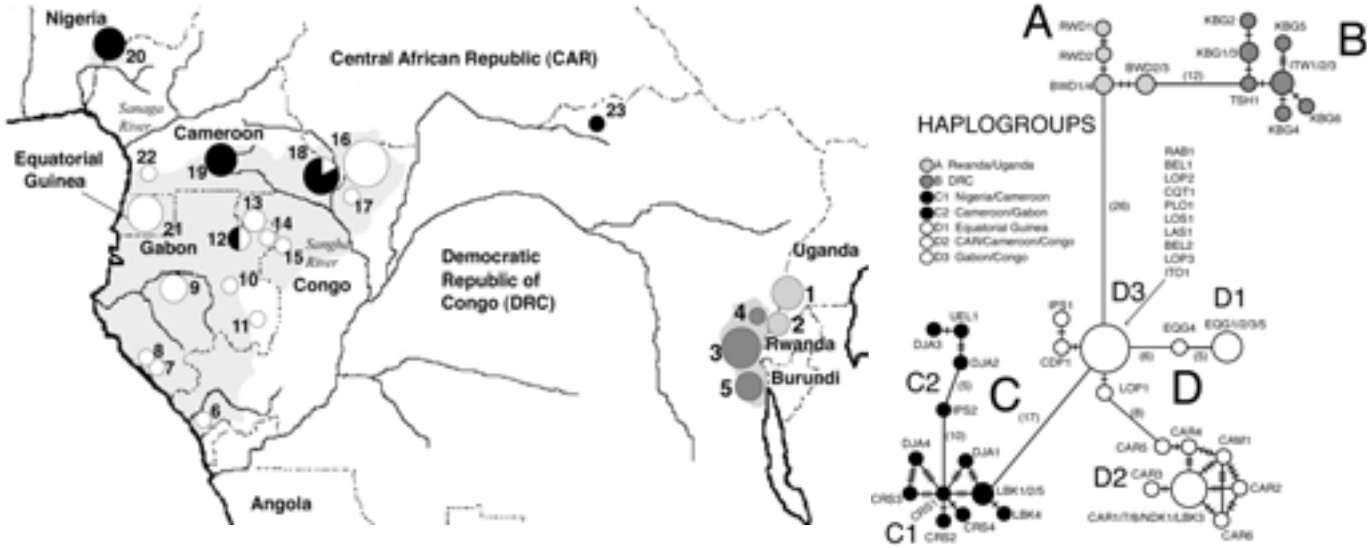

Geographic distribution and haplogroup designation (A–D) of sequences sampled from 23 sites across current gorilla range. The area of each circle is proportional to number of sequences analysed at each site and proportionally divided where more than one haplogroup is present. The present day geographical distribution of gorillas is shaded in grey. Subgroups are reflected in circle coloration. *Reproduced by permission of Blackwells Publishing from Clifford et al (2004)*

Minimum spanning network of pair-wise absolute differences between gorilla mitochondrial DNA haplotypes. For three-letter codes see Figure 1. The area of each circle represents the proportional representation of each of the respective haplotypes. Branch lengths are also proportionally represented and hash marks for closely related haplotypes indicate individual mutational steps. Haplogroups A to D are colour coded and subgroups C1, C2, D1, D2 and D3 are indicated. *Reproduced by permission of Blackwells Publishing from Clifford et al (2004)*

Having identified and subsequently excluded Numt sequences from the analysis, 4 major mtDNA haplogroups were identified (A–D), comprising a total of 36 unique mitochondrial haplotypes at 23 different sites of the gorilla range. Haplogroups A and B correspond to mountain and eastern lowland gorillas, respectively. Haplogroups C and D together cover the western lowland gorilla range, with C spanning from the Cross River region in Nigeria/Cameroon, through Dja and Lobéké in Cameroon to Ipassa in northeastern Gabon and one museum sample from the Uele Valley, Democratic Republic of Congo. Haplogroup D encompasses Gabon, Congo, Central African Republic and Equatorial Guinea, as well as one museum sample from Cameroon. The separation between eastern (A, B) and western (C, D) haplogroups recapitulates the large genetic distance and major evolutionary split between eastern and western gorillas, with mountain gorillas (A) distinct from eastern lowland gorilla populations (B) (Garner & Ryder 1996).

The most striking finding in this study is the identification of two distinct groups within western lowland gorillas (haplogroups C and D). Genetic divergence in the mitochondrial control region between the two western groups C and D is on average greater than that seen between the two eastern haplogroups A and B, which are presented in the new taxonomic description as two different subspecies (Groves 2001). This divergence within western lowland gorillas does not coincide with any previously recognised biogeographic barrier, but may potentially be linked to historic climatic events and changes in forest cover (see later). In addition, western gorillas are more genetically diverse within each haplogroup than are the two eastern groups, and sub-structuring is evident within both groups C and D. The Cross River gorillas *(G. g. diehli)* belong to the most diverse haplogroup (C), which also includes gorillas from south of the Sanaga River in southern Cameroon and from adjacent northeastern Gabon.

Within the two western lowland gorilla haplogroups, two major subgroups are evident in haplogroup C (C1, C2) and 3 geographically partitioned subgroups in haplogroup D (D1, D2, D3). Subgroup D1 comprises go-

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rillas almost exclusively from Equatorial Guinea, subgroup D2 constitutes gorillas from Central African Republic, northern Congo and one sample from Lobéké, and subgroup D3 comprises the majority of gorillas from Gabon and adjacent Congo. Interestingly, subgroup D3, which covers the largest surface area and contains the largest number of gorillas, also shows the lowest genetic diversity of the 5 subgroups.

Patterns of genetic variation indicate that a history of population fragmentation may have given rise to the distinct haplogroups identified in this study. Mismatch distributions provide limited evidence of demographic expansion in eastern lowland gorilla populations as observed in a previous study (Jensen-Seaman & Kidd 2001).

Within western gorillas, sub-groups D2 (CAR) and D3 (Gabon/adjacent Congo) show evidence of expansion whereas gorilla populations in Nigeria/Cameroon (C) exhibit a more complex population structure and history. Periodic changes in climate during recent Pleistocene history led to repeated retractions of vegetation cover into isolated refugia during glacial maxima (Maley 1996). Distributions of species dependent on closed canopy forest would have followed these changes, leading to population fragmentation within restricted forest refugia, from which expansion would later follow during climate warming. Such repeated isolation and expansion events may have had profound effects on genetic structure, as demonstrated in western gorillas. Several montane refuges have been identified in western Central Africa (Maley 1996), and the existence of fluvial refuges has also been proposed (Colyn 1991). The present location of D2 would correspond to one of these fluvial refuges, whereas the remaining subgroups could be traced to montane forest remnants in Cameroon and Gabon/Equatorial Guinea. Riverine barriers do not appear to have influenced gorilla history to the same extent.

Recognised barriers such as the Sanaga River (Grubb 2001) have had no apparent effect on gorilla divergence; rather the occurrence of haplogroups C and D in Lobéké (Cameroon) may reflect recent gene flow between adjacent haplogroups across the Sangha River following recent post-glacial expansion. Similarly admixture consistent with ongoing population expansion out of Nigeria/Cameroon, and refuges in Gabon (Monts de Cristal and Massif du Chaillu), could explain the diversity of types found in northeastern Gabon.

What are the implications of these findings for gorilla conservation? The relatively deep subdivision between haplogroups C and D within western gorillas in conjunction with the divisions between eastern and mountain gorillas would support the recognition of four distinct evolutionary significant units (ESU, Moritz 1994). It might be premature to base such conclusions on mtDNA diversity alone, given the stochasticity of a single marker system and the fact that neutral markers may fail to detect divergence in ecologically important traits. Nevertheless, “demes” based on morphological traits identified in western gorillas (Groves 1967, 1970) correspond by and large to the geographical separation seen in genetic signatures, although the morphologically distinct Cross River gorillas in Nigeria belong to a larger haplogroup encompassing gorillas in Cameroon. The conservation status of all gorillas within group C appears equally precarious, due to extreme habitat fragmentation and human pressure (Oates 2002; Groves 2002).

This study demonstrates that authentic mitochondrial genetic diversity can be assessed in the context of biological and analytical artefacts such as Numts, heteroplasmy and in vitro recombination, and future work will clarify the importance of heteroplasmy and nuclear integrations as evolutionary markers in their own right. In a historical and biogeographical context, our results show that distribution of forest cover during the recent past may have had profound effects on the divergence of gorilla populations, and we would suggest that conservation policy should aim to preserve these regional differences.

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Possible Existence of Previously Unrecorded Cross River Gorillas

Conservationists from the Cameroon-based *Environment and Rural Development Foundation* have discovered 12 previously unrecorded nesting sites of what are believed to be the critically endangered Cross River gorilla *Gorilla gorilla diehli* and the endangered Cross River chimpanzee *Pan troglodytes vellerosus*. If verified, this discovery, made during February–March 2004 in Bechanti-Fossimondi-Besali forest in southwestern Cameroon and comprising over 40 individual nests, would confirm that the range of both subspecies extends further than originally thought and that total population numbers are higher than current estimates. The surveys were funded by the *Flagship Species Fund* – a joint initiative between *Fauna & Flora International* (FFI) and the UK Government's Department for Environment, Food & Rural Affairs.

Daniel Pouakouyou and David Beamont

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Population and Habitat Viability Analysis of the Cross River Gorilla

The Cross River gorilla *(Gorilla gorilla diehli)* is one of Africa's most endangered primates, numbering approximately 250 individuals split into at least 10 subpopulations, and threatened by hunting, habitat loss, and population fragmentation. There is an urgent need to develop a realistic management plan, one that takes account of the small size of the remaining population, its fragmentation, and the continuing pressures on the animals and their habitat.

One of the main factors hindering the development of such a plan is the lack of population-wide data for these gorillas. In order to provide government officials and conservation professionals with quantitative data upon which to base management decisions, I am conducting a population and habitat viability analysis (PHVA). The goal of this analysis is to evaluate the overall viability of each of the Cross River subpopulations and to identify the main threats to their persistence, thereby contributing to a conservation action plan. This evaluation will integrate existing information from new field surveys, a study of their genetic variability, remote-sensing analysis (satellite imagery), and demographic modeling with previously collected data on subpopulation size and distribution.

Approach

Cross River gorillas have proven extremely difficult to study in the field. The extremely rugged terrain in which they live, coupled with their scarcity and extreme wariness after years of hunting, has made them challenging research subjects. In Nigeria, Kelley McFarland conducted a pioneering ecological study of one subpopulation on Afi Mountain, and in Cameroon, Jacqui Sunderland-Groves has conducted surveys throughout their range and established a long-term gorilla research and monitoring site at Kagwene. Other than these studies and limited distribution surveys, little research has been conducted on them.

Despite the success of these prior and ongoing research projects, little is known of levels of migration between

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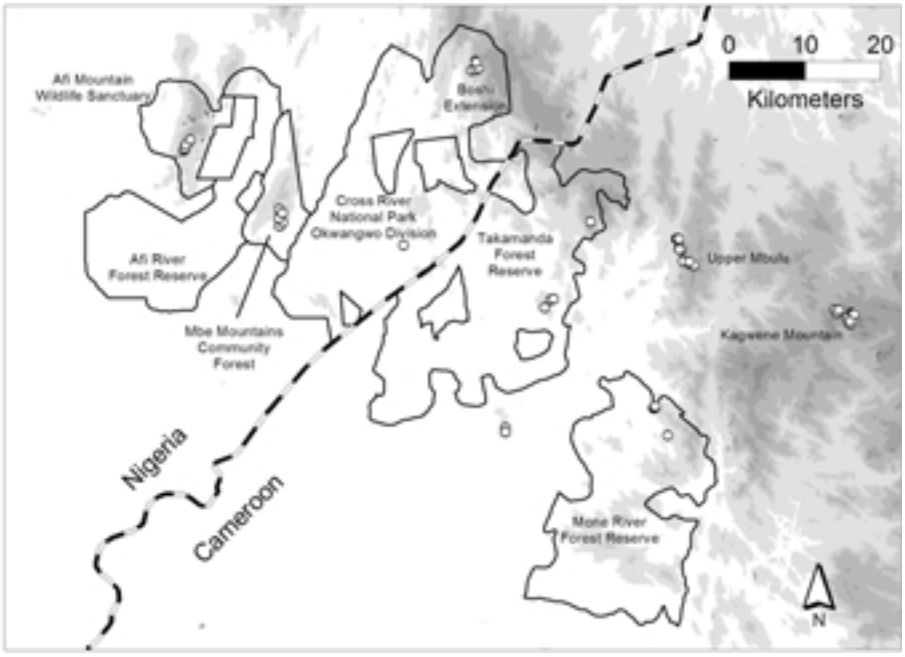

Locations where gorilla faecal samples were collected. Topographic relief shown in shades of grey *Map: Richard Bergl*

putative Cross River subpopulations or the genetic ”health” of the population as a whole. Small populations such as this are in danger of reduced fitness due to decreased genetic diversity caused by inbreeding and genetic drift. In order to elucidate patterns of sub-structuring and estimate relative levels of genetic diversity within the Cross River population I am analyzing microsatellite DNA data which is extracted from faecal samples. This technique is entirely non-invasive and does not require any contact with the gorillas.

In addition to small population size and its associated genetic problems, the Cross River gorillas are threatened by habitat loss and fragmentation. Intense human population pressure is causing forest loss throughout the gorillas' range due to small-scale logging, clearing of forest for farms, and burning by pastoralists. It is currently unclear how connected each of the gorilla habitat areas are, which areas are losing forest most rapidly, and how much potential gorilla habitat remains. Analysis of satellite imagery will allow assessment of existing forest cover, identification of corridors between gorilla habitat patches, and the potential carrying capacity of the remaining forest.

I will also use demographic modeling to examine the effects of various population parameters on population growth trends in the Cross River gorillas. Demographic models are computer-based ways of predicting changes in population size and composition. The goal of these analyses will be to examine which demographic variables are predicted to affect the population most significantly.

Field Work and Analysis

The first field survey for the PHVA project was conducted between December 2002 and March 2003 in Cross River State, Nigeria. In cooperation with the management of Cross River National Park (CRNP), the Department of Forestry Development, the *Nigerian Conservation Foundation* (NCF), the *Wildlife Conservation Society* (WCS) *Nigeria Biodiversity Research Programme* and the *Biodiversity Preservation Group* (BPG), surveys of 3 of the Nigerian subpopulations were made: those at the Boshi Extension area of Cross River National Park, the Mbe Mountains, and the Afi Mountain Wildlife Sanctuary. Research was conducted with the assistance of rangers from CRNP and the Forestry Department as well as NCF research staff, BPG research staff, and local guides.

Further field work in Southwest Province, Cameroon was conducted between October 2003 and June 2004 in cooperation with the Cameroonian Ministry of Environment and Forestry (MINEF) and WCS Cameroon. All 7 Cameroonian subpopulations were surveyed in upper Mbulu, Kagwene Mountain, Takamanda, and Mone. Research was conducted with the assistance of WCS/CRGRP staff and local guides.

Over 40 nest sites were found from which samples could be collected. In total, over 300 faecal samples were collected from nest sites, trails, and feeding sites.

Molecular genetic laboratory work is being conducted in collaboration with the Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany. Analysis of the molecular genetic data is just beginning; preliminary data suggest at least some genetic differentiation between several of the Cross River gorilla subpopulations.

The remote sensing analysis and demographic modeling portions of the PHVA are also in the early stages, but initial analysis of satellite imagery indicates considerable forest loss within and between many of the forest blocks in which the gorillas live. This

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Richard Bergl collecting samples in Cameroon

is particularly significant in several areas (e.g. the forest between the Boshi Extension area of CRNP and central Okwangwo/Takamanda forest) as forest corridors between subpopulations are on the verge of being eliminated.

What Hope for Cross River Gorillas?

When examining all the threats to the persistence of the Cross River gorilla population, it is tempting to believe that the conservation of the subspecies is a hopeless task. But it is important to note that these gorillas have persisted in the Cross River region despite years of bushmeat hunting and population fragmentation. Though some of the extant subpopulations are likely separated from one another, forested connections remain between most areas. Substantial areas of forest also remain that are currently not occupied by the gorillas.

If hunting pressure and human disturbance of the forest were decreased there is considerable area into which the gorillas could expand. Recent surveys also suggest that previously unknown subpopulations may exist in several highland areas in Cameroon, meaning that the total population may be larger than current estimates. Furthermore, at a workshop in Cameroon last year, the Ministers for Environment of both Nigeria and Cameroon both identified Cross River gorilla conservation as a priority for their respective ministries.

Since resources for conservation are limited and the situation facing the gorillas is dire, conservation efforts must be directed where they can have the most impact. The data accumulated by the Cross River gorilla PHVA will provide government agencies and NGOs working for the conservation of these unique animals with a clearer understanding of population and habitat dynamics to aid in making informed management decisions.

Richard A. Bergl

This research is supported by the National Geographic Conservation Trust*,* Conservation International*,* Primate Conservation Inc*., Lincoln Park Zoo, and the Max Planck Society.*

The Gorillas of "Petit Evengue"

About 3 years ago ”Operation Loango” started a project to develop research and eco-tourism in and around the Petit Loango Reserve in the south west of Gabon. Part of this project involves an island with four (2.2) western lowland gorillas. Originally 3 of these animals came from the CIRMF *(Centre International de Recherches Medicales Franceville)* research centre where they had lived in cages for most of their life, but fortunately were never used for any medical research.

They were put on the island for several reasons – first of all to give them the opportunity to live a more natural life, including simple but important things like finding natural food sources, climbing trees and building nests. Furthermore it was planned to look at the possibilities of using them for research and for the education of tourists, and to help the local villagers to learn to appreciate them.

The gorillas are housed in a small enclosure surrounded by a 2 m high hotwire fence, where they also have access to two small cages. The original idea was that the gorillas would have access to the whole island (approximately 2 km^2) with the exception of a little tourist camp, based on the other side of the island; this camp was also surrounded by a hotwire fence.

Kim as a juvenile

Photo: Frans Keizer

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Furthermore it was hoped that it would be possible to follow the gorillas from a short distance to do some research, preferably joined by a small group of tourists.

A Little History

Mabeke (wild-caught), a silverback, 21 years old, Kessala (wild-caught) a female, 15 years old, and their offspring Kim (captive-bred, female), 3 years old, and Congo (captive-bred, male), 8 months, arrived in July 2001. After they had spent 3 months in their small enclosure to get accustomed to their new surroundings, they were released onto the island for the first time. To reduce stress as much as possible, no attempt was made to try to follow the animals, so it was not known where they went and where they spent the night.

The next morning, at the first feeding session, the young male Congo was missing. Kessala, his mother, had left him at the edge of the forest, where he was found dead after the remaining three were locked up again in their small enclosure. Kessala was probably under considerable stress and lacked maternal behaviour, which may be why she had neglected him.

The gorillas stayed in their enclosure until April 2002 when they were released for the second time, but now with an attempt to see if they would accept human company.

Without going into too much detail, it was very clear after about 20 minutes that the silverback wanted to dominate the two female keepers. After displaying two or three times, he slowly approached them and started biting and tearing at their arms and legs. It was mainly with the help of the two female gorillas Kessala and Kim, who started screaming at the silverback, that the keepers were able to get to the boat without too many scratches. Because of their disillusionment, the two keepers concerned left the project soon after this incident.

A New Start

After having visited the project a couple of times, we decided that we would take over the job for one year. We had not only to take care of the gorillas and improve their situation, but we also had to run and develop the little tourist camp.

As the camp had to be extended from two to four bungalows, it was decided to tear down the hot wire fence that surrounded it. The gorillas will now get two smaller enclosures and a big one of 50 ha, with a lot of forest, swamp and savannah, all important parts of their natural habitat. The part of the fence that has to cross the savannah will be in a 2 m deep dry moat so it will not be visible from a distance.

The part of the forest next to the camp will be used to educate tourists about some of the plants and fruits that are eaten by the wild gorilla population.

On the 23rd of July 2003 the female Kessala gave birth to a male offspring. He was named Ozange, which means ”light” in the locale Myene language.

The Orphans

On the 2nd of July 2003, we received a phone call concerning a one-year-old male orphan gorilla tied up in one of the local villages, surrounded by screaming kids and barking dogs. His mother had been trapped in a snare and killed for bushmeat.

Essogoue *Photo: Frans Keizer*

The first orphan, Owendja
Photo: Frans Keizer

The next day he was confiscated by the ministry of Eaux et Forêts, and they gave us permission to look after him until further notice. We had hoped it would be possible to send him to the PPG *(Projet Protection des Gorilles)* as soon as possible, but they had just decided not to take any new gorilla orphans for a while. The young male was named Owendja, which means ”the day” in Myene.

Owendja is still with us and he is being taken into the forest on a daily routine, so he can learn to search for vegetation which is part of the diet of wild gorillas. We were at once quite surprised by what he knew he could eat or not eat, and he spends hours high up in the trees by himself, looking for anything to fill up his big belly.

Essogoue (named after the village he came from) was brought in on the 27th September 2003 by two boys who said they had found him alone in the forest and that his family had left him, but the real story will definitely turn out to be different. The young male, whose face was full of scratches and covered with lice and ticks, was estimated at 3–4 months old, for he had only 2 upper and 2 lower teeth and he could not walk.

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My wife Marian undertook the heavy task of looking after him, for he needed attention 24 hours per day. For a couple of weeks his face was swollen with the inflammation, but luckily that soon healed and now he is a healthy looking gorilla. We also take him into the forest every day, so he can learn from his big pal Owendja the art of climbing into and falling out of trees.

September 2004
By the end of June 2004 the second enclosure with an area of 4,000 m^2 was finally finished, and now the gorillas enjoy the larger space very much. They can climb the big Raphia palms, and build nests in and under the other vegetation where they still find a lot of fruits and plants that they add to their diet.

So far, we have dug just a part of the moat for the 50 ha enclosure. Unfortunately we have had a lot of problems with our bulldozer, which has meant still further delay.

In April 2004 we started with the introduction of the orphan Owendja to the group. First he was housed in a small enclosure next to the group so they could all get accustomed to each other. The real introduction happened within 2 months and went very smoothly. In the beginning the two females Kessala and Kim made life tough for him, but slowly he started to feel more confident, and nowadays he plays a lot with the one-year-old male Ozange.

The orphan Essogoue is still with us in the camp and is taken into the forest and to the gorillas on a daily routine.

Next to the island of Petit Evengue lies the bigger island of Grand Evengue, with an area of about 8 km^2. We hope it will be possible to use it in the near future to re-introduce the orphans into a more natural situation, and to try to help them to develop as much species-specific behaviour as possible.

For us, our gorilla adventure in Gabon ended at the end of September, for I have to start work again at the Apenheul primate park, but I hope to be able to return to Gabon to see how everything develops in the future.

Frans and Marian Keizer
Updated version of an article first published in Gorilla Gazette *17(1), 2004*

Wildlife Law Enforcement in Cameroon

Tonye Nken stood in the courtroom, holding the wooden rail with both hands. He could not believe that the sentence was referring to him – 30 days in prison and CFA 600,000 fine (US$ 1,000). A few months earlier he had met a man claiming to be interested in buying Kita, a baby chimpanzee that he kept chained in his backyard. When the policeman showed up and caught him trying to sell Kita, he thought that with a few bucks he would sort out this minor problem. This time it did not work out that way. Outside the court journalists were waiting to report on this unique case – the first wildlife law violator that has ever been prosecuted in Cameroon.

The numbers of wild chimpanzees, gorillas, forest elephants and other threatened species are declining at a worrying rate. One of the main causes of this crisis is what is known as the "bushmeat problem" – wild animals are hunted for their meat. It is important to mention that not all bushmeat is illegal; there are species that are not protected under the law, so hunt-

Caricature in the* Cameroon Tribune *(for explanation see text)

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Gorilla poached in Abong Mbang *Photo: LAGA*

ing and trade in some bushmeat is legal.

The trade in threatened and endangered species is a modern business that requires a well organized system, from the hunter through the dealer and the seller to the clients. Apes and elephants are generally no longer hunted for the villagers' pots – their meat is an exclusive product which fetches much more profit from wealthy customers in modern towns.

The Cameroonian wildlife law is strict regarding threatened species. According to this law, any person found with a protected animal (living or dead) or part of it in his possession is considered to have killed it. This law has existed since 1994, and some efforts have been made by MINEF (Ministry of Environment and Forestry) to enforce it but none of these efforts resulted in a trial. For 9 years the wildlife law has been neglected and has not constituted any threat to the trade in endangered species; the trade has continued. The situation is not unique to Cameroon but common to most countries in Africa with forests.

The precedent on July 2003 was led by *The Last Great Ape Organization* (LAGA). LAGA is a young field-based organization designed to establish effective enforcement of local wildlife law in Cameroon. It is the first specialized law enforcement NGO in the sub-region and it focuses on threatened species, dealers – the primary generators of the illegal bushmeat business, the ivory trade and the pet trade.

LAGA follows wildlife cases from the first stage (the field) to the last stage (the executions of prosecution). As in the case of Tonye Nken, undercover agents collect filmed and audio recorded information about wildlife law violations. When the evidence is concrete, LAGA coordinates between MINEF and the enforcement agencies to arrest the violators. In most operations, suspects attempt to bribe their way out or arrest.

It is only possible to enforce and apply the wildlife law if efforts are made to fight corruption in the field and if good governance is promoted. LAGA formed a legal department to assist MINEF's lawyer, who represents the wildlife cases. LAGA's legal department also tracks the cases in court. This enables them to Identify bottlenecks in the judicial system which is extremely important. Obstacles that were intentionally thrown out by middle-level officials were solved by bringing the incidents to the attention of a higher-level official.

Punishing all criminals is not possible. The most important thing in law enforcement is to create a deterrent. By publicizing arrests and punishments, LAGA is trying to reach active and potential wildlife criminals. Creating public debate by using the media – television, radio and press – is essential for raising awareness and for deterrence.

A caricature was published by the *Cameroon Tribune* after Tonye Nken's prosecution, the first ever prosecution of wildlife crime in Cameroon and most of the sub-region. In this caricature, a dealer chooses a rifle. The public recognizes the dealer as a wealthy, well-fed man. The seller warns the dealer that he should not hunt protected animals, and shows him a list in his possession. The wildlife law is so strange to the public that it seems a caricature. This is the beginning of a public debate that will continue as new cases arise.

Legal precedents, by their nature, are heralds. In the one and a half years since the Tonye Nken case, 28 cases have been brought to court in Cameroon, thanks to the collaboration between LAGA and MINEF. All this needs to be put in proportion, considering that we are in very early stages of the process, but we see budding of a change in governance through attention to wildlife law and its enforcement.

Ofir Drori with bush-meat including apes *Photo: LAGA*

GORILLAS

I remember the first time I participated in an operation. It was Friday morning, and I had recording equipment hidden in my bag as I waited for the ivory dealer to show up. He arrived with another man, looking very happy, ready to close the best deal of his life. 50 m away the arresting team and Ofir Drori, the director of LAGA, were waiting for my signal. It all happened very quickly; the dealer was arrested, he signed a complaint report on his crime and was locked up.

The scale of his offence was taken seriously in court. Seeing the proud expressions on our team members faces was one of the most satisfying moments in my work. For more than one year I have been working with Ofir and LAGA's team – a local team. These committed and devoted people are proud to take a part in a process that aspires to turn around the gloomy forecast of the future of the great apes and other threatened species.

Galit Zangwill

GRASP Update

Since its launch in 2001, GRASP (the *Great Apes Survival Project*) has brought together a diversity of stakeholders to address the crisis facing the great apes and their habitat. From a dozen partners in 2001, the partnership has grown to 39 partners including UNESCO and virtually all the main NGOs with major programmes in Africa or Asia dealing with great ape conservation and the four biodiversity related conventions.

GRASP has sent technical missions to 17 of the 23 great ape range states which have resulted in strengthened support for great ape conservation and promotion of *National Great Ape Survival Plan* (NGASP) workshops. To date, workshops producing national action plans have been held in Democratic Republic of Congo (September 2002), Cameroon (March 2003), Republic of Congo (April 2003) and Rwanda (July 2003).

GRASP has also financially supported NGO partner projects such as the *Wild Chimpanzee Foundation*'s conservation of chimpanzees in the Ivory Coast, *Fauna & Flora International*'s conservation of Cross River gorillas in Nigeria, the *International Gorilla Conservation Programme*'s conservation of mountain gorillas and their afromontane forest habitat, the *Dian Fossey Gorilla Fund Europe*'s Durban Process with artisanal miners of coltan in the Democratic Republic of Congo and CARE/Nature Uganda's participatory environmental management in Kasyoha-Kitomi landscape.

GRASP carried out an awareness campaign on the infant ape and bushmeat trade in April 2004 in coordination with UN missions in the Democratic Republic of Congo and southern Sudan.

Following a preparatory experts meeting for an intergovernmental meeting on great apes and GRASP, key partnership documents have been produced including the final report of the preparatory experts meeting, the Global Strategy for the Survival of Great Apes, the GRASP Outline Workplan 2003–2007 and the draft rules for the organization and management of the GRASP Partnership. These have been distributed to the partnership and are available on the GRASP website at this address: **http://www.unesco.org/mab/grasp/revised_documents.pdf**

GRASP is making progress towards the convening of a major intergovernmental meeting (IGM) to be held in 2005. The IGM is expected to adopt the Paris intergovernmental meeting preparatory committee report and documents and, most importantly, to set the stage for a major increase in the funding of great ape conservation programmes and projects and the adoption of a high-level political declaration on great apes.

Richard Leakey, a world-renowned conservationist and one of the GRASP patrons, will be taking a more active role in GRASP activities.

UNEP/GRASP intervened in the April 2004 illegal occupation and forest destruction of the Virunga National Park, a world heritage site and home to the remaining population of the mountain gorilla. Together with other conservation NGOs and governmental agencies, UNEP/GRASP prevailed upon the governments of Rwanda and the Democratic Republic of Congo to bring to a halt the destruction of the park habitat by settlers and the subsequent withdrawal of all settlers who had moved into the park. UNEP contributed US$ 50,000 towards the building of a wall to demarcate the park from the settlement area.

Daniel Malonza

A few months ago, the Berggorilla & Regenwald Direkthilfe *became an official GRASP partner. We will do our best to join our forces with GRASP to solve the bushmeat problem that threatens almost all the gorilla populations.*

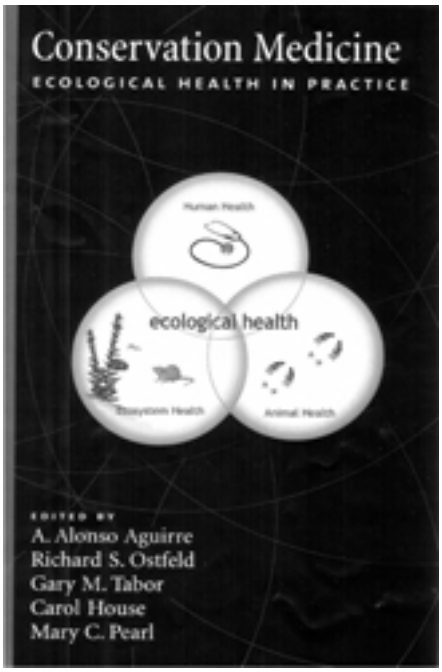
READING

A. Alonso Aguirre, Richard S. Ostfeld, Gary M. Tabor, Carol House and Mary C. Pearl (eds.) Conservation Medicine: Ecological Health in Practice. Oxford (Oxford University Press) 2002. 407 pages, 12 line illustrations. Hardcover, US$ 45. ISBN 0-19-515093-7

Conservation medicine is an emerging scientific field, focusing on the intersection of ecosystem health, animal health, and human health. It explores the connections between these, traces the environmental sources of pathogens and pollutants, develops an understanding of the ecological causes of changes in human and animal health, and addresses the consequences of diseases to populations and ecological communities. It relates to aspects of social and political sciences, which are fundamental for understanding the human-induced changes in climate and habitats and the use of marine and terrestrial ecosystems. It unites ecologists and zoologists as well as cell, micro and molecular biologists, epidemiologists, toxicologists, pathologists, veterinarians and human doctors in transdisciplinary collaboration.

Conservation Medicine defines this new discipline. It examines ecological health issues from various standpoints, including the emergence and resurgence of infectious disease agents, the increasing impacts of toxic chemicals and hazardous substances, and the health implications of habitat fragmentation, degradation and global loss of biodiversity. It provides a framework in which to examine the connections between health of the planet and health of all species. It challenges practitioners and students in the health sciences and the natural sciences to think about new, collaborative ways to address ecological health concerns.

Conservation Medicine contains 29 chapters written by 65 authors, who



are pioneers of this new discipline. It also comprises a chapter on gorillas: "The mountain gorilla and conservation medicine" by M. Cranfield, L. Gaffikin, J. Sleeman and M. Rooney. The 15 pages of this chapter are divided into the following subchapters: historical background, clinical medicine, preventive medicine, surveillance and monitoring, serology, bacteriology, parasitology, pathology, vaccinations, zoonoses and research agenda of the MGVP *(Mountain Gorilla Veterinary Project)*.

I can wholeheartedly recommend this book to everyone. The loss of biodiversity affects the well-being of both animals and people. This book takes a look the state of our planet's ecosystems and their inhabitants and at the same time offers solutions and hope for their survival.

K. Alexandra Dörnath

Bernard Chapais and Carol M. Berman (eds.) Kinship and Behavior in Primates. Oxford (Oxford University Press) 2004. XII, 507 pages. Hardcover, £ 55. ISBN 0-19-514889-4.

Most primates are social animals with complex individualized long-lasting social structures, from which it can be assumed that related individuals play a special role in those primates' social behaviour and life history. We have learned a lot about this important factor during the last decades, and this book summarizes the new knowledge and understanding. It includes various aspects of kinship research, from genetic analyses of relationships and ecological aspects to the evolution of humans; the main focus, however, is the influence of kinship on behaviour in nonhuman primates. The authors do not deal with single species but give comprehensive overviews.

Part I introduces the methods of genetic analysis and a comparison of these methods for testing different questions. In part II, socio-ecological theories are discussed with respect to kin groups and the development of kinship ties in immatures. In some contributions, theories are reviewed critically; in others the results of field studies are summarized.

In part III, the authors discuss the present state of knowledge of the influence of matrilineal and patrilineal kinship on behaviour. Most research has been done on female philopatric cercopithecines; therefore these species dominate the reviews, but other taxa including the great apes are also discussed. Part IV explains the processes involved in the development and mechanisms of kin recognition and kin-biased behaviours.

Finally, part V, called "The evolutionary origins of human kinship", contains contributions that include subjects like the history of kinship studies

READING

in cultural anthropology and the importance of various kin relationships in all kinds of human societies – sometimes also compared to chimpanzee societies.

The book is a valuable source of information and references – a great number of important references is provided by most authors. It certainly is very useful for anybody studying primate behaviour if they also deal with kinship.

Angela Meder

Barbara J. King
The Dynamic Dance: Nonvocal Communication in African Great Apes. Cambridge, MA (Harvard University Press) 2004. 304 pages, 7 halftones. Hardcover, US$ 29.95, £ 19.95, Euro 27.70. ISBN 0-674-01515-0

Carel van Schaik and Perry van Duijnhoven
Among Orangutans: Red Apes and the Rise of Human Culture. Belknap Press 2004. 272 pages, 148 color illustrations, 8 maps, 5 hafltones, 10 charts. Hardcover, US$ 29.95/ £ 19.95/Euro 27.70. ISBN 0-674-01577-0

James Mollison
James and Other Apes. London (Chris Boot). 112 pages, 50 colour photos. Hardcover, US$ 39.95. ISBN 0954689402

William H. Calvin
A Brief History of the Mind: From Apes to Intellect and Beyond. New York (Oxford University Press) 2004. 240 pages, 34 halftones, 4 line illustrations. Hardcover, US$ 26.00. ISBN 0-19-515907-1

Juan Carlos Gomez
Apes, Monkeys, Children, and the Growth of Mind (The Developing Child). Cambridge, MA (Harvard University Press) 2004. 352 pages, 17 line illustrations. Hardcover, US$ 39.95, £ 25.95, Euro 36.90. ISBN 0-674-01145-7

Chris Beard and Mark Klingler
The Hunt for the Dawn Monkey: Unearthing the Origins of Monkeys, Apes, and Humans. Berkeley (University of California Press) 2004. 363 pages, 14 color illustrations, 26 b/w photographs, 21 line illustrations. Hardcover, US$ 27.50, £ 17.95. ISBN 0-520-23369-7

Jean-Pierre Vande Weghe
Forêts d'Afrique Centrale. La nature et l'homme. Tielt, Belgium (Lannoo Uitgeverij) 2004. 368 pages, Euro 44.95. ISBN 90-209-4783-4

Rebecca Kormos, Christophe Boesch, Mohamed I. Bakarr and Thomas M. Butynski (eds.)
Chimpanzés d'Afrique de l'Ouest. Etat de conservation de l'espèce et plan d'action. Gland, Cambridge (UICN) 2004. 237 pages, many illustrations. Paperback. ISBN 2-8317-0780-3.

Eldredge Bermingham, Christopher Dick, Craig Moritz
Tropical Rainforests: Past, Present, and Future. Chicago (Chicago University Press) 2004. 672 pages, 8 colour plates, many line drawings and tables. Hardcover US$ 110.00, ISBN 0-226-04466-1. Paperback US$ 45.00, ISBN 0-226-04468-8.

Elizabeth Losos and Egbert Giles Leigh, Jr.
Tropical Forest Diversity and Dynamism. Findings from a large-scale plot network. Chicago (Chicago University Press) 2004. 688 pages, many line drawings and tables. Hardcover, US$ 95.00, ISBN 0-226-49345-8-1. Paperback US$ 38.00, ISBN 0-226-49346-6.

Karen Hayes and Richard Burge
Coltan Mining in the Democratic Republic of Congo: How tantalum-using industries can commit to the reconstruction of the DRC. London (Fauna & Flora International) 2003. Available from FFI (**www.fauna-flora.org**). £ 10.00, US$ 20.00, Euro 17.00

New on the Internet

Amnesty International published a report about the rape of women in the Democratic Republic of Congo: Mass rape – time for remedies. It can be downloaded at **http://web.amnesty.org/library/index/engafr620182004**

The *International Rescue Committee* published an analysis called "Mortality in the Democratic Republic of Congo: Results from a Nationwide Survey". The full report can be downloaded at **http://intranet.theirc.org/docs/DRC_MortalitySurvey2004_RB_8Dec04.pdf**

The APPG *(The All Party Parliamentary Group on the Great Lakes Region & Genocide Prevention)* is the leading forum in the UK Parliament for discussion and critical analysis of policy issues affecting the people of the Great Lakes region. It publishes reports on the situation in the Great Lakes region. On 23rd December, the report "Arms Flows in Eastern Congo" was published; it is available for download at **http://www.appggreatlakes.org/content/word/ArmsFlowsinEasternCongo.doc**

In October 2004, the 13th meeting of the CITES Conference of the Parties was held in Bangkok. They passed a resolution on great apes (**www.cites.org/eng/cop/13/com/E13-ComII-16.pdf**), of which the final version is available at **http://www.cites.org/eng/resols/13/13-04.shtml** and a resolution on bushmeat, download at **http://www.cites.org/eng/prog/bushmeat.shtml**

BERGGORILLA & REGENWALD DIREKTHILFE

Support

We thank everybody who supported us during the period from May to October 2004. We received large donations from Horst Engel, Jörg and Marianne Famula, Sharon Farbiash Hirzen, Stefan Faust, Detlev Fricke, Monika Gail-Drouinaud, Peter Haug, *Hundeleben* GmbH, Helga Innerhofer, Frank Jacobi, Hans H. Kreischer, Angela Meder, Brunhilde Präckel, Horst Richter, Erwin Rosenkranz and Kurt Walter.

We also received donations in kind from the SerCon company and by the "Neue Alte" organisation in Bünde and the *Druckhaus Kirchner* in Kirchlengern printed stickers for distribution in the Kahuzi-Biega National Park. We are very grateful to these individuals and companies as well as to all our other supporters too numerous to name here! Special thanks to Volker Jährling and Manfred Paul (Schenker) for their cooperation for many years!

Our New Account in Switzerland
We now have an account for our members and friends in Switzerland:

Postscheckkonto Postfinance
Account number 40-461685-7

We are very grateful to* Nouvelles Approches *for the translation of the* Gorilla Journal *to French again!

Nouvelles Approches, a Belgian based NGO, works to safeguard the national parks of the Democratic Republic of Congo. We are the only NGO currently active in Upemba and Kundelungu National Parks of Katanga Province and we collaborate with the GTZ in Kahuzi-Biega National Park.

The fact that almost every member of our Board of Trustees has lived or is still resident in the D. R. Congo, is an asset that gives us good knowledge of the country. We maintain permanent contacts in Bukavu, Lubumbashi, and Kinshasa. We keep excellent relationships with the ICCN and all national and international organizations involved in conservation in Central Africa.

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Information

Perhaps you already are a regular user of our site **www.berggorilla.org** for news about the situation of gorillas – if you have not seen it yet, you may be interested to visit it. We provide latest information on our **News** page and all kinds of other information on our **Information** page. There you will find, among other things, our "**Who's Who?**" list of acronyms which is constantly updated.

Although we try our best to stay up-to-date, we may miss something important, links/information may be outdated, or a page may contain mistakes. We would appreciate a hint if you find something that should be corrected (to angela.meder@t-online.de). Of course we are also grateful for any news on the situation.

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