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0521019869 - Mountain Gorillas: Three Decades of Research at Karisoke

Edited by Martha M. Robbins, Pascale Sicotte and Kelly J. Stewart

Excerpt

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# 1 *Mountain gorillas of the Virungas: a short history*

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& MARTHA M. ROBBINS



Dian Fossey and Digit. (Photo by Kelly J. Stewart.)

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### Introduction

In January 1999, the Max Planck Institute for Evolutionary Anthropology hosted a conference in Leipzig, to celebrate more than three decades of research on wild mountain gorillas at the Karisoke Research Center. To be more specific, it was 32 years and 9 months since Dian Fossey had set up camp in the Rwandan sector of the Virunga Volcanoes (Figure 1.1). On September 24, 1967, using a marriage of Karisimbi and Visoke, the names of the two closest volcanoes, Fossey christened her site Karisoke. She could not have known that this would be her home for the rest of her life, or that the tent she pitched at 3000 m in that wet, montane forest would become one of the longest-running research sites in field primatology. Many of the direct descendants of the mountain gorillas she first contacted in 1967 are still being observed today.

The story of Karisoke is a chronicle of the development of behavioral and ecological research, intertwined with the growth of conservation efforts to save mountain gorillas. It has been played out against a backdrop of political instability and, over the past decade, devastating war. We present briefly this story below, to set the stage for the chapters that follow (for a more detailed description of the development and history of behavioral ecology, we recommend Strier, 1994 and Janson, 2000).

#### *The intellectual setting*

By 1967, primatology and anthropology were ripe for a long-term study of gorillas. It was four years after the publication of George Schaller's classic work, *The Mountain Gorilla*, a landmark study of remarkable detail that described the basics of the subspecies' social organization, life history, and ecology (Schaller, 1963). While western science had been aware of, and intrigued by, the gorilla since its discovery in Gabon in 1847, Schaller's work was based on more direct observations of wild gorillas and provided far more information than had ever been gathered before on any of the three gorilla subspecies (see Yerkes & Yerkes, 1929; Schaller, 1963, for a review of discovery and exploration).

Primatologists at the time were recognizing the value of long-term observations of known individuals, thanks to naturalistic studies of Japanese macaques and rhesus monkeys, initiated in the 1950s and early 1960s (e.g. Kawai, 1965; Koford, 1965). During the same period, anthropologists were beginning to use the behavior of living primates as a window into our hominid past. Baboons, by virtue of living in a habitat which was thought to be the one in which early hominids evolved, became a favorite species for modeling the behavior of our ancestors (Washburn & DeVore, 1961). The great apes, because of their close phylogenetic related-

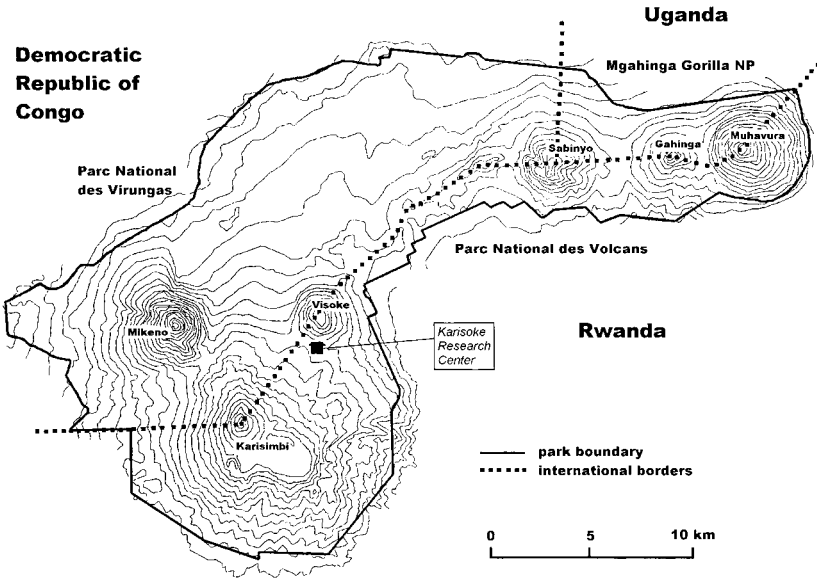


Figure 1.1. Map of the Virunga Volcano region.

ness to humans, also became models of human evolution (Rodman, 1994). Jane Goodall had been observing wild chimpanzees in Gombe Stream, Tanzania, since the early 1960s, and she was making discoveries that narrowed the traditional gaps between humans and apes (Goodall, 1968). It was Goodall's mentor, paleoanthropologist Louis Leakey, who, in his search for someone to conduct similar work on gorillas, helped launch Dian Fossey's project.

### *The ecological setting*

Karisoke Research Center lies in the Rwandan portion of the Virunga Volcanoes (Figure 1.1), a chain of mountains stretching 77 km across the bottom of the Albertine Rift. The eight volcanic peaks (two still active) and their intervening saddle areas comprise one continuous ecosystem of largely moist montane forest (Schaller, 1963; Spinage, 1972). Today, the region encompasses the borders of three different countries: 211 km lie within the Parc National des Virungas, in the Democratic Republic of Congo (formerly known as Zaire); 125 km belong to Rwanda's Parc National des Volcans, and 44.5 km to Uganda's Mgahinga Gorilla Park (Figure 1.1). The Virungas are the "classic home" of mountain gorillas, *Gorilla gorilla beringei* (see Box 1.1), being the place where they were discovered by German officer, Oscar von Beringe, in 1902 (Schaller, 1963).

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[More information](#)**Box 1.1. Gorilla taxonomy**

Currently three subspecies of gorillas are recognized (Figure 1.3) (Groves, 1970). Western lowland gorillas (*Gorilla gorilla gorilla*) are the most widely distributed, with populations totaling approximately 110 000 gorillas occurring in Gabon, Democratic Republic of Congo (formerly Zaire), Congo, Cameroon, Equatorial Guinea, and Central African Republic (Harcourt, 1996). Eastern lowland gorillas (*G. g. graueri*) are found only in the Democratic Republic of Congo with approximately 17 000 gorillas being found in several isolated populations (Harcourt, 1996; Hall *et al.*, 1998). Mountain gorillas (*G. g. beringei*) number only approximately 600 individuals divided into two populations, the Virunga Volcanos of Rwanda, Uganda, and Democratic Republic of Congo, and Bwindi Impenetrable National Park, Uganda (Sholley, 1991; McNeilage *et al.*, 1998).

At a meeting held in February, 2000, members of the IUCN/SSC Primate Specialist Group proposed a revised consensus taxonomy for gorillas (J. Oates, personal communication). This proposed classification describes two species and four subspecies of gorillas. Western gorillas are divided into two subspecies, the western lowland gorilla (*G. g. gorilla*) and the Cross River gorilla (*G. g. diehli*). The Cross River gorilla, found in at least five small subpopulations in Nigeria, is critically endangered with approximately only 150–200 individuals remaining (Oates, 2000). The other species of gorilla, eastern gorilla, is divided into mountain gorillas (*G. beringei beringei*) and Grauer's gorilla (*G. b. graueri*). There is debate as to whether mountain gorillas should be further split into two subspecies by raising the Bwindi Impenetrable gorilla population to the level of subspecies. Limited morphological and ecological comparisons between the Virunga and Bwindi gorillas suggest that they should not be considered the same subspecies (Sarmiento *et al.*, 1996), but genetic evidence indicates that there is no difference between the two populations (Garner & Ryder, 1996; Jensen-Seaman, 2000). Further research on both populations, but particularly the Bwindi gorillas, is necessary to resolve this issue.

But why were mountain gorillas the choice for a long-term study and why have they dominated the gorilla scene ever since? They are hardly representative of the genus. *Gorilla gorilla beringei* is the rarest of the subspecies (Groves, 1970; Harcourt, 1996), and is widely thought to occur in only two populations of about 300 individuals each. The Virunga gorillas live at the ecological extreme of the gorilla's distribution (Schaller, 1963). Their habitat ranges up to 4507 m, far higher than any other gorilla habitat and its montane vegetation is notably lacking in fruit. Further-

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more, it is the only gorilla site where gorillas do not overlap with their closest relatives, chimpanzees.

The nature of their habitat, however, is precisely what makes mountain gorillas more observable than other populations. This is as true today as it was back in 1967. Their highly folivorous, fruit-poor diet results in shorter daily ranges and presumably in smaller home ranges than those of gorillas in lowland tropical forest (Tutin, 1996; Remis, 1997; Doran & McNeillage, 1998). When the gorillas feed and travel in the dense undergrowth of montane forest, they leave behind a well-marked trail of trampled vegetation that enables humans to follow them relatively easily. In addition, the rugged terrain sometimes permits excellent visibility (for both humans and gorillas) while maintaining a fair distance with the observer that may help reduce the initial fear response of the gorillas (Fossey, 1983). Finally, the Virunga gorillas have not been traditionally hunted for food by humans, as have other gorilla populations (Schaller, 1963). These last two points have probably contributed to making the mountain gorillas more amenable to habituation than their lowland counterparts.

This combination of logistical factors no doubt contributed to the “gorilla-friendly” attitude of westerners towards the Virungas from the 1920s onwards, when expeditions began to focus on observing the animals rather than “collecting” them (Akeley, 1923). In fact, gorillas were a main reason for the creation in 1926 of Albert National Park, Africa’s first national park. Thus, when Dian Fossey arrived in Rwanda in 1967, the gorillas were, at least on paper, legally protected, but known to be threatened; and history had shown that observing them was feasible.

*The 1970s**Research*

The 1970s opened the doors into the individual lives of gorillas. By 1972, Fossey and others at Karisoke had habituated three groups, enabling close-range observations of known animals. Using the systematic methods of data collection that had been developed in field primatology by this time (Altmann, 1974), Karisoke researchers documented and quantified the fundamentals of gorilla ecology, demography, and social organization.

A brief review of what was to become our “classic” understanding of gorilla socioecology follows. Most individuals dispersed from their natal group. Females always joined either a lone silverback or another breeding group, while males did not immigrate into breeding groups, but attracted females away from other silverbacks (Harcourt, 1978). The resulting social organization consisted of stable, cohesive groups held together by long-term bonds between adult males and females, while relationships among

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females were relatively weak (Harcourt, 1979*a,b*). Dominance relationships among adult females were generally unclear, and agonistic interactions relatively infrequent (Harcourt, 1979*b*). These findings could be tied to low levels of feeding competition, as well as to the dominant male's control of female–female aggression (Fossey & Harcourt, 1977; Harcourt, 1979*a,b*). In the groups that contained more than one adult male, rank differences between males were clear-cut and the dominant male appeared to do most of the mating (Harcourt, 1979*c*; Harcourt *et al.*, 1980). The nature of courtship and mating supported the notion that male–male competition for females found its fullest expression in contests between, not within, groups (Harcourt *et al.*, 1980). Indeed, relations between groups were not based on resource defense, since gorillas' home ranges overlapped extensively (Fossey & Harcourt, 1977). Rather, the nature of inter-group interactions was the result of intense mating competition between adult males.

As our understanding of gorilla socioecology increased, the growing number of studies on other primate species provided data for comparison. The “typical” primate, based on extensive studies on cercopithecines (particularly baboons and macaques), exhibited female philopatry, strong matrilineal kinship bonds, and highly structured dominance relationships (see Strier, 1994 for review). Mountain gorillas offered a sharp contrast to these findings.

Meanwhile, new field studies of orangutans in Borneo and Sumatra (Rodman, 1973; Rijksen, 1978; Galdikas, 1979), chimpanzees at other sites (Reynolds, 1965; Nishida, 1979), and bonobos (Kano, 1979) were revealing extraordinary diversity in ape social organizations. In most habitats, orangutans range in a solitary fashion. The home range of a male may overlap with the home ranges of several females. Chimpanzees and bonobos are found in fission–fusion social systems, where the composition of traveling parties within a community changes depending on the food resources available and on the reproductive state of females. Although the social system of mountain gorillas was seemingly quite different, these early studies nevertheless highlighted the fact that apes shared features, such as female dispersal and at least some degree of male philopatry, that distinguished them from many other primates (Harcourt, 1978).

Theoretical developments in the disciplines of animal behavior and ecology during the 1970s had a profound influence on the interpretation of gorilla behavior. While Hinde's conceptual framework described the relation between individuals' social interactions, their relationships, and the social system (Hinde, 1976), socioecological models from studies of birds and mammals related ecological variables to foraging strategies, range use,

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and social systems (Crook & Gartlan, 1966; Lack, 1968; Clutton-Brock & Harvey, 1977; Verencamp, 1979). Behavioral ecology blossomed in 1975 with the publication of *Sociobiology* (Wilson, 1975) providing the link between individuals' social behavior and evolutionary theory (Hamilton, 1964; Williams, 1966; Trivers, 1972, 1974). This approach held that individuals in a group could have divergent interests and therefore, that a behavior that was advantageous for an individual was not necessarily "good" for the group. Social systems resulted from the compromises among individuals in their strategies to gain resources and mates (Wrangham, 1979, 1980). The view of infanticide as an adaptive strategy is a good example of how an evolutionary approach influenced our interpretation of animal behavior. Working with langurs, Hrdy (1977, 1979) suggested that males may under certain circumstances benefit reproductively from killing unrelated infants. Females suffer reproductively from these killings, and she suggested that female counter-strategies to male infanticide should evolve. These have since been documented in a large number of species, including gorillas (Smuts & Smuts, 1993). Finally, the theory of sperm competition, a development of sexual selection theory stemming from male-male competition, put comparative data on the great apes' sexual morphology and mating behavior in an evolutionary perspective (Short, 1979; Harcourt *et al.*, 1981).

*Conservation*

Unfortunately, while research was thriving during the 1970s, the gorillas were not. The Virungas have a long history of human settlement on the edge of the gorillas' habitat, as well as incursions into the forest by people and cattle (Schaller, 1963; Curry-lindhal, 1969; Desforges, 1972; Spinage, 1972). For much of the 1970s, international conservation organizations were minimally involved in mountain gorillas, and Karisoke Research Center was the most constant and noticeable conservation presence in the forest. Its conservation activities, however, were focused on anti-poaching efforts in which patrols swept repeatedly through the forest to cut the snares that were set to catch antelopes and buffaloes (and to which gorillas are vulnerable), as well as to search for poachers' camps.

A Karisoke-based census of the entire Virunga ecosystem in the early 1970s showed that the gorilla population had declined since Schaller's estimate in the 1960s, from about 450 to about 275 animals (Figure 1.2) (Harcourt & Groom, 1972; Harcourt & Fossey, 1981; Weber & Vedder, 1983). One cause of this decline was habitat loss. Major loss of gorilla habitat occurred between 1958 and 1973, when more than 50% of the Parc National des Volcans (the Rwandan side of the Virungas) was cleared to

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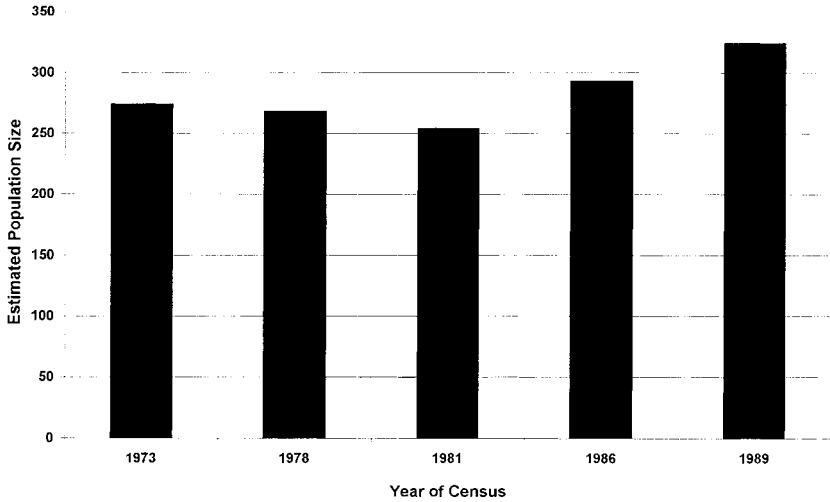
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Figure 1.2. Changes in the population size of mountain gorillas in the Virunga Volcanoes region as measured by periodic censuses.

allow human settlement and cultivation of cash crops (Weber, 1987, 1989). Another cause of this decline in population was the incidental as well as deliberate hunting of gorillas. In the mid 1970s, a gruesome trophy trade in gorilla heads and skulls surfaced in Rwanda, with the main market being foreign residents and visitors (Harcourt, 1986). This trade was behind the poacher attacks in 1978 on Karisoke's longest-observed study group, Group 4. Hunters killed two silverbacks, a female, and an infant, resulting in the eventual disintegration of the breeding group (Fossey, 1983). The massive publicity campaign in England and in the USA that followed these killings resulted in the now famous Mountain Gorilla Project, a program that became a model for gorilla conservation in other parts of Africa (Harcourt, 1986; Weber, 1989).

### *The early 1980s*

#### *Research*

While the demise of Group 4 and its aftermath were tragic, it taught us much about the dynamics of group formation and dissolution, including those of all-male groups (Fossey, 1983; Yamagiwa, 1987; Watts, 1991). Perhaps most significantly, it underlined the role of adult males in protecting related infants from infanticide (Fossey, 1984; Watts, 1989). Soon after the death of the leading silverback of Group 4, two infants were killed by males who were not their fathers (Fossey, 1983). When females lose the



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protection of the silverback of their group, their infants become vulnerable to infanticide (Watts, 1989).

The 1980s was also a time to start harvesting the fruits of long-term observations of known individuals. Gorillas who had first been seen as small infants in the study groups began reaching adulthood, and researchers could now examine variations in many aspects of behavior. Studies became more problem-oriented and considered the impact of factors such as group size, feeding competition, and kinship on social relationships and dispersal decisions (e.g. Watts, 1985, 1990, 1991, 1992; Stewart & Harcourt, 1987; Harcourt & Stewart, 1989). Our understanding of gorilla ecology increased significantly with detailed studies that measured food quality, distribution, and abundance, and related these to foraging patterns (Waterman *et al.*, 1983; Vedder, 1984; Watts, 1984). Finally, long-term ranging data enabled researchers to assess the relative impact of ecological and social factors on gorillas' habitat use (Yamagiwa, 1986; Watts, 1991, 1994a).

Within the discipline of behavioral ecology, models for the evolution of primate sociality provided a theoretical frame for the emerging pattern of gorilla behavior and ecology (Wrangham, 1979, 1980; van Schaik, 1989). But this picture of gorilla social evolution was still based on one subspecies. This situation began to change as observations on *G. g. graueri* in eastern Zaire, on groups habituated since the 1970s, became more consistent and systematic (Casimir, 1975; Yamagiwa, 1983). In addition, researchers were establishing long-term studies of the western lowland gorillas *G. g. gorilla*, first in Gabon in 1980 and then in Central African Republic and Congo (Tutin, 1996; Doran & McNeillage, 1998; see Figure 1.3 for location of field sites). The data emerging from this work confirmed hints from earlier studies (Sabater Pi, 1971; Calvert, 1985) as to major differences in diet and ranging behavior between lowland and mountain gorillas.

*Conservation*

The new conservation efforts initiated in the late 1970s in Rwanda appeared to work. Censuses during the 1980s showed a halt to the population decline after 1981, and a subsequent increase in numbers (Figure 1.2) (Harcourt, 1986; Vedder & Aveling 1987). A conservation program similar to the Mountain Gorilla Project was soon initiated on the Congo side of the Virungas (Aveling & Aveling, 1989), and efforts were mounted to improve the situation for gorillas in Uganda. In keeping with the expansion of the times, Karisoke extended its operations beyond the borders of the study site and the park, establishing cooperative links with

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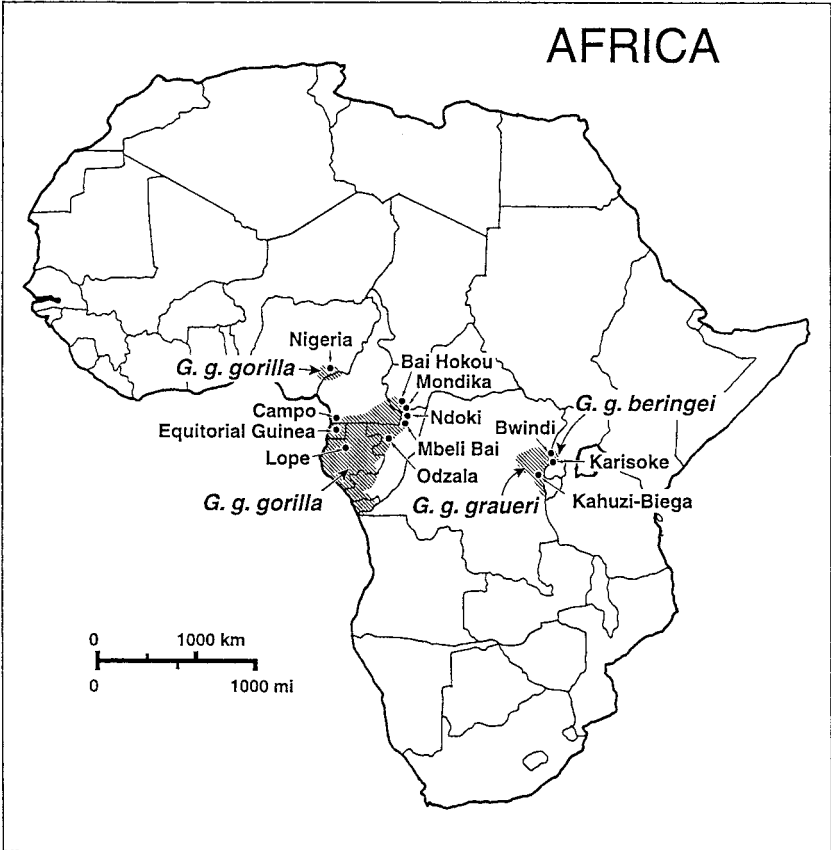


Figure 1.3. Map of Africa indicating the distribution of the three currently recognized subspecies of gorillas and the major research sites focusing on gorillas.

conservation projects in Rwanda, and later, Uganda and Congo, and with institutions such as l'Université Nationale du Rwanda. In addition, its conservation activities became closely integrated with those of the Rwandan park authorities, l'Office Rwandais du Tourisme et des Parcs Nationaux (ORTPN), specifically in well-organized joint patrols between the park guards and Karisoke field personnel. For the first time, sociological research was also directed towards the human population surrounding the park. Interviews of farmers revealed that the conservation education program put together by the Mountain Gorilla Project was having a positive impact on people's attitude towards conserving the park and its wildlife (Weber, 1987, 1989). Overall, there were grounds for cautious optimism.