Habitat Use by White-thighed Colobus in the Kikélé Sacred Forest:
Activity Budget, Feeding Ecology and Selection of Sleeping Trees

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Abstract: Understanding habitat preference and use is an important aspect of primate ecology, and is essential for setting conservation strategies. This study examined the activity budget, feeding ecology and selection of sleeping trees of a population of white-thighed colobus (Colobus vellerosus). A group of 18 was followed during 72 days over a full annual cycle in the Kikélé Sacred Forest of the Bassila administrative region in central Benin (West Africa). Activity budget and diet were determined using scan sampling. The structure of the habitat and the physical characteristics of sleeping trees were determined using plot surveys. Resting, feeding, moving, social interactions and other activities accounted for 56.6%, 26.3%, 13.0%, 3.3%, and 0.7% of the activity budget, respectively. The group spent more time feeding and less time moving in the dry season compared to the rainy season. The diet was composed of 35 plant species belonging to 16 families, with items including leaves, fruits, seeds, buds, bark, flowers, gum, and inflorescences. Only three tree species were used as sleeping trees: Celtis integrifolia, Cola cordifolia, and Holoptelea grandis. Our findings suggest that the monkeys prefer tall (22.53 ± SD 3.76 m) and large-trunked (112.07 ± SD 14.23 cm) sleeping trees. The results of this study can be used for sound management of the white-thighed colobus in the study area and elsewhere.

Key Words: activity budget, feeding ecology, sleeping trees, Colobus vellerosus, conservation, West Africa

Introduction

Crucial components of an animal’s habitat are the provision of food and resting sites that are safe from predators (Gautier-Hion et al. 1983). Activity budgets are reliable indicators of the coping strategies of primates in their environment, and are often related to the ways animals conserve energy (Milton 1998). Activity budgets are influenced by factors such as group size and habitat quality (Teichroeb et al. 2003; Wong et al. 2006). With their folivorous diet, colobines tend to reduce energy expenditure by spending long periods of time resting (Irwin 2008a, 2008b; Korstjens et al. 2010). As leaves are superabundant and widely dispersed, it is supposed that folivorous primates such as colobines do not experience intragroup scramble competition for food (for example, Colobus guereza: Fashing 2001; Procolobus rufomitratus: Snaith 2008; Colobus vellerosus: Saj and Sicotte 2007; Teichroeb and Sicotte 2009). This has also been found in Asian colobines (Yeager and Kirkpatrick 1998; Yeager and Kool 2000). For this reason colobine monkeys would be expected to form large groups, which is not always the case. This is the “folivore paradox” (Steenbeek and van Schaik 2001; Snaith 2008).

The colobine diet varies in species composition with the food resources available and the floristic composition of their habitats. Colobine monkeys also eat fruits and other plant parts besides leaves (for example, Procolobus verus: Oates 1988, Davies et al. 1999; Colobus polykomos: Dasilva 1994, Davies et al. 1999; Procolobus badius: Davies et al. 1999; Colobus vellerosus: Teichroeb et al. 2003).

Sleeping sites (nests of leaves, holes in trees, or the branches of trees) are night refuges for diurnal animals, and affect habitat use. The study of sleeping sites, therefore, may help to understand some aspects of their behavior. The choice of sleeping sites by animals is influenced by predation avoidance and access to food (Albert et al. 2011; Holmes et al. 2011; Teichroeb et al. 2012), thermoregulation (Fan and Jiang 2008), and social factors (Anderson 1998). The white-thighed...
colobus (*Colobus vellerosus*) is endemic to West Africa and is listed as Vulnerable on the IUCN Red List (Oates et al. 2008). Despite conservation efforts in Côte d’Ivoire, which covers a significant part of its range, the conservation status of *C. vellerosus* is deteriorating, and the species may now be Endangered (Gonedélé Bi et al. 2010). Most of the behavioral studies on *C. vellerosus* have been conducted in Ghana. According to Wong et al. (2006), its diet is dominated by leaves (79%), but also comprise fruits (10.7%), flowers and buds (6%), seedpods (4%) and sap (0.3%). Wong and Sicotte (2007) found that the activity budget of *C. vellerosus* comprises 22.0% feeding, 68.6% resting, 6.8% moving, and 2.6% social activities, and is influenced by group size and group composition as well as food availability (Teichroeb et al. 2003).

Habitat types, plant communities and seasonal variation in resource availability influence diet composition. In Benin, *C. vellerosus* is restricted to the Guineo-congolese zone and Guineo-sudanian zone (Djègo-Djossou and Sinsin 2009). The species is legally protected in forest reserves (Djègo-Djossou, 2013) whereas in the Kikélé Sacred Forest its protection is based on traditional beliefs (Djègo-Djossou et al. 2012). The studies mentioned above were conducted in typical Guinea-Congo semi-deciduous forests, and here we report for the first time on the activity budget, food resources and dietary composition, as well as the physical characteristics of the trees selected as sleeping sites, of *C. vellerosus* in a dry forest in the Kikélé Sacred Forest.

**Methods**

**Study site**

The Kikélé Sacred Forest (13 ha) is in the Bassila administrative region near the village of Kikélé in central Benin, West Africa (Fig. 1). This forest is occupied by a single, multi-male/multi-female group of *Colobus vellerosus* of 18 individuals that has been protected by traditional beliefs for decades (Djègo-Djossou et al. 2012). The Sacred Forest is extended by a gallery forest that surrounds the entire village and is fragmented by agricultural clearings and access roads.

The climate of Kikélé is of the Sudanian dry type, characterized by a dry season from mid-October to mid-April, alternating with a rainy season from mid-April to mid-October. Although the climate is dry, yearly rainfall (1300 mm) is higher compared to other regions in Benin (950–1200 mm). The vegetation of this Sacred Forest contains tall trees that are typical of semi-deciduous forests. There are several vegetation types: dense forest, woodland, and savanna. The most common species in this region are similar to those of the Boabeng-Fiema Monkey Sanctuary, Ghana. They include *Cola gigantea* (Sterculiaceae), *Celtis zenkeri* and *C. toka* (Ulmaceae), *Antiaris toxicaria* (Moraceae), *Holoptelea grandis* (Ulmaceae), *Erythrophleum suaveolens* (Leguminosae - Caesalpinioideae), and *Khaya grandifoliola* (Meliaceae) (Adomou 2005). Besides *C. vellerosus*, the mammal fauna of the Kikélé Sacred Forest comprises a few individuals of *Cercopithecus mona* and various rodents, including the rare Beecroft’s flying squirrel *Anomalurus beecrofti*.

**Data collection: Activity budget and food resources**

Data were collected using instantaneous scan sampling (Altmann 1974) during an annual cycle from February 2010 to January 2011. In optimal conditions, the scans were made every 30 minutes from 6:30 am to 6:30–7:00 pm when the monkeys would retire to a sleeping tree. Observations were made twice a month during three consecutive days with an interval of at least seven days between each observation period. During each scan, data were registered for five minutes on the first five adult or sub-adult monkeys seen clearly (Arroyo-Rodriguez et al. 2007). A total of 1,772 scans were made over 886 hours of observations. Activities recorded were grouped into five categories: social interactions, resting, moving, feeding and other (auto-grooming, vocalization, scratching, urination). When feeding, the plant species and parts eaten were recorded.

**Data collection: Habitat characteristics**

Vegetation structure was determined in two forest patches—Patch 1 in the Kikélé Sacred Forest and Patch 2 a connected gallery forest—through plot surveys following Braun-Blanquet (1932). Patch 2 was visited by the monkeys only occasionally. A total of 16 plots were set up at random in
four locations over the home range of the *C. vellerosus* group: 10 square plots of $30 \times 30$ m in Patch 1 (six in the dense forest, two in the woodland, and two in the savanna); and six rectangular plots of $25 \times 20$ m in Patch 2 (gallery forest). Plants with a diameter at breast height (DBH) of 10 cm or more were identified in each plot (Chapman *et al.* 1992). The height and the location of each sleeping tree were also recorded.

**Data analysis: Activity budget, diet and foods resources**

The time spent on each activity was estimated indirectly by calculating the percentage between the number of records of the activity and the total number of records. Data were computed using Statistica 10.0 and the significance level was set for analyses $\alpha = 0.05$. The three-day observation period is the unit of analysis ($N = 24$). An analysis of variance was performed to compare the times spent in each activity in the dry season and the wet season. The proportions of the items consumed were estimated indirectly by calculating the percentage of feeding records for each item against the total number of feeding records records.

**Data analysis: Habitat structure and computation of ecological indexes**

Three indices were computed to assess the habitats occupied by the colobus monkeys. The Shannon-Wiener Index of Diversity was used to estimate plant species diversity. Sorensen’s Coefficient ($S$) was calculated to compare similarity between the two forest patches: $S = 2C/A+B$, where $C$ is the number of species shared in both patches; $A$ and $B$ the number of species specific to each patch. If $S \leq 0.5$ the communities compared are dissimilar; if $S > 0.5$, the communities compared are similar. The Evenness Index of Pielou was used to examine how evenly the species recorded are represented in each habitat.

We also calculated the patch attendance rate through the ratio between the number of days where the colobus used Patch 1 and/or Patch 2, and the total number of observation days. We calculated the average diameter and height of sleeping trees and all the trees in each plot.

**Results**

**Activity budgets**

The time the *C. vellerosus* group spent resting was more than twice the time it spent feeding (56.6% vs. 26.3%), and more than four times the time allocated to moving (56.6% vs. 13.0%) (Fig. 2). Social interactions and other activities accounted for only 3.3% and 0.7% of the activity budget, respectively.

Activity budgets varied seasonally and monthly (Fig. 3). Seasonal fluctuations in feeding (df = 23, $F = 5.02$, $p = 0.03$) and moving (df = 23, $F = 12.6$, $p = 0.01$) were statistically significant, while those for resting, social interactions and other activities showed no difference (df = 23, $F < 4.28$ and $p > 0.05$ in each case). Regardless of the month, the time spent on resting was always more than 50% of the total activities.

**Daily activity pattern**

The monkeys were very active in the early morning; activities were dominated by moving and feeding. Activities could be broadly categorized into three periods: (i) in the morning, between 7:00 am and 10:00 am; (ii) in the afternoon, between 12:00 am and 2:00 pm, activities were dominated by resting and social interactions (grooming, physical contacts, playing, and scratching); whereas (iii) in the afternoon and early evening, between 3:30 pm and 5:30 pm, feeding, moving and social were the predominant activities. The large majority of social interactions were affiliative (94% were grooming and playing).

**Habitat characteristics**

Sixty species of 28 families were recorded in Patches 1 and 2. Most of the trees were of the families Moraceae (18% of the species) and Leguminosae (13%). Although the number
of food plants was similar in the two patches, the monkey troop used the forest of Patch 1 every day and entered the gallery forest of Patch 2 on only 57% of the days. Sorensen’s Index (0.33) showed a significant difference between the patches. The Evenness Index of Pielou had similar value for both patches (0.97) indicating an even distribution of recorded species (Table 1). The Shannon-Wiener Index of Diversity was also high in both patches, with its value being slightly higher in Patch 2 (H = 5.19) than in Patch 1 (H = 4.87) (Table 1).

Food plants and items consumed
The colobus monkeys ate 60 items; 59 plant parts (leaves 53.1%, fruits 33.3%, seeds 2.5%, stems 1.3%, bark 1.4%, buds 3.1%, flowers 2.45%, and petioles 2.8%) and one prey (ants). The plant parts came from 35 species belonging to 16 families (Table 2). The best represented families in the diet were the Leguminosae (29% of species) and Moraceae (23%). Leaves and fruits contributed more than 90% of the diet (Fig. 4).

Characteristics of sleeping trees
Over 72 nights, C. vellerosus used 13 trees of three species as sleeping sites in Patch 1. The species were Celtis integrifolia, Cola cordifolia, and Holoptelea grandis. The troop’s favorite species was C. integrifolia; six trees (DBH = 90–125 cm) were used on 86% of the 72 nights. Five H. grandis (DBH = 100–135 cm) were used on 10%, and two C. cordifolia trees (DBH = 110–120 cm) were used on 4%. The frequency of use of different trees in each species varied. Two Celtis integrifolia trees were used more than the other four individuals. The average diameter at breast height (DBH) and mean height of the 13 sleeping trees were 112.07 ± SD 14.23 cm and 22.53 ± SD 13.76 m, respectively, while the averages for all trees measured were 53.72 ± SD 38.26 cm for mean DBH, and 17.23 ± SD 9.81 m for mean height. Of note is that a sleeping tree could be used for several consecutive nights. One sleeping tree was used for two consecutive nights on twelve occasions, three consecutive nights on two occasions, and once for four consecutive nights.

Discussion
Activity budget
Colobus vellerosus of the Kikélé Sacred Forest showed an activity pattern similar to that of most colobines, with time spent on resting much greater than that spent on feeding. Table 3 shows the activity budgets of several species of black-and-white colobus monkeys and that of C. vellerosus in the Kikélé Sacred Forest recorded in this study. With the exception of Colobus guereza in Ituri, Democratic Republic of Congo, and C. angolensis ruwenzorii in Nyungwe, Rwanda, with 44% and 32% of the time spent on resting, respectively, all studies show that black-and-white colobus monkeys spend more than 50% of the time resting. Long resting time among colobines has been explained in a number of ways. Some authors have linked it to the need to ferment leaves for their digestion or to the quality of the habitat (Marsh 1981; Oates 1988; Korsjtens et al. 2010). It has also been considered a strategy of behavioral thermoregulation for Colobus polykomos, as it may limit energy losses (Dasilva 1992, 1994).

Differences in group activity budgets may be explained by differences in group size as social activities are more frequent in larger troops (Teichroeb et al. 2003), as well as by other factors such as predation risk, the social structure of troops, seasonality, and the availability and distribution of food resources (Kinnaird and O’Brien 2000). The time that C. vellerosus spent resting in Kikélé Sacred Forest was lower than that recorded for the same species in Ghana. This could be explained by the small size of the Kikélé group and the relatively poor quality of the habitat (Wong and Sicotte 2007). Our results contrast with the theory that indicates that time

Figure 4. Annual diet of Colobus vellerosus in the Kikélé Sacred Forest, Benin.

Table 1. Habitat characteristics in the Kikélé Sacred Forest, Benin.

| Designation | Habitat      | Area (ha) | Floristic diversity | Potential food plants (% of spp.) | Shannon Wiener Index | Pielou Evenness Index |
|------------|--------------|-----------|---------------------|-----------------------------------|----------------------|-----------------------|
| Patch 1 (Sacred Forest) | Dense forest | 6.38      | 40                  | 51%                               | 4.87                 | 0.97                  |
|            | Woodland     | 2.10      | 16                  | 44%                               | 3.52                 | 0.72                  |
|            | Savanna      | 3.56      | 26                  | 27%                               | 3.11                 | 0.55                  |
| Patch 2   | Gallery forest | 6.25     | 32                  | 50%                               | 5.19                 | 0.97                  |
spent resting increases when it is hotter (Chaves et al. 2011). We found no difference in time spent resting by colobus in dry and rainy seasons. This is probably a consequence of the degraded habitat; Kikélé Sacred Forest is a small fragmented forest.

**Feeding**

Fifty eight percent of the plant species occurring in the study area contribute to the diet of *Colobus vellerosus*. Our findings are congruent with previous works that suggest that the Leguminosae provides the main food sources for colobus monkeys (Davies et al. 1988). Consumption of *Erythrophleum suaveolens* leaves by *C. vellerosus* was also confirmed despite their toxicity (see Kay and Davies 1994).

Feeding generally ranks after resting in the activity budget of colobines, unlike other primates where feeding is the primary activity (for example, *Cercopithecus ascanius*: Cords 1987; *Lagothrix lagothricha*: Defler 1996). The diet of the *C. vellerosus* group was dominated by leaves, as has been reported elsewhere for this species. However, when compared to other sites, leaves are much less dominant (i.e., 53% vs. 74% in Ghana, Saj et al. 2005; Tan 2006; Wong et al. 2006). Foods such as fruits, seeds and ants also seem to be important components. This could result either from a locally higher diversity of food resources or a shortage in the preferred food (i.e., leaves); leading to exploration and inclusion of alternative foods in the diet.

**Sleeping sites and their characteristics**

The monkeys of the Kikélé Sacred Forest chose the Patch 1 forest for their sleeping sites and never slept in Patch 2, the gallery forest. This may be an anti-predation strategy because gallery forest used to be exploited by people from the surrounding villages (i.e., Manigri, Bassila), and colobus monkeys were hunted there over many years. Although there is currently no hunting in the Kikélé Sacred Forest, this finding

### Table 2. Food plants consumed by Colobus vellerosus in the Kikélé Sacred Forest, Benin.

| Scientific name          | Common name (Nagot) | Family                     | Food item¹ |
|--------------------------|---------------------|----------------------------|------------|
| *Afzelia africana*       | Akpaka              | Leguminosae - Caesalpinioideae | UFr        |
| *Albizia zygia*          | Itikpalala          | Leguminosae-Mimosoideae    | L, UFr, B, Ba |
| *Anacardium occidentale* | Amé gnibo           | Anacardiaceae              | Fl         |
| *Anogeissus leiocarpa*   | Koloo               | Combretaceae               | ML         |
| *Azadirachta indica*     | Lili                | Meliaceae                  | YL, ML, Re, St |
| *Cassia sp.*             | Agbélékokpayan      | Leguminosae - Caesalpinioideae | YL        |
| *Caesalpinia pulcherrima*|                     | Leguminosae - Caesalpinioideae | UFr, F    |
| *Ceiba pentandra*        | Araba               | Malvaceae-Bombacoideae     | YL         |
| *Celtis integriololia*   | Afofè               | Ulmaceae                   | YL, MF, UFr |
| *Cola cordifolia*        | Kpoé                | Sterculiaceae              | UFr, Lai,PB |
| *Cynometra vogeli*       |                     | Leguminosae-Caesalpinioideae | MF, UFr, S |
| *Daniella oliveri*       | Iya                 | Leguminosae-Caesalpinioideae | UFr        |
| *Diospyros mespiliformis*| Don’ko              | Ebenecae                   | Fr         |
| *Erythrophleum suaveolens*| Ayinyin             | Leguminosae - Caesalpinioideae | Fr, UFr  |
| *Ficus capensis*         | Adan Abo            | Moraceae                   | UFr, YL    |
| *Ficus congensis*        | Kpolidi             | Moraceae                   | UFr, YL    |
| *Ficus exasperata*       | Oupi                | Moraceae                   | UFr, YL    |
| *Ficus ingens*           |                     | Moraceae                   | UFr, YL    |
| *Ficus platypilla*       |                     | Moraceae                   | UFr, YL    |
| *Ficus polita*           |                     | Moraceae                   | UFr        |
| *Ficus sycomorus*        |                     | Moraceae                   | UFr        |
| *Ficus thonningii*       | Okpoto              | Moraceae                   | YL         |
| *Holoptelea grandis*     | Kpakokpako          | Ulmaceae                   | YL, UFr, B |
| *Khaya senegalensis*     | Agao                | Meliaceae                  | YL, UFr    |
| *Lonchocarpus cyanensens*| Elou                | Leguminosae - Papilionoideae | Fr        |
| *Luffa aesthetica*       |                     | Curcurbitaceae             | UFr, L     |
| *Mimusops multiverris*   |                     | Sapotaceae                 | Fr         |
| *Sarocephalus latifolius*| Ewé eikikoro        | Rubiaceae                  | L          |
| *Newbouldia leavis*      |                     | Bignoniaceae               | L          |
| *Parinari curtatifolia*  | Imédou              | Chrysobalanaceae           | L          |
| *Parkia biglobosa*       | Igba                | Leguminosae - Mimosoideae  | Fl         |
| *Parquetina nigrescens*  |                     | Asclepiadaceae             | L          |
| *Pterocarpus erinaceus*  | Akpékpé             | Leguminosae - Papilionoideae | YL        |
| *Strophantus sarmentosus*|                     | Apocynaceae                | UFr, S, L  |
| *Tapinanthus voliensis*  | Afoman              | Loranthaceae               | UFr, L     |

¹Legend: YL= young leaves; ML= matures leaves; L= leaves; UFr = Unripe fruit; R= resin; Fl= flowers; B= buds; S=seeds; Ba= bark; St= Stem; P= petiole.
Table 3. Comparison of the activity budget of the white-thighed colobus, Colobus vellerosus, at Kikélé with those of other Colobus species.

| Species                  | Group size | Rest | Feed | Move % | Social % | Source               |
|--------------------------|------------|------|------|--------|----------|----------------------|
| Colobus vellerosus       |            |      |      |        |          |                     |
| Fragments surrounding    | 31–33      | 60   | 24   | 12     | 4        | Teichroeb et al. (2003) |
| Boabeng-Fiema            | 15–16      | 58   | 23   | 17     | 2        |                      |
|                          | 7–8        | 59   | 24   | 15     | 2        |                      |
| Fragments surrounding    | 8, 16, 17  | 68   | 22   | 7      | 3        | Wong and Sicotte (2007) |
| Boabeng-Fiema            |            |      |      |        |          |                     |
| Kikélé, Benin            | 13–18      | 56.64| 26.31| 13.04  | 3.13     | This study           |
| Colobus polykomos        |            |      |      |        |          |                     |
| Tiwai, Sierra Leone      | 9–11       | 55   | 31   | 12     | 2        | Dasilva (1992)       |
| Parc National de Tai,    | 14         | 58   | 25   | 16     | 1        | Bitty (unpubl. data) |
| Ivory Coast              | 11–12      | 54   | 21   | 25     | 0        |                      |
|                          | 16         | 70   | 11   | 15     | 4        |                      |
| Colobus guereza          |            |      |      |        |          |                     |
| Kibali, Uganda           | 9          | 57   | 20   | 5      | 11       | Oates (1977)         |
| Ituri, RDC               | 8–10       | 44   | 26   | 24     | 5        | Bocian (1997)        |
| Kakamega, Kenya          | 10–13      | 63   | 28   | 2      | 6        | Fashing (2001)       |
| Colobus angolensis       |            |      |      |        |          |                     |
| ruwenzorii               | 19–20      | 52   | 19   | 22     | 5        | Bocian (1997)        |
| Nyungwe, Rwanda          | >300       | 32   | 42   | 20     | 5        | Fashing et al. (2007) |
| Colobus angolensis       |            |      |      |        |          |                     |
| palliatus                | 5–6        | 64   | 22   | 3      | 4        | Wijten et al. (2012) |
| Colobus satanas          |            |      |      |        |          |                     |
| Douala-Edea,Cameroun     | 13–17      | 54   | 23   | 4      | 13       | McKay and Waterman (1982) |

may support the hypothesis of predator avoidance in the selection of sleeping sites, as indicated in studies of other primates (for example, Saguinus mystax and S. fuscicollis: Heymann 1995; Macaca leonina: Albert et al. 2011) and for C. vellerosus by Teichroeb et al. (2012). Although there is no predation, in Patch 1 the colobus monkeys chose sleeping trees to rest. Predator avoidance behaviors could also be associated with hunting in the vicinity of the study area, as mentioned above. However, other factors such as reducing time and energy needed for foraging could also determine sleeping tree selection (Anderson 1998).

The physical characteristics of the sleeping sites also support the idea that C. vellerosus at Kikélé selects sleeping sites to avoid predators. The sleeping trees were generally the largest and tallest trees, undoubtedly reducing the chances of predators climbing them. Some large and tall trees, however, were not used as sleeping sites. This was the case for a Ficus sp., Albizia zygia, and Blighia sapida (Sapindaceae); the first two being food species for the colobus monkeys. Selection of sleeping trees is probably also linked to other physical characteristics of the trees. Celtis integrifolia was the species the monkeys slept in most. Compared to the other trees, Celtis integrifolia has very rigid stems and its branches are well spread, which allows for a better distribution of colobus monkeys through the crown and, it could well be more comfortable. However, the monkeys seemed to prefer certain individual trees of the same species despite their similar physical characteristics. This may be a question of habit, or may be linked to their position, which may, for example, allow for better views of their surroundings (Bovy 2010; Maslarov 2012).

Use of the same sleeping tree on consecutive nights may be due to the lack of predators. In high-risk environments, primates often avoid consecutive use of the same sleeping sites so as to reduce detection by predators (Li et al. 2006; Phoonjampa et al. 2010). The selection of sleeping trees appears to be a compromise between several factors—species, diameter and height, and location—and the preference of C. vellerosus for C. integrifolia in Kikélé may also be explained by the fact that it is also used for feeding and resting during the day, with monkeys spending up to eight hours a day on its branches.

Conservation

The white-thighed colobus formerly occurred over a relatively wide swath of West Africa, east of Côte d’Ivoire from between the Sassandra and Bandama rivers to western Nigeria. It occurs in a number of protected areas, but hunting (primarily) and habitat loss are now major threats. It is declining fast in Côte d’Ivoire, rare in Benin and Togo, possibly extinct in Nigeria, and heavily hunted in Ghana (Gonedelé Bi et al. 2010; Oates 2011). Ginn and Nekaris (2014) indicated that it may have been extirpated already from southern Burkina Faso. Its survival will be strongly dependent on small sanctuaries and forest reserves, such as those in Benin. The permanence of the single troop in the Kikélé Sacred Forest and the other small populations in forest patches and forest reserves
will depend on careful management, which will demand a good understanding of their population dynamics and ecological needs with regard to food resources and sleeping sites. Our study suggests that *C. vellerosus* shows an activity pattern similar to most colobines elsewhere. However, its diet seemed to be more balanced between leaves and other items such as fruits, seeds, ants, buds, bark, flowers, gum, and inflorescences. The choice of sleeping trees indicates persistence of predation avoidance behaviors despite the absence of predators. As Oates (2011) pointed out, hunting for its meat and fur is the main threat, exacerbated by logging and forest destruction since the 1970s. As such, translocation, forest restoration and active meta-population management are predictably the necessary future steps for its conservation.

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