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Distribution of Diurnal Primate Species in Togo and Bénin

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Key Words
Diurnal primates · Togo · Bénin · Distribution · Survey · Dahomey Gap

Abstract
The Dahomey Gap, a strip of forest-savanna mosaic that interrupts the lowland rainforests of West Africa, is supposed to have acted as a natural barrier to the distribution of forest-dwelling mammals. However, few thorough mammal surveys have been conducted in this region. This study intended to gather distributional data and help clarify the distribution limits of diurnal primates occurring within this 'Gap'. Southern Togo and Bénin were surveyed between June and November 2003. The surveys consisted of interviews with hunters and guards from parks and reserves, and walking surveys of forests. As a result, seven diurnal primate species are listed for Togo and Bénin.

Introduction

West Africa's vegetation includes the Upper Guinean forest block in its western part and the Lower Guinean forest block in its eastern part, the two blocks being separated by the Dahomey Gap. The Dahomey Gap is a strip of forest-savanna mosaic that stretches from Elmina, Ghana, in the west to Porto-Novo, Bénin, in the east, thus interrupting the two lowland rain forest blocks [Robbins, 1978; Ern, 1988; Oates, 1988; Martin, 1991] (fig. 1). The xerophytic vegetation found in the Dahomey Gap is due to particular topographic, oceanographic and climatic interactions that result in lower precipitation on the mainland [Jenik, 1984, 1994]. This difference in vegetation is thought to have acted as a major biogeographical barrier, affecting the distribution of many mammal species in West Africa [Booth, 1958; Moreau, 1969; Oates, 1988].

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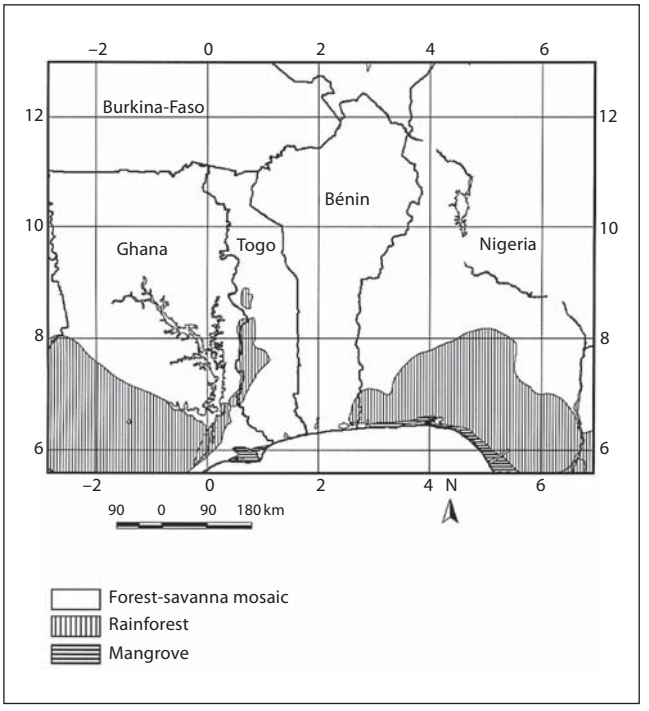
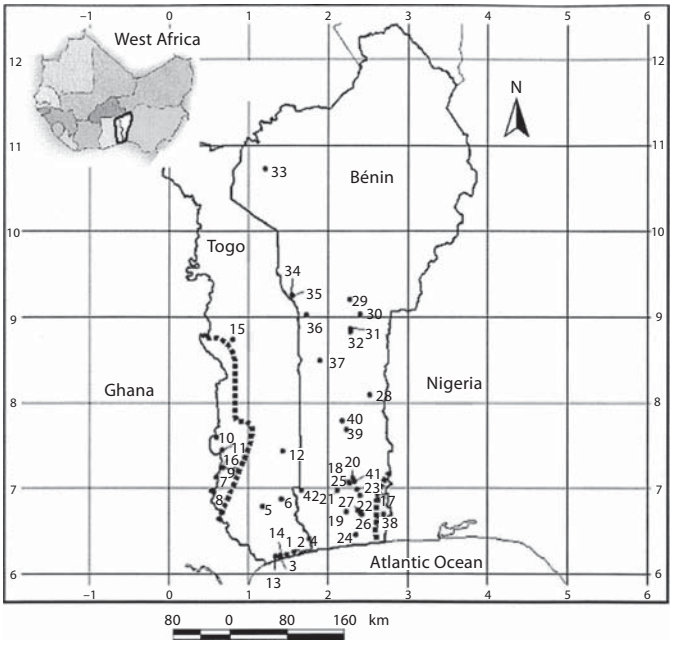


Fig. 1. Differences in vegetation occurring in the Dahomey Gap [modified after Hearn et al., 2001].

Angus Booth [1954, 1956a] clarified the distribution limits of several mammal species based on fieldwork in Ivory Coast, Ghana and Western Togo. He also wrote about the distribution of mammals, including primates, for all of West Africa [Booth, 1958]. However, he based the presence or absence of primate species in Togo and Bénin only on the literature available, which was scarce and predominantly anecdotal. Recent studies have been conducted in most countries of the Upper and Lower Guinean forest blocks, but these studies have neglected the Dahomey Gap, i.e. Togo and Bénin [e.g. Oates et al., 2000; Werre, 2001; Magnuson, 2002–2003; Gippoliti and Dell'Omo, 2003; Galat and Galat-Luong, 2006]. To date, there is no comprehensive published survey of mammals in Togo and the only published survey of mammals in Bénin was based on research conducted between 1974 and 1979 [Sayer and Green, 1984]. Sayer and Green [1984] focussed mainly on the northern part of Bénin and on the presence of animals in markets, which is not reflective of a thorough and accurate survey of mammals present.

In this study we report the diurnal primate species we identified in part of the Dahomey Gap, primarily within southern Togo and Bénin, in order to validate and extend the findings of previous surveys. In addition, we attempt to clarify the distribution limits of several primate species, allowing us to update currently available distribution maps.



Togo
1. Togoville
2. Kouenou Forest
3. Amédéhoévé Forest
4. Avévé
5. Amakpavé
6. Togodo Forest
7. Yikpa-Gigbé
8. Mont Klouto
9. Dzobégan
10. Badou
11. Agbo-kopé
12. Nangbéto
13. Dégodji Forest
14. Amaréhoévé Forest
15. Fazao-Malfakassa NP
16. Alhon Bogo

Bénin
17. Gnanhouizoumé
18. Koussoukpa
19. Domé
20. Gbafo
21. Lama Forest
22. Houessio Sacred Forest
23. Kpokissa
24. Jocombi Forest
25. Lokoli
26. Togbota-Agué
27. Walli Forest
28. Diho
29. Bétérou
30. Alafiarou
31. Koda
32. Agbassa
33. Tiélé (Pendjari NP)
34. Pénélan
35. Pénéssoulou Forest
36. Kikélé
37. Banon
38. Lagbé
39. Atcherigbé
40. Mojigangan
41. Go
42. Tchatéhoué

Fig. 2. Localities surveyed in Togo and Bénin. Dashed lines represent the approximate eastern and western limits to, respectively, the Upper and Lower Guinean forest blocks. Inset: map of West Africa with the two countries encircled.

Methods

Area Covered

This survey concentrated on the Dahomey Gap, to the South of Togo and Bénin, an area corresponding to a mosaic of intact and degraded dry semi-deciduous forests, cropland and secondary grassland [Ern, 1988; Jenik, 1994; Salzmann and Hoelzmann, 2005]. Additional localities (No. 7–11 and 16 for Togo; No. 38 for Bénin) were surveyed in the dense forest blocks in Western Togo and Eastern Bénin. Overall, 16 localities were surveyed in Togo and 26 in Bénin (table 1; fig. 2). Bénin was surveyed more extensively, because of ongoing primate research in that area (conducted by G.C.). In Togo, the survey extended as far north as Bounako in the Fazao-Malfakassa National Park (FMNP) (fig. 2: No. 15) and as far west as Mont Klouto (fig. 2: No. 8). In Bénin, the survey area extended north to Tiélé (fig. 2: No. 33) and east to Lagbè (fig. 2: No. 38).

Data Collection

Villages and forests were surveyed in Togo during September 2003 and in Bénin between June and November 2003. Additionally, two localities were surveyed in Togo in October 2005 (fig. 2: No. 15 and 16). The surveys included two types of data collection: (1) interviews with local hunters and officials and (2) walking surveys of the forests.

Table 1. Location and detail of observations for each locality surveyed in Togo and Bénin

	Localities	Coordinates	Survey type	Survey effort		Species							
				h	km	*C. erythrogaster*	*C. petaurista*	*C. mona*	*C. tantalus*	*E. patas*	*P. anubis*	*Co. vellerosus*	*Pr. verus*
Togo													
1	Togoville	06°13′ N; 01°28′ E	1; 2	4	3	–	–	R	R	–	–	–	–
2	Kouenou Forest	06°14′ N; 01°34′ E	2	2	1.5	–	–	–	S	–	–	–	–
3	Amédéhoévé Forest	06°11′ N; 01°23′ E	2	3	2.5	–	–	–	S	–	–	–	–
4	Avévé	06°24′ N; 01°45′ E	1; 2	3	2.5	–	–	R	R	R	–	–	–
5	Amakpavé	06°46′ N; 01°10′ E	1	–	–	–	–	R	R	R	–	–	–
6	Togodo Forest	06°51′ N; 01°24′ E	1; 2	6	5	H?	–	H S R	R	R	R	–	–
7	Yikpa-Gigbé	07°07′ N; 00°36′ E	1	–	–	–	R	R	R	–	R	R P	–
8	Mont Klouto	06°57′ N; 00°34′ E	1	–	–	–	R	R	–	–	–	–	–
9	Dzobégan	07°13′ N; 00°40′ E	1	–	–	–	–	R	–	–	–	–	–
10	Badou	07°34′ N; 00°36′ E	1	–	–	–	–	–	–	–	–	–	–
11	Agbo-kopé	07°25′ N; 00°39′ E	1	–	–	–	–	–	–	–	–	–	–
12	Nangbéto	07°25′ N; 01°26′ E	1	–	–	–	–	R	R C	R C	–	–	R
13	Dégodji Forest	06°11′ N; 01°20′ E	1; 2	3	2	–	–	R	R	R	R	–	–
14	Amaréhoévé Forest	06°12′ N; 01°23′ E	1; 2	5	4	–	–	R	S R	R	R	–	–
15	Fazao-Malfakassa NP	08°44′ N; 00°48′ E	1; 2	296	296	–	–	H S R	H S R	S R C	H S R	H S R	–
16	Alhon Bogo	07°14′ N; 00°40′ E	1; 2	6	5.5	–	H S R	R	–	–	–	–	–
Bénin													
17	Gnanhouizoumé	06°54′ N; 02°24′ E	1; 2	22.5	22.5	R	–	H S R	S R	–	–	R	S R
18	Koussoukpa	07°02′ N; 02°15′ E	1	–	–	R	–	R	R	R	–	R	R
19	Domé	06°42′ N; 02°13′ E	1	–	–	R	–	R	R	R	–	R	R
20	Gbafo	07°06′ N; 02°18′ E	1	–	–	R	–	R	R	R	–	–	R
21	Lama Forest	06°58′ N; 02°07′ E	1; 2	323	323	H S R	–	H S R	S R	–	–	H S R	H S R
22	Houessio Sacred Forest	06°41′ N; 02°25′ E	1; 2	3	3	–	–	R	R	–	–	R	R
23	Kpokissa	06°58′ N; 02°21′ E	1; 2	8	7.5	H S R		H S R	R	R	–	–	R
24	Jocombi Forest	06°27′ N; 02°20′ E	1	–	–	–	–	–	R	–	–	–	–
25	Lokoli	07°03′ N; 02°15′ E	1; 2	79.5	79.5	H S R	–	H S R	R	R	–	R	R
26	Togbota-Agué	06°41′ N; 02°24′ E	1; 2	107	107	H S R	–	H S R	S R	R	–	R	H S R
27	Walli Forest	06°43′ N; 02°22′ E	1; 2	2	3	R	–	R	R	–	–	–	R
28	Diho	08°04′ N; 02°31′ E	1	–	–	–	–	–	R	R	R	–	–

Table 1 (continued)

	Localities	Coordinates	Survey type	Survey effort		Species							
				h	km	*C. erythrogaster*	*C. petaurista*	*C. mona*	*C. tantalus*	*E. patas*	*P. anubis*	*Co. vellerosus*	*Pr. verus*
29	Bétérou	09°12′ N; 02°16′ E	1	–	–	–	–	R	R	R	R	R	–
30	Alafiarou	09°01′ N; 02°24′ E	1	–	–	–	–	R	R	R	R	R	–
31	Koda	08°51′ N; 02°17′ E	1	–	–	–	–	R	R	R	R	R	–
32	Agbassa	08°49′ N; 02°17′ E	1	–	–	–	–	R	R	R	R	R	–
33	Tiélé (Pendjari NP)	10°43′ N; 01°12′ E	1; 2	8	6	–	–	–	R	R	H S R	–	–
34	Pénélan	09°14′ N; 01°32′ E	1; 2	4	3	–	–	–	R	R	R	R	–
35	Pénéssoulou Forest	09°14′ N; 01°33′ E	1	–	–	–	–	R	R	R	R	R	–
36	Kikélé	09°00′ N; 01°43′ E	1; 2	4	2	–	–	R	R	R	R	H S R	–
37	Banon	08°29′ N; 01°53′ E	1	–	–	R	–	R	R	R P	R	R P	–
38	Lagbé	06°41′ N; 02°41′ E	1; 2	5	3.5	R	–	H S R	R	R	R	–	R
39	Atcherigbé	07°40′ N; 02°13′ E	1	–	–	–	–	R	R	R	R	–	–
40	Mojigangan	07°47′ N; 02°11′ E	1	–	–	–	–	–	R	R	R	–	–
41	Go	07°04′ N; 02°19′ E	1; 2	3	3	–	–	S R	R	R	–	–	S R
42	Tchatéhoué	06°58′ N; 01°39′ E	1	–	–	–	–	R	R	R	R P	–	R

Survey type: 1 = interview, 2 = walking survey of forest. Survey effort: h = hours spent surveying the forest, compiled to the nearest half hour, km = approximate number of kilometres covered, derived from the walking speed. Species: H = species was heard, S = species was seen, R = species was reported during interviews, C = species was seen in captivity, P = a pelt of the species was seen during interviews.

Interviews with Hunters and Officials

The first interviews took place in the capitals of Togo and Bénin, respectively Lomé and Cotonou, and were conducted in French. We interviewed officials from universities, export companies and from the Direction de la Faune et de la Chasse (Wildlife and Hunting Division). We also visited six markets and interviewed hunters who supplied primates to bushmeat and fetish markets. These people would often refer to other contacts (e.g. hunters, dealers, wildlife scientists), so we tried to interview as many people as possible. From the preliminary information gathered, we planned the areas to be surveyed. Further consultations took place in the villages near forests that were considered potential primate habitats. In each village, we spoke to local hunters with the aid of a local translator when required. These hunters were asked to enumerate the primate species extant and extinct in their region and to describe them in terms of colour, size, vocalization, habitat and behavioural characteristics (such as polyspecific association). These preliminary identifications were confirmed by asking hunters to select the correct species from a field guide [Kingdon, 2001] or photograph. Occasionally, species were identified from skins that had been preserved by hunters.

Walking Surveys of the Forests

The surveys followed existing trails and focussed on areas of suitable primate habitat. Efforts were also made to locate rare primate species that had been identified by hunters. The survey teams consisted of between two and four people: G.C. (all surveys), J.T. (for localities

1–14; 28–37; 39–41) and one or two local hunters. A total search effort of 897 h along approximately 885 km was undertaken in 9 localities in Togo and 12 in Bénin (table 1). Where possible, the surveys were carried out in the early morning or late afternoon to increase the chance of seeing primates. When primates were seen or heard, we used binoculars to enable a detailed record of coat colour features to be made and/or documented the characteristics of calls in order to identify which primate species had been encountered. We also consulted with hunters to further confirm the identifications. Primate taxa differ in their habitat use, group size, locomotion, anti-predator strategies and response to observers, which may cause differences in detectability and may account for us only rarely detecting certain species during our surveys [Campbell et al., 2007]. These surveys were done solely to confirm the presence of primate species within these areas, and therefore no data on species abundance were collected.

Data Analysis

The distribution results from this survey were spatially referenced using the Geographical Information System ArcView 3.2. The numbers and distribution of species found during this survey were compared to available information and maps from the literature.

Results

In total, 28 hunters were interviewed in Togo and 51 in Bénin. On the basis of the interviews and surveys, we list seven species as present in Togo and seven in Bénin (table 2). An eighth species *(Cercopithecus erythrogaster)* is tentatively suggested for Togo, but its presence requires confirmation. Indeed, during this survey no individual of this species was seen in Togo, but we heard an alarm call that was identified as being from an adult male *C. erythrogaster*. All of these species, except *C. petaurista* and *C. erythrogaster*, are found on both sides of the Dahomey Gap.

The following are the distribution results for the diurnal primate species encountered in the area surveyed. They are based on personal observations or acceptable reports from hunters. A report was judged 'acceptable' when there was concordance between local name, description, call of species given by the hunter and the subsequent identification of the species on pictures.

Cephus *Superspecies*

The red-bellied guenon *(C. erythrogaster erythrogaster)* was found only in Bénin (fig. 3; table 1), in 42% (11/26) of the localities surveyed. It is possible that they range up to Banon (8°29′ N); no individuals were encountered at this site, but their presence was reported by hunters. Their distribution range might also extend into Togo (see discussion). *C. petaurista petaurista* were found only in Togo, in 19% (3/16) of the localities surveyed, mainly in forests at the border with Ghana (fig. 3).

Cercopithecus mona

The mona monkey *(C. mona)* was found in 75% (12/16) and 81% (21/26) of the localities surveyed in Togo and Bénin, respectively (fig. 4). They range from west to east in both countries and were recorded as far north as 9°14′ N in Bénin.

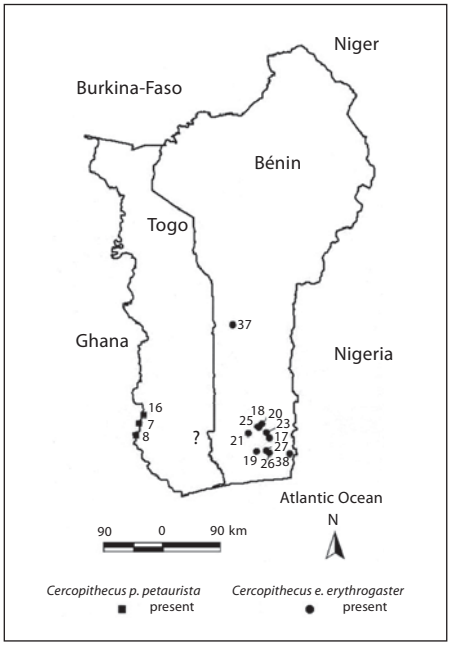


Fig. 3. Distribution of two subspecies belonging to the *Cephus* superspecies in Togo and Bénin. Question mark is for *C. e. erythrogaster* and discussed in the text.

Table 2. Primate species list for Togo and Bénin

Country	Species	Heard[1]	Seen[1]	Reported[2]
Togo	*Cercopithecus e. erythrogaster*	?		+
	Cercopithecus p. petaurista	+	+	+
	Cercopithecus mona	+	+	+
	Cercopithecus aethiops tantalus		+	+
	Erythrocebus patas		+	+
	Papio anubis	+	+	+
	Colobus vellerosus	+	+	+
	Procolobus verus			+
Bénin	*Cercopithecus e. erythrogaster*	+	+	+
	Cercopithecus mona	+	+	+
	Cercopithecus aethiops tantalus		+	+
	Erythrocebus patas		+	+
	Papio anubis	+	+	+
	Colobus vellerosus	+	+	+
	Procolobus verus	+	+	+

[1] Primate species heard or seen by G.C.
[2] Primate species reported by hunters to be still present and common.

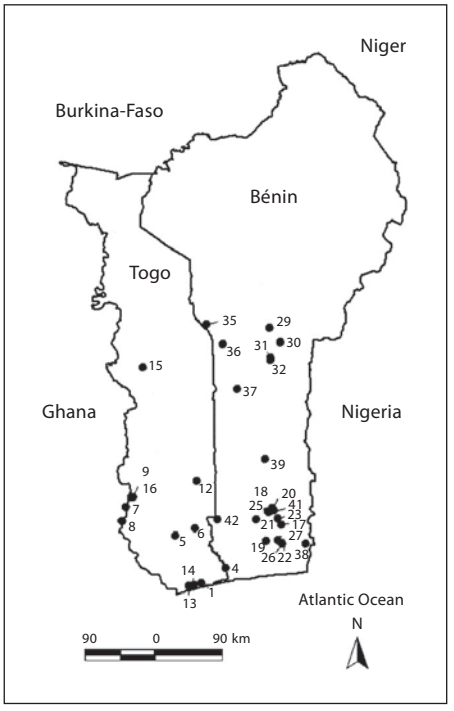


Fig. 4. Distribution of *C. mona* in Togo and Bénin.

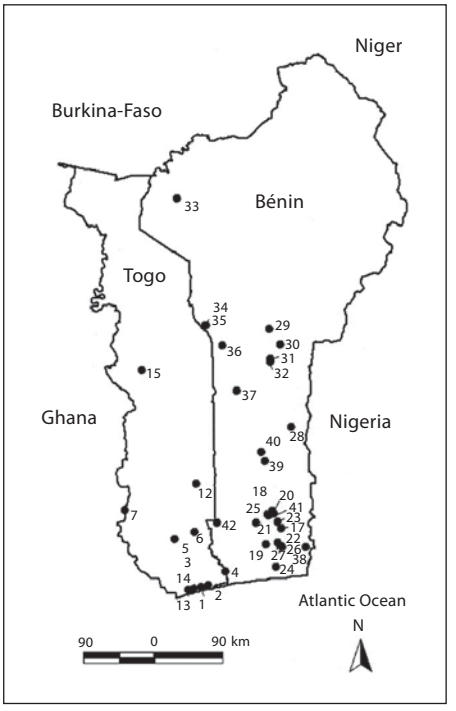


Fig. 5. Distribution of *C. aethiops tantalus* in Togo and Bénin.

The Savanna Primate Species

The tantalus monkey *(Cercopithecus aethiops tantalus)* appears widespread throughout Togo and Bénin, residing in degraded habitats or forest edges (fig. 5). They were recorded in 69% (11/16) of the localities surveyed in Togo and 100% (26/26) of the localities in Bénin, as far north as Tiélé (10°43′ N).

Patas monkeys *(Erythrocebus patas)* and olive baboons *(Papio anubis)* were reported by hunters to occur mostly in northern Togo and Bénin. They were also reported in southern Togo and Bénin (fig. 6, 7) but were never seen south of 6°51′ N. The presence of patas monkeys was recorded for 44% (7/16) of the localities surveyed in Togo and 81% (21/26) in Bénin. Baboons were reported in 31% (5/16) of the localities surveyed in Togo and 54% (14/26) in Bénin.

Colobus vellerosus

The white-thighed colobus *(Co. vellerosus)* was reported by local hunters in several areas in Togo, but reports could only be confirmed in two localities (13%; 2/16). In Bénin, they were observed in different habitats, including swamp forests, semi-deciduous forests and gallery forests, and encountered in 58% (15/26) of the localities surveyed (fig. 8). The locality in which they were most visible was in Kikélé (Bénin: No. 36 on fig. 2), where they are sacred and therefore do not fear man.

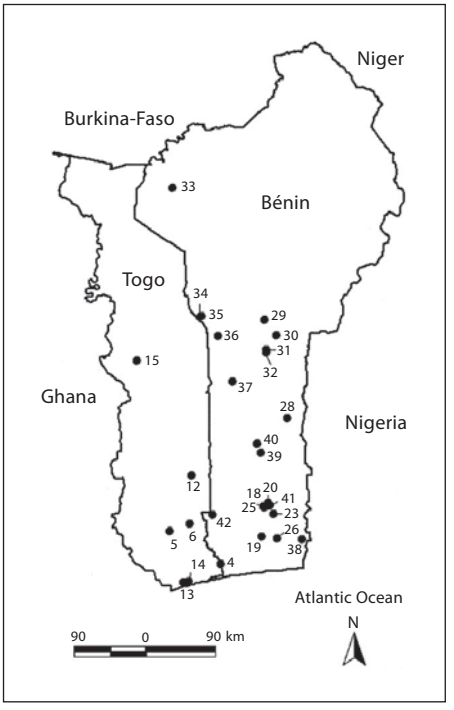


Fig. 6. Distribution of *E. patas* in Togo and Bénin.

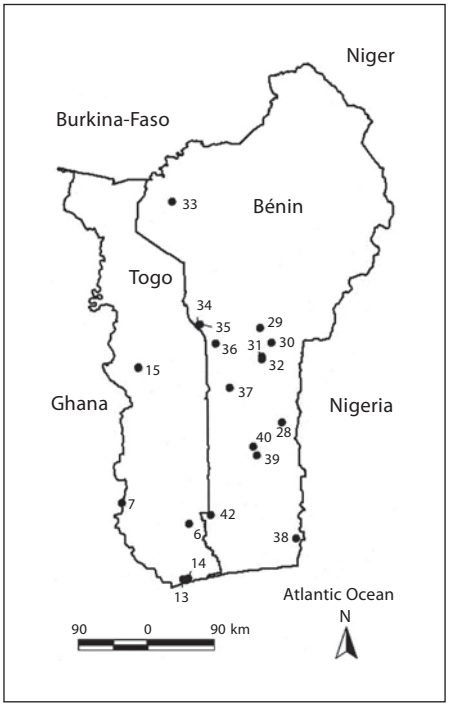


Fig. 7. Distribution of *P. anubis* in Togo and Bénin.

Procolobus verus

The olive colobus *(Pr. verus)* can be difficult to observe in its natural environment because of its cryptic colouration and behaviour, having a dull olive-brown pelage, residing in small groups, usually as part of a large polyspecific association, and mainly occupying the lower and middle dense vegetation strata [Anadu and Oates, 1988; Korstjens, 2001; Fashing, 2007]. Therefore, we only encountered this species in Bénin, where the survey effort was greater. It was reported for 50% (13/26) of the localities surveyed in Bénin (fig. 9). No sightings of olive colobus were made in Togo by our team, although it was reported and accurately described by hunters in one locality (fig. 9).

Discussion

The primate species lists for Togo and Bénin quantified by this study are similar to previous lists assembled by Oates [1996a] (table 2). However, some of our findings on the distributional patterns of species differ from previously published distributional data. In the following section, we will discuss each species separately and compare our findings to previous accounts on the distribution of diurnal primate species in the region.

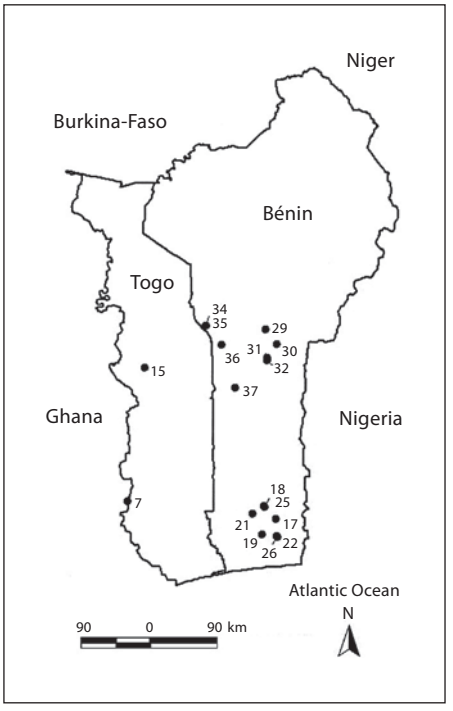


Fig. 8. Distribution of *Co. vellerosus* in Togo and Bénin.

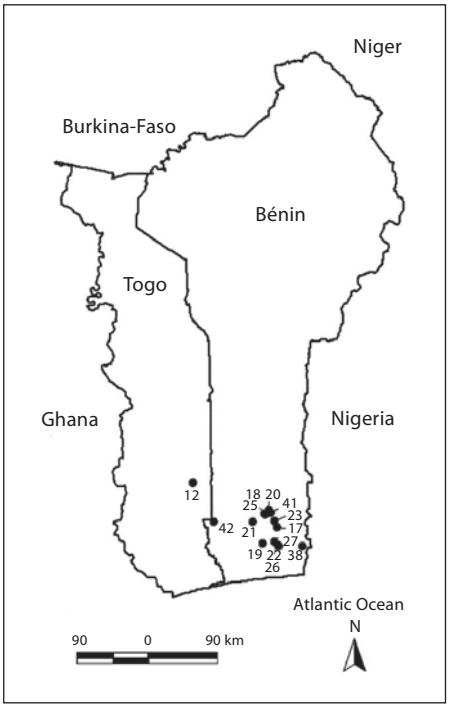


Fig. 9. Distribution of *Pr. verus* in Togo and Bénin.

Cercopithecus erythrogaster erythrogaster

The red-bellied guenon *(C. e. erythrogaster)* is thought to be restricted and endemic to southern Bénin [Sinsin et al., 2002]. In 1987, a red-bellied guenon was shipped to the Mulhouse zoo in France. The individual was believed to have been captured in forests around Lomé, Togo [Oates, 1996b; J.M. Lernould, pers. commun.]. Following this finding, Oates [1996b] conducted surveys in both southern Togo and Bénin but was only able to locate red-bellied guenons in the Lama Forest, southern Bénin. Our findings suggest that red-bellied guenons may be present in the Togodo Forest in Togo (No. 6 on fig. 2).

The Togodo Forest is dominated by semi-deciduous forest, similar to the Lama Forest in Bénin but with a more hilly terrain. During the walking survey of Togodo, we identified an alarm call from an adult male *C. e. erythrogaster*[1], which was in a mixed group with mona monkeys. However, we were unable to make a positive visual identification. *C. e. erythrogaster* and *C. p. petaurista* are closely genetically related and share similar calls [Gautier, 1989]. Since both species have been reported

[1] The first author is familiar with the calls of *C. e. erythrogaster*, having conducted fieldwork on this subspecies [Campbell, 2005].

in Togo, it is possible that the alarm call may have emanated from *C. p. petaurista*. However, the reports of hunters suggest that this was not the case. In Togodo, hunters failed to recognize *C. p. petaurista* from pictures but positively identified *C. e. erythrogaster*. Furthermore, a poacher was caught with a *C. e. erythrogaster* in the area surrounding Togodo following the completion of our survey [December 2004, Tchibozo, pers. commun.]. More extensive surveys of southern Togo have been planned by Togolese and Beninese NGOs to confirm whether or not *C. e. erythrogaster* range in Togo.

Cercopithecus p. petaurista

In the 1950s, Booth and Tappen listed the eastern limit to the distribution of *C. p. petaurista* as French Togoland, which is now Togo [Booth, 1956b; Tappen, 1960]. In the more recent *Kingdon Field Guide to African Mammals* [Kingdon, 2001], the distribution of *C. p. petaurista* extends eastward into Bénin. However, during this survey, no *C. p. petaurista* were found east of the Upper Guinean forest block, including its outliers in Togo, at the Togo-Ghana border. Our results concur with Booth and Tappen's distribution lists. The view that *C. p. petaurista* does not extend east of Togo is shared by Grubb et al. [1998] and J. Oates [pers. commun.]. *C. p. petaurista* were probably thought to occur in Bénin based on the sole article on mammal distribution in Bénin [Sayer and Green, 1984]. The authors reported seeing *C. p. petaurista* in captivity in Cotonou and thus suggested that *C. p. petaurista* was widespread in southern Bénin. Both *C. p. petaurista* and the red-bellied guenon *(C. e. erythrogaster)* belong to the *cephus* superspecies. Therefore, it is possible that *C. p. petaurista* is only found in forests associated with the Upper Guinean block and that *C. e. erythrogaster* replaces this species in the forest-savanna mosaic of the Dahomey Gap.

Cercopithecus mona

During our field observations, the mona monkey was found to be common in Togo and Bénin but became rarer towards the north. They did not appear to be specialized to any particular habitat type, since they were found in swamp forests, semi-deciduous forests, fragmented semi-deciduous forests, and grasslands near forest fragments. Their utilisation of various habitat types is consistent with previous published observations [Gartlan and Struhsaker, 1972; Howard, 1977; Angelici et al., 1999; Kingdon, 2001].

Colobus vellerosus

During our surveys in Togo, we could only confirm the presence of *Co. vellerosus* in two localities: Yikpa-gigbé and the FMNP. However, hunters reported their occurrence in many localities throughout the country. In the FMNP, several groups were seen in gallery forests and savanna habitat [Campbell and Radley, 2006].

In Bénin, *Co. vellerosus* was found throughout the country in semi-deciduous, gallery and riparian forests. The white-thighed colobus is often called 'toklan' in the Fongbé language spoken in southern Bénin, which translates as 'the colobus by the river'. This name may reflect its preference for flooded or seasonally flooded habitats in southern Bénin. Djego [2003] conducted surveys to assess the distribution of *Co. vellerosus* in Bénin. She estimated the current northern limit to their distribution as being between 6°55′ N and 9°45′ N but suggested they might have ranged up to 10°50′ N until recently.

Procolobus verus

The first account of the presence of olive colobus *(Pr. verus)* in Bénin was recorded by Oates [1996b], where he documented olive colobus in the Lama Forest. We also encountered olive colobus in the Lama Forest, as well as in patches of forest along the Ouémé River. It appears that they can survive in small and degraded forest fragments. In all sightings of olive colobus, they were in mixed-species groups with mona monkeys, or mona monkeys and red-bellied guenons.

Although olive colobus were accurately described and reported in Togo by hunters, we did not record their presence there. Despite the fact that we did not see nor hear any individuals of this species, we believe olive colobus to be present in Togo. Our failure to record this species may have been due to their cryptic behaviour and our lower survey efforts in Togo.

Cercopithecus nictitans

The putty-nosed monkey *(C. nictitans)* was not reported nor seen in any of the localities surveyed, despite previous accounts of its presence in Bénin (reported for the Lama Forest [Sayer and Green, 1984]). Extensive periods were spent in the Lama Forest, and during our stay this species was never encountered. Local people and hunters also did not report seeing this species in the area. We believe that if putty-nosed monkeys were in Bénin, they would be present in the south east, near the border with Nigeria, an area with suitable forest cover and a higher canopy. This area warrants further study.

Primate Species Reported but Not Confirmed

Cercopithecus diana roloway

Booth [1956b] determined the distribution of *C. d. roloway* to extend from the Sassandra River in Ivory Coast to within approximately 60 miles of Lake Volta in Ghana. Current distribution maps agree with this assessment [Magnuson, 2002], but no field surveys have been conducted east of Lake Volta. Roloway monkeys are usually found in primary or mature secondary dense forests [Rowe, 1996; Kingdon, 2001]. Nevertheless, they were also reported in gallery forests in Comoé National Park, northern Ivory Coast [Fischer et al., 2002] and their distribution might extend into Burkina-Faso [Roure, 1968]. To the east of Lake Volta, extending into Togo, is the last fragment of the Upper Guinean forest block. It encompasses mature secondary dense forests and gallery forests with high and continuous canopy, which is a suitable habitat for roloway monkeys. Although no field surveys have been made east of Lake Volta, several accounts of its presence, particularly in Togo, can be found in the literature [Fischer, 1913; Roure, 1966; Lernould, 1988]. During our surveys, officials from the Direction de la Faune et de la Chasse in Lomé reported roloway monkeys in the FMNP, which is adjacent to the Kyabobo National Park in Ghana. However, during our surveys of the FMNP, we did not find evidence of their presence [Campbell and Radley, 2006]. Other hunters also reported roloways in the region around Kpalimé, located near the border with Ghana. They refer to the species as 'efiai aighéhi', which translates into 'monkey with a white beard'. Further investigations are needed in the forest zone along the Togo-Ghana border to confirm or refute the presence of roloway monkeys in Togo.

Cercocebus torquatus

The red-capped mangabey *(Ce. torquatus)* is found in Gabon, Equatorial Guinea, Cameroon and Nigeria [Kingdon, 2001]. Within Nigeria, the western distributional limit of this species is thought to be the forests near the Dahomey Gap [Lee et al., 1988]. We received reports of this species in the southeast region of Bénin, near the border with Nigeria. It was reported for Lokoli, recently for the Lama Forest and in Go around 60 years ago. These three forests are either continually or seasonally flooded. The individual mangabeys were described as having white eyelids, which contrast with their black face, a white belly and 'weird' buttocks. Mangabeys (*Cercocebus* sp.) can be distinguished by the presence of white eyelids, which contrast the dark face, and by the fusion of the ischial callosities in the male [Schwarz, 1928; Kingdon, 2001]. In Lokoli, a swamp forest in Bénin, a hunter told us that there was only one individual left and that he could occasionally be seen with black and white colobus. These reports fit the description of Rowe [1996], who described the red-capped mangabey as thriving in a number of habitat types, including swamp forests, and that they could be found in polyspecific associations with black and white colobus. This species has never been reported in Bénin previously and may now be extirpated.

Pan troglodytes verus

In Togo, hunters and staff from the Direction de la Faune et de la Chasse in Lomé reported the presence of chimpanzees *(P. t. verus)* in the FMNP. Chimpanzees have been reported in this area before [Harrisson, 1971; World Conservation Monitoring Centre in Nishida et al., 2001] but are thought by others to have gone extinct in Togo before 1978 [Lee et al., 1988; Brownell, 2003a]. We did not confirm the presence of chimpanzees in the FMNP during our surveys [Campbell and Radley, 2006]. However, we think that if no population survived the 20th century, a certainty is that they went extinct more recently than previously thought.

In Bénin, the time period in which chimpanzees were extirpated is unclear [in the 1930s according to: Gartlan et al., 1978; in the 1960s: Teleki and Baldwin, 1979; 1969: Brownell, 2003b], which probably reflects the lack of field studies in this area. During our surveys, we gathered many stories and reports of chimpanzees, known locally as 'Loki' in the Fongbé language. The most convincing report came from a hunter in Gnanhouizoumé. He reported seeing occasional chimpanzee nests and several other villagers reported their presence in the area. Therefore, the available evidence suggests chimpanzees may still be present in this area, or at least that they have only recently become extinct.

Conclusion

Although the Dahomey Gap is thought to have been a major biogeographical barrier to the distribution of mammal species in West Africa, few surveys have been conducted in this region. This survey concentrated on the primate species found in the southern part of Togo and Bénin. Seven species are reported each for Bénin and Togo. All species reported in this study, except for *C. petaurista* and *C. erythrogaster*, can be found on both sides of the Gap. *C. petaurista* were thought to extend into Bénin, but we suggest that the eastern limit to their distribution should be contiguous

with the end of the Upper Guinean forest block in Togo. It is probable that this species is replaced by the red-bellied guenon within the Dahomey Gap, thus extending the distribution of red-bellied guenons into Togo. *C. nictitans* is often listed as present in the Dahomey Gap, but this survey did not support their presence in the area. Along the border with Ghana, in forests belonging to the Upper Guinean forest block, the roloway monkey *(C. diana roloway)* was reported to occur, though their presence could not be confirmed. Further field studies should concentrate on the forested area in the transitional vegetation zone along the borders of Ghana-Togo and Bénin-Nigeria.

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