THE DIURNAL PRIMATE FAUNA AND POPULATION DENSITIES OF TSCHEGO CHIMPANZEES IN SOUTHWESTERN CONGO

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ABSTRACT An extensive two-part survey on the diurnal primate fauna and population densities of tschego chimpanzees (*Pan t. troglodytes*) was carried out in southwestern Congo from November 1992 to February 1993. The first half of the survey was conducted in the Regions of Niari and Lekoumou. In this area, the occurrence of *Pan t. troglodytes* and *Cercopithecus pogonias* was confirmed by direct observations. The occurrence of *Gorilla g. gorilla, Mandrillus sphinx, Cercopithecus cephus* and *C. nictitans* was confirmed by the indirect evidence. Local people informed me of the presence of *Cercocebus albigena, C. torquatus* and *Miopithecus talapoin*, although they were not confirmed directly. The second half of the survey was carried out at Dimonika in the Region of Kouilou. *Pan t. troglodytes* and *Cercopithecus cephus* were directly observed. Feer (1991) has reported the occurrence of *Gorilla g. gorilla, Mandrillus sphinx, Cercocebus albigena, Cercopithecus pogonias* and *C. nictitans*, but no evidence was obtained for their presence. The chimpanzee population densities, calculated from nest counts in the survey, were higher near the border of Gabon and in the eastern part of the Region of Lekoumou than other areas. This difference in population densities seemed to be due to differences in hunting pressure by humans. The overall population density of chimpanzees in southwestern Congo was lower than that in the Nouabalé-Ndoki National Park in northern Congo, but roughly the same as in Equatorial Guinea, and in Gabon.

Key Words: Diurnal primate fauna; *Pan t. troglodytes*; Population density; Southwestern Congo.

INTRODUCTION

Tschego chimpanzees (*Pan troglodytes troglodytes*) are widely distributed in the central parts of Africa (Wolfheim, 1983), and their population densities in Equatorial Guinea, CAR and Gabon have been reported (Jones & Sabater Pi, 1971; Carrol, 1986; Tutin & Fernandez, 1984). Northern and southern Congo are covered with evergreen forests, where many primate species may occur (Fig. 1). Recently, primate fauna have been reported in the northern part of Congo (Mitani, 1990a, b), and intensive primates surveys have been carried out mainly at the Nouabalé-Ndoki National Park (e.g., Kuroda, 1992; Nishihara, 1992) and in the Region of Likouala (e.g., Fay et al., 1989; Fay & Agnagna, 1992) from which population densities have been calculated (Mitani, 1992; Suzuki, 1993). However, the diurnal primate fauna in southwestern Congo have not been reported, except

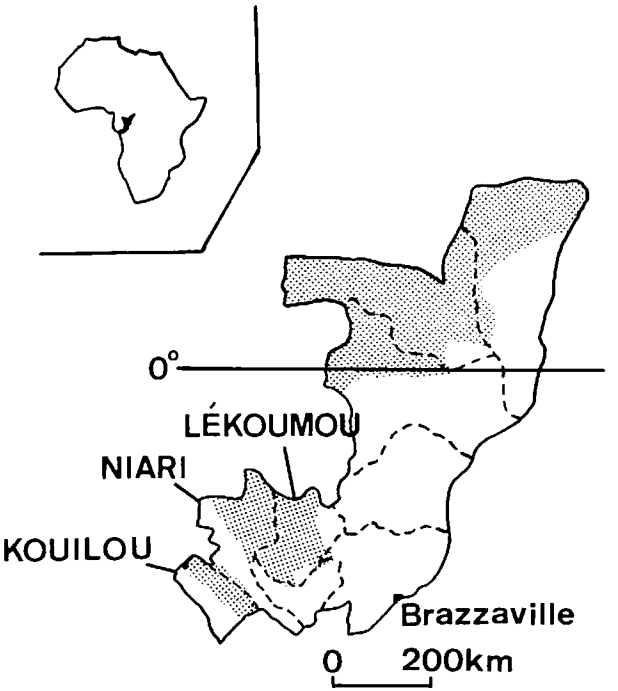

Fig. 1. The evergreen forests (shaded parts) and nine Regions in Republic of Congo. The extensive surveys were carried out in Niari, Lekoumou and Kouilou Regions. The solid lines and broken lines indicate the border and the boundary of the Regions, respectively.

for a preliminary report on the distribution of chimpanzees (Idani, 1994). I conducted extensive surveys in these areas to confirm the presence of diurnal primates, and carried out nest counts of chimpanzees to calculate population densities.

STUDY AREAS AND METHODS

The survey was conducted in two-parts.

The first half of the survey was carried out in the Regions of Niari and Lekoumou from 14 November 1992 to 19 December 1992 (Fig. 2). The areas are mainly covered with evergreen forests. Much of the area has an average elevation of 400 to 600 m. The mean annual temperature is about 25°C. The mean annual rainfall varies from 1,600 mm to 1,800 mm. The rainy season is from October to April, and the dry season is from May to September (Vennetier, 1977).

The second half of the survey was carried out at Dimonika in Kouilou Region from 13 January 1993 to 15 February 1993 (Fig. 2). The village is located in the biosphere reserve at Dimonika. The area is covered with evergreen forests. The average elevation of the area is from 600 to 700 m. The mean temperature is about 22°C to 26°C. The mean annual rainfall is 1,350 mm. The rainy season is from

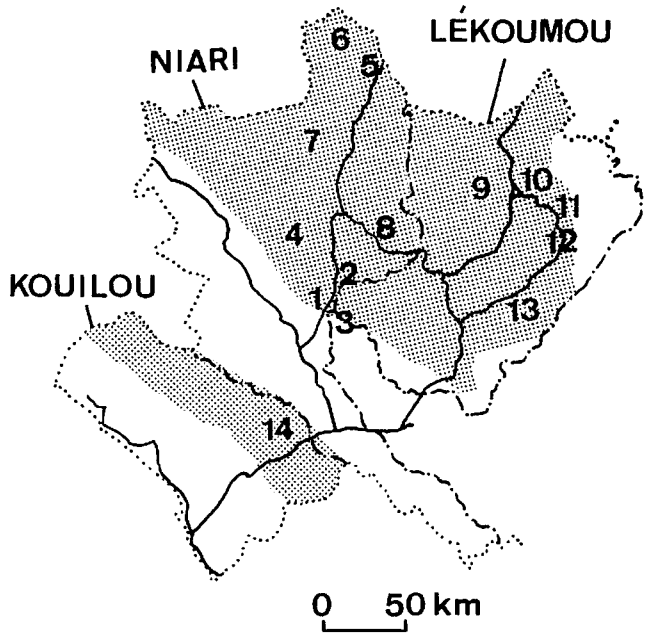

Fig. 2. Map of the surveyed areas. The shaded parts indicate the areas covered with evergreen forests. The numbers indicate the villages whose forests I walked in; 1: Makabana, 2: Makalonga, 3: Ndemi, 4: Ngoua II, 5: Mbinda, 6: Ngoubou-Ngoubou, 7: Musitu, 8: Kisiele, 9: Malanga, 10: Mokila, 11: Zanaga, 12: Kengue, 13: Ingolo I, 14: Dimonika. The solid lines, dotted lines and broken lines indicate the main roads, the border and the boundary of the Regions, respectively.

October to April with maximum rainfall of 250 mm per month, and the dry season is from May to September (Clairac et al., 1989).

Vernacular names and other information on the diurnal primates in the areas were collected from the local people, by showing local people a pictorial book (Dorst & Dandelot, 1970). In places where there seemed to be many villagers who have sighted the primates, I tried to observe them directly, and to obtain indirect evidence in the forests. I walked in the forests of 13 villages in the first half of the survey. The same procedure was repeated around Dimonika village in the second half of the survey.

For the calculation of the chimpanzee population densities, I carried out nest counts of chimpanzees or gorillas from the paths by a route census method, and gathered food remains or feces when I could. For each nest observed during walks in the forests, the following information was recorded as in Tutin & Fernandez (1984): (1) Species: gorilla, chimpanzee, or unknown; (2) Age-class of nest: (a) fresh; vegetation green, (b) recent; vegetation dry and changing color, (c) old; vegetation dead but nest still intact, (d) rotting; nest beginning to disintegrate; (3) Estimated height of the nest above the ground; and (4) Perpendicular distance from the paths to the trees in which the nests were built.

I asked the local people to distinguish the nests of chimpanzees and gorillas. As

described below, the vertical distribution of the nests indicated that the observations by the local people were usually correct in distinguishing chimpanzee nests from those of gorillas. Since only four gorilla nests were found at one village, I calculated only the chimpanzee population densities for the present study.

To overcome the problem of the clumped distribution of nests, I analyzed the nest counts from paths in terms of groups. All nests recorded along a 20 m stretch of a path were defined as a group, unless they were of different nest age-classes.

I used the following formula, used by Tutin & Fernandez (1984), to calculate the population densities of weaned chimpanzees:

$$\frac{N}{S} \times \frac{1}{X} \times M = \text{number of weaned chimpanzees per km}^2,$$

where N is the number of nest groups within the visibility limits of the nests, S is the sampled area (km^2), X is the mean length of time that the nest remained in fact, and M is the median nest group size. S was calculated with the following formula: S = walking distance × visibility limit of the nests × 2. The walking distances were measured by a pace meter.

Since I did not obtain the visibility limits of nests and the mean length of time that the nests remained recognizable in the surveys, I used the values from Tutin & Fernandez (1984). Although Tutin & Fernandez calculated the visibility limits of nests according to habitat types, I did not record the habitat types in detail. I defined the habitat type of the whole study area as dense primary forest and used 15 m as the visibility limit value. The mean length of time that the nests remained recognizable was 113.6 days

RESULTS AND DISCUSSION

I. Diurnal Primate Fauna

1. The First Half of the Survey

Vernacular names of the diurnal primates were collected at seven villages in four languages (Table 1).

Table 2 shows the diurnal primates whose presence were suspected or confirmed by direct obsevations, indirect evidence, or information from local people.

The presence of two species (*Pan t. troglodytes* and *Cercopithecus pogonias*) was confirmed by direct observations. *C. pogonias* was observed once (Village 3 in Fig. 2) and *P. t. troglodytes* was observed four times at three villages (Villages 2, 4 and 6 in Fig. 2). Nests of *P. t. troglodytes* were observed at 12 villages (Villages 2 to 13 in Fig. 2). Food remains, such as fruits of *Myrianthus arboreus, Elaeis guineensis, Gambeya* sp., *Ficus* sp., *Dialium* sp. and other six species (not identified), were obtained at eight villages (Villages 3, 4, 5, 6, 7, 8, 12 and 13 in Fig. 2). The local people seemed to have seen these two species throughout the areas.

The presence of four species (*Gorilla g. gorilla, Mandrillus sphinx, Cercopithecus cephus* and *C. nictitans*) was confirmed by indirect evidence, such as

Table 1. Vernacular names of diurnal primates in southwestern Congo.

Scientific name	Language(1)			
	Kicougni	Mbere-Nzabi	Ndasa	Teke
Miopithecus talapoin	Tschengui	Mtschenbi (Mtschengui)	Lenjinji	Mutschi
Cercopithecus pogonias	Kisemba	Mpundi	Mpundi	?
C. cephus	—	—	Osanji	Kemiye
C. nictitans	Mwindo	Liyembi (Liyembe)	Koyi	Kepine
Cercocebus torquatus	—	—	Kanbu	?
C. albigena	—	Ngata	—	—
Mandrillus sphinx	Kimpenji	Tscheghe	?	Kimpenji
Gorilla g. gorilla	Mpungou	Ndjiya	Ndjiya	Njile
Pan t. troglodytes	Kiyangui	Nkulu	Nkula	Njigi (Njiki)

?: no available data; —: absence of the species; (1): Kicougni is spoken at Makabana and Ndemi, Mbere-Nzabi is spoken at Mbinda and Ngoubou-Ngoubou, Ndasa is spoken at Kisiele and Malanga and Take is spoken at Kisiele, Malanga and Kengue.

Table 2. The diurnal primates, whose presence were suspected or confirmed by direct observations, indirect evidence or information from the local people in the first half of the survey.

Scientific name	English name	Source
Miopithecus talapoin	Talapoin monkey	Information from local people
Cercopithecus pogonias	Crowned guenon	Direct observation
C. cephus	Moustached monkey	Captured individuals
C. nistitans	Greater white-nosed monkey	Carcass
Cercocebus torquatus	Sooty mangabey	Information from local people
C. albigena	Gray-cheeked mangabey	Information from local people
Mandrillus sphinx	Mandrill	Captured individuals and skulls
Gorilla g. gorilla	Western lowland gorilla	Nests and food remains
Pan t. troglodytes	Tschego chimpanzee	Direct observation

nests, food remains, captured individuals, skulls, and/or dead bodies sold at local markets. Gorillas' nests and food remains of banana piths were obtained at only one village (Village 2 in Fig. 2). A pet *M. sphinx*, bought from the local people, was observed at one village (Village 1 in Fig. 2) and the skulls of the species were observed at two villages (Villages 8 and 12 in Fig. 2). A pet *C. cephus* was observed at Village 11 (Fig. 2). *C. nictitans* was sold for meat at Village 5 (Fig. 2). The information given by the local people suggested the presence of *G. g. gorilla, M. sphinx* and *C. nictitans* throughout the areas and that of *C. cephus* restricted to the eastern part of the Region of Lekoumou.

I suspected the presence of three species (*Cercocebus albigena, C. torquatus* and *Miopithecus talapoin*) from the information from local people. Information on *M. talapoin* was obtained at five villages (Villages 1, 3, 5, 6 and 9 in Fig. 2). The information on the other two species were obtained at only one or two villages. The population densities of these three species in the area seem to be low.

The local people usually hunt monkeys and apes for meat. Also, the local people kill them for pest control. Forestry is developing within the survey areas. The low population densities of inhabiting diurnal primates seem to due to these

human activities.

2. The Second Half of the Survey

Seven species of diurnal primates (*Pan t. troglodytes, Gorilla g. gorilla, Mandrillus sphinx, Cercocebus albigena, Cercopithecus cephus, C. nictitans* and *C. pogonias*) reportedly inhabit the reserve biosphere at Dimonika (Feer, 1991). Among these species, I observed *P. t. troglodytes* once and *C. cephus* twice. Vocalizations of *P. t. troglodytes* were heard three times, and nests were also observed throughout the area. Food remains of four fruit species (not identified) were also obtained in the area. Local people informed me that *G. g. gorilla* inhabit the region, although I could obtain no evidence, such as nests or food remains. Also, I could not obtain any information on the other four species from local people.

The extremely low encounter rates for the diurnal primates may due to hunting by the local people. Local people at Dimonika usually hunt monkeys and apes for meat. Also, pest control was conducted by local people to protect banana fields. Gold mining accompanied by clearing the forests by local people also affected the population density of the primates.

The situation of the diurnal primate fauna in the surveyed areas was almost the same as Wolfheim (1983) reported, except for the absence of *Colobus satanus*. However, the population densities of diurnal primates seemed to be low, probably due to some human activities, such as hunting or deforestation. Some suitable action against hunting or deforestation is necessary to protect the presence of these species.

II. Population Densities of Chimpanzees

Two hundred ninety-one nests of chimpanzees were counted in the first and second halves of the surveys (Table 3). One hundred twenty-one nest groups were recorded, and the median number of nests at a nest group was 2.0. Figure 3 shows the frequency of nests at a nest group. The maximum number of nests at a nest group was 9. Almost half of the nest groups contained only one nest.

Figure 4 shows the vertical distribution of estimated heights of chimpanzee nests. Many nests were constructed in medium to low trees. There were few nests lower than 2 m or above 25 m. Tutin & Fernandez (1984) distinguished the chimpanzee and gorilla nests by using the criterion that all nests above the height of 2 m in trees were those of chimpanzees. Few chimpanzee nests were found below 20 feet in Kahuzi-Itebero Region in Zaire, where chimpanzees and gorillas occur sympatrically (Mwanza et al., 1992). My results showing that almost all the nests attributed to chimpanzees were above the height of 2 m supported Tutin & Fernandez's criterion that the gorilla nests were distinguishable from those of chimpanzees.

Table 3 shows chimpanzee population densities at each village. At Mbinda and Ngoubou-Ngoubou, near the border of Gabon, and at Mokila and Ingolo I, in the eastern part of the Region of Lekoumou, the population densities were relatively

Table 3. Population densities of chimpanzees in each village.

Village	Village number[1]	Walking distance (km)	Number of nests	Population density
Makabana[2]	1	?	0	—
Makalonga	2	14.2	2	0.04
Ndemi	3	24.9	14	0.18
Ngoua II	4	15.0	2	0.04
Mbinda	5	6.5	19	0.35
Ngoubou-Ngoubou	6	18.9	28	0.39
Musitu[2]	7	?	7	—
Kisiele	8	20.3	27	0.36
Malanga	9	8.4	1	0.04
Mokila	10	16.2	50	0.65
Zanaga	11	25.6	14	0.08
Kengue	12	28.0	49	0.47
Ingolo I	13	13.9	62	0.65
Dimonika	14	72.9	16	0.06
Total		264.8	291	0.27

(1): village number corresponds to Figure 2; (2): population density of chimpanzees around the village could not be calculated, since walking distance was not obtained.

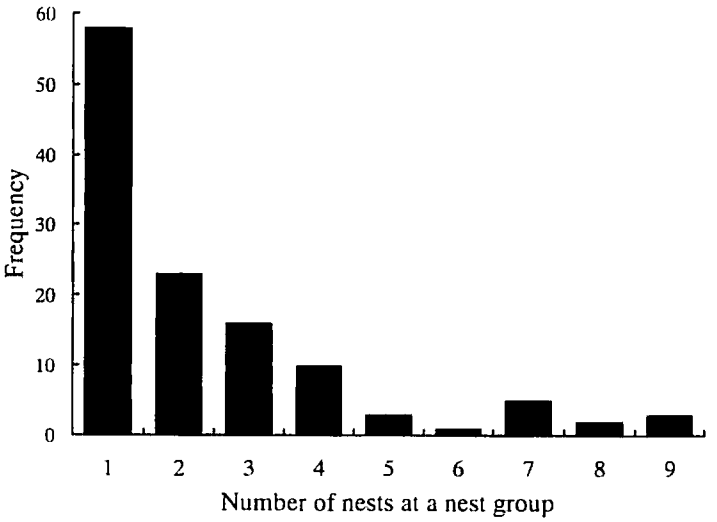

Fig. 3. Frequency of chimpanzee nests at a nest group.

higher than the other areas. Idani (1994) has reported that the forests around Zanaga and Kengue, in the eastern part of Lekoumou Region, had a higher population density of chimpanzees than other areas in Lekoumou Region.

The habitat types of the study areas were roughly dense primary forests. The hunting pressure, however, differed in each area. In the areas where hunting pressure on chimpanzees by humans was relatively low, the population densities of chimpanzees were relatively high. Idani (1994) found that in some villages, where chimpanzee meat was rarely eaten, direct observation was easy and he recorded many

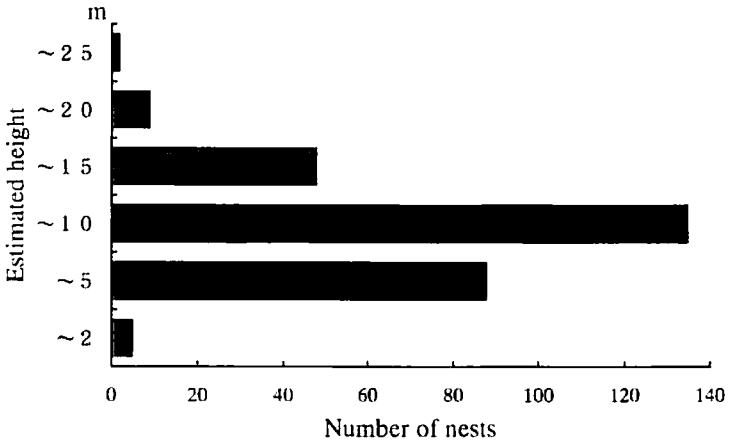

Fig. 4. Vertical distribution of estimated heights of the chimpanzee nests.

Table 4. Population densities of tschego chimpanzees in several habitats.

Country	Location	Population density (#/km²)	Methods	Hunting pressure(1)	Source
Congo	Southwestern part	0.27(2)	Nest count	++	This study
Congo	Ndoki	1.30	Direct observation	+	Mitani, 1992
Congo	Ndoki	2.65	Direct observation	+	Suzuki, 1993
CAR	Dzanga-Sangha	0.01–0.13(2)	Nest count	++	Carrol, 1986
Gabon	Whole	0.32(2)	Nest count	?	Tutin & Fernandez, 1984
Equatorial Guinea	Rio Muni	0.31–1.53	Nest count and direct observation	?	Jones & Sabater Pi, 1971

(1): a plus (+) means hunting pressure by humans exists, but is very light, a double plus (++) means it is very heavy and a question mark (?) means it is unknown; (2): population densities of weaned individuals.

new nests near the villages. The difference in population densities in these areas may not reflect a difference in environmental conditions such as habitat types, but a difference in hunting pressure by humans in each area.

The mean population density of chimpanzees in the area was 0.27 chimpanzees/km². The value was lower than that in the Nouabalé-Ndoki National Park, but roughly matched those in Rio Muni in Equatorial Guinea or the whole of Gabon (Table 4). The value was higher than in the southwestern part of CAR. Tutin & Fernandez (1984) reported that hunting by the rural population was found to affect ape density in Gabon. The variance in the population densities in each habitat may be attributable to the variance in hunting pressure by humans either through the direct or indirect results of hunting.

ACKNOWLEDGMENT The present study was supported by a grant from the Monbusho International Scientific Research Program of the Ministry of Education, Science and Culture, Japan, awarded to Prof. T. Kano (No. 02041049).

I would like to express my gratitude to Drs. R. Tsila, R. A. Oko and J. Dinga-Reassi who made it possible for me to conduct field work in Congo, to Prof. T. Kano for his guidance and constant encouragement, and to Prof. Nishida and the member of Laboratory of Human Evolution Studies for their useful comments on this paper.

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———Accepted *January 12, 1995*

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