

altura", *C. c. ucayalii*, se suministra esos nutrientes de los frutos de *Mauritia flexuosa* y *Jessenia bataua*, particularmente entre los meses de Junio a Agosto, coincidente con la estación de escasez de otros frutos.

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FISSION-FUSION IN THE BLACK-HEADED UACARI (*CACAJAO MELANOCEPHALUS*) IN EASTERN COLOMBIA

Thomas R. Defler

Introduction

Until recently little has been known about the behavior and ecology of the pitheciine species *Cacajao melanocephalus*, which in Colombia does not seem to be particularly abundant, besides being hunted by various indigenous ethnic groups (Defler, 1991). The Colombian reality has resulted in my suggestion that the Colombian status of the species should be classified as "Vulnerable", using the IUCN system (Defler, 1996).

Recently Boubli (1994, 1997, 1998) has begun reporting on his recent study of northern Brazilian populations of this primate, including the surprising observation that at his study site no fission-fusion behavior was observed. I report here on the extreme fission-fusion behavior commonly observed in the Colombian population that I have been observing for several years (Defler, 1989, 1991, in press).

Methods

The term "fission-fusion" in Primatology has most often been used with respect to the primates *Pan troglodytes* (common chimpanzee) and *Ateles* spp. (spider monkeys), as discussed by Symington (1988, 1990). These primates travel in subgroups varying in number, according to conditions and decisions made by the individual animals. The subgroups, however, belong to a large clan or group. Symington (1987, 1988, 1990) demonstrated ecological correlates with group size in *Ateles chamek*, particularly food

crop size, while this type of grouping was first described in *Pan troglodytes* by Nishida (1968), Wrangham (1977) and Goodall (1986).

I use the term "fission-fusion" for any primate species that is observed in groups which vary greatly in number in the same area being studied. Thus, *Cacajao melanocephalus*, which sometimes is observed as individuals or very small groups and at other times is observed in seemingly cohesive groups of 100 or more, are clearly exhibiting a fission-fusion type of society.

When using the term fission-fusion I do not intimate anything about the nature or make-up of the subgroups, as this is still under study. Nevertheless, it is clear that the larger groups of *Cacajao melanocephalus* are made up of multiple adult males and females with young.

The Study Site

I have been observing *Cacajao melanocephalus ouakary* on-and-off for more than seven years near the Estación Biológica Caparú, a site in the Colombian Amazon near the Brazilian border (Defler, 1999). I have accumulated more than 1,800 observation hours (many informal observations beginning as early as 1984 are not included in this count) of the population found around Caparú. The monkeys range around an ancient oxbow lake formed from a meander of the lower Río Apaporis (see Fig. 1).

During this time I have developed a trail system of about 100 km on inland forest and about 20 km in the local *igapó* (black-water inundation forest), which has been used for studies of several other primate species. Both *al azar* and focus animal techniques have been used to monitor basic activities.

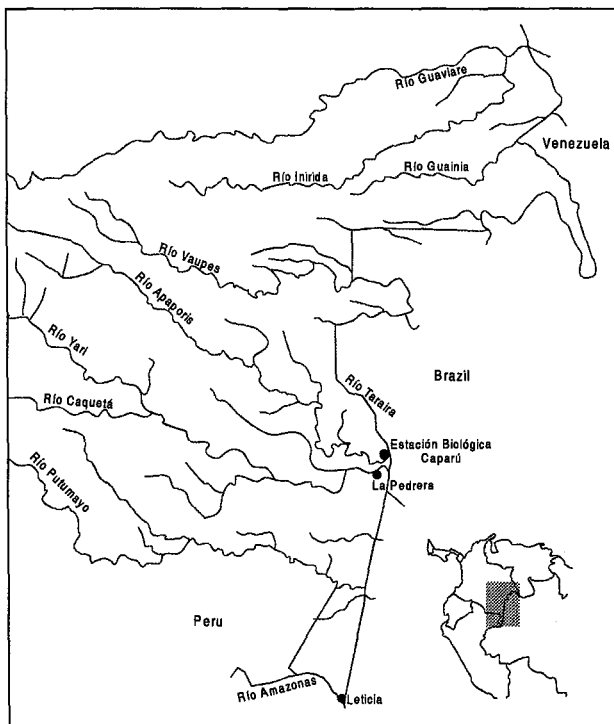


Figure 1. Location of the Estación Biológica Caparú, lower Río Apaporis, Colombia.

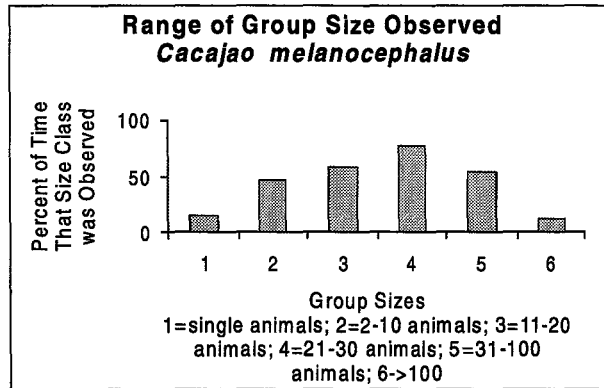


Figure 2. The range of group sizes observed for *Cacajao melanocephalus* at the Estación Biológica Caparú, Río Apaporis, Colombia.

The local primate community includes eight species: *Aotus* sp., *Saimiri sciureus*, *Callicebus torquatus*, *Cebus apella*, *Cebus albifrons*, *Cacajao melanocephalus*, *Alouatta seniculus* and *Lagothrix lagothricha*.

Counting Monkeys

Several years ago, Dilver Pintor of the Colombian National Park System and I discussed the difficulty of counting small primate groups in forest habitat. We compared separate counts to the actual number that had been determined for several groups of several species and concluded that counts in forests are notoriously unreliable (Defler and Pintor, 1985). Most counts in this study were taken from a canoe as group members passed by in typical fashion along the river edge, so the counts represent in most cases a minimum estimate, as some members obviously could have passed by deeper in the forest. Thus, my highest count of 108 animals was a minimum and the group was probably larger. One early observation of 1984 of a very large group within the forest may have actually represented around 200 animals, but no count was attempted at the time.

Results and Discussion

I have observed an extremely variable number of uacaris at this site throughout the year, varying from individual animals, which do not seem to be in contact with conspecifics, to cohesive groups of over 100 individuals, which travel in a coordinated fashion for several days both in *igapó* and dry land. Figure 2 gives a break-down of group size estimates.

Groups of around 20-30 are most often noted at Caparú, and I take this to indicate that the number represents the average group size for this site. Nevertheless, the groups of this population both split up and coalesce into large groups of over 100, apparently in response to the available food; the largest counted group was of at least 108 individuals. Small groups of 1-10 are most commonly seen during the season with fewest available fruits (Defler and Defler, 1996; Palacios *et al.*, 1997; S. Defler, in prep.), while the groups surpassing 100 are seen sporadically during the rest of the year and especially during the seasons of greater fruit availability, particularly when *Eschweilera* sp.

(Lecythidaceae) fruits mature in the seasonally flooded forest.

Although *Micrandra spruceana* (Euphorbiaceae) is found at appreciable densities at Caparú, especially on the extensive Pleistocene terrace not far from the *igapó*, it is not the most important food species for these animals as was reported by Boubli (1998) for his groups. The *Eschweilera* species is by far the most consumed fruit of the Caparú population, and I believe that the *igapó* is important to *Cacajao melanocephalus* at this site because of the widespread occurrence of *Eschweilera* there.

Lagothrix lagothricha at Caparú also exhibits a type of fission-fusion society as first described by Soini (1986) in Pacaya-Samiria, Peru. One study group made up of 22-24 animals most commonly moved in two separate subunits (often in vocal contact) throughout most of the day, only seeming to come together when particularly large food crops were available or at night for sleeping, although it often slept spread out over a large area (Defler, 1996b). This fission behavior is apparently not seen at another Colombian study site on the Río Duda, Tinigua National Natural Park, north-western Colombian Amazon (Stevenson *et al.*, 1994). Several types of evidence suggest that Caparú (which is a black-water site) is very infertile, while the Río Duda site (white-water and near the Cordillera Oriental) is relatively more fertile. At any rate, Ardila and Florez (1994) and Peres (1996) give data showing that group dispersion is minimal when most ripe fruit is available, and troops are less cohesive when ripe fruit is at its lowest levels.

Besides *Lagothrix lagothricha* and *C. melanocephalus* varying intraspecific differences in fragmentation and coalescence have been described for groups of *Saimiri* (see Baldwin and Baldwin, 1972), *Alouatta palliata* (see Glander, 1987), *Brachyteles arachnoides* (see Strier, 1989), *Cebus olivaceus* (see Robinson, 1988), some *Saguinus* spp. (Castro and Soini, 1977), and *Cacajao calvus* (see Ayres, 1986), the most extreme cases of which Kinzey and Cunningham (1994) term "fission-fusion", but which are obviously part of a continuum. *C. melanocephalus* seems to me to represent an extreme example of fragmentation, at least at the Caparú site. Fission-fusion of the type described above may be an ecological tactic of many Neotropical primates, allowing a more efficient and economic foraging mode, according to the circumstances of available food (Kinzey and Cunningham, 1994; Chapman *et al.*, 1991). It is particularly interesting that intraspecific foraging tactics may vary from site to site, and field researchers should be aware of the possibility of these differences and seek to associate the particular tactic with the available resources.

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USO DE PLANTAS COMO ALIMENTO POR *ALOUATTA PALLIATA* EN UN FRAGMENTO DE SELVA EN LOS TUXTLAS, MÉXICO

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Teresita de Jesus Ortiz Martínez
Alejandro Estrada
Rosamond Coates-Estrada

Debido a que las selvas tropicales son ecosistemas altamente sensibles a la perturbación causada por el hombre, un gran número de vertebrados han desaparecido simultáneamente con la pérdida y aislamiento de su hábitat natural (Estrada *et al.*, 1993, 1994, 1997) y aquellos que han logrado sobrevivir a las condiciones de fragmentación de su hábitat, están representados solamente por individuos aislados o unidades de población demasiado pequeñas o de estructura de edades inadecuadas para hacer viable su reproducción a largo plazo (Offerman *et al.*, 1995). Los monos aulladores, *Alouatta palliata*, del sur de México no han escapado de esta alteración resultando en el exterminio

local de la especie en algunas áreas y en la existencia de poblaciones fragmentadas y aisladas bajo riesgo de extinción. Nuestro conocimiento sobre el comportamiento y ecología de *Alouatta* bajo condiciones de fragmentación del hábitat es escaso (Kinzey, 1997). Tal información es indispensable para calibrar la elasticidad ecológica de las especies y generar modelos que eviten la desaparición continuada de éstas a nivel local y regional. Así, el objetivo de este proyecto fue describir, en un ciclo anual (1995), el uso de plantas como recurso alimenticio por un grupo de monos aulladores viviendo en un fragmento aislado de vegetación selvática en la región de Los Tuxtlas, Veracruz, México.

Metodología

El trabajo se efectuó en la región de Los Tuxtlas, al sur del estado de Veracruz, México, en la zona en donde se encuentran los terrenos de la Estación de Biología Tropical «Los Tuxtlas» del Instituto de Biología de la Universidad Nacional Autónoma de México, localizada aproximadamente entre los 95° 04'-95° 09' de longitud oeste y a 18° 34'-18° 36' de latitud norte (Fig. 1). El clima en el área de estudio es cálido-húmedo con una precipitación media anual de 4900 mm y una temperatura media anual de 27 °C (Estrada *et al.*, 1985).

En esta región existen constelaciones de fragmentos de selva aislados unos de otros por distancias variables. El sitio de estudio fue uno de estos fragmentos que comprende un área de 3.6 ha en extensión, de forma alargada, y habitado por una tropa de *A. palliata* compuesta por dos machos adultos, dos hembras adultas, dos infantes y un juvenil. Las observaciones del comportamiento alimenticio de los

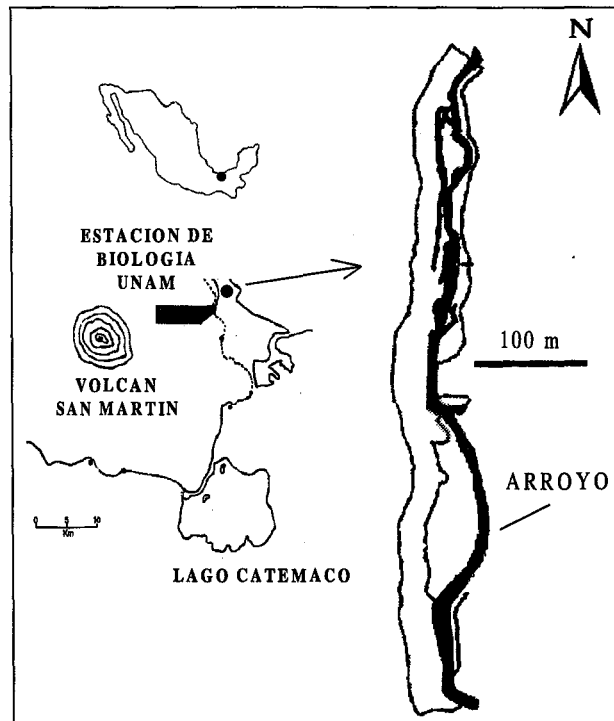


Figura 1. Ubicación de la zona de estudio y del fragmento habitado por la tropa de monos aulladores. Note la forma alargada y angosta del sitio.