

R. M. 1994. Validity of measures assessing reproductive status of female howling monkeys (*Alouatta palliata*) in Costa Rica. *Am. J. Primatol.* 33:255.

## POPULATION GENETICS AND CONSERVATION OF OWL MONKEYS (*AOTUS AZARAI*) IN ARGENTINA: A PROMISING FIELD SITE

The evolution of monogamy and nocturnality in owl monkeys (*Aotus* spp.) remains largely unexplained. This can be blamed, at least partially, on the lack of long-term data on the ecology and behavior of this unique New World primate species. We report here on a field site that offers an unique opportunity to conduct long-term research in *Aotus azarai*. First, we report preliminary data on the ecology and behavior of the owl monkey population. We conclude with a brief description of three research projects that we will conduct in the area in the near future.

### Study Area

The field site is located on the borders of the Pilagá River which runs across Estancia Guaycoléc (58°13' W, 26°54'S) in Eastern Formosa. The area is comprised of a mosaic of grasslands, savannas, xeric thorn forests and semideciduous forests. The semideciduous forests occur along river banks, where they form gallery forests. The 13-18 meter-high gallery forest, contains, on average, 39 tree species per hectare (Placci *et al.*, 1992, cited in Brown *et al.*, 1993). The understorey is clear and easy to walk through because of cattle grazing. The climate is subtropical with mean temperatures of 27.4 °C during the summer and 16.9 °C during the winter. There are usually some nights with below freezing temperatures each year. Although there is no marked rainy season (1400 mm per year), average monthly precipitation tends to be lower between June and August (45 mm/month) than during the rest of the year (160 mm/month). The weather in the region is generally highly unpredictable.

### Primate Species

Two primate species inhabit the area: owl monkeys (*Aotus azarai*) and black howler monkeys (*Alouatta caraya*). *Aotus azarai*, is one of the five species south of the Amazon classified in the red-necked group (Ford, 1994). Densities in the area vary from 12.7 ind/km<sup>2</sup> to 25.4 ind/km<sup>2</sup> (Rathbun and Gache, 1980; Arditi and Placci, 1990; Arditi, 1992; Brown and Zunino, 1994).

The density of *Alouatta caraya* reported in the area before 1982 was one of the highest for the species in Argenti-

na (63.2 ind/km<sup>2</sup>), only superseded by the density reported in the flooded forests of the Río Paraná islands (Brown and Zunino, 1994). A significant decrease in population numbers occurred in 1982, apparently as a result of a botfly infestation (*Dermatobia* sp.). The most recent estimate indicated a density in the area of 9 ind/km<sup>2</sup> (Arditi and Placci, 1990).

### Preliminary Study

Between May and July 1996, we conducted a preliminary study of owl monkeys in the area which allowed us to (1) identify this as a convenient field site for long-term studies, (2) obtain preliminary data on the behavior and demography of the species.

1) Estancia Guaycoléc is a 75,000 ha cattle-raising and rice-growing ranch owned by Pilagá S.A., a multinational company based in Buenos Aires, Argentina. The company has supported scientific research and promoted conservation efforts in the past (Rathbun and Gache, 1980; Zunino *et al.*, 1985; Arditi and Placci, 1990; Arditi, 1992). The commitment of the company to conservation, the convenient location of the ranch (on a paved national highway 25 km from the capital of the province and 100 km from Asunción, Paraguay), and the existence of a wildlife reserve with housing facilities and a small zoo, make this site an excellent one to conduct long-term projects in conservation, wildlife management and environmental education.

2) We have conducted 46 surveys of the area. On 17 occasions we encountered, observed and followed owl monkeys. Based on repeated encounters of one of the groups, we estimated that at least four different groups were regularly ranging within a 1 km-radius of the camp (Table 1).

As has been reported previously for owl monkeys in Argentina, our preliminary observations suggest that they are active both during the day and night. Although most of the activity was recorded during the early and late hours of the day, three of the four groups were observed moving and feeding during the early afternoon (approximately 1500 h, Table 2).

### Population Genetics of Owl Monkeys

In the future we will examine how different aspects of the monogamous social organization of owl monkeys interact to determine the degree of genetic differentiation between and within populations. To understand better the evolution of monogamy in these monkeys, we will use molecular genetic data to explore the influences that monogamous patterns of dispersal and mating have on the genetic structure of owl monkey populations. These data should allow us, among other things, to assess the extent to which a socially monogamous relationship, as has been described for *Aotus* (Wright, 1994), implies genetic monogamy in the sense of an exclusive mating relationship between the adult male and the adult female in a group.

The long-term goals of the study are: 1) to locate and iden-

Table 1. *Aotus azarai* group composition in Guaycoléc, Formosa, Argentina. N = number of encounters.

Group	Adults	Juveniles	Infants	N
1	2	1	1	5
2	2	1	1	4
3	2	1		5
4	2	1		2

**Table 2.** Time of day (one-hour periods) between 0600 and 2100 h when at least one individual in each of four *Aotus* groups was active.

Group	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1			X	X	X			X		X				X	X
2		X	X	X					X				X	X	
3			X	X	X				X		X	X			
4		X												X	

tify 10-15 groups of owl monkeys from which demographic and ecological data will be collected, 2) to habituate 3-4 of those groups from which behavioral data will be collected, 3) to obtain feces and blood samples from all groups and, 4) to obtain genetic data from the samples to examine patterns of dispersal and mating as well as degree of relatedness among individuals.

### Increasing the Area of Protected Owl Monkey Habitat

The Chaco region extends over one million km<sup>2</sup> of Argentina, Bolivia, Brazil and Paraguay. Despite data suggesting that this region is as rich as tropical rain forests when numbers of large and medium-sized mammalian species are considered (Redford *et al.*, 1990), and that it holds a greater diversity of endemics than other major macrohabitats (Mares, 1992), the Chaco has received less attention from conservation agencies than have tropical rain forests.

In Argentina, the original landscape of forest patches alternating with extensive savannas has been replaced by communities of trees, thick and continuous shrubs, and very low coverage of grasses as a result of severe overgrazing (Adámoli *et al.*, 1990). Gallery forests in particular are not well represented in the protected areas of Argentina (Brown and Zunino, 1994) and are suffering constant pressure from urban and agricultural development. Our long-term goal is to promote the conservation of this threatened habitat which has traditionally received little attention from the scientific community and conservation agencies.

We have plans to assess the impact that cattle grazing and hunting have on the mammals and birds in the poorly protected gallery forests of the Argentinean Chaco. We will estimate the abundance of mammals and birds in: 1) gallery forests subject to cattle grazing and 2) in gallery forests that have not been subjected to cattle grazing for the last 15 years, and which are also of difficult access to hunters. Results will be used in deciding the most convenient location for the establishment of a 5,000 ha wildlife reserve on the premises of the ranch. The reserve will increase the area of protected gallery forest inhabited by species that are heavily hunted (for example, tapirs, peccaries, and parrots), as well as those that are threatened by the destruction of their habitat (for example, Nearctic migratory birds, puma, giant anteater, and owl monkeys).

### Environmental Education: Owl Monkeys as Flagship Species

Conservation efforts are generally more successful if carried out in collaboration with local communities. Our initial efforts to involve local people will be focused on edu-

catinal institutions. In collaboration with GEOS, an Argentinean NGO whose main objective is to promote environmental education, we will organize four one-day workshops at the primary school located in the ranch. The workshops will make use of audiovisual material to depict the fauna and flora of the area, will include special activities and will provide the students with printed materials to illustrate important concepts of ecology and conservation. The workshops will provide us with an opportunity to identify a small group of motivated students and teachers especially interested in conservation. These students and teachers will join us in the organization of a survey on the status of the local fauna.

### Acknowledgments

Funding for the preliminary study of *Aotus* was provided by the L. S. B. Leakey Foundation, Oakland, California, through a General Grant to EF-D. Support for the project on population genetics of owl monkeys will come through two Earthwatch Expeditions. Finally, we would like to thank Pilagá S.A. for authorizing and supporting our work on the ranch and the employees of Estancia Guaycoléc for their continued help.

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### References

- Adámoli J., Sennhauser, E., Acero, J. M. and Rescia, A. 1990. Stress and disturbance: vegetation dynamics in the dry Chaco region of Argentina. *J. Biogeog.* 17:491-500.
- Arditi, S. I. and Placci, L. G. 1990. Hábitat y densidad de *Aotus azarae* y *Alouatta caraya* en el Riacho Pilagá, Formosa. *Boletín Primatológico Latinoamericano* 2, 29-47.
- Arditi, S. I. (1992). Variaciones estacionales en la actividad y dieta de *Aotus azarae* y *Alouatta caraya* en Formosa, Argentina. *Boletín Primatológico Latinoamericano* 3(1):11-30.
- Brown, A. D. and Zunino G. E. 1994. Hábitat, densidad y problemas de conservación de los primates en Argentina. *Vida Silvestre Neotropical* 3:30-40.
- Brown, A. D., Placci, L. G. and Grau, N. R. 1993. Ecología y diversidad de las selvas subtropicales de la Argentina. In: *Elementos de Política Ambiental*, F. Goin and R. Goin (eds.), pp.215-222. Di Giovanni Grafica, La Plata.
- Ford, S. M. 1994. Taxonomy and distribution of the owl monkey. In: *Aotus: The Owl Monkey*, J. F. Baer, R. E. Weller and I. Kakoma (eds.), pp. 1-57. Academic Press, San Diego.
- Mares, M. 1992. Neotropical mammals and the myth of Amazonian biodiversity. *Science* 255:976-979.
- Rathbun, G. B. and Gache, M. 1980. Ecological survey of the night monkey, *Aotus trivirgatus*, in Formosa Province, Argentina. *Primates* 21:211-219.
- Redford, K. H., Taber, A. and Simonetti, J. A. 1990. There

is more to biodiversity than the tropical rain forests. *Conservation Biology* 4(3):328-330.

Wright, P. C. 1994. The behavior and ecology of the owl monkey. In: Aotus: *The Owl Monkey*, J. F. Baer, R. E. Weller and I. Kakoma (eds.), pp.97-112). Academic Press, San Diego:

Zunino, G. E., Galliari, C. A. and Colillas, O. J. 1985. Distribución y conservación del mirikina (*Aotus azarae*) en Argentina: Resultados preliminares. In: *A Primatologia no Brasil - 2* M. T. de Mello (ed.), pp. 305-316. Sociedade Brasileira de Primatologia, Brasília.

## UTILIZAÇÃO DE RÁDIO TELEMETRIA EM SAUÁS, *CALLICEBUS PERSONATUS*, RESGATADOS DURANTE A IMPLANTAÇÃO DA USINA HIDRELÉTRICA NOVA PONTE, MINAS GERAIS

### Introdução

O sauá ou guigó, *Callicebus personatus*, é endêmico da Mata Atlântica. A espécie defende seu território por meio de vocalizações, é monógama e forma grupos de até cinco indivíduos. No estado de Minas Gerais, Brasil, o sauá, *C. p. nigrifrons*, ocorre ainda em pequenas remanescentes de floresta e matas ciliares no Cerrado. *C. personatus* é um animal tímido, de movimentos sutis e que emite vocalizações, em muitas regiões, apenas matutinas, dificultando seu encontro e estudo até a habituação a pesquisadores. Aqui relatamos nossa experiência a respeito da colocação de colares com rádio transmissores como um meio de facilitar a habituação e observação dessa espécie na natureza.

Durante a implantação da Usina Hidrelétrica Nova Ponte, Minas Gerais, pela Companhia Energética de Minas Gerais (CEMIG), no Triângulo Mineiro, foram realizadas operações de resgate de fauna. Dentre outros animais, foram capturados 25 sauás, visando novas tentativas de utilização da técnica de rádio telemetria com estes primatas, aumentando-se os dados disponíveis para a espécie.

O presente trabalho objetivou, além da obtenção de dados ecológicos da espécie, a verificação da readaptação ou não, de animais originados de operações de resgate, reintroduzidos a novos habitats.

### Material e Métodos

Durante as operações de resgate de fauna pela CEMIG, os animais foram levados a um centro de triagem, onde permaneceram em recintos de três a seis animais de março de 1994 a janeiro de 1995, até serem obtidas condições necessárias a soltura e para observações sobre sua biologia. Tais procedimentos seriam realizados por três biólogos da Universidade Federal de Minas Gerais, contactados após resgate dos animais. Após este período, os animais foram devidamente preparados para receberem os aparelhos transmissores. Os indivíduos foram sedados por via intramuscular, com Ketalar a 3mg/kg. Em seguida eram pesados, e recebiam os transmissores (TELONICS). Eram ainda marcados com produto de bom poder de tingimento dos pêlos e de boa durabilidade, o Nyanzol. As marcações distinguiam machos de fêmeas (parte proximal e distal da cauda respectivamente) e grupos (coxas e região costal, ora esquerda ora direita variando o posicionamento da marcação de acordo com o grupo). Durante o processo de sedação foram tomadas temperaturas, batimentos cardíacos e movimentos respiratórios dos sauás. Após todos estes processos, os sauás ficaram em observação de quatro a doze dias para verificação da adaptação aos transmissores e reação ao anestésico (Ver dados referentes ao processo de sedação na Tabela 2). Foram realizados esfregaços de sangue, para verificação de parasitismo sanguíneo. Coletou-se ainda fezes para análise parasitológica.

### Resultados e Discussão

Verificaram-se várias reações de desconforto quanto aos aparelhos. Os primatas manusearam, ora as próprias coleiras, ora as de outros indivíduos, tentando arrancá-las com as mãos ou boca sistematicamente. Houveram casos de retirada do imã, que mantém os aparelhos desligados até a soltura dos sauás, e de manuseio das antenas, que foram roídas, entortadas e descascadas em suas camadas plásticas.

Tabela 1. Diferença dos pesos dos indivíduos antes e depois da colocação dos transmissores.

Número do Transmissor	Sexo	Recinto	Data colocação do transmissor	Peso(kg)	Data retirada do transmissor	Peso(kg)
362615	F	3 e 4	10.01.95	-	09.02.95	1,06
362616	F	3 e 4	10.01.95	1,34	09.02.95	1,22
362617	F	3 e 4	10.01.95	1,28	09.02.95	1,20
362618	M	3 e 4	10.01.95	0,79	09.02.95	0,83
362609	F	5	11.01.95	0,82	09.02.95	0,76
362610	M	5	11.01.95	0,74	09.02.95	0,68
362611	M	5	11.01.95	1,05	09.02.95	0,99
362612	F	5	11.01.95	0,80	09.02.95	0,86
362613	F	5	11.01.95	0,68	09.02.95	0,72
362614	M	5	11.01.95	1,10	09.02.95	1,05
362619	F	1	12.01.95	1,18	09.02.95	1,05
362620	M	1	12.01.95	1,50	ant. à 09.02.95	1,33
362621	M	1	12.01.95	1,45	ant. à 09.02.95	1,46
362622	M	6 e 7	19.01.95	1,15	20.02.95	-
362623	F	6 e 7	19.01.95	1,20	*	-

\* Não foi retirado o transmissor.