to consume the bird (until prevented), it also clearly 'stalked' its prey, as has been reported for free-ranging populations during invertebrate foraging (Soini, 1988; Stevenson and Rylands, 1988). Indeed, a similar observation of stalking, capturing, killing (with a bite to the head) and consuming a bird is reported for a captive Saguinus (Schaffelin, 1958 in Snowdon and Soini, 1988). A working hypothesis is that this hunting behavior may be opportunistically extended to birds in the wild. Digby and Barreto (1998) report that free-ranging common marmosets 'seek out and inspect bird nests', and that birds were occasionally observed mobbing marmosets suggesting recognition of a predator threat. Intriguingly, Soini (1988) reports that pygmy marmoset core use areas have fewer birds than surrounding areas of the home range, and that flocking birds are often chased. Soini (1988) suggests this behavior maybe designed to reduce inter-specific feeding competition with birds. This observation suggests there may also be some risk to those that are careless.

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References

A NORTHEASTERN EXTENSION OF THE DISTRIBUTION OF AOTOS INFULATUS IN MARANHÃO, BRAZIL

José de Sousa e Silva Júnior Marcus E. B. Fernandes

Introduction
The night monkeys (Aotus Humboldt, 1811) are predominantly Amazonian in their distribution, although they also extend into Central America and south into Paraguay and Argentina (Hershkovitz, 1983). A number of recent studies have adjusted the geographic distributions as indicated by Hershkovitz (1983) (for example, Aquino and Encarnación, 1988; Timm, 1988; Pieczarka, 1993; Brooks, 1993, in Brooks, 1996; Ford, 1994; Silva Jr. et al., 1995; Rodríguez-Luna et al., 1996). Silva Jr. et al. (1995) reported the occurrence of A. infulatus Kuhl, 1820 on the islands of Caviana and Marajó,
and north of the Amazon estuary in a small area of southeastern Amapá. According to Hershkovitz (1983), the range of *A. influatius* is restricted in the east by the Rios Gurupí and Tocantins, and although Silva Jr. *et al.* (1992) and Lopes (1993) recorded its occurrence east of the Rio Gurupí, the range limits as given by Hershkovitz (1983) have been maintained in the recent literature (see, for example, Ford, 1994; Emmons and Feer, 1997; Eisenberg and Redford, 1999). Here we report on a study examining new localities for, and the habitats occupied by, *A. influatius* in the easternmost part of the range of the genus in the state of Maranhão, confirming its occurrence east as far as the Rio Parnaiba.

**Material and Methods**

A number of expeditions have been carried out since 1989 in order to examine the range limits of *A. influatius* in the state of Maranhão. Specimens were collected and further evidence was obtained through direct observation (sightings and vocalizations), interviews and from animals kept as pets. The specimens collected were compared with museum specimens at the Museu Paraense Emílio Goeldi (MPEG), Belém, the National Museum of the Federal University of Rio de Janeiro (MNJR), and the Zoology Museum of the University of São Paulo (MZUSP). All the field specimens collected were deposited in the scientific collection of the MPEG. The localities were plotted on Hershkovitz’s map (Hershkovitz, 1983, Fig. 2, p. 214) (see Fig. 1).

**Results and Discussion**

Table 1 summarizes the information obtained in this study, including the localities visited, the habitats in which the specimens were registered, and the nature of each record. The state of Maranhão covers a mosaic of biomes resulting from the transition from Amazonia rain forest to the bush savanna (*Cerrado*) of central Brazil, and the dry thorn scrub and deciduous forest (*Caatinga*) of the northeast. *A. influatius* was registered in 20 new localities, all east of the Rios Tocantins and Gurupí. These localities are spread through the following five landscapes in Maranhão: Amazonia, Zona dos Cocos (*Orbignya* palm tree forest), coastal areas, *Cerrado*, and the transition zone eastward (between Amazonia, *Cerrado* and *Caatinga* biomes). In Amazonian forest, *A. influatius* was registered in a few degraded *terra firme* forests mixed with patches of igapó (flooded forest). In the Zona dos Cocos records indicated the presence of *A. influatius* in disturbed forest patches, locally called "capoeira alta", as well as in the extensive

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areas of *Orbignya* sp. palm trees locally referred to as *babaçual*. These palms are used by night monkeys as sleeping trees. The coastal area is dominated by red mangroves (*Rhizophora* sp.), adjacent to tall secondary growth (*Capoeira alta*). Night monkeys can be found throughout these contiguous areas along the coastline. *Cerrado* is the dominant vegetation in the south of the state. Information collected in the municipality of Alto Parnaíba strongly suggested the occurrence of *A. infilatus* only on the left bank of the river. Finally, there is a transition zone in the east of the state of Maranhão, dominated by mosaics and transitions of *Cerrado* forest (*cerradão*), gallery forest, *babaçual*, and *caatinga*, as well as associations of some local palm trees such as *Orbignya* and *Copernicia*. *A. infilatus* was collected in the *cerradão*, near to a patch of *Orbignya* forest. Direct observations (sightings and vocalizations), to-
together with information from local people, showed that *A. infulatus* forages in all these environments with the exception of *caatinga*. Local people also emphasized the use of *Orbignya* as sleeping trees. All the information obtained in São Miguel and Brejinho, as well as in four other localities on the right bank of the Rio Parnaiba, state of Piauí (David Caldas, Novo Nilo, União, and Santa Rita), indicated that *A. infulatus* was restricted to the left bank of the river in the state of Maranhão.

Conclusions

The results showed that the geographical distribution of *A. infulatus* extends east to the left bank of the Rio Parnaiba, and hence including all of the state of Maranhão. Although the distribution may not be continuous in this part of Maranhão, the night monkeys were found in many different forest types. The only exceptions were severely degraded areas such as the region near the city of Bacabal.

Although the Rio Parnaiba evidently delimits the geographical distribution of *A. infulatus* in the east of its range (and that of the genus), it has features which would indicate that it is not an efficient barrier (see Ayres and Clutton-Brock, 1992). It is a meandering, slow, white-water river, with a high sediment load, and is not a natural barrier for any other primate species. *Callithrix jacchus*, for example, a smaller species than *A. infulatus*, occurs on both banks of the Rio Parnaiba (Silva Jr., unpublished data), and it is reasonable to suppose that enclaves populations of *A. infulatus* may occur on the right bank, as has been recorded for other night monkeys by Hershkovitz (1983). Further investigation may also extend the eastern limits of the range of *A. infulatus* toward the northwest of the state of Bahia. This possibility is suggested by a museum specimen (MNRJ-3904), collected by R.M. Gilmore from "north-west Bahia" which has to date been considered to be of mistaken origin.

With the range extension described here, the geographical distribution of *A. infulatus* has the largest range of the genus *Aotus*.

Rylands et al. (1995) consider *A. infulatus* to be a common species without any risk of extinction. However, there is no information on its biology and ecology from areas outside the Amazon. This study showed that *A. infulatus* uses previously unrecorded environments, such as the meso-habitats described as part of the Zona dos Cocos, coastal area, and the transition zone from eastern Maranhão. Further research is needed to study the ecology of these night monkeys, vital for future conservation programs in a region which has suffered widespread deforestation and degradation of its natural environments.

Specimens Collected and Examined

Specimens collected and material examined at the Museu Paraense Emílio Goeldi (MPEG), Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ), and Museu de Zoologia da Universidade de São Paulo (MZUSP): *Aotus infulatus*: AMAPÁ: Caru de Macacouru, municipality of Itaubal (MPEG-22522, 22523, 24035); PARÁ: Ponta de Pedras, Marajó Island (MPEG-8875, 8876, 8877); Ararí Lake, Marajó Island (MPEG-99, 100); Fazenda Santana, Caviana Island, municipality of Chaves (MPEG-23058, 23059, 24130, 24131, 24132); Maiaandeua Island, municipality of Maracanaú (MNRJ-23102); Nova Timboreta (MNRJ-24840, 24841); Vila Brabo, right bank of Rio Tocantins (MPEG-12177, 12178); Cocai, right bank of Rio Tocantins (MPEG-11851); Timboazal, left bank of Rio Tocantins (MPEG-11852, 11853); Sítio Calandrinho, left bank of the Rio Tocantins (MPEG-8869, 8870); Saique, left bank of the Rio Tocantins (MPEG-12179); Conceição do Araguaia (MPEG-1321); MARANHÃO: Juirema, municipality of Amarante (MPEG-23036); Pedra Preta, municipality of Lago da Pedra (MPEG-23037); São Miguel, right bank of Rio Parnaiba, municipality of Caxias (MPEG-24123, 24124, and field number CZ-1420); BAHIA: northwestern Bahia (MNRJ-3904).

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**PATRONES DE ACTIVIDAD DE ALOUATTA PALLIATA EN UN FRAGMENTO DE SELVA EN LOS TUXTLAS, MEXICO**

**Teresita de Jesús Ortiz Martínez**
**Said Juan Solano**
**Alejandro Estrada**
**Rosamond Coates-Estrada**

En México, la selva húmeda tropical de la región de Los Tuxtlas resguarda la distribución geográfica más septentrional del género Alouatta en el Continente Americano representado por la especie A. palliata (v. Estrada y Coates-Estrada, 1984). Desdichadamente gran parte del hábitat de esta especie ha sido destruido o fragmentado por el hombre como parte del proceso de conversión de la selva a pastizales y, en menor medida, a monocultivos (Estrada y Coates-Estrada, 1996). Nuestro conocimiento sobre el comportamiento y ecología de Alouatta bajo condiciones de fragmentación y aislamiento del hábitat en el Neotrópico es aún escaso. Tal información es indispensable para generar modelos de conservación que eviten la desaparición continuada de representantes de las especies de interés.

Los patrones de actividad diurnos de monos aulladores (Alouatta spp.) y la relación que éstos guardan con las condiciones de su hábitat ha sido motivo de estudio en diferentes partes del Neotrópico (Serio-Silva, 1992; Bicca-Marques y Calegaro-Marques, 1994; Stoner, 1996). Los monos aulladores se han caracterizado por presentar patrones de baja actividad, descansando más de la mitad de su tiempo diurno, lo cual se atribuye a la necesidad de procesar grandes cantidades de fibra vegetal como resultado de una dieta rica en hojas (Milton, 1980). Las variaciones en los patrones de actividad de este primate parecen estar relacionadas con el grado de dispersión en el tiempo y espacio del recurso alimentario (Crockett y Eisenberg, 1987; Serio-Silva, 1992), con su densidad y con variables abióticas como el clima (Chivers, 1969, Glander, 1979); así como también con la edad y sexo de los aulladores (Bicca-Marques y Calegaro-Marques, 1994). La perturbación antropogénica de los hábitats naturales de este primates también tiene una influencia importante sobre la estrategia de asignación de tiempo y energía a las diferentes actividades vitales (crecimiento, mantenimiento y reproducción), pero hasta el momento existe poca información al respecto. Así, este trabajo presenta información sobre el patrón de actividad general para un

**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.**

**Figura 2. Patrón general de actividades de la tropa bajo estudio para el ciclo anual reportado.**