

THE BLUE-THROATED MOTMOT (*ASPATHA GULARIS*) IN THE CENTRAL CLOUD FORESTS OF GUATEMALA: AN INDICATOR FOR PRIMARY FOREST?

Swen C. Renner

Conservation and Research Center, National Zoological Park, Smithsonian Institution, 1500 Remount Road, Front Royal, VA 22630 USA

renners@si.edu

Abstract

Distribution of the Blue-throated Motmot *Aspatha gularis* is restricted to the Central American Highlands (> 1500 m) from southern Mexico (Chiapas) to western Honduras. This species is considered to be a good indicator of mature cloud forest in some literature. A population of *A. gularis* in the northernmost Guatemalan mountain range (Chelemhá) was studied from March to September 2001 and 2002 to analyze the species' habitat preferences. Thirty observations of at least five individuals were made within the 102 ha study area, half of which was mature cloud forest while the remainder was old second growth and slash and burn agriculture. Ten percent of the observations of *A. gularis* occurred in mature forest (here equivalent with pine-oak forest and cloud forest) while more than 90% were in old secondary growth or at the forest edge bordering to slash-and-burn agriculture. These findings raise questions concerning the species' use as an indicator of mature cloud forest.

Key words: conservation, Guatemala, Blue-throated Motmot, *Aspatha gularis*, tropical montane cloud forest

Resumen

La distribución del *Aspatha gularis* está restringida a los montañas de Meso América (> 1500 m) desde el sur de México (Chiapas) hasta el oeste de Honduras. *Aspatha gularis* es conocida como una especie indicadora de bosques nublados primarios. Se estudió una población de *A. gularis* en los montañas en el centro de Guatemala de Marzo hasta Septiembre de 2001 y 2002 para analizar sus preferencias de hábitat. En las 102 ha del área de estudio, se hicieron 30 observaciones de 5 individuos. La mitad del sitio de la estudio era bosque primario y la otra mitad vegetación secundaria como consecuencia de agricultura de tala y quema. Menos de 10% de las observaciones se realizaron en el bosque primario y

más de 90% en vegetación secundaria o al borde de bosque primario con vegetación secundaria. Estos resultados dan lugar a dudas acerca de el uso de la especie como indicadora de bosque de niebla primario.

Palabras clave: conservación, Guatemala, *Aspatha gularis*, bosque nubloso, bosque montañoso tropical

Introduction

The Blue-throated Motmot, *Aspatha gularis*, is a restricted-range species occurring in Central America from southern Mexico (Chiapas) to Honduras (Howell & Webb 1995). It is considered to be a species of the cloud forest zone and inhabits humid to semi-humid forests above 1500 m (Stotz et al. 1996). Several authors indicate that this species is restricted in distribution to mature and/or primary cloud forest (e.g., Peterson et al. 2003; Tejeda-Cruz & Sutherland 2004), and could serve as a good indicator and keystone species for conservation efforts (e.g., Eisermann 2000). However, this is subject to discussion since not all authors agree (e.g. Snow 2001). In particular, it has been noted that the loud and distinctive calls of the species could be very useful as a simple biodiversity measure to help non-scientists assess the conservation urgency status of an area (Eisermann 2000). Howell & Webb (1995) describe the habitat of the Blue-throated Motmot as humid to semi-humid evergreen and pine-evergreen forests.

The species is often shy and elusive when perching in low understory. Sometimes *A. gularis* also calls from high in trees, often on exposed branches. Here I report new aspects on the species' biology found during a bird community study in central Guatemala and discuss the suitability as indicator for primary forest.

Study area and methods

The study area was located in the Sierra Yalijux (Fig. 1), a tropical cloud forest in northern Guatemala. In total three large mature forest remnants remain in the Sierra Yalijux and amount to a total of 5500 ha. The regional mature cloud forest is mainly comprised of oaks (*Quercus* sp.) with interspersed pines (*Pinus maximinoii*). A 102 ha study plot in Chelelhá was established (90°04'W, 15°23'N, 1980-2550 m) in the largest mature cloud forest patch (~2200 ha of mature forest patch), in which mature forest and secondary forest each covered 50% of the total area. While the cloud forests are still abundant above 2000 m and cover all the area above that in

the Sierra Yalijux, below they are diminished to few small forest patches and are hardly present anymore. The young secondary forest in the Sierra Yalijux is regularly slashed and burned for agriculture, but young secondary forest within the Chelemhá Plot had not been burned for the six years preceding this study, and was characterized by vegetation up to 10 m in height. The young secondary vegetation is comprised of

a patchwork of different vegetations age stages (Table 1) but the study plot's young secondary vegetation was mainly shrub of ~4 m and pine reforestation (plantation) of ~3 m in 2002 and 2-3 years age. Cornfields bordered to the study plot but were not included in it. The mature forests were not used by humans except for small amounts of timber extraction and minimal subsistence hunting (Fig. 2).

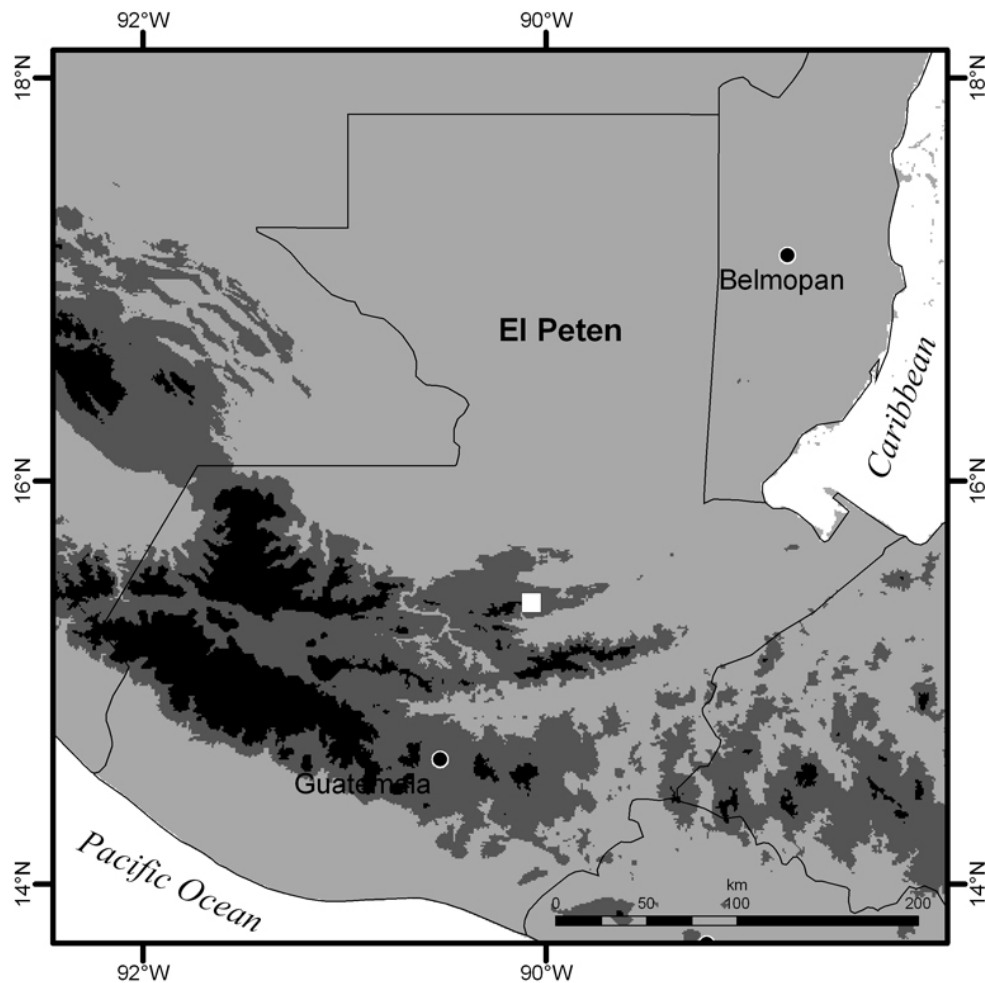


Figure 1. Location of the Chelemhá Study Plot in Guatemala (rectangle) and elevations (light gray < 1000 m, dark gray < 2000 m, black > 2000 m).

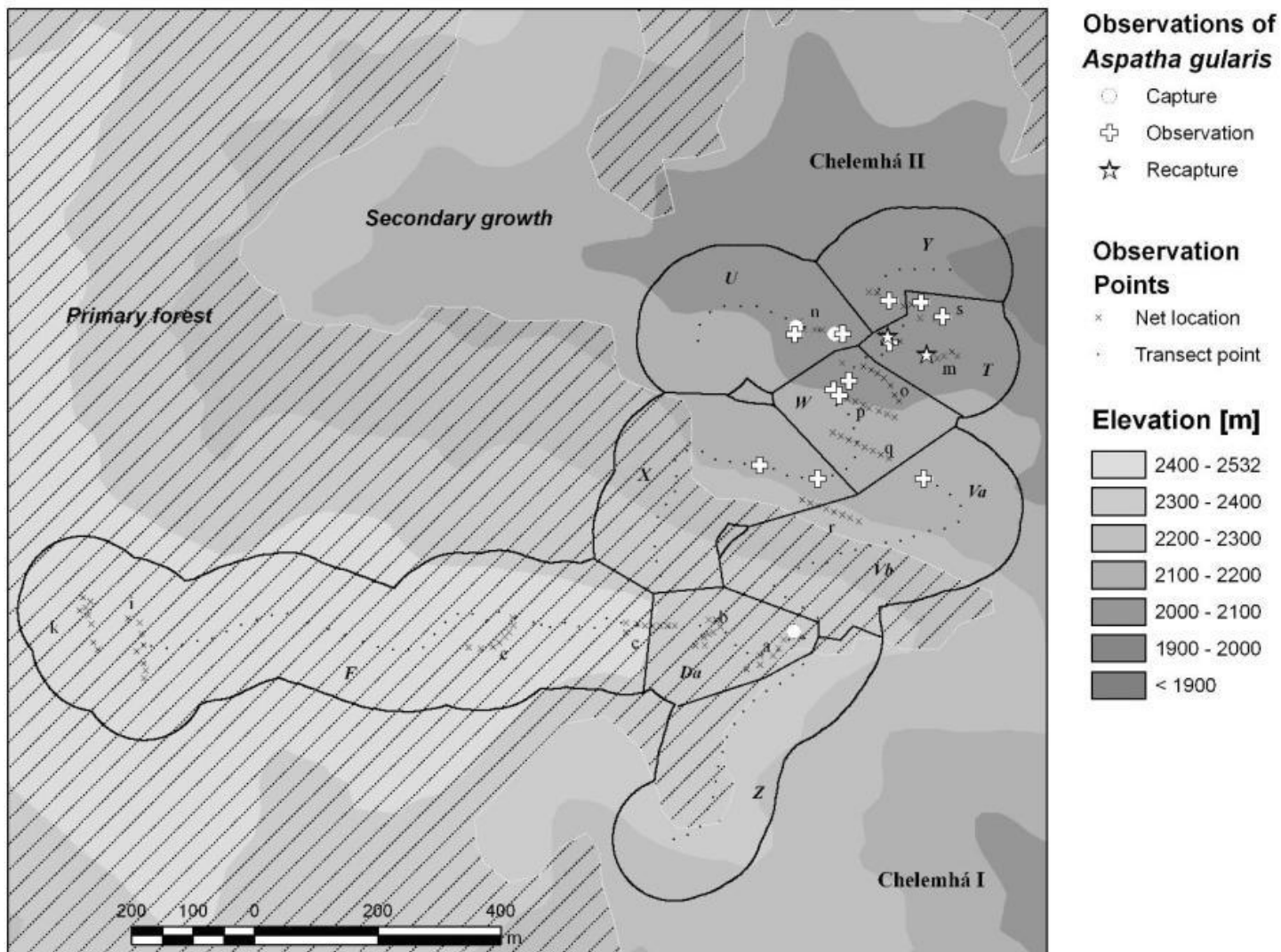


Figure 2. Chelemhá Study Plot and relevant locations. Capital letters indicate area of transect mapping, lower case indicate mist net line of 96 m length in total.

In mature and secondary forest regular transects counts along an existing trail system were used to assess population densities for different habitats of the plot (Bibby et al. 1995; Krebs 1999; Gilbert et al. 2000). I conducted standardized

censuses and mist netting three times during the breeding season of *A. gularis* in 2001 and 2002, each year once in April, once in May, and once in June 2002. I made further additional observational surveys between March and October in both years. The same amount of capture

hours per net (78 capture days for a total of 5304 hours per 12-m net in both habitats together) and observation per transects were made in both habitats 132 h of observations per habitat). All *A. gularis* individuals captured in mist nets or seen or heard along transects were mapped. It was possible to distinguish two or more (maximum of four different concurrent observations) individuals on occasion during audio-visual surveys. For instance, two simultaneous observations at close localities were considered as two individuals. Due to loud calls, audible from the forest border in open country and distant hills up to 500 m, and distinctive display behavior, as many as four individuals of the species could be mapped at the same time. The number of individuals was derived from the maximum number of observations per transect repetition. Captured individuals were individually banded with color and aluminum leg bands. For a more detailed description of the study area and methods used, refer to Renner (2003, 2005), and Renner et al. (in press).

Results

Twenty-three audio/visual observations were made on the 102 ha plot, and additionally five individuals were captured and banded (Tab. 1). Two individuals previously banded

by me were recaptured later the same month (Tab. 1). Assuming the captured individuals are resident breeding birds – of course there are restrictions due to moving and/or disturbed individuals by the capturing process or foraging individuals (for discussion see Remsen 1994) – at least five individuals inhabit the study plot. Three captured birds were classified as females on the basis of brood patches being present. The simultaneously observation of four displaying individuals on 18 March 2002 supports the number of the above indicated five residents. In total, 23 audio-visual observations had been made, the majority in secondary growth (Tab. 1). Out of all observations and captures just four were made in oak-pine forest and at the edge of old secondary forest. All other observations and capture/recaptures were made in all kinds of secondary growth in the Chelemhá plot (Fig. 2). The observations in the two habitats are not distributed equally in-between the major parts of the study plot. I made only two observations, with the same sampling efforts in both habitats, in oak-pine mature cloud forest in the study region. The remaining observations are almost equally distributed over pine-reforestation area (7), old secondary forest (6), and young secondary forest (8) amounting for 91.3% of all the observations for the secondary vegetation, not including captures. While most individuals

were observed in secondary growth, 60% of the captures had been made in mature pine-oak cloud forest. However, both recaptures had been made in old secondary growth (Tab. 1).

Discussion

The individual density of 5 individuals per 102 ha in the Sierra Yalijux near the community of Chelelhá is exceptionally high (Snow 2001; Renner 2003). Although prior studies found *A. gularis* only in mature forests, I found the species often near forest edges on the mature forest side and in old secondary growth (~15 years), and on a few occasions in young secondary growth (= 7 years).

Despite the high sampling effort, capture rates for *A. gularis* were low, which implies that in the Sierra Yalijux its density is low. For instance, the same sampling effort for other species had much higher individual numbers per 102 ha in Chelelhá. The Common Bush Tanager (*Chlorospingus ophthalmicus*) had 148 captures and 232 observations with the same sampling effort in the same area (Renner et al. in press). The findings of low density have been reported also by other studies, e.g., Gómez de Silva et al. (1999) report that *A. gularis* is found in the forests of El Triunfo “in low numbers” with

the main activity during winter and spring.

A. gularis is reported to be a shy and rare species with area restriction to the highlands of Central America. Komar (1998, 2002) observed the species only in the very north of El Salvador (Montecristo National Park) with few individuals. Also he concludes that the species is endangered in that country. Reports from Honduras are not known but *A. gularis* probably occurs in the southwestern highlands of Honduras (Howell & Webb 1995).

Estimation of species numbers and individual numbers are subject to several methodological efforts by biologists since neither all species nor all individuals will be observed with limited spatiotemporal effort (Krebs 1999). Therefore, indices and algorithms had been employed to estimate e.g., the species numbers or the population sizes. The attempted to estimate the population size with mark-recaptures methods for *A. gularis* failed due to the small sample size (Krebs 1999).

The Blue-throated Motmot in the Sierra Yalijux of Guatemala is not restricted to mature and/or primary cloud forest. This finding suggests that either the species is not suitable as indicator for mature cloud forests in the region or that there are restrictions to that assumption.

Eisermann (2000) stated that the status of this species in habitats other than mature cloud forest was unclear, and that *A. gularis* might be useful as an indicator for untouched cloud forest as he found the species in low population densities in the Sierra Caquipec (< 2 individuals per 100 ha), exclusively in mature cloud forest. However, he further stated that he had insufficient data on which to base a conclusive recommendation. In addition, he reported the frequent occurrence of the species in the Biosphere Reserve of the Sierra de Las Minas (Eisermann 2000; Eisermann pers. comm.), where the species has been also reported at elevations below the cloud forests belt (i.e., < 1500 m).

Stotz et al. (1996) list *A. gularis* as a species highly sensitive to habitat disturbance, occurring uncommonly in the understory of montane evergreen forest and pine-oak forest with a distribution limited to the Central American highlands between 1500-3100 m. They suggest a conservation and research priority for the species as “medium”. The statement “declining with deforestation” indicates that the species is linked to forest habitats and is threatened by ongoing deforestation (Stotz et al. 1996). However, while deforestation will surely diminish populations of this forest bird according to Stotz et al.

(1996), my findings indicate that the species regularly visits secondary growth.

A. gularis may not be a suitable indicator species for ‘untouched cloud forest’ for several reasons. The density with less than 5 individuals per km² (reported from several regions, see above) seems to be low in general and few aspects are known about the biology of the species. In fact, the finding might bode well for the species’ chance of long-term survival in old secondary growth once the mature forest has vanished (compare Renner & Markussen 2005).

Acknowledgements

The study was supported by the German Research Foundation (DFG) as part of the DFG GK 642/1 “Valuation and Conservation of Bio-diversity in Guatemala”. The study was performed in accordance with the current laws of Guatemala and CONAP authorized the study (No. 139-2001). I would like to thank John Rappole, Peter Leimgruber, Pia Terra-nova, and David Anderson for valuable comments on earlier versions of the manuscript and help with English. In addition, I would like to thank all Guatemalans who supported this study and all locals in Chelemhá, as well as David Unger and Knut Eisermann for selection of the study plot and further information on the species and background information on the region.

References

- Bibby, C. J., Burgess, N. D., & D. A. Hill. 1995. Bird census techniques. Neumann, Radebeul.
- Gómez de Silva G., H., González-García, F. & M. P. Casillas-Trejo. 1999. Birds of the upper cloud forest of El Triunfo, Chiapas, Mexico. *Ornitología Neotropical* 10: 1-26.
- Eisermann, K. 2000. Avifaunistisch-ökologische Untersuchungen in der Sierra Caquiepec, Cobán, Alta Verapaz, Guatemala. Fachhochschule Eberswalde, Eberswalde.
- Gilbert, G., Gibbons, D. W., & J. Evans. 2000. Bird Monitoring Methods. A Manual of Techniques for Key UK Species. A & C Black Pub, London.
- Howell, S. N. G. & S. Webb. 1995. A guide to the birds of Mexico and northern Central America. Oxford University Press, Oxford.
- Komar, O. 1998. Birds of Montecristo National Park, El Salvador. *Ornitología Neotropical* 13: 167-193.
- Komar, O. 2002. Priority conservation areas for birds in El Salvador. *Animal Conservation* 5: 173-183.
- Krebs, C. 1999. Ecological methodology. Addison-Welsey Educational Pub, Menlo Park.
- Peterson, T. A., Navarro-Sigüenza, A. G., Hernández-Baños, B. E., Escalona-Segura, G., Rebón-Gallardo, F., Rodríguez-Ayala, E., Figueroa-Esquivel, E. M., & L. Cabrera-García. 2003. The Chimalapas Region, Oaxaca, Mexico: a high-priority region for bird conservation in Mesoamerica. *Bird Conservation International* 13: 227-253.
- Remsen, Jr., J. V. 1994. Use and misuse of bird lists in community ecology and conservation. *Auk* 111: 225-227.

- Renner, S. C. 2003. Structure and diversity of cloud forest bird communities in Alta Verapaz, Guatemala, and implications for conservation. Niedersächsische Staats- und Universitätsbibliothek Göttingen. Available: <http://webdoc.sub.gwdg.de/diss/2003/renner/renner.pdf> (downloaded 27 January 2004).
- Renner, S. C. 2005. The Resplendent Quetzal (*Pharomachrus mocinno*) in the Sierra Yalijux, Guatemala. *Journal of Ornithology* 146: 79-84.
- Renner, S. C. & M. Markussen. 2005. Human impact on bird diversity and community structure in a tropical montane cloud forest in Alta Verapaz, Guatemala, with special reference to the Quetzal (*Pharomachrus mocinno*). Pp 373-390 in: Markussen, M., Marggraf, R., Buse, R., Garrelts, H., Mánéz-Costa, M. A. & S. Menzel (eds): *Valuation and Conservation of Biodiversity - Interdisciplinary Perspectives on the Convention on Biological Diversity*. Springer. Berlin, Heidelberg.
- Renner, S. C., Waltert, M. & M. Mühlenberg. Comparison of bird communities in primary versus young secondary tropical montane cloud forest in Guatemala. *Biodiversity and Conservation*. In Press.
- Snow, D. W. 2001. Family Momotidae (Motmots). Pp 264-284. in: del Hoyo, J., Elliott, A. & Sargatal, J. eds (2001). *Handbook of the Birds of the World, Volume 6. Mousebirds to Hornbills*. Lynx Edicions, Barcelona.
- Stotz, D. F., Fitzpatrick, J. W., Parker, III, T. A. & D. K. Moskovitz. 1996. *Neotropical birds. Ecology and conservation*. University of Chicago Press, Chicago.
- Tejeda-Cruz, C. & W. J. Sutherland. 2004. Bird responses to shade coffee production. *Animal Conservation* 7: 169-179.

Date	Observation	Location ¹	Sex	Habitat
12Aug2001	Capture	n	-	Primary forest edge interior to old secondary growth (10-15 years) ²
12Aug2001	Capture	n	-	Primary forest edge interior to old secondary growth (10-15 years) ²
05Sep2001	Capture	n	? **	Secondary growth (5-7 years) ³
15Mar2002	A/V *	X	-	Secondary growth (5-7 years) ³
18Mar2002	A/V *	p	-	Pine-reforest ^{3,4}
18Mar2002	A/V *	p	-	Pine-reforest ^{3,4}
18Mar2002	A/V *	p	-	Pine-reforest ^{3,4}
18Mar2002	A/V *	p	-	Pine-reforest ^{3,4}
19Mar2002	A/V *	T/m	-	Young secondary growth (< 2 years) ³
19Mar2002	A/V *	T/m	-	Young secondary growth (< 2 years) ³
28Mar2002	A/V *	T	-	Secondary growth (5-7 years) ³
29Mar2002	A/V *	T	-	Secondary growth (5-7 years) ³
29Mar2002	A/V *	U	-	Secondary growth (5-7 years) ³
30Mar2002	A/V *	X	-	Oak-Pine ²
31Mar2002	A/V *	X	-	Oak-Pine ²
15April2002	A/V *	U	-	Secondary growth (5-7 years) ³
08May2002	A/V *	T	-	Young secondary growth (< 2 years) ³
10May2002	A/V *	T	-	Secondary growth (5-7 years) ³
11May2002	A/V *	W	-	Pine-reforest ^{3,4}
11May2002	A/V *	W	-	Pine-reforest ^{3,4}
12May2002	Capture	n	? **	Secondary growth (5-7 years) ³
19May2002	Recapture	m	?	Secondary growth (5-7 years) ³
19May2002	Recapture	m	?	Secondary growth (5-7 years) ³
23May2002	A/V *	Va	-	Young secondary growth (< 2 years) ³
24May2002	A/V *	T/s	-	Young secondary growth (< 2 years) ³
24May2002	A/V *	T/s	-	Young secondary growth (< 2 years) ³
29Jun2002	A/V *	Va	-	Young secondary growth (< 2 years) ³
29Jun2002	A/V *	Y	-	Young secondary growth (< 2 years) ³
10Jul2002	Capture	a	? **	Primary forest edge interior to old secondary growth (10-15 years) ²
23Jul2002	A/V *	W (o)	-	Pine-reforest ^{3,4}

Table 1. Observations of *Aspatha gularis* in the Chelemhá Plot in 2001 and 2002. * A/V: Audio and/or visual observation, ** Brood patch present, ¹ Refers to Fig. 2, ² Primary forest part of study plot, ³ Secondary forest part of study plot, ⁴ Pine-reforest is a type of secondary vegetation that resembles young secondary forest; the planted pines get support during the first two years by trimming the surrounding vegetation in a perimeter of ~ 1.5 m around the pine.