

Odonata of Cloudbridge

An inventory of dragonflies and damselflies in various habitats

Bridget Henning

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Objective

The purpose of this inventory is to discover which species of adult Odonates are present in Cloudbridge Private Nature Reserve.

Introduction

Cloudbridge Nature Reserve is located near San Gerardo de Rivas, Costa Rica on montane forests adjacent to Chirripo National Park. It encompasses areas of pristine forest, secondary forest, replanted pasture, and historic pasture allowed to regrow naturally. Large areas of the lowlands have in the past been cleared for



pastures or plantations. Clearcutting of cloud forests directly destroys the habitat of many species and has numerous drastic effects on the surroundings. The surrounding habitat is altered by an increase in wind speed, more variable temperatures, and a decrease in humidity, which the cloud forest relies on as its main source of moisture (Laurance and Bierregaard, 1997). The increases in stream temperature and soil run-off can have effects on habitats at even greater distances from the clearing (Bartholow, 2000). Cloudbridge is working to restore the cleared areas within the reserve for improved forest functioning and wildlife habitat.

When managing a natural area it is important to be able to monitor the quality of the land. Dragonflies and damselflies are frequently used as indicator species for assessing habitats in wetlands, riparian forests, and lake shores around the world (Duncan, 2005). Odonates have aquatic and terrestrial life stages and thus respond to the quality of both environments (Bried, 2005). Cloudbridge odonata species have never before been surveyed so this inaugural inventory may serve as a baseline that future surveys may be compared with to detect changes in the riparian habitat that may have gone unnoticed by humans.

The objective of this study was to record the Odonata species diversity and habitat use within Cloudbridge reserve. The reserve encompasses a variety of aquatic habitats such as rivers, streams, ponds, and tank bromeliads that may be suitable breeding habitat for Odonata. These diverse habitats throughout the reserve were surveyed. While the dragonflies and damselflies in the area surrounding Cloudbridge have never before been studied, Carlos Esquivel, entomologist at Universidad Nacional in Heredia, expected the following Anisoptera genera to be present in this area: Erythrodiplax, Pantala, Orthemis, Elasmothermis, Brechmorhoga, and Macrothemis.

Methodology

Adult odonates use a variety of terrestrial and riparian habitats during different periods for feeding, breeding, and migration (Dunkle, 2000; Bried, 2005). Additionally, territorial males are frequently found near suitable aquatic breeding habitats while females and non-territorial males are frequently found further from breeding habitats. In order to encompass as much of the potential habitat as possible while maintaining a safe survey environment, the inventory included as many of the trails and streams in Cloudbridge as possible. The trails and streams wind through the primary forest, secondary forest, plantation, and natural regrowth land types.



Trails and streams were walked during periods of no rain and little wind. Dragonflies and damselflies seen were netted, identified and if necessary collected. Dragonflies were identified to genus using *Dragonfly Genera of the New World* by Garrison et al. Identification of damselflies will be done using *The Dragonflies of Central America exclusive of Mexico and the West Indies* by Forster, to species when possible. Areas with particularly high diversity were surveyed repeatedly at varying times of day to ensure all species present are detected. Photos of each

individual were taken. Information of each individual were recorded in an odonata database regarding location in latitude/longitude and relative to landmarks, time, weather, temperature, habitat, behavior, vegetation type, species identification, and individual characteristics. Voucher specimens of each species are also kept at the reserve for future reference.

Materials used:

- GPS unit
- net
- plastic envelopes
- watch
- thermometer
- microscope
- field notebook
- acetone (for permanent specimen collection)
- glass jars
- camera

Results

After four weeks of surveying Odonata throughout the Cloudbridge Reserve, 55 individuals were captured, identified, and databased: 51 Zygoptera and 4 Anisoptera (the excel database can be found in c:/cloudbridge/Research/Fauna/Odonata 2007). The majority (40 individuals) were of the family Coenagrionidae. Thirty eight individuals were of the genus *Argia*, which has 110 neotropical species that are not well enough studied to have a definitive key (Forster, 1999); however, one individual is likely *Argia lacrimans* (photo1) and most of the others are taxonomically near *Argia extranea* (photo 2).



Photo 1- Male *Argia lacrimans*

Argia sp were found mostly in disturbed, sunny areas with very little canopy cover; in general males were near ponds and slow running water while females were frequently in open areas upland from these sites. One recently emerged *Argia* sp was found in primary forest over a rivulet. Two individuals of the genus *Metaleptobasis* (photo 3) were found in open sunny habitats similar to where most *Argi* sp were found.



Photo 2- Male *Argia* sp. (near *extranea*)



Photo 3-
Female *Metaleptobasis* sp.

Eleven individuals were of the family Calopterygidae; classified to *Hetaerina caja* (3 individuals) and *Hetaerina cruentata* (8 individuals, photo 4 and 5). All were found in disturbed, open sunny locations much like *Argia* sp.



Photo 4- Male *Hetaerina cruentata*



Photo 5- Female tenderling *Hetaerina cruentata*, just emerged from exuvium

Four Anisoptera of two families were collected; two individuals of the family Libellulidae were classified as *Sympetrum* sp. (photo 6) and the two individuals of the family Aeshnidae were classified as *Aeshna psilus* and *Gynacantha* sp. (photo 7). All Anisoptera were found in disturbed areas. Both *Sympetrum* sp were found in open disturbed areas near the road. The *Aeshna psilus* individual was found dead months earlier in an opening along a trail. The *Gynacantha* sp was found in the Uran Restaurant on a light fixture during the evening.



Photo 6- Male *Sympetrum* sp.

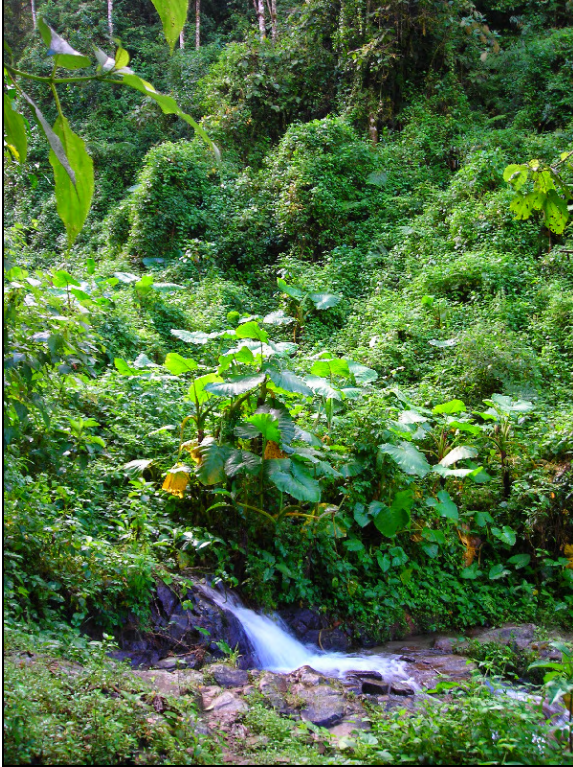


Photo 7- Female Gynacantha sp.

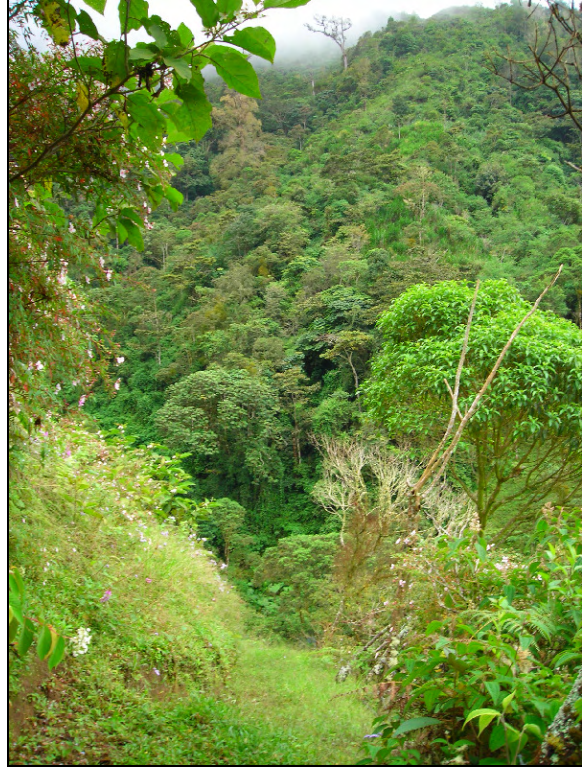
All but one of the odonata were found in open disturbed areas similar to photos 8-10. Habitat photo 8 shows a pond highly populated by *Argia* sp. and *Hetaerina* sp. in a disturbed area. Habitat photo 9 is of a similarly disturbed area with a rivulet. Habitat photo 10 is of an upland opening along a trail, a typical female *Argia* sp. habitat. The odonata individual not found in a disturbed area was found in older growth forest at the bottom of the valley near the Rio Chirripo, but not far from secondary forest. Despite extensive searches in old growth forest near and far from the river at different elevations no odonata were found in these habitats.



Habitat photo 8- pond in a disturbed opening



Habitat Photo 9- rivulet through a disturbed opening



Habitat photo 10- upland opening along a trail

Discussion

Six different odonata genera were found in the course of this baseline survey at Cloudbridge (Table 1.). Though I had no expectations for the number of Zygoptera genera present, it was suspected that the following Anisoptera genera may be present in cloudbridge: Erythrodiplax, Pantala, Orthemis, Elasmothemis, Brechmorhoga, and Macrothemis. However, none of these genera were seen and the diversity was much lower than expected. There are many possible explanations for why this may be.

Seasonality may play a role in diversity found at any given time. Odonata undergo a life cycle with an aquatic and a terrestrial phase. The aquatic phase lasts longer and in tropical areas can occur during different times of the year depending on the species (Corbet,1980). This survey was conducted as the rainy season was ended and the dry season began, which is also likely to be a period when new odonata species are emerging as others are ending there terrestrial phase. Half of the genera found were not seen until the last week of surveys, which may indicate that a period of emergence is just beginning. Much of December continued to be rainy, which may have delayed emergence from the typical beginning of the dry season.

Additionally, Odonata are frequently used as bioindicators around aquatic-terrestrial ecotones because they readily respond to the health of the habitat. Much of Cloudbridge Reserve was cleared in the past 50 years with possible long term effects. Changes in forest composition and water quality may be a result that greatly affects the diversity and

composition of the Odonata community. Much of the area has secondary growth but it may not be adequate for the former species to return. Hopefully with time and the reforestation program at Cloudbridge the diversity can rebound if indeed the lack in diversity seen is due to past human disturbance.

Further research is needed to hash out the greater picture as this is a baseline study from which it is hard to draw conclusions. Future Odonata surveys during different times of the year are necessary to determine the full diversity and composition of the community as well as to have a complete picture to detect changes in the future

References

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Table 1. Odonata Found at Cloudbridge

Family	Genus	Species
Coenagrionidae	<i>Argia</i>	Sp (near <i>extranea</i>)
		<i>lacrimans</i>
		sp (near <i>fissia</i>)
		Sp (near <i>immunda</i>)
	Sp (near <i>johanella</i>)	
	<i>Metaleptobasis</i>	sp
Calopterygidae	<i>Hetaerina</i>	<i>caja</i>
		<i>cruentata</i>
Aeshnidae	<i>Aeshna</i>	<i>psilus</i>
	<i>Gynacantha</i>	sp
Libellulidae	<i>Sympetrum</i>	sp