Fishes recorded in surveys of streams in Guanacaste Conservation Area (ACG)

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In March 2015, we visited ACG with the primary objective to characterize fish communities around Rincon de la Vieja National Park and other habitats. We were particularly interested in identifying sites that are characterized by high concentrations of hydrogen sulfide. We found two sulfide springs, but only one (Middle Earth; MT15-09) was inhabited by fish.

Fish at each site were sampled with seines or a backpack electro-shocker, depending on the habitat. All species were identified on site based on keys provided by Bussing (1998). After photographing select specimens, fish were released unharmed at the original collection site. The exception included select specimens of the family Poeciliidae, which were fixed for morphological analyses as permitted by our permit.

In the coming months, we will analyze morphological variation of *Poecilia gillii* collected at the Middle Earth site and compare it to specimens from adjacent, non-sulfidic habitats. Considering the similarity of the Middle Earth site to sulfide springs in Mexico, future research should include genetic analyses that test for genetic differentiation between sulfidic and non-sulfidic populations, which has been documented for sulfide spring species of the genus *Poecilia* in Mexico (Tobler & Hastings 2011; Tobler *et al.* 2011).

Below we provide our data from sampling efforts during last month’s visit. For each site, we provide latitude and longitude, as well as a list of species detected. We also include photographs of habitats and select specimens that were seen at each site.

**Rio Colorado, just outside of entrance to Sector Las Pailas (MT15-04)**

- Latitude/longitude: 10.75562/ -85.35339
- Fish species recorded: *Priapichthys annectens*

Habitat picture

*Priapichthys annectens* male
**Priapichthys annectens**  
female

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**Rio Los Ahogadas (MT15-05)**

Latitude/longitude: 10.75438/ -85.51608  
Fish species recorded:  
- *Brachyrhaphis olomina*  
- *Poecilia gillii*  
- *Amatitlania siquia*  
- *Parachromis dovii*  
- *Gymnotus maculosus*  
- *Rhamdia guatemalensis*

Habitat picture

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**Gymnotus maculosus**

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**Rhamdia guatemalensis**
Tributary of Rio Azul, near Buenos Aires (MT15-06)

Latitude/longitude: 10.88441/ -85.32259
Fish species recorded: 
- Priapichthys annectens
- Rivulus isthmensis
- Astatheros alfari (note: this species may have been an escapee from an adjacent, artificial pond)

Note: This was a very interesting stream because of the high levels of calcium carbonate, which created rocks covered in light color. Interestingly, P. annectens at this site were almost white, in contrast with other populations in this area. This phenomenon needs further investigation.

Habitat picture

Priapichthys annectens male

Priapichthys annectens female

Rivulus isthmensis
Quebrada Garcia, east of Quebrada Grande (MT15-07)
Latitude/longitude: 10.86298/-85.42132
Fish species recorded:
- Brachyrhaphis olomina
- Astyanax aeneus
- Rhamdia guatemalensis
- Amatitlania sigua
- Astatheros alfari
- Parachromis dovii

Brachyrhaphis olomina, male

Brachyrhaphis olomina, female

Astatheros alfari

Sulfide springs at Middle Earth, west of Quebrada Grande (MT15-08)
Latitude/longitude: 10.83823/-85.51614
Fish species recorded: Poecilia gillii
Note:
This habitat was characterized by high levels of hydrogen sulfide.
Similar to springs in Mexico, the only inhabitant was a species of Poecilia. This will provide an opportunity to study adaptation to the toxic environments in a comparative fashion.
Habitat picture

Poecilia gillii male

**Quebrada Cerro Grande at Middle Earth, west of Quebrada Grande (MT15-09)**

Latitude/longitude: 10.83913/ -85.51730
Fish species recorded:
- *Brachyrhaphis olimina*
- *Poecilia gillii*
- *Astyanax aeneus*
- *Synbranchus marmoratus*
- *Amatitlania siquia*

Poecilia gillii male

**Rio Tempesquito (MT15-10)**

Latitude/longitude: 10.78935/ -85.55112
Fish species recorded:
- *Brachyrhaphis olimina*
- *Poecilia gillii*
- *Poeciliopsis turubarensis*
- *Astyanax aeneus*
- *Rhoeboides bouchellei*
- *Rhamdia guatemalensis*
- *Amatitlania siquia*
- *Astatethos alfari*
- *Parachromis dovii*
Poeciliopsis turrubarensis

Quebrada Carmen (MT15-11)
Latitude/longitude: 11.121074/ -85.593573
Fish species recorded: Alfaro cultratus  
Phallichthys amates  
Poecilia gillii  
Astyanax aenens  
Rimulus isthmensis  
Rhamdia guatemalensis  
Amatitlania sigua  
Astatheros alfari  
Parachromis dovii

Alfaro cultratus

Phallichthys amates, female

Phallichthys amates, male

Rimulus isthmensis
Rio Sapoa (MT15-12)
Latitude/longitude: 11.121905/ -85.595165
Fish species recorded:
- Alfaro cultratus
- Poecilia gillii
- Astyanax aenens
- Rhamdia guatemalensis
- Loricariidae sp. (introduced)
- Amatitlania siquia
- Amphilophus citrinellus
- Astatheros alfari
- Astatheros longimanus
- Astatheros rostratus
- Hypsophrys nematopus
- Parachromis dovii
- Parachromis loisellei
- Tomocichla tuba

Habitat picture

Poecilia gillii

Amatitlania siquia
Amphilophus citrinellus

Astatheros longimanus

Astatheros rostratus

Hypsophrys nematopus

Parachromis loisellei
Tomocichla tuba

Tributary to Rio Tempisquito (MT15-13)
Latitude/longitude: 10.85064/ -85.48477
Fish species recorded: Poecilia gillii
Astyanax aeneus
Rhamdia guatemalensis
Amatitlania siquia

Habitat picture

Stream north of Quebrada Grande (MT15-14)
Latitude/longitude: 10.88541/ -85.47228
Fish species recorded: Priapichthys annectens
Rhamdia guatemalensis

Habitat picture

Stream at Aguas Termales Santa Maria (MT15-15)
Latitude/longitude: 10.75903/ -85.32280
Fish species recorded: Rivulus isthmensis
Note: Portions of this habitat exhibited high levels of hydrogen sulfide, but no fish were caught in the sulfidic portion of the stream.
Rio Zopilote, by waterfall (MT15-16)
Latitude/longitude: 10.76439 / -85.31147
Fish species recorded: Priapichthys annectens

Stream near headquarters at Sta. Maria (MT15-17)
Latitude/longitude: 10.76430 / -85.30643
Fish species recorded: Priapichthys annectens
Rivulus istmensis
*Priapichthys annectens* male

**Tributary of Quebrada Pailas (MT15-18)**

<table>
<thead>
<tr>
<th>Latitude/longitude:</th>
<th>10.77476/ -85.34472</th>
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| Fish species recorded: | *Priapichthys annectens*  
|                       | *Rhamdia guatemalensis* |

Habitat picture

**Quebrada Pailas (MT15-19)**

<table>
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<tr>
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<tbody>
<tr>
<td>Fish species recorded:</td>
<td>No fish</td>
</tr>
</tbody>
</table>

Habitat picture
**Creek just outside of Rincon de la Vieja NP (MT15-20)**
Latitude/longitude: 10.75481 / -85.36729
Fish species recorded: *Brachyrhaphis olomina*  
*Parachromis dovii*

Habitat picture

**Parachromis dovii**

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**Creek past Rio Blanco (MT15-21)**
Latitude/longitude: 10.78104 / -85.36063
Fish species recorded: *No fish*

Habitat picture
**Arroyo Agria (MT15-22)**
Latitude/longitude: 10.78119/ -85.35670
Fish species recorded: No fish

Habitat picture

**Stream in Sector Sta Maria (MT15-23)**
Latitude/longitude: 10.75226/ -85.30841
Fish species recorded: *Priapichthys annectens*  
*Rivulus isthmensis*

Habitat picture

*Priapichthys annectens*

*Rivulus isthmensis*
**Rio Panilla (MT15-24)**

Latitude/longitude: 10.25711 / -85.81276

Fish species recorded:
- *Brachyrhaphis olomina*
- *Poecilia gillii*
- *Rhamdia guatemalensis*
- *Dormitator latifrons*
- *Eleotris picta*

Habitat picture

![Dormitator latifrons](image)

References

