The Thickness of Calcium Deposits and its Effects on the Snail Population in the Stream Located Near The Sleeping Giant Lodge

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Introduction:

When viewing the snails in the stream near the sleeping giant lodge one would be startled to find that these do not look like ordinary snails. With thick bulky shells and a light grey color these snails look more like rocks than living creatures. What causes this abnormality? Is it an adaptation to the stream, or a new type of snail? Neither, the bulkiness of the shell is caused by a large build up of calcium that has accumulated on the snails shell (Chiatanawisuti, Kritsanapuntu, Santaweesuk). These snails are known as Jute snails or more properly as Pachychilus. These snails are common in this area of central America and live in fast flowing fresh water. Also these snails are very known for being a favorite food of the Mayans because of their abundance (Meerman). But what causes this large amount of calcium to build up in this particular stream when it seems other streams in the area are not likewise affected? I believe this to be caused by a large amount of limestone in the area in which the stream flows. Also it may be caused in a large part by the stream flowing under the road way through the ground. When water flows through limestone it washes away the calcium contained in the rock and it becomes what we would call hard, this is because it contains calcium deposits from the stone (Bliss, Hayes, Orris). This excess of calcium builds up on the snails shell leading to the disfiguration we now see. By measuring the different thicknesses of the calcium deposits we can narrow down what part of the stream the calcium is originating. In order to determine what part of the stream this calcification begins, I used a number of different materials and methods for my experiment.

Materials needed:

- Water Hardness testing kit
- Collection containers (4, approximately pint sized)

- Ruler measuring millimeters
- Medium rock or hammer
- Pen and paper

Methods

Step 1. In order to get an equal representation of the water in the stream I broke the stream up into four sections. The area of the stream I used started where the stream emerges from the jungle near a cabana and down to about where the stream becomes unreachable which is about where it meets the Sibun River. I then broke this section into four segments and took collection from each place.

Step 2. Following the instructions on the water testing kit I tested the hardness of the stream.

Step 3. Using the four containers, I marked each as to which site the collections were taken from. I collected ten snails from each site and filled the containers with plenty of water to keep the snails from drying out.

Step 4. I took the snails back to a work area where I measured and recorded the length of each individual shell.

Step 5. After the length was obtained I then took a medium sized rock and carefully chipped off the layer of calcium surrounding the shell. This was difficult at times because the layer of calcium was very thin in places and a gentile touch was needed not to crush the animal.

Step 6. Using the metric ruler I measured the thickness of the calcium chipped off for each individual snail and recoded my observations in a notebook.

Step 7. Once I was finished with all my measurements I returned the snails to the stream and cleaned up my work area.

Step 8. I also surveyed other surrounding streams near the lodge for signs of similar calcium residue.

Results:

Site 1

Shell length in mm	Thickness of shell in mm
35	Less than ¼ covered
30	Less than ½ covered
34	Less than ¾ covered
32	Less than ½ covered
31	Less than ½ covered
32	Less than ¼ covered
27	Less than ¼ covered
30	Less than ½ covered
31	Less than ¾ covered
28	Less than ½ covered

Average thickness: 47.5% coverage

Site 2

Shell length in mm	Thickness of shell in mm
37	1
32	0.75
34	0.5
37	2
32	1.25
33	1.5
36	1
31	2
25	1
36	1.25

Average thickness: 1.225mm

Site 3

Shell length in mm	Thickness of shell in mm
20	0.5
33	0.25
32	0.5
24	0.5
27	1
30	0.5
38	0.75
29	1
33	0.25
19	0.5

Average thickness: 0.575mm

Site 4

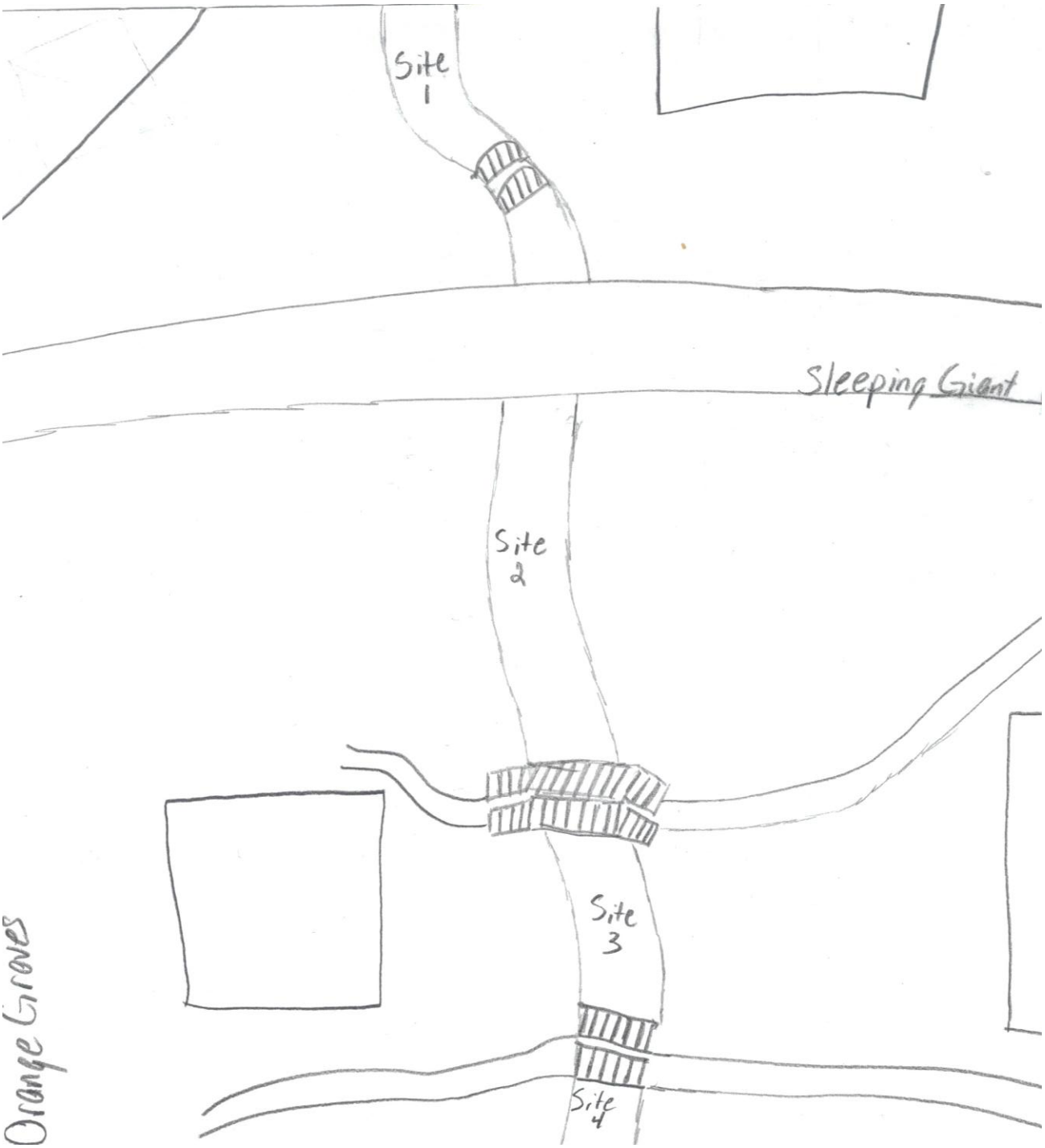
Shell length in mm	Thickness of shell in mm
35	0.75
20	0.5
34	0.75
21	1
25	0.5
38	1
38	1
21	0.75
22	0.5
35	3

Average thickness: 0.975mm

When comparing the averages I found the thickness of the calcium differs from each site. The snails found at site 1 were the least covered of all the snails. The site 1 snails were not even completely covered by the calcium making it impossible to measure the thickness so I estimated the percent of the shell that was covered. The snails at site 2 were found to have the thickest layer of calcium for all the tested sites. After site 2, site 4 was the next thickest and then site 3. Because all the sites had differing thicknesses we can use our results to help locate a origin of the calcium. Also we have the results from our water hardness test. The test shows that the hardness is about 340 which is close to the highest level provided by the test kit which ranged from 0-425. I was curious about other surrounding waterways and after surveying both the Sibun river and a near buy tributary I found no calcium on any of the snails found in either location.

Conclusion:

The results show that the calcium deposits on the snail shells is far thicker at site 2 than any other place. The map shows that this site is located rite where the stream emerges from under the road way. These findings make me believe that my original hypothesis that the stream flowing under the roadway causes the water to become so calcium rich was a valid premise. But because the calcium build up on the snail shells stays fairly consistent throughout the length of the stream we would almost wonder if there was another source for the calcium. Yes the calcium at site 2 is the thickest but only by about 0.3 millimeters. We would think that the amount calcium would decreases the further down stream we went but this is not the case, thus leading me to believe that there are other contributing factors to the build up of calcium other than the stream flowing under the roadway. After further research I discovered that limestone deposits have been found in parts of central America, meaning that the Sleeping Giant lodge could be built on a small limestone accumulation (Roberts, Irving). Because this is the only stream in the area afflicted with this strange occurrence it is probably a very small amount of limestone in the this area of the Sleeping Giant lodge. Although calcium covers almost every snail in the stream it doesn't seem to affect the animal ability to eat, reproduce or thrive.



Map of the four tested sites along the stream at the Sleeping Giant lodge

Works cited

CHAITANAWISUTI, NILNAJ, SIRUSA KRITSANAPUNTU, and WANNANEE SANTAWEESUK. "Effects Of Water Depth And Water Flow Duration On Growth And Survival Of Juvenile Spotted Babylon (Babylonia Areolata) Cultured In A Flow-Through System." *Journal Of Applied Aquaculture* 22.1 (2010): 11-17. *Academic Search Complete*. Web. 29 Jan. 2012

Bliss, James D. Hayes, Timothy B. Orris, Gretta J. "Limestone: A Crucial and Versatile Industrial Mineral Commodity**. "** USGS -- Republished from USGS fact sheet 2008-3089. Web. 28 Jan. 2012

Meerman, Jan. "Some Interesting Invertebrates of Belize." *Biological Diversity In Belize.* 2004. Web

Roberts, Ralph J. Irving Earl M. "Mineral Deposits Of Central America." *Geological Survey Bulletin* 1034. (1957): 220. Web. 28 Jan. 2012