

**The Connection between Sex and Location of Strawberry Poison Dart Frogs  
(*Oophaga pumilio*) in Boca del Drago, Isla Colón, Bocas del Toro, Panama**

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**Abstract**

For our study, we captured poison dart frogs (*Oophaga pumilio*) to find out if there was a connection between their sexes and primary locations at ITEC in Bocas del Toro. In the rainforest, we caught 100 frogs and recorded their sex and location in which we found them. Our data showed that female poison dart frogs tend to be on the ground in the rainforest, while males were frequently found on trees or plants. After doing a chi-square analysis, we found that there was a significant difference between the sex and location of poison dart frogs.

## **Introduction**

The tropical rainforests of Isla Colón, Bocas del Toro harbors a variety of exotic plants and animals, including the Strawberry Poison Dart Frog (*Oophaga pumilio*). While they may be small, these frogs are able to climb the tall rainforest trees several times over in order to lay their eggs and feed their young. Females will lay their clutch on the forest floor, and later carry each tadpole up a tree in search of small pools of water. Many frogs use bromeliad plants, which are found high up in trees ("Strawberry Dart Frog", 2011). Our research was guided by the question:

Where are poison dart frogs of different sexes found most frequently in the rainforest in relation to their location, such as the ground floor, or plants and tree trunks?

We collected our data by traveling into the rainforest for three days in a row, in different weather conditions, and at different times of day. One day there was rain, another day we went out post-rain, and another day it was dry and cloudy. We caught as many frogs as we could, noting their location, size, and sex.

Our hypothesis was that there would be more female frogs on the ground, while males would be found on elevated surfaces like plants and trees. We chose this hypothesis because during our first day at ITEC, Pete taught us that female frogs will lay their eggs on the ground of the forest, and then carry them up to the tops of trees to hatch (Lahanas, P. 2022 pers. comm.). Our null hypothesis stated that there would be no correlation between sex and location of poison dart frogs.

## **Materials and Methods**

- Caliper (see Figures 1. and 2.)
- Phone for camera and notes
- Computer

First, we found the poison dart frogs and took note of their specific location. For example, if they are on the ground, on a tree, or on a plant. Then, we captured the frog and checked their sex. If the frog is a male, a green spot will appear on the underside of its neck; if there is no green spot, the frog is a female (see Figures 3 and 4). We also used the caliper (see Figure 1 and 2) to measure the length of the frog's abdomen in order to potentially see if age/size have a connection to location and sex. After we recorded the location, sex, and length of the frog, we released it.



**Figure 1.** The Caliper



**Figure 2.** Here we are using the caliper to measure a frog



**Figure 3.** A female poison dart frog, with no green patch on its neck.

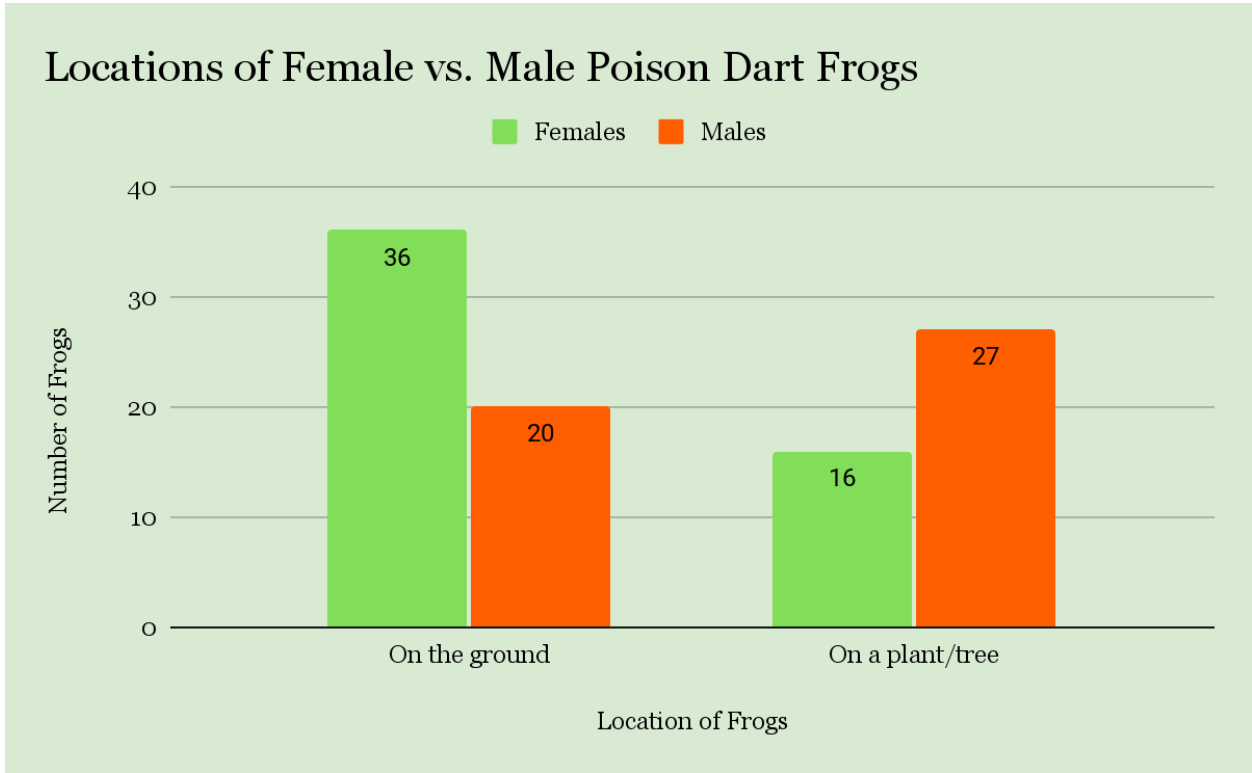


**Figure 4.** A male poison dart frog, with a green patch on its neck.

## Results

**Table 1.** Number of female and male poison dart frogs found on the ground or plants/trees.

	Females	Males
On the ground	36	20
On a plant/tree	16	27



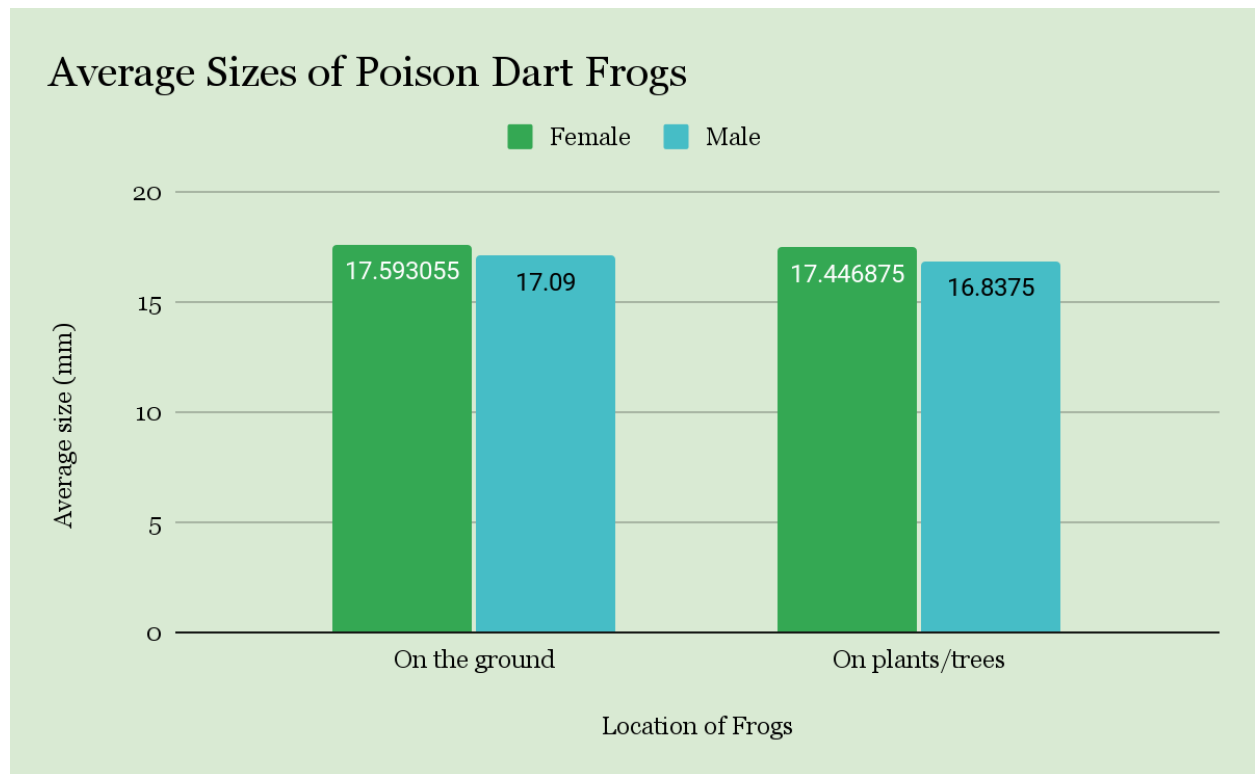
**Figure 5.** Comparison of female and male poison dart frogs found in different locations.

**Table 2.** The chi-square chart. The low p-value in this calculation suggests that our hypothesis was supported: There were more female frogs on the ground, while males were be found on elevated surfaces like plants and trees.

	females	males	<i>Marginal Row Totals</i>
<b>ground</b>	36 (29.41) [1.47]	20 (26.59) [1.63]	56
<b>plants/trees</b>	16 (22.59) [1.92]	27 (20.41) [2.12]	43
<b><i>Marginal Column Totals</i></b>	52	47	99 (Grand Total)

The chi-square statistic is 7.1511. The *p*-value is .007492. Significant at  $p < .05$ .

The chi-square statistic with Yates correction is 6.1065. The *p*-value is .013469. Significant at  $p < .05$ .



**Figure 6.** This graph compares the average sizes of frogs by sex and location. For the frogs found on the ground, the average female size was 17.59 mm and the average male size was 17.09 mm. For frogs found on elevated surfaces, the average female was 17.44 mm, and the average male was 16.83 mm.

## Discussion

As seen in Tables 1-2 and Figures 5-6, female frogs were most frequently found on the ground, while males were found more often on trees. For females, we found 36 on the ground, and 16 on trees or plants. For males, we found 20 on the ground, and 27 on trees or plants. While we were unable to find as many males as we did females, it was still evident that males preferred elevated surfaces rather than the ground, while females preferred the ground of the rainforest instead of plants or trees. Our data of sex and location proved that our original hypothesis about the connection between gender and location was correct, and that our null hypothesis was incorrect. The low p-value in our chi-square chart not only shows our hypothesis is correct, but also shows our data is significant.

Our data about the sizes of frogs suggests that there is no significant difference in the average size of poison dart frogs by location. As Figure 6 portrays, the average size of female frogs found on the ground was 17.59 mm while the average size of female frogs found on trees or plants was 17.44 mm. The difference between the averages is minimal, meaning the difference is not significant. The same is true of the male frogs we caught and measured. The average size of male frogs found on the ground floor was 17.09 mm

while the average size of male frogs found on plants or trees was 16.83 mm. The minor difference between the average sizes is 0.5 mm, meaning this difference is not significant.

## **Conclusion**

Despite initial trouble with catching frogs and learning how to use the caliper, by the end of our data collection we ended up catching 100 frogs with another group. The data noted from the specimens proved our hypothesis correct: female frogs were found more on the ground floor of the rainforest while male frogs were found more on the trees and plants in the rainforest. Additionally we discovered that there is no correlation between location and size of adult frogs in the rainforest.

The process of catching frogs and recording data was a difficult task due to the varying weather conditions and our trouble with capturing frogs. We spotted many frogs on trees or plants that we had trouble catching due to their speed and hiding places that we could not access (such as hiding in tree trunks or in holes in the ground). In addition, when we attempted to collect frogs during dry and cloudy weather, we were unable to find as many frogs as we found in the rainy weather. This could be another potential research project - the effect of different weather on frog activity.

## **References**

Strawberry Dart Frog. Smithsonian Institution. (2011). Retrieved 30 March 2022, from <https://www.si.edu/newsdesk/snapshot/strawberry-dart-frog>.

Sandmeier, F. (2019). *Oophaga pumilio*. Amphibiaweb.org. Retrieved 30 March 2022, from <https://amphibiaweb.org/species/1641>.

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