PHOLCID SPIDER DIVERSITY AND ITS MICROHABITATS IN PHILIPPINES TARSIER SANCTUARY, CORELLA, BOHOL, PHILIPPINES

College of Agriculture and Natural Resources
BOHOL ISLAND STATE UNIVERSITY
Zamora, Bilar, Bohol

TERENCIO A. SANTILLANA

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A Thesis

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In Partial Fulfillment
of the Requirements for the Degree
of Bachelor of Science in Forestry

Terencio A. Santillana

June 2022

APPROVAL SHEET

The thesis entitled **"PHOLCID SPIDER DIVERSITY AND ITS MICROHABITATS IN PHILIPPINE TARSIER SANCTUARY, CORELLA, BOHOL, PHILIPPINES"** prepared and submitted by Terencio A. Santillana in partial fulfillment of the requirements for the degree Bachelor of Science in Forestry (BSF) has been examined and recommended for acceptance and approval for oral defense.

RESEARCH COMMITTEE

NOEL T. LOMOSBOG, PhD
Chair

REIZL P. JOSE, PhD
Adviser

MARY BETH SARNOWSKI, MRes
Editor

EDDIE P. MONDEJAR, PhD
Statistician

LYNDE QUIÑONES - BULLONG, PhD
Internal Expert

EXAMINING PANEL

Approved by the committee on Oral Examination with the rating of 1.0.

MARIETTA C. MACALOLOT, PhD
Chair

NOEL T. LOMOSBOG, PhD
Member

WILBERT A. AUREO, MSc
Member

Accepted and approved in partial fulfillment of the requirements for the degree of BACHELOR OF SCIENCE IN FORESTRY.

MARIETTA C. MACALOLOT, PhD
Campus Director

Date of Approved Defense
May 25, 2022

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ABSTRACT

Pholcids are the most common web-building spiders. They live in a wide range of environments, from leaf litter to tree canopies, and numerous species can be found in caves and in close proximity to humans. Pholcideae also, is one of the most species-rich spider families. Despite of their richness, less study has been conducted yet in Bohol. The purpose of the study was to evaluate the diversity and determine the species of pholcid in Philippine Tarsier Sanctuary, Corella, Bohol, Philippines. Ten sampling plots were randomly established with a size of 10m x 10m to capture, identify and record the pholcids. The study was able to document 71 individuals with two species under the Family Pholcideae. The most dominant species was Daddy long-legs (*Aetana* sp.) which was highly observed in six plots. Open forest, one of the habitat types was the highest in species diversity with a (H'= 0.69), followed by Close forest (H'= 0.64) and Open area (H'= 0.62) respectively. The diversity indices of the three habitats were not diverse. Moreover, *Aetana* sp. tends to be associated with cloud cover, elevation and air temperature. These findings highlight the importance of improving the area's habitat preservation and conservation efforts.

Chapter 1

THE PROBLEM AND ITS SCOPE

Rationale

In many tropical and subtropical locations of the world, pholcids are the most common web-building spiders. They live in a wide range of environments, from leaf litter to tree canopies, and numerous species can be found in caves and in close proximity to humans (Huber, 2001). Diversification analyses conducted by Everle and Dimitrov (2018) clearly show that microhabitat is a significant element determining pholcid spider diversification patterns. A new genus comprising 17 new species and three species moved from Spermophora has been identified. Pholcids may turn out to be one of the most varied spider families, according to current estimates of species numbers (Bernhard, 2003).

Pholcideae is one of the most species-rich spider families (World Spider Catalog, 2018), and it includes some of the most well-known spiders, such as daddy long-legs and cellar spiders, which are found in homes all over the world. Over the last few decades, a large amount of morphological, taxonomic, behavioral, and biogeographic data on pholcids has been gathered and published (Jako, 2004). Spider of the family Pholcideae has a high ecological plasticity and can be found in a wide range of habitat.

They like gloomy environments such as caves, rock fissures, and crevices. They can be found in leaf litter, webs between buttresses, tiny holes in trees or fallen logs, and the undersides of huge leaves in wooded regions. Spiders have a terrible standing among the general population, since they are thought to be ugly, hairy, brown, and toxic (Huber, 2000). There are stories about them laying eggs in human skin, frequenting airport toilet seats, and crawling into your mouth as you sleep. Spider misinformation is common in the popular media and on the Internet, leading to erroneous impressions and bad feelings about spiders. Spiders, on the other hand, offer intrigue and mystery, and may be utilized to effectively interest even arachnophobic persons in arachnid-related debate and activities. Pholcid is a spider family with a diverse range of species. In Southeast Asian nations like the Philippines, however, pholcid spiders are poorly investigated. The pholcid fauna of Canapnapan, Corella, Bohol, Philippines, has been investigated in this research. Pholcids were found utilizing a mix of aerial and ground hand searches. The ecology of pholcid spiders was studied in chosen places to discover how leaf-dwelling and forest ground-dwelling pholcids use microhabitats.

Literature Background

Pholcid Spiders

Arachnids, according to Huber (2004), are a kind of arthropod that includes scorpions, mites, and ticks. Spiders are found in ecosystems all over the world and number over 45,000 species. Spiders with a cartoonish butt, spiders that can jump on command, and cannibal spiders that look like pelicans are among the creatures featured. The spider family Pholcidae includes a huge variety of mostly tropical web-weaving spiders and is one of the world's most diverse and dominant spider families. So far, only morphological data has been used to examine the phylogeny of this family (Huber, 2005).

Analyses of ancient microhabitat demonstrated a high rate of evolution. Numerous shifts from near-ground habitat to leaves and back were discovered among the biggest subfamily Pholcinae. Taxa that live in leaves and big enclosed places have a greater rate of diversity than those that live on the ground. In leaf- and space-dwelling species, shifts in specification rate were discovered. Their research yielded one of the most extensive phylogenies for a major spider family, as well as a framework for future research into pholcid spider biology.

Individual spiders may either share webs or live alone, and they switch between the two techniques regularly. Size and recent feeding success affected spiders' preferences. Food-deprived spiders were more inclined to depart their webs and construct their own, supporting the theory that spiders employ a win-stay/lose-shift strategy. (Briceno, 1983). When spiders were provided more food in the wild, they were more inclined to stay in webs overnight (Jako, 2004).

Males are dominating, yet they regularly hand over prey to females; partnered males of at least two species consume less food than lonely males. Because paired females' feeding rates are similar to those of solitary females, this 'chivalrous' behavior is likely to convince the female not to leave and therefore make her defendable (Eberhard and Briceno, 1983).

Because a habitat may be chosen for cover availability, competition, or predation, species abundance is dependent on the microhabitats present in each sample region (Krausman 1999). The vulnerability of spiders to abiotic and biotic stimuli is closely connected to their macro-scale dispersion (Mineo et al., 2010). Furthermore, the vegetation structure of each environment has a significant impact on spider dispersal. The underlying process of the spider's microhabitat choosing is difficult to resolve due to the mix of many elements that influence it (Huber and Schutte, 2009).

Fifteen species are newly described, and the first SEM data and first phylogenetic analysis of the genus are presented. Four species groups are well supported, one restricted to Borneo, two restricted to the Philippines (Bernard A. Huber, 2018). Ground-dwelling pholcids can be found under leaf litter, webs between buttresses, tiny holes in trees, and fallen logs in wooded regions. The dark offers a vital habitat for earth dwelling creatures (Huber, 2000). Spiders hide in dark locations to avoid being seen and to make it harder for their major predators to catch them (Huber, 2005). Leaf-dwelling pholcids, on the other hand, are known to live on the undersides of massive leaves. Their light greenish tint and delicate long legs distinguish them. Instead of spinning and dropping off

the web, these pholcids frequently spend the day pushed against the undersides of leaves. As a result, their anatomy and behavior help them to evade predation. Even while some research have shown precise associations between spiders and certain plant species, the association of spiders with specific plant kinds or species has been thought to be exceptional (Romero, 2006; Vasconcellos-Neto et al., 2007).

THE PROBLEM AND ITS SCOPE

Statement of the Problem

The main objective of the study was to determine the species diversity of Pholcid spider in Philippine Tarsier Sanctuary, Corella, Bohol.

Specifically, the study aimed to answer the following questions:

1. What are the species of pholcid spiders in Philippine Tarsier Sanctuary?
2. What species of pholcid spider is dominant in every sampling area?
3. What is the species diversity and relative abundance of pholcid spiders in Philippine Tarsier Sanctuary?
4. What are the environmental factors influencing the species diversity?

Significance of the Study

The main goal of the study was to determine the pholcid spider diversity in Philippine Tarsier Sanctuary, Corella, Bohol, Philippines. The result would serve as a reference for further study of pholcids in Barangay Canapnapan.

The result of the study would be a great help of the following beneficiaries;

The Department of Environmental and Natural Resources. As the leading agency of the government that concerns with the forest regeneration, rehabilitation, maintaining and managing the natural resources. This serve as the reference to determine the pholcid diversity in Bohol province particularly in barangay Canapnapan, it would serve as their basis of the prospective project.

The Academe. The result of this study would serve as their reference for research purposes of learning institutions.

The Students. The finding of the study would enable the students to be aware and enhance their knowledge about importance of spiders. It will serve as their reference for some studies related into it.

The Future Researchers. The data gathered in this study would motivate future researchers and organizational group who needs more information related to the study.

RESEARCH METHODOLOGY

Research Design

Pholcids were collected on February 7-14, 2022 using a combination of aerial-hand searching and ground-hand searching methods. In this study, ecology of pholcid spiders was investigated in selected sampling areas of Canapnapan, Corella to determine the microhabitat utilization of leaf-dwelling and forest ground-dwelling pholcids in the overall ten plots. The easiest way to capture and collect spiders was to scare them into a dry container (empty film canisters) and then transferred them into a container with alcohol. Alternately, the film canister could be placed in a freezer for few minutes. In the freezer the spider would enter torpor and die relatively quickly and may experience fewer traumas (Huber 2018). Ten (10) sampling plots were used, (10m x 10m) to facilitate the capturing and recording of pholcid species (Figure1).

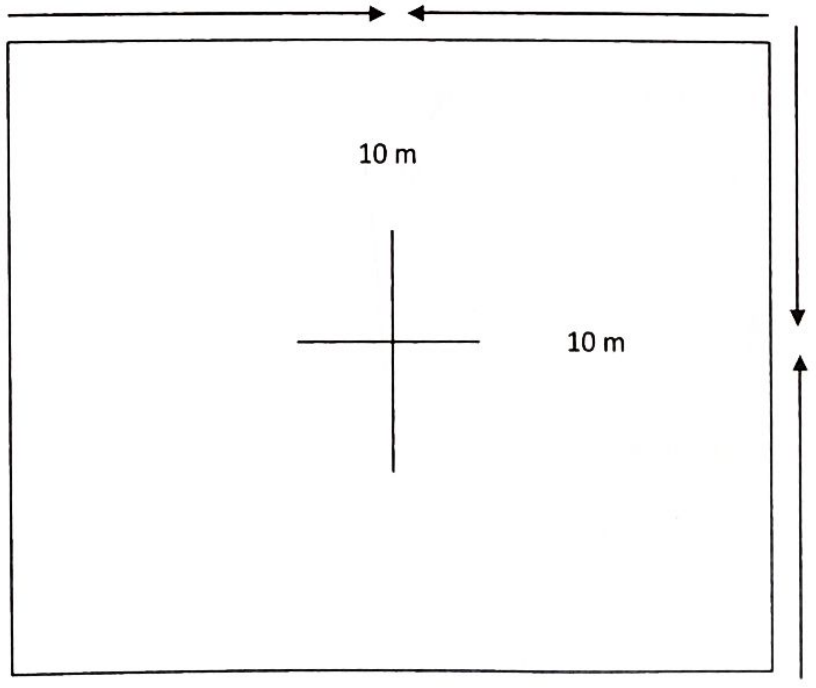

Figure 1. Layout of the sampling plots.

Research Instrument

The materials we use in the collection of pholcid spider samples were: Tape measure to measure the sampling area; ethanol, gloves, containers, plastic cups, and cotton for collection and preservation of specimen; USB microscope, phone camera for documentations; Global Positioning System (GPS) used to obtain coordinates and elevation; stick markers, and record book for listing of captured specimen.

Collection of Data

Visual Search

The researcher walked through habitats and search visually for spider, spider retreats (curled leaves, silken cases), lose bark, fallen wood debris and rocks.

Litter Sampling

Using gloves, the researcher collected a large amount of leaf litter using a black plastic trash bag or similar container and searched for spider species.

Vial-Tapping Method

An improvise method for capturing samples using a plastic cup or wide-mouth vial with lid has been used during visual searching (Figure 2).

Figure 2. Species collection using vial-tapping method.

Identification Process

The first stem in identification was to separate specimens into morphospecies, or units that look different from one another. Each morphospecies was assigned a number so that specimens sorted later could be associated with similar previously encountered specimen. The most essential thing in identification is to collaborate with spider taxonomists for the proper identification of the specimen.

Research Environment

Canapnapan is a barangay in the municipality of Corella, in the province of Bohol. Its population as determined by the 2020 Census was 940. This represented 9.92% of the total population of Corella. On the Philippine Island of Bohol, there is a sanctuary populated not just by skinny trees but also by

protected tarsiers, an endangered species of strange-looking primates that cling to the thin branches with their long, alien fingers. The Tarsier Sanctuary is a larger forest dedicated to the protection of tarsiers, small nocturnal primates with big round eyes that feed primarily on insects. Canapnapan is situated at approximately 9.6949, 123.9351. in the island of Bohol. Elevation at these coordinates is estimated at 68.2 meters or 223.8 feet above mean sea level (Figure 3).

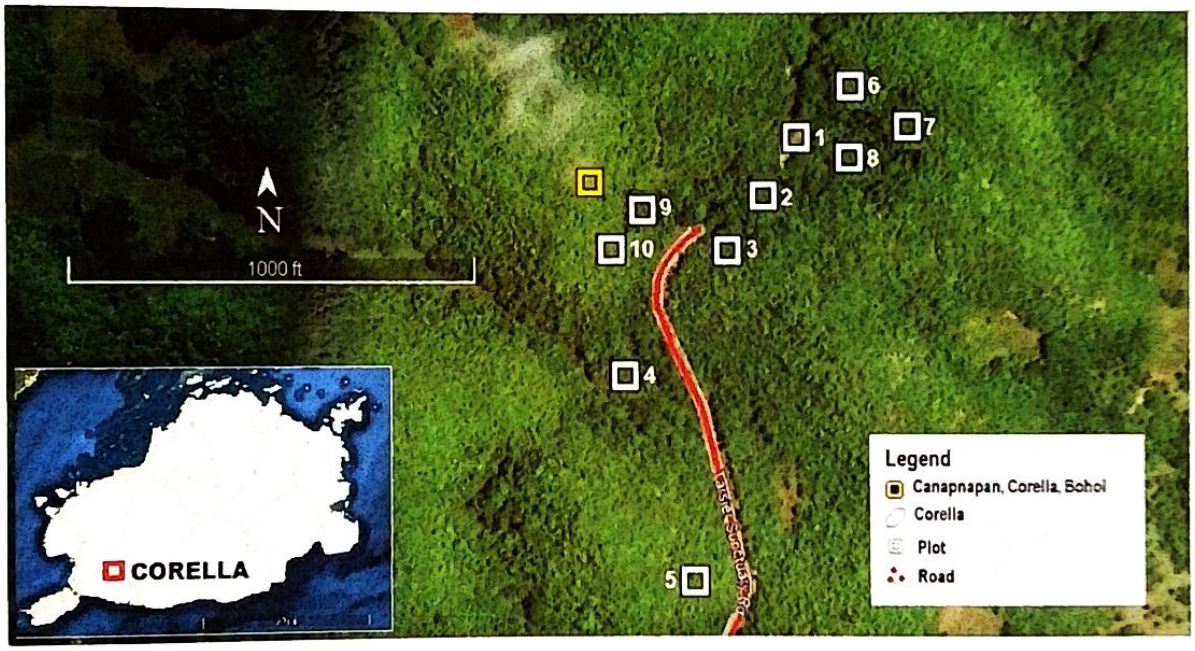

Figure 3. Location of the established sampling plots.

Research Procedure

A. Coordinated with the project in charge.

A permit letter was given to the staff in-charged for permission and notification regarding the purpose of the study.

B. Collection of Secondary Data

The project profile, shapefile of thematic maps, and other associated maps were acquired and used in the actual survey at the research site.

C. Collection of Primary Data

The actual collection of spiders using different method would follow accordingly in the site. Pholcids were collected using a combination of aerial-hand searching and ground-hand searching methods.

D. Sorting of Samples

Sorting of spiders was done right after the collection from the sampling plots.

Statistical Analysis

Diversity indices were determined using the Shannon Wiener index (Shannon and Wiener 1949). The Shannon diversity index (a.k.a. the Shannon–Wiener diversity index) is a popular metric used in ecology. It is based on Claude Shannon's formula for entropy and estimates species diversity. The index takes into account the number of species living in a habitat (richness) and their relative abundance (evenness). The Shannon diversity index (*H*) is another index that is

commonly used to characterize species diversity in a community. Shannon's index accounts for both abundance and evenness of the species present. The proportion of species *i* relative to the total number of species (p_i) is calculated, and then multiplied by the natural logarithm of this proportion ($\ln p_i$). The resulting product is summed across species, and multiplied by -1:(Shannon and Wiener 1949).

$$H' = -\sum_{i=1}^{S} p_i \ln p_i$$

PAST Software

Past Software is free software for scientific data analysis with functions for data manipulation, plotting, univariate and multivariate statistics, ecological analysis, time series and spatial analysis, morphometric and stratigraphy.

The Cannonical correspondence analysis (CCA) was used to determine the species and environmental factors association.

Cluster Analysis (Ward 1963)

- Cluster: a collection of data objects similar to one another within the same cluster and dissimilar to the objects in other clusters.
- Cluster analysis is the grouping a set of data objects into clusters.

To determine the similarity index between species, cluster analysis of plots was done using the Bray-Curtis Similarity index from Paleontological Statistics (PAST version 2.17c) (Hammer and Harper 2006). The dendogram was generated through the unweighted pair group method (UPGMA) and bootstrapping (n = 1000). Bray-Curtis Similarity is used in ecology and biology to quantify how different two sites are in terms of the species found in those sites: Calculated as:

$$BCij = (2*Cij)/(si+Sj)$$

Where:

- Cj: The sum of the lesser values for the species found in each site.
- Si: The total number of specimens counted at site *i*
- Sj: The total number of specimens counted at site *j*

Definition of Terms

Composition - In this study in pertains to the arrangement of spiders, or the act of putting something together, or the combination of elements or qualities.

Functional - It refers to the biology of individual spider species, including their taxonomy and distribution.

Biodiversity – It refers to the variety of life on Earth at all its levels, from genes to ecosystems, and can encompass the evolutionary, ecological, and cultural processes that sustain life.

Diversity – It refers to the range of human differences, including but not limited to race, ethnicity, gender, gender identity, sexual orientation, age, social class, physical ability or attributes, religious or ethical values system, national origin, and political belief

Abundance – It refers very large quantity of something.

Dendrogram – In this study, it pertains to a diagram that shows the hierarchical relationship between objects. It is most commonly created as an output from hierarchical clustering.

Visual Search – In this study, it pertains to the walking through the habitat and searching for spiders and for their webs (curled leaves, silken cases).

Sweeping - In this study, it pertains to the using of heavy insect net (or even a pillowcase stretched over a wire clothes hanger) sweep through the top foot of loose soft vegetation or tall grass.

Beating - This method is much like sweeping. In this case spread the cloth sheet under a bush or the low branches of a tree.

Pitfall Trapping - One of the most effective methods of capturing ground-living spiders

Litter Sampling - In this study, it pertains to the using of gloves, collect a large amount of leaf litter in a black plastic trash bag or similar container.

Pholcid Spider – This refers to cellar spiders or daddy long-legs spiders which is very confusing as this name.

Forest – This refers to a thick growth of trees and bushes that covers a large area.

Ecosystem – This refers to everything that exists in a particular environment.

Biology – This refers to the plant and animals life of a particular place.

Connation – This refers to the development fusion of organs of the same type.

CHAPTER 2

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the presentation and findings of data. To achieve the purpose of this study, the researcher made full use of the numbers of collected Pholcid at every plot as well as the number of every species up to their family level were identified.

Data on the diversity of pholcid spiders in every sampling area is under presented and analyzed.

Species Account of Pholcid Species

Two species belonging to Family Pholcideae was identified, namely; *Aetana* sp. and *Crossopriza lyoni.*

The Aetana is a genus of spiders belonging to the family Pholcidae, which are colloquially referred to as daddy long-legs spiders. Spiders are ocherous yellow, with light brown legs covered in dark bands. The *Aetana* sp. found in plot 2 (Figure 4) was caught under a dying leaf of mango (*Mangifera indica*) and in plot 6 captured an Aetana in a shaded rock buil-up measuring 5.8 cm (2 inches). Like other members of the Pholcidae family, they have very long legs (Huber 1805). The eggs are laid inside a silk sac, with each sac containing 30 eggs. Spiderlings have comparatively short legs than adults, but eventually, they resemble adults as they mature. The webs are irregularly built, with them adding layers on top of existing ones (Figure 4).

Figure 4. *Aetana* sp. Barangay: Canapnapan,Corella, Bohol, Plot 2 (9°41'14"N, 123°57'20"E) Plot 6 (9°41'28"N, 123°56'30"E)

During the survey, species *Crossopriza lyoni* were mostly found in plots 1 and 10 and are mostly caught in building ceilings and bamboo shoots (Figure 5). The first pair of legs in larger individuals reaches up to 2.4 cm in length. The legs are gray to amber in color and covered with numerous small longitudinal brown spots. The knee joints are brown, and the ends of the femur and tibiae are girdled with white. The cephalothorax is wider than it is long, greying-white to pale amber in color. In the middle of the upper surface is a deep depression

(called the thoracic fovea) and a darker longitudinal band of color. *Crossopriza lyoni* is distinguished through characteristic boxy shape of their abdomens. The abdomen is angular and somewhat box-shaped, with a small conical hump on the upper back (Figure 5).

Figure 5. *Crossopriza lyoni*: Philippine Tarsier Sanctuary, Corella,Bohol. Plot 1 (9°41'21"N,123°56'30"E) Plot 10(9°41'11"N, 123°57'9"E)

Community Structure

The dendogram shows the 10 sampling plots cluster analysis generated through PAST software using the Bray-Curtis Similarity Index. In the analysis of similarity of species according to their habitat type and number of individuals, two major groups were identified. Cluster 1 has four plots grouped together, in which cluster 1 has a dominant species *Crossopriza lyoni*. On the other hand, cluster 2 has six plots grouped together and has dominant species *Aetana sp.* The cophenetic correlation is 0.78 as seen in (Figure 6). The value is quite close to 100% and it indicated that the clustering is quite fit.

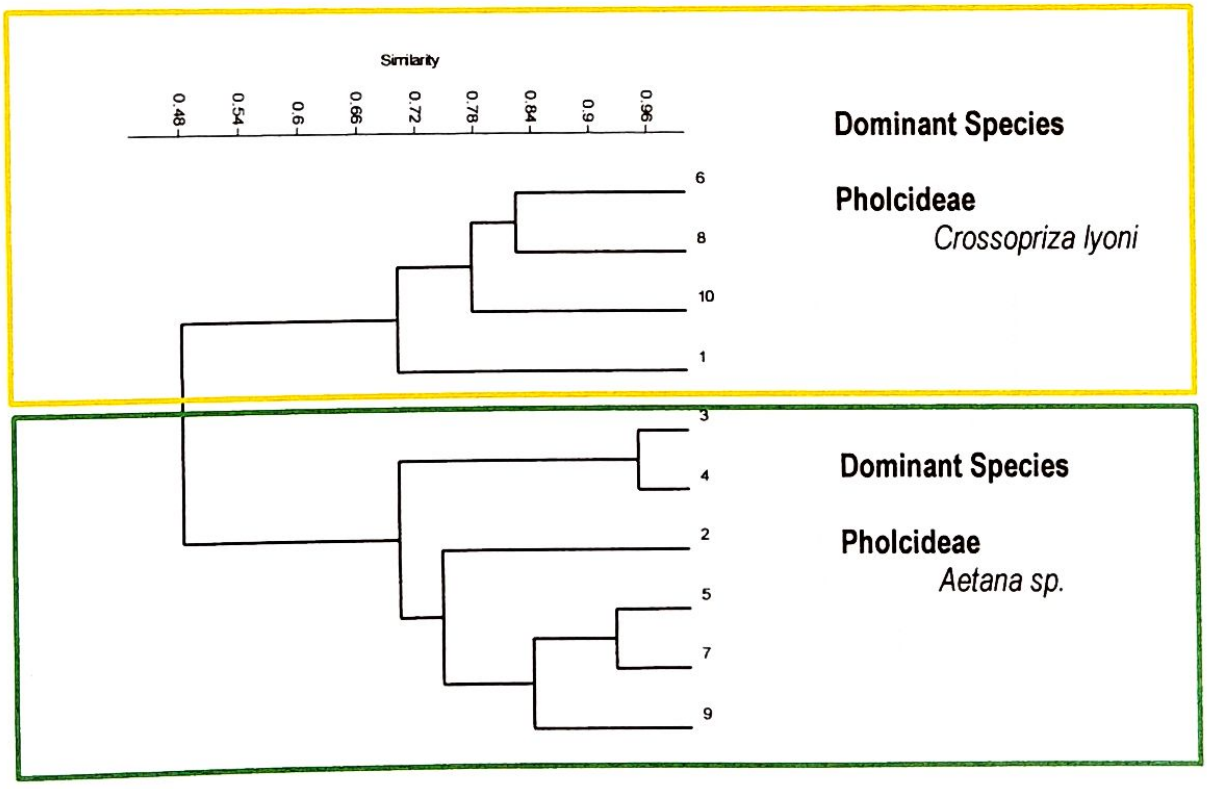

Figure 6. Dendogram with 10 sampling plots generated through PASTsoftware using the Bray-Curtis Similarity Index. Cophenetic correlation value reached 0.78.

Species Diversity of Pholcid Spiders

Plot number 1 (0.73) had the highest species diversity compared to other plots; this sampling areas was forested, shady, unpopulated and less human intervention. Plots 8 (0.72) and 2 (0.71) also had higher diversity. However, plots 3 and 7 had very low diversity with an H' index of 0.0.This is further shown in (Figure 7). These low values are due to human disturbance as a result of the natural disturbance especially from the typhoon *Odette* that struck the Island of Bohol last December 17, 2021 before the conduct of the sampling causing the area to be flooded and animal populations to be disturbed. The combined H' index for all plots was 0.33 which indicated that the sampling area is not diverse in pholcid species.

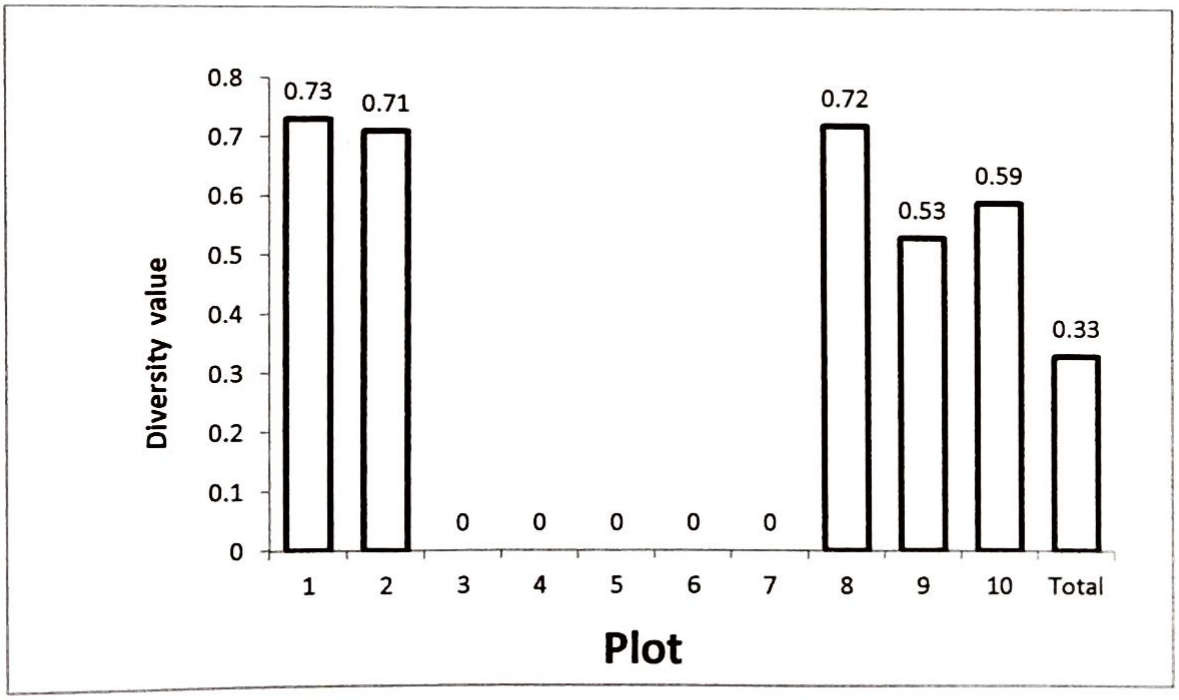

Figure 7. Species diversity in different sampling plots

The habitat, open area has a diversity index value of 0.62, followed by the habitat 2, the close forest with a diversity index value of 0.64 while habitat 3, an open forest has a higher diversity compared to the first two habitats, with a value of 0.69 (Figure 8). The total summation of these three habitat types is 0.65 and indicates that the area is not diverse in pholcid spider species.

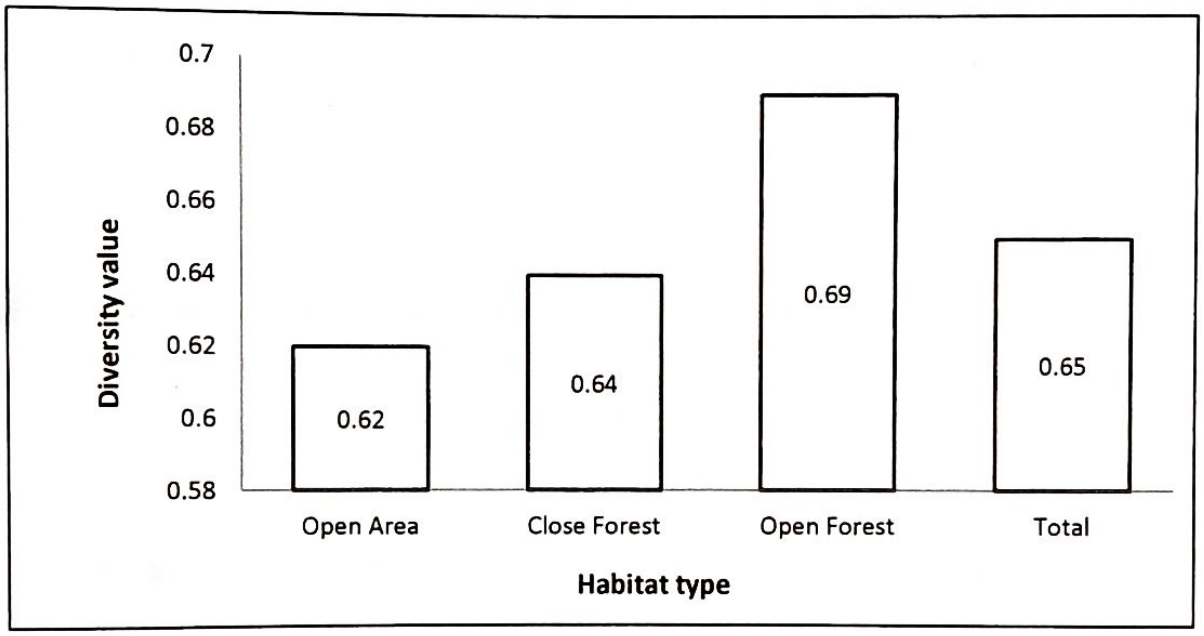

Figure 8. Diversity index in every habitat

Relative abundance of Pholcid Spiders

The *Aetana* sp. is more abundant in the area with a total of 45 individuals (63%), followed by *Crossopriza lyoni* with 26 individuals at (37%). Both species captured were under the Least Concern spider fauna based in Spider Web Chart (2021) which suggests that the species identified are not yet under threat though conservation and protection are still needed.

Table 1. Species relative abundance

Genus	No. of samples	Relative abundance	Relative Abundance (%)
Aetana sp.	45	0.63	63.38
Crossopriza lyoni	26	0.37	36.62
TOTAL	71	1	100

4. Environmental Factors Influencing Spider Occurrence

The Canonical Correspondence Analysis (CCA) shows what the pholcid spider species are dependent unto as shown in (Figure 9). Based on the data, *Crossopriza lyoni* is negatively associated with any of the environmental factors, for this reason; this species are considered independent to environmental factors and could thrive elsewhere. While species *Aetana* sp. is associated with environmental factor canopy cover, elevation and air temperature.

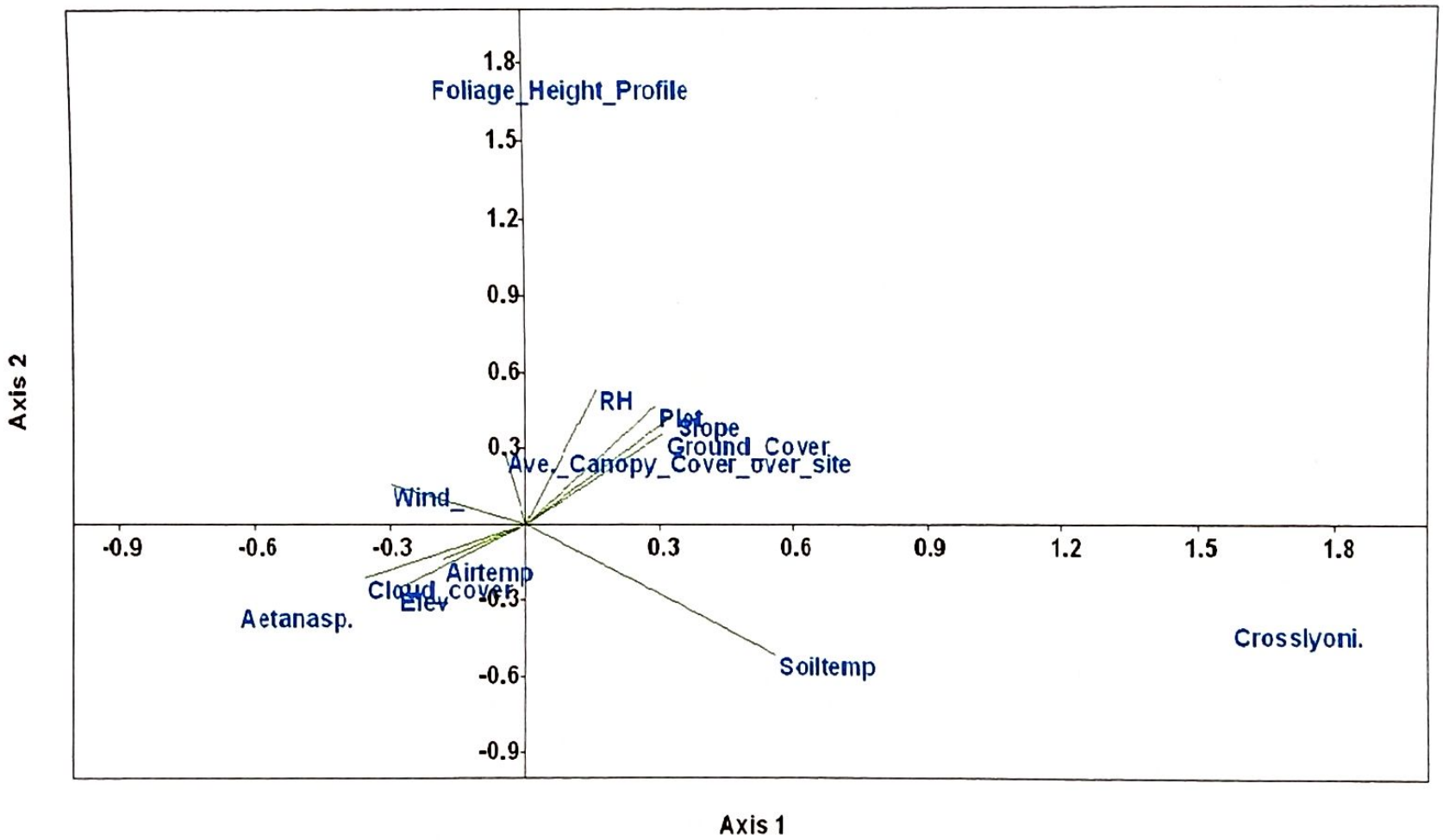

Figure 9. Canonical correspondence analysis (CCA) of pholcid spider and its habitat characteristics association.Code: Airtemp – Air temperature, Elev - Elevation, RH - RelativeHumiudity, Ave._Canopy – Average,Canopy,Soiltemp – Soil temperature, Aetanasp. – *Aetana* sp, Crosslyoni. - *Crossopriza lyoni.*

Chapter 3

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

This research was conducted at the Philippine Tarsier Sanctuary in Corella, Bohol, Philippines, particularly in the Barangay Canapnapan, Corella. The research aimed to determine the diversity of spider species in the Pholcideae family, as well as their microhabitats, in the Philippine Tarsier Sanctuary. During the data collection, two distinct spider species belonging to the pholcideae family were discovered: *Crossopriza lyoni* and *Aetana* sp. The cellar spider, also known as the daddy long-leg spider or gyrating spider, and the Crossopriza lyoni, often known as the carpenter spider, are popular names for these spiders. Both spider species are web-builders and serve as bio-indicators for air pollution. Two primary groupings were discovered in the examination of species similarity based on habitat type and number of individuals. Cluster 1 consists of four plots clustered together, with *Crossopriza lyoni* as the main species. Cluster 2 features six plots clustered together, with *Aetana* sp. as the dominant species. In comparison to the other plots, Plot 1 (0.73) had the highest species diversity; this sample region was forested, shady, uninhabited, and had less human intervention. Plots 8 (0.72) and 2 (0.71) have more diversity as well. With an H' value of 0.0, plots 3 and 7 exhibited very low variety. The total H' index for all plots is 0.33 which indicated that the sampling area is not diverse in pholcid species. None of the environmental factors are adversely related with *Crossopriza lyoni* this species is deemed independent of them and may thrive

everywhere. Although the species *Aetana* sp. is linked to the factors of canopy cover, elevation, and air temperature.

Conclusions

Based on the findings of the study, it was concluded that different Pholcid spiders were mostly found on the building ceilings, bamboo shoots and rock built-up. However, *Ficus nota, Sweitenia macrophylla, Vitex parviflora* and *Mangifera indica* leaves utilized by leaf-dwelling pholcids regardless of its leaf size. Furthermore, several *Aetana* sp. preferred specific microhabitats as well as *Crossopriza lyoni*. In comparison to the other plots, plot 1 has the largest species diversity, followed by plots 8 and 2. Plots 3 and 7 have extremely little diversity, with an H' value of 0.0. These low numbers are due to both human and environmental disturbance, most notably Typhoon Odette, which struck the island of Bohol on December 17, 2021, flooding the area and disrupting spider populations. The overall H' index for all plots is 0.33, indicating a diverse range of pholcid species in the sample area. The total index of these three habitat types is 0.65, indicating that the area is not diverse in spider species.

Recommendations

On the basis of the findings, the following recommendations are forwarded:

1. Conduct the same study on different sites to identify the environmental factor that influence the collection.
2. Use of different methods in conducting study in order to validate which method will capture more Pholcid.
3. Create field guide on Pholcideae family if ample amounts of species are collected as basis in identifying.
4. Submit the unknown species on the expert for the identifications.
5. Raise awareness to the public on the benefits and harm of pholcid spiders for better understanding and for conservation purposes.

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APPENDIX A

Raw Data

DAY 1 **Coordinates: 9˚41'21"N, 123 ˚56'30"E**

Plot 1

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Fully Shade
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Fully Shade
Daddy long-leg	*Aetana sp.*	Rock Built-up		Visual Search	Fully Shade
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Macaranga grandifolia*	Litter Sampling	Fully Shade
Daddy long-leg	*Aetana sp.*	Rock Built-up		Visual Search	Fully Shade
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Fully Shade
Carpenter Spider	*Crossopriza lyoni.*	Ceiling		Visual Search	Fully Shade
Carpenter Spider	*Crossopriza lyoni.*	Ceiling		Visual Search	Fully Shade
Carpenter Spider	*Crossopriza lyoni.*	Ceiling		Visual Search	Fully Shade
Carpenter Spider	*Crossopriza lyoni.*	Ceiling		Visual Search	Fully Shade

Carpenter Spider	*Crossopriza lyoni.*	Ceiling	Visual Search	Fully Shade
Carpenter Spider	*Crossopriza lyoni.*	Ceiling	Visual Search	Fully Shade

Plot 2 **Coordinates: 9˚41'14"N, 123 ˚57'20"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Buttress	*Mangifera indica*	Visual Search	Shady
Carpenter Spider	*Crossopriza sp.*	Ceilling		Visual Search	Shady
Carpenter Spider	*Crossopriza sp.*	Beneath of woodpile	*Swietenia macrophylla*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Beneath of woodpile	*Swietenia macrophylla*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Shady

DAY 2 **Coordinates: 9 ˚41'23", 123 ˚57'6"E**

Plot 3

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Mangifera indica*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Mangifera indica*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Rock Built-up		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Rock Built-up		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Rock Built-up		Visual Search	Shady

Plot 4 **Coordinates: 41'28"N, 123 °57'12"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Shady
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Shady
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Shady
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Shady
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Ficus nota*	Litter Sampling	Shady

DAY 3

PLOT 5 **Coordinates: 9 °41'28"N, 123 °57'21"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Buttress	*Swietenia macrophylla*	Visual Search	Shady Area
Daddy long-leg	*Aetana sp.*	Buttress	*Swietenia macrophylla*	Visual Search	Shady Area
Daddy long-leg	*Aetana sp.*	Buttress	*Swietenia macrophylla*	Visual Search	Shady Area
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Swietenia macrophylla*	Litter Sampling	Shady Area

PLOT 6 **Coordinates: 9 °41'28"N, 123 °56'30"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Carpenter Spider	*Crossopriza lyoni*	Coconut Cone	*Cocos nucifera*	Visual Search	Partly Shady
Carpenter Spider	*Crossopriza lyoni*	Coconut Cone	*Cocos nucifera*	Visual Search	Partly Shady
Carpenter Spider	*Crossopriza lyoni*	Rock Built-up		Visual Search	Partly Shady
Carpenter Spider	*Crossopriza lyoni*	Rock Built-up		Visual Search	Partly Shady
Carpenter Spider	*Crossopriza lyoni*	Rock Built-up		Visual Search	Partly Shady

DAY 4

PLOT 7 **Coordinates: 9 °41'17"N, 123 °57'7"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Shady Area
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Shady Area
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Shady Area
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Shady Area
Daddy long-leg	*Aetana sp.*	Underside of Leaf	*Vitex parviflora*	Litter Sampling	Shady Area

PLOT 8 **Coordinates: 9 ˚41'12"N, 123 ˚57'26"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Carpenter Spider	*Crossopriza lyoni*	Ceiling		Visual Search	Shady
Carpenter Spider	*Crossopriza lyoni*	Ceiling		Visual Search	Shady
Carpenter Spider	*Crossopriza lyoni*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Ceiling		Visual Search	Shady
Carpenter Spider	*Crossopriza lyoni*	Ceiling		Visual Search	Shady
Carpenter Spider	*Crossopriza lyoni*	Ceiling		Visual Search	Shady

DAY 5

PLOT 9 **Coordinates: 9 °41'18"N, 123 °57'10"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*		Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*		Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*		Shady
Carpenter Spider	*Crossopriza lyoni*	Buttress	*Swietenia macrophylla*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*	Visual Search	Shady
Daddy long-leg	*Aetana sp.*	Buttress	*Vitex parviflora*	Visual Search	Shady
Carpenter Spider	*Crossopriza lyoni*	Buttress	*Swietenia macrophylla*	Visual Search	Shady

PLOT 10 **Coordinates: 9 ˚41'11"N, 123 ˚57'11"E**

Common Name of Species	Species	Microhabitat	Scientific Name Of Leaf/Tree	Method of Captivity	Vegetation Cover
Carpenter Spider	*Crossopriza lyoni*	Underside of Leaf	*Artopcarpus sericarpus*	Litter Sampling	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Underside of Leaf	*Artopcarpus sericarpus*	Litter Sampling	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Daddy long-leg	*Aetana sp.*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade
Carpenter Spider	*Crossopriza lyoni*	Bamboo shoots	*Bambusa spinosa*	Visual Search	Fully Sade

APPENDIX B

Scientific name	Common name	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10
Crossopriza lyoni	Carpenter Spider	6	2	0	0	0	5	0	5	1	7
Aetana sp.	Daddy long-legs	6	4	8	8	4	0	5	3	5	2
	TOTAL	**12**	**6**	**8**	**8**	**4**	**5**	**5**	**8**	**6**	**9**

APPENDIX C

	Open_Area	Close_Forest	Open_Forest
Taxa_S	2	2	2
Individuals	26	30	16
Dominance_D	0.574	0.5556	0.5078
Simpson_1-D	0.426	0.4444	0.4922
Shannon_H	0.6172	0.6365	0.6853
Evenness_e^H/S	0.9269	0.9449	0.9922
Brillouin	0.5485	0.5739	0.5841
Menhinick	0.3922	0.3651	0.5
Margalef	0.3069	0.294	0.3607
Equitability_J	0.8905	0.9183	0.9887
Fisher_alpha	0.505	0.4824	0.6033
Berger-Parker	0.6923	0.6667	0.5625

APPENDIX D

SPECIES	No. of Individuals	Pi	ln Pi	Pi*lnPi
Crossopriza lyoni	26	0.366197183	-1.00458334	-0.36788
Aetana sp.	45	0.633802817	-0.45601739	-0.28903
	71	1		-0.6569
			H=	0.656901

APPENDIX E

C_Forest	Plot	Elev	Slope	Airtemp	Soiltemp	RH	Ground Cover	Wind	Cloud cover	Ave. Canopy Cover over site	Foliage Height Profile	*Aetanasp.*	*Crosslyoni.*	
O_Area	1	142	1	26	27	78	1	1	3	4	1	6	6	
O_Area	2	140	1	27	25	80	1	2	3	3	2	4	2	
C_Forest	3	147	1	27	26	84	1	1	3	3	2	8	0	
O_Area	4	144	1	25	24	79	1	2	3	4	3	8	0	
C_Forest	5	148	2	26	22	77	2	2	3	3	2	4	0	
C_Forest	6	142	2	26	25	90	2	1	2	4	3	0	5	
C_Forest	7	139	1	26	25	93	1	2	4	4	3	5	0	
C_Forest	8	144	2	24	25	90	1	1	4	3	2	3	5	
O_Forest	9	139	1	22	23	85	3	1	2	4	3	5	1	
O_Forest	10	141	1	24	28	80	3	2	2	3	2	2	7	
												45	26	71

APPENDIX F

APPENDIX G

APPROVAL SHEET

The thesis entitled "PHOLCID SPIDER DIVERSITY AND MICROHABITATS IN PHILIPPINE TARSIER SANCTUARY, CORELLA, BOHOL, PHILIPPINES" prepared and submitted by Terencio A. Santillana in partial fulfillment of the requirements for the degree Bachelor of Science in Forestry (BSF) has been examined and recommended for acceptance and approval for oral defense.

RESEARCH COMMITTEE

NOEL T. LOMOSBOG, PhD
Dean

REIZL P. JOSE, PhD
Adviser

MARY BETH SARNOWSKI, MRes
Editor

EDDIE P. MONDEJAR, PhD
Statistician

LYNDE QUIÑONES - BULLONG, PhD
Internal Expert

WILBERT A. AUREO, MSc.
Chairperson

EXAMINING PANEL Approved by the committee on Oral Examination with the rating of _____.

MARIETTA C. MACALOLOT, MS
Campus Director

WILBERT T. AUREO, MSc
Member

NOEL T. LOMOSBOG, PhD
Member

REIZL P. JOSE, PhD
Member

LYNDE QUIÑONES - BULLONG, PhD
Member

Accepted and approved in partial fulfillment of the requirements for the degree of BACHELOR OF SCIENCE IN FORESTRY.

Date and approved Defense: May, 2021

NOEL T. LOMOSBOG, PhD
Dean, College of Agriculture and Natural Resources

APPENDIX H

PARENTAL CONSENT

Permission is granted for my/our son/daughter to participate in the following Field Trip/ Educational Tour/Field Practice/Field activity:

NAME OF STUDENT	:	Terencio A. Santillana
COURSE	:	Bachelor of Science in Forestry
SCHOOL	:	Bohol Island State University, Bilar Campus
THESIS TITLE	:	PHOLCID SPIDER DIVERSITY AND MICROHABITATS IN PHILIPPINE TARSIER SANCTUARY, CORELLA, BOHOL, PHILIPPINES
DESTINATION	:	Philippine Tarsier Foundation Inc., Canapnapan, Corella, Bohol
DATE	:	February 7 – 14, 2022

I/We hereby acknowledge that sufficient information has been provided by the school with respect to the planned activity, duration, location, method of transportation, participants and supervision.

I/We hereby acknowledge that certain RISKS or INJURIES are inherent to participate in learning activities outside the school. These types of injuries may be minor or serious and may result from one's actions, or the actions or actions or inaction of others, or a combination of both.

I/We understand that the rules and regulations established for the Field Trip/Educational Tour are designed for the safety and protection of the participants and hereby undertake to inform my child to abide these rules and regulations.

I/We declare having read and understood the above Parental Consent Agreement in its entirety and hereby consent to allow my/our child to participate, acknowledging all of the foregoing.

IN WITNESS WHEREOF, I/We hereto affix my/our signature this 17 th day of November, 2021 at Poblacion, Bilar, Bohol, Philippines.

BERNARDITA M. TADENA
Parent/Guardian
(signature over printed name)

Valid ID No. S.I 4960

LUCIO C. TADENA
Parent/Guardian
(signature over printed name)

Valid ID No. _____

SUBSCRIBED AND SWORN to before me this 17 th day of November, 2021 at Poblacion, Bilar, Bohol, Philippines

ATTY. LORETO B. DORIA, CPA
Notary Public
DORIA LAW OFFICE, POBLACION, BILAR, BOHOL
Email: loreto.doria@yahoo.com
Mobile Nos. 09183713939/09674232276
NCS No. 2019-01, Extended until December 31, 2021
Roll No. 63982, LRN 013950 IBPLifetime Member
MCLE Compliance No.VI-0006657 until April 14, 2022
PTR No. 98885149 01-07-2021, TIN 263-242-444

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Book No. VII

APPENDIX I

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
College of Agriculture and Natural Resources
Forestry and Environmental Science Department
Bilar Campus, Zamora, Bilar, Bohol

February 2, 2022

HON. D. HILARIO D. TOCMO
Municipal Mayor
Municipality of Corella
Province of Bohol

Dear Sir,

I am Mr. Terencio A. Santillana, a fourth-year college student at Bohol Island State University, Bilar Campus, taking up Bachelor of Science in Forestry.

One of the requirements for graduation is conducting research (thesis). My study is entitled **"PHOLCID SPIDER DIVERSITY AND MICROHABITATS IN PHILIPPINE TARSIER SANCTUARY, CORELLA, BOHOL, PHILIPPINES".** I am asking permission to conduct a study starting February 7 to February 14, 2022, from 8 am to 5 pm in Canapnapan, Corella, Bohol.

The permission you will grant is a great help to my study with the assurance of complying whatever your office will require me.

Thank you and God bless!

Very truly yours,

TERENCIO A. SANTILLANA
Student Researcher

Noted by:

REIZL P. JOSE, PhD
Thesis Adviser

Recommending Approval:

NOEL T. LOMOSBOG, PhD
Dean, CANR

Approved by:

HON. D. HILARIO D. TOCMO
Municipal Mayor

APPENDIX J

Republic of the Philippines
BOHOL ISLAND STATE UNIVERSITY
College of Agriculture and Natural Resources
Forestry and Environmental Science Department
Bilar Campus, Zamora, Bilar, Bohol

February 2, 2022

HON. ROEL A. TAJANTAJAN
Barangay Captain
Canapnapan
Corella, Bohol

Dear Sir,

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Student Researcher

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REIZL P. JOSE, PhD
Thesis Adviser

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NOEL T. LOMOSBOG, PhD
Dean, CANR

Approved by:

HON. ROEL A. TAJANTAJAN
Municipal Mayor