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# The lycaenid butterfly fauna (Lepidoptera) of Cosñipata, Peru: annotated checklist, elevational patterns, and rarity

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**Abstract.** Peru's Cosñipata Region in Cuzco and Madre de Dios Departments is a valley between Manu National Park and the Amarakaeri Communal Reserve that ranges from 400 to 4,000 m elevation. A team of experienced lepidopterists sampled the butterfly fauna of this valley for more than a decade (7,440 field person-hours). We analyze the data for Lycaenidae (Lepidoptera: Papilionoidea), a family for which we have taxonomic expertise. After adding data on the fauna from museums and the literature, we present an annotated checklist of the 340 Lycaenidae species recorded from the Cosñipata Region with notes for each species on the elevations and seasons at which it occurs, adult behavior, and sampled relative abundance. Species richness is twice that recorded for Trinidad or Brazil's Parque Nacional do Itatiaia, each of which also has a mix of low, mid, and high elevation habitats. There was an average of 8.3 adult specimens per species in the fieldwork sample. For those species with more than 8 specimens, the median elevational range was 1,100 m. Species richness in low elevation habitats was greater than that at mid or high elevations, which is contrary to findings for some other Neotropical insects. We present evidence why further sampling is likely to increase this difference. Maximal adult species richness occurs during the transition from dry to wet seasons (September to November) at all elevations, but there is little evidence that adults of species occur only during this season. Sampled relative abundances were skewed so that 70% of the species were encountered less frequently than average (1/340). These results are consistent with the observation that most species are rarely encountered using standard sampling methods.

**Key words.** Encounter rates, Eumaeini, mid-domain effect, seasonality, species richness.

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## Introduction

Documenting the composition and structure of species-rich faunas is difficult because most species are rare (Kunin and Gaston 1993). For Neotropical butterflies, faunal studies require significant, long-term sampling (e.g., Hoffmann 1940, 1941; Zikán and Zikán 1940, 1968; Ebert 1969; DeVries 1987, 1997; Brown 1992), oftentimes accompanied by prodigious taxonomic effort (e.g., Robbins et al. 1996). For Neotropical Lycaenidae, taxonomic expertise is necessary, whether documenting a hilltop fauna of territorial males (Prieto and Dahners 2006, 2009) or the fauna of a political region (Duarte et al. 2010; Robbins et al. 2012; Cock and Robbins 2016).

The Lepidoptera of the Cosñipata Region in southern Peru have been sampled for almost two centuries (Lamas 1989). French naturalist Claude Isidore Gay collected Cosñipata butterflies in 1839–1840 and was followed by Henry Whitely Jr., who collected some Lycaenidae (Druce 1876). Sporadic subsequent collections indicated that the Cosñipata Region has a rich lepidopteran fauna. Further, habitat access via a road through the steep valley suggested that the Cosñipata Region might be an excellent place to quantify elevational patterns of a butterfly community. For these reasons, we initiated a project to sample the Cosñipata Region adult butterfly fauna at a variety of elevations and seasons. The primary focus was on Lycaenidae, especially the Eumaeini (Theclinae). After 7,440 person-hours of fieldwork over 12 years, during which we sampled 2,692 lycaenid adults, we address the following questions.

First, is lycaenid species richness greatest in low or mid elevation habitats? Species richness generally declines with increasing elevation, but whether richness peaks at low or mid elevations has been controversial (McCoy 1990; Rahbek 2005; Beck et al. 2017 and included citations). In particular, the random distribution of elevational ranges would lead to a mid-domain effect (Colwell and Lees 2000). Focusing on elevation gradients in Neotropical Lepidoptera, species richness of Costa Rican Geometridae is greatest between about 1,000 and 2,000 m elevation (Brehm et al. 2007). Species richness of Peruvian Sphingidae peaks at about 600–800 m elevation (Ignatov et al 2011; Sublett et al. 2019). Species richness showed no evident mid elevation peak in Mexican (Meléndez-Jaramillo et al. 2019) or Brazilian (Pires et al. 2020) butterflies, albeit the gradient in the latter paper was restricted to 800–1,400 m elevation. Elevational species richness gradients have not been assessed for Neotropical lycaenids.

Second, what is the median elevational range of a Cosñipata Region lycaenid? Although lycaenid elevational ranges are anecdotally documented in generic revisions (e.g., Robbins and Busby 2008; Busby et al. 2017), they have not been quantified for a Neotropical community, such as that in the Cosñipata Region.

Third, are lycaenid elevational ranges narrow at higher elevations? Satyrine butterflies have been reported to be stratified in narrow elevational ranges at higher elevations (Adams 1985; Pyrcz and Wojtusiak 2002), and we assess whether this pattern occurs in lycaenids.

The fourth question concerns seasonal variation in lycaenid species richness. In some Neotropical lowland sites, species richness is greatest during the dry season (Bates 1875; Robbins and Small 1981), but in Amazonian Peru, it appears to be greatest during the transition between the dry and wet seasons (Robbins et al. 1996). We ask when species richness is greatest in the Cosñipata Region and whether it is dependent upon elevation.

A related fifth question is whether lycaenid adults fly only during one season of the year, and if strict seasonality does occur, whether it tends to occur at lower or higher elevations.

Sixth, how frequently is each species encountered? Whereas the concepts of rarity and commonness have a variety of meanings (Gaston 1997), relative abundance in a sample is heuristically easy to understand. A species with a sampled relative abundance of 1/100 has been encountered, on average, once for every 100 sampled individuals. The significance of encounter rate is that it determines, in part, the ability to accumulate information about a species. A practical consequence is that species of conservation concern are generally rare species (Kunin and Gaston 1993).

Seventh, what proportion of the community's species and individuals are sampled less than the average relative abundance? We ask this question as a way to quantify how relative abundances, as measured by sampled encounter rates, are skewed towards rarity. It is a way to quantify the "most species are rarely encountered" description.

Butterfly diversity samples are biased. The number of sampled individuals of a species depends upon the abundance of that species and the interaction between its behavior/morphology and the sampling method. For example, "apparency" in butterfly size and color biases samples (Dennis et al 2006). As another example, some species are attracted to decaying fish baits while others are not (Busby et al. 2017). The interaction between behavior/morphology and sampling method biases the answers to the questions just posed. For this reason, we specifically note potential biases in sampling and analyses in the answers to these questions.

Given the rarity with which most Neotropical lycaenid butterfly species are encountered, long-term faunal studies such as this one, as well as museum collections, are often times the only sources of information about the majority of species. It is the biological *raison d'ĕtre* for this paper.

# Materials and Methods

## Study Area

The Cosñipata Region is an interconnected complex of valleys in Cuzco and Madre de Dios Departments, Peru (Fig. 1). It is comprised of the Cosñipata Valley, the Pilcopata Valley, the lower parts of the Tono and Piñi Piñi Valleys, and the upper portion of the Alto Madre de Dios Valley. Drainage from Abra Acjanaco creates the headwaters of the Río Cosñipata, which flows into the Río Pilcopata just upstream from Pilcopata. The Río Pilcopata then merges with the Río Tono and Río Piñi Piñi to form the Río Alto Madre de Dios. This region is located between Manu National Park, Biosphere Reserve and World Heritage Site and the Amarakaeri Communal Reserve (Fig. 1).

We focused sampling along a 126 kilometer stretch of the Paucartambo-Shintuya road (Fig. 2–4), from Abra Acjanaco (3,600 m) to Pantiacolla Lodge (400 m). We list and map the primary field sites with their elevations, coordinates, and plant communities (Table 1). The road runs from Abra Acjanaco (3,600 m) to Shintuya (400 m), a road distance of 126 kilometers (Fig. 2–4). There is virtually continuous access to undisturbed grassland and forest (Fig. 3–4) from Abra Acjanaco to Chontachaca (970 m). Disturbed habitat predominates from Chontachaca to Atalaya (500 m, on the southeastern bank of the Alto Madre de Dios River). From Atalaya to


**Figure 1.** Location of the Cosñipata Region (yellow box) in southeast Peru. © Amazonia Lodge.

**Table 1.** Major Cosñipata Region sampling localities for Lycaenidae.

| Locality | Elevation (m) | Coordinates | Location Figure 2 | Plant Communities |
|---|---|---|---|---|
| **Abra Acjanaco** | 3,600–3,500 | 13° 11′ S, 71° 38′ W | 1 | Puna with bunchgrasses (Poaceae), tola shrubs, and small trees along quebradas. |
| **Wayquecha** | 2,950 | 13° 10′ S, 71° 35′ W | 2 | Mossy elfin forest in mesic situations and more xeric ericaceous brush on slopes. |
| **Pillahuata** | 2,585–2,600 | 13° 09′ S, 71° 35′ W | 3 | Elfin forest with xeric ericaceous brush on open slopes. |
| **Quebrada Buenos Aires** | 2,410 | 13° 09′ S, 71° 36′ W | 3 | Montane forest with stands of *Alnus*. |
| **Quebrada Yanamayo** | 2,350 | 13° 08′ S, 71° 35′ W | 4 | Montane forest with patchy stands of bamboo. |
| **Quebrada Morro Leguía** | 2,135 | 13° 07′ S, 71° 34′ W | 5 | Montane forest with patchy stands of bamboo and xeric ericaceous brush on open slopes. |
| **Rocotal** | 1,970 | 13° 06′ S, 71° 34′ W | 6 | Montane forest with stands of bamboo and *Miconia*. |
| **El Mirador** | 1,720 | 13° 04′ S, 71° 33′ W | 7 | Montane forest with stands of *Miconia* and roadside promontories. |
| **Puente Unión** | 1,600 | 13° 04′ S, 71° 34′ W | 8 | Montane forest with stands of *Miconia* along the Unión River. |
| **San Pedro** | 1,375 | 13° 03′ S, 71° 33′ W | 9 | Lower Montane forest with large trees covered in epiphytes, and a dense understory composed of bamboo, tree ferns, palms, and small trees. |
| **Quebrada Santa Isabel** | 1,194 | 13° 02′ S, 71° 31′ W | 10 | Lower Montane forest on ridges with tropical riparian growth. |
| **Quebrada Quitacalzón** | 1,050 | 13° 01′ S, 71° 30′ W | 11 | Lower Montane forest on ridges with tropical riparian growth and bamboo. |
| **Chontachaca** | 950 | 13° 02′ S, 71° 28′ W | 12 | Disturbed lowland forest with two trail systems and many open areas. |
| **Patria** | 680 | 12° 58′ S, 71° 26′ W | 13 | Disturbed lowland forest with many open areas. |
| **Pilcopata (including Villa Carmen)** | 580 | 12° 54′ S, 71° 24′ W | 14 | Predominantly secondary lowland rain forest. |
| **Atalaya** | 505 | 12° 54′ S, 71° 22′ W | 15 | Riparian habitat at the junction of the Alto Madre de Dios and Carbón Rivers. |
| **Amazonia Lodge** | 500–800 | 12° 52′ S, 71° 23′ W | 16 | Primary and secondary lowland rain forest. The secondary forest floods each year. |
| **Salvación** | 500–600 | 12° 50′ S, 71° 21′ W | 17 | Disturbed lowland rain forest with many open areas. |
| **Erika** | 550–650 | 12° 49′ S, 71° 24′ W | 18 | Primary lowland rain forest with a few riparian open areas. |
| **Mascoitania** | 520 | 12° 47′ S, 71° 24′ W | 19 | Primary lowland rain forest with a few riparian open areas. |
| **Shintuya** | 450 | 12° 41′ S, 71° 14′ W | 20 | Primary lowland rain forest with some unflooded open areas. |
| **Pantiacolla Lodge** | 400 | 12° 39′ S, 71° 13′ W | 21 | Primary lowland rain forest on unflooded *terra firma*. |

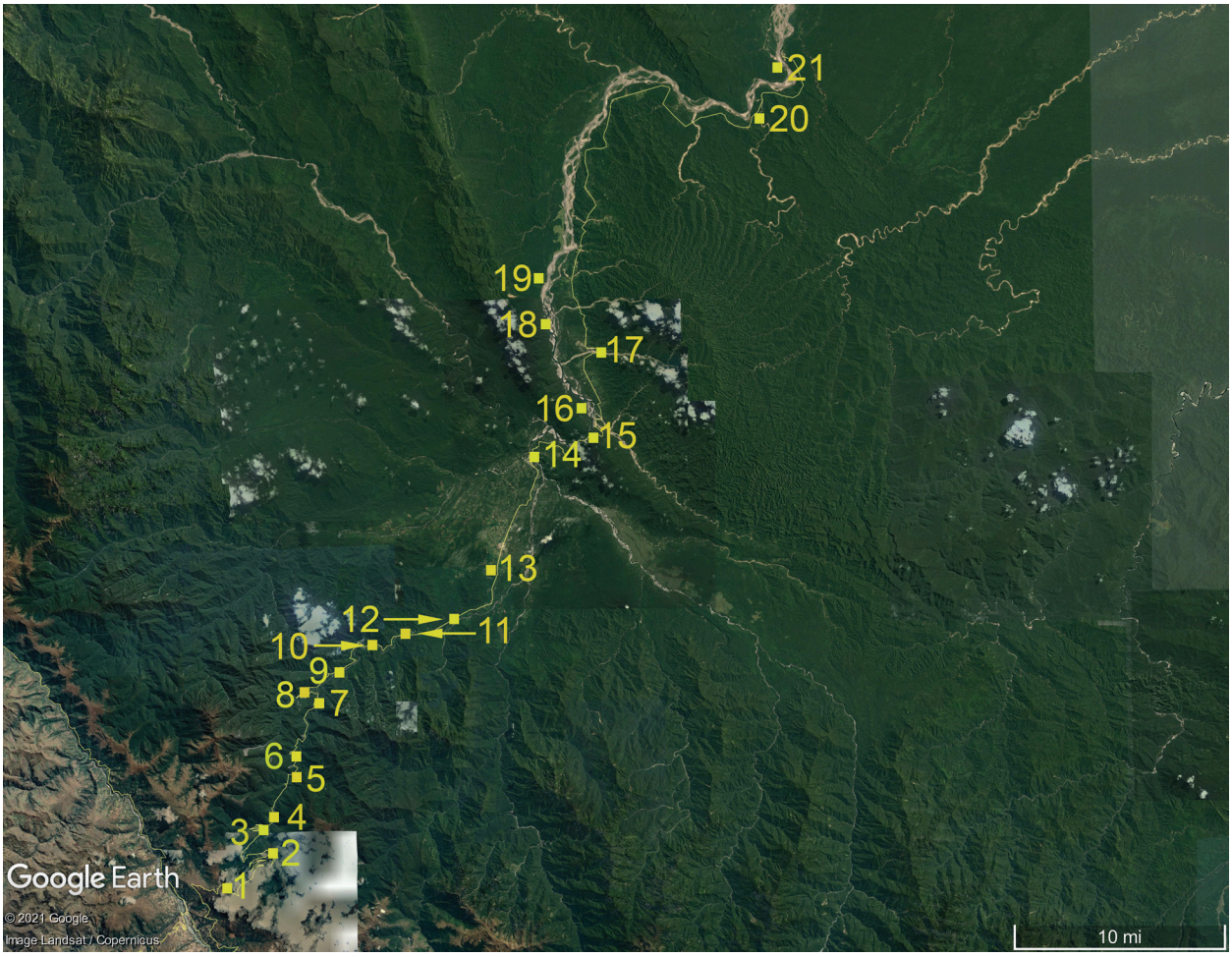


**Figure 2.** Location of major sampling sites. The numbers reference Table 1.

**Figure 3.** The Cosñipata Valley, view from 1,650m, looking towards the northeast.


**Figure 4.** El Mirador (red marking), a site occupied by territorial males at 1,720m (image courtesy S. Kinyon).

Shintuya, roadside habitat on the eastern bank of the river is moderately disturbed, but we accessed primary and secondary forest on the western bank of the Alto Madre de Dios River.

We also sampled three lowland areas with extensive trail systems, the Villa Carmen Biological Station, the Amazonia Lodge and the Pantiacolla Lodge. Villa Carmen is managed by the Amazon Conservation Association (ACCA or Asociación para la Conservación de la Cuenca Amazónica). It encompasses 3,035 hectares (7,500 acres); and is located 1.4 km NNE of Pilcopata in Cuzco Department. The Amazonia Lodge consists of 350 hectares (865 acres) and is located 3 km downstream of Atalaya on the west bank of the Río Alto Madre de Dios in Madre de Dios Department. The Pantiacolla Lodge has 900 hectares (2,200 acres) and is located across from Shintuya on the northwest bank of the Alto Madre de Dios in Madre de Dios Department.

The study area comprises approximately 1,000 hectares. There is a 20-meter strip along the 126 km Acjanaco-Shintuya road, 1.6 $km^2$ at the Amazonia Lodge, 1.7 $km^2$ at Villa Carmen, 1.5 $km^2$ at Pantiacolla Lodge, and small areas near the villages of Chontachaca and Patria).

The Cosñipata Region has marked seasonality with the wettest months from November through March and the driest from June through August (ONERN 1976). The transition from the end of the dry season to the beginning of the wet season occurs from September to November. A portion of the Cosñipata Region, the Pantiacolla Range, has the highest annual rainfall in Peru (>8,000 mm).

## Sampling Methods

**Fieldwork localities and person-hours.** Fieldwork was done at multiple elevations during each season with the goal of systematically surveying the butterfly fauna of the Cosñipata Region (Table 1, Fig. 2). We visited the study sites for two to three-week periods during January, February, March, April, May, June, August, September, October, and November. We used field stations/lodges as bases of research. Lodges are located at Wayquecha (2,950 m), San Pedro (1,375 m), Pilcopata (540 m), Atalaya (491 m), and Pantiacolla (400 m).

Survey participants were experienced lepidopterists (see Acknowledgments). All lycaenids encountered that could be collected were sampled with the exception of *Arawacus separata* (Lathy) and *Ocaria ocrisia* (Hewitson), which were common and easily recognized lycaenids. As one way to assess collector bias, we calculated variation among the collectors in the rate at which they sampled lycaenids.

Field survey person-hours were recorded during weather when butterflies were active at various elevations in the Cosñipata Region (Table 2). Due to frequent cloud cover, butterfly activity was less frequent above 2,000 m elevation resulting in fewer field person-hours at these elevations. The proportion of field person-hours at low elevation habitats between 0–1,000 m (45.1%) was similar to that at mid elevation habitats between 1,000–2,000 m (45.0%).

Sampling was influenced by locality constraints. At elevations higher than 950 m (Chontachaca), survey efforts were largely restricted to roadsides and roadway promontories because there were few trails through the forest. At Chontachaca and lower elevations, there were extensive trail systems that provided better access to forest species. These trails were also more conducive to the use of bait traps.

**Insect net sampling.** When the survey began, efforts were primarily focused on the use of insect nets. Due to the steep slopes on each side of the Acjanaco-Shintuya road, long telescoping nets (up to 8 m in length) were a necessity. At lower elevations long nets were used to capture specimens at higher forest levels.

Male hairstreaks set up mating territories for two hours or more at a place and time that is characteristic of that species (Prieto and Dahners 2006, 2009). Indeed, males of a particular species were often sampled at the same spot at the same time on successive days. Many promontories along the winding road were occupied by males after 11:00 AM when the sun illuminated the side of trees facing the road (Fig. 4). The vegetation along and above quebradas (small streams) also served as mating territories for males.

Many hairstreak butterflies landed within a meter of the ground in dappled shade on hot, clear days between 11:30 AM and 2:00 PM. This presumed thermoregulatory behavior was observed only at elevations below 1,100 m and facilitated sampling.

We found limited nectar sources in the Cosñipata Region, but the Acjanaco-Shintuya road has several species of *Miconia* (Melastomataceae) that bloomed during different months at elevations between 1,000 and 2,600 m. These flowers are well-known for attracting insects (Kriebel and Zumbado 2014). For lycaenids, the most attractive *Miconia* trees bloomed during the wet season (January and February) between 1,100 and 2,000 m. These trees were often less than 10 m high. Many lycaenid species were recorded nectaring on *Miconia* flowers and were not otherwise seen in the Cosñipata Region.

**Bait trapping.** Baiting efforts evolved during the survey. Initially, efforts were restricted to traps deployed 10–20 m above ground, baited with decaying fish. This type of trapping attracted both male and female lycaenids. As opposed to butterflies that usually enter traps, lycaenids primarily land on exterior trap surfaces (top and sides, Busby et al. 2017). Traps were positioned in dappled or nearly-full sunlight in proximity to the forest canopy.

**Table 2.** Sampling partitioned by elevation.

| Elevation (m) | 400–600 | 600–1,000 | 1,000–1,500 | 1,500–2,000 | 2,000–2,500 | 2,500–3,000 | 3,000–3,500 | 3,500–4,000 |
|---|---|---|---|---|---|---|---|---|
| **# of field person-hours** | 3,128 | 228 | 2,543 | 808 | 375 | 215 | 95 | 48 |
| **% of survey effort** | 42.0% | 3.1% | 34.2% | 10.9% | 5.0% | 2.9% | 1.3% | 0.7% |
| **# of species recorded** | 188 | 128 | 154 | 93 | 41 | 34 | 16 | 10 |
| **# of elevationally restricted species** | 77 | 8 | 33 | 32 | 3 | 4 | 1 | 1 |
| **# of elevationally restricted species with >8 specimens** | 4 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| **% of species sampled during transition from dry to wet seasons** | 95% | 95% | 90% | 81% | 98% | 97% | 88% | 100% |
| **% of seasonally restricted species with >8 specimens** | 4% | 5% | 2% | 0% | 0% | 0% | 0% | 0% |

Since hairstreaks alighted on the outside of the trap, care was taken to lower the trap without disturbing the butterfly. Trapping for hairstreaks was most successful in the Cosñipata Region at elevations below 600 m, where 50 or more specimens/person were on occasion sampled in a single day. The lack of bait trapping success at higher elevations may have been due to a lack of forest access rather than sampling method. In Ecuador, baited traps attracted lycaenids at elevations up to 1,600 m (Busby et al. 2017).

A modified baiting technique was effective. We mixed urine with decaying fish, which produced an odiferous and easily dispensed bait. This mixture was sprayed or sprinkled on vegetation along trails to attract butterflies of all families. This method was a relatively efficient means of attracting Lycaenidae to ground level, where they could be collected.

We also used simulated bird droppings (Lamas et al. 1993). We chewed paper and placed the paper/saliva residue on leaf surfaces. Butterflies from all families (particularly Hesperiidae) were attracted to these baits from 400 to 2,200 m elevation. These baits attracted Lycaenidae on occasion, such as *Arcas imperialis* (Cramer).

## Compiled Data

Field person-hours and the data for each sampled specimen were recorded in an electronic spreadsheet. Each specimen was identified, which sometimes necessitated genitalic dissection, based on the taxonomy in Lamas (2004), Robbins (2004b), and subsequent revisions. Vouchers for fieldwork are deposited in the Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru (MUSM) and in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. USA.

The Cosñipata Region Lycaenidae fauna consisted of the fieldwork sample and of data from the scientific literature and museums, especially MUSM.

We tabulated the Lycaenidae fauna of the Cosñipata Region in an annotated checklist (Appendix 1). Each species account in the Appendix includes elevation range and temporal distribution. In addition, information is given regarding relative abundance, ratio of males to females, nectar preferences, male behavior, and attraction to traps/bait.

## Data Analysis

We partitioned the Cosñipata Region into eight elevation zones of 500 m or less and recorded the number of species in each zone, noting how many were found only at that elevation (Table 2). To determine the elevational range of a species, we assumed that each species occurred throughout the zones in which it was collected and in all zones between the highest and lowest at which it was collected. The biases of this method are discussed below.

We did not do statistical tests. Virtually all statistical tests, whether parametric or not, assume independent samples. As noted in the introduction and discussed below, samples are highly biased. We know of no evidence to support the hypothesis that samples are independent. In place of supporting conclusions with questionably appropriate statistical tests, we instead focus on assessing the biases of sampling methods and data analyses.

To assess the hypothesis that species richness is greatest at mid-elevations, we partitioned the Cosñipata Region into lowland habitats (up to 1,000 m), mid-elevation habitats (1,000–2,000 m), and high elevation habitats (2,000–4,000 m) (Table 3). We then tabulated the number of species in each habitat, the number of species in each habitat represented by only one specimen in the field sample, and the number of species in each habitat not represented in the field sample, but which had been collected by others, usually before the project was initiated.

**Table 3.** Species distributions partitioned by low, mid, and high elevation habitats.

| Habitat (elevation) | Low (0–1,000 m) | Mid (1,000–2,000 m) | High (2,000–4,000 m) |
|---|---|---|---|
| **# of Species** | 205 | 196 | 56 |
| **# of species with one specimen (%)** | 48 (23%) | 24 (12%) | 4 (7%) |
| **# of species not in field sample (previously sampled)** | 12 | 4 | 0 |
| **% of species with relative abundance less than average** | 70% | 65% | 63% |

The basic data for temporal occurrence was the number of species sampled in each month (Table 4). We assessed adult seasonality using the following reasoning. As sample size for a species with adults that occur only in one season increases, it will continue to be recorded only in that season. For a non-seasonal species, other seasons will be recorded as sample size increases. As a potential maximum measure of adult seasonality, we tabulated the number of species with more than eight specimens (the average number of specimens per species) collected in only one season at each elevation (Table 2).

With 340 species, the average relative abundance of lycaenid species in the Cosñipata Region, by definition, was 1/340. To estimate the number of species with a smaller relative abundance than average, we counted the number of species in the total sample that had a smaller relative abundance. We then did an analogous calculation for each habitat zone (Table 3).

**Table 4.** Monthly occurrence of Lycaenidae in the Cosñipata Region.

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **% of field survey effort** | 5.5% | 10.2% | 2.1% | 5.9% | 9.2% | 5.6% | 0% | 3.5% | 9.4% | 22.4% | 26.2% | 0% |
| **# of species in field sample** | 71 | 112 | 27 | 43 | 80 | 85 | 2 | 57 | 129 | 208 | 222 | 13 |

# Results

**Annotated checklist.** We list the 340 lycaenid species fauna of the Cosñipata Region (Appendix), of which 324 species were sampled during the fieldwork part of this project. We found 136 previous records of Cosñipata Region lycaenid species in museums and the literature, of which 16 were not sampled during the fieldwork.

Taxonomy and identification remain a problem. About one of every six species is undescribed. Correct names remain unresolved in genera in which it is difficult to associate the sexes until DNA samples for both male and female types can be obtained.

**Fieldwork sample.** We sampled 2,692 specimens of 324 Lycaenidae species (321 Eumaeini, 3 Polyommatinae) in the Cosñipata Region over 12 years and 7,440 person-hours of fieldwork. One lycaenid was sampled on average every 2.8 person-hours in the field. The collector most focused on lycaenids averaged one lycaenid every 1.3 person-hours. Because two common species were ignored, the actual time to encounter a lycaenid was lower.

The fieldwork sample contained an average of 8.3 and a median of 4 specimens per species. As one measure of encounter rarity, 81 species (24%) in the fieldwork sample were collected once. Another 16 species that were collected by others in the Cosñipata Region were unsampled. Since previously unrecorded species are still being discovered, a minimum of 29% of the Cosñipata Region lycaenid fauna was sampled one or fewer times in 7,440 person-hours of fieldwork.

**Elevation.** The number of species in the entire sample in each elevation zone is presented in Table 2. For the more common species (those with nine or more specimens), the median elevational range was 1,100 m, and only 7 were restricted to one elevation zone (Table 2).

**Low, Mid, and High Elevation Habitats.** The number of species in the entire sample were partitioned by elevation habitat (Table 3). Marginally more species were sampled in low (205 species) than mid (196 species) elevation habitats with approximately equal person-hours (Table 2). The number of species represented by one individual, however, is greatest in low elevation habitats (Table 3). The number of species previously collected, but not found in the fieldwork, is also greatest at low elevation (Table 3).

**Seasonality.** Maximum species richness occurred from September through November during the transition from the dry to the wet season (Table 4). Almost 87% (295 species) were recorded during this seasonal transition. Maximal species richness from September through November occurred at all elevations (Table 2). The low number of species in July and December (Table 4) is an artifact because we did no fieldwork for this project during these months.

As a measure of strict adult seasonality (occurrence during only one season), 121 species (36%) were recorded only during the transition from dry to wet season, but only eight of these species had nine or more sampled specimens (the average number of specimens per species). All occurred under 1,500 m elevation (Table 2). Forty-three species (13%) were recorded only from December to August, but none had nine or more sampled specimens.

**Relative abundances.** The average and median relative abundances, respectively, in the total sample were $2.9 \times 10^{-3}$ and $1.3 \times 10^{-3}$, with 237 species (70%) having a relative abundance less than the average. Each of these 237 species would be encountered, on average, less than once for every 743 specimens encountered. We repeated these calculations for low, mid, and high elevation habitats (Table 3). The 237 species that were encountered less often than average contained 24% of specimens sampled.

# Discussion

**Species richness.** The Eumaeini lycaenid fauna of the Cosñipata Region with 337 recorded species (Appendix) is richer than other comparable Neotropical sites, albeit comparative data are scanty. Brazil's Parque Nacional do Itatiaia (Rio de Janeiro state, ~12,000 hectares) has low, mid, and high elevation habitats, as in the Cosñipata Region, but only 176 described and undescribed species were recorded after decades of collecting (Zikán and Zikán 1940, 1968). In fact, all of Rio de Janeiro state (~4,365,000 hectares), which includes elevations above 3,000 m, has 203 recorded eumaeine species (Duarte et al. 2010). The recorded eumaeine fauna of Trinidad (~480,000 hectares), which also has low, mid, and high elevation habitats, is 127 species (Cock and Robbins 2016).

Of 1,058 Eumaeini recognized in the Neotropics from Mexico to Chile (Robbins 2004a), 32% are recorded from the Cosñipata Region. The 76 Eumaeini species represented by one individual each in the combined fieldwork and museum/literature samples indicate that the Cosñipata fauna is not yet fully documented.

**Is lycaenid species richness greatest in low or mid elevation habitats?** The number of species in low elevation habitats (1,000 m and below) is slightly greater than that in mid elevation habitats (1,000–2,000 m) (Table 3). Sampling efforts in low and mid elevation habitats were equivalent (Table 2). However, the number of low elevation species in the fieldwork sample with zero or one specimen is more than double that at mid elevations (Table 3). Additionally, another 40 lowland species recorded at Pakitza (Fig. 1, 100 km north of the Cosñipata Region, 356 m) were unrecorded at Cosñipata (Robbins et al. 1996). Based on this evidence, we expect the species richness in low elevation habitats to increase with further sampling more quickly than that in mid elevation habitats. This finding suggests that lycaenid elevational ranges are not distributed at random, which would lead to a mid-domain effect (Colwell and Lees 2000).

**What is the median elevational range of a Cosñipata Region lycaenid?** Cosñipata Region lycaenid species have a median elevational range of 1,100 m, but the calculation of elevational range suffers from three sources of error. First, a single outlier record, such as a historical record for *Panthiades paphlagon* (C. Felder and R. Felder) from H. Whitely at 3000 m, overestimates elevational range for a few species. However, the use of median ranges obviates this kind of error. Second, elevational range is overestimated because we assumed that a species found in an elevation zone occurred throughout that zone. Third, elevational range is underestimated because further sampling can increase the range of zones in which each species is found. Regardless of how these latter two sources of error offset each other, there is no comparable published median estimate of elevational range in a Neotropical lycaenid community.

**Are lycaenid elevational ranges narrow at higher elevations?** Of the 26 species sampled at least nine times above 2,000 m elevation, none had an elevational range under 1,000 m. There is little apparent evidence to support the hypothesis that high elevation lycaenid species are stratified in narrow elevational ranges.

**At what season is adult species richness the greatest?** Nearly 87% of the Cosñipata Region lycaenid species were recorded with 58% of the sampling effort during the transition from the dry to wet seasons (September to November), (Table 4). This seasonal pattern occurred at all elevations (Table 2). A similar pattern was found in the lowland parts of Manu National Park (Robbins et al. 1996).

**Are lycaenid adults strictly seasonal?** There is little evidence that adult lycaenids are restricted to one season in the Cosñipata Region. For the 103 species represented by at least nine specimens (the average number of specimens per species), eight occurred only during the transition from the dry to wet seasons, and none occurred only at other times. It remains to be seen if the eight species currently known only from the dry to wet season transition continue to be seasonally restricted with further sampling. All eight occur under 1,500 m elevation (Table 2).

**How frequently is each lycaenid species encountered?** The median relative abundance in the entire sample was 0.0013, which is an encounter rate of one individual, on average, in a sample of 744 specimens. It would take the most efficient collector of lycaenids in this project (one lycaenid encountered every 1.3 field-hours) nearly 14 weeks of 70-hour field weeks to accumulate a sample of 744 specimens.

Another way to assess sample relative abundances is that 94% (321 species) of the lycaenid species at Cosñipata were encountered one or fewer times, on average, in a sample of 100 individuals.

**What proportion of the community's species and individuals have less than average relative abundance?** Relative abundances in the sample are skewed towards rarity. In the entire sample, 237 species (70%) representing 24% of all individuals, have a relative abundance less than the average (1/340). This skew in sample relative abundances occurs in low, mid, and high elevation habitats (Table 3).

An evident bias in the unevenness of sampled relative abundances was that a few common and easily recognized species were ignored. Similarly, if specimens of two species were seen simultaneously, the less frequently encountered species was likely collected. Lastly, species are still unsampled. All three of these biases suggest that that unevenness in the distribution of sampled relative abundances underestimates the distribution of unevenness in nature.

# Conclusion

Studying the biology of most species is problematic because most are rarely encountered. For biologists concerned with species at risk of extinction, it is unclear how one distinguishes between rarity and being in danger of extinction. Given the rarity with which most lycaenid species are encountered, museum specimens and compiled observational information, such as that in the Appendix, are the primary sources of information for the vast majority of species. It is the major reason why faunal studies and museum collections are biologically significant.

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## Appendix 1. Cosñipata species checklist

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 1 | *Eumaeus toxana* (Boisduval, 1870) | 400–550 | Oct–Nov | Occurs in Cuzco and Madre de Dios below 550 m. All specimens to date have been solitary and half of all observations were at fish/urine bait. |
| 2 | *Theorema dysmenia* Draudt, 1919 | 1350–1450 | Oct–Nov | Two of the four known specimens of this species are from the Cosñipata Region. The other two are from Colombia. One individual was encountered near the Paradise Lodge sitting on a small tree trunk and the other was flying around a small sapling between San Pedro and Puente Unión. |
| 3 | *Paiwarria telemus* (Cramer, 1775) | 950–1100 | Jun, Sep–Nov | Uncommon up to 1,100 m. Females are most frequent on Chontachaca trails and are strongly attracted to bait. |
| 4 | *Paiwarria episcopalis* (Fassl, 1912) | 1150–1250 | Jan | Known only from a worn female at Quebrada Santa Isabel. |
| 5 | *Paraspiculatus orobia* (Hewitson, 1867) | 400–1050 | Jan, Nov | All *Paraspiculatus* observations have been on fish-baited traps or fish/urine bait sprayed on foliage. *P. orobia* and *P. colombiensis* are the most commonly encountered *Paraspiculatus*. Individuals will remain on traps despite heavy rains or strong winds. |
| 6 | *Paraspiculatus colombiensis* K. Johnson and Constantino, 1997 | 400–950 | Jun, Nov | Uncommon and only found on traps or bait. |
| 7 | *Paraspiculatus azul* Busby, Robbins and Faynel, 2017 | 400–950 | Jan, Jun, Nov | Uncommon and only found on traps or bait. |
| 8 | *Paraspiculatus sine* Busby and Robbins, 2017 | 800–1000 | Oct–Nov | Uncommon and only found on traps or bait. |
| 9 | *Brangas getus* (Fabricius, 1787) | 400–450 | Nov | This widespread species is very rare in the Cosñipata, with a single specimen from the Pantiacolla Lodge. |
| 10 | *Brangas caranus* (Stoll, 1780) | 450–550 | Oct | Another widespread species that is rare in the Cosñipata. Both specimens were seen the same day at the Amazonia Lodge, perching at 7m between 14:00 and 15:00 h. |
| 11 | *Brangas polonus* Bálint, 2008 | 1100–1750 | Jan–Feb, Apr, Jun, Sep–Nov | This is the most frequently encountered *Brangas* in the survey area. Males perch at the Mirador, in a wide bend of the road between Acjanaco and San Pedro, at 1,720 m. This locality is frequented by many hairstreak species from 11:30 to 16:30 h when sun is available. |
| 12 | *Brangas insolitus* Bálint and Faynel, 2008 | 1700–1750 | Feb | A rare species in the study area with all three specimens observed over a four–day period, during February 2010. All were nectaring on blooming *Miconia* trees between Puente Unión and the Mirador. |
| 13 | *Thaeides theia* (Hewitson, 1870) | 1000–1750 | Jan–Feb, Nov | Most specimens (80%) were seen during population booms in 2010 and 2013, nectaring on *Miconia*, between Puente Unión and the Mirador. None were recorded from February 2013 through November 2018 and only two individuals have been seen since November 2018, indicating a severe population decline since the relative abundance of 2013. |
| 14 | *Thaeides muela* (Dyar, 1913) | 2400–3500 | Feb, May–Jun, Aug, Oct | Occurs in dryer areas. Most frequently encountered at nectar or on foliage less than 2 m high. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 15 | *Enos myrtea* (Hewitson, 1867) | 500–600 | Oct | Known from a photograph of an individual on fish/urine bait at Villa Carmen, outside Pilcopata. |
| 16 | *Enos polka* Lamas and Robbins, 2009 | 500–1100 | Feb, Nov | Uncommon species occurring from the Pantiacolla Lodge to Quitacalzón. This species is attracted to bait. |
| 17 | *Annamaria lathyi* Bálint, 2005 | 1000–1100 | Aug, Oct | An uncommon species (not recorded since 2010) that occurs at and just below Quitacalzón. This species perches above Quebrada Quitacalzón on western facing slopes between 13:00 and 15:00 h. |
| 18 | *Annamaria rhaptissima* (K. Johnson, 1991) | 950–1200 | Apr, Nov | A spectacularly beautiful species that is strongly dimorphic. Known only from mid-elevations. Females are more common than males. The only male was seen at Quitacalzón, above the quebrada at 13:00 h. |
| 19 | *Evenus coronata* (Hewitson, 1865) | 1700–1750 | Feb | A single specimen of this species encountered during the height of the rainy season in February 2010, while visiting *Miconia* blooms. |
| 20 | *Evenus felix* Neild and Bálint, 2014 | 1350–1400 | Nov | The sole specimen was found dead in the road after being hit by a passing vehicle, during November 2016. |
| 21 | *Evenus floralia* (H. H. Druce, 1907) | 400–450 | Jun | A single specimen from one of the lower trails at the Pantiacolla Lodge, on a fish–baited trap. |
| 22 | *Atlides carpophora* (Hewitson, 1868) | 1700–1750 | Jan–Feb, Jun, Sep–Nov | This is the most common *Atlides* species in the Cosñipata. All known specimens have been found hilltopping at the Mirador or nectaring on *Miconia* between Puente Unión and the Mirador. |
| 23 | *Atlides halljasoni* Bálint, Kertész and Wojtusiak, 2006 | 1700–1750 | Feb, Jun | All specimens of this uncommon species have been hilltopping at the Mirador. |
| 24 | *Atlides* cf. *rustan* (Stoll, 1790) | 1400–1750 | Feb, Nov | Another uncommon species with 5 males hilltopping or nectaring on *Miconia* (during the rainy season in January and February) at the Mirador (1720m). There is one female specimen known from 1,400m at San Pedro. |
| 25 | *Atlides havila* (Hewitson, 1865) | 2550–2600 | Mar, Sep | An interesting high–elevation *Atlides*. All specimens from the Cosñipata come from the area immediately above the Pillahuata landmark. They perch on the tips of downslope trees such that they are at road elevation 8 to 10m from the road. |
| 26 | *Arcas imperialis* (Cramer, 1775) | 450–1100 | Sep–Nov | A relatively frequent species up to 1,100m. Individuals are frequently found on paper lures, moistened with salt water to attract Hesperiidae. They are also attracted to nectar. This species is attracted to traps in Ecuador, but has not been seen on a trap in the Cosñipata yet. |
| 27 | *Arcas tuneta* (Hewitson, 1865) | 500–550 | Oct | This widespread species is seemingly rare in the survey area. The sole record is a photograph at Villa Carmen during October 2014. This species is also attracted to traps and bait elsewhere. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 28 | *Arcas alleluia* Bálint, 2002 | 1700–1750 | Feb–Mar, Jun, Oct | *A. alleluia* is frequently encountered at mid-elevations. All observations have either been hilltopping at the Mirador or visiting *Miconia* blooms during Jan./Feb. |
| 29 | *Pseudolycaena marsyas* (Linnaeus, 1758) | 450–600 | May, Sep | A normally common species that is very rarely seen in the Cosñipata. Only two individuals have been encountered, both below 600m at Villa Carmen and the Amazonia Lodge. |
| 30 | *Theritas mavors* Hübner, 1818 | 450–1750 | Jan–Feb, Apr–Jun, Aug–Nov | A common species up to 1,100m. Females (78%) are much more frequently encountered than males (22%). Females are often found on vegetation at heights less than 2m. |
| 31 | *Theritas paupera* (C. Felder and R. Felder, 1865) | 1000–1100 | Nov | This common species reaches its southernmost limit in the Cosñipata Valley, where it is rare. Only two specimens have been seen, both at Quebrada Quitacalzón. |
| 32 | *Theritas harrietta* (Weeks, 1901) | 1050–2000 | Jan–Feb, Apr–Jun, Oct–Nov | This normally rare species is frequently seen in the Cosñipata, although the Region represents its northernmost limit. To our knowledge, the Cosñipata represents the only area where *T. harrieta* and *T. paupera* are sympatric. There are more *T. harrieta* specimens known from the survey area (24) than from the balance of *T. harrieta's* range. In addition, the only known males of the species are from the Cosñipata. |
| 33 | *Lucilda danaus* (C. Felder and R. Felder, 1865) | 1100–2250 | Feb, May–Jun, Aug, Nov | An uncommon species from San Pedro to Quebrada Morro Leguía. Most specimens have been encountered at blooming *Miconia* trees. Females are much more common than males, with a single male recorded during the first 12 years of the survey. |
| 34 | *Lucilda dabrerus* (Bálint, 2002) | 1950–2000 | Oct–Nov | A rare species known only from the Rocotal area during the transition period between the dry season and the rains in October/November. In contrast to *L. danaus* only males are known from the Cosñipata. |
| 35 | *Aveexcrenota anna* (H. H. Druce, 1907) | 1700–1750 | Feb, Jun | Uncommon. All specimens were encountered hilltopping at the Mirador or nectaring on *Miconia* during January/February. |
| 36 | *Denivia hemon* (Cramer, 1775) | 400–1100 | Apr–Jun, Sep–Nov | This widespread species is common from the lowlands to Quitacalzón. |
| 37 | *Denivia phegeus* (Hewitson, 1865) | 400–1100 | Mar, Jun, Sep–Nov | Another common *Denivia*, at elevations as high as Quitacalzón. |
| 38 | *Denivia arene* (Goodson, 1945) | 1350–1750 | Feb | An uncommon species found at higher elevations than either *D. hemon* or *D. phegeus*. |
| 39 | *Denivia monica* (Hewitson, 1867) | 450–1750 | Feb, Jun, Aug–Nov | The most common *Denivia* in the Region, with the greatest elevation range. |
| 40 | *Denivia silma* (Martins, Faynel and Robbins, 2016) | 550–650 | Sep | This species is known from a single specimen, a paratype, from the Erika Lodge in 1989. |
| 41 | *Denivia lisus* (Stoll, 1790) | 400–1400 | Feb, May–Jun, Sep–Nov | Another widespread species that is commonly encountered between 400 and 1,100 m (with strays to San Pedro). It is most common at Quebrada Quitacalzón, downstream from the bridge. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 42 | *Denivia orsina* (Hewitson, 1877) | 1100–1400 | Feb, Apr–May, Aug–Oct | Very similar to, and formerly considered conspecific with, *D. lisus*. In the Cosñipata it has been found between Quitacalzón and San Pedro. |
| 43 | *Johnsonita pardoa* (D'Abrera, 1995) | 2900–3000 | Oct | All known specimens (4) were encountered during October 2010 at Wayquecha. |
| 44 | *Johnsonita* sp. n. 1 | 1050–2250 | Jan–Feb, Apr–May, Aug–Dec | Similar to *J. auda* (Hewitson, 1867). This species occurs commonly between Quitacalzón and Morro Leguía. It may represent an undescribed species or a geographical variant of *auda*. |
| 45 | *Johnsonita* sp. n. 2 | 1350–2950 | Jan–Feb, Apr–Jun, Aug, Oct–Nov | Very similar to *J. johnbanksi* Bálint, 2003 and *J. pardoa*, this species has been found at lower elevations than *J. pardoa*, from the Mirador to Morro Leguía. |
| 46 | *Brevianta undulata* (Hewitson, 1867) | 1050–1750 | Nov | Known from a photograph at Quitacalzón (Nov. 2016) and a sight record from the Mirador. |
| 47 | *Micandra platyptera* (C. Felder and R. Felder, 1865) | 1050–1800 | Jan–Feb, May–Jun, Aug–Nov | The most common *Micandra* in the Region, occurring from Quitacalzón to just above the Mirador. 96% of observations have been females, with most flitting above low vegetation, looking for sites to oviposit. |
| 48 | *Micandra comae* (H. H. Druce, 1907) | 1700–2950 | Jan–Feb, Apr, Oct–Nov | Males comprise less than 25% of individuals observed. Most specimens have been seen in the vicinity of the Mirador and quebradas at Morro Leguía and Yanamayo. The nomenclature for these individuals is unsettled. There appear to be two species referable to "*comae*", one east and one west of the Andean divide. Since the type of *M. comae* is from Muzo, Colombia, it is uncertain as to which species the name *comae* applies. In addition, there are four females from the Mirador and Rocotal that may represent *M. ion* (H. H. Druce, 1890) or *M. extrema* (Draudt, 1919). They have been placed within *M. comae* since no males of either *M. ion* or *M. extrema* have been encountered in the Region. |
| 49 | *Micandra aegides* (C. Felder and R. Felder, 1865) | 2100–2950 | Feb, May, Oct–Nov | Uncommon and known only from females. Occurs in the same localities as *M. comae*. Not observed since 2012. |
| 50 | *Micandra dignota* (Draudt, 1919) | 1970–2950 | Feb–Mar, May, Aug, Oct–Nov | The second most frequently observed *Micandra*. This species was common from 2010 through 2012, but has not been seen since 2017. |
| 51 | *Micandra* sp. n. 1 | 1950–2150 | Nov | Known from a male and female flying between Rocotal and Quebrada Morro Leguía, both during November. |
| 52 | *Timaeta timaeus* (C. Felder and R. Felder, 1865) | 1350–3400 | Jan–Feb, May, Aug–Nov | This species exhibits a wide elevation range, occurring from the San Pedro bridge to 2 km east of Acjanaco Pass. Males are more frequently encountered than females and perch during early afternoon (12:00–14:00 h) on shrubs/saplings 2–3m high. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 53 | *Timaeta molinopampa* (Bálint and Wojtusiak, 2000) | 2950–3550 | Feb, Apr–Jun, Oct | *T. molinopampa* can be common between Wayquecha and Acjanaco. Males perch in trees of 5–8 m height along ravines in the "elfin" forest above 3,000 m. Females are infrequently encountered, with a single individual known from the Wayquecha Field Station. Individuals of this species were described as an endemic Cosñipata species, *T. boyeropampa* (Bálint and Wojtusiak, 2010). Some of the characters used to separate *boyeropampa* from *molinopampa* occur in both populations. Further research is necessary to determine whether populations occurring from Ecuador to Southern Peru represent one or two species. |
| 54 | *Timaeta trochus* (H. H. Druce, 1907) | 1550–1650 | Feb | A single specimen from Puente Unión, during February 2013. |
| 55 | *Timaeta roberti* Busby and Robbins, 2008 | 1700–2150 | Feb, Oct | Known from the Mirador (nectaring on *Miconia*) to Morro Leguía. Three of four specimens were seen during February. The fourth was located in October. This species has not been seen since 2013. |
| 56 | *Timaeta aepea* (Hewitson, 1874) | 1000–1100 | Aug–Sep | Known from two specimens at Quitacalzón, the most recent in 2014. |
| 57 | *Timaeta pilosa* Robbins and Busby, 2008 | 2300–2400 | Nov | A single specimen from at Quebrada Morro Leguía, during November 2012. |
| 58 | *Timaeta cospata* Robbins and Busby, 2008 | 1950–2150 | Apr, Aug | This is an endemic Cosñipata species. The holotype was taken during light rain at Quebrada Morro Leguía in August 1989. A second specimen was located at the same locality, in April 2015. Unfortunately, this locality suffered a landslide that scoured the vegetation along the quebrada in 2016. |
| 59 | *Rhamma familiaris* (K. Johnson, 1991) | 1950–2600 | Feb, Aug, Oct–Dec | Normally encountered as solitary individuals along the roadside between Rocotal and Pillahuata. Most Individuals have been observed during the start of the rains in October and November, sitting on low vegetation. |
| 60 | *Rhamma inexpectata* K. Johnson, 1992 | 2500–3400 | Jan, May | Rarely encountered (2 specimens) between Pillahuata and Acjanaco. |
| 61 | *Rhamma livida* Torres and K. Johnson, 1997 | 2550–2950 | May, Oct–Nov | Occurs between Pillahuata and Wayquecha. The Pillahuata specimens were nectaring on an unidentified flowering bush with white blossoms. Easily confused with *R. aurugo*. |
| 62 | *Rhamma aurugo* (Draudt, 1919) | 2550–3550 | May–Jun, Oct | Frequently encountered between Wayquecha and Acjanaco. Males perch is short trees and females are attracted to nectar. |
| 63 | *Rhamma hybla* (H. H. Druce, 1907) | 3350–3450 | Jun | A single specimen was found below Acjanaco, during June 2019. The dry season is the best time to observe high elevation lycaenids, as sun is often scarce above 2,500 m at other times of the year. |
| 64 | *Rhamma arria* (Hewitson, 1870) | 2100–3500 | Jan–Mar, Aug, Oct–Nov | The most common *Rhamma*, occurring primarily at and above Pillahuata. |
| 65 | *Rhamma nigrasarotina* K. Johnson, 1992 | 2350–2850 | Feb, Aug, Oct–Nov | Occurs from Quebrada Yanamayo to Wayquecha. Most common on nectar at Pillahuata. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 66 | *Rhamma tarma* K. Johnson, 1992 | 3450–3550 | Aug, Oct | Rarely encountered and seemingly confined to the highest elevations of the study area near Abra Acjanaco. |
| 67 | *Phothecla margarita* (Draudt, 1920) | 1400–2000 | Oct–Nov | Only three specimens encountered over a four-year period (2014–2017), at mid-elevations between San Pedro and Rocotal. |
| 68 | *Phothecla thespia* (Hewitson, 1870) | 400–500 | Oct–Nov | More common than *P. margarita*, with most specimens attracted to traps or fish/urine bait. |
| 69 | *Salazaria sala* (Hewitson, 1867) | 1150–1250 | Mar | A single specimen from Quebrada Santa Isabel. |
| 70 | *Temecla tema* (Hewitson, 1867) | 400–800 | Jan–Feb, Sep, Nov | An uncommon lowland species that is attracted to fish–baited traps. |
| 71 | *Temecla bennetti* (Dyar, 1913) | 1600–2000 | Sep, Nov | Three males and a female with a range from Puente Unión to Rocotal. |
| 72 | *Temecla* cf. *heraclides* (Godman and Salvin, 1887) | 1350–1750 | Feb, Nov | All specimens have been seen hilltopping at the Mirador except for a single female sitting on low vegetation near San Pedro. |
| 73 | *Temecla* sp. n. 2 | 1350–2150 | Feb, May, Oct | A male and a female from San Pedro with an additional male almost 1,000 m higher at Quebrada Morro Leguía. |
| 74 | *Temecla* sp. n. 3 | 1950–2050 | Oct | A single male from Rocotal, in 2013. |
| 75 | *Temecla* sp. n. 4 | 1350–1400 | Aug, Nov | Known from a photograph and a single specimen (from the garden at the Paradise Lodge). |
| 76 | *Ipidecla schausi* (Godman and Salvin, 1887) | 500–1050 | May, Oct | A single specimen from the Amazonia Lodge and a photo of a male attracted to fish/urine bait at Quitacalzón. |
| 77 | *Ipidecla crepundia* (H. H. Druce, 1909) | 800–850 | Nov | Known only from a photo of a specimen attracted to fish/urine bait, on the Ticary Amazon Lodge Trail below Chontachaca. |
| 78 | *Penaincisalia loxurina* (C. Felder and R. Felder, 1865) | 2100–3550 | Feb–Mar, May–Aug, Oct–Nov | The most common high-elevation hairstreak, found abundantly from Pillahuata to Acjanaco. Individuals are attracted to both flowers and cow manure (a rather strange blend of nutrition). Males have been observed perching from mid-morning into early afternoon. |
| 79 | *Penaincisalia magnifica* (K. Johnson, 1992) | 2900–3000 | Oct | Known from a single specimen, collected along the road above the Wayquecha Research Station. |
| 80 | *Penaincisalia purpurea* (K. Johnson, 1992) | 2950–3550 | Feb, Apr–Jun, Aug, Oct–Nov | The second most frequently encountered *Penaincisalia*. It can be dependably observed perching on short trees in ravines just below Abra Acjanaco. It flies in the same habitats and same trees as *Timaeta molinopampa*. Males of both species can be observed engaging in aerial fights in an attempt to obtain the best perch sites on a given tree. |
| 81 | *Penaincisalia libertada* J. Hall, 2005 | 1950–2000 | Sep | Known from a single specimen, tapped from an unidentified blooming *Miconia* tree between Rocotal and the Mirador. This species of *Miconia* blooms during the transition from the dry season to the rains in September. It is a different species than the *Miconia* sp. that blooms in profusion at the same elevation during the rains in Jan/Feb. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 82 | *Penaincisalia amatista* (Dognin, 1895) | 2950–3550 | Apr, Jul, Oct–Nov | Not uncommon and occurring at the same locations as *P. loxurina*. |
| 83 | *Penaincisalia culminicola* (Staudinger, 1894) | 3450–3550 | May, Sep–Nov | All observed individuals have been found in the vicinity of Abra Acjanaco, on the western side of the pass. They avidly come to nectar (only observed on white flowers) and often sit on rocks or soil in this very windy area. |
| 84 | *Penaincisalia duviolsi* (Bálint, Boyer and Wojtusiak, 2006) | 2900–3000 | Apr, Oct | A species endemic to the Cosñipata Valley. The holotype was taken at "Acjanaco vers Boca Manu at 3000 m" in 2005. More recent specimens have all come from the vicinity of the Wayquecha Research Station. |
| 85 | *Penaincisalia acjabamba* (Bálint, Boyer and Wojtusiak, 2006) | 2850–3550 | Apr–May, Oct | Another species described from "Acjanaco vers Boca Manu at 3000 m". The species flies with *T. molinopampa* and *P. purpurea* below Abra Acjanaco on the east side of the pass. Like those species, it perches on small trees that grow in ravines in this area of Puna grassland. |
| 86 | *Podanotum* sp. n. 1 | 1950–2950 | Oct–Nov | Known from two specimens, one each from Rocotal and Wayquecha. |
| 87 | *Podanotum* sp. n. 2 | 2950–3550 | May, Aug, Nov | Five specimens from Wayquecha to Acjanaco. This species occurs in the same ravines as *T. molinopampa* and *P. purpurea*. |
| 88 | *Thereus gabathana* (Strand, 1918) | 1350–1450 | Feb | Three males, all nectaring on the same *Miconia* tree during one afternoon of the same day. |
| 89 | *Thereus ortalus* (Godman and Salvin, 1887) | 500–950 | Jan, Apr | This common wide-ranging species is scarce in the study area, with only two specimens observed. |
| 90 | *Thereus pedusa* (Hewitson, 1867) | 800–850 | Nov | Known only from a photo of a specimen attracted to fish/urine bait on the Ticary Amazon Lodge Trail, below Chontachaca. |
| 91 | *Thereus timoclea* (Hewitson, 1870) | 450–550 | Oct–Nov | A rare species in the study area. Both known specimens came from the Amazonia Lodge, just downstream from Atalaya. |
| 92 | *Thereus endera* (Hewitson, 1867) | 500–950 | Oct–Nov | Another uncommon *Thereus*, with single specimens known from the Amazonia Lodge and Chontachaca. |
| 93 | *Thereus columbicola* (Strand, 1916) | 400–600 | May, Sep–Nov | The most common *Thereus* in the Cosñipata region, with specimens known from Pilcopata to the Amazonia Lodge. Most individuals have been seen at a single perch site, along one of the Amazonia Lodge's trails in early afternoon. |
| 94 | *Thereus* sp. n. 1 | 1050–1150 | Nov | A single specimen, from Quitacalzón. |
| 95 | *Thereus* sp. n. 2 | 1950–2000 | Nov | A single specimen, similar to *T. wojtusiaki* Bálint, 2005, from Rocotal. |
| 96 | *Rekoa meton* (Cramer, 1779) | 450–1400 | Sep–Oct | A common widespread species that is infrequently encountered in the Cosñipata. |
| 97 | *Rekoa palegon* (Cramer, 1780) | 450–1400 | Feb, Sep–Nov | A common species, from the lowlands to San Pedro. |
| 98 | *Rekoa marius* (Lucas, 1857) | 950–1200 | Jan, Nov | Uncommon, with only two individuals observed. One was nectaring on a *Miconia* tree at the west end of the Quebrada Santa Isabel bridge. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 99 | *Rekoa stagira* (Hewitson, 1867) | 500–850 | Feb, Sep, Nov | Uncommon, with only three individuals observed. |
| 100 | *Arawacus separata* (Lathy, 1926) | 400–1400 | Jan–Feb, Apr–Jun, Aug–Nov | Abundant from the lowlands up to San Pedro. |
| 101 | *Arawacus dolylas* (Cramer, 1777) | 500–1650 | May, Aug, Oct–Nov | Frequent in the vicinity of the Quitacalzón bridge, less common elsewhere. Females (77%) are more likely to be seen than males. |
| 102 | *Contrafacia imma* (Prittwitz, 1865) | 550–2250 | Jan, Jun, Aug–Dec | Common, throughout its elevation range. |
| 103 | *Kolana ligurina* (Hewitson, 1874) | 400–1050 | Jun, Sep–Nov | Strongly attracted to bait and traps. |
| 104 | *Kolana lyde* (Godman and Salvin, 1887) | 400–1100 | Jan, Mar, Jun, Aug, Nov | Occurs from the lowlands to Quitacalzón. *K. lyde* can be distinguished from *K. ergina* by the hue of dorsal blue on both males and females. *K. lyde* has duller blue males and greyish blue females. These two species also have distinct genitalia. Strongly attracted to bait and traps. |
| 105 | *Kolana ergina* (Hewitson, 1867) | 400–1050 | Aug–Oct | Like *K. lyde*, occurs from the lowlands to Quitacalzón and is strongly attracted to bait and traps. |
| 106 | *Ocaria aholiba* (Hewitson, 1867) | 1200–2250 | Jan–Feb, Oct–Nov | Relatively common with most individuals observed hilltopping at the Mirador. |
| 107 | *Ocaria clepsydra* (H. H. Druce, 1907) | 1350–1750 | Nov | Only two specimens known. One was attracted to fish/urine bait above San Pedro. The other was hilltopping at the Mirador. |
| 108 | *Ocaria cinerea* (Lathy, 1936) | 400–1050 | Oct–Nov | Known from a specimen on a trap at the Pantiacolla Lodge and a photo of a specimen attracted to bait at Quitacalzón. |
| 109 | *Ocaria sadiei* (Weeks, 1901) | 450–500 | Nov | A single specimen from the Amazonia Lodge in 2007. |
| 110 | *Ocaria calesia* (Hewitson, 1870) | 1350–1750 | Feb, Oct | Most frequently seen between Puente Unión and the Mirador. Attracted to bait. |
| 111 | *Ocaria elongata* (Hewitson, 1870) | 1400–2000 | Jan–Feb, Apr, Oct–Nov | Most specimens have been observed sitting at mud in the road. Several have been seen on very cloudy days and even during light rain. |
| 112 | *Ocaria thales* (Fabricius, 1793) | 400–450 | Oct | A single specimen on one of the lower trails at the Pantiacolla Lodge. |
| 113 | *Ocaria ocrisia* (Hewitson, 1868) | 450–1750 | Feb, May–Jun, Aug–Nov | One of the most common hairstreaks in the Cosñipata Valley. Can almost always be seen sitting on mud, along the Quitacalzón bridge. |
| 114 | *Chlorostrymon telea* (Hewitson, 1868) | 1050–2250 | Oct | This species is more common in dry habitats, which are scarce in the Cosñipata. There are two records from the Region, including one strange high elevation record from Morro Leguía at 2,250 m. |
| 115 | *Cyanophrys amyntor* (Cramer, 1775) | 400–1050 | Feb, Jun, Sep–Nov | Wide–ranging species that is frequent from the lowlands up to Quitacalzón. |
| 116 | *Cyanophrys herodotus* (Fabricius, 1793) | 400–1650 | Sep–Nov | Wide–ranging species that is frequent from the lowlands up to San Pedro. |
| 117 | *Cyanophrys pseudolongula* (Clench, 1944) | 500–1750 | Feb, Jun, Aug–Nov | Most common *Cyanophrys* in the Region, particularly at the Mirador. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 118 | *Cyanophrys banosensis* (Clench, 1944) | 1700–2600 | Feb, Jun, Sep–Nov | Second most common *Cyanophrys*, most often found hilltopping at the Mirador. |
| 119 | *Bistonina feretria* (Hewitson, 1878) | 1000–1100 | Jun | A single female from Quitacalzón at 14:00 h, under a cloudy sky. The individual flew slowly across the road and landed on a small plant less than 0.5 m in height. |
| 120 | *Megathecla cupentus* (Stoll, 1781) | 400–1100 | Apr, Jun, Sep, Nov | Frequently encountered, almost always as solitary individuals. Most individuals have been seen at the Amazonia Lodge and at Quitacalzón. |
| 121 | *Thestius meridionalis* (Draudt, 1920) | 400–1100 | Jan–Feb, Apr–Jun, Aug–Nov | Commonly encountered from the lowlands to Quitacalzón. Not attracted to traps and normally seen in dappled sunlight low in vegetation. |
| 122 | *Thestius epopea* (Hewitson, 1870) | 950–1100 | Feb–Mar, May, Aug–Nov | Commonly found at Quitacalzón. Rare elsewhere with a single additional specimen from Chontachaca. |
| 123 | *Thestius* sp. n. 1 | 550–1100 | May–Jun | Two specimens, similar to *T. epopea*. One from Pilcopata and the other from Quitacalzón. |
| 124 | *Gossenia lycabas* (Cramer, 1777) | 500–1100 | Oct–Nov | Rare, with one specimen from Quitacalzón and one from Amazonia Lodge. |
| 125 | *Allosmaitia strophius* (Godart, [1824]) | 450–2150 | May, Sep–Nov | A common species, with most records from Quitacalzón. |
| 126 | *Laothus gibberosa* (Hewitson, 1867) | 400–1450 | Jan–Feb, Apr–May, Aug–Nov | One of the most common hairstreaks in the Region. Particularly frequent at Quitacalzón, downhill from the bridge. Females are much more common than males and are typically seen searching for sites to oviposit at heights of less than 1m. |
| 127 | *Laothus viridicans* (C. Felder and R. Felder, 1865) | 1050–2350 | Jan–Apr, Aug–Nov | Another common species from Quitacalzón to the Mirador. Both sexes nectar avidly at *Miconia* trees. |
| 128 | *Janthecla malvina* (Hewitson, 1867) | 400–450 | Oct | A single specimen from the Pantiacolla Lodge was observed in underbrush along a trail, just after noon, on a hot sunny day. In the lowlands, extremely hot sunny days result in many hairstreak species leaving the canopy to seek shelter in dappled sunlight on low vegetation. |
| 129 | *Janthecla leea* Venables and Robbins, 1991 | 400–1400 | Nov | Most specimens have been found along trails at the Pantiacolla Lodge. However, there is a single verified record from San Pedro, during November 2017. |
| 130 | *Janthecla sista* (Hewitson, 1867) | 400–1100 | Sep–Nov | The most common *Janthecla*, with most specimens from the Amazonia and Pantiacolla Lodges. One record from Quitacalzón. |
| 131 | *Lamprospilus decorata* Lathy, 1926 | 1700–1750 | Jan–Apr, Jun, Sep–Nov | Only known from the Mirador, where it is a common hilltopper. |
| 132 | *Lamprospilus nicetus* (C. Felder and R. Felder, 1865) | 1400–2600 | Jan–Mar, May, Aug–Sep, Nov–Dec | Known from San Pedro to Pillahuata. Populations appear to fluctuate substantially. It was seen each year from 2008–2013. It was then absent during 2014–2015, reappeared during 2016, and then disappeared from 2017–2020. It is unclear whether *L. nicetus* refers to the populations east or west of the Andean divide, which differ and likely represent different species. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 133 | *Lamprospilus draudti* Lathy, 1932 | 1050–1750 | Jan–Mar, Jun, Sep–Nov | This population differs from typical *L. draudti* by having materially duller white DFW and DHW markings (partially obscured by brown scales). This difference may represent geographical variation or the Cosñipata population may represent an undescribed species. It occurs from Quitacalzón to the Mirador, where it is a frequent hilltopper. This species has not exhibited the year-to-year fluctuation of *L. nicetus*. Individuals have been encountered in all years from 2010 to 2019, except 2015 and 2017. |
| 134 | *Lamprospilus orcidia* (Hewitson, 1874) | 400–1750 | Feb, Oct–Nov | All individuals have been encountered below 500m, except one specimen from the Mirador (1,720m). |
| 135 | *Lamprospilus aunus* (Cramer, 1775) | 900–1000 | Oct | A single male, photographed at bait on a Chontachaca trail. |
| 136 | *Lamprospilus coelicolor* (Butler and H. Druce, 1872) | 400–600 | Feb, Oct–Nov | A beautiful but uncommon lowland species, with all individuals occurring below 600m. |
| 137 | *Lamprospilus* sp. n. 1 | 1050–1750 | Feb, Aug, Nov | Another uncommon species that resembles *L. coelicolor* and replaces it at higher elevations. |
| 138 | *Lamprospilus* sp. n. 2 | 1700–1750 | Nov | Rare, with two specimens that resemble *L. aunus* (Cramer, 1775), from the Mirador. |
| 139 | *Badecla lanckena* (Schaus, 1902) | 450–1350 | Sep, Nov | Two specimens known from widely disparate locations, San Pedro and the Amazonia Lodge. Thus far, no individuals have been seen at intermediate localities. |
| 140 | *Badecla* sp. n. 1 | 1700–2950 | Jan–Mar, May–Jun, Aug–Nov | A very common species that is frequently found perching on trees growing downslope on promontories formed by bends in the road. |
| 141 | *Badecla* sp. n. 2 | 1050–1150 | May | A single female from Quitacalzón with a very distinctive ventral pattern featuring a wide red post–median line on both wings. |
| 142 | *Arzecla arza* (Hewitson, 1874) | 400–800 | Jan, Sep–Oct | Uncommon in the Region and restricted to low elevation. Individuals are attracted to fish–baited traps. |
| 143 | *Arzecla canacha* (Hewitson, 1877) | 1700–1750 | Jan–Feb, Jun | Rarely encountered, with all specimens perching at the Mirador. It is unclear as to whether the name *canacha* refers to populations that occur on the east side or the west side of the Andean divide. |
| 144 | *Arzecla tucumanensis* (K. Johnson and Kroenlein, 1993) | 450–1750 | Sep–Nov | Encountered as solitary individuals over a wide elevational range. |
| 145 | *Arzecla paralus* (Godman and Salvin, 1887) | 1700–1750 | Feb, Oct | All three specimens were hilltopping at the Mirador. The name *paralus* currently refers to two different populations occurring on both sides of the Andean divide. |
| 146 | *Arzecla taminella* (Schaus, 1902) | 400–450 | Nov | The single individual known was found on a fish-baited trap at the Pantiacolla Lodge. |
| 147 | *Arzecla albolineata* (Lathy, 1936) | 1700–1750 | Feb | Known from three perching specimens at the Mirador. |
| 148 | *Arzecla straboris* Bálint, 2019 | 1700–1750 | Feb | A single specimen perching at the Mirador. |
| 149 | *Arzecla* sp. n. 2 | 1050–1100 | Aug | A single specimen from Quitacalzón. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 150 | *Arumecla aruma* (Hewitson, 1877) | 400–1100 | Apr, Jun, Sep–Nov | Common below 600 m, with two specimens from Quitacalzón. |
| 151 | *Arumecla calycopinotis* (K. Johnson and Kroenlein, 1993) | 1700–1750 | Jun, Nov | Rare, with two specimens from the Mirador. |
| 152 | *Arumecla netesca* (Draudt, 1920) | 450–500 | May | A single specimen from the Amazonia Lodge, sitting low in dappled sunlight to avoid the heat. |
| 153 | *Arumecla* sp. n. 1 | 1400–2600 | Feb, May, Aug–Nov | Frequently found from the Mirador to Pillahuata. More common at the Mirador and Morro Leguía than at other localities. |
| 154 | *Arumecla* sp. n. 2 | 500–550 | Oct | A single specimen, similar to *A. galliena* (Hewitson, 1877), sitting on low vegetation at a quebrada crossing just uphill from Atalaya. |
| 155 | *Camissecla camissa* (Hewitson, 1870) | 400–1050 | Feb, Apr, Jun, Sep–Oct | From the lowlands to Quitacalzón as isolated individuals, |
| 156 | *Camissecla cleocha* (Hewitson, 1870) | 1050–1750 | Feb, May, Aug–Sep, Nov–Dec | The most common *Camissecla*, usually seen as isolated individuals settled low in early afternoon. |
| 157 | *Camissecla pactya* (Hewitson, 1874) | 1400–2350 | Feb, Apr, Aug, Oct–Nov | Most frequent at Morro Leguía. Males are seen much less frequently than females. |
| 158 | *Camissecla vesper* (H. H. Druce, 1909) | 400–800 | Sep–Nov | The dominant *Camissecla* below 600 m. Most common at the Amazonia Lodge. |
| 159 | *Camissecla verbenaca* (H. H. Druce, 1907) | 400–1100 | Apr, Jun | Rare, with one specimen each from Quitacalzón and the Pantiacolla Lodge. |
| 160 | *Ziegleria hesperitis* (Butler and H. Druce, 1872) | 400–2000 | Jan–Feb, Apr–Jun, Sep–Nov | Very common up to 600 m. Two verified outliers from 1,750 and 1,970 m. Strongly attracted to fish bait and can be a pest on traps. |
| 161 | *Ziegleria ceromia* (Hewitson, 1877) | 400–950 | May–Jun, Sep–Nov | Not uncommon, with most specimens from the Amazonia and Pantiacolla Lodges. |
| 162 | *Kisutam syllis* (Godman and Salvin, 1887) | 400–1050 | Jan, Oct | This widespread and normally common species is rare in the Cosñipata region. The first of two specimens was found at the Pantiacolla Lodge during 2018 (10 years after the survey commenced). |
| 163 | *Electrostrymon endymion* (Fabricius, 1775) | 900–1000 | Oct | Another widespread species that is rare in the Region. A single specimen from Chontachaca in 2013. Despite intensive collecting in that area during 2019 and 2020, no other individuals have been seen. |
| 164 | *Rubroserrata ecbatana* (Hewitson, 1868) | 400–500 | May–Jun, Nov | Uncommon on both the Amazonia and Pantiacolla Lodges trails. |
| 165 | *Calycopis* cf. *tamos* (Godman and Salvin, 1887) | 1000–1100 | Oct–Nov | Two specimens and a photographed individual from Quitacalzón. |
| 166 | *Calycopis atnius* (Herrich–Schäffer, [1853]) | 400–600 | Oct–Nov | Uncommon, although there was a large population at the Pantiacolla Lodge, during October 2018 |
| 167 | *Calycopis* cf. *atnius* (Herrich–Schäffer, [1853]) | 1000–1100 | Oct | A single female from Quitacalzón during 2016. |
| 168 | *Calycopis mimas* (Godman and Salvin, 1887) | 400–450 | Nov | One female from the Pantiacolla Lodge. |
| 169 | *Calycopis johnsoni* (Salazar, 2000) | 1700–1750 | Nov | A solitary female from the Mirador. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 170 | *Calycopis demonassa* (Hewitson, 1868) | 400–850 | Jan, Oct–Nov | Frequently seen with males outnumbering females 2.5 to 1. Strongly attracted to traps and bait. |
| 171 | *Calycopis buphonia* (Hewitson, 1868) | 400–950 | Jun, Oct–Nov | Less common than *C. demonassa* and fond of sitting low in dappled sunlight. All 12 specimens are males. Most were found during 2010 at the Amazonia Lodge or 2018 at Pantiacolla Lodge. A single individual was located at Chontachaca. |
| 172 | *Calycopis calus* (Godart, [1824]) | 400–1050 | Jun, Sep–Nov | Very common and strongly attracted to bait and traps. |
| 173 | *Calycopis wolfii* (K. Johnson, 1993) | 500–550 | Oct | Only one specimen from Villa Carmen. Some individuals may be overlooked due to this species' similarity to *C. calus*. |
| 174 | *Calycopis caesaries* (H. H. Druce, 1907) | 400–450 | Oct | Only one specimen from a trap at the Pantiacolla Lodge. |
| 175 | *Calycopis cicero* Robbins and Duarte, 2005 | 1050–1750 | Jan–Apr, Jun, Sep–Nov | Common perching at the Mirador. One elevation outlier is a specimen from Quitacalzón. |
| 176 | *Calycopis cerata* (Hewitson, 1877) | 400–1050 | Jan–Feb, Apr–Jun, Sep–Nov | Abundant in the underbrush along lowland trails. Also, strongly attracted to bait. Amazingly, this species which is normally seen less than 1m high is frequently seen sitting on traps 15–20m high. |
| 177 | *Calycopis bactra* (Hewitson, 1877) | 450–500 | Oct | A single female from the Amazonia Lodge. |
| 178 | *Calycopis lerbela* Field, 1967 | 1000–1100 | Sep, Nov | Three females, all from Quitacalzón between 2012 and 2014. |
| 179 | *Calycopis nicolayi* Field, 1967 | 400–800 | Jan, May, Sep–Nov | One male from the intersection of Quebrada Bienvenida and the Río Tono, north of Pilcopata. Six females from Villa Carmen, the Amazonia Lodge, and the Pantiacolla Lodge. |
| 180 | *Calycopis bellera* (Hewitson, 1877) | 400–800 | Sep–Nov | Frequent during the transition from the dry season to the rains at both the Amazonia and Pantiacolla Lodges. |
| 181 | *Calycopis* cf. *bellera* (Hewitson, 1877) | 400–650 | Jan, Apr–May, Oct | A male and three females that are similar in appearance to the preceding species. |
| 182 | *Calycopis centoripa* (Hewitson, 1868) | 400 –1750 | Jan–Feb, May, Sep–Dec | Species is common in the lowlands with two strays to the Mirador. Equal representation of males and females. |
| 183 | *Calycopis vibulena* (Hewitson, 1877) | 400–800 | Sep–Nov | Six of seven specimens are males. Their flight seems to be limited to the dry/wet transition period. |
| 184 | *Calycopis* cf. *origo* (Godman and Salvin, 1887) | 1350–1400 | Feb | A single female, resembling *C. origo*, whose genitalia have 6 rather than 4 spines on the *ostium bursae*. |
| 185 | *Calycopis vitruvia* (Hewitson, 1877) | 400–950 | Oct–Nov | Common at Pantiacolla Lodge. Rare elsewhere, with one record from Amazonia and a stray from Chontachaca. Pairs are frequently encountered *in copula*. |
| 186 | *Calycopis partunda* (Hewitson, 1877) | 400–550 | May, Oct–Nov | Uncommon and seemingly restricted to the transitions between dry/wet seasons. |
| 187 | *Calycopis anfracta* (H. H. Druce, 1907) | 400–950 | Sep–Nov | Thus far, mostly restricted to the Amazonia and Pantiacolla Lodge trails. Single records from Villa Carmen and Chontachaca. |
| 188 | *Calycopis anastasia* Field, 1967 | 450–500 | Oct | Two female specimens from the Amazonia Lodge, during October 2010. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 189 | *Calycopis* cf. *anastasia* Field, 1967 | 400–550 | Sep–Nov | Five females from Pilcopata, the Amazonia Lodge, and the Pantiacolla Lodge. |
| 190 | *Calycopis spadectis* (K. Johnson and Kroenlein, 1993) | 450–800 | Jan, Apr, Sep–Oct | Uncommon, with all six specimens being males. |
| 191 | *Calycopis malta* (Schaus, 1902) | 400–1400 | Jan–Jun, Aug–Nov | Abundant and particularly fond of perching during late afternoon (14:00–16:00 h). |
| 192 | *Calycopis gentilla* (Schaus, 1902) | 950–1400 | June, Oct | Rare, with two specimens from mid-elevations (San Pedro and Chontachaca). |
| 193 | *Calycopis trebula* (Hewitson, 1868) | 400–1050 | Jan–Feb, Jun, Sep–Nov | Common in the lowlands and frequent on traps. |
| 194 | *Calycopis puppius* (Godman and Salvin, 1887) | 400–450 | Nov | A single male from Pantiacolla Lodge. |
| 195 | *Calycopis* cf. *pisis* (Godman and Salvin, 1887) | 400–500 | Sep, Nov | Thus far restricted to the Amazonia and Pantiacolla Lodges trails during the onset of the rains. |
| 196 | *Calycopis tifla* (Field, 1967) | 400–450 | Oct–Nov | A male and two females from the Pantiacolla Lodge. Male genitalia have very distinctive harpes. |
| 197 | *Calycopis cyanus* (Draudt, 1920) | 1050–1100 | Jan | A single male from Quitacalzón, during January 2010. |
| 198 | *Calycopis* cf. *cyanus* (Draudt, 1920) | 1100–1400 | Aug, Nov | Known from one male (Quitacalzón) and one female (San Pedro). |
| 199 | *Calycopis orcillula* (Strand, 1916) | 400–450 | Oct | Two males have been observed on the Pantiacolla Lodge trails. |
| 200 | *Calycopis orcilla* (Hewitson, 1874) | 400–1100 | Jan–Feb, May–Jun, Sep–Dec | Abundant in the lowlands. There was a large emergence (dozens) in Chontachaca during Jan/Feb 2020. |
| 201 | *Calycopis naka* (Field, 1967) | 500–1100 | Apr–May, Sep–Oct, Dec | Uncommon with most specimens from the Amazonia Lodge trails. |
| 202 | *Calycopis suda* (Draudt, 1920) | 1700–2200 | Feb, Apr, Aug–Oct | A high elevation *Calycopis*, strongly attracted to blooming *Miconia* trees. |
| 203 | *Calycopis boliviensis* (K. Johnson, 1991) | 1000–1100 | Feb, Jun | Two females from Quitacalzón. |
| 204 | *Calycopis* sp. n. 14 | 400–450 | Oct | A single male from Pantiacolla Lodge. |
| 205 | *Calycopis* sp. n. 16 | 700–800 | Feb | A male, collected above Pilcopata. |
| 206 | *Strymon mulucha* (Hewitson, 1867) | 550–1200 | Sep–Nov | Four females from Pilcopata to Quitacalzón. All were seen between 2014 and 2017 (none from 2007–2013 or 2018–2020), again illustrating population fluctuations. This species will tolerate extremely disturbed habitat with one specimen from the Patria airport and another from "downtown" Pilcopata. |
| 207 | *Strymon cestri* (Reakirt, [1867]) | 2800–2850 | Oct | One specimen from October 2010. The locality provided (Wayquecha at 2,835 m) is surprising and may reflect a labeling error. However, *S. davara* has been observed at 2,950m. |
| 208 | *Strymon davara* (Hewitson, 1868) | 400–2950 | Feb, Jun, Sep–Nov | Very common from the lowlands to the Mirador. There have been two strays from Wayquecha. This species has the greatest elevation range in the Region, for a lycaenid. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 209 | *Strymon bazochii* (Godart, [1824]) | 500–600 | Nov | This widespread species is common from Mexico throughout South America. It normally inhabits dry disturbed habitats which are very scarce in the Cosñipata region. We have only two records, both from areas with extensive human disturbance. |
| 210 | *Strymon bubastus* (Stoll, 1780) | 500–700 | Aug, Oct–Nov | Another disturbed habitat specialist. The Cosñipata headquarters for this species is the south end of the grassy runway at the Patria airport. |
| 211 | *Strymon ziba* (Hewitson, 1868) | 400–600 | Feb, Oct–Nov | A common lowland species that enjoys sitting on large tree trunks from 12:00–14:00 h. |
| 212 | *Tmolus echion* (Linnaeus, 1767) | 400–1400 | Jan–Feb, May–Jun, Aug–Nov | A common widespread species that is attracted to bait or traps. |
| 213 | *Tmolus cydrara* (Hewitson, 1868) | 400–500 | Oct–Nov | Another usually common lowland species that is scarce in the Cosñipata (2 specimens with a couple of additional sight records). This species is strongly attracted to traps and bait. |
| 214 | *Tmolus ufentina* (Hewitson, 1868) | 1050–1400 | Oct–Nov | A single specimen from a "spit-wad" lure along the Paradise Lodge driveway. There is also a photograph from Quitacalzón. |
| 215 | *Tmolus mutina* (Hewitson, 1867) | 400–800 | Sep–Nov | An uncommon lowland species. At Pantiacolla Lodge, a pair was found *in copula* at 06:30 h, sitting on a sunlit leaf at approximately 6 m high. |
| 216 | *Tmolus* sp. n. 4 | 450–1650 | Feb, Aug, Oct–Nov | A common widespread species with a ventral surface that resembles *T. echion*. |
| 217 | *Tmolus* sp. n. 5 | 1700–1750 | Jan–Feb, Oct–Nov | All records of this species (which resembles *T. crolinus* Butler and H. Druce, 1872) are for males hilltopping at the Mirador. Perch sites for this species at the Mirador have always been on lower branches than those used by larger hairstreaks such as *Brangas*, *Atlides* and *Arcas*. This species has also been observed hilltopping in Zamora-Chinchipe Province, Ecuador, where it perches in the afternoon on ferns and other low vegetation less than 0.5m in height. |
| 218 | *Tmolus* sp. n. 6 | 400–450 | Nov | A single male from Pantiacolla Lodge during November 2017. |
| 219 | *Nicolaea dolium* (H. H. Druce, 1907) | 400–450 | Oct | A single male from Pantiacolla Lodge during October 2018. |
| 220 | *Nicolaea heraldica* (Dyar, 1914) | 1050–1100 | May, Nov | Two females are known from Quitacalzón. This species has a red ventral hindwing post-median line. |
| 221 | *Nicolaea pyxis* (K. Johnson, 1993) | 500–1100 | Jan–Feb, May, Sep–Nov | *N. pyxis* is frequent at Quitacalzón and very rare elsewhere (single record from Villa Carmen). 90% of specimens are females. This species can be separated from *N. heraldica* by its white ventral hindwing post-median line. |
| 222 | *Nicolaea munditia* (H. H. Druce, 1907) | 1050–1750 | Feb, Apr–May, Sep–Nov | The most common *Nicolaea* with most individuals seen at Quitacalzón and the Mirador. This is also the only *Nicolaea* with approximately equal numbers of males and females observed. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 223 | *Nicolaea* cf. *besidia* (Hewitson, 1868) | 1700–1750 | Jan | Two females from the Mirador, both during the rainy season on *Miconia*. |
| 224 | *Nicolaea* cf. *laconia* (Hewitson, 1868) | 400–1100 | May–Jun, Sep, Nov | Uncommon, with seven females seen in a 12-year period. This species can be separated from *N. heraldica* by its white ventral hindwing post–median line and from *N. pyxis* by the dorsal surface which has more extensive blue on both the forewing and hindwing. |
| 225 | *Ministrymon zilda* (Hewitson, 1873) | 500–600 | Oct | A single individual was photographed at Villa Carmen. |
| 226 | *Ministrymon cruenta* (Gosse, 1880) | 400–550 | Oct–Nov | Uncommon, with two males and two females known. Females of *M. cruenta* and *M. arthuri* may not be reliably distinguished. |
| 227 | *Ministrymon arthuri* Bálint, K. Johnson, and Austin, [1999] | 450–1100 | Jan, Sep–Nov | As uncommon as *M. cruenta*. Only one male known. The five females recorded in the Cosñipata as *M. arthuri* may be this species or *M. cruenta*. |
| 228 | *Ministrymon azia* (Hewitson, 1873) | 550–650 | Dec | This common hairstreak of dry/disturbed habitats is very rare in the Cosñipata. There are two records from 1979. The species has not been seen during our 12-year survey. |
| 229 | *Ministrymon cleon* (Fabricius, 1775) | 1000–1100 | Sep, Nov | Uncommon, with two males and two females from Quitacalzón |
| 230 | *Ministrymon una* (Hewitson, 1873) | 450–700 | Feb, Apr–May, Aug–Nov | The only common *Ministrymon* in the study area. It is usually present at the south end of the Patria airport. |
| 231 | *Exorbaetta metanira* (Hewitson, 1867) | 400–1450 | Jan–Feb, Apr–Jun, Aug–Nov | Frequent at Chontachaca and Quitacalzón, uncommon elsewhere. Males outnumber females 2 to 1. |
| 232 | *Gargina gargophia* (Hewitson, 1877) | 400–600 | Sep–Nov | Frequent on the Amazonia Lodge trails, rare elsewhere. All specimens have been observed during the transition period from the dry season to the rains. |
| 233 | *Gargina caninius* (H. H. Druce, 1907) | 400–1750 | Feb, Jun, Aug–Nov | Common at Quitacalzón and the Amazonia Lodge. One stray at the Mirador. Females outnumber males 5 to 1. |
| 234 | *Gargina emessa* (Hewitson, 1867) | 400–550 | May–Jun, Oct | Known (three females) from Pilcopata and the Pantiacolla Lodge trails. |
| 235 | *Gargina panchaea* (Hewitson, 1869) | 450–1100 | Sep, Nov | One male from Quitacalzón and a single female from the Amazonia Lodge. |
| 236 | *Siderus leucophaeus* (Hübner, 1818) | 400–1100 | Jan–Feb, May, Sep, Nov | Seen every year at Quitacalzón from 2010 to 2014. Only record since then was 2017 at Pantiacolla Lodge. The change at Quitacalzón may be due to logging conducted on the ridge east of the quebrada. |
| 237 | *Siderus* sp. n. 7 | 500–550 | May, Nov | One male (similar to *S. guapila* Schaus, 1913) from Amazonia Lodge and a photo from Río Coloradito (between Pilcopata and Atalaya). |
| 238 | *Siderus athymbra* (Hewitson, 1867) | 400–500 | Sep, Nov | Two males, one from Amazonia Lodge and the other from Pantiacolla Lodge. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 239 | *Theclopsis lydus* (Hübner, [1819]) | 400–1200 | Jan–Feb, Jun, Sep–Dec | Common from the lowlands to Quitacalzón. Thus far, not attracted to bait. |
| 240 | *Theclopsis gargara* (Hewitson, 1868) | 450–1100 | Mar, Jun, Sep–Nov | Uncommon from the lowlands to Quitacalzón. |
| 241 | *Theclopsis* sp. n. 1 | 500–600 | Sep–Oct | Rare, with three specimens from Atalaya to the Amazonia Lodge. |
| 242 | *Theclopsis* sp. n. 2 | 500–1100 | Mar–May, Aug–Nov | Uncommon, with 80% of specimens from Quitacalzón (most from vegetation adjacent to the bridge). Males are much more common than the putative females. |
| 243 | *Ostrinotes halciones* (Butler and H. Druce, 1872) | 400–450 | Jun | One female from the Pantiacolla Lodge. |
| 244 | *Ostrinotes tympania* (Hewitson, 1869) | 400–800 | Sep–Nov | Three putative females from the lowlands. All were observed during the dry/wet transition period. |
| 245 | *Ostrinotes tarena* (Hewitson, 1874) | 500–1050 | Sep–Nov | Uncommon, with most specimens from Quitacalzón. So far, this species has only been seen during the onset of the rains. |
| 246 | *Ostrinotes gentiana* (H.H. Druce, 1907) | 450–1100 | May, Sep–Nov | Common and most frequently seen at Quitacalzón and the Amazonia Lodge. |
| 247 | *Ostrinotes silva* Faynel and Robbins, 2015 | 450–650 | Oct–Nov | Only two males of this recently described species, both from the Atalaya/Amazonia Lodge area. |
| 248 | *Ostrinotes* sp. n. 2 | 400–500 | Oct–Nov | Three males and a female, near *O. empusa* (Hewitson, 1867), from the Amazonia and Pantiacolla Lodges trail systems, during the onset of the rains. |
| 249 | *Ostrinotes* sp. n. 6 | 400–500 | Jun, Sep | A male and two females, also near *O. empusa*, from the Amazonia and Pantiacolla Lodges trail systems. |
| 250 | *Strephonota tephraeus* (Geyer, 1837) | 450–1100 | Jan, Sep, Nov | This widespread and normally common species is rare in the Cosñipata with three records from the Amazonia Lodge to Quitacalzón. |
| 251 | *Strephonota dindymus* (Cramer, 1775) | 450–500 | Nov | Another widespread/normally common species that is rare in the study area. We have one record from the Amazonia Lodge, during November 2007. |
| 252 | *Strephonota jactator* (H. H. Druce, 1907) | 450–500 | Sep | A single female from the Amazonia Lodge, during 2011. |
| 253 | *Strephonota* sp. n. 2 | 450–500 | Oct | One male, known from the Amazonia Lodge during 2010. |
| 254 | *Strephonota cyllarissus* (Herbst, 1800) | 400–950 | Feb, May, Sep–Nov | Frequent up to 600m. (Amazonia, Pantiacolla, and Villa Carmen). One stray to Chontachaca. 90% of specimens are males and the species is attracted to bait. |
| 255 | *Strephonota* cf. *cyllarissus* (Herbst, 1800) | 400–450 | Oct | One male from Pantiacolla Lodge in 2018. |
| 256 | *Strephonota* cf. *foyi* (Schaus, 1902) | 550–650 | Sep | A single female from the Erika Lodge, located on the east bank of the Alto Madre de Dios river, between the Amazonia and Pantiacolla Lodges, in 1989. |
| 257 | *Strephonota syedra* (Hewitson, 1867) | 400–600 | Jan, Jun, Nov–Dec | Four specimens from Pilcopata to the Pantiacolla Lodge. Attracted to traps. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 258 | *Strephonota strephon* (Fabricius, 1775) | 400–1050 | Mar–May, Sep–Nov | Along with *S. carteia*, one of the most common *Strephonota* in the Cosñipata. Particularly common at the Amazonia Lodge and occurring as high as Quitacalzón. Attracted to traps. |
| 259 | *Strephonota parvipuncta* (Lathy, 1926) | 400–550 | May–Jun, Sep–Nov | Uncommon, with five males known (in total) from Amazonia Lodge, Pantiacolla Lodge, and Villa Carmen. |
| 260 | *Strephonota* cf. *elika* (Hewitson, 1867) | 400–450 | Nov | A male and a female, collected on the same day at Pantiacolla Lodge by two different collectors. |
| 261 | *Strephonota tyriam* (H. H. Druce, 1907) | 400–800 | Jun, Sep, Nov | A male and two females from the Amazonia and Pantiacolla Lodges trail systems. |
| 262 | *Strephonota perola* (Hewitson, 1867) | 400–450 | Oct–Nov | Two males from Pantiacolla Lodge, collected over a three–day period in 2018. |
| 263 | *Strephonota carteia* (Hewitson, 1870) | 400–1050 | Jan, May–Jun, Sep–Nov | Common below 600m, straying to Chontachaca and Quitacalzón. |
| 264 | *Strephonota ambrax* (Westwood, [1851]) | 400–650 | Jun, Oct–Nov | Three males and a female from Atalaya to Pantiacolla Lodge. The species is attracted to traps, although none of the Cosñipata specimens were trapped. |
| 265 | *Strephonota hightoni* (Bálint, 2014) | 1950–2050 | Aug | One individual photographed above Rocotal in 2007. |
| 266 | *Strephonota* cf. *strephon* (Fabricius, 1775) | 450–550 | Sep | One male from the Amazonia Lodge in 2011. |
| 267 | *Strephonota* cf. *azurinus* (Butler and H. Druce, 1872) | 1050–1100 | Mar, May–Jun, Nov | Three males and a female, near *azurinus*, from Quitacalzón. The specimens were encountered in 2008, 2012, 2016, and 2019, suggesting a very low population density. |
| 268 | *Strephonota* sp. n. 19 | 400–1100 | Jan, May, Nov | A male and a putative female from Quitacalzón. |
| 269 | *Panthiades bitias* (Cramer, 1777) | 400–1100 | Jan, May–Jun, Sep–Nov | A common lowland species, with strays up to Quitacalzón. |
| 270 | *Panthiades aeolus* (Fabricius, 1775) | 450–1050 | Jan, Sep, Nov–Dec | An uncommon lowland species, that strays to Quitacalzón. The most amusing record of this species is from the edge of the Patria airport grass runway. That capture illustrates this species' ability to adapt to extremely disturbed habitats. |
| 271 | *Panthiades paphlagon* (C. Felder and R. Felder, 1865) | 1000–1450 | Oct | A single specimen just uphill from the Cock of the Rock Lodge during October 2018. There is also a photograph of a specimen from Quitacalzón and a literature record from H. Whitely from "Huasampilla" at 3,000 m. That elevation is surprisingly high and doubtful. In Ecuador, this species perches during early afternoon at 1,200–1,300 m. |
| 272 | *Panthiades phaleros* (Linnaeus, 1767) | 450–500 | Sep–Oct | Rare, with four females from the Amazonia Lodge, during the transition from the dry season to the rains. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 273 | *Porthecla barba* (H.H. Druce, 1907) | 1700–1750 | Feb | Very rare, with a male and three females on blooming *Miconia* trees from February 7–10, 2010. No additional individuals have been observed during three wet season (Jan/Feb) expeditions to the same area of blooming *Miconia* (below the Mirador). |
| 274 | *Porthecla gemma* (H. H. Druce, 1907) | 400–1100 | May–Jun, Nov | Uncommon, with five observations from the Pantiacolla Lodge to Quitacalzón. |
| 275 | *Porthecla minyia* (Hewitson, 1867) | 1050–1100 | Feb | A single female from Quitacalzón, during February 2010. The wet season during Jan/Feb 2010 benefitted from extraordinarily fine weather, that has not been duplicated during three subsequent trips at the same time of year. As a result, several records from 2010 have not been duplicated since. |
| 276 | *Porthecla willmotti* Busby, Faynel and Moser, 2011 | 1700–1750 | Jan–Feb | Rare, with four specimens from the Mirador area, all nectaring on *Miconia*. |
| 277 | *Porthecla peruensis* Faynel and Moser, 2011 | 1350–1400 | Nov | One female from San Pedro during 2017. |
| 278 | *Porthecla* sp. n. 1 | 450–800 | Sep | A single female, near *P. prietoi* Faynel and Busby, 2011, from the Amazonia Lodge during September 2011. |
| 279 | *Thepytus thyrea* (Hewitson, 1867) | 1050–1200 | Mar, Oct | Two females, one from each of Quitacalzón and Quebrada Santa Isabel. This species has been observed perching in Ecuador between 1,400–1,600 m during early afternoon. |
| 280 | *Thepytus jennifer* Busby and Robbins, 2010 | 1700–1750 | Feb | Two of the four known specimens of this rare species are from the Cosñipata. We have one male and one female, on *Miconia* below the Mirador, during the rainy season. |
| 281 | *Thepytus beatrizae* (Bálint and Dahners, 2006) | 1700–1750 | Jan–Feb, Sep–Nov | Not uncommon hilltopping at the Mirador. Not recorded elsewhere. |
| 282 | *Oenomaus atesa* (Hewitson, 1867) | 400–450 | Nov | A single male, from a trap, at the Pantiacolla Lodge (Araucaria Trail). |
| 283 | *Oenomaus lea* Faynel and Robbins, 2012 | 400–450 | Oct | One female, on a trap, from the Pantiacolla Lodge (Araucaria Trail). |
| 284 | *Oenomaus andi* Busby and Faynel, 2012 | 1100–1750 | Jan–Feb, Jun, Nov | Uncommon from Quitacalzón to the Mirador, with most specimens found on *Miconia*, near the Mirador. |
| 285 | *Oenomaus taua* Faynel and Moser, 2008 | 400–450 | Nov | A single female from a trap, on the Araucaria Trail, at the Pantiacolla Lodge. |
| 286 | *Parrhasius polibetes* (Stoll, 1781) | 400–1050 | Feb, Sep–Nov | Common from the lowlands to Quitacalzón. Strongly attracted to rotting fish. |
| 287 | *Parrhasius orgia* (Hewitson, 1867) | 400–500 | Sep–Nov | Frequent at the Amazonia and Pantiacolla Lodges. Females are more frequently seen than males. |
| 288 | *Parrhasius selika* (Hewitson, 1874) | 950–1750 | Jan–Feb, Jun, Oct–Nov | Normally uncommon from Chontachaca to the Mirador. During February 2010, there was a population explosion and the species was common on *Miconia* blooms below the Mirador. |
| 289 | *Michaelus phoenissa* (Hewitson, 1867) | 450–950 | Apr–Jun, Sep–Nov | Frequent at the Amazonia Lodge, rare elsewhere. This species is strongly attracted to fish-baited traps. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 290 | *Michaelus jebus* (Godart, [1824]) | 400–1100 | Jan, Sep–Nov | Frequent below 600 m, uncommon higher. This species is attracted to traps and females outnumber males 3 to 1. |
| 291 | *Michaelus joseph* Robbins, 2010 | 400–450 | Oct | A single male from Pantiacolla Lodge (on a fish–baited trap) in 2016. |
| 292 | *Michaelus thordesa* (Hewitson, 1867) | 400–950 | Nov | A male from Pantiacolla Lodge and a female from Chontachaca. |
| 293 | *Michaelus ira* (Hewitson, 1867) | 400–450 | Nov | This normally common species is scarce in the Region. We have only a single female from a trap baited with rotting fish from the Pantiacolla Lodge (Araucaria Trail). |
| 294 | *Ignata caldas* Robbins, 2010 | 400–1100 | Oct–Nov | Frequent at the Amazonia and Pantiacolla Lodges, straying to Quitacalzón. Females are strongly attracted to traps while males are not. |
| 295 | *Ignata levis* (H.H. Druce, 1907) | 500–1050 | Nov | One female from a quebrada above Atalaya and photos from Villa Carmen and Quitacalzón. |
| 296 | *Olynthus obsoleta* (Lathy, 1926) | 400–450 | Nov | A single female from the Pantiacolla Lodge, in 2018. |
| 297 | *Olynthus essus* (Herrich–Schäffer, [1853]) | 400–450 | Nov | A single female from a trap baited with rotting fish, on Pantiacolla's Araucaria Trail. |
| 298 | *Hypostrymon renidens* (Draudt, 1920) | 950––1450 | Aug, Oct–Nov | A male from just above Chontachaca and three females from San Pedro. |
| 299 | *Hypostrymon aepeona* (Draudt, 1920) | 1700–1750 | Feb, Oct | A single male and two females from the Mirador. |
| 300 | *Hypostrymon asa* (Hewitson, 1868) | 400–1100 | Feb–Mar, May, Aug–Nov | Common below 500 m, with strays to Quitacalzón. Males are more frequently encountered than females. |
| 301 | *Hypostrymon* sp. n. 1 | 550–650 | Sep | One male from the Erika Lodge, in 1989. |
| 302 | *Marachina maraches* (H. H. Druce, 1912) | 2100–2350 | May, Aug, Oct | Uncommon from Morro Leguía to Quebrada Yanamayo. |
| 303 | *Marachina* sp. n. 1 | 1700–2000 | Feb | Four males, from the Mirador and Rocotal, that can be differentiated from *M. maraches* on the basis of dorsal forewing androconia and a brighter blue dorsal surface with narrower black margins on both wings. |
| 304 | *Marachina* sp. n. 2 | 2100–2950 | Feb, May, Oct–Nov | The most common *Marachina*, occurring from Morro Leguía to Wayquecha. Again, it is differentiated from the other two *Marachina* species based on male dorsal forewing androconia. In addition, there are wider dark borders on both the dorsal forewing and hindwing. |
| 305 | *Nesiostrymon calchinia* (Hewitson, 1868) | 1700–1750 | Feb | One female from the Mirador in2011. |
| 306 | *Balintus tityrus* (C. Felder and R. Felder, 1865) | 1700–1750 | Sep | One female from the Mirador during 2014. |
| 307 | *Aubergina alda* (Hewitson, 1868) | 400–1050 | May–Jun, Sep–Nov | Common below 600 m, with strays to Quitacalzón. Females are rarely encountered. |
| 308 | *Aubergina hesychia* (Godman and Salvin, 1887) | 1050–1750 | Mar, Jun, Sep–Nov | Extremely common at the Mirador, perched on the lower branches of trees. Males are much more commonly observed than females. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 309 | *Aubergina* cf. *hesychia* (Godman and Salvin, 1887) | 500–550 | Jan | One male from Villa Carmen on a trap. |
| 310 | *Terenthina terentia* (Hewitson, 1868) | 400–1100 | Jan–Feb, Apr, Jun, Sep–Nov | Common below 1000 m, and particularly attracted to fish/urine bait placed on leaves less than 1m above ground. |
| 311 | *Iaspis castitas* (H. H. Druce, 1907) | 900–1000 | Jun | A single male attracted to fish/urine bait on a Chontachaca trail during the dry season. |
| 312 | *Iaspis temesa* (Hewitson, 1868) | 400–1050 | Nov | A photo from Quitacalzón and a male perching in early afternoon, near the Pantiacolla Lodge's Mirador trail. |
| 313 | *Celmia celmus* (Cramer, 1775) | 400–1100 | Jan, May–Jun, Sep–Nov | Abundant below 600 m, with a single stray from Quitacalzón. Perhaps, the most ubiquitous lowland species. |
| 314 | *Celmia* sp. n. 1 | 1700–1750 | Oct | A single specimen of this higher elevation *Celmia* was encountered hilltopping at the Mirador. |
| 315 | *Celmia mecrida* (Hewitson, 1867) | 400–450 | Nov | One male from Pantiacolla Lodge, in 2018. |
| 316 | *Celmia conoveria* (Schaus, 1902) | 400–450 | Nov | One female from Pantiacolla Lodge, in 2018. |
| 317 | *Dicya carnica* (Hewitson, 1873) | 400–950 | Oct–Nov | Rare, with most specimens from Pantiacolla Lodge and a single individual from Chontachaca. |
| 318 | *Dicya iambe* (Godman and Salvin, 1887) | 450–500 | Oct | A single specimen from the Amazonia Lodge in 2010. |
| 319 | *Erora biblia* (Hewitson, 1868) | 400–600 | Jun, Oct–Nov | Rare, with three females widely dispersed below 600 m (Amazonia Lodge, Pantiacolla Lodge, and above Atalaya). |
| 320 | *Erora* cf. *nitetis* (Godman and Salvin, 1887) | 1700–1750 | Nov | Two males hilltopping at the Mirador, one on 4 November 2012 and one the following day. Genitalia differ from *E. nitetis*. |
| 321 | *Erora phrosine* (H. H. Druce, 1909) | 950–1400 | Feb–Mar, May, Sep–Nov | Common at Quitacalzón and the most common *Erora* in the Cosñipata Region. Females are encountered much more frequently than males (6 to 1). |
| 322 | *Erora gabina* (Godman and Salvin, 1887) | 450–600 | Feb, Oct | A male, collected at the Amazonia Lodge in 2010 and a female from Quebrada Bienvenida in 2013. |
| 323 | *Erora badeta* (Hewitson, 1873) | 400–500 | Oct–Nov | Uncommon below 500m, with all records from the Amazonia and Pantiacolla Lodge trails. A single male and five females observed to date. |
| 324 | *Erora senta* (Draudt, 1920) | 1700–1750 | Feb | A male and a female from the Mirador on *Miconia*. |
| 325 | *Erora caespes* (H. H. Druce, 1907) | 1050–1750 | Apr, Aug–Nov | Second most common *Erora* in the Region. Fond of sitting at mud. As with all *Erora*, females greatly outnumber males observed (9 to 1). Since *Erora* males and females are dimorphic, it is very difficult to confidently associate males and females of the same species. The expanded use of DNA analyses in taxonomic studies will illuminate this issue. |
| 326 | *Erora nana* (C. Felder and R. Felder, 1865) | 2350–2500 | Feb, Oct | Three males from Quebrada Yanamayo to Pillahuata. |
| 327 | *Erora* sp. n. 1 | 950–1400 | Nov | One male and eight females, primarily from Quitacalzón. This species is normally seen taking moisture at mud. |

| | Species | Elevation range (m) | Monthly occurrence | Notes and observations |
|---|---|---|---|---|
| 328 | *Erora* sp. n. 2 | 2350–2950 | Mar, Oct–Nov | Eight females from Yanamayo to Wayquecha. |
| 329 | *Erora* sp. n. 3 | 500–600 | May, Sep–Nov | Four females, three from Amazonia Lodge and one from Quebrada Bienvenida at Río Tono. Very similar to *Erora* sp. n. 1. |
| 330 | *Erora* sp. n. 4 | 2350–2600 | Mar, Oct–Nov | Two females from Quebrada Yanamayo and one female from Pillahuata. These individuals are near *E. nana* and may represent the female of that species. The VHW PM line differs slightly from *E. nana* occurring on the west slope of the Andes in Ecuador. |
| 331 | *Erora* sp. n. 6 | 1050–1400 | Feb–Mar | Two females with one each from Quitacalzón and San Pedro. Dorsum similar to *Erora* sp. n. 1, but ventral hindwing postmedian line differs. |
| 332 | *Erora* sp. n. 7 | 1050–1150 | Nov | One female from Quitacalzón. This species is similar to *E. gabina*, but has a deeper blue dorsal surface and the ventral hindwing post-median line is shaped and colored differently. |
| 333 | *Semonina ares* (Godman and Salvin, 1887) | 500–550 | Jan | One female from Villa Carmen, sitting on the top of a trap. |
| 334 | *Chalybs janias* (Cramer, 1779) | 400–650 | Aug–Oct | Uncommon, with records from Villa Carmen, Erika Lodge, and Pantiacolla Lodge. |
| 335 | *Chalybs hassan* (Stoll, 1790) | 400–1100 | Jun, Sep–Nov | Common at Amazonia and Pantiacolla Lodges with strays to Quitacalzón. Females outnumber males with a ratio of 11:1. |
| 336 | *Symbiopsis perulera* Robbins, 2004 | 400–1100 | Sep–Nov | Uncommon, with most records from the Amazonia Lodge. |
| 337 | *Symbiopsis aprica* (Möschler, 1883) | 450–1100 | Feb, Jun, Aug, Oct–Nov | Frequently encountered at Quitacalzón and Chontachaca. |
| 338 | *Leptotes callanga* (Dyar, 1913) | 1100–3550 | Feb, Aug, Oct–Dec | Formerly frequent from 2,000–2,950 m, with verified strays from Quitacalzón and Acjanaco. Despite dependable occurrence from 2008 to 2013, only one specimen has been observed since. Some of that scarcity is due to less sampling time being spent from Quebrada Buenos Aires to Wayquecha. |
| 339 | *Leptotes cassius cassius* (Cramer, 1775) | 400–1400 | Jan, May, Sep–Nov | Common below 600 m and frequent to San Pedro, primarily in disturbed areas. |
| 340 | *Hemiargus hanno hanno* (Stoll, 1790) | 500–550 | Nov | Two males and a female from the north end of the bridge over the Río Carbón, just outside Atalaya. |