
NOMENCLATORIAL NOTES OF *ARCAS SPLENDOR* DRUCE, 1907 IN CENTRAL COLOMBIA WITH COMMENTS ON TERRITORIAL BEHAVIOUR AND PERCHING LOCATIONS (LEPIDOPTERA: LYCAENIDAE)*

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Abstract

The territorial behaviors of the lycaenid *Arcas splendor* Druce, 1907 were observed in several places located in the western slopes of the Central Cordillera (Department of Caldas). Males were active after midday hours, during which they showed territorial habits. They perched on the same leaves or spots and occasionally flew around the sampling site, interacting with other species of butterflies (*Nymphalidae*, *Charaxidae*, *Lycaenidae*, *Riodinidae* and *Hesperiidae*). Notes on its historical nomenclature are given.

Key words

Lycaenidae, local interactions, Nymphaloidea, Hesperioidea, nomenclature, territory, Theritas, geotropic.

Resumen

NOTICIAS SOBRE LA NOMENCLATURA DE *ARCAS SPLENDOR* DRUCE, 1907 EN COLOMBIA CENTRAL CON COMENTARIOS SOBRE SU COMPORTAMIENTO TERRITORIAL (LEPIDOPTERA: LYCAENIDAE)

Los hábitos territoriales de la mariposa licénida *Arcas splendor* Druce, 1907 son observados en algunos lugares ubicados en el costado Oeste de la Cordillera Central de Colombia, en el departamento de Caldas. Los machos fueron activos después del medio día posando alertas en las mismas hojas de las plantas más emergentes en los sitios de muestreo e interactuando con otras especies de mariposas (*Nymphalidae*, *Charaxidae*, *Lycaenidae*, *Riodinidae* y *Hesperiidae*). Se revisa su nomenclatura histórica.

Palabras clave

Lycaenidae, interacciones locales, Nymphaloidea, Hesperioidea, nomenclatura, territorios de vuelo, Theritas, Neotrópico.

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INTRODUCTION

The splendor hairstreak is a large Neotropical butterfly representing the genus *Arcas* Swainson, 1832. This magnificent species is distributed in montane habitats of the andean region of Colombia at moderate elevations. It was recorded in the Central Cordillera and in the Western slopes of the Occidental Cordillera between 1600-2200 m. Hitherto *A. splendor* remained a poorly known species. The main purposes of this paper are to clarify the nomenclature of *Arcas splendor*, to present information on the perching sites of the males and to annotate their behavior on the basis of data taken *in situ*.

NOMENCLATURE

The nominal taxon *Thecla splendor* was described a hundred years ago on the basis of the female holotype, which was collected probably in the environment of Bogotá according to one of the original labels of the type specimen. This information was not provided by Hamilton Hebert DRUCE when he published the description of "*Thecla splendor*" in his seminal study on Neotropical Lycaenidae published in the Proceedings of the Zoological Society of London in 1907 (NICOLAY, 1971; BÁLINT, 2002: 154-155). Seventy years later NICOLAY (1971) reviewed the taxon transferring from *Thecla* to *Arcas*, and associated a male phenotype with tear-shaped fore wing dorsal androconia to the female phenotype. He remarked, that splendor is a Mesoamerican species. Since 1971 three *Arcas* species have been described from Colombia territory: *Arcas katia* Salazar & Johnson, 2002; *A. lecromi* Salazar & Constantino, 1995 and *A. nicolayi* Salazar & Constantino, 1995. More recently BÁLINT (2002) published a paper on the taxonomic position of five taxa. In this paper Bálint described two new *Arcas* species: *A. alleluia* from Perú and *A. arcadia* from Brazil. Both species were synonymized by ROBBINS (2004) with *A. tuneta* and *A. nicolayi*, respectively, without any comment or supporting data. Robbins recognized eighth species following the work of Nicolay.

The nomenclature of *A. splendor* is turned to be complex. BÁLINT (2002: 155) remarked that two *Arcas* species, described recently from Colombian mountains have distinctive androconial patches in their fore wing dorsal surfaces compared to individuals representing *A. splendor sensu* Nicolay.

ROBBINS (2004) regarded these Colombian taxa as follows: (1) *Arcas lecromi* was placed as synonym of *A. nicolayi*; (2) *A. nicolayi* was considered as a distinct species and (3) *A. splendor* was listed as a distinct species too. The firstly mentioned two species of *Arcas* are similar in wing coloration and pattern to the holotype of "*Thecla splendor*". A careful comparison of

the *Thecla splendor* holotype, representing the female sex (see DRAUDT, 1924: pl. 146 d; BÁLINT, 2002: 158) with female individuals of *A. lecromi* (see SALAZAR & CONSTANTINO, 1995: 458) suggest that they belong to the same species. Because the type locality of *Thecla splendor* is "Bogotá" and the holotype represents the female phenotype of *Arcas lecromi* and *A. nicolayi* (?), these taxa are synonyms. The senior name is *splendor*. In fact the male of *A. splendor* was described almost a hundred years (BÁLINT, 2002: 155; SALAZAR, 2004: 354).

An interesting remark was given by BÁLINT (*Op. cit.*) who indicate that "Accordingly, I am of the opinion that *A. splendor* only inhabits montane ecosystems in Colombia and does not reach Costa Rica or Panamá". The species *A. splendor* was illustrated in colour by D' ABRERA (1995: 1105). PARRA *et al.* (2000: 185) and GARCÍA *et al.* (2002: 194) figured the same species as *A. lecromi*.

Antecedents

Perching behaviour have been recorded for many butterflies in various geographic regions. The best documented groups in the Neotropics are the families Papilionidae (PINHEIRO, 1991; TYLER *et al.*, 1994); Riodinidae (CALLAGHAN, 1983; ALCOCK, 1988) and Brassolidae (FREITAS *et al.*, 1997). In temperate regions studies were conducted on Nymphalidae (RUTOWSKI, 1984; RUTOWSKI *et al.*, 1991; DENNIS, 2004; BITZER, 2005) and Satyridae (LEIMAR *et al.*, 2003; MERCKX & VAN DYCK, 2005).

In the case of the family Lycaenidae according with several authors demonstrated that male individuals have territorial behavior and occasionally conspecific males display co-rotating flights between the resident and the intruder because of reasons for dominance or taking females (ALCOCK, 1983; CORDERO *et al.*, 2000; TAKEUCHI & IMAFUKU, 2005). The defense of hilltop territories by male individual butterflies is well known to students of butterfly behavior (SHIELDS, 1967) and clearly supported the expected relationships between the polygyny and ecological variables. The phenomenon of hilltopping in recent years received special attention and interest when occur in neotropical species of Eumaeini (SALAZAR, 1996, 2001, 2004; FAYNEL, 2001, 2005; PRIETO, 2006). For example male individuals of *Arcas* species are hilltoppers, consequently the males can be found in the summit of the highest point within a given area (NICOLAY, 1971). This behavior combined with a preference for lofty tree perch, what makes difficult to catch the butterflies. For the genus *A. splendor* is not an exception. However in these locations in the region of Caldas, it is possible to observe individuals of *A. splendor* because of suitable circumstances (see below). In

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general, according to the observations male individulas are active from 12.30 to 14.15-14.40 when they perching in interaction with other butterflies species in the following locations.

VEGETATION

Table I. Plant species characteristics for the locations

The study area is covered by subtropical rain forest interpolating by the coffe belt with an annual rainfall near to 2000-3000 mm and an average annual temperature of 17-24 °C (I.G.A.C., 1963). General vegetation of the locations are characterized by the following species recorded in the emergent hilltops (PÉREZ-ARBELÁEZ, 1996):

Spanish Name	Scientific Name	Family
Nacedero	<i>Trichanthera gigantea</i> (H. & B.)	Euphorbiaceae
Higuerillo	<i>Ricinus comunis</i> (L.)	Euphorbiaceae
Drago	<i>Croton</i> sp.	Euphorbiaceae
Aguacatillo	<i>Persea coerulea</i> (R. & P.)	Lauraceae
Caucho	<i>Ficus</i> sp.	Moraceae
Trompeto	<i>Bocconia frutescens</i> (L.)	Papaveraceae
Cordoncillo	<i>Piper</i> sp.	Piperaceae
Chachafruto	<i>Erythrina edulis</i> (Pos.)	Papilionaceae
Arboloco	<i>Montanoa quadrangularis</i> (H.)	Asteraceae
Naranja	<i>Citrus</i> sp.	Rutaceae
Nogal cafetero	<i>Cordia alliodora</i> (R. & P.)	Boraginaceae
Cafeto	<i>Coffea arabiga</i> (L.)	Rubiaceae
Plátano	<i>Musa</i> sp.	Musaceae
Guadua	<i>Guadua angustifolia</i> (Kunth.)	Graminae Graminae
Cañabrava	<i>Gynereum sagittatum</i> (Bev.)	Graminae
Carbonero	<i>Calliandra</i> sp.	Mimosaceae
Guamo	<i>Inga edulis</i> (Mart.)	Mimosaceae
Sauce	<i>Salix humboldtiana</i> (Mos.) v	Salicaceae
Helecho de marrano	<i>Pteridium aquilinum</i> (L.)	Polypodaceae
Nispero	<i>Achras</i> sp.	Sapotaceae

Located individual adults of *A. splendor* were photographed *in situ* for recording behavior together with other species present in the site. Voucher specimens were deposited in the Natural History Museum-Caldas University, Manizales, J. A. Salazar and J. I. Vargas collections and Alexander Von Humdoldt Institut (IiAvH), Villa de Leyva, Boyacá.

LOCATIONS AND OBSERVATIONS

a) Bajo Tablazo

The locality belong to the Manizales Municipality, in the Western slopes of the Central Cordillera (Caldas departament) at elevation of 1800 m. Field

work was carried out in 14 July 1995, 10 December 1998 and 9 April 2006. In this locality four males were found and I observed in the perching area at different intervals during from 12:00 to 14:30. The specimens were flying around the leaves of higuerillo and drago. The vegetation is dominated by other plants (arboloco, guadua, sauce, camargo) citrus and caucho trees and grow topographically on a little mound uncovered of coffea plants. The interactions of *Arcas splendor* occurred with the following non-lycaenids species: *Epargyreus exadeus* (Cramer), *Hypanartia dione* (Latreille), *Adelpha alala* (Hewitson), *A. lycorias wallisii* (Dewitz). No interactions were observed with other hairstreaks lycaenid species present in the location, except *Theritas paupera* (Felder). The males of this latter species were capable to occupy and to defend territories by aggressive behaviour display patrolling flights from camargo leaves situated one meter above the ground level.

b) Veracruz

The locality finca "Villa-Gómez", where *Arcas splendor* has been found, is a small farm within a larger study area (1820-1835 m). The site is located at 800 m of the Veracruz road (Terminal bus station on the highway Manizales-Arauca), situated in the Western slopes of the Central Cordillera, Departamento Caldas. It was in the coffee belt covered by submontane humid forest. The local vegetation is composed by meadows and caucho trees, plus further plants as arboloco, pino, chachafruto, poma, guayabo and bambu surrounded by secondary forest and suburban land properties for recreational activities. The only individual record of *A. splendor* was recorded on 5 March 2006, when a male individual perched in leaves of caucho, three meters high above the ground. The individual displayed aggressive and chased several nymphalid and lycaenid butterflies as (12:45 p.m.) *Fountainea glycerium comstocki* (Witt), *Epargyreus exadeus* (Cramer), *Dione juno* (Cramer), *Calycopis* spp., and *Hypanartia dione* (Latreille). In the same territorial behavior was also recorded for males of the pierid *Catasticta flisa* (H-Schäffer) on coffee leaves and for the lycaenid *Cyanophrys pseudolongula* (Clench) above the leaves of chachafruto.

c) Cerro Sinifaná (Alto de las Brujas) (Fig. 1, 2, 3)

This location is a hill situated at the elevation 1750-1800 m, above sea level in the Eastern slopes of Western Cordillera. Administratively it belongs to the Eastern zone of the Municipality Riosucio, Departamento Caldas. The observations were carried out in 12 March 2000 and 13 April 2006. The hilltop possesses a vegetation to be based on café arábigo, plátano, guayabo, guadua, níspero and trees of pino and aliso (*Alnus jorullensis* HBK, Betulaceae) growing as high as 10-15 m. The main interactions of *A. splendor* starts from 12:55. Individuals were observed on leaves of plátano and níspero plants (Fig. 3) (2.5 m above ground). They displayed territorial flights and aggressive chasing of various butterflies as *Memphis lyceus* (Druce), *Adelpha lycorias wallisii*

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(Dewitz), *A. seripia* (Felder.), *Catasticta cteneme actinotis* (Butler), *Astraptes fulgerator* (Walch), *Zera nolckenii* (Mabille.), *Hypanartia dione* (Latreille) and males of *Heraclides androgeus epidaureus* (Godman & Stichel) (this species patrolling prolonged fights in circles). On the other hand, a well established community of Riodinids were existing under the leaves of coffee plants. Territorial disputes were observed for *Symmachia probetor championi* (Godman & Salvin), *S. tricolor* (Hewitson.), *Theope folia* (Godman & Salvin), *Hypophylla caldensis* (Callaghan), *Catocyclotis elpinice* (Godman) and *Pirascuca pluto* (Stichel). Beside *A. splendor* only two further hairstreak species were recorded in the site: *Cyanophrys pseudolongula* (Clench) and *Theritas mavors* (Hübner), both in coffee plantations.

d) La Linda (Fig. 4, 5)

Field work was carried out in May and February of 2005-2006, situated at elevation 1720-1750 m, Western slopes of Central Cordillera. In the hilltop the vegetation is composed by nogal cafetero, cañabrava, cafeto, and "helecho de marrano", and a unknown arbustive tree and in the vicinity Nacedero (canopy to 4 m). The summit is flat and covered by coffee plants and vegetation as indicated above. In community with *Arcas splendor* further 15 species of Eumaeini inhabit the hilltop.

The perching sites, which were defended by aggressive territorial behavior, were almost exclusively in leaves of cañabrava (*Gynereum sagittatum*) and nogal (*Cordia alliodora*). In the site two males of *A. splendor* were observed in competitive or isolated perching activity. In the beginning, one male was observed over *Cordia* leaves situated to 3.50 m, above the ground in 1 May 2005, in interactions with other lycaenid species as *Lamasa calesia* (Hewitson), *Cyanophrys pseudolongula* (Clench), *Aubergina hesychia* (Godman & Salvin), *Gigantorubra orcidia* (Hewitson) and several males of *Avexcrenota anna* (Druce). The situation was different in 12 February 2006, when another male perched at the tips of cañabrava leaves (Fig. 6). This individual launched defensive flight that repelled another hairstreaks especially *Avexcrenota anna* (Druce) that explored the same leaf between 13:40 p.m. and 14:15 (Fig. 7). On this same plant an intensive activity of territorial behavior was assisted by other butterflies as *Emesis mandana* (Cramer), *Parcella amarynthina* (Felder), *Mesene ingrumaensis* (Callaghan & Salazar) and some Lycaenids: *Brangas caranus* (Stoll), *Paralustrus commodus* (Felder), *Aubergina hesychia* (Godman & Salvin), *Strymon melinus* (Hübner) and *Atlides polybe* (Linnaeus). This last species perched very high 4 m above the ground at 14.00-14.30 on leaves of a unknown plant growing together with cañabrava individuals. *Rekoa pagon* (Cramer), *Strymon serapio* (Godman & Salvin), and *Ocaria ocrisia* (Hewitson) were also recorded but as non hilltopping species in coffee plantations taking positions at 1.80 m above the ground.

In contrast two species *Theritas mavors* (Hübner) and *T. paupera* (Felder)

displayed. The resident and the intruder individuals interacted through co-rotating flights and head to head encounters for a perching site of a *Pteridium* twig after the midday (12: 30 to 14: 00 p.m.). These interactions occurred only in the lower vegetation protected by Cañabrava stems (Figs. 8,9). The phenomenon between the two *Theritas* species was mentioned but remained unrecorded in a recent work dealing with communities of Eumaeini that inhabit fly five hilltops in Valle del Cauca (PRIETO, 2006). Formerly, a similar situation was observed in Miraflores, Riosucio (Caldas) at 10 January 2001 (in identical period of the day), where two males of *Arcas splendor* were involved perching on citric leaves.

COMMENTS

According to TAKEUCHI & IMAFUKU (2005) who studied the Japanese hairstreak *Favonius taxila* (Bremer) in Japan, males show territorial behavior and apparently do not use alternative strategies such as patrolling observed in other butterflies (PINHEIRO, 1991). According to our observations *Arcas splendor* showed similar habits in the localities, and did not display patrolling behavior, which is a male mate-locating strategy for finding females. This kind of behavior was not displayed in the locations. Indeed no *A. splendor* female individuals were ever recorded, which supports our observations. Females were observed flying individually in the streets of Manizales city.

As it was demonstrated that *A. splendor* males were local and sedentary butterflies with low little population density comprised by one or two individuals. They exhibited hilltopping behavior in each of the location. Furthermore this beautiful lycaenid species was a rare member in places where a community of numerous taxa of Eumaeini has been established. For example hilltops in various mountain systems explored by SALAZAR *et al.* (2003) and PRIETO (2006) revealed no records of *A. splendor*. Maybe this suggests that *A. splendor* is in decline in Central Colombia lacking ability to adapt its populations to the rapidly changing environment. Other hairstreak species were able to colonize the "niche segregations" successfully because they are in size or more thermophilous like *Ocaria clepsydra* (Druce.), *Aubergina hesychia* (Godman & Salvin) and *Cyanophrys pseudolongula* (Clench) (SCOTT, 1970; PRIETO, 2006).

Arcas butterflies, like *A. ducalis* (Westwood) and *A. tuneta* (Hewitson) are rare generally species and live in restricted geographical regions (NICOLAY, 1971). However, certain species can be temporal survivors in unexpected habitats where topographical foreland occur (*Evenus coronata* (Hewitson), *E. regalis* (Cramer), *Ipidecla schausi* (Godman & Salvin)).

Contrary to the hypothesis proposed by PRIETO (2006: 49) the cover vegetation has no significant role to prove the presence of hilltopper species

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in any sites. For example in the localtion La Linda only the plant cañabrava supports a permanent community of 15 butterfly species representing the families *Nymphaloidea*, *Riodinidae*, *Lycaenidae* and *Hesperiidae* in different period of a sunny days (Draw I & II). Maybe this phenomenon is helped by the influence of forest classified as submontane moist forest and it fauna coming from the Guacaica river canyon and the promontory configuration isolated.

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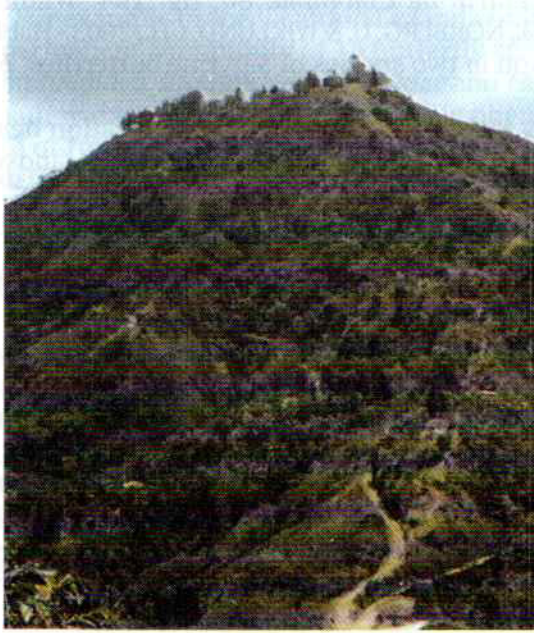


Fig. 1. Cerro Sinifaná (Riosucio, Caldas). Photo by J. A. Salazar (2005).



Fig. 2. Cerro Sinifaná (Riosucio, Caldas). Aspect of Hilltopp. Photo by J. A. Salazar (2006).



Fig. 3. Male of *Arcas splendor* (Druce) at perching position. Photo by J. A. Salazar (2000).



Fig. 4. La Linda (Manizales Municipality), General view of the location. Photo by J. A. Salazar (2005).



Fig. 5. Aspect of the Hill of La Linda, with cañabrava plants in front. Photo by J. A. Salazar (2006).

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Fig. 6. Male of *Arcas splendor* (Druce) at perching position. Photo by J. A. Salazar (2006).



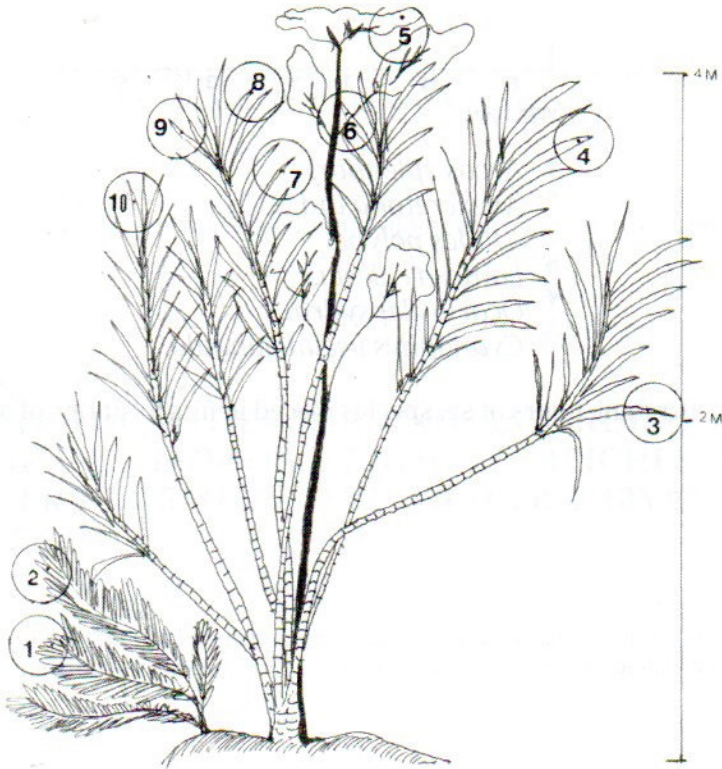
Fig. 7. Male of *Avexcrenota anna* (Druce) At perching position. Photo by J. A. Salazar (2006).



Fig. 8. *Theritas paupera* and *mavors* in confrontation. Photo by J. A. Salazar (2006).



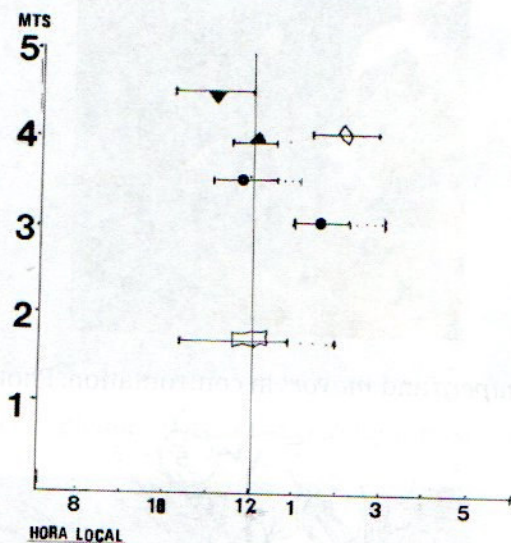
Fig. 9. *Theritas paupera* and *mavors* in confrontation. Photo by J. A. Salazar (2006).



Draw I. Perching locations of some butterflies on *Ginereum* (right) and *Pteridium* (left) plants as follows:

- | | |
|------------------------------|--------------------------------|
| 1. <i>Theritas mavors</i> . | 6. <i>Rhamma commodus</i> . |
| 2. <i>Theritas paupera</i> . | 7. <i>Avexcrenota anna</i> . |
| 3. <i>Arcas splendor</i> . | 8. <i>Aubergina hesychia</i> . |
| 4. <i>Rydonia pasibula</i> . | 9. <i>Brangas caranus</i> . |
| 5. <i>Atlides polybe</i> . | 10. <i>Strymon melinus</i> . |

Nomenclatural notes of *arcas splendor* druce, 1907 in central colombia with comments on territorial behaviour and perching locations (lepidoptera: lycaenidae)



- *Arcas splendor.*
- ◊ *Avexcretona anna.*
- ◊ *Atlides polybe.*
- ▲ *Lamasa calesia.*
- ▼ *Ocaria clepsydra.*
- ◻ *Cyanophys pseudolongula.*

Draw II. Perching hours of six species placed in mts locations of a sunny day.