

COLOMBIAN BUTTERFLIES XII  
NOTES ON SOME TERRITORIAL PERCHING SITES OF *ARCAS IMPERIALIS* (CRAMER) IN COLOMBIA  
(LEPIDOPTERA: LYCAENIDAE)\*

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Abstract

The territorial habits of the hairstreak butterfly *Arcas imperialis* (Cramer, 1775) is described in some sites located in western (upper Garrapatas river, Valle), central (Riosucio-Irra Caldas, Risaralda) and eastern zones (Puerto Leguizamo, Putumayo) of Colombia. Males are active after midday, perched in alertness awaiting possible rivals or other butterfly species that invade their territories. Data on historical nomenclature is provided.

**Key words:** Conservation, Lycaenidae, local perching, Nymphaloidea, Hesperioidae, nomenclature, territory, *Arcas splendor*, secondary habitats

MARIPOSAS COLOMBIANAS XII  
NOTAS SOBRE ALGUNOS POSADEROS TERRITORIALES DE *ARCAS IMPERIALIS* (CRAMER) EN COLOMBIA  
(LEPIDOPTERA: LYCAENIDAE)

Resumen

Los hábitos territoriales del eumaeini *Arcas imperialis* (Cramer, 1775) son observados en algunos lugares ubicados en diversas regiones del occidente (Alto Río Garrapatas, Valle), centro (Riosucio-Irra, Caldas, Risaralda) y oriente de Colombia (Puerto Leguizamo, Putumayo). Los machos son activos después del medio día, posados alertas en espera de posibles rivales o de otras especies de mariposas que invadan sus territorios. Se dan datos sobre su nomenclatura histórica.

**Palabras clave:** Conservación, Lycaenidae, interacción local, Nymphaloidea, Hesperioidae, nomenclatura, territorios de vuelo, hábitat secundarios, *Arcas splendor*

INTRODUCTION

The “Imperial Hairstreak” is a medium sized and beautiful hairstreak butterfly representing the type species of the genus *Arcas* Swainson, 1832. This species has a wide distribution from Mexico via Mesoamerica to the mainland South America, including the tropical Andes, the Amazon and Guiana regions, and south-eastern Brazil (DRAUDT, 1919; D’ABRERA, 1995; BÁLINT, 2002; FAYNEL, 2001). *Arcas imperialis* has been recorded in Colombia on both slopes of the three

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cordilleras from sea level to 1200-1500 m, but exceptionally up to 1700 m. It occurs in association with natural forest habitats and also in places with moderate degree of human disturbance. In Colombian collections this species is commonly represented by specimens taken in many regions of tropical climate.

The main purpose of this paper is to give some information on the perching sites of the males of *imperialis* and describe their behavior on the basis of observational data recorded "in situ" in four sites located in western, central and southern Colombia.

#### PREVIOUS REMARKS

In 1832 William Swainson established the generic name *Arcas* with type species *Papilio imperialis* Cramer, 1775. The generic name *Arcas* was not used until the paper of NICOLAY (1971), who presented a synopsis of the genus. The type species of *Arcas* is a favorite species for color illustrations in popular books on butterflies, and it would be difficult to confuse it with any of its relatives.

The name of "*Thecla oakesii*" Butler, 1884 was given to distinguish specimens with a coppery or rosy discal coloration in the basal part of the hindwing ventral surface. The holotype of *oakesii* has been figured by BÁLINT (2005). Percy Lathy in 1930 applied the name as a female form for the Colombian populations but he noted that some *imperialis* taken in locations other than Colombia have also varying degrees of the rosy wash. NICOLAY (1971) examined a good series of males from Colombia deposited in the American Museum of Natural History (New York), and the specimens showed no pink coloration as seen in Panamanian ones. BÁLINT (2002) argued that the coppery or rosy discal coloration of *imperialis* is artificial and it originates by a kind of physical change influencing the scales. According to recent observations, however living individuals have also this trait. As this peculiar hindwing ventral surface basal coloration because of be found only in the species-pair *A. imperialis* and *A. ducalis* (Westwood, 1844), restricted in distribution to south-eastern Brazil, probably it probably indicates a close relationship between these species (Balint, pers. com.). Anyway, this character is irrelevant for *imperialis* and the name *oakesii* and other newly established names for phenotypes very similar to that of *imperialis* are now considered as junior synonyms (ROBBINS, 2004).

In Colombia *Arcas imperialis* is a familiar species for lepidopterists because its wide distribution and beauty. However there was little concentration to record biological data or publish a synopsis of its distribution. For example, ANDRADE (2002) only recorded the species for the eastern slopes of the Oriental Cordillera, but the species also inhabits the coffee belt on the other side and the species hilltops there (SALAZAR & CONSTANTINO, 1995).

More recently FAYNEL (2001), presented his observations of five years in *Theclinae* of French Guiana, recording *Arcas imperialis* nectaring on plants such *Emmotum fagifolium* Desv. (Icacinaceae) and *Cordia schomburgkii* Adc (Boraginaceae) and recorded adults inhabiting hilltops in early afternoon between 13:00 pm and 14:30 pm.

Constantino (in VALENCIA *et al.*, 2005) recorded *Rollinia muscosa* as a larval host food plant of *Arcas imperialis* in the Valle del Cauca. This plant is known by various

common names as “anón amazónico, cimarrón” or “biribá” and in Colombia it is widely distributed and found in the Andean, Amazonian and the Pacific regions between 20-1000 m (MURILLO, 2001).

Recent works on butterfly ecology have noted territorial behavior in many species that perform perching activities (ALCOCK, 1983, 1988; BAKER, 1983; BITZER & SHAW, 1979, 1983; DENNIS, 1987; FREITAS *et al.*, 1995; PINHEIRO, 1991; TAKEUCHI & IMAFUKU, 2005). The publications of SALAZAR (1996, 2001) and PRIETO & DAHNERS (2006) are focused on hairstreak butterflies. Most recently the observations on territorial habits of *Arcas splendor* Druce as conducted in central Colombia has been communicated to the scientific community (SALAZAR, 2006).

## MATERIAL AND METHODS

Observations were carried out in various locations of western, central and eastern Colombia (Valle, Caldas, Risaralda and Putumayo) as briefly described. Males of *Arcas imperialis* were recorded in each study sites cited below with the taking altitudinal measurements, recording adult behavior data on the intensity of patrolling activity and the interactions with other butterflies.

Metric measurements are given according to metric sea level.

Voucher specimens were captured at each perch sites location and have been deposited in the collections of the Natural History Museum (Caldas University), José I. Vargas collection (Villamaria) and the personal collection of the author (Manizales).

Photographs of habitats were taken with cameras Pentax K-1000 and Canon digital Powershots 470 of 7.1 megapixels and 460 of 5.0 megapixels.

## STUDY AREAS AND OBSERVATIONS

### a) Playa Rica (upper Garrapatas river, Valle)

This area belongs to the biogeographic region Chocó and administratively it belongs to the Dovio Municipality. It is covered by tropical rain forests located in the foothills of the western cordillera (Valle del Cauca) at elevation of 500-800 m. Field observation was carried out in March 1996 in a forest fragment situated in a little mountain near to the Garrapatas river.

Only a single male individual of *A. imperialis* male was recorded here. The male was sitting and perching on leafs 2-3 m. above the ground, in a small sunlight clearing in the dense forest. Infrequent and short, swift flights were performed by the individual, which always returned to the same spot (Fig. 1). Similar behavior was also recorded for the species by NICOLAY (1971), who made his observations in Panamá, Colombia and Brazil. Few interactions were detected with other species present in the location, including the lycaenid *Theritas mavors* (Hübner) and the riordinid *Anteros renaldus* (Stoll). Both perched above the leaves of unidentified plants in the same time (12:30-13:00 pm) in the microhabitat.



Fig. 1      Male of *Arcas imperialis* in perch (Rio Garrapatas, Valle)

b) Miraflores (Riosucio, Caldas) (Fig. 2)

Miraflores is a little land located at elevation 1650-1700 in the eastern slopes of the western Cordillera. Administratively it belongs to the Municipality of Riosucio, Caldas (SALAZAR, 2002). The vegetation is dominated by plants of Aguacatillo (*Persea coerulea* R. & P), guamo macheto (*Inga densiflora* Mart.), carboneros (*Calliandra* sp.), platano (*Musa* spp.), mango (*Mangifera indica* L.), mestizo (*Guarea trichiloides* K.), naranjos (*Citrus* sp.), Laurel (*Laurus* spp.) and Guanabana (*Anona* sp.). In search of locations suitable for this study we explored the vicinity as follows: Alto de las Brujas, 1750 m (13 April 2006), El Pajar, 1700 m (27 December 2007), Guamal-Supía, 1400 m (2 January 2008), cerro Aguacatal, 1650 m (27 December 2008), quebrada Piedras-Supía, 700 m (5 January 2008), upper quebrada La Honda-Supía, 780 m (10 January 2008) cerro Carbunco, 1640 m (11 January 2008) and Montebonito-Río Pozo, La Merced (12 January 2008) but no *Arcas imperialis* individuals were found. In the zone of Miraflores field-studies were carried out in 30 December 1998, 22 September 2007 and 3 January 2008 for observing *Arcas imperialis*.



Fig. 2      Male of *Arcas imperialis* on *Musa* leaf (Miraflores, Riosucio)

The first encounter occurred in a site closely situated to a little farm. A pair of *A. imperialis* in high meeting activity was recorded between 12:45–14:00 pm early afternoon. The two individuals were flying around in the vegetation of small trees at height of 2 m over the ground and were apparently in courtship. Active interactions with several species of Lycaenids were also recorded, for example *Cyanophrys herodotus* (Fabricius), *Chalybs hassan* (Stoll), *Timaeta eronos* (Druce), *Strephonota (circa) ambrax* (Westwood); and also Riodinids *Theope phaeo* (Prittowitz), *Charis anius* (Cramer), *Symmachia rubina* (Bates) and *Catocyclotis elpinice* (Godman).

The second encounter occurred when one male individual in September 2007 was seen and photographed resting on coffee and *Inga* leaves, grown in plants that bordered the Miraflores pathway. This male (Fig. 3) in alert posture was observed between 13:00–14:00 in a transect of 3–6 m patrolling the vicinity. The same trail has been used by other hairstreak lycaenids, for example *Theritas mavors* (Hübner) in low perch and *Arcas splendor* (Druce) in high perch, respectively.



Fig. 3      Male *Arcas imperialis* on *Coffea* leaf

The last encounter was recorded in January 2008 with a male Flying high in the canopy formed by platano (*Musa* sp.) and mestizo (*Guarea trichiloides*) between 12:35-13:35 pm. This individual was seen flying 2-3 m high over the ground in an abandoned agricultural land of coffee bushes and small citric trees (Fig. 5). The male rested for 10-15 minutes in perching position for searching congeners and other butterflies such as the common *Cyanophrys pseudolongula* (Clench), *Adelpha lycorias wallisii* (Dewitz), *Diaeathria marchallii* (Guerin-M.), *Calycopis* sp., and particularly *Arcas splendor* (Druce) which used the same spot to perch in the period 13:35-14:00 pm. (Fig. 4).



Fig. 4 Male of *Arcas splendor* perching in same spot of *A. imperialis*

### c) Irra (Cauca river, Risaralda) (Fig. 5)

Irra, a small town on the Cauca river, was known previously as a locality of *Arcas imperialis* via José I. Vargas who collected a male and female specimen in 24 July 1998. Administratively it belongs to Quinchia Municipality, Risaralda. The collecting site was situated in a place of a little hill of secondary forest (grasses and several unknown trees) where a communication tower was constructed at 870 m.

The species was repeatedly observed here in 20 June 2008 when two males performed strong territorial activity. One of the males arrived at 13:30 pm and landed on the foliage that grew near the cleared place of the tower and perched secretly in the semi penumbra leaves. In five minutes later the second male was seen flying nearby to this spot, from which the first male took flight and a territorial clash started between the two males. A genuine fight turned after, when the two clashed males confronted face to face and tried to push out each other from the territory by active their wings strongly. Similar behavior was observed between *Theritas paupera* (Felder) and *Th. mavors* (Hübner) in central Colombia (see SALAZAR, 2006). Subsequently they separated and flew away unceasing. They turned to settle down another perching sight for a new fight. This territorial activity was detected between 13:00-14:20 pm early afternoon at 3 m above the ground level. No other interactions were seen except the brief encounters with individuals of *Achlyodes mithridates thrasso* (Hübner), *Doxocopa pavon* (Latreille) and *Adelpha serpa celerio* (Bates).



Fig. 5      Irra, Risaralda. Location of *Arcas imperialis* observations

#### d) Caucayá (Putumayo river, Puerto Leguízamo) (Fig. 6)

In Caucayá a region of tropical rain forest in the upper Amazonian (200 m). Administratively the site of tropical rain forest belongs to Puerto Legízamo, Putumayo). *Arcas imperialis* was recorded from this site by NIELSEN *et al.*, (2001). According to previous observations *A. imperialis* is a butterfly which sometimes descended from the tree canopy to land on low foliage. NICOLAY (1971) remarks "that both sexes may occasionally be found in flowers and early in the mornings females at the sunlight edge of the heavy forest on low bushes". We recorded such behavior only in the case of a single specimen. The female we observed came down from the canopy to rest on leaves in the low vegetation and lie down its body for a few minutes. Other species with the same posture were seen, for example *Calycopis lerbela* (Field), *Strephonota carteia* (Hewitson) and *Mithras nautes* (Cramer) and several species or riordinids (*Nymphidium lisimon* (Stoll), *Charis caryatis* (Hewitson), *Metacharis regalis* (Butler)), also often flying in the light gaps of the forest and perching in leaves with open wings.

#### CONSERVATION

With the exception of *Arcas imperialis*, representatives of the genus *Arcas* are considered rare or vulnerable (BROWN, 1993). These butterflies are the most exquisite of all Neotropical Theclinae, moreover they are considered to be typical for large areas of virgin forests. It is remarked by BROWN (op. cit.) that one of the threats of Neotropical butterfly species including *Arcas*, is that when the slight modification of the habitat eliminates male perching sites and prevents the sexes to meet and mate. Perching and meeting sites are crucial for species having populations with low individual numbers in vast superficially homogenous forest regions. The phenomenon mentioned by BROWN (op. cit.) that some species such

*A. tuneta* (Hewitson), *A. delphia* (Nicolay), *A. cypria* (Geyer) and *A. jivaro* (Nicolay) are rarely encountered is certainly the a kind of sign for low individual number. Another supporting aspect of this that *Arcas splendor* was not recorded for 110 years after its description, but it is revealed now that the species is usually not rare and can be observed with certainty in solitary individuals when circumstances of moderate perturbation in a human made landscape positive for the species are available (SALAZAR, 2006).

The situation is similar for *Arcas imperialis*, which is not particularly rare in the coffee belt of central Colombia. In this region the species can survive in surprisingly small patches of secondary vegetation surrounding by coffee, sugar cane and other exotic plants (aguacates, mangos, citric trees and guamo). As we have confirmed by this study *A. imperialis* and *A. splendor* can occur in similar palces if the ecological conditions are suitable.

BROWN (1993) claims that *Arcas imperialis* as a good indicator of healthy and still original (intact) tropical ecosystems. With the knowledge of the habitat preference of *A. imperialis* of Colombia this is not the case. As it is demonstrated *A. imperialis*, as well as *A. splendor*, is well established in secondary natural habitats, even in human settlements. These two magnificent creatures well demonstrate the vitality of the genus *Arcas*, and its ability to colonize new types of habitats. More attention must be paid to other members of the genus recorded from Colombia (*Arcas cypria*, *A. delphia* and *A. tuneta*), in order to ask, whether these species are real indicators of untouched forests or they can also be adopted themselves for a rapidly changing environment with more and more human pressure.



Fig. 6 Puerto Leguizamo, Putumayo, *Arcas imperialis* female resting in leaf of plant

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## BIBLIOGRAPHY

- ALCOCK, J., 1983.,- Territoriality by hilltopping males of the green purple hairstreak *Atlides halesus* (Lep: Lycaenidae) convergent evolution with a pompilid wasp. *Behav. Ecol. & Soc.*, 13 (1), (abstract).
- \_\_\_\_\_, 1988.,- The mating system of three territorial butterflies in Costa Rica. *J. Res. Lepid.*, 26 (1): 89-97.
- ANDRADE, M.G., 2002.,- Biodiversidad de las Mariposas (Lep: Rhop.) de Colombia, 2: 159. In: COSTA *et al.*, (eds.). *Proyecto de Red Iberoamericana de Biogeografía y Entomología Sistemática* PRIBES 2002. SEA-Zaragoza.
- BÁLINT, Z., 2002.,- Miscellaneous notes on *Arcas* Swainson, 1832 (Lep. Lycaenidae: Eumaeini). *Ann. Hist. Nat. Mus. Hung.*, 94: 141-161.
- \_\_\_\_\_, 2005.,- Frederick W. Goodson and his contribution to the taxonomy of neotropical hairstreak butterflies (Lep:Lycaenidae: Eumaeini). *Systematics and Biodiversity*, 2 (4): 355-373.
- BAKER, R., 1983.- Insect Territoriality. *Ann. Rev. Ent.*, 28: 65-89.
- BITZER, R. & SHAW, K., 1979.,- Territorial behavior of the red admiral *Vanessa atalanta* (L.) (Lep: Nymph.). *J. Res. Lepid.*, 18 (1): 36-49.
- \_\_\_\_\_, 1983.,- Territorial behavior of *Nymphalis antiopa* and *Polygonia comma* (Lep: Nymph.). *J. Lepid. Soc.*, 37 (1): 1-13.
- BROWN, K. S., 1993.,- Neotropical Lycaenidae: an overview. In: NEW (ed.) *Conservation Biology Lycaenidae*, Occasional paper, 8: 45-149. IUCN, Spec. Surv.
- D'ABRERA, B., 1995.,- *Butterflies of the Neotropical Region*, Lycaenidae, 7: 1105 pp. Hill House, Victoria.
- DENNIS, R., 1987.,- Hilltopping as a mate location strategy in a Mediterranean population of *Lasiommata megera* (L.) (Lep: Sat.). *Nota Lepid.*, 10 (1): 65-70.
- DRAUDT, M., 1919.- *Theclini imperialis* gruppe. In: SEITZ, A. (ed.) *Die Gross Schmetterlinge der Erde, Die Amerikanischen Tagfalter*, 5: 746, 5 (1924): *Eumaeus-Thecla*, pl. 146 d. A. Kernen, Stuttgart.
- FAYNEL, CH., 2001.- Cinq années d' observation sur les *Theclinae* de Guyane Française (Lep: Lycaenidae). In : LACOMME & MANIL (eds.). Lépidoptères de Guyane. *Bull. Lep. Par.Hors.*, -Série: 49-62.
- FREITAS, A., BENSON, W., MARINI-F., O. & CARVALHO, R.M., 1995.,- Territoriality by the dawn's early light: The neotropical owl butterfly *Caligo idomeneus* (Nymph: Brassolinae). *J. Res. Lepid.*, 34: 14-20.
- MURILLO, J., 2001.,- Las Annonaceae de Colombia. *Biota Colombiana*, 2 (2): 49-58.
- NICOLAY, S.S., 1971.,- A review of the genus *Arcas* with descriptions of new species (Lyc: Strymonini). *J. Lepid. Soc.*, 25 (2): 87-109.
- NIELSEN, G., SALAZAR, J.A. & VARGAS, J.I., 2001.,- Reconocimiento de Rhopalocera en algunas taxocenosis de Lepidópteros chocoanos y amazónicos. *Bol. Cient. Mus. Hist. Nat. U de Caldas*, 5: 99.
- PINHEIRO, C.E., 1991.,- Territorial hilltopping behavior of three swallowtail butterflies (Lep: pap.) in western Brazil. *J. Res. Lepid.*, 29 (1-2): 134-142.
- PRIETO, C. & DAHNERS, H., 2006.,- Sección morfología y comportamiento, ecología, evolución y sistemática de Eumaeini (Lep: Lyc.) del cerro San Antonio: dinámica de la riqueza y comportamiento de "Hilltopping". *Rev. Col. Ent.*, 32 (2): 179-190.
- ROBBINS, R.K., 2004.,- Tribe Eumaeini- *Arcas* Swainson, 1832: 119. In: LAMAS (ed.). *Atlas of Neotropical Lepidóptera: Checklist*: part 4<sup>a</sup>. Hesperioida & Papilionoidea. ATL + Scient. Publ.
- SALAZAR, J.A., 1996.,- Sobre la concentración de Lepidópteros ropoloceros en la cumbre de un cerro del Noroccidente de Caldas, Colombia (Insecta: Lepidóptera). *SHILAP*, 24 (94): 183-195.
- \_\_\_\_\_, 2001.,- Nuevas observaciones sobre la concentración de Lepidópteros ropoloceros en las cumbres de algunos cerros de Caldas y Antioquia, Colombia (Lep). *Bol. Cient. Mus. Hist. Nat. U. de Caldas*, 5: 66-90.
- \_\_\_\_\_, 2002.,- Palatabilidad de algunas especies de mariposas predadas por mantodea (Insecta: Mantodea; Lepidóptera). *Bol. Cient. Mus. Hist. Nat. U. de Caldas*, 6: 195-212.
- \_\_\_\_\_, 2006.,- Nomenclatural notes of *Arcas splendor* Druce, 1907 in central Colombia with comments on territorial behavior and perching locations (Lep: Lyc.). *Bol. Cient. Mus. Hist. Nat. U. de Caldas*, 10: 209-222.
- SALAZAR, J.A. & CONSTANTINO, L.M., 1995.,- Sobre algunas especies colombianas del género *Arcas* Swainson, 1832 y descripción de una nueva (Lep: Lyc.). *SHILAP*, 23 (90): 123-128.
- TAKEUCHI, T. & IMAFUKU, M., 2005.,- Territorial behavior of a green hairstreak *Chrysophyrysmaragdinus* (Lep: Lyc.): Site tenacity and wars of attrition. *Zoological Science*, 22: 989-994.
- VALENCIA, C., GIL, Z. & CONSTANTINO, L.M., 2005.,- *Mariposas diurnas de la zona central cafetera colombiana*: 185, 196. Colciencias, FNCC.