

Hostplant Records and Natural History Notes on Costa Rican Butterflies (Papilionidae, Pieridae & Nymphalidae)

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Abstract. Hostplant records for 209 species of butterflies in the families Papilionidae, Pieridae and Nymphalidae are reported from various habitats throughout Costa Rica to provide a basis for understanding fine-scale hostplant relationships of neotropical butterflies at the population level. Notes on egg, clutch-size, larval behavior, larval feeding, oviposition behavior, and hostplant microhabitat are given. New and unusual hostplant families and errors in the hostplant literature are discussed, and the possibilities of unrecognized sibling species masquerading under a single species name are indicated.

Introduction

To students of butterflies it has become evident that hostplant relationships play an increasingly important role in butterfly biology. Hostplant data have been used in developing classifications and systematics at the family, subfamily, genus, and species levels (Müller, 1886; Singer et al., 1983; DeVries et al., 1985), and in some cases the hostplant has been used as a character in naming populations (e.g. Murphy & Ehrlich, 1984). Hostplant data are of paramount importance for elucidating broad-scale evolutionary patterns of host use among systematic lineages (Brues, 1924; Ehrlich & Raven, 1965; Benson et al., 1976), for understanding butterfly ecology at the community (Gilbert, 1984) and population (Ehrlich, 1984) levels, for the dynamics of host-breadth and host shifts (Singer, 1983, 1984), and for the development of mimicry theory (Gilbert, 1983) and ecological chemistry (Brower, 1984). In short, hostplant relationships are a basis upon which we rest many of our ideas about butterflies.

Taken as a whole, it appears from surveys of literature records that hostplant relationships are well understood for the majority of the systematic lineages of butterflies (Ehrlich & Raven, 1965; P. Ackery, in prep.), particularly at higher systematic levels. However, this is not true with respect to specific butterfly faunas at the genus and species levels. Perhaps the only places on earth where such relationships are well known,

but not completely known at these levels are in the U.S.A., England, parts of northern Europe and Japan. In these areas fine-scale hostplant data are available for entire faunas which can be used to develop systematic and ecological studies with a critical degree of resolution. In all other areas of the world such data are not available, and this is especially so in the tropics. Although the tropics contain the greatest diversity of butterfly species, compared to temperate regions, hostplant relationships of butterflies are poorly known, and least known of all in the neotropics. If we are to gain an understanding of the butterflies of the neotropics comparable to our knowledge of the temperate regions, it is important to have a more complete picture of hostplant relationships than currently exists. This is a tall order considering that the neotropics contain a butterfly diversity greater than any other region on earth (DeVries, 1986). One very useful method is to develop hostplant lists for butterfly faunas of specific areas.

During a long term and continuing study of the butterfly fauna of Costa Rica I have had the opportunity to rear a number of species, as well as the good fortune to work with colleagues who, although involved in studies of their own, have provided me with hostplant records to augment my work. I here summarize the hostplant records for 209 species of Costa Rican butterflies in the families Papilionidae, Pieridae and Nymphalidae reared between 1976 and 1982 by my colleagues and myself. The purpose of this paper is to provide a starting point for eventually understanding fine-scale hostplant relationships at the population level for neotropical butterflies. Natural history information is provided for both butterflies and hostplants in coded form along with each hostplant record. In the remainder of this paper I highlight some new and unusual hostplant records, point to instances where there may be several species currently placed under one name, and draw attention to what I believe to be errors in previous literature. Additional hostplant records of Costa Rican butterflies and an analysis of the ecological patterns of hostplant use which are evident in the present paper will be discussed in a future publication (DeVries, in prep.).

Materials and Methods

Except where indicated, all hostplant records presented (Appendix I) have resulted from a larva feeding on a plant and developing into an adult. All records are from field collected eggs or larvae, except where otherwise noted. Oviposition records are indicated as such, the butterflies have been positively identified with a voucher specimen taken at the time of oviposition, or in a few cases, determined on the wing with the use of binoculars. Therefore, the vast majority of records reported here have voucher specimens in the collection of the author or the person responsible for the record.

Butterfly Nomenclature. The nomenclature follows DeVries (1986) which is modified and refined from DeVries (1983). Additional systematic references useful

for Costa Rican butterflies may be found in Ackery and Vane-Wright (1985), DeVries et al. (1985), Higgins (1981), Jenkins (1983) and Singer et al. (1983).

Plant Determinations. The hostplants in Appendix (I) are for the most part positively determined to genus (many to species), but in a few instances it was only possible to determine the plants to family due to undescribed taxa or insufficient plant material. The following people have lent their expertise in determining the hostplants: H. Bold, W. Burger, I. A. Chacon, R. Foster, L. D. Gomez, W. Haber, B. Hammil, L. Gilbert, G. Hartshorn, D. H. Janzen, S. Knapp, R. Marquis, R. Pohl, L. Poveda and F. G. Stiles. Useful references for identification of plants of Costa Rica include: Allen (1956), Burger (1971, 1977), Croat (1978), Daniels and Stiles (1979), Janzen and Leisner (1980) and Stiles (1980).

Coded Information in Appendix I: Explanations for the coded sequences in Appendix I are found in Tables I, II and III. This information is found in a series of columns located to the right of each butterfly taxon and corresponds to: hostplant identity, locality of record and who reared the butterfly, egg clutch-size, oviposition behavior, larval behavior, larval feeding and binomic notes concerned with the ovipositing butterfly and microhabit of the hostplant respectively. Further details on localities, habitats, and butterfly biology in Costa Rica are found in DeVries (1986).

All hostplant records reported here are from Costa Rica except those coded *AA and *KS. These come from Barro Colorado Island, Panama and augment Costa Rican records. Except for those hostplant records marked with an asterisk and a set of initials preceding the locality code, all records are those of DeVries. The initials refer to records of the following people: AA = A. Aiello, IC = I. A. Chacon, RC = R. Cubero, SK = S. Koptur, LEG = L. E. Gilbert, WH = W. Haber, DJ = D. H. Janzen, JM = J. Mallet, RM = R. Marquis, KS = K. Steiner, MCS = M. C. Singer, FGS = F. G. Stiles, and TR = T. Ray.

Comments

The hostplant records in Appendix I completely corroborate the pattern of relationship between hostplants and butterflies as described by Ehrlich and Raven (1965). There are, however, a few records in Appendix I which deserve special comment because they either represent hostplant families not reported in Ehrlich and Raven (1965), or they indicate a need for further study within the neotropical butterfly fauna as a whole. These records are briefly discussed here by butterfly family.

Papilionidae: The record of *Papilio cleotas* feeding on Moraceae requires confirmation since no papilionid species is known to feed on this plant family anywhere in the world. Hostplant records in the literature frequently report that *Papilio crespontes* and *P. thoas* both utilize Rutaceae and Piperaceae as larval hostplants. Based on field experience and the data presented here I believe that such records are misidentifications of the butterfly species; the species are extremely similar in appearance. In Costa Rica *P. crespontes* larvae feed only on Rutaceae,

and conversely, *P. thoas* larvae feed only on Piperaceae.

Pieridae: The records of *Catasticta* and *Pereute* feeding on Loranthaceae and the behavior and morphology of larvae and pupae suggest a close affinity to the extensive Old World genus *Delias*. The records also further amplify those reported in Ehrlich and Raven (1965). However, I believe the reference of *Pereute* feeding on the Lauraceae (Jørgensen, 1932) is in error (DeVries, 1982). I also believe the record of *Perrhybris lypera* feeding on Lauraceae is a plant misidentification (see Young, 1980, 1982; DeVries, 1982). The records of *Aphrissa statira* feeding on Bignoniaceae are very unusual for the Pieridae, and suggest either a chemical convergence between certain Bignoniaceae and Caesalpiniaceae or that there is more than a single species under the name *A. statira*.

Nymphalidae: The records of *Agrias amydon* on Erythroxylaceae represent an unusual hostplant family for the subfamily Charaxinae. It is further notable because of commercial interest in both the butterfly and chemistry of secondary chemicals of the hostplant genus. The record of *Zaretis itys* feeding on Piperaceae is unusual since its usual hostplants are Flacourtiaceae in the same habitat. Several interesting records are reported from the Nymphalinae. In my experience, the larvae of *Eunica monima* feed only on Burseraceae. I believe that the original record of this species feeding on Rutaceae (Dyar, 1912) represents a misidentification of the hostplant which subsequently became embedded in the literature. Muysshondt (1975) stated that Müller (1886) was in error for reporting *Diaethria marchalli* to feed on *Trema* (Ulmaceae) and said that in El Salvador he only found this species feeding upon Sapindaceae. In Costa Rica, *Trema* is the only hostplant for *D. marchalli* of which I am aware, suggesting that either the butterfly switches hostplant families in areas north of Costa Rica, or that there are two species of butterfly involved here. Data reported here suggest either that certain species of *Adelpha* are highly polyphagous, or that there are cryptic species involved under the same name (e.g. *A. boreas*, *A. celerio*, *A. heraclea*). *Adelpha melanthe*, on the other hand, changes hostplant family from east to west in Costa Rica, but all are closely allied within the Urticales. In the subfamily Satyrinae the record of *Megeuptychia antonoe* feeding on Cyclanthaceae is unusual, but Cyclanthaceae has recently been demonstrated to be a host of *Caligo* in Costa Rica as well (I. A. Chacon, pers. comm.). The record of *Euptychia insolata* feeding on Neckeraceae is the first record for any butterfly to utilize a member of the Bryophyta as a larval hostplant, although some members of the genus are known to feed on Lycopsidea (Singer et al., 1983). Lastly, the records of *Pierella* and *Cissia confusa* on Poaceae, Marantaceae, Palmae and Heliconiaceae indicate a high degree of polyphagy, mostly within the same habitat.

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Table 1. Numerical Codes for Hostplant Families in Appendix I.

1 Acanthaceae	17 Erythroxylaceae	33 Poaceae
2 Amaranthaceae	18 Euphorbiaceae	34 Poaceae:Bambusoidea
3 Annonaceae	19 Fabaceae	35 Rubiaceae
4 Aristolochiaceae	20 Flacourtiaceae	36 Rutaceae
5 Asclepidaceae	21 Heliconiaceae	37 Sapindaceae
6 Bignoniaceae	22 Hernandiaceae	38 Selaginellaceae
7 Brassicaceae	23 Lauraceae	39 Simaroubaceae
8 Bromeliaceae	24 Loranthaceae	40 Solanaceae
9 Burseraceae	25 Marantaceae	41 Tiliaceae
10 Caesalpiniaceae	26 Melastomataceae	42 Tropaeolaceae
11 Capparidaceae	27 Mimosaceae	43 Turneraceae
12 Caricaceae	28 Moraceae	44 Ulmaceae
13 Compositae	29 Neckeraceae	45 Umbelliferae (=Apiaceae)
14 Cyclanthaceae	30 Palmae (=Arecaceae)	46 Urticaceae
15 Cyperaceae	31 Passifloraceae	47 Verbenaceae
16 Ericaceae	32 Piperaceae	

Table 2. Codes for Rearing Localities Cited in Appendix I.

AT = Atenas (AL)	LS = Finca la Selva (HER)
BLH = Bajo la Hondura (SJ)	MV = Monte Verde (PUN)
BAR = Barranca (PUN)	PATT = Patarra (SJ)
BCI = Barro Colorado Island (PAN)	RCN = Rincón de Osa (PUN)
CDM = Cerro de la Muerte (SJ)	SV = San Vito de Java (PUN)
CURR = Curridibat (CAR)	SRNP = Parque Santa Rosa (GUAN)
COP = Copey (SJ)	SJ = San José (SJ)
CAN = Cañas (GUAN)	TUR = Turrialba (CAR)
CAR = Parque Braulio Carrillo (SJ)	UCR = Universidad de Costa Rica (SJ)
CVDO = Parque Corcovado (PUN)	VTUR = Volcán Turrialba (CAR)
EST = Estrella de Cartago (CAR)	VBVA = Volcán Barva (HER)
ELROD = Finca el Rodeo (SJ)	VSM = Volcán Santa María (GUAN)
GOL = Golfito (PUN)	VDS = Virgen del Socorro (AL)
HER = Heredia (HER)	VM = Volcán Miravalles (AL)
LALT = Finca las Alturas (PUN)	

Costa Rican Province Codes are: (AL) = Alajuela, (CAR) = Cartago, (GUAN) = Guanacaste, (HER) = Heredia, (PUN) = Puntarenas, (SJ) = San José. The code (PAN) = the country Panamá.

Table 3. Codes Used for Eggs, Larvae and Hostplant in Appendix I.

Eggs and Oviposition

S = eggs laid singly

C = eggs laid in clusters

1 = female may oviposit several times on same plant.

2 = female usually oviposits only once on a plant.

3 = female always oviposits several times on same plant.

Larval Behavior

S = solitary

G = gregarious

1 = larvae feed on new, then old leaves.

2 = larvae will feed on all leaves.

3 = larvae feed only on young leaves.

4 = larvae feed only on older leaves.

5 = larvae feed on plant parts other than leaves.

Hostplant Microhabitat

1 = female oviposits on plants occurring in open areas.

2 = female oviposits on plants occurring in forest.

3 = female oviposits on plants occurring at forest or riparian edges.

4 = female oviposits on plants occurring in forest light gaps.

Appendix I. Reading from left to right the information in this appendix is divided into five columns corresponding to: 1) butterfly taxa, 2) hostplant, locality and authorships of rearing, 3) clutch-size of eggs and frequency of oviposition, 4) larval behavior and feeding and 5) microhabitat of hostplant and natural history notes. Explanations for the coded sequences are found in the text and in Tables 1, 2 and 3.

FAMILY: PAPILIONIDAE

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: Battus			
<i>polydamas</i> L.	<i>Aristolochia</i> (4) <i>grandiflora</i> S.J <i>angustida</i> SRNP undetermined LS	C G1 C G1	All hostplants are 3 and 4. Egg clusters range from 5 to 10.
GENUS: Parides			
<i>belus</i> <i>urrus</i> Kol.	<i>Aristolochia</i> (4) <i>grandiflora</i> S.J, TUR. undetermined LS. undetermined CVDO undetermined SV	S1 S1 S1 S1 S1 S1 S1 S1	Hostplants are 3, 4 and riparian edges.
<i>crassus</i> Cr.	<i>Aristolochia</i> (4) <i>veraguensis</i> CVDO undetermined LS	C G1 C G1	Hostplants are 2, 3, 4 and riparian edges. Egg clusters range from 20 to 40 eggs.
GENUS: Parides			
<i>photinus</i> Dblidy.	<i>Aristolochia</i> (4) <i>pilosa</i> ELROD, AT.	C G2	Hostplants are 3 and 4 provided they receive direct sunshine. Plants are usually juvenile growing along the ground.
<i>childeranae</i> Gray	<i>Aristolochia</i> (4) <i>tonduzii</i> LS. undetermined *RM LS	S1 S1 S1 S1	Hostplants are all 2, either young or old, provided they have vigorous new growth.
<i>sessostriis</i> <i>zestos</i> Gray	<i>Aristolochia</i> (4) undetermined VM	? ?	This rearing was of six mature larvae all on the same juvenile plant, eating all leaves.

<i>iphidamas</i> Fab.	<i>Aristolochia</i> (4)				
	<i>veraguensis</i> CVDO, AT.	S1	S1	Hostplants are 2, 3, 4 and riparian edges where	
	af. <i>grandiflora</i> CAR.	S1	S1	microhabitats have been slightly disturbed.	
	<i>tonduzi</i> LS.	S1	S1	Plants are either juvenile or mature.	
	undetermined *JM CVDO	?	S1		
<i>lycimenes</i> Boisd.	<i>Aristolochia</i> (4)				
	<i>maxima</i> *IC VSM	?	S1	Hostplants are 3 and 4, either juvenile or	
	undetermined *RM LS.	?	S1	mature with new shoots.	
<i>arcas</i>	<i>Aristolochia</i> (4)				
<i>nylottes</i> Bates	<i>anguicida</i> SRNP	S1	S1	All hostplants are 2, 3, 4, either young or	
	<i>grandiflora</i> VDS	S1	S1	mature plants and usually close to the	
	<i>tonduzii</i> LS	S1	S1	ground.	
	undetermined CAR	S1	S1		
GENUS: Eurytides					
<i>epidaus</i> Dbldy.	<i>Annona</i> (3)				
	<i>reticulata</i> SRNP	S1	S1	Females oviposit on saplings or mature forest	
				trees occurring in sunny places within the	
				forest.	
<i>euryleon</i>	<i>Annona</i> (3)				
<i>clusoculis</i> But.	<i>glabra</i> MV.	S1	S1	Both hostplant genera are 1, 2, 3, 4 and may	
	<i>Guatteria</i> (3)			range from seedlings to mature forest trees. It is	
	<i>oliviformis</i> VSM	S1	S3	of interest that only young leaves of <i>Guatteria</i>	
				are acceptable to larvae.	
<i>branchus</i> Dbldy.	<i>Annona</i> (3)				
	<i>reticulata</i> *DJ (81-SRNP-249)	?	?	Janzen reared this species from a solitary larva.	
				No information on leaves or plant condition.	
<i>orabilis</i> Butler	<i>Guatteria</i> (3)				
	<i>tonduzii</i> VDS	S3	?	The female lays many eggs in the axils of new	
				growth leaves of large subcanopy trees along	
				riparian edges. I have observed oviposition a	
				number of times over the course of three years	
				but have not reared larvae past third instar.	

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Papilio</i> <i>cresphontes</i> Cr.	<i>Citrus</i> (36) several species SV, AT, GOL, PAT. <i>Zanthoxylum</i> (36) <i>setulosum</i> SRNP, CAN, CVDO <i>Essenbeckia</i> (36) <i>litoralis</i> *DJ (79-SRNP-106)	S1 S1 S1 S1 S1 S1	All <i>Citrus</i> = 1, <i>Zanthoxylum</i> = 2, 3 on medium sized trees in the forest. Janzen's record is from a late instar larva.
<i>thoas</i> <i>nealces</i> R & J	<i>Piper</i> (32) <i>tuberculatum</i> SRNP, AT <i>sancti-felicis</i> LS <i>marginatum</i> *DJ (81-SRNP-1046) <i>amalago</i> *DJ (81-SRNP-827) <i>auritum</i> LS <i>multiinervium</i> *RM LS <i>reticulatum</i> *JM CVDO <i>friedrichsthalii</i> *JM CVDO undetermined VDS	S1 S1 S1 S1 S1 S1	All plants are either 1 or 4 depending on the species and the habitat. All eggs are S2; all larvae are S1.
<i>polixenes</i> <i>stabilis</i> R & J	<i>Apium</i> (45) <i>leptophyllum</i> SJ,VDS,VB, PAT,COP, TUR. <i>Foeniculum</i> (45) <i>vulgare</i> MV.	S1 S2 S1 S2	Both hostplants are 1, females oviposit on young and mature plants.
<i>cleotas</i> <i>archytas</i> Hop.	<i>Sorocea</i> (28) <i>trophoides</i> *WH VM	? ?	Haber reared this species from a solitary mature larva feeding on mature leaves. This represents a very unusual record for the Papilionidae.
<i>victorinus</i> <i>vulneratus</i> Butler	<i>Persea</i> (23) <i>americana</i> *WH MV	? ?	Haber reared this species from a solitary late

instar larva feeding on all leaves of an open grown tree.

<i>birchalli</i> Hew.	<i>Hernandia</i> (22)	S2	S3
	<i>didymanthera</i> LS	?2	S3
	undetermined CAR	S?	S3
	undetermined *RM LS		
<i>anchisades</i>	<i>Cassimiroa</i> (36)	C	G1
<i>ideaus</i> Fab.	<i>edulis</i> SJ		
	<i>Citrus</i> (36)		
	various species CAR, CVDO, TUR, LS,		
	PAT	C	G1
	<i>Zanthoxylum</i> (36)	C?	G1
	<i>setulosum</i> *DJ (79-SRNP-163)		

FAMILY: PIERIDAE

GENUS: *Dismorphia*

<i>amphiona</i>	<i>Inga</i> (27)	S1	S2
<i>praxinoe</i> Dbldy.	undetermined CAR	S1	S2
	undetermined LS	S1	S2
	<i>sapindoides</i> *SK TUR	S1	S2
	<i>densiflora</i> *SK TUR	S1	S2
<i>eunoe</i>	<i>Inga</i> (27)	S1	S?
<i>desine</i> Hew.	undetermined VB		
<i>zathoe</i>	<i>Inga</i> (27)	S1	S3
<i>pallidula</i> But. & Dru.	undetermined BLH	S1	S3
	undetermined CAR	S1	S3
	<i>densiflora</i> *SK MV	S1	S3

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>crisia</i> <i>lubina</i> But.	<i>Inga</i> (27) undetermined EST undetermined *SK MV <i>Pithecellobium</i> (27) <i>brenesii</i> *WH MV	S1 S1 ?	All hostplants are 2, 3 and 4 and range from understorey saplings to mature canopy trees. Females will lay from 5 to 15 eggs on the same plant depending on the size of the plant.
<i>zaela</i> <i>oreas</i> Sal.	<i>Inga</i> (27) undetermined CAR	S1 S2	Hostplants are 3 and 4 and all are saplings in the understorey or in shady light gaps.
GENUS: <i>Lietnix</i> <i>nemesis</i> G & S	<i>Inga</i> (27) <i>mortonia</i> *SK MV <i>longispica</i> *SK MV <i>brenesii</i> *SK MV <i>densiflora</i> *SK MV	S1 S3 S1 S3 S3 S3	Hostplants are 3 and 4. This species can apparently feed on a variety of species of <i>Inga</i> but is restricted entirely to new growth leaves.
GENUS: <i>Anteos</i> <i>clorinde</i> Godart	<i>Cassia</i> (10) <i>emarginata</i> SRNP	S1 S2	Hostplants are 1 and may be young or mature.
<i>mareula</i> Fab.	<i>Cassia</i> (10) <i>emarginata</i> SRNP	S1 S1	Hostplants are 1 and may be young or mature.
GENUS: <i>Phoebis</i> <i>argantea</i> Fab.	<i>Cassia</i> (10) <i>biflora</i> SRNP <i>fruticosa</i> LS <i>Pentaclethra</i> (27) <i>macroloba</i> LS	S1 S1 S1 S1 S1	All hostplants are 1 except <i>Pentaclethra</i> which may be 4. All range from saplings to mature trees and may be seedlings in <i>Pentaclethra</i> .

<i>philea</i> L					
<i>Inga</i> (27)					
<i>vera</i> *DJ (79-SRNP-387)	?	S			
<i>ruiziana</i> *JM CVDO	?	S			
<i>Cassia</i> (10)					
<i>grandis</i> SJ	S1	S1		All plants are 1 or 3 and range in size from young to mature forest trees.	
<i>alata</i> SJ	S1	S1			
<i>leptocarpa</i> *DJ (79-SRNP-398)	?	S?			
<i>hayesiana</i> *DJ (82-SRNP-4)	?	S?			
<i>fruticosa</i> *RM LS	?	S?			
<i>Cassia</i> (10)					
<i>fruticosa</i> *RM LS	S1	S3		Marquis records this species from numerous larvae feeding only on new leaves of an isolated tree in an open area.	
<i>sennae</i> Cr.					
<i>Cassia</i> (10)					
<i>biflora</i> SRNP	?	S?		All hostplants are 1 or 3 and usually sapling trees.	
<i>obtusifolia</i> *DJ (79-SRNP 407)					
<i>Callichlamys</i> (6)					
<i>latifolia</i> *DJ (81-SRNP-72)	?	S3		Janzen reared this species from solitary late instar larvae only on new leaves. These records are the first for the Pieridae feeding on the Bignoniaceae.	
"Woody vine" (6)					
undetermined *DJ (79-SRNP-10918)	?	S3			
<i>Eurema</i>					
<i>mexicana</i> Feld.					
<i>Diphysa</i> (19)					
<i>robinoides</i> HER	S1	S3		Hostplant is 1 or 3 in bright sunshine. Plants range from saplings to mature trees.	
<i>Cassia</i> (10)					
<i>fruticosa</i> LS	S1	S1		Hostplant is 1 and ranges from saplings to mature trees. Mature larvae are able to feed on old leaves.	
<i>albula</i> Cr.					

GENUS: **Aphrissa**

statira Cr.

GENUS: **Eurema**

mexicana Feld.

albula Cr.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>dina</i> West.	<i>Picramnia</i> (39) <i>alleni</i> ELROD <i>quaternaria</i> SRNP	S1 S3 S1 S3	Hostplants are 2, 3 or 4 provided there is some shade. Plants range from saplings to mature trees.
<i>daira</i> Feld.	<i>Aeschynomene</i> (19) undetermined SRNP, CAN.	S1 S1	Hostplant 1, usually in recently disturbed pastures and roadsides.
GENUS: <i>Catasticta</i> <i>teutila</i> Dbldy.	<i>Dendrophthora</i> (24) <i>costaricensis</i> VTUR, CDM	C G2	The hostplant is an epiphytic parasite. There has been confusion in the literature, because the host tree rather than the parasite was often taken to be the hostplant of the butterfly. Females oviposit on mature hostplants occurring on mature emergent canopy trees or on large remnant trees in pastures.
<i>theresa</i> Butler	<i>Antidaphne</i> (24) <i>viscoides</i> COP	C G2	The hostplant is an epiphytic parasite of <i>Alnus</i> (Betulaceae) that occurs along riparian edges. Egg clusters range from 10 to 50 eggs.
<i>nimbice</i> <i>bryson</i> G & S	<i>Struthanthus</i> (24) undetermined *IC PAT	? G2	Chacon reared this species from a mass of early instar larvae feeding on all leaves. The hostplant is an epiphytic parasite of forest trees.
GENUS: <i>Perente</i> <i>cheops</i> Staud.	<i>Antidaphne</i> (24) <i>viscoides</i> COP	C G	This is a single cluster of eggs after I observed oviposition. Larvae have not been reared past first instar.

charops Boisd.

"mistletoe" (24)
undetermined LALT

C I have repeatedly watched, with binoculars, several females oviposit large clusters of eggs on what was certainly Loranthaceae. In addition I have seen large groups of larvae feeding on leaves of the same epiphytic parasite. These larvae descended the tree trunk and pupated on the tree trunk. The hostplants were growing on large emergent canopy trees along riparian edges.

GENUS: *Hesperocharis**crocea* Bates

Struthanthus (24)
undetermined *IC SJ

? ? Chacon reared this species from a small aggregation of late instar larvae feeding on all leaves. The hostplant is an epiphytic parasite.

GENUS: *Itaballia**demophile* J & T

Capparis (11)
indica SRNP, BAR
frondosa *WH CAN

S1 S1 Hostplants are 3 and 4 and are mature woody shrubs.
? S1

*caesia**tenuicornis* B & D

Podandrogynae (11)
pulcherrima BLH, CAR, COP, SV

S1 S1 Hostplant is 2 or 3 usually along riparian edges. Females oviposit on young and mature plants. Larvae also feed on flower buds.

GENUS: *Pteriballia**mandella**noctipennis* B & D

Capparis (11)
pseudocacao *WH MV

? S? Haber reared this species from a solitary late instar larva feeding on all leaves. The plant occurred as a small understory tree.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Perrhybris</i> <i>pyrrha</i> Fab.	<i>Capparis</i> (11) <i>isthmensis</i> CVDO	C G2	Hostplant is 2 and 4, either young or mature tree.
<i>lypera</i> Kollar	<i>Capparis</i> (11) <i>pittieri</i> LS <i>pittieri</i> *WH LS undetermined *LEG LS	C G2 C ?	Hostplants are 2, 3 or 4, ranging from seedling to sapling plants. Egg clusters range from 10 to 50 per leaf.
GENUS: <i>Ascia</i> <i>monuste</i> L.	<i>Lepidium</i> (7) undetermined SJ <i>Crataeva</i> (11) undetermined *LEG CVDO	S1 S1 S1 ?	Hostplant is always 1 and in areas of recent disturbance. Both young and mature plants are acceptable to ovipositing females. The <i>Crataeva</i> record is an oviposition as viewed through a Questar telescope.
<i>josepha</i> G & S	<i>Capparis</i> (11) <i>indica</i> SRNP, CAN <i>incana</i> *DJ (81-SRNP-1086)	S1 S1 ? S1	Hostplants are 3 and 4 and may be sapling or mature trees.
GENUS: <i>Leptophobia</i> <i>aripa</i> Boisd.	<i>Nasturtium</i> (7) <i>officinale</i> SV, EST, CAR. <i>Tropaeolum</i> (42) <i>maritzianum</i> VDS, CAR	C G2 C G2	Both hostplants are riparian edge species and usually grow in bright sunshine. Plants may be young or mature.

FAMILY: NYMPHALIDAE
SUBFAMILY: CHARAXINAE

GENUS: Archaeoprepona

demophon L.
Nectandra or *Ocotea* (23)
 undetermined LS
 S1 S1 Hostplants are 3 or 4 and range from young to mature trees. Larvae rest on frass chains.
Ocotea (23)
 ? S1
veraguensis *DJ (81-SRNP-218)
Persea (23)
 S1 S1 Hostplants may be 1, 2, 3 or 4 depending on the habitat and range from seedlings to mature forest trees. Larvae rest on frass chains.
americana VB
 ? S?
Phoebe (23)
 undetermined *WH MV

GENUS: Prepona

laertes
octavia Fruh.
 ? S?
 Records are from late instar larvae which fed on all leaves of a forest edge tree.

GENUS: Agrias

amydon
philatelia DeVr.
 ? S2 Both records are from solitary late instar larvae feeding on all leaves. The hostplant is an understory shrub along edges and in gaps.
 ? S2
Erythroxylum (17)
havanense *DJ (80-SRNP-209)
 undetermined *TR LS

GENUS: Siderone

marthesia Cr.
 ? S2 The hostplants are 2, 3 or 4 and range from saplings to mature trees. *Zuelania* records only on saplings.
 ? S2
Casearia (20)
sylvestris *DJ (81-SRNP-339)
Zuelania (20)
quidonia *DJ (81-SRNP-1045)

GENUS: Zaretis

itys Cr.
 S1 S1 All hostplants are 2, 3 and 4 and range from saplings to mature forest trees, except *Piperaceae*, which are herbaceous. This species
 S1 S1

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
	<i>Casearia</i> (20)		
	<i>nitida</i> LS	S1 S1	feeds on a wide variety of hosts at La Selva, which also may be found to be the case in the Pacific drainage. Of interest is that Atlantic and Pacific drainage adults look very different; a detailed comparison of the early stages should provide an insight to whether or not the name <i>ellops</i> should be applied to the Pacific drainage insects.
	<i>arborea</i> LS	S1	
	<i>corymbosa</i> *DJ (81-SRNP-272)	?	
	<i>arguta</i> *DJ (81-SRNP-232)	?	
	undetermined *JM CFDO	?	
	<i>Piper</i> (32)		
	<i>arietanum</i> *RM LS	?	
GENUS: <i>Consul</i>			
<i>fabius</i> Dbldy.	<i>Piper</i> (32)	S1 S2	Hostplants are 2, 3 and 4. Early instars rest on frass chains, later instars rest in a tube.
	<i>sanciti-felicis</i>	S1	
	<i>tuberculatum</i>	S1 S2	
	undescribed species	?	
	<i>auritum</i> *JM CVDO	?	
	<i>amatago</i> *DJ (81-SRNP-600)	?	
<i>jansonii</i> Salvin	<i>Piper</i> (32)		
	<i>reticulatum</i> *JM CVDO	?	All records of this species are from solitary late instar larvae from hostplants growing along forest or riparian edges.
	undetermined CAR	?	
	<i>reticulatum</i> *RM LS	?	
GENUS: <i>Hypna</i>			
<i>clytemnestra</i> Cr.	<i>Croton</i> (18)		
	<i>schiedeanus</i> *RM LS	?	Marquis reports this from a solitary late instar larva feeding on a sapling plant. The larva rests on frass chains.
GENUS: <i>Memphis</i>			
<i>euryptyle</i>	<i>Croton</i> (18)		

<i>glycerium</i> Dbldy.	<i>Croton</i> (18) <i>jalapensis</i> ELROD, AT	S1	S1	saplings to mature trees. Hostplant is 3, ranging from saplings to mature trees. Early instars rest on frass chains, later roll a tube.
<i>aieda</i> Guer.-Men.	<i>Acalypha</i> (18) <i>garnieri</i> SRNP	S1	S1	Hostplant is 3 or 4, ranging from saplings to mature shrubs. Early instars make frass chains, later they roll a tube.
<i>arginussa</i> <i>eubaena</i> Boisd.	<i>Croton</i> (18) undetermined SJ, VB undetermined AT <i>schiedeanus</i> LS	S1 ? ?	S2 S2 S2	Hostplants are 2, 3 or 4 and range from saplings to mature forest trees. Early instars make frass chains, later they roll a tube.
<i>pithyusa</i> Felder	<i>Croton</i> (18) <i>jalapensis</i> AT, SJ <i>schiedeanus</i> *JM CVDO	S1 ?	S2 S?	Hostplants are 1, 2, 3 or 4 and range from saplings to mature forest trees. Early instars make frass chains, later they roll a tube.
<i>beatrix</i> Druce	<i>Piper</i> (32) undetermined EST, CAR	?	S2	This species is recorded from solitary late instar larvae feeding on all leaves. The hostplant is a semi-woody vine growing at the bases of large trees in the forest.
<i>artacaena</i> Hew.	<i>Croton</i> (18) <i>schiedeanus</i> LS <i>schiedeanus</i> *JM CVDO	S1 ?	S2 S2	Hostplants are 3 or 4 but most commonly along riparian edges. Early instars make frass chains, later they make tubes.
<i>oenomais</i> Boisd.	<i>Croton</i> (18) <i>bilbergianus</i> *AA (79-70, 79-101)	S	S3	Aiello reared these from Barro Colorado, Panama. There the hostplant occurs as a small tree in light gaps.
<i>cleomestra</i> Hew.	<i>Piper</i> (32) undescribed species LS <i>xanthostachyum</i> *RM LS	? ?	S2 S2	Hostplants are 2 or 4; one is an epiphytic vine, the other terrestrial. Early instars make frass chains, later they roll tubes.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>morvus</i> <i>boisduvalii</i> Comst.	<i>Persea</i> (23) undetermined *IC LS	? S2	Chacon records this species from a solitary late instar larva. The host was a mature tree along forest edge. Mature larvae roll tubes.
<i>ferrerii</i> G & S	<i>Ocotea</i> (23) <i>veraguensis</i> *DJ (81-SRP-939)	? S1	Hostplant is 2, 3 or 4. Early instars make frass chains, last instars roll tubes.
FAMILY: NYMPHALIDAE SUBFAMILY: NYMPHALINAE			
GENUS: Marpesia			
<i>petreus</i> Bates	<i>Ficus</i> (28) undetermined SRNP <i>goldmani</i> *DJ (81-SRNP-158a)	S1 S1 ? S1	Hostplants are 1, 2, 3 and 4 and usually large trees.
<i>chiron</i> Fab.	<i>Brosimum</i> (28) <i>alicastrum</i> *DJ (80-SRNP-113) <i>lactescens</i> *RM LS	? S2 S2	Both records are from late instar larvae on mature forest trees.
<i>merops</i> Boisid.	<i>Brosimum</i> (28) <i>lactescens</i> LS	? ?	This is a probable record based on mature larvae crawling down the tree trunk to pupate. The tree was isolated along forest edge. This record needs verification.
GENUS: Colobura			
<i>dirce</i> L.	<i>Cecropia</i> (28) various species: SRNP, MV, SV, TUR, SJ, LALT, VSM, CVDO, AT		All of my records have eggs laid in loose clusters of 10 to 30 eggs on saplings to mature trees. These have resulted in small clusters of

larvae that are semi-gregarious. J. Mallet reared "dirce" from La Selva and found gregarious masses of larvae composed of more than 30 individuals from emergent trees. There are striking differences in larval coloration suggesting that perhaps there are two species (*dirce* and *dirceoides*) as indicated in Sepp (1928).

GENUS: Historis

odius Fab.

Cecropia (28)

peltata SRNP, AT, VSM
undetermined LS, CAR, TUR

S1

S2

Hostplants are usually 3 or 4 depending on the habitat, ranging in size from saplings to mature trees. Early instars make frass chains, later they rest on the apical meristem.

acheronta Fab.

Cecropia (28)

peltata SRNP, CVDO

S1

S1

Hostplants are usually saplings along edges. Larval behavior as for *odius*.

GENUS: Smyrna

blomfieldia
datis Fruh.

Ureia (46)

baccifera SRNP

?

S2

I have reared this from a solitary late instar larva. In SRNP the hostplant occurs as a riparian plant.

GENUS: Pycina

zamba zelys G & S

Ureia (46)

undetermined MV

undetermined CAR

S1

?

S1

?

These records are from a number of oviposition records from mature plants along forest edge. I have not reared the larvae.

GENUS: Tigridia

acesta L.

Cecropia (28)

undetermined LS, CAR

Females oviposit singly but tend to lay in loose

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Hamadryas</i> <i>februa</i> Hubner	undetermined *JM <i>Paurouma</i> (28) <i>aspera</i> LS undetermined CAR		clusters of 3 to 8 eggs on the same leaf. Larvae are solitary or semi-gregarious and feed only on young leaves. Hostplants are always saplings and seedlings, and occur as 2, 3 or 4.
	<i>Dalechampia</i> (18) <i>scandens</i> SRNP, AT	S1 S1	Hostplant is 2, 3 or 4 and ranges from juvenile to mature plants.
<i>amphinome</i> <i>mexicana</i> Lucas	<i>Dalechampia</i> (18) <i>scandens</i> SRNP	C G1	Hostplant is 3 or 4; eggs in long chains.
<i>guatemalena</i> Bates	<i>Dalechampia</i> (18) <i>scandens</i> SRNP	S1 S1	Hostplant is 3 or 4 or vines ascending into the forest canopy.
<i>laodamia</i> <i>saurites</i> Fruh.	<i>Dalechampia</i> (18) undescribed species *JM LS	? S2	Mallet reports this species from a solitary late instar larva. Hostplant was along forest edge ascending into the canopy.
<i>ipheme</i> Bates	<i>Dalechampia</i> (18) <i>cissifolia</i> *AA (78-66, 78-79)	S S3	Aiello reports this from Panama where the hostplant occurs in open areas and along forest edges.
GENUS: <i>Ectima</i> <i>rectifascia</i> But. & Dru.	<i>Dalechampia</i> (18) undescribed species LS	S1 S3	Hostplants are 3 and 4 and are all juvenile plants.
GENUS: <i>Eunica</i> <i>monima</i>	<i>Bursera</i> (9)		

<i>modesta</i> Bates		S1	S3	Hostplant can be 1, 2, 3 or 4 and during outbreak years the larvae can defoliate entire trees.
<i>mira</i> G & S	<i>simaruba</i> SRNP <i>Mabea</i> (18) <i>occidentalis</i> *KS-BCI <i>occidentalis</i> LS	?	S5 S3-5	Steiner reports that in Panama larvae are only found on male portions of the inflorescence and not on leaves; plants are riparian. At La Selva I found that eggs are laid on fruiting trees and that first instars will feed on very new leaves; the plants occur in deep forest.
<i>mygdonia</i> Godart	<i>Mabea</i> (18) <i>occidentalis</i> *KS-BCI	?	S5	Steiner reports this species as in <i>mira</i> .
GENUS: Dynamine				
<i>salpensa</i> Bates	<i>Dalechampia</i> (18) undescribed species LS	S1	S5	Hostplant is 3 or 4. Females oviposit only on developing flowers, larvae feed only on flower bracts and developing ovaries. Larvae will not eat leaves.
<i>mylitta</i> Cr.	<i>Dalechampia</i> (18) <i>scandens</i> SRNP, VSM	S1	S3-5	Hostplant is 3 or 4; larvae feed only on new leaves or flower parts.
<i>glauca</i> Bates	<i>Dalechampia</i> (18) <i>cissifolia</i> AT	S1	S3-5	Hostplant is 3 or riparian edge; larvae only feed on new leaves or flower parts.
<i>hopi</i> <i>albicola</i> Rober	<i>Dalechampia</i> (18) undescribed species LS	S1	?	Mallet records this as an oviposition record on flower buds.
GENUS: Temenis				
<i>laothoe</i> <i>libera</i> Fab.	<i>Serjania</i> (37) <i>paucidentata</i> CVDO undetermined LS <i>atrolineata</i> *DHJ (81-SRNP-1092) <i>Paulinia</i> (37) undetermined *RM LS	S1 S1 ?	S2 S2 S2	Hostplants are 2, 3 and 4 and range from juvenile to mature plants. Females oviposit on damaged portions of leaves. Early instars make frass chains, later rest on leaf edges.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Epiphile</i> <i>adrasta</i> Hew.	<i>Serjania</i> (37) undetermined MV <i>Cardiospermum</i> (35) undetermined SJ	S1 S2 S1 S2	Hostplants are 2 or 4 or as canopy vines and range from juvenile to mature plants. Early instars make frass chains, later instars rest on upperside of leaves.
<i>orea</i> <i>plusios</i> G & S	<i>Serjania</i> (37) undetermined CAR	S1 S2	Hostplants are 2, 3 or 4 or canopy vines. Early instars make frass chains; later instars rest on frass chains or upperside of leaves.
GENUS: <i>Catonephele</i> <i>numilia</i> <i>esite</i> Feld.	<i>Alchornea</i> (18) <i>costaricensis</i> LS	S1 S2	Hostplant is 3 and 4. Females oviposit on sapling sized plants. Early instars make frass chains, later instars rest on the uppersides of leaves.
<i>orites</i> Stichel	<i>Alchornea</i> (18) <i>costariensis</i> LS	S1 S2	Hostplants are 2, 3 and 4. Females oviposit on seedlings and saplings, usually within the seed shadow of a mature tree. Early instars make frass chains, later instars rest on upperside of leaves.
<i>chromis</i> <i>godmani</i> Stichel	<i>Alchornea</i> (18) <i>poasana</i> EST	S1 S?	This is an oviposition record where the female laid single eggs on sapling sized plants along forest edge. Larvae were not reared to adulthood.
<i>nyctimus</i> Wstwd.	<i>Veconiceba</i> (18) <i>pleistemonia</i> *IC LS	? S2	Chacon records this from a solitary larva on a sapling sized tree along forest edge.

GENUS: *Nessaea*
aglaura Dbldy. & Hew.

Alchornea (18)
costaricensis LS
Piukenetia (18)
volutilis *RM LS

S1 S2 *Alchornea* is 2, 3 and 4; all seedlings. Early instars make frass chains, later instars rest on upperside of leaves. Marquis records this species from a solitary late-instar larva feeding on all leaves.

? S2

GENUS: *Diaethria*
eupepla G & S

S1 S2 Hostplants are 2, 3 and 4, and range from juveniles to canopy vines. Early instars make frass chains, later rest on leaves.

marchalli Guer.-Men.

S1 S2 Hostplants are 2, 3, 4 and range from saplings to mature trees. Early instars make frass chains, later they rest on the underside of leaves.

GENUS: *Callicore*
pitheas Latr.

Serjania (37)
mexicana *AA (78-92) BCI

S S1 Aiello states that early instar larvae skeletonize the young leaves, later instars are on all leaves. The hostplant is 3 and 4.

lyca
aerius G & S

S1 S1 Hostplants are 3 and 4, usually canopy or sub-canopy vines.

GENUS: *Pyrhogyra*
edocla Dbldy. & Hew.

Serjania (37)
undetermined SV

? S2 I reared this species from late-instar larvae on large woody vines occurring along forest and riparian edges. Larvae make frass chains.

crameri Aur.

S1 S1 Hostplant is 2, 3 and 4. Females oviposit only on newly emerging leaves. Larvae make frass chains.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Adelpha</i> <i>melanthe</i> Bates	<i>Trema</i> (44) <i>micantha</i> SRNP, VSM <i>Urea</i> (46) undetermined LS undetermined CAR, VDS <i>Myriocarpa</i> (46) <i>longipes</i> LS <i>Cecropia</i> (28) undetermined MV, SV	S1 S2-4	All hostplants are 1, 2, 3 or 4 depending on the habitat and range from young to mature plants. Early instars make frass chains, later instars rest on leaves. Although all leaves are acceptable to larvae, they are usually found on old leaves.
<i>celerio</i> Butler	<i>Urea</i> (46) undetermined LS <i>Miconia</i> (26) <i>argentea</i> *JM CVDO	S1 S2 ?	<i>Urea</i> is 3 and 4 in swampy areas that receive bright sunshine. Early instars make frass chains, later instars rest on uppersides of leaves.
<i>iphicia</i> <i>iphicleola</i> Bates	<i>Calicophyllum</i> (35) <i>candidissimum</i> *DJ (79-SRNP-135)	? S2	Janzen records this species from several late instar larvae feeding on all leaves. The host-plant is 3 and 4.
<i>bassilloides</i> Bates	<i>Ixora</i> (35) <i>nicaraguensis</i> *RM LS <i>nicaraguensis</i> *JM CVDO <i>Alibertia</i> (35) <i>edulis</i> *DJ SRNP "unknown genus" (35) undetermined *WH MV undetermined *IC PAT	? S ? S ? S	All records are from late instar larvae feeding on all leaves. Hostplants are found as 3 and 4.
<i>tracta</i> Butler	undetermined *WH MV undetermined *IC PAT	? S2 ? S2	Both records are from late instar larvae feeding on all leaves of an unidentified woody shrub along forest edges.
<i>boeotia</i> <i>boeotia</i> Felder	<i>Luehea</i> (41) <i>seemannii</i> *JM CVDO	? ?	No information as to larval feeding. The host

commonly occurs as all categories in Corcovado but no information on where early stages are likely to occur.

<i>heraclea</i> Felder	<i>Vitex</i> (47) <i>cooperi</i> LS <i>Piper</i> (32) <i>artianum</i> *RM LS	S1 ? S1	S1 S1	<i>Vitex</i> is in my experience the common host at La Selva and is 3 and 4, usually from saplings to mature trees. <i>Piper</i> record is from a late instar larva feeding on all leaves in light gap. Larvae rest on frass chains. These records represent quite a diverse set of hostplants from the same locality.
<i>boreas</i> <i>tizona</i> Fruh.	<i>Chomelia</i> (35) <i>bispinosa</i> VDS <i>Satyria</i> (16) undetermined *RM LS	S1 ? S?	S? S?	I have not succeeded in rearing this species to adulthood. Early instars on <i>Chomelia</i> feed on new leaves and make frass chains. <i>Chomelia</i> occurs as 3 and 4. Marquis records this species from a solitary late instar larva; <i>Satyria</i> is an epiphyte. This is an unusual record for the family Nymphalidae.
<i>zalmona</i> <i>sophax</i> G & S	<i>Sabicea</i> (35) <i>aspera</i> CAR	S1	S1	Hostplants are along roadsides, riparian edges in bright sunshine. Early instars make frass chains, later instars rest on leaves.
<i>leucothalma</i> <i>mephestopheles</i> But.	"Unknown genus" (35) undetermined SV, CAR	S2	S2	Hostplants are 2, 3 and 4 depending on the habitat and range from seedlings to saplings. Early instars make frass chains, later they rest on upperside of leaves.
<i>cocala</i> <i>lorzae</i> Boisd.	<i>Pentagonia</i> (35) <i>macrophylla</i> LS <i>Psychotria</i> (35) undetermined *RM LS <i>Calycophyllum</i> (35) <i>candidissimum</i> *DJ (81-SRNP-740)	S2 ? ? ?	S4 S? S?	<i>Pentagonia</i> is 2, 3, 4 and is either seedling or sapling sized; <i>Psychotria</i> is sapling-2. Females oviposit on damaged portions of old leaves. Larvae feed on old leaves in all plants and make frass chains.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>cytherea</i> <i>marcia</i> Fruh.	<i>Sabicea</i> (35) <i>villosa</i> LS, CAR, CVDO	S1 S1	Hostplants are 3 and 4 in bright sunshine. All instars rest on frass chains. Mallet reared this species from the same hostplant in Corcovado.
<i>fessonia</i> Hew.	<i>Randia</i> (35) <i>echinocarpa</i> *DJ (79-SRNP-216) <i>karstenii</i> *DJ (81-SRNP-725)	? S2 ? S2	These records are from solitary late instar larvae. Hostplants are 3 and 4.
<i>demiaiba</i> Butler	<i>Rondeletia</i> (35) undescribed species *WH MV	? S3	This record is from a solitary late instar larva; hostplant was 3.
GENUS: <i>Hypanartia</i> <i>lethe</i> Fab.	<i>Phenax</i> (46) undetermined SJ <i>Trema</i> (44) <i>micrantha</i> *DJ (81-SRNP-296)	S2 S1 ? S	Hostplants are 1 and 3. <i>Phenax</i> is an herbaceous plant in open areas, <i>Trema</i> is a secondary succession tree. On <i>Phenax</i> the larva forms a cup from one leaf with silk and rests and eventually pupates in this silk lined cup.
GENUS: <i>Siproeta</i> <i>stelenes</i> <i>biplagiata</i> Fruh.	<i>Blechnum</i> (1) <i>pyramidatum</i> *DJ (81-SRNP-71) undetermined CAR	? S2	Hostplants are all 1.
GENUS: <i>Chlosyne</i> <i>hyperia</i> Fab.	<i>Melanthera</i> (13) <i>aspera</i> SRNP	? S2	Hostplant is 1.

<i>gaudialis</i> Bates	<i>Justicia</i> (1) undetermined	?	S2	Hostplant is 3, 4 ranging from seedling to mature plants.
<i>narva</i> <i>bonplandi</i> Latr.	<i>Amaranthus</i> (2) undetermined LS	C?	G2	Hostplant is 2, 3 and 4 from seedling to mature plants.
<i>lacinia</i> Geyer	<i>Clibadium</i> (13) undetermined *RM LS	C?	G2	Reported from a mass of late instar larvae on an open area plant.
<i>melanarge</i> Bates	<i>Aphelandra</i> (1) <i>deppiana</i> SRNP	C?	G2	Hostplant is 2, 3 and 4 ranging from juvenile to mature plants.
GENUS: <i>Eresia</i> <i>coela</i> Druce	<i>Justicia</i> (1) undetermined LS <i>Herpetacanthus</i> (1) <i>panamensis</i> *LEG LS	C	G	Hostplants are 2, 3 and 4. <i>Justicia</i> are usually seedlings. I have not reared this species to adulthood on <i>Justicia</i> .
GENUS: <i>Castilia</i> <i>ofella</i> Hew.	<i>Justicia</i> (1) <i>comaeta</i> LS <i>Aphelandra</i> (1) <i>storhesi</i> *JM CVDO	C	G2	Hostplants are 2, 3, 4 ranging from juvenile to mature plants. Eggs in clusters of 20 to 40.
<i>myia</i> Hew.	<i>Justicia</i> (1) undetermined LS	C	G?	This record is from a single batch of 10 larvae feeding on a mature plant along forest edge.
<i>eranytes</i> Hew.	<i>Justicia</i> (1) undetermined LS	C	G	I record this from several oviposition records all on seedling plants in open areas. First instar larvae feed on new leaves, later instars feed on all leaves. I have not reared this species to adulthood.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
GENUS: <i>Anthanassa</i> <i>ptolyca</i> Bates	<i>Justicia</i> (1) undetermined **AA (80-65) BCI	?	Aiello records this species from several late instar larvae feeding on all leaves. The host occurs along roadsides as an herbaceous weed.
GENUS: <i>Tegosa</i> <i>anieta</i> Hew.	<i>Vernonia</i> (13) undetermined VDS	C G2	Hostplants are 3 or riparian edges and range from juvenile to mature plants.
GENUS: <i>Euptoeita</i> <i>hegesia</i> <i>hoffmani</i> Comstock	<i>Turnera</i> (43) <i>ulmifolia</i> SRNP, CVDO	S2 S1	Hostplants are 1, either juvenile or mature plants.

FAMILY: NYMPHALIDAE
SUBFAMILY: HELICONIINAE

The bulk of the pertinent Costa Rican hostplant records has been reported by Benson, et. al. (1978) and the reader is referred to that paper. The records presented here complete their picture.

GENUS: <i>Dryadula</i> <i>phaetusa</i> L.	<i>Passiflora</i> (31) <i>talamancensis</i> *JM CVDO	S S2	Mallet records this species from late instar larvae on host growing in open areas of bright sunshine.
GENUS: <i>Eueides</i> <i>vibilia</i>	<i>Passiflora</i> (31)		

- vialis* Stichel ? G4 This species is reported from a solitary cluster of larvae on a host in the forest.
- procula* ? G Janzen reports that larvae make holes in the leaf as early instars and later feed at the leaf margins. The hostplant is a forest tree (see Janzen, 1983).
- vulgiformis* But. & Dru. ? G

SUBFAMILY: ACRAEINAE**GENUS: Actinote**

- leucomelas* Bates C G1 Hostplant is 1, 2, 3 and 4.
- Mikania* (13) undetermined SV, MV, CAR
- lapitha* Staud. ? G2 Hostplant is 1 as a scandent semi-woody vine.
- Mikania* (13) *riparia* CVDO

SUBFAMILY: DANAINAE**GENUS: Anetia**

- thirza* "genus?" (5) S1 ? This represents an oviposition record.
- insignis* Salvin undetermined COP

GENUS: Lycorea

- cleobaea* *Carica* (12) S1 S2 Hostplants are 2, 3, 4 and range from juvenile to mature forest trees. There is variation among
- atergatis* Dist. *papaya* LS, SJ, ELROD S1 S2 hosts as to what plant fraction the larva will eat. Larvae feeding on Caricaceae cut the main
- dolichaula* LS S1 S2 and accessory veins of the leaf and then feed on the leaf portion distal to stem; presumably to avoid secondary compounds.
- Ficus* (26) ? S3
- undetermined *WH MV ? S3
- undetermined *DJ (79-SRNP-113) ? S
- Matalea* (5) ? S
- quirosii* *DJ (79-SRNP-131) ? S
- Asclepias* (5) ? S
- curassavica* *WH MV

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>ilione</i>	<i>Ficus</i> (28)		
<i>albescens</i> Distant	<i>tuerckheimii</i> *WH MV	? S3	Haber reports this from a solitary late instar larva feeding on the stump sprouts of the host-plant growing in an open pasture.

SUBFAMILY: ITHOMIINAE

The bulk of Costa Rican hostplant records for the Ithomiinae may be found in Haber (1978). The following records are additions or new records to his list or records gathered by other workers. In addition in the present list I have included data pertinent to eggs, larvae and adults.

GENUS: *Melinaea*

<i>lilis</i>	<i>Markea</i> (40)	S1 S1	Hostplant is an epiphyte, females oviposit on plants occurring as 2, 3, 4 and range from seedling to mature plants. Early instars cut leaf veins before feeding on tissues distal to the stem.
<i>imitata</i> Bates	<i>neurantha</i> LS, CAR		
<i>scylax</i> Bates	<i>Juanuloa</i> (40)	S1 S1	In the insectary, females of <i>Costa Rica</i> stock preferentially oviposited on this plant (Mexican origin) although <i>Markea</i> and <i>Solandra</i> were present, and both are used by <i>lilis imitata</i> in the insectary. All hostplants are epiphytic.
	<i>mexicana</i> *LEG		

GENUS: *Mechanitis*

<i>polymnia</i>	<i>Solanum</i> (40)	C G2	Hostplants are 3 and 4 and range from seedlings to mature vines.
<i>isthmia</i> Bates	<i>lancaefolium</i> *LEG LS	C G2	
	<i>lancaefolium</i> *RM LS	C G2	
	<i>torvum</i> *FGS UCR	C G2	
<i>menapis</i>	<i>Solanum</i> (40)	C G2	Hostplants are 3 or riparian edges.
<i>saturata</i> G & S	<i>torvum</i> CAR	C G2	
	<i>torvum</i> *FGS UCR	C G2	

GENUS: *Ithomia**patilla* Hew.

Witheringia (40)
solanacea *FGS UCR
 S1 S2 Hostplants are 3 and 4.
 S1 S2

undetermined species *LEG SV

*diasa**hippocrennis* But. & Dru.

S1 S2 Hostplants are 3 and 4.
 S1 S2

heraldica Bates

Acristus (40)
arborescens SV, SJ, UCR, PAT
 S1 S2 Hostplants are 1, 3 and 4 and may be young or
 mature plants.
 S1 S2

Witheringia (40)
 undetermined species *LEG SV,LS
Capricum ? (40)

*celernia**plaginata* But. & Dru.

S1 S2 Hostplant occurs as an understory forest shrub
 and is acceptable as young and mature plants.
 Probably a *Witheringia* (S. Knap, pers.
 comm.).

xeros Bates

Acristus (40)
arborescens *FGS UCR
 S1 S2 Hostplants are 2, 3 and 4.

GENUS: *Ceratinia**tuita**Solanum* (40)

nudum *LEG RCN
nudum *JM CVDO

S1 S2 Hostplants are forest understory shrubs and
 S1 S2 usually occur in heavy second growth vegeta-
 tion.

GENUS: *Dircenna**klugi* Geyer

Solanum (40) *all FGS
umbellatum UCR
torum UCR
lanceolatum UCR
ochraceo-ferruginium

S1 S2 Stiles records all of these species from the same
 S1 S2 locality. All hostplants are 2, 3, 4 provided
 S1 S2 open sunshine during a part of the day.
 S1 S2

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>euchytma</i> Feld.	<i>Solanum</i> (40) <i>ochraceo-ferruginum</i> *LEG LS	S1 S3	Hostplants are 3 and riparian edges.
GENUS: <i>Godyris</i> <i>zygia</i> G & S	<i>Cestrum</i> (40) <i>nocturnum</i> *LEG SV	S1 S2	Hostplants are understory shrubs and range from juvenile to mature plants.
GENUS: <i>Hyaliris</i> <i>excelsa</i> <i>decumena</i> G & S	<i>Solanum</i> (40) <i>lancaefolium</i> SJ, CAR, VDS	S1 S1	Hostplants are 2, 3 or 4 and usually seedling or sapling plants.
GENUS: <i>Hypothyris</i> <i>lycaste</i> <i>callispila</i> Bates	<i>Solanum</i> (40) <i>umbellatum</i> *FGS UCR <i>ochraceo-ferruginum</i>	S1 S2	No data on hostplant habitat.
<i>euclea</i> <i>valore</i> Haensch	<i>Solanum</i> (40) <i>umbellatum</i> *FGS UCR	S1 S?	No data on hostplant habitat.
GENUS: <i>Episcada</i> <i>sabinia</i> <i>opleri</i> Lamas	<i>Solanum</i> (40) "new species" *LEG SV <i>nudum</i> IFGS UCR	C G2 C G2	Hostplants are all second growth shrubs.
GENUS: <i>Pteronymia</i> <i>agalla</i> <i>obscurata</i> Fab.	<i>Solanum</i> (40) <i>brenesii</i> *LEG SV, RCN	S1 S?	No data on hostplant habitat.

<i>artena</i> Hew.					
<i>Lycianthes</i> (40)	undetermined species	*LEG			Gilbert reports this from several eggs on old leaves. No data on hostplant habitat. Mallet reports this from <i>Solanum</i> which are all second growth or forest understory shrubs.
<i>Solanum</i> (40)	<i>confirme</i>		?	S?	
	"new species" *JM		?	S2	
<i>lonera</i> But. & Dru.	<i>Cyphomandra</i> (40)		?	S2	
	<i>costaricensis</i> *LEG SV		S1	S1	Hostplant is 3 and 4. Females oviposit on mature plants.

SUBFAMILY: MORPHINAE**GENUS: Antirhea**

<i>pterocephala</i> G & S	<i>Calypteroogyne</i> (30)	undetermined	CAR		
				?	S4
<i>militades</i> Fab.	<i>Geonoma</i> (30)			?	S4
	<i>longivaginata</i> *RM LS				
				?	S4
					Marquis reports this from a solitary late instar larva from a plant growing in deep shade.

GENUS: Caerois

<i>gerduatus</i> Stich.	<i>Socratea</i> (30)	undetermined	*IC LS		
				?	S2
					Chacon reports this from a solitary late instar larvae feeding on a large tree growing in a swamp.

GENUS: Morpho

<i>amathonte</i> Dey.	<i>Pterocarpus</i> (19)	<i>officinalis</i> CVDO			
				?	S2
					I report this from a solitary late instar larva feeding on a sapling in a swamp. The larva fed nocturnally.

granadensis polybapta Butler

	<i>Machaerium</i> (19)	<i>semani</i>		S?	S2
					I report this from solitary larvae feeding on

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>peleides</i> Esper	<i>Machaerium</i> (19) <i>seemanii</i> LS, CVDO, CAR, VSM undetermined LSALT undetermined VDS <i>bioulatum</i> *DJ (81-SRNP-711) <i>Mucuna</i> (19) <i>mutisiana</i> **confined female MV, SV <i>Dalbergia</i> (19) <i>retusa</i> *DJ (81-SRNP-226) <i>Pterocarpus</i> (19) <i>rohrii</i> **AA (80-16) BCI	S S2 S? S2 S? S2 S? S2 S2 S? S2 ? ?	seedling and sapling sized plants. Females lay on this plant when confined. Hostplants are all 2, 3, 4 and range from seedlings to large forest trees. Larvae are nocturnal feeders and usually crawl off the host leaves while not feeding.
SUBFAMILY: BRASSOLINAE			
GENUS: <i>Dynastor</i>			
<i>darius</i>	<i>Aechmea</i> (8)	S1 S2	Hostplants are 2, 3, 4 and in swampy areas if
<i>stygianus</i> Butler	<i>magdalenae</i> LS undetermined LS <i>Bromelia</i> (8) <i>pinguin</i> *DJ (82-SRNP-1308)	? S2 ? S2	terrestrial. The undetermined record is an epiphyte. Larvae rest in the middle of the leaf blade when not feeding.
GENUS: <i>Opsiphanes</i>			
<i>tamarindii</i>	<i>Heliconia</i> (21) various species LS, CVDO, SJ	S1 S2	Hostplants can be 1, 2, 3 or 4.
<i>sikyon</i> Fruh.	<i>Acrocomia</i> (30) <i>vinifera</i> SRNP <i>Cocos</i> (30) <i>nucifera</i> CVDO	S1 S2 S1 S2 S1 S2	Hostplants are 1 or 3 and range from juvenile to large trees.

<i>staudingeri</i> G & S	<i>Chusquea</i> (34) undetermined *IC PAT	?	S2	Chacon reports this species from late instar larvae which feed nocturnally.
<i>bogatatus</i> Distant	" <i>palm</i> " (30) undetermined *RC VDS	?	S2	Cubero reports this from larvae feeding on juvenile plants growing in the forest.
GENUS: Eryphanis <i>polyxena</i> <i>lycomedon</i> Felder	"exotic bamboo" (34) *RC	S	S2	Cubero reports this from a confined female. Larvae feed nocturnally.

GENUS: Caligo

****NOTE:** It is common in the hostplant literature to record *Caligo* from *Musa*. However this certainly represents a radiation onto an introduced plant; *Musa* is native to the Old World. In my rearing studies of *Caligo* I have found that any species of *Heliconia* will serve as a hostplant and a stimulus to oviposit, both in the field and in the insectary.

<i>memnon</i> Fedler	<i>Heliconia</i> (21) various species SJ, SV, AT, CVDO	See	Comments	Hostplants are 2, 3 or 4 and range from juvenile to mature plants. Females oviposit small clusters of eggs (2-15) and then will lay several clusters on the same plant. All leaves are acceptable to all instars.
<i>eurilochus</i> <i>sultanus</i> Fruh.	<i>Heliconia</i> (21) various species CAR, CVDO, LS, SV, C1	G2	G2	Hostplants are 2, 3, 4 and range from juvenile to mature plants. Larvae are gregarious and aggregations may contain all instars without cannibalism.
<i>atreus</i> Kollar	<i>Heliconia</i> (21) various species CAR, LS, CVDO <i>Asterogyne</i> (30) <i>marshiana</i> *IC LS	C2	G2	Hostplants are 2, 3, 4 and range from juvenile to mature plants. Chacon reports this record from a solitary late instar larva on old leaves. Usually larvae are in small aggregations where all instars may be present without cannibalism.
		?	S	

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>illioneus</i> Kollar	<i>Heliconia</i> (21) various species LS	C2 G2	Hostplants are 2, 3, 4 and may range from juvenile to mature plants. Larvae are gregarious and may be present in all instars without cannibalism.
SUBFAMILY: SATYRINAE			
GENUS: <i>Dulcedo</i>			
<i>polita</i> Hew.	<i>Geonoma</i> (30) undetermined LS <i>Euterpe</i> (30) undetermined LS	S1 S1 S1 S1	Hostplants are all seedlings occurring in well shaded swampy areas.
GENUS: <i>Pierella</i>			
<i>luna</i> Fab.	<i>Heliconia</i> (21) <i>latispatha</i> CVDO <i>Calathea</i> (25) <i>marantifolia</i> *JM CVDO	S2 S2 ? S2	Hostplants are all seedlings occurring in well shaded light gaps.
GENUS: <i>Cylopsis</i>			
<i>helvetia</i> <i>incanescens</i> G & S	<i>Heliconia</i> (21) various species LS, TUR <i>Asterogyne</i> (30) undetermined LS <i>Calathea</i> (25) undetermined LS <i>Panicum</i> (33) undetermined *MCS CVDO	S2 S2 S2 S2 S2 S2	Hostplants are all 2, 3, 4 and are seedlings except for <i>Panicum</i> .
GENUS: <i>Cylopsis</i>			
<i>philodice</i> G & S	<i>Swallenocloa</i> (34)		

argentella But. & Dru.

undetermined COP, CDM S1 S3 Hostplants occur in dense stands in open areas at high elevations.

Chusquea (34)

undetermined COP, PAT C? *G2 Hostplants occur as dense stands along riparian edges or forest edges. Early instars are gregarious, later instars appear to be solitary (I have only lab reared them in later stages). Eggs are laid on young plants with abundant new growth.

GENUS: *Oressinoma**typhla* West. & Hew.

Cyperus (15) S2 S1 Hostplants occur in open areas usually associated with swampy or riparian situations.

lazulae BLH, CARGENUS: *Taygetis**andromeda* Cr.

Olyra (33) ? S2 Janzen reports this species from solitary larvae feeding on hostplants growing along forest edges.

latifolia *DJ (81-SRNP-946)GENUS: *Euptychia**insolata* But. & Dru.

Neckeropsis (29) S1 S2 Hostplant is an epiphytic moss on tree trunks in well shaded rainforest habitats. This is a highly unusual host record for any butterfly family.

undulata *MCS CVDO*jesia* Butler*Selaginella* (38)

horizontalis *MCS LS, CVDO, SV S1 S2 Hostplants are 2, 3 and 4.

undetermined species ELROD

undetermined CAR S1 S2

westwoodi Butler*Selaginella* (38)

arthriticum *MCS LS, SV, CVDO, AT S1 S2 Hostplants are 2, 3 and 4.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>molina</i> Hub.	<i>Selaginella</i> (38) <i>arthriticum</i> *MCS SV undetermined CAR	S1 S2 S1 S2	Hostplants are 2, 3 and 4.
GENUS: Chloreuptychia			
<i>arnaea</i> Fab.	<i>Eleusine</i> (33) undetermined *MCS SV, CVDO <i>Oplismenus</i> (33) undetermined *MCS AT <i>Ichnanthus</i> (33) undetermined *MCS LS undetermined CAR	S1 S2 S1 S2 S1 S2 S1 S2 S1 S2	Hostplants occur in isolated clumps in light gaps and at bases of trees.
GENUS: Cissia			
<i>usitata</i> Butler	<i>Eleusine</i> (33) <i>indica</i> *MCS LS, CVDO	S2 S2	Hostplants occur along sunny edges and light gaps.
<i>themis</i> Butler	"various grasses" (33) undetermined *MCS AT	S2 S2	Hostplant occurs in small clumps in open forest.
<i>confusa</i> Staud.	<i>Panicum</i> (33) undetermined *MCS CVDO undetermined CAR <i>Euterpe</i> (30) undetermined *MCS LS CVDO <i>Geonoma</i> (30) <i>congesta</i> LS, CAR <i>Calathea</i> (26) undetermined LS	S2 S2 S2 S2 S2 S2 S2 S2 S2 S2 S2 S2	All hostplants occur as isolated clumps (grass) or seedlings (<i>palms</i> and <i>Calathea</i>) on the shady forest floor.

<i>labe</i> Butler	"grasses" (33) undetermined *MCS LS				The eggs are deposited singly off the hostplants, usually on nearby dead vegetation. The host occurs in lush, tall clumps in large light gaps.
<i>palladia</i> Butler	"various grasses" (33) greenhouse data *MCS LS				In captivity, eggs are laid singly. All leaves of various grasses were acceptable to all instars.
<i>pseudoconfusa</i> S, D & E	<i>Panicum</i> (33) undetermined LS, CVDO, SV "grass" (33) undetermined CAR	S2	S2	S2	Hostplants occur in isolated clumps in shady forest.
<i>gomezi</i> S, D & E	"grass" (33) undetermined *MCS CVDO	?	S2	S2	This is recorded from a solitary late instar larva feeding on a grass growing along forest edge.
<i>libye</i> L.	<i>Panicum</i> (33) <i>maximum</i> SRNP, AT "various grasses" (33) undetermined *MCS LS, CVDO, SV	S2	S2	S2	Hostplants are 3 and 4 provided there is direct sunshine at some time of the day.
<i>renata</i> Cr.	"various grasses" (33) undetermined *MCS AT, CVDO, SV	S	S2	S2	Female oviposits off the hostplant on nearby vegetation and litter. Hostplants occur in very open forest or edges.
<i>hesione</i> Sulzer	<i>Eleusine</i> (33) various species *MCS LS, CVDO, SV	S2	S2	S2	Hostplants occur as isolated clumps in open areas or along forest edges.
<i>metaluca</i> Boisd.	"grass" (33) undetermined *MCS LS, CVDO, SV	S2	S2	S2	Hostplants occur in isolated clumps in the forest or along forest edges.
<i>hermes</i> Fab.	<i>Eleusine</i> (33) undetermined *MCS AT, CVDO <i>Panicum</i> (33) undetermined *MCS SV, LS	S2	S2	S2	Hostplant almost always in open sunny areas, usually second growth, occasionally within the forest shade.

Species	Hostplant & Locality	Egg & Larval Data	Bionomic Notes of Host and Butterfly
<i>calixta</i> Butler	<i>Leparus</i> (15) <i>lazulae</i> BLH, CAR	S2 S2	Hostplants occur in wet open areas along roadsides and trails, or riparian edges.
	"grass" (33) undetermined CAR	S2 S2	
<i>polyphemus</i> Butler	<i>Chusquea</i> (34) undetermined *IC PAT	S2 S2	Chacon reports this species from late instar larvae feeding on a dense stand of hostplant along forest edges. The larvae feed nocturnally.
GENUS: <i>Megeuptychia</i> <i>antonoe</i> Cr.	<i>Calathea</i> (25) <i>lutea</i> *JM CVDO <i>Cyclanthus</i> (14) undetermined LS	C G2	Mallet reports this species from seedlings occurring in deep forest or along forest edges. My record is an oviposition as seen with binoculars while I was in the forest canopy.
GENUS: <i>Dioriste</i> <i>cothonides</i> GRS.-SMT.	<i>Chusquea</i> (34) undetermined COP, PAT	C G2	Hostplants occur as dense thickets along forest and riparian edges. Early instars are gregarious, later instars are solitary. The larvae feed nocturnally.
GENUS: <i>Eretris</i> <i>suzannae</i> DeVr.	<i>Chusquea</i> (34) undetermined BLH	S1 S1	Hostplants occur as dense thickets along forest and riparian edges. The egg is deposited on the terminal spine of the leaf.

GENUS: Pedaliodes*perperna* Hew.*Rhipidoctadum* (34)
maxonii EST

S1 S1 Hostplants occur in isolated, juvenile clumps on the forest floor in old light gaps.

*ereiba**Chusquea* (34)

S1 ? This is reported as an oviposition record only; larvae were not reared past first instar. Females lay eggs singly in the axils of the whorled leaves near the main stem.

undetermined COP

GENUS: Catargynnis*rogersi* G & S*Chusquea* (34)

S2 ? Hostplants occur in dense stands in shady areas in the forest or edges. Females lay eggs in leaf axils; larvae not reared.

undetermined BLH, COP, CAR