AN UPDATED LIST OF THE BUTTERFLIES OF CHILE (LEPIDOPTERA, PAPILIONOIDEA AND HESPERIOIDEA) INCLUDING DISTRIBUTION, FLIGHT PERIOD AND CONSERVATION STATUS
PART I, COMPRISING THE FAMILIES: PAPILIONIDAE, PIERIDAE, NYMPHALIDAE (IN PART) AND HESPERIIDAE
DEscribing A NEW SPECIES OF HYSOPHiLA (PIERIDAE) AND A NEW SUBSPECIES OF YRAMEA MODESTA (NYMPHALIDAE)

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ABSTRACT

During more than half a century, Luis Peña and later his collaborator Alfredo Ugarte, gathered all known butterfly data and suspected Chilean specimens to publish their seminal book on the butterflies of Chile (Peña and Ugarte 1997). Their work summarized the accumulated knowledge up to the end of the 20th century. Since then much additional work has been done by the authors, resulting in the descriptions of numerous new species as well as establishing new species records for Chile, especially in the families Lycaenidae and Nymphalidae (Satyrinae). The list of these two families is still not complete, as several new species will be published soon and will appear in part II of this paper. The present work involving four families updates the Chilean list by: 1) describing one new species of Pieridae, 2) describing one new subspecies of Nymphalidae (Heliconiinae), 3) adding in total 10 species and two subspecies to the Chilean list.

The present updated list includes regional distribution (D) and for the first time, flight period (FP) and conservation status (C). Many butterfly species in Chile are of special concern for conservation. Several have already apparently disappeared from their biotopes many years ago. The fast pace of development and habitat conversion and loss are endangering many of these insects. The authors send an urgent request to the Chilean authorities to save these insects of Chile because it will soon be too late.

Key words: Lepidoptera, Papilionoidea, Hesperioidea, Chile, updated list, part I, regional distribution, flight period, conservation status.

RESUMEN

Una lista actualizada de las mariposas de Chile (Lepidoptera, Papilionoidea and Hesperioidea) incluyendo distribución, periodo de vuelo y estado de conservación. Parte I incluyendo las Familias: Papilionidae, Pieridae, Nympalidae (en parte) y Hesperidae. Con la descripción de una nueva especie de Hypsochila (Pieridae) y una nueva subespecie de Yramea modesta (Nymphalidae). Durante más de medio siglo, Luis Peña y posteriormente su colaborador Alfredo Ugarte, reunieron toda la información conocida sobre mariposas en Chile para publicar la primera obra completa sobre estos insectos en el país (Peña y Ugarte, 1997). Su trabajo resume el conocimiento acumulado hasta el final del siglo XX. Desde entonces, los autores han realizado trabajos adicionales, resultando en la descripción de numerosas especies nuevas, así como también, el establecimiento de nuevos registros de especies para Chile, especialmente en las familias Lycaenidae y Nymphalidae (Satyrinae). La lista de estas dos familias, aún no está completa, pues varias especies nuevas se publicarán pronto y aparecerán en la segunda parte de este documento. El presente trabajo comprende cuatro familias y se actualiza la lista de mariposas de Chile a través de: 1) la descripción de una nueva especie de Pieridae,
2) la descripción de una nueva subespecie de Nymphalidae (Heliconiinae), y 3) la adición de un total de 10 especies y dos subespecies.

La presente lista actualizada incluye la distribución regional (D) y por primera vez, el periodo de vuelo (FP) y el estado de conservación (C). Muchas especies de mariposas chilenas son de especial interés para la conservación. Varias ya habrían desaparecido en algunas localidades. El acelerado ritmo del desarrollo y la conversión y pérdida del hábitat, ponen en peligro a muchos de estos insectos. Los autores hacen un llamado a las autoridades para salvar las mariposas de Chile.

**Palabras clave:** Lepidoptera, Rhopalocera, Chile, lista actualizada, primera parte, distribución regional, periodo de vuelo, estado de conservación.

**INTRODUCTION**

The butterflies of Chile have been studied since the mid-19th century. The first list of Chilean butterflies appeared in Blanchard (1852) and included 44 species of all five major families. In 1886 Calvert published a new catalogue with 68 species. Emilio Ureta, the curator of the insect collections in the Museo Nacional de Historia Natural in Santiago, summarized his papers and known data for his time and brought the number of known taxa to 135 (Ureta 1963). Later Peña and Ugarte (1997) accumulated all the known data and recorded 169 species. Since then much has been done by the authors and their colleagues. The present list includes 86 species and 13 subspecies of the families: Papilionidae, Pieridae, Nymphalidae and Hesperiidae. The remainder of the fauna will be treated in Part II.

For every species we present all the information known to us in the following order:

**Distribution and Flight Period**

The presented data includes most of the accessible existing historical records and personal knowledge. However, recent records may suggest several changes:

1) Some historical data are already outdated, especially for extinct species.
2) Ongoing climate change is strongly reflected by butterflies, which are among best bioindicators (Thomas *et al.* 2004, Pe’er and Settele 2008). Typical results are earlier seasonal appearance (Forister and Shapiro 2003) and altitudinal and latitudinal shifts to upper elevations and higher latitudes respectively (Parmesan and Yohe 2003). Distributional changes involve species moving to any new favorable biotopes having been driven from newly hostile/drier zones.

The existing data may serve to present and future researchers as a baseline to follow climate change effects on Chilean butterflies.

Flight periods are denoted by numbers, representing months from 1 (January) to 12 (December). ‘FP: 1-12’ means flight period the whole year around, but usually in warm preferred localities.

Region numbers are presented by Roman numerals I (first), II (second) etc. New regions numbers XIV and XV and many recently published maps which are inconsistent with one another, cause great misunderstandings. To eliminate this, we provide a relevant map with a list of Regions - Plate II.

The list of Regions is given below from north to south:

- Región de Arica y Parinacota (XV)
- Región de Tarapacá (I)
- Región de Antofagasta (II)
- Región de Atacama (III)
- Región de Coquimbo (IV)
- Región de Valparaíso (V)
- Región Metropolitana (13)
- Región del Libertador Bernardo O’Higgins (VI) (abbreviated ….O’Higgins)
- Región del Maule (VII)
- Región del Biobio (VIII)
- Región de la Araucanía (IX)
- Región de los Lagos (XIV)
Región de los Ríos (X)
Región de Aisén del General Carlos Ibáñez del Campo (XI) (abbreviated - Región de Aisén)
Región de Magallanes y Antártica Chile (XII) (abbreviated - Región de Magallanes)

Conservation Status

The present conservation status as we perceive it is given for all species, many of them are under constant existing stress. To our knowledge, no butterfly species in Chile has yet been accorded ‘listed’, ‘threatened’, or ‘endangered’ status by either the Chilean national or provincial/regional governments or by any conservation body such as the IUCN. We thus present our own perceptions based on our cumulative experience, which we hope may serve as a guideline for future action. In addition to habitat loss and conversion, there are other recent threats to the Chilean fauna. Introduction of foreign predators, especially the German or European wasp (Vespula germanica; Hymenoptera: Vespidae) which destroys vast numbers of lepidopterous larvae and occasionally even adults, and microhymenopterous parasitoids (such as the braconid Cotesia glomerata, introduced as a biological control agent against the naturalized pest Pieris brassicae, but now attacking and suppressing populations of endemic Chilean Pieridae as well) cause further threats to the existence of the wild species. It is our hope that this work will serve Chilean authorities (Ministry of Interior, Ministry of the Environment, Ministry of Agriculture, CONAF, Universities, Municipalities, Regional Management, ‘Green’ organizations and Mine companies!) to institute protection of the endangered species, thereby helping them to survive. The Chilean butterfly biodiversity, with its very high level of endemism, is a national resource which must be preserved and protected before being destroyed and lost forever.

Definition of Conservation status

(Note: Some of these terms are not mutually exclusive, so that several may apply in a given case).
1) Not endangered
2) Possibly not endangered
3) Migrant
4) Rare. Rabinowitz (1981) argued that species rarity could occur in three different ways, which applies also to Chile: a) restricted geographic distribution; b) narrow habitat distribution; c) low local population abundance.
5) Under increasing stress/threat, not yet endangered
6) Endangered
7) Highly endangered
8) Close to extinction
9) Locally extinct (it may or may not exist elsewhere)
10) Data deficient
11) Geographically restricted (Endemic)

Endemism

Chile is well known to have two great natural isolating barriers: the high mountain chain of the Andes reaching almost 7000 meters – known as ‘the continental divide’, and the Atacama absolute desert in the north. Both have contributed to the remarkably high endemism of the Chilean flora and fauna, including butterflies, making Chile an ‘island’ in a biogeographical sense. The level of endemism is about 25%. Endemic species to Chile are marked with ‘11’.

Biology

Butterfly biological data including larval hostplants, myrmecophily, natural enemies, ethology and annual number of broods (which is still far from being complete) will be published in future years. This publication will update and nearly complete Peña and Ugarte’s project.
How to read the data; an example of a fictitious species:

**Chileana chilensa**
D: XV-RM and TDF; FP: 9(L)-2(E), 4?; C: 4, 8, 11.

Key: Distribution (D): from XV Region of Arica and Parinacota to the Metropolitan Region of Santiago (RM) and Tierra del Fuego (TDF).
Flight Period (FP): Late September to early February, April questionable record.
Conservation status (C): rare, close to extinction, endemic.

**LIST OF SPECIES**

**Papilionoidea**

**Papilionidae**

1. *Battus polydamas archidamas* (Boisduval, 1836)
D: III- VIII; FP: 9-3, 5, Coquimbo to Concepción. All the year in Atacama Region; C: 1.

**Pieridae**

**Pierinae**

2. *Eroessa chiliensis* (Guérin-Méneville, [1830])
D: VII (coastal only) - XI; FP: 9-2, 4; C: 2.

3. *Mathania leucothea* (Molina, 1782)
D: III (Copiapó mountains) - XIV; FP: 8-2; C: 1.

4. *Pieris brassicae* (Linnaeus, 1758)
D: IV-XIV; FP: 1-12; C: 1.

5. *Tatochila distincta fieldi* Herrera, 1970
D: II; FP: 12-3; C: 10.

D: II; FP: 1-4; C: 4, 9.

D: II; FP: 12-4; C: 4, 9.

8. *Tatochila autodie blanchardii* Butler, 1881
D: I-X; FP: 1-12; C: 1.

D: XV; FP: 11-4; C: 6.

9. *Tatochila mercedes mercedes* (Eschscholtz, 1821)
D: II-X; FP: 1-12; C: 1.

9a. *Tatochila mercedes sterodice* Staudinger, 1899
D: XII; FP: 12(L)-3(E); C: 10.

9b. *Tatochila mercedes macrodice* Staudinger, 1899
D: XV; FP: 8, 10-2, 4; C: 1.
9c. Tatochila mercedis fueguensis (Field, 1959)
D: XII and TDF; FP: 12-3; C: 10.

10. Tatochila theodice theodice (Boisduval, 1832)
D: RM-XI; FP: 1-12; C: 1.

10a. Tatochila theodice gymnodice Staudinger, 1899
D: XII and TDF; FP: 11-4; C: 1.

10b. Tatochila theodice staudingeri Field, 1959
D: XII and TDF; FP: 11-12; C: 10.

11. Hypsochila galactodice Ureta, 1955
D: VIII-IX; FP: 1-2; C: 10.

12. Hypsochila huemul Peña, 1964
D: IX-XI; FP: 12-3; C: 4, 10.

13. Hypsochila penai Ureta, 1955
D: II; FP: 12-2, 4; C: 4, 10.

14. Hypsochila argyrodice (Staudinger, 1899)
D: XII and TDF; FP: 10-2; C: 4, 10.

15. Hypsochila wagenknechti wagenknechti (Ureta, 1938)
D: IV-VII; FP: 11-2; C: 1.

15a. Hypsochila wagenknechti sulfurodice Ureta, 1955
D: XV-II; FP: 9-3; C: 1.

16. Hypsochila microdice (Blanchard, 1852)
D: XII; FP: 11-2; C: 4.

17. Hypsochila pelambres Benyamini, sp. nov. (Plates I and II)
D: IV; FP: 12-1; C: 9.

Type material - Holotype: ♂, forewing length 18.5 mm, labelled as: ‘Los Pelambres Valley [+] 25 km N. of Cuncumén [+] Salamanca, Coquimbo, Chile [+] 2950 m, 15.1.1994 [+] Leg. Dubi Benyamini’ (printed).

Allotype: ♀, forewing length 16.7 mm, labelled as: ‘Los Pelambres Valley [+] 25 km N. of Cuncumén [+] Salamanca, Coquimbo, Chile [+] 2950-3300 m 28.1.1994 [+] Leg. Dubi Benyamini’ (printed).

Paratypes: 8♂ and 3♀, from the same locality of holotype and allotype, 3♂ 2800 m 19.12.1993 [+] Leg. Dubi Benyamini; 3♂ 2950 m 15.1.1994 [+] Leg. Dubi Benyamini; 2♂ 2950-3300 m 28.1.1994 [+] Leg. Dubi Benyamini; 2♀ 2950-3300 m, 28.1.1994 [+] Leg. Dubi Benyamini. The paratype male forewing lengths are 17.0 mm to 20.2 mm with average of 18.61 mm (n=8). The paratype female forewing lengths are 16.1 mm to 17.7 mm with average of 16.66 mm (n=3) and are smaller. H. pelambres is a legume feeder, apparently geographically isolated from its closest relatives, Hypsochila microdice (Blanchard, 1852) which flies at the Straits of Magellan some 2380 km to the south, and H. huemul Peña, 1964, which is distributed from the province of Malleco to Aisén in Chile and Neuquén to Chubut in Argentina. Its northern limit as presently understood is about 720 km south of Los Pelambres.

Hypsochila pelambres differs from H. huemul and H. microdice (Plate I) by:

a. The arrow-head black markings in the subcostal areas between all the veins on the hindwing underside do not occur in H. pelambres. In 6/13 specimens of the type-series there are faint black marks in the HW lower side in two locations in cells M₁ and M₂ at the submarginal area.
Plate I

*Hypsochila huemul* Peña, 1964 - paratype male

*Hypsochila microdice*, (Blanchard, 1852) - holotype male

*Hypsochila pelambres* Benyamini, 2013 - holotype male

2950m, 15.1.1994, Los Pelambres Valley, Salamanca, Coquimbo, Chile, Leg. Dubi Benyamini

*Hypsochila pelambres* Benyamini, 2013 - paratypes male & female

2950-3250m, 28.1.1994, Los Pelambres Valley, Salamanca, Coquimbo, Chile, Leg. Dubi Benyamini
Plate II

Regions of Chile

Hypsochila petambres sp. nov. genitalia, holotype male

Hypsochila petambres sp. nov. genitalia, allotype female

Yramea modesta araucana sp. nov.
male holotype Vn. Llaima, 1200-1400m, 4/3/1998
female allotype Vn. Villarrica, 1832m, 4/1/2002
IX Region, de la Araucania, Chile, Leg. Dubi Benyamini

Hylephila kenhaywardi MacNeill, 1998, holotype male

Hylephila herrerae MacNeill, 2002
holotype male and paratype female
Cotacotani, Parinacota, XV Region of Arica, 4500 m, 28/2/1948

source: MacNeill, 2002, page 82 figs 32 and 33

Modified from Atlas Chile y El Mundo
ORIGO Ediciones 2012
b. The underside ground colour in *H. huemul* and *H. microdice* is tinged with orange, while in *H. pelambres* it is yellow with no orange.

c. The forewing shape of *H. microdice* is elongated and well adapted to the strong winds in its biotopes in southern Patagonia, while in *H. pelambres* it is ‘normal’ and adapted to its biotope in sheltered valleys of the upper Andes, where strong persistent winds are not a problem for flight.

d. In contrast to *H. huemul*, on the hindwing underside of *H. pelambres* the veins appear white with strong black borders on either side, rather than being fully blackened.

e. The genitalia of *H. pelambres* (plate II) as compared with *H. huemul* and *H. microdice* in the revision of Field and Herrera (1977), were analyzed by Dr. Zsolt Bálint, the curator of the butterflies collection in the Hungarian National History Museum in Budapest. He communicated to the first author that ‘Genitalia - *Hypsochila* species have almost identical genitalia (Field and Herrera 1977: 4-5). Male and female genitalia of the new species are very much like the other species of *Hypsochila*. Male genitalia with uncus, valva, and anellus almost identical to those of other *Hypsochila* species; valva with a strong upper middle and distal process, gnathos absent, lateroventral wall at base of uncus well folded inward and closely appressed upon its inner side, saccus with a heavily sclerotized plate in length as long as uncus; aedeagus in lateral view about as broad distally as through the middle, deeply incised both dorsally and ventrally from one-third to more than one-half its entire length. Comparing the geographically closest relative *H. wagenknechtii* (Field and Herrera 1977, figure 130) the only difference was the somewhat larger and broader saccular plate, resembling to that of *H. penai* (Field and Herrera 1977 figure 131). Female genitalia with large and oval membranous ductus bursae having ringed sclerotized area immediately anterior to the ostium. Eighth tergite and sternite with larger inner genital plate, divided into a broad anterior lobe and a smaller finger-like projection posterior to this and with both of these parts entirely and thickly sclerotized on their outer faces. Comparing the geographically closest relatives *H. wagenknechtii* and *H. penai* (Field and Herrera 1977, figures 148-150) we could not find any diagnostic difference in structures, but we note that we could not detect any setulosed parts as indicated and figured by the mentioned authors. Shapiro (1990) noted that because the genitalia were so invariant, larval and pupal morphology and hostplant were unusually informative taxonomically in this group.

Distribution: the species was isolated at the upper part of the Los Pelambres Valley, 25 km north of Cuncumén, Coquimbo, Chile. High and steep mountains on both sides of the valley delimit its distribution. It has not been found in adjacent valleys in Coquimbo nor across the Andes in San Juan, Argentina, but the area has been infrequently collected.

Type locality and flight period: adults were observed at 2800 m from mid-December 1993 to the end of January 1994 at 3300 m, possibly in one annual brood. The biotope is the bottom of the Los Pelambres valley, where the adults were flying fast and low over their hostplants and the river.

Hostplants: *Vicia aff. vicina* Clos. and/or *V. acerosa* Clos. (det. Prof. Luis Faúndez) concentrated on small ‘islands’ in the river and along its banks. *V. vicina* is a hydrophyte - confined to wet biotopes. Several attempts to breed the species failed; only two larvae were ever found on the hostplant but both died in the lab.

Conservation: the type locality of the species has been changed drastically by the development work of the Los Pelambres Copper Mine. It is our hope that with the help of the mine environmental department we will be able to find other nearby localities of the Los Pelambres White, and in the same effort protect the Los Pelambres blue – *Pseudolucia avishai* Benyamini, Bálint and Johnson, 1995, that possibly survived on the slopes of the valley.

The holotype and allotype will be deposited in the Museo Nacional de Historia Natural, Santiago de Chile. All other paratypes are in the collection of the first author.

Etymology: the name is taken from the species type locality at Los Pelambres Valley, Cuncumén, Salamanca, Coquimbo, Chile.
18. Phulia nymphula nymphula (Blanchard, 1852)
D: XV-RM; FP: 8, 10-4; C: 1.
19. Pierphulia rosea rosea (Ureta, 1956)
D: II; FP: 11-2, 4; C: 5.
19a. Pierphulia rosea maria Field and Herrera, 1977
D: XV-I; FP: 1-2, 4; C: 4, 10.
20. Pierphulia isabela Field and Herrera, 1977
D: I, III; FP: 1-3; C: 4, 10.
21. Infraphulia ilyodes (Ureta, 1955)
D: XV-II; FP: 12-4; C: 10.

Coliadinae

22. Colias vauthierii vauthierii Guérin-Méneville, [1830]
D: III-XI; FP: 1-12; C: 1.
22a. Colias vauthierii cunninghamii (Butler, 1881)
D: XI, XII and TDF; FP: 1-3; C: 1.
23. Colias lesbia lesbia (Fabricius, 1775)
D: VIII-IX; FP: 10, 12-2; C: 3, 4.
24. Colias mendozina Breyer, 1939
D: V; FP: 1-3; C: 5.
25. Colias flaveola flaveola Blanchard, 1852
D: IV; FP: 12-3; C: 7.
26. Colias euxanthe hermina (Butler 1871) – new to Chile (Plate III)
D: XV-I?; FP: 9, 2, 4; C: 10.
27. Colias blameyi Jörgensen, 1916 [=? weberbaueri (Strand, 1912)]
D: XV-II; FP: 1-4; C: 2.
28. Colias erika Lamas, 1981- new to Chile (Plate III)
D: XV; FP: recorded only in March; C: 4, 10.

Note: C. mendozina, C. flaveola, C. blameyi, C. weberbaueri and C. erika are probably all conspecific.

29. Colias ponteni Wallengren, 1860 [syn. C. imperialis (Butler, 1871)]
The Magellanic origin of this insect is doubtful. It was apparently collected twice in the 19th Century but the circumstances of both collections are obscure. The species is extremely distinctive morphologically, and its unique genitalia probably dictate its removal to its own monotypic genus. See Shapiro, 1993, Sjöberg, 1997, and Hara, 1999.
30. Zerene cesonia cesonides (Staudinger, 1894)
D: XV; FP: 9-5; C: 3, 4.
31. *Phoebis sennae amphitrite* (Feisthamel, 1839)  
D: III-XIV; FP: 11-5; C: 1, 3.

32. *Phoebis argante argante* (Fabricius, 1775) - new to Chile (Plate III)  
D: V; FP: 12(L); C: 3,4.

32a. *Phoebis argante chincha* Lamas 1976 - (Plate III)  
D: XV; FP: 2-5; C: 3, 4.

33. *Eurema deva chilensis* (Blanchard, 1852)  
D: III-RM; FP: 9-4(E); C: 1.

34. *Teriocolias zelia andina* Forbes, 1928  
D: XV; FP: 7, 10-4; C: 10.

Nymphalidae

Danainae

35. *Danaus erippus* (Cramer, 1775)  
D: XV-IX; FP: 8-5; C: 3, 10.

36. *Danaus eresimus erginus* (Godman and Salvin, 1897) - (Plate III). This record is based on a single male collected by Alfredo Ugarte in Vicuña, Elqui, Coquimbo in November 1997.  
D: IV; FP: 11; C: 3, 4.

37. *Danaus plexippus plexippus* (Linnaeus, 1758) - (Plate III). This record is based on a single male collected by the first author in Copiapó, Atacama on 14. August. 1994.  
D: III; FP: 8; C: 3, 4.  
Note by A. M. Shapiro: If this individual is correctly identified as *D. plexippus plexippus*, this is the only record for the Southern Cone of South America. It is extremely unlikely that it came under its own power from the species’ North American range. The most likely explanations of its occurrence are a very rare displacement across the Pacific from its naturalized range there, or an accidental introduction from somewhere. We hope to clarify this case if it is possible to look for molecular genomic markers.

Heliconiinae

38. *Dione glycera* (C. Felder and R. Felder, 1861)  
D: XV; FP: 1-4, 7; C: 3, 4.

39. *Agraulis vanillae* (Linnaeus, 1758)  
D: I; FP: 12, 1, 4; C: 3.

40. *Yramea cytheris siga* (Geyer, 1832)  
D: RM-XII; FP: 9-4; C: 1.

41. *Yramea lathonioides* (Blanchard, 1852)  
D: III-XII and TDF; FP: 10-3; C: 1.

42. *Yramea sobrina* (Weymer, 1890) - new to Chile (Plate III)  
D: XV; FP: 12-2; C: 3?, 4.
43. *Yramea modesta modesta* (Blanchard, 1852)
D: IV-X; FP: 12-3; C: 1.
Note: Señor Manuel Galvez of Rancagua found an interesting community of this species at the intermediate forest belt of Alto Huemul. Its systematic position has not been analyzed yet.

43a. *Yramea modesta araucania* Benyamini, 2013, ssp. nov. - (Plate II)
D: IX; FP: 1(E); C: 2.
Type material - Holotype: 1♂, forewing length 14.5 mm, labelled as: ‘Vn. Llaima, 1200-1400 m [/] 4.1.1998, IX Reg. Chile [/] Leg. Dubi Benyamini’ (printed) (Plate II).
Allotype: 1♀, forewing length 15.8 mm, labelled as: ‘Vn. Villarrica, 1432 m [/] 4.1.2002, (Refugio) [/] IX Reg. de Araucania, Chile [/] Leg. Dubi Benyamini’ (printed) (Plate II). The holotype and allotype will be deposited in the Museo Nacional de Historia Natural, Santiago de Chile, Chile.
Paratypes: 2♂ with holotype data; 4♂ and 2♀ from Refugio Llaima 1450-1490 m [/] 5.1.2012, IX Reg. de Araucania, Chile [/] Leg. Dubi Benyamini. All paratypes in collection of the first author.
Paratype male forewing lengths are from 14.1 mm to 15.3 mm, average 14.7 mm (n=7). Paratype female forewing lengths are from 14.0 mm to 15.5 mm average 14.75 mm (n=2).
Note: A.M. Shapiro believes this is probably the subspecies represented at Las Leñas, Mendoza, on the Argentine side of the crest, but material is too limited to allow a definite conclusion and is deliberately excluded from the type-series.

It differs from nominate *Y. m. modesta* by the following:

a. Flying at 1200 to 1450 m compared with the usual distribution over 2500 m of *Y. modesta modesta*.

b. The type series are reported from early January while nominate *Y. m. modesta* flies from mid-December at higher elevations, where it is colder.
c. The two submarginal rows of black points in the male are much larger on the upper- and undersides of all four wings. The points of the inner line of the forewings are larger than the outer line on upper- and undersides, while in *Y. m. modesta* the reverse applies. The points of the inner line on the hindwing underside are so big that they almost touch each other.

d. The marginal black spots on the upperside of all four wings are connected, especially in the hindwings, while in *Y. m. modesta* the spots are smaller and separated.

e. The wing veins are more strongly marked.

f. The male upperside ground colour is reddish-orange defined as *Tangier Pl.10 L11 compared with yellowish light orange defined as *Cavalry Deep Chrome Pl.9 L7 in *Y. m. modesta*.

g. The male underside ground colour is *Doubloon Roman Ochre Pl.11 L11, compared with *Maise Pl.10 G5 in *Y. m. modesta*.

h. The forewing upperside of all *Y. m. modesta* females has lighter colours than the hindwings. In *Y. m. araucania* the forewing ground colour is close to *Amber Y. Pl.10J3 and the hindwings are *Apricot Pl.10 F7 compared with *Flax (Pebble-Peanut) Pl.12 B2 forewing upperside and *Martius Y. Pl.9 I1 hindwing upperside of *Y. m. modesta*.

i. The female underside colours are the opposite of the upperside; here the hindwings are lighter. Therefore, in *Y. m. araucania* the forewing ground colour is orange defined as *Chinese Y. Pl.10 K6 and the hindwings are ‘dirty’ white with tinted grey and orange defined as *Old Ivory Pl.12 C3.

* - All colours are per Maerz and Paul, 1950.

44. *Euptoieta hortensia* (Blanchard, 1852)
D: IV-XIV; FP: 10-4(E), 6(Santiago); C: 1.
Nymphalinae

45. *Junonia vestina livia* Fruhstorfer, 1912  
D: XV; FP: 8, 10-5; C: 3, 4.

46. *Vanessa carye* (Hübner, [1812])  
D: XV-XII, Easter Island and TDF; FP: 1-12; C: 1, 3.

47. *Vanessa terpsichore* Philippi, 1859  
D: IV-XII and TDF; FP: 9-4; C: 2.

48. *Vanessa braziliensis* (Moore, 1883) - (Plate III)  
D: XV; FP: 1-2; C: 1, 3.  
Note: Dr. Héctor Vargas of Tarapacá University, Arica, was the first to find and breed this species in Chile (Vargas 2013b).

Libytheinae

49. *Libytheana carinenta carinenta* (Cramer, 1777)  
D: VII (Curicó); FP: 2; C: 3, 4.

Hesperioidea

Hesperiidae

50. *Urbanus dorantes dorantes* (Stoll, 1790)  
D: XV; FP: 10-11, 1-2, 4; C: 2.

51. *Urbanus proteus proteus* (Linnaeus, 1758)  
D: XV-I; FP: 11, 1-5; C: 2.

52. *Polythrix octomaculata* (Sepp, [1844]). This species does not occur now in Chile. It is probably an historical mislabelled specimen mentioned by Hayward (1933).  
D: XV?; FP: 10 (in Ucayali, Peru); C: 10.

53. *Pyrgus barrosi* Ureta, 1956  
D: II; FP: 11-2; C: 4, 10, 11.

54. *Pyrgus bocchoris trisignatus* (Mabille, 1875)  
D: XV-VIII; FP: 1-12; C: 1.

55. *Pyrgus communis chloe* Evans, 1942  
D: XV; FP: 2; C: 3?, 10.

56. *Pyrgus fides* Hayward, 1940  
D: XV-RM; FP: 8, 10-4(E); C: 1.

57. *Pyrgus limbata limbata* (Erschoff, 1876)  
D: XV-II; FP: 9-1, 4; C: 10.

58. *Pyrgus notatus notatus* (Blanchard, 1852)  
D: RM-VIII; FP: 10-3; C: 10.
58a. *Pyrgus notatus valdiviana* (Reed, 1877)
D: VIII-XIV; FP: 2; C: 10.

59. *Pyrgus orcus* (Stoll, 1780)
D: XV, RM; FP: 9-11, 2; C: 10.

60. *Heliopyrgus americanus americanus* (Blanchard, 1852)
D: III-VIII; FP: 9, 10, 12-4; C: 1.

61. *Erynnis funeralis* (Scudder and Burgess, 1870)
D: II-IX; FP: 9, 1-3, 5(E); C: 10.

62. *Butleria bissexguttatus* (Philippi, 1859)
D: V-X; FP: 12(L)–3(E); C: 6 (at northern regions), 2.

63. *Butleria elvesi* Evans, 1939
D: V-XIV; FP: 12-2; C: 6 (at northern regions), 2.

64. *Butleria flavomaculatus flavomaculatus* (Blanchard, 1852)
D: IV-IX; FP: 12-3; C: 6, 11.

64a. *Butleria flavomaculatus tristriata* Bryk, 1944
D: X-XI; FP: ?, C: 2, 11.

64b. *Butleria flavomaculatus valdivianus* (Philippi, 1859)
D: XIV-X; FP: 11-4; C: 1, 11.

65. *Butleria fruticolens* (Butler, 1881)
D: V-X; FP: 2-3; C: 1.

66. *Butleria panisoides panisoides* (Blanchard, 1852)
D: XIV-XI; FP: 12-2; C: 1.

66a. *Butleria panisoides polspilus* (Felder, 1862)
D: IV-XIV; FP: 11-3; C: 6.

67. *Butleria philippi* (Butler, 1881)
D: VIII-X; FP: 10, 12-4; C: 4, 6, 11.

68. *Butleria quilla* Evans, 1939
D: V-XI; FP: 11-4; C: 6.

69. *Butleria sotoi* Reed, 1877
D: V-VIII; FP: 11-4; C: 6, 8 (in Valparaiso), 11.

70. *Argopteron aureipennis* (Blanchard, 1852)
D: VIII-XIV; FP: 1-2; C: 1.

71. *Argopteron aureum* Peña, 1968
D: VII; FP: 2-3; C: 6.

72. *Argopteron puelmae* (Calvert, 1888)
D: VII-XI; FP: 1-3; C: 4, 11.
73. *Hylephila ancora* (Plötz, 1883)
D: XV; FP: 9, 10, 1; C: 10.

74. *Hylephila boulleti* (Mabille, 1906)
D: XV-II; FP: 11-1, 3; C: 2.

75. *Hylephila fasciolata* (Blanchard, 1852)
D: III-XII; FP: 10(L)-4; C: 1.

76. *Hylephila herrerai* MacNeill, 2002 - (Plate II)
D: XV; FP: 2-3; C: 2

77. *Hylephila isonira mima* Evans, 1955
D: XV-II; FP: 10-4; C: 1.

78. *Hylephila kenhaywardi* MacNeill, 1999 - (Plate II)
D: III-IV; FP: 1-2(E); C: 1.

79. *Hylephila phyleus basistrigata* (Eaton, 1932)
D: XV; FP: 1-12; C: 1

80. *Hylephila signata* (Blanchard, 1852)
D: III-XII; FP: 10-3(E); C: 1

81. *Hylephila venustus* (Hayward, 1940)
D: VIII-XI; FP: 1-3; C: 1.

82. *Lerodea eufala concepcionis* (Strand, 1921)
D: III-XIV; FP: 10-3(E); C: 1.

83. *Lerodea gracia* Dyar, 1913
D: XV; FP: 4, 8, 12; C: 10 - and as *L. forbesi* Lindsey 1925 (junior synonym of *L. gracia*) from Codpa 2/1954 and Lluta River 11/1955, both places in Region XV.

84. *Quinta cannae* (Herrich-Schäffer, 1869)
D: XV; FP: 1-3; C: 10.

85. *Calpodes ethlius* (Stoll, 1782)
D: XV; FP: 3; C: 3, 10.

86. *Nyctelius nyctelius nyctelius* (Latreille, [1824])
D: XV; FP: 11-3; C: 1.

**CONCLUSIONS**

*Composition of the fauna* – Part I of the Chilean list includes 86 species comprising one species of Papilionidae, 33 species of Pieridae, 15 species of Nymphalidae (Danainae, Heliconiinae, Nymphalinae, and Libytheinae) and 37 species of Hesperiidae. Estimating the number of species of Lycaenidae and Nymphalidae (Satyrinae), which will appear in part II as 65 and 38 respectively, we arrive at a total of 189 species ever recorded in Chile.

Comparing our new list with Peña and Ugarte (1997), we add 20 species to their 169 species (Table 1). It is important to note that the additional number of species is actually 32 because we eliminated 12 species (since synonymised) and historical mistakes of singleton Lycaenids. An explanation of the treatment of these highly questionable species is given in Part II.
### Table 1 - Composition of the Chilean butterfly families (* Estimated number)

<table>
<thead>
<tr>
<th>Family</th>
<th>Num. of species</th>
<th>Num. of species (%)</th>
<th>Num. of species (Peña &amp; Ugarte, 1997)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papilionidae</td>
<td>1</td>
<td>0.53</td>
<td>1</td>
</tr>
<tr>
<td>Pieridae</td>
<td>33</td>
<td>17.46</td>
<td>29</td>
</tr>
<tr>
<td>Nymphalidae (Part 1 - Danainae, Heliconiinae, Nymphalinae, Libytheinae)</td>
<td>15</td>
<td>7.94</td>
<td>11</td>
</tr>
<tr>
<td>Nymphalidae (Satyrinae)*</td>
<td>38</td>
<td>20.11</td>
<td>34</td>
</tr>
<tr>
<td>Lycaenidae*</td>
<td>65</td>
<td>34.39</td>
<td>59</td>
</tr>
<tr>
<td>Hesperiidae</td>
<td>37</td>
<td>19.58</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>189</strong></td>
<td><strong>100</strong></td>
<td><strong>169</strong></td>
</tr>
</tbody>
</table>

Part I summary:

**Butterfly distribution in 15 regions in Chile** – Table 2 and Figure 3 list the number of species per region; maximum number of species are 36 in Bio Bio VIII Region, 35 in Arica & Parinacota XV region and 34 in Santiago metropolitan region. The minimum number of species flying in Magallanes (XII Reg.) is 12 species, Aisen (XI Reg.) 14 species and Tarapaca (I Reg.) 18 species.

**Flight period of the species** – this is depicted in months in Table 3 & Fig. 2; a minimum number of 10 species fly in the months June and July, rising continuously up to 74 species in February.

**Conservation status** – is summarized in Table 4 where:
- 36% (31 species) and 13% (11 species) respectively are not endangered or possibly not endangered;
- 19% (16 species) are migrating species;
- 24% (21 species) are rare species;
- 14% (13 species) are under increasing stress and close to extinction (categories 5, 6, 7, & 8);
- 5% (4 species) are locally extinct.

For 29% (25 species) we do not have sufficient data and 7% (6 species) are geographically restricted = endemic. Therefore, while nearly 50% of the fauna are in good conservation status, 14% are under various stages of stress and 29% have insufficient data. These last two groups call for attention and should receive the highest priority of any future butterfly conservation activity in Chile.
TABLE 2 - Butterfly species distribution in Chile

<table>
<thead>
<tr>
<th>Latitude and Region</th>
<th>18° - Arica-Parinacota (I)</th>
<th>20° - Atacama (II)</th>
<th>24° - Antofagasta (III)</th>
<th>27° - Coquimbo (IV)</th>
<th>30° - Valparaíso (V)</th>
<th>33° - O'Higgins (VI)</th>
<th>34° - Del Maule (VII)</th>
<th>37° - De la Araucanía (IX)</th>
<th>40° - De los Lagos (XIV)</th>
<th>42° - De los Ríos (X)</th>
<th>46° - Magallanes (XII)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latitude</td>
<td>18.5°</td>
<td>20°</td>
<td>24°</td>
<td>27.5°</td>
<td>30°</td>
<td>33°</td>
<td>34.5°</td>
<td>37°</td>
<td>40°</td>
<td>42°</td>
<td>46°</td>
</tr>
<tr>
<td>Species</td>
<td>Papilionidae</td>
<td>Papilionidae</td>
<td>Pieridae</td>
<td>Nymphalidae (Part 1)</td>
<td>Nymphalidae (Part 1)</td>
<td>Pieridae</td>
<td>Hesperiidae</td>
<td>Hesperiidae</td>
<td>Papilionidae</td>
<td>Pieridae</td>
<td>Nymphalidae (Part 1)</td>
</tr>
<tr>
<td>%</td>
<td>0,0</td>
<td>0,0</td>
<td>0,0</td>
<td>100</td>
<td>100</td>
<td>100</td>
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<td>29,4</td>
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<tr>
<td>Pieridae %</td>
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<td>23,5</td>
<td>32,4</td>
<td>29,4</td>
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<td>7</td>
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<tr>
<td>Nymphalidae (Part 1) %</td>
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<td>20,0</td>
<td>13,3</td>
<td>26,7</td>
<td>46,7</td>
<td>46,7</td>
<td>53,3</td>
<td>46,7</td>
<td>46,7</td>
<td>40,0</td>
<td>33,3</td>
</tr>
<tr>
<td>Hesperiidae %</td>
<td>17</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>14</td>
<td>16</td>
<td>14</td>
<td>16</td>
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<tr>
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<td>45,9</td>
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<td>21,6</td>
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<tr>
<td>total %</td>
<td>35</td>
<td>18</td>
<td>21</td>
<td>21</td>
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<td>34</td>
<td>34</td>
<td>36</td>
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<tr>
<td>total</td>
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<td>24,4</td>
<td>24,4</td>
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<td>37,2</td>
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<td>36,0</td>
<td>39,5</td>
<td>41,9</td>
<td>38,4</td>
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</table>

Note: The table above shows the distribution of butterfly species across different latitudes and regions in Chile.
FIGURE 3. Butterfly species distribution in Chilean political regions

<table>
<thead>
<tr>
<th>Latitudes &amp; Regions</th>
<th>Flight Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5. - 30.25 latitude</td>
<td>JAN</td>
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<tr>
<td>Papilionidae</td>
<td>1</td>
</tr>
<tr>
<td>Papilionidae %</td>
<td>100</td>
</tr>
<tr>
<td>Pieridae</td>
<td>29</td>
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<tr>
<td>Pieridae %</td>
<td>85.3</td>
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<td>Nymphalidae (Part 1)</td>
<td>12</td>
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<tr>
<td>Nymphalidae (Part 1) %</td>
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<tr>
<td>Hesperiidae</td>
<td>30</td>
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<tr>
<td>Hesperiidae %</td>
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<tr>
<td>total</td>
<td>72</td>
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<tr>
<td>total %</td>
<td>84</td>
</tr>
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</table>

TABLE 3 - Months flight period of Chilean butterflies
FIGURE 4. Flight period of Chilean butterflies by month.

<table>
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<tr>
<th>Conservation status</th>
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<th>3</th>
<th>4</th>
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<tr>
<td>Pieridae</td>
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<td>4</td>
<td>12</td>
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<td>1</td>
<td>4</td>
<td>13</td>
<td>1</td>
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<tr>
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<td>11,8</td>
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<td>8,0</td>
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<td>19</td>
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<td>10</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>29</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 4 - Summary of butterfly conservation status in Chile
ACKNOWLEDGEMENTS

The authors would like to express their special appreciation to Dr. Alfred Moser of Porto Alegre, Brazil, who opined on the Lycaenidae, Theclinae species. His remarks were very helpful analyzing historical mistakes. Dr. Héctor A. Vargas of Tarapacá University shared with us his latest records on the butterflies of Northern Chile, enabling us to update the current list. Dr. Andrew Warren, Senior Collections Manager at the McGuire Center for Lepidoptera and Biodiversity solved our lack of knowledge regarding the two new Hylephila sp. (Hesperiidae), new to the Chilean list. In the Natural History Museum of Santiago de Chile at Quinta Normal, the curator of the butterflies collection, Dr. Mario Elgueta and his assistant Mrs. Yasna Sepúlveda were very helpful in checking missing data for this paper. The best butterfly collection in Chile nowadays at the University of Concepción, was also the best data source for butterfly distribution and annual activity. The collection staff were always there to help the first author during his visits and prepare him useful lists of specimens from their collection. He is thankful to Dr. Jorge Artigas, Dr. Andrés Angulo and especially to the ladies Elvira Solar and Myriam Ramírez who did the hard job of reading and registering the labels’ collecting data. Thanks also to Dra. Patricia Estrada and Prof. Jaime Solervicens of Univ. Metropolitana, Santiago for giving him the opportunity to check their well-preserved butterfly collection. Dr. Gerardo Lamas MHN Univ. Nac. Mayor de San Marcos Lima, Peru, was the first to realize that Danaus Plexippus Plexippus was collected by the first author in Chile, but believed it was a mislabelling. We thank him for the fruitful discussion on possible origin of this specimen. Dr. Richard (Dick) Vane-Wright (UK), specialist on the Danaini, recently corresponded with us regarding the identification of this specimen, and urged us to obtain molecular data if possible. In light of our discovery, he intends to undertake new research on the phenotypic separation of D. Erius and D. plexippus.

In the field and in the lab, the senior author received logistic support from Agr. Eng. Juan Enrique Barriga of Los Niches, Curicó. He always shared his vast botanical and entomological knowledge which contributed so much to this paper. In the hostile environment of Volcán Tacora (Reg. XV of Arica) the field support of Barbara Knapton of Putre and the CONAF staff of Arica chapter was essential to the success of our expeditions. On several expeditions and in our lab the professional support of the principal author’s assistant Omer Tomer was of great value. Prof. Luis Faúndez of the University of Chile is acknowledged for the identification of the hostplant of the Los Pelambres White, Vicia aff. vicina Clos., Agr. Eng. Melica Muñoz, ex-curator of Botany in the Chilean National Museum of Natural History was always ready to identify hundreds of butterfly hostplants and nectar-sources; her technical support as well as her friendship are unforgettable. Thanks to Origo Ediciones Ltda. of Padre Alonso de Ovalle 748, Santiago, for their permission to use their map ‘Chile Político’ belonging to the Atlas de Chile y el Mundo in our plate II. The Gejman family; Silvia and Roberto were my hosting family during many visits to Chile, their house was my hospitable home in Santiago.

Last but not least the authors honour the huge contribution of the late Luis Peña, who dedicated his life to the study of Chilean insects. During many years he accumulated in his butterfly collection all species and specimens having even the slightest suspicion of belonging to the Chilean fauna. His approach of saving/acquiring specimens from all possible sources was invaluable for the description of new species to Chile, but also as a paradox added possible historical mistakes, which we try to correct in part II of this article. Eddie John, Vale of Glamorgan, UK edited the MS to its final version. The first author’s devoted wife Leah Benyamini prepared the beautiful colour Plates. My sincere thanks to Francisco Urra Lagos of the editorial desk of this Boletín for his final editing.

To all these people and institutions we greatly appreciate their contribution to this paper.

REFERENCES

Note: Only relevant lists/catalogues and recent publications are listed. The reader may find older publications in Peña et al (1997), Ureta (1964) and others.

ANGULO, A. and G. WEIGERT
1974 Estados postembrionales de Eroessa chilensis (Guérin) (Lepidoptera: Pieridae) Boletín Sociedad Biológica de Concepción, 47: 49-56.

BÁLINT, Z., D. BENYAMINI and K. JOHNSON

BÁLINT, Z. and D. BENYAMINI
2001 Taxonomic notes, faunistics and species descriptions of the austral South American Polyommatine lycaenid
genus *Pseudolucia* (Lepidoptera: Lycaenidae): the *chilensis* and *collina* species-groups. Annales historico-naturales Musei nationalis hungarici 93: 107-149.

BÁLINT, Z. and D. BENYAMINI  
2013 *Pseudolucia maricunga* sp. n., a new high Andean butterfly from northern Chile (Lepidoptera: Lycaenidae). Folia Entomologica Hungarica 74: 1-8.

BÁLINT, Z. and K. JOHNSON  

BÁLINT, Z. and K. JOHNSON  

BÁLINT, Z. and K. JOHNSON  

BÁLINT, Z. and K. JOHNSON  
1995c New species of *Pseudolucia* Nabokov from the coastal region of Chile (Lepidoptera: Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 46: 1-7.

BÁLINT, Z. and K. JOHNSON  
1997 Reformation of the Polyommatus Section with a taxonomic and biogeographic overview (Lepidoptera, Lycaenidae, Polyommatini). Neue Entomologische Nachrichten (Marktleuthen) 40: 1–68.

BALLETTO, E.  

BENYAMINI, D.  

BENYAMINI, D.  

BENYAMINI, D.  

BENYAMINI, D.  

BENYAMINI, D. and Z. BÁLINT  

BENYAMINI, D. and Z. BÁLINT  

BENYAMINI, D., Z. BÁLINT and K. JOHNSON  
1995a Additions to the diversity of the Polyommatine genus *Madeleinea* Bálint (Lepidoptera, Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 47: 1-5.

BENYAMINI, D., Z. BÁLINT and K. JOHNSON  

BENYAMINI, D., Z. BÁLINT and K. JOHNSON  
1995c Recently discovered new species of *Pseudolucia* Nabokov (Lepidoptera, Lycaenidae) from Austral South America. Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 53: 1-5.

BENYAMINI, D. and K. JOHNSON  
BLANCHARD, E.

BRABY, F. M. and K. NISHIDA  

BREYER, A.

BUTLER, A. G.

CALVERT, W.
1885 Catálogo de los Lepidópteros Rhopalóceros y Heteróceros de Chile. Anales de la Universidad de Chile 69 (1): 311-352.

CALVERT, W.
1893 Nuevos Lepidópteros de Chile. Anales de la Universidad de Chile 84: 813-834.

CALVERT, W.
1898 Catálogo revisado de los lepidópteros de Chile. Revista Chilena de Historia Natural 2(7): 97-101 (July), (9): 114-117 (September).

ELWES, H. J.

ETCHEVERRY, M.
1989 Chile y sus mariposas. Shilap 17: 71–75.

FIELD, D. and J. HERRERA

FORISTER, M. L. and A. M. SHAPIRO

HARA, H.

HAYWARD, K. J.

HERRERA, J.

HERRERA, J., M. ETCHEVERRY and R. BARRIENTOS

HERRERA, J. and V. PEREZ

HEWITSON, W. C.

HOVANITZ, W.

JOHNSON, K.

JOHNSON, K., L. D. MILLER and J. HERRERA
MACNEILL, C. D.

MACNEILL, C. D. and J. HERRERA


NABOKOV, V.

ORIGO EDICIONES

PARES, C. and G. YOHE

PE’ER, G. and J. SETTELE

PEREZ, V.
1996 Lista de las especies de mariposas diurnas (Lepidoptera: Rhopalocera) de Magallanes y clave para su identificación. Anales del Instituto de la Patagonia, Series Cs. Nat. 24: 49-64.

PEREZ, V., E. FAUNDEZ, D. VARGAS, A. ZUÑIGA and N. BUTOROVICH
2005 El regreso de la mariposa colorada *Cynthia carye* (Hübner, 1812) (Lepidoptera: Nymphalidae) a Punta Arenas, Región de Magallanes. Anales del Instituto de la Patagonia (Chile) 33: 37-40.

PEÑA, L. E. and A. J. UGARTE
1997 Las Mariposas de Chile. Editorial Universitaria Chile. 359 pp.

PHILIPPI, R. A.
1859 Descripción de algunas nuevas especies de mariposas chilenas, principalmente de la Provincia de Valdivia. Anales de la Universidad de Chile 16(12): 1088–1114.

PHILIPPI, R. A.

PYRCZ, T.
2012 A new species of Satyrine butterfly from Patagonia in more than a century and revisional notes on the genus *Faunula* C. Felder & R. Felder (Lepidoptera: Nymphalidae: Satyrinae). Zootaxa 3342: 60-68.

RABINOWITZ, D.

SHAPIRO, A. M.

SHAPIRO, A. M.

SHAPIRO, A. M.

SHAPIRO, A. M.
1992 The proposed Magellanic Type-Locality of *Colias imperialis* Butler (Lepidoptera: Pieridae). Acta Entomológica Chilena 18: 77-82.

SHAPIRO, A. M.
1996 Impactos antropogénicos sobre la fauna de mariposas (Lepidoptera: Rhopalocera) de Patagonia austral y Tierra del Fuego. Anales del Instituto de la Patagonia, Series Cs. Nat. 25: 117-126.

SHAPIRO, A. M.
SJÖBERG, G.

TALBOT, G.


URETA, R. E.

URETA, R. E.
1949 Lepidópteros de Chile (Rhopalocera) IV Parte. Familia Lycaenidae. Boletín del Museo Nacional de Historia Natural, Chile 24: 93-123.

URETA, R. E.

VARGAS, H. A. and G. LAMAS
2011 First record of Phoebis argante chincha Lamas (Lepidoptera, Pieridae) from Chile. Revista Brasileira de Entomologia 55(3): 445-446.

VARGAS, H. A.
2006 Calpodes ethlius (Stoll, 1782) (Lepidoptera: Hesperiidae): primer registro de distribución para el extremo norte de Chile. Idesia 24(3): 69-70.

VARGAS, H. A.

VARGAS, H. A.
2013a Use of a native and an exotic Malvaceae by the little known skipper Pyrgus bocchoris trisignatus (Mabille) (Hesperiidae) in northern Chile. Journal of the Lepidopterists’ Society 67(3): 225-226.

VARGAS, H. A.
2013b First record of Vanessa braziliensis (Moore) (Lepidoptera: Nymphalidae) in Chile. Gayana 77(2): 171-173.

VARGAS, H. A., O. H. H. MIELKE and M. M. CASAGRANDE
2006 Calpodes ethlius (Stoll, 1782) (Lepidoptera: Hesperiidae): primer registro de distribución para el extremo norte de Chile. Idesia 24(3): 69-70.

WEYMER, G.