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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 *HYPSOCHILA* (PIERIDAE) AND A NEW SUBSPECIES OF *YRAMEA MODESTA* (NYMPHALIDAE)

Dubi Benyamini[1], Alfredo Ugarte[2], Arthur M. Shapiro[3], Olaf Hermann Hendrik Mielke[4], Tomasz Pyrcz [5] and Zsolt Bálint[6]

[1] 4D MicroRobotics, Israel dubi_ben@netvision.net.il; [2] P. O. Box 2974, Santiago, Chile augartepena@gmail.com; [3] Center for Population Biology, University of California, Davis, CA 95616, U.S.A. amshapiro@ucdavis.edu; [4] University of Parana, Brazil omhesp@ufpr.br; [5] Zoological Museum, Jagiellonian University, Krakow, Poland tpyrcz@yahoo.com; [6] Hungarian National History Museum, Budapest, Hungary. balint@nhmus.hu

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, período de vuelo y estado de conservación. Parte I incluyendo las Familias: Papilionidae, Pieridae, Nymphalidae (en parte) y Hesperiidae. 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 aparecerían 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 período 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 Hesperidae. 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 Biobío (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.

6. *Tatochila mariae* Herrera, 1970
D: II; FP: 1-4; C: 4, 9.

7. *Tatochila inversa razmilici* Herrera, 1970
D: II; FP: 12-4; C: 4, 9.

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

8a. *Tatochila autodice ernestae* Herrera, 1954
D: XV; FP: 11-4; C: 6.

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

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

9b. *Tatochila mercedis 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 M_1 and M_2 at the submarginal area.

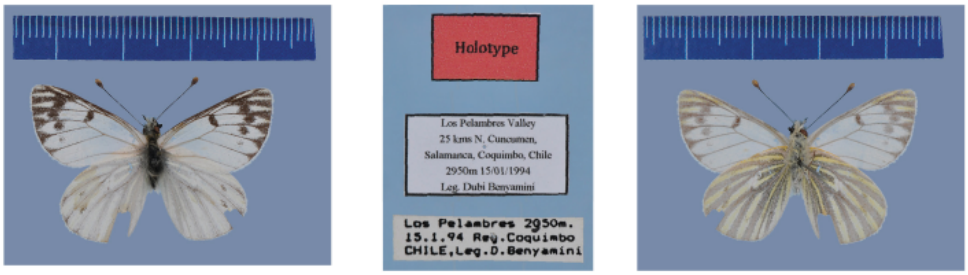
Plate I

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

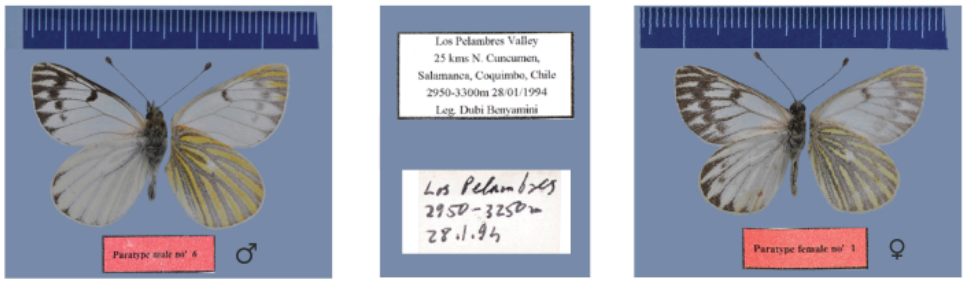
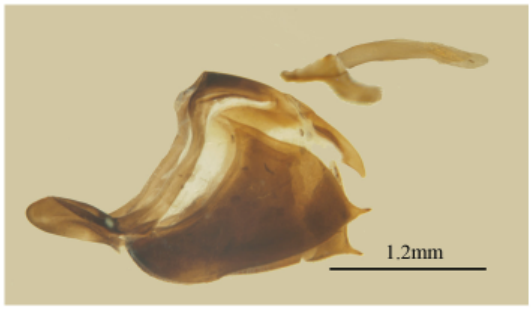


Plate II

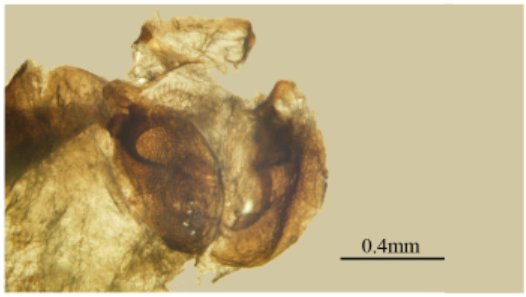
Regions of Chile

Modified from Atlas Chile y El Mundo
ORIGO Ediciones 2012

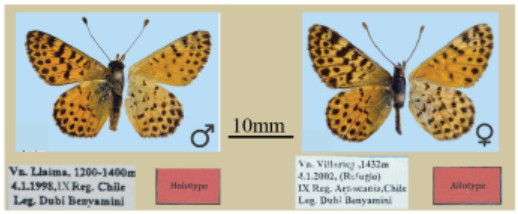
Hypsochila pelambres sp. nov. genitalia, holotype male



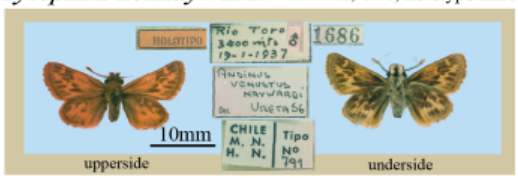
Hypsochila pelambres sp. nov. genitalia, allotype female



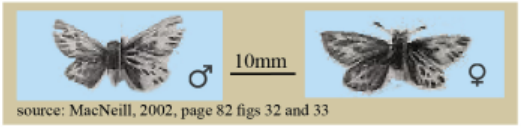
Yramea modesta araucania ssp. nov.
male holotype Vn. Llaima, 1200-1400m, 4/1/1998
female allotype Vn. Villarrica, 1432m, 4/1/2002
IX Region, de La Araucania, Chile, Leg. Dubi Benyamini



Hylephila kenhaywardi MacNeill, 1998, holotype male



Hylephila herrerai 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

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. wagenknechti* (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. wagenknechti* and *H. penai* (Field and Herrera 1977, figuress. 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)]

D: XII?; FP: ?; C: 9.
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 elwesi* 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 paniscoides paniscoides* (Blanchard, 1852)
D: XIV-XI; FP: 12-2; C: 1.

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

67. *Butleria philippii* (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.

Family	Num. of species	Num. of species (%)	Num. of species (Peña & Ugarte, 1997)
Papilionidae	1	0,53	1
Pieridae	33	17,46	29
Nymphalidae (Part 1 - Danainae, Heliconiinae, Nymphalinae, Libytheinae)	15	7,94	11
Nymphalidae (Satyrinae)*	38	20,11	34
Lycaenidae*	65	34,39	59
Hesperiidae	37	19,58	35
Total	189	100	169

Table 1 - Compositin of the Chilean butterfly families (* Estimated number)

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.

	Latitude and Region															
	18.5° - Arica-Parinacota (XV)	20° - Tarapacá (I)	24° - Antofagasta (II)	27.5° - Atacama (III)	30.5° - Coquimbo (IV)	33° - Valparaíso (V)	33.5° - Metropolitana (13)	34.5° - O'Higgins (VI)	35.5° - Del Maule (VII)	37° - Del Biobío (VIII)	38.5° - De la Araucanía (IX)	40° - De los Lagos (XIV)	42° - De los Ríos (X)	46° - De Aisén (XI)	52° - Magallanes (XII)	Rapa Nui (Isla Pascua)
Papilionidae				1	1	1	1	1	1	1						
Papilionidae %	0,0	0,0	0,0	100	100	100	100	100	100	100	0,0	0,0	0,0	0,0	0,0	0,0
Pieridae	12	8	11	8	10	11	10	9	9	10	11	8	5	3	6	0
Pieridae %	35,3	23,5	32,4	23,5	29,4	32,4	29,4	26,5	26,5	29,4	32,4	23,5	14,7	8,8	17,6	0,0
Nymphalidae (Part 1)	6	3	2	4	7	6	7	7	8	7	7	6	5	4	4	1
Nymphalidae (Part 1) %	40,0	20,0	13,3	26,7	46,7	40,0	46,7	46,7	53,3	46,7	46,7	40,0	33,3	26,7	26,7	6,7
Hesperiidae	17	7	8	8	10	14	16	14	16	18	15	14	10	7	2	0
Hesperiidae %	45,9	18,9	21,6	21,6	27,0	37,8	43,2	37,8	43,2	48,6	40,5	37,8	27,0	18,9	5,4	0,0
total	35	18	21	21	28	32	34	31	34	36	33	28	20	14	12	1
total %	40,7	20,9	24,4	24,4	32,6	37,2	39,5	36,0	39,5	41,9	38,4	32,6	23,3	16,3	14,0	1,2

TABLE 2 - Butterfly species distribution in Chile

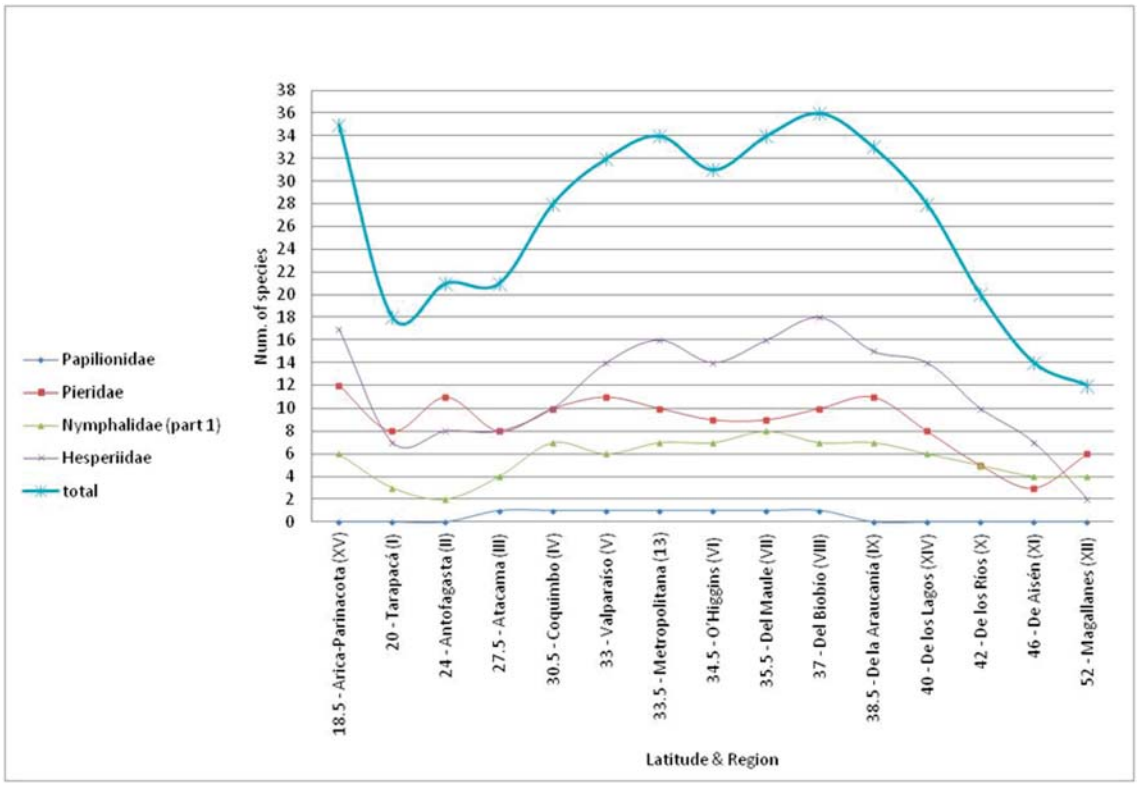


FIGURE 3. Butterfly species distribution in Chilean political regions

	Flight Period											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Papilionidae	1	1	1	1	1	1	1	1	1	1	1	1
Papilionidae %	100	100	100	100	100	100	100	100	100	100	100	100
Pieridae	29	30	22	19	8	5	6	7	11	14	16	25
Pieridae %	85,3	88,2	64,7	55,9	23,5	14,7	17,6	20,6	32,4	41,2	47,1	73,5
Nymphalidae (Part 1)	12	12	9	8	3	2	1	4	4	7	8	10
Nymphalidae (Part 1) %	80,0	80,0	60,0	53,3	20,0	13,3	6,7	26,7	26,7	46,7	53,3	66,7
Hesperiidae	30	31	25	14	4	2	2	4	7	15	19	21
Hesperiidae %	81,1	83,8	67,6	37,8	10,8	5,4	5,4	10,8	18,9	40,5	51,4	56,8
total	72	74	57	42	16	10	10	16	23	37	44	57
total %	84	86	66	49	19	12	12	19	27	43	51	66

TABLE 3 - Months flight period of Chilean butterflies

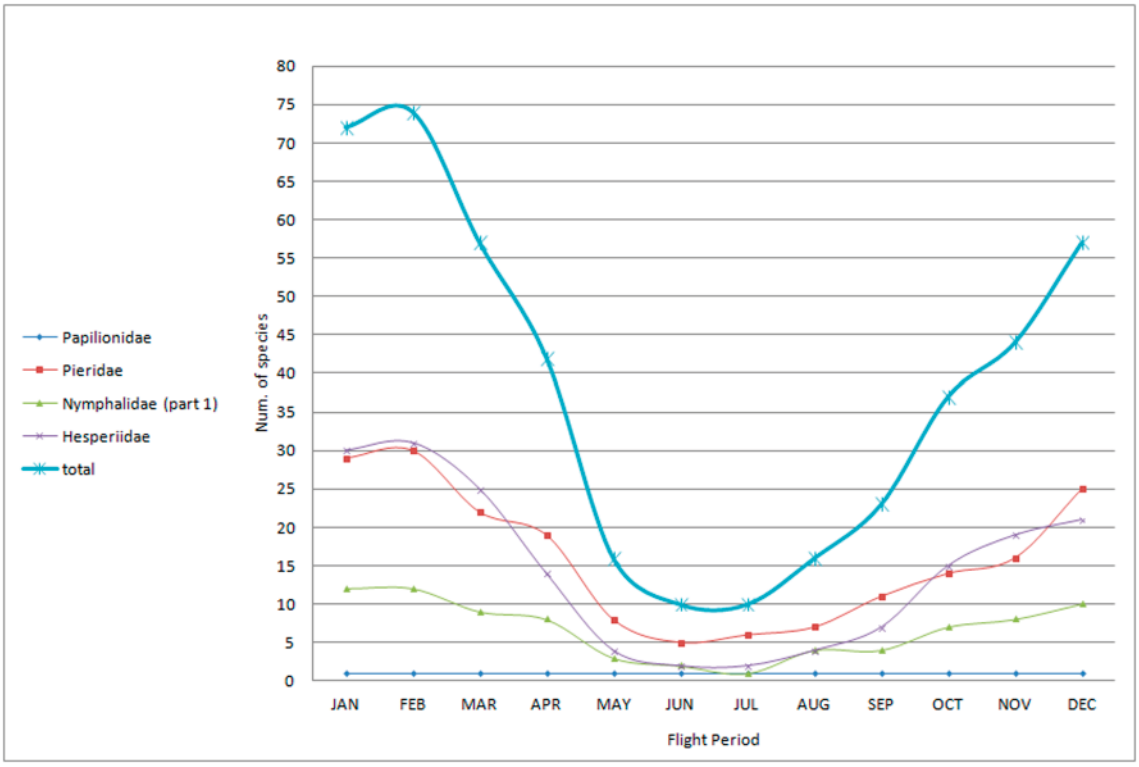


FIGURE 4. Flight period of Chilean butterflies by month.

	Conservation status										
	1	2	3	4	5	6	7	8	9	10	11
Papilionidae	1										
Papilionidae %	100										
Pieridae	10	2	4	12	2	1	1		4	13	1
Pieridae %	29,4	5,9	11,8	35,3	5,9	2,9	2,9		11,8	38,2	2,9
Nymphalidae (Part 1)	6,0	2,0	10,0	6,0						1,0	
Nymphalidae (Part 1) %	40,0	13,3	66,7	40,0						6,7	
Hesperiidae	14,0	7,0	2,0	3,0		8,0		1,0		11,0	5,0
Hesperiidae %	37,8	18,9	5,4	8,1		21,6		2,7		29,7	13,5
total	31	11	16	21	2	9	1	1	4	25	6
total %	36	13	19	24	2	10	1	1	5	29	7

Table 4 - Summary of butterfly conservation status in Chile

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REFERENCES

Note: Only relevant lists/catalogues and recent publications are listed. The reader may find older publications in Peña and Ugarte (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
2001 Species descriptions and miscellaneous notes on the genus *Pseudolucia* (Lepidoptera: Lycaenidae). Folia Entomologica Hungarica 62: 151-165.

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

1993 New species of *Pseudolucia* Nabokov from Chile and Patagonia (Lepidoptera: Lycaenidae, Polyommatinae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 27: 1-25.

BÁLINT, Z. and K. JOHNSON

1995a Synopsis of the high Andean and austral Polyommatine genus *Madeleinea* Bálint (Lepidoptera: Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 43: 1-28.

BÁLINT, Z. and K. JOHNSON

1995b The Argentine fauna of *Pseudolucia* Nabokov (Lepidoptera: Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 45: 1-23.

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.

1993 On some new genus-group and species-group names of Andean Polyommatini (Lepidoptera). Bolletino della Società Entomologica Italiana 124: 231-243.

BENYAMINI, D.

1995a New courtship posture in females of two Chilean butterflies: rejective or receptive? Journal Research on the Lepidoptera, 31(3-4): 291-292.

BENYAMINI, D.

1995b Synopsis of biological studies of the Chilean Polyommatini (Lepidoptera, Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 52: (ii) + 51 pp.

BENYAMINI, D.

1996 Pupal summer diapause in Chilean *Pieris brassicae* (Linnaeus, 1758) (Lepidoptera, Pieridae). Nota Lepidopterologica 18 (3/4) (1995): 184-192.

BENYAMINI, D.

2011 Scientific note: *Danaus eresimus* (Cramer, 1777) new to Chile and the status in that country of *Danaus erippus* (Cramer, 1776). Tropical Lepidoptera Research 20(2): 98-99.

BENYAMINI, D. and Z. BÁLINT

1995 Studies of life history and myrmecophily in certain Chilean *Pseudolucia* Nabokov (Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 51: 1-7.

BENYAMINI, D. and Z. BÁLINT

2011 Descriptions of eight new *Pseudolucia* species from Chile (Lepidoptera: Lycaenidae: Polyommatinae). Annales Historico-Naturales Musei Nationalis Hungarici 103: 257-276.

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

1995b Two new *Pseudolucia* species from the high Andean Region of Temperate South America. With revision of the status of *P. andina neuqueniensis* Bálint and Johnson. Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 48: 1-9.

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

1995 Review of austral *Heoda,* with a new species from Chile (Lepidoptera: Lycaenidae: Eumaeini). Tropical Lepidoptera 6(2): 13-20.

BLANCHARD, E.
1852 Orden VI. Lepidópteris. In: Gay, C. (ed.): Historia Física y Política de Chile según documentos adquiridos en esta república durante doce años de residencia en ella y publicada bajo los auspicios del Supremo Gobierno. Zoológia. Paris, C. Gay 7: 1-112.
BRABY, F. M. and K. NISHIDA
2007 The immature stages, larval host plants and biology of Neotropical mistletoe butterflies (Lepidoptera: Pieridae): I The *Hesperocharis* group (Anthocharidini). Journal of the Lepidopterists' Society 61(4): 181-195.
BREYER, A.
1939 Über die Argentinischen Pieriden (Lep. Rhop.). VII International Congress of Entomology, Berlin (I): 26-55.
BUTLER, A. G.
1881 List of Butterflies collected in Chili by Thomas Edmonds. Transactions of the Entomological Society. Part 4 (Dec): 449-486. Lam. 21.
CALVERT, W.
1886 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.
1903 The Butterflies of Chile. Transactions of the Entomological Society of London. Part 3 (Oct): 263-301, pl. 12-15.
ETCHEVERRY, M.
1989 Chile y sus mariposas. Shilap 17**:** 71–75.
FIELD, D. and J. HERRERA
1977 The Pierid butterflies of the genera *Hypsochila* Ureta, *Phulia* Herrich-Schäffer, *Infraphulia* Field, *Pierphulia* Field, and *Piercolias* Staudinger. Smithsonian Contributions to Zoology. 232: i-iii, 1-64, with 198 figures.
FORISTER, M. L. and A. M. SHAPIRO
2003 Climatic trends and advancing spring flight of butterflies in lowland California. Global Change Biology 9:1130-1135.
HARA, H.
1999 *Colias imperialis* / *Colias ponteni*. [In Japanese.] Privately published. 96 pp.
HAYWARD, K. J.
1951 Catalogo sinonímico de los ropalóceros argentinos, excluyendo "Hesperiidae". Acta Zoológica Lilloana 9: 85-281.
HERRERA, J.
1954 Lepidópteros nuevos para Chile. Lepidoptera, Pieridae**.** Revista Chilena de Entomología 3: 140-147, 12 figs.
HERRERA, J., M. ETCHEVERRY and R. BARRIENTOS
1958 Los Nymphalidae Chilenos. Ediciones de los Anales de la Universidad de Chile 3: 5-38.
HERRERA, J. and V. PEREZ
1989 Rediscovery of *Stuardosatyrus williamsianus* (Butler), 1868 and considerations of the genus. Acta Entomológica Chilena 15: 171-196.
HEWITSON, W. C.
1874 Descriptions of new species of Lycaenidae from South America. Entomologist's Monthly Magazine 11(124): 104–107.
HOVANITZ, W.
1971 Habitat - *Colias vauthieri***.** Journal of Research on the Lepidoptera 9(2): 100.
JOHNSON, K.
1992 Genera and species of the Neotropical 'elfin'-like hairstreak Butterflies (Lepidoptera, Lycaenidae, Theclinae). Reports of the Museum of Natural History, University of Wisconsin - Stevens Point 22: vol. 1, pp. 1-135, vol. 2, pp. 136-279.
JOHNSON, K., L. D. MILLER and J. HERRERA
1994 *Eiseliana* and *Heoda*, high Andean and austral genera of the Neotropical Eumaeini (Lepidoptera: Lycaenidae). Acta Entomológica Chilena (Santiago) 17: 107-146.

MACNEILL, C. D.
2002 Studies in the genus *Hylephila* Billberg, II. The *boulleti* species groups (Hesperiidae: Hesperiinae). Journal of the Lepidopterists' Society 56(2): 66-89.
MACNEILL, C. D. and J. HERRERA
1999 Studies in the genus *Hylephila* Billberg, I. Introduction and the *ignorans* and *venusta* species groups (Hesperiidae: Hesperiinae). Journal of the Lepidopterists' Society 52: 277-317.
MASSARDO, D., P. A. RORATTO, H. A. VARGAS, M. R. KRONFORST and G. R. P. MOREIRA
2012 Development of a microsatellite library for the passion flower butterfly *Dione moneta* Hübner (Lepidoptera: Nymphalidae: Heliconiinae). Conservation Genetics Resources 4: 719-724. DOI: 10.1007/s12686-012-9630-9.
NABOKOV, V.
1945 Notes on neotropical Plebejinae (Lycaenidae, Lepidoptera). Psyche (Cambridge) 52: 1–61.
ORIGO EDICIONES
2012 Atlas Chile y el Mundo en Imágenes. Origo Ediciones, 128pp.
PARMESAN, C. and G. YOHE
2003 A globally coherent fingerprint of climate change impacts across natural systems. Nature, 421: 37-42.
PE'ER, G. and J. SETTELE
2008 Butterflies in and for conservation: trends and prospects. Israel Journal of Ecology and Evolution 54: 7-17.
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.
1860 Beschreibung einiger neuer chilenischer Schmetterlinge. Linnea Entomologica 14: 265–297.
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.
1981 Seven forms of rarity. pp. 205-217. In SYNGE, H. (ed.) The Biological aspects of rare plant conservation. Wiley, New York.
SHAPIRO, A. M.
1990a The biology of *Colias blameyi* (Pieridae), the 'Green Sulphur' of the Argentine Puna. Journal of Research on the Lepidoptera 28(1-2): 14-25.
SHAPIRO, A. M.
1990b The life-histories and behavior of the Patagonian-Fuegian white butterflies *Hypsochila microdice* and *H. galactodice.* Journal of the New York Entomological Society 98: 461-473.
SHAPIRO, A. M.
1991 The zoogeography and systematics of the Argentine Andean and Patagonian pierid fauna. Journal of Research on the Lepidoptera 28: 137–238.
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.
2006 Use of an exotic weed as an oviposition substrate of the high Andean pierid *Phulia nymphula*. Journal of the Lepidopterists' Society 60(2): 100-101.

SJÖBERG, G.
1997 *Colias ponteni* Wallengren 1860: Bredbanded Hofjaril. En doldis pa Amerikas sydspets? Eller Hawaii? Insectifera 5: 68-102.
TALBOT, G.
1925 Forms of *Colias* from Peru. Proc. Entom. Soc. London 1925/1926: xvi.
THOMAS, J. A., M. G. TELFER, D. B. ROY, C. D. PRESTON, J. J. D. GREENWOOD, J. ASHER, R. FOX, R. T. CLARKE and J. H. LAWTON
2004 Comparative losses of British butterflies, birds and plants and the global extinction crisis. Science 303: 1879-1881.
URETA, R. E.
1940 Lepidópteros de Chile (III Parte). Revista Chilena de Historia Natural 43: 226-260.
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.
1963 Catalogo de Lepidópteros de Chile. Boletín del Museo Nacional de Historia Natural, Chile 28(2): 53-147.
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.
2012 First host plant record for *Teriocolias zelia andina* Forbes (Lepidoptera: Pieridae) and evidences for local specialization. Neotropical Entomology 41(6): 524-525. DOI: 10.1007/s13744-012-0076-2.
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.
1890 Lepidopteren gesammelt auf einer Reise durch Colombia, Ecuador, Peru, Brazilien, Argentinien und Bolivien in den Jahren 1868-1877 von Alphons Stübel, in A. Stübel Reisen in Süd-America. Berlin, A. Asher & Co., vi + 182pp, 9 pls.

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