AN UPDATED LIST OF THE BUTTERFLIES OF CHILE (LEPIDOPTERA, PAPILIONOIDEA AND HESPERIOIDEA) INCLUDING DISTRIBUTION, FLIGHT PERIOD, CONSERVATION STATUS AND COMMENTS ON BIOLOGY. PART III/1, SUBFAMILY POLYOMMATINAE (LYCAENIDAE) WITH DESCRIPTIONS OF THREE NEW SPECIES OF *PSEUDOLUCIA*

URN:LSID:ZOOBANK.ORG:PUB:C5228237-3F34-4084-9E58-19B26421DCAE

[1]Dubi Benyamini, [2]Alfredo Ugarte and [3]Zsolt Bálint

[1]4D MicroRobotics, Israel. dubi_ben@netvision.net.il

[2]Selva Viva, Santiago, Chile. augartepena@gmail.com

[3]Hungarian National History Museum, Budapest, Hungary. balint.zsolt@nhmus.hu

ABSTRACT

Part III/1 of the updated list of Chilean butterflies deals with 46 species of the subfamily Polyommatinae (Lycaenidae). The presence of *Paralycaeides vapa* (Staudinger, 1894) in the Chilean fauna is confirmed. The taxa *Pseudolucia malleco* Bálint and Benyamini, sp. n., *Pseudolucia domeyko* and *Pseudolucia pascualama* Benyamini and Bálint, spp. n. are described. Two synonyms are established: *Pseudolucia annamaria* Bálint and Johnson, 1993 = *Pseudolucia clarea* Bálint and Johnson, 1993, new junior subjective synonym and *Lycaena ludicra* Weymer, 1890 = *Madeleinea sigal* Benyamini, Bálint and Johnson, 1995, new junior subjective synonym. Data on regional distribution, flight periods, conservation status and comments on biology are included. Species endemic for Chile (n = 27) are also identified. The species *Nabokovia ada* Bálint and Johnson, 1994, *Pseudolucia johnsoni* Benyamini and Bálint, 2011, *Pseudolucia kechico* Bálint, Benyamini and Johnson, 2001 and *Pseudolucia faundezi* Benyamini and Bálint, 2011 are considered to be locally extinct. The fast pace of agricultural and industrial innovation, yielding rapid habitat alterations, are endangering many of polyommatine species occurring in restricted areas, because of their special life history strongly associated with specific larval hostplants and attending ant species. In an appendix, the occurrence of *Dione juno miraculosa* Hering, 1926 in the Arica and Parinacota region is recorded as new species for the Chilean fauna.

Key words: Chile, regional distribution, flight period, conservation status, biology, Lepidoptera, Lycaenidae, myrmecophily, new faunistical records, new species, new synonyms, Nymphalidae, Papilionoidea, updated list.

RESUMEN

Parte III/1. Lista actualizada de las mariposas chilenas con 46 especies de la subfamilia Polyommatinae (Lycaenidae). Se confirma para Chile la presencia de *Paralycaeides vapa* (Staudinger, 1894). Nuevas especies descritas: *Pseudolucia malleco* Bálint y Benyamini, sp. n., *Pseudolucia domeyko* y *Pseudolucia pascualama* Benyamini y Bálint, spp. n. Se establecen sinonimias: P*seudolucia annamaria* Bálint y Johnson, 1993 = *Pseudolucia clarea* Bálint y Johnson, 1993 y *Lycaena ludicra* Weymer, 1890 = *Madeleinea sigal* Benyamini, Bálint y Johnson, 1995. Se incluyen datos sobre la distribución regional (D), los períodos de vuelo (FP) y, por primera vez, el estado de conservación (C). Las especies endémicas de Chile (n=27) también están marcadas. La especie *Nabokovia ada* Bálint y Johnson, 1994, *Pseudolucia johnsoni* Benyamini y Bálint, 2011, *Pseudolucia kechico* Bálint, Benyamini y Johnson, 2001 y *Pseudolucia faundezi* Benyamini y Bálint, 2011 se consideran localmente extintas. El ritmo acelerado de la agricultura y las industrias que producen alteraciones del hábitat está poniendo en peligro muchas de las especies poliamatinas que hay en áreas restringidas debido a que su ciclo de vida esta estrechamente relacionado con sus plantas hospederas y algunas especies de hormigas. En el apéndice, se registra una nueva especie para la fauna chilena, *Dione juno miraculosa* Hering, 1926 de la Región Arica-Parinacota.

Palabras claves: Chile, estado de conservación, período de vuelo, Lepidoptera, Lycaenidae, myrmecophily, Nymphalidae, nuevos datos faunistícos, nuevas especies, nuevas sinonimias, Papilionoidea, distribución geográfica, lista actualizada.

INTRODUCTION

Here, we present the next part of the series dedicated to Chilean Papilionoidea initiated in 2014. The families Hesperiidae, Nymphalidae, Papilionidae and Pieridae have been reviewed by teams of several authors (Benyamini *et al.* 2014, Pyrcz *et al*. 2016). The present work concentrates on the representatives of the family Lycaenidae. In the Neotropical region, the family displays large diversity by the subfamily Theclinae via circa 1300 species, most of them belonging to the tribe Eumaeini, the hairstreaks (Lamas 2004). The subfamily Lycaeninae is represented in the region only by a single species in Mesoamerica: *Iophanus pyrrhias* (Godman and Salvin, 1887). The remaining subfamily Polyommatinae has moderate diversity in the region, with fewer than 150 species. Our present paper concentrates on the subfamily Polyommatinae. Hairstreaks will be the subject of the next part (III/2), completing the series.

The first descriptions of lycaenids appeared earlier in classical works dealing with the fauna of the region (e.g. Blanchard 1852, Philippi 1859, Wallengren 1860). However, it was not underlined that members of the family Lycaenidae did not attract the specialised attention of any workers. The reasons are threefold: (1) compared with other Neotropical butterflies the imagines are less attractive, (2) identification problems and (3) the rarity of many species in collections. This is exemplified in the seminal work of Vladimir Nabokov (1899-1977), who was the first to revise the Neotropical polyommatines (Nabokov 1945). Because of his extreme skill in observing and describing anatomical details (Blackwell and Johnson 2016), Nabokov was able to determine the main clades and allocate them as various genera (Vila *et al.* 2011). By contrast, at the species level his results were less than satisfactory, because the material available to him suffered from gross under-sampling. The best example is the lineage of "Nabokov blues", a polyommatine lycaenid genus endemic to austral South America. For the genus, the name *Pseudolucia* was proposed by Nabokov who, beside the type species *Lycaena chilensis* Blanchard, 1852, placed in the genus only one more species: *Lycaena collina* Philippi, 1859. The first entomologist who focused on the Lycaenidae fauna of Chile was the late professor Emilio Ureta Rojas (1907-1959). Authoring several lycaenid taxa, he also monographed the family in the fourth part of his series "Lepidoptera de Chile (Rhopalocera)" (Ureta 1949). Regarding the diversity of *Pseudolucia* in Chile, we wonder what he would have discovered had his life not been so short. In his papers, there were signs that he had discovered the peculiarity of "Nabokov's blues" and had begun to understand the various phenomena this highly interesting genus poses in the temperate region of austral South America.

From 1985 and onwards, Zsolt Bálint spent annually several weeks in the Natural History Museum (London, UK) as a visiting scholar, and in 1993 compiled a catalogue of Neotropical polyommatine lycaenids (Bálint 1993). This was the year when his collaboration started with Dr Kurt Johnson (USA) on Neotropical lycaenids, and, among other papers, there resulted a taxonomic paper revealing the hitherto undiscovered diversity of the genus *Pseudolucia* (Bálint and Johnson 1993). As it happened, this was the year (1993), when Israeli lepidopterist Dubi Benyamini had signed a contract in Chile that allowed him to stay in that country for three years. He was already in contact with Dr Johnson on lepidopterological subjects and had started sending him new Chilean material. The three lepidopterists - the American, the Hungarian and the Israeli - joined forces and a flood of academic papers appeared from their pens on polyommatine lycaenid taxonomy, classification and biology (Johnson and Coates 1999). Their early results were incorporated in the pages of the now classical book "Las mariposas de Chile" authored by the late Luis E. Peña (†1995) and his nephew Alfredo Ugarte (Peña and Ugarte revised 2006 edition).

However, the exploration of the Chilean fauna did not end with the publication of the books mentioned. Many regions seldom visited by lepidopterists were sampled again, and longer expeditions by the first and second authors of the present work, were organized almost annually to remote and never

previously accessed areas. This resulted in several discoveries along the Andes (cf. Benyamini and Bálint, 2011, Bálint and Benyamini 2013 and 2017, Benyamini 2013, Benyamini and Bálint 2015, Guerra Serrudo *et al.* 2018, Benyamini *et al*., in prep.).

In this article, we integrate all the new results, list and discuss the nomenclature, classification, distribution, phenology, conservation status and comment on the biology of 46 polyommatine lycaenid species currently known to occur in Chile. A large percentage of them are endemic to the Pacific side of the Andes (n = 27, i.e. = 59%). We provide the descriptions of three new *Pseudolucia* species and propose two synonymies. Our aim here is identical with the aims of the previously published parts: via presenting an updated checklist of the butterfly fauna of Chile, we aim to stimulate workers to engage further in the biology of these fascinating insects, gaining a better understanding of the role they play in the intricate network of life, of which we humans are also part.

MATERIALS AND METHODS

Material

Documentation (geographical, flight period and collecting data) are based on ca. 1300 specimens housed in the private collection of Dubi Benyamini* (Beit Arye, Israel), 118 specimens of Alfredo Ugarte (Portezuelo, Chile) and 416 specimens of the Hungarian Natural History Museum (Budapest, Hungary) (HNHM). Observations of the authors recorded in field were also taken into consideration. Primary types and important historical material have been examined personally by Dubi Benyamini and Zsolt Bálint in the relevant public collections.

* To be housed in the Lepidoptera collection of The Steinhardt Museum of Natural History, Tel-Aviv University, Israel.

Taxonomic Methods

Wing pattern and coloration provides qualitative and quantitative traits to discriminate species (see Benyamini and Bálint 2011). When deemed necessary, abdomens were dissected using conventional methods (Winter 2000); dissections were databased and documented in the HNHM laboratories. The dissected abdomen with genitalia is retained in a glycerol vial pinned beneath the corresponding specimen. Determination of *Pseudolucia* specimens was supported by DNA sequencing. Molecular analysis was carried out at the Institut de Biologia Evolutiva (CSIC-UPF), Universitat Pompeu Fabra, Barcelona, Spain.

Presentation

The numbering of species follows on from Parts I and II, starting with no. 125. Genera and species are listed in systematic order. Literature references are given for the original descriptions, and subsequent binominal combinations supported by descriptions or figures as documented in the basic literature for Neotropical butterflies. Pure scientific binomials or misspelled names published in various lists were not taken into consideration.

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

Distribution (D)

Region numbers are presented by Roman numerals I (first), II (second), etc. New region numbers XIV and XV and many recently published maps (which are inconsistent with one another), cause considerable misunderstanding. To eliminate this, we provided a relevant map with a list of Regions in the first part (see Benyamini *et al.* 2014, plate II).

The list of Regions (north to south) is given below:

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)

Flight Periods (FP)
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.

Definition of Conservation status (C)
(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 and 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)

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 a 'listed', 'threatened' or 'endangered' status either by the Chilean national or provincial/regional governments or by any conservation body such as the International Union for Conservation of Nature (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. Insect predators, especially the invasive *Vespula germanica* and *V. vulgaris* (Hymenoptera: Vespidae) the German or European wasp, 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 native 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 and live under the ever increasing anthropogenic pressure. 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.

Chile is well known to have two great natural isolating terrestrial barriers: the high mountain chain of the Andes reaching almost 7000 m – 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 25% for animals, but for plants it is higher, reaching 50%. Endemic polyommatine species to Chile are marked with '11'.

Comments
We give comments on the nomenclature, distribution, biology (including some larval hostplants) and conservation threats of the species involved.

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 the project of Peña and Ugarte (2006).

How to read the data – an example of a fictitious species:

Chilucia chila

D: XV-X; FP: 10(M)-2(E), 4(?); C: 4, 8, 11.

Distribution (D): from XV Region of Arica-Parinacota to X Region of De Los Lagos.

Flight Period (FP): Middle October to early February, April questionable record.

Conservation status (C): rare, close to extinction, endemic.

LIST OF SPECIES

Genus *Itylo*s Draudt, 1921
Members of the genus are restricted to the highest regions of the Andes from southern Ecuador to northwest Argentina, and northeast Chile almost up to the altitude of 6000 m (Bálint and Johnson 1994b).
125. *Itylos titicaca* (Weymer, 1890)
Lycaena titicaca Weymer 1890: 122.
Cupido speciosa Staudinger 1894: 77.
Itylos titicaca (Weymer, 1890); Draudt 1921: 822, Ureta 1949: 115, Bálint 1993: 13, Benyamini 1995: 3, Peña and Ugarte 2006: 228.
Itylos speciosa (Staudinger); Draudt 1921: 822, Ureta 1947: 59.
Parachilades titicaca (Weymer); Nabokov 1945: 6.
Parachilades speciosa (Staudinger); Nabokov 1945: 6 (as synonym of *P. titicaca*).
D: XV, I-II; FP: 10(L)-4; C: 1.

Comments: Distributed in the upper Puna and lower Alpine belts from approximately 3800 to 4500 m. The adults inhabit the green wet "Bofedales" of Arica-Parinacota to Antofagasta regions, where eggs are laid on *Plantago* spp. (in Bolivia see: Guerra Serrudo *et al.* 2013). In the "Altiplano", adults are often seen "puddling" at droppings of domesticated Llamas and Alpacas, suggesting that it is a source of necessary minerals. They are able to survive intermittent snowy and icy conditions occurring in their biotopes. Not endangered, but possibly under stress because of grazing of the hostplant by the "Camélidos". On 8.4.2007 a "vega" without any grazing was visited near the deserted plant at Aguas Calientes, west of Volcán Tacora at an altitude of 4500 m (GPS reading), where the species was very common. A female escaped from the net and flew into the dense vegetation, demonstrating its behaviour under threat and potentially as an overnight shelter hided inside the dense vegetation.

Genus *Hemiargus* Hübner, 1818

Pan-American genus, first reviewed by Nabokov (1945), and subsequently by Johnson and Bálint (1995). All the species are known to inhabit open biotopes in pioneer state; therefore, many of them appear in areas showing severe human influence, or in high altitude regions where the climate is hostile.

126. *Hemiargus ramon* (Dognin, 1887)

Lycaena ramon Dognin, 1887: 189.
Hemiargus ramon (Dognin, 1887); Draudt 1921: 819, Ureta 1947: 57, Bálint 1993: 14, Benyamini 1995: 3, Peña and Ugarte 2006: 229.
Hemiargus ceraunus ramon (Dognin); Ureta 1949: 18.
D: XV, I-II; FP: 1-12 (with reduced activity in winter months); C: 1.
Comments: Distributed in the northern regions of Arica and Parinacota via Tarapacá to Antofagasta in gardens and agricultural zones where it flourishes in Alfalfa fields. It switched easily to other Legumes like: *Acacia macracantha*, *Adesmia melanthes*, *A. spinosissima*, *Crotalaria picensis*, *Dalea pennellii*, *Desmodium scorpiurus*, *D. subsericeum*, *Medicago*, *Mimosa, Prosopis* spp, *Rhynchosia minima* and *Senna birostris* (*Cassia*). The larvae are myrmecophilous, having a prominent dorsal nectary organ. A mild pest in Alfalfa fields (Ureta 1947). The life history of the species has been documented also by Vargas (2014).

Genus *Nabokovia* Hemming, 1960

The original genus-group name was proposed as *Pseudothecla* by Nabokov (1945), which was shown to be junior homonym of *Pseudothecla* Strand, 1910. Hemming proposed the replacement name *Nabokovia* (Hemming 1960). The genus has been reviewed by Bálint and Johnson (1994a).

127. *Nabokovia faga* (Dognin, 1895)

Thecla faga Dognin, 1895: 105.
Scolitantides faga (Dognin); Draudt 1921: 822.
Pseudothecla faga (Dognin); Ureta 1956a: 185.
Nabokovia faga (Dognin, 1895); Hemming 1960: 41, Bálint 1993: 28, Benyamini 1995: 3, Peña and Ugarte 2006: 230.
D: XV-I; FP: 10-4; C: 1.
Comments: The hairstreak-like *Thecla faga* has been described from the Loja region. It is not yet clear how far the range of the species extends southwards. The Bolivian and the southern Peruvian populations were associated with the name *Thecla excisicosta* Dyar, 1913 (Type Locality: Cotahuasi, Peru), that is probably synonymous with *N. faga*.
In Chile, the species is confined to the regions Arica-Parinacota and Taracapá where it flies up to the Puna belt at approximately 3000 m. Males are strongly territorial along dry ravines perching on plants, stones or bare soil. Larvae were found and reared on the prostrate, yellow-flowered *Dalea pennellii* var. *chilensis*. Females regularly lay eggs on the large, spiny bushes of the common *Adesmia melanthes* and

A. spinosissima. Luis Peña (pers. comm.) reported many sightings along watercourses and in Alfalfa fields. The species has several successive broods. The life history of the species has been documented also by Vargas (2014).

128. *Nabokovia ada* Bálint and Johnson, 1994

Nabokovia ada Bálint and Johnson, 1994a: 140, Peña and Ugarte 2006: 231.
D: IV; FP: 10; C: 9, 11.
Comments: Extinct for many years. Described from one specimen collected in the mid-1950s by the road engineer Rodolfo Wagenknecht in "Totoralillo". According to López Silva (1983: 456), in Chile there are 21 locations with the name Totoralillo, all of them below 2000 m. There were numerous visits in the region of Coquimbo, where most of these locations are situated. Neither the late Luis Peña, nor any of the present authors reported any recent observations. This is one of few real extinct species marking the ongoing desiccation of the Chilean coastal zone from Atacama southwards through Coquimbo to Valparaiso Regions.

Genus *Leptotes* Scudder, 1876

A pantropical genus, with interesting endemic species in several oceanic islands (Canaries, Galapagos, Mauritius, São Tome). The Neotropical taxa were reviewed by Bálint and Johnson (1995a). It seems that besides some boreal and riverine species there are taxa that live in habitats without trees in high altitudes, some of which can easily invade and inhabit secondary biotopes in open landscapes. They appear amongst the first pioneers to colonize devastated and abandoned places resulting from environment-destroying human activities.

129. *Leptotes trigemmatus* (Butler, 1881)

Lampides trigemmatus Butler, 1881: 468.
Leptotes trigemmatus (Butler, 1881); Ureta 1949: 110, Bálint and Johnson 1995a: 9, Benyamini 1995: 5, Peña and Ugarte 2006: 232.
Leptotes trigemmatus borealis Ureta 1949: 112; Bálint and Johnson 1995a: 9 (in synonymy of *L. trigemmatus*). D: XV, I-III; FP: 1-12; C: 1.
Comments: Recorded from the northern and central regions of Chile in a disjunct distributional pattern reflecting the influence of human activity. Adults were reported from northern "quebradas", desert oases, agricultural areas, *Acacia*/*Prosopis* forests and hedges as well as from villages and cities where one of its numerous hostplants from the families Fabaceae, Mimosaceae and Plumbaginaceae might be present. This is the only Chilean Polyommatine with early biological records (Ureta 1949). Recorded hostplants are: *Acacia karroo*, *Aloysia looseri*, *Medicago sativa*, *Plumbago capensis*, *Prosopis chilensis*, *P. tamarugo* and *Scirpus americanus*. In the summer, it expands southwards to cultivated fields and to cities where it will lay its eggs on cultivated *Plumbago capensis* and other available hostplants. The larvae have a prominent dorsal nectary organ (DNO) suggesting it is strongly myrmecophilous. It flies in warm northern localities year-round, but in smaller numbers in the winter. Southwards, seasonal populations are regularly established, although not every summer. The life history of the species has been documented also by Vargas (2014).

Genus *Pseudolucia* Nabokov, 1945

This is the most diverse Lycaenidae genus in Chile and in the austral part of South America. Fifty-five species have already been described, 38 of them occurring in Chile. The local, presumably rapid speciation identified to date in the Coquimbo Region, suggests that more species are to be found, hopefully, before extinction. Most of the reared larvae have a DNO suggesting strong myrmecophily of the genus (see Benyamini and Bálint 1995). Until now, all species were found to have winter diapause in the larval stage.

The genus was established by Nabokov in 1945 for the species *Lycaena chilensis* (type species – see below) and *L. collina* based on genitalia morphology. Bálint (1993) combined 18 nominal taxa with *Pseudolucia*.

Almost simultaneously Balletto (1993) proposed the following genera for species placed by Bálint in *Pseudolucia*: *Cherchiella* (type species: *Lycaena grata* Köhler, 1934; included species: *andina*, *argentina* (sp. n.), *patago*, *plumbea* and *scintilla* (sp. n.)), *Facula* (type species: *Cupido sibylla* Kirby, 1861[sic]) (monotypic), *Pallidula* (type species: *Pallidula vicunha* sp. n. = *Lycaena chilensis*) (monotypic). The generic names of Balletto were discussed and synonymized subsequently by Bálint (1995). We have now more than two decades of experience in the genus. We are of the opinion that the species groups in *Pseudolucia* can be recognized based on characters provided by adult morphology, life-history and molecular markers, and indeed deserve generic names. The taxonomic actions need a separate paper providing additional details beyond the scope of this work, and is planned to be addressed in a monograph dedicated to the genus.

The *chilensis* species group – the *Cuscuta* feeders (= *Pseudolucia* s. str.)

For this group, Balletto (1993) proposed the name *Pallidula* based on the new species *Pallidula vicunha*, which proved to be synonymous with *P. chilensis* (Bálint and Benyamini 2001). Therefore, the two generic names *Pallidula* and *Pseudolucia* are objective synonyms, as they were based on the same species. Moreover, the name *Pallidula* is not available for any nomenclatural or taxonomic use as it was proposed as an adjective (Bálint 1995). Balletto considered the group to be monotypic, but there are additional described species (cf. Bálint and Benyamini 2001, Benyamini and Bálint 2015, and Guerra Serrudo *et al.* 2018).

130. *Pseudolucia chilensis* (Blanchard, 1852)
Lycaena chilensis Blanchard, 1852: 7.
Polyommatus atahualpa Wallengren, 1860: 37.
Scolitantides chilensis (Blanchard); Draudt 1921: 822, Ureta 1949: 117.
Pseudolucia chilensis (Blanchard); Nabokov 1945: 33, Bálint and Johnson 1993: 16, Bálint 1993: 17, Benyamini 1995: 14, Bálint and Benyamini 2001: 112, Peña and Ugarte 2006: 244.
D: III-VIII; FP: 8-4; C: 1. 11.
Comments: The most common polyommatine in Chile. Distributed from Chañaral in the northern Atacama Region south to Arauco, 53 km SW of Concepción in the Biobío Region. Along some 1400 km of its distribution, it is found from sea level to 3000 m on the western slopes of the Andes and usually present around its unique parasitic hostplant – various species of *Cuscuta*. It has at least three successive broods.

The *collina* species group – the Polygonaceae and Montiaceae ex Portulacaceae feeders

One of the members of this group "*Cherchiella scintilla* sp. n." was placed in the genus *Cherchiella* by Balletto (1993). During our investigations, the *collina* species group was shown to be relatively diverse, having 13 recognized taxa, six of them endemic to Chile, and two of them occurring on both sides of the Andes, whilst five species can be found only in Argentina (Benyamini and Bálint 2015). Based on larval host or female genitalia morphology (cf. Pl. XVII, A-H), the group can be subdivided into two subgroups of species. However, these groupings were controversial in the light of molecular taxonomy, as trees generated by all consensus genes, or COI only, did not provide the same pattern.

131. *Pseudolucia collina* (Philippi, 1860)
Lycaena collina Philippi 1859: 1093.
Lycaena lyrnessa Hewitson 1874: 107; Draudt 1921: 822 (in synonymy of *Scolitantides collina*).
Scolitantides collina (Philippi, 1859); Draudt 1921: 822, Ureta 1949: 118.
Pseudolucia collina (Philippi, 1859); Nabokov 1945: 34, Benyamini 1995: 5, Bálint and Benyamini 2001: 115, Peña and Ugarte 2006: 234 and 237.
Pseudolucia zembla Bálint and Johnson 1993: 6; Bálint 1995: 7 (in synonymy of *Pseudolucia lyrnessa*).
D: V(13)-VIII; FP: 9(M)-3; C: 1.

Comments: *Lycaena collina* was described from specimens collected in the hills around Santiago, as was *Lycaena lyrnessa*. The two species were synonymized by Draudt. The name *Pseudolucia zembla* has been introduced for *collina*-like specimens collected in Las Trancas, Ñuble, ca. 400 km south of Santiago. All these names represent in Chile the relatively widely distributed species *P. collina*, that has a female phenotype with restricted blue basal coloration and medial orange pattern in the dark brown dorsal hindwing surface, plus a tubular female genitalia henia, which in lateral view is straight with a pointed terminus (Pl. XVII, A). Distributed south of Santiago and the Maipo River to Biobío Region and at the coast, where it is very local south of Constitución (Maule Region). It penetrates Argentina near Lago Alumine (Neuquén) and flies from sea level to 1900 m. The females lay eggs on various *Montiopsis* spp. (Montiaceae ex Portulacaceae) inland and in the mountains, and along the coast on cushion-like *Chorizanthe vaginata* Benth. (Polygonaceae). The flight period starts in mid-September (or earlier) to March. There are up to two annual broods in the mountains. On the coast, there are up to three successive annual broods, where perennial *Chorizanthe* plants are in bloom from spring to the summer.

132. *Pseudolucia dubi* Bálint, 2001 (Pl. XII, A)

Pseudolucia dubi Bálint, in Bálint and Benyamini 2001: 138.

D: IV-V; FP: 8(M)-3; C: 1, 11.

Comments: The species has a female phenotype without blue basal coloration and often with extensive medial orange pattern in the brown colored dorsal hindwing surface. The female genitalia henia is tubular, which is C-shaped in lateral view and the internal (cephalad) terminus is often bifurcated (C-shaped), whilst the external (caudal) is pointed and bending (Pl. XVII, B).

Distributed from the Precordillera of Central Chile north of the Aconcagua River, northern Valparaiso to Coquimbo. Here, it was common on the mountainous slopes along Rio Choapa. It proceeds along the coast north to La Higuera north of La Serena, where it is on wing from sea level to 2650 m in the Andes. In early spring it lays eggs on annual *Montiopsis* (*Calandrinia*) *capitata*, *M. discolor*, *M. frigida*, *M*. cfr. *parviflora*, *M. ramosissima*, *M. sericea*, *M*. aff. *stricta*, *M. umbellata* and possibly other *Montiopsis* species. Later in season, it switches to perennial *Chorizanthe* spp. that start to bloom later. The following species were recorded as larval hosts: *C. dasyantha*, *C*. aff. *densa*, *C. paniculata*, *C. rosea*, *C. vaginata*, *C. viridis* and *C. umbellata*.

Flight period spans from mid-August to March in three annual coastal broods, but with fewer broods at upper elevations. A limited fourth brood may fly in low, warm biotopes in autumn as late as April. In general, the population density is high, and imagines are common around the larval hostplants. Recent DNA analysis of this widespread species showed great variation between local populations that are more than sufficient to describe new taxa at subspecies level.

Conservation: On 2-3 of January 2018, the first author returned to the "classical" inland Coquimbo biotopes in Cuesta los Cristales, along Rio Choapa (Cuncumen, Tranquilla, Batuco) and Cerro la Virgen (Almendrillo) up to 1950 m. However, due to five continuous years of severe drought, not a single butterfly, or any hostplants were observed. It seems that this climatic catastrophe, possibly unknown in the local past history along Rio Choapa up to ca 2000 m, caused the local extinction of *P. dubi*. Only on 5 January 2018 (along Paso del Agua Negra mountain pass from La Serena, Chile to San Juan, Argentina, 14 km after Juntas, along lower Rio la Laguna at 2133 m), was a single female observed around the larval hostplant *Chorizanthe viridis* Phil. Interestingly, on 29.1.2015 (during the Los Pelambres mine rescue expedition after the lost *P. avishai* and *Hypsochila pelambres* butterflies to upper Rio Piuquenes ca. five km NW Los Pelambres copper mine) an isolated biotope of *P. dubi* was found on top of Palos Volados 31º47'8.79"S and 70º36'28.46"W at 2041 m asl and the slopes around it. The records of *P. dubi* of January 2015 and 2018, show the same process of upward retreat of this species from its former lower biotopes to their refuge above 2000 m. Should the climate revert to rainy and cooler periods, surviving populations of the high mountain *P. dubi* may return to re-establish their former biotopes.

Etymology: A noun, patronym of Dubi Benyamini, the first author of this study.

133. *Pseudolucia oraria* Bálint and Benyamini, 2001 (Pl. XII, B)
Pseudolucia oraria Bálint and Benyamini 2001: 129.
D: II-III; FP: 12-1; C: 4, 11.
Comments: The species has a female phenotype without blue basal coloration, dorsal hindwing surface is orange with wide brown margin. The female genitalia henia is C-shaped in lateral view, the internal terminus is large but not bifurcated, and the external terminus is also pointed, as in *P. collina* but less bent (Pl. XVII, C). The types were collected in the 1940s by the Chilean road engineer Adolfo Wagenknecht, in the National Park Pan de Azucar on the Atacama coast between the Regions Antofagasta and Atacama. Several visits to the type-locality between October to February clarified the situation: the species does not fly there anymore. The clue came from a single specimen collected in Frerinia near Huasco, Atacama Region by the Chilean coleopterist Juan-Enrique Barriga of Los Niches, Curico, which led to its rediscovery north of Huasco. The species is presently known from coastal Atacama localities between Carrizal Bajo (north of Huasco) to west of Domeyko (south of Vallenar), where it can be found around *Chorizanthe* aff. *vaginata* (Polygonaceae), the larval hostplant. It should be looked for along the coast, south of Huasco, where it has never been searched for previously. Based on available material, the flight period is recorded from the months December and January, but certainly extending to February and March, depending on the availability of the hostplant.
Conservation: The poor status of its hostplant in rainless years clearly indicates that this blue is under stress from the present climatological situation. Distribution has shrunk in comparison with that of 1946-1949, when the species flew north to Pan de Azucar National Park. This reduced range is possibly due to the desiccation process of the coastal region.
Etymology: Noun, with the meaning “the one, who lives on the coast”; in contrast to the sister species *P. collina* “the one, who lives in collines”.

134. *Pseudolucia vera* Bálint and Johnson, 1993
Pseudolucia vera Bálint and Johnson 1993: 15; Benyamini 1995: 13, Peña and Ugarte 2006: 243.
D: VII-IX; FP: 11(M)-2; C: 1.
Comments: The species has a female phenotype without blue basal coloration, dorsal hindwing surface is brown with occasionally orange patterning along the veins. The membraneous female genitalia henia is tubular and “winged” (with lateral lobes), well contrasting with *collina* that is sclerotized and without lateral lobes (Pl. XVII, D).
Confined to volcanic soil near Volcán Lonquimay, usually over the Araucarias timberline (its type locality in the Región de la Araucanía) to Termas de Pemehue and Volcán Tolhuaca. Recorded in small numbers from Parque Nacional Nahuelbuta (Biobío). Extends also to the Region del Maule where specimens were recorded from Hacienda San Manuel. It possibly crosses the border to Argentina towards neighbouring Lago Alumine.
There are at least two successive annual broods. Imagines occur in habitats from 1000 up to 1300 m. The hostplant is *Montiopsis gayana* (Montiaceae).

135. *Pseudolucia benyamini* Bálint and Johnson, 1995
Pseudolucia benyamini Bálint and Johnson, 1995c: 2; Benyamini 1995: 6, Bálint and Benyamini 2001: 138, Peña and Ugarte 2006: 236.
D: IV-V; FP: 8-4; C: 7, 11.
Comments: The species has a female phenotype without blue basal coloration, dorsal wing surfaces are orange with wide brown margins with occasional orange pattern along the veins. The female genitalia is tubular and in lateral view slightly bent, there is no bifurcation and is laterally lobeless (Pl. XVII, E).

Distributed along the central Chile Pacific Coast from San Antonio in the V Region of Valparaiso north to Pichicuy (which is the type-locality) and S Los Vilos, IV Coquimbo Region. There are three full generations and a fourth partial one. Locally common around its cushion-like hostplant, *Chorizanthe vaginata* (Polygonaceae).
Conservation: This tiny blue is highly endangered because the coastal dunes overlooking the Ocean between Reñaca and Concon are quickly disappearing under newly built hotels, while to the north the coastal area is sold as lots ("Parcelas") for private use. Some hope exists in the type locality at Pichicuy, where the coastal dunes possibly fall within an unfenced military area. S of Los Vilos, the local coastal isolated population flies over the dense wind-sculptured cushions of *Chorizanthe vaginata*. Its close location to the southern limit of Los Vilos city may risk its future survival and it is in urgent need of conservation efforts.

136. *Pseudolucia ugartei* Bálint and Benyamini, 2001 (Pl. XII, C)
Pseudolucia ugartei Bálint and Benyamini 2001: 134.
D: V; FP: 9-3; C: 5, 11.
Comments: The species has a female phenotype without blue basal coloration, dorsal forewing surface is orange with wide brown margin, hindwing dorsal surface brown with scant orange scaling, and with occasional orange patterning along the veins. In lateral view, the female genitalia henia is L-shaped and less robust than that of *P. collina* and *P. oraria*, with no lateral lobes (Pl. XVII, F).
Recorded only from either side of Cuesta la Dormida, a mountain pass in the coastal mountain range (Cordillera de la Costa) and at San Felipe in the Region Valparaiso. There are three annual broods. Locally common around its hostplants: *Montiopsis capitata* in the first brood and *Chorizanthe virgata* in later two broods.
Conservation: The existence of the species is under stress on both sides of Cuesta la Dormida, where the area was sold to private owners who destroyed the native vegetation with the hostplants and pushed the species to the lots' margins and steep adjacent slopes. Some relief comes from the observation that local goats avoid grazing on *Chorizanthe*.
Etymology: Dedicated to Alfredo Ugarte (Portezuelo, Santiago, Chile) a leading explorer of the insect fauna of austral South America and a co-author of this publication.

The *scintilla* species sub-group of *collina* – the Polygonaceae and Montiaceae ex Portulacaceae feeders

137. *Pseudolucia scintilla* (Balletto, 1993) (Pl. XII, D)
Cherchiella scintilla Balletto 1993: 238.
Pseudolucia scintilla (Balletto); Bálint 1995: 9 [as senior synonym of *P. kinbote* Bálint and Johnson 1993 (in error)], Bálint and Benyamini 2001: 128, Peña and Ugarte 2006: 242 (in the sense of Bálint 1993).
D: IV; FP: 9-1; C: 1, 11.
Comments: This is a species with the female phenotype possessing extensive blue/greyish-white dorsal wing coloration. The female genitalia henia is tubular with lateral membranous lobes (Pl. XVII, G).
The species was inadequately documented in the original description (see Bálint 1995). Subsequently, because of this it was considered a representative of the *andina*-group. Examination of the type material showed that it is a *collina*-like species (see Bálint and Benyamini 2001), restricted to the Illapel region. The holotype specimen was poorly treated, leading to damage of the structural blue dorsal wing coloration, explaining why the species had been misdiagnosed.
There are at least two successive broods. A very local species in upper Rio Illapel, above 2100 m and locally common around *Chorizanthe viridis*, its hostplant there. The type material was collected in Guampula 30 km N of Ovalle, Coquimbo while we observed the species in a different locality. The late Luis Peña collected it in the 1960s in "Hacienda Illapel" and gave only general directions to the biotope. It took the senior author several years until its rediscovery in early January 2002. The present status of the species may suggest that two different taxa are involved. The authors did not succeed in collecting fresh material from Guampula to inspect its original real identity.

The species is extremely local, but not endangered because the goats avoid eating the larval hostplant in the biotope, that is otherwise generally overgrazed.

138. *Pseudolucia zoellneri* Benyamini and Bálint, 2011 (Pl. XII, E)
Pseudolucia zoellneri Benyamini and Bálint 2011: 268.
D: VII; FP: 12-1; C: 2.
Comments: This is a species with the orange female phenotype possessing blue dorsal wing coloration restricted to the basal area. The female genitalia henia is tubular with lateral membranous lobes (Pl. XVII, H). Distributed on the Chilean side of Paso Vergara and in Paso Pehuenche o del Maule from 1350 m to 2800 m. Both mountain passes are located in Province Talca at the VII's Región del Maule. Prof. A. M. Shapiro (Davis, California) collected it also near Cerro Campanario on the Argentinean side of Paso Pehuenche o del Maule (Mendoza) at an elevation of 3000 m. The larval hostplants in Chile are *Montiopsis andicola, M. capitata* and *M. umbellata*.
Conservation: A recent visit by the first author and Juan-Enrique Barriga to Paso Vergara in early 12/2018, revealed a dry area devoid of hostplants, and elsewhere a strong decline in abundance of both larval hostplant and of the blue in its lower distribution limit, and an upwards shift to higher elevations. It is not known if L5 diapausing larvae extended the dormant phase to the next (and hopefully) more favourable year, or if the brood hatched, and on failing to find available larval hostplants were successful at a higher level, resulting in an uphill translocation of the entire local population.
Etymology: Dedicated to the late Chilean botanist Otto Zöllner Schorr (1909-2007) of Valparaiso University, who helped the senior author to identify all the *Chorizanthe* (Polygonaceae) larval hostplants of the genus *Pseudolucia*.

The *charlotte* species group – the feeders on *Adesmia* (volcanic prostrate to small shrubs)

This is a well-differentiated group of two species, easy to separate from other congeners on the basis of wing pattern, coloration and genitalic morphology (Bálint and Benyamini 2001: 111). One of the most obvious traits of the species is the male dorsal forewing surface orange or pink pigmented scaling, in an otherwise structural blue coloration. Based on genitalic characters this group is related to *P. andina*, also confirmed by results of molecular investigations.

139. *Pseudolucia charlotte* Bálint and Johnson, 1993
Pseudolucia charlotte Bálint and Johnson 1993: 17; Benyamini 1995: 15, D'Abrera 1995: 1254, Bálint, Benyamini and Johnson 2001: 162, Peña and Ugarte 2006: 235.
D: VIII-X; FP: 12-1 (in a single annual brood); C: 1.
Comments: The collecting site of the holotype (= type locality) was erroneously given in the original description as "Mendoza, Valle de las Leñas" in Argentina. Subsequently, it was corrected to Volcán Villarica, Araucanía, Chile by Bálint *et al.* (2001). *P. charlotte* was confused with "similar" males from other localities e.g. Cuesta la Dormida (Benyamini 1995: 15), which later became a new species: *P. ugartei*. The most pronounced external differences between *P. charlotte* and *P. lanin* are: the dorsal wing surface of the *charlotte* female is entirely brown rather than blue, orange-pigmented in *lanin*. The *charlotte* male has a faint or non-existent orange patch. Although the *P. charlotte* male was figured correctly by Benyamini (1995, Pl. XIII, fig. 34 – although wrongly marked in the caption as female), in the text it was confused with similar males from other localities, e.g. Cuesta la Dormida that were later used for material serving the description of *P. ugartei*.
Typical Chilean biotopes are upper volcanic slopes of: Volcán (Vn) Villarica over the timberline at 1400 – 1450 m, Vn Llaima 1200-1400 m, Vn Lonquimay 1100-1450 m, Vn Antillanca 1050-1400 m and also Pino Hachado Pass 1800 m, Las Raices and 12 km SE Recinto (BioBío). The larval hostplants are *Adesmia emarginata* Clos and possibly also *A*. cfr. *papposa* (Lag.) DC.

140. *Pseudolucia lanin* Bálint and Johnson, 1993
Pseudolucia lanin Bálint and Johnson 1993: 17; Bálint and Johnson 1995b: 11, Benyamini 1995: 17, D'Abrera 1995: 1256, Peña and Ugarte 2006: 245.
D: X; FP: 12-3 (in one annual brood); C: 1.
Comments: Distributed from its type locality west of the Argentine National Park Nahuel Huapi north of San Carlos de Bariloche, across Puyehue pass (1300 m) to Chile, where it was observed in Volcán Antillanca (Región de Los Lagos). The Chilean biotopes are situated on bare slopes of the volcano and above the *Nothofagus* forest timberline from 1100 m, up to Raihuen Crater (1300 m) and above it to 1400 m. In the ski trails above Hotel Refugio Antillanca, females lay eggs on the prostrate hostplant *Adesmia vetusa* Grisebach that grows on volcanic ash, and possibly also on *A. longipes* Phil. The typical rainy weather restricts adult activity to fewer sunny days, but then the species is quite numerous.

The *plumbea* species group – the *Adesmia* feeders (medium to large shrubs)

Ureta (1949) notes the color variability of the "*Scolitantides plumbea* males", as a particular trait of the taxon he identified under that name. For this group, the name *Cherchiella* was proposed by Balletto, with the type species *Lycaena grata* Köhler, 1934. In his genus, Balletto placed several species that we arranged into different groups (*P. andina, P. argentina* and *P. scintilla*). Beside genitalia traits given for the *plumbea* species group (see Bálint and Benyamini 2001: 111), members can be characterized by a structural blue or green (lighter or darker) coloration in males and a dorsal forewing orange pigmented coloration in most of the females. On the eastern side of the Andes, the group is less differentiated than on the western side, where several endemic taxa have been determined.

141. *Pseudolucia plumbea* (Butler, 1881)
Scolitantides plumbea Butler 1881: 486; Draudt 1921: 822, Ureta 1949: 120.
Pseudolucia plumbea (Butler); Bálint and Johnson 1993: 7, Bálint 1993: 19, Benyamini 1995: 9, Peña and Ugarte 2006: 240.
D: V(13)-VIII; FP: 9-1; C: 1, 11.
Comments: Distributed from Santiago to Ñuble over the elevation 1300 m. The species was reared in Santiago from larvae found on *Adesmia gracilis* Meyen ex Vogel. The final instar larva diapauses in the soil through winter to the following spring.

142. *Pseudolucia zina* Benyamini, Bálint and Johnson, 1995 (Pl. XIII, A)
Pseudolucia zina Benyamini, Bálint and Johnson 1995: 1.
D: V(13); FP: 11-12; C: 1, 11.
Comments: A small, local species found on the northern slopes of Cerro Morado, the Andes, on the southern and eastern shores of Embalse del Yeso artificial reservoir, 2600–3300 m, N of the Maipo River in SE Santiago Metropolitan Region. Adults were observed on its *Adesmia gracilis* hostplant, where it can be locally common. Presently not endangered, but extremely vulnerable because of its limited distribution. The species has one or two annual broods.

143. *Pseudolucia patago* (Mabille, 1889) (Pl. XIII, B)
Lycaena patago Mabille 1889: 143.
Itylos grata Köhler 1934: 39.
Itylos plumbea grata Köhler; Ureta 1956a: 183.
Cherchiella patago (Mabille); Balletto 1993: 236.
Cherchiella grata (Köhler); Balletto 1993: 236.
Pseudolucia grata (Köhler); Bálint 1993: 20, Bálint and Johnson 1995: 4.
D: XI; FP: 12-3; C: 1.

Comments: The holotype specimen of *P. patago* comes from Santa-Cruz (Patagonia, Argentina). This represents a male phenotype having blue dorsal coloration with a relatively wide black margin. It is identical with the taxon *Itylos grata* (Type Locality: Rio Agrio, Neuquén, Argentina) and *Pseudolucia whitakeri* (Type Locality: Tecka, Chubut, Argentina), but has been also recorded in Chile (vicinity of Chile Chico, Aisen). Its larval hostplant east of Chile Chico in the wide shallow valley of Rio Jeinimeni on the border with Argentina, is *Adesmia volckmanii* Phil., where it forms large bushes. It may lay eggs also on *A. aegiceras* Phil. that grows in this biotope.

144. *Pseudolucia arauco* Bálint, Benyamini and Johnson, 2001 (Pl. XIII, C)

Pseudolucia arauco Bálint, Benyamini and Johnson 2001: 158.

D: IX; FP: 12-1; C: 1, 11.

Comments: Both specimens of the type material (holotype and paratype male) possess bright and light blue dorsal wing surface coloration, a character peculiar for the known phenotypes of the *P. grata* group. Because of the close geographical origin of the two specimens, they were associated together and described as new species on the hypothesis that the male blue coloration is species specific and the spectral deviancy is very limited (cf. Bálint 2012 *et al*., Piszter *et al.* 2016). Subsequently, the species has been found in Chile on the western slopes of Volcán Llaima (Temuco, Province Cautín), where it flies from 1200 to 1400 m. Its lower flight limit is among sparse trees and proceeds across the timberline to the bare volcanic soil around Refugio Llaima. Small bushes of *Adesmia emarginata* serve as the hostplant.

Etymology: Named after the region of the type locality; Araucanía.

145. *Pseudolucia annamaria* Bálint and Johnson, 1993

Pseudolucia annamaria Bálint and Johnson 1993: 7; Benyamini 1995: 12, D'Abrera 1995: 1254, Peña and Ugarte 2006: 241.

Pseudolucia clarea Bálint and Johnson 1993: 9; Peña and Ugarte 2006: 239, new synonym.

D: IV-V; FP: 9-2; C: 7, 11.

Comments: The species *P. annamaria* and *P. clarea* were described based on specimens originating from the same population; therefore, we consider them synonymous. The holotype of *P. clarea* is a female specimen, and the genitalia have been most probably intermixed with a male individual.

This beautiful species, the male having a metallic green sheen, is relatively widely distributed in the lower slopes (Pre-Cordillera) of the Andes, from Alcohuaz in Coquimbo and north-east Valparaíso along some 650 km south to the Parral Mountains (Talca). At Alcohuaz, it laid eggs on the tall *Adesmia dichotoma* Clos and *Adesmia argentea* Meyen, at lower elevations it flies around the prostrate *Adesmia* aff. *exilis* Clos, and at Cerro la Virgen (2850 m) on *Adesmia* aff. *glutinosa* Hook and Arnott, a small bush similar to the cushion-like plant of *A. aegiceras*. At 1400 m, the flight period is from September to October, at 1850 m it starts from the end of October, and at 2850 m from the end of November and lasts until February. At the lower range, it has two annual broods, but at higher elevations, just one. This data is for Coquimbo Region. In Alcohuaz, it is highly threatened by competing livestock that consume and destroy the hostplant, especially the flower buds with eggs and larvae. At higher elevations, it is less threatened except for summer herds of thousands of livestock that may consume and destroy protein-rich legume flowers and fruits.

146. *Pseudolucia malleco* Bálint and Benyamini, new species (Pl. XIII, D)

urn:lsid:zoobank.org:act:042F355B-1D8A-4E57-BF95-B3B958D58B2C

Pseudolucia clarea Bálint and Johnson 1993: 9; d'Abrera 1995: 1256.

D: IX; FP: 11; C: 10, 11. urn:lsid:zoobank.org:act:042F355B-1D8A-4E57-BF95-B3B958D58B2C

Diagnosis and description. Habitus (see Pl. XIII, D): The male superficially resembles *P. annamaria* with a metallic green dorsal wing surface suffusion that is intensive only in the basal area (in *P. annamaria* the male wing surface is entirely greenish); forewing having less bent and shorter outer margin resulting in a more acute apex and narrower shape (the outer margin is longer and more bent in *P. annamaria* resulting a rounder and wider wing shape); the ventral hindwing postbasal maculation is conspicuous (more or less vestigial in *P. annamaria*).

The male genitalia structure (Pl. XVII, I) is typical of the *plumbea* species group (see in Bálint and Johnson, 1993 for males figs. C-G, for females C-E, G), but in lateral view the male organ with extremely elongate and slender valva (in general, *plumbea* species group valval shape is wider forming a less slender shape).
Description: Male wings dorsal coloration metallic green with relatively wide (2 mm) darker brown forewing margin and black hindwing marginal spots in lighter greyish background between the cubital vein and anal margin; fringes long and chequered: black at vein termini, white between veins. Ventral forewing surface from base to postmedian area orange with a row of black postmedian spots in spaces between veins, running from costal margin to the anal vein, but anal margin area grey; submarginal area graeyish-white with faint distal and more pigmented basal pattern; hindwing pattern complex "*plumbea*-like" (see Bálint and Johnson 1993, fig. 2) with black basal, postbasal and median spots, but medial spots forming a ruptive band running from vein M1 to inner margin and bordered by white spots or arrowhead-shaped pattern basally or distally in a lighter grey background, submargin with large black spots in cells CuA1 and CuA2. Female wings: forewing dorsal surface coloration greenish blue in basal, orange in medial and greyish in marginal areas; hindwing dorsal surface greenish blue in basal and greyish-brown in median areas, but postmedian area with black veins and greyish arrowhead pattern, submarginal area greyish-white with black spots attached to the black marginal border; fringes as in male. Ventral coloration and pattern as in male, but hindwing greyish ground color with orange hint and with reduced white pattern elements. Genitalia: typical of *plumbea* group, but male organ extremely small and in lateral view with long and narrow shaped valva with a slightly bent upper costa. Female genitalia unknown.
Measurements (in mm): Forewing costal length: 8 (male; n =1); 9 (female; n =1) male genitalia valva (n = 1): AB = 1.00, C = 0.61, CD = 0.27, E = 0.73, EF = 0.08.
Type material: Holotype male, set dorsally, in bad condition (right part destroyed: antenna missing, wing broken), abdomen missing (dissected, the genitalia are mounted on a slide), labeled as: (1) "Malacahuello, (6) 1200m, Malleco (/) 27-Nov-1990 (/) Leg. L. E. Peña G." (oblong, white, printed), (2) "gen. prep. No. (6) 317 (/) det. Zs. Bálint" (quadrant, white, printed, numbers hand written); (3) "*destroyed by* (/) *d'Abrera during* (/) his photo-process" (oblong, white, hand-written). Paratype (allotype) female, with holotype data. Both deposited in HNHM.
Etymology: The name is a Latinized noun, with female gender, formed from the Araucanian or Mapudungun word "Malleco" (it means "agua gredosa"), and is one of the provinces of the Región de La Araucanía, where the type locality Malalcahuello is situated.
Comment: The species is known only from the type material that was sent to Zsolt Bálint for dissection in 1992, by Kurt Johnson. The male abdomen has been dissected and the genitalia mounted on a slide (gen. prep. Bálint No. 317). The female abdomen, including genitalia, was partly destroyed by museum pest; therefore, it was not possible to be characterized. The specimens and the male genitalia were documented, and the documentation has been sent to New York as the information about a new species. Johnson selected a "male" (recte: female) *Pseudolucia annamaria* specimen collected in Elqui as the holotype of the species diagnosed, as a result of which the names *P. annamaria* and *P. clarea* became synonymous (see above). In 1994, with other Neotropical Polyommatine, the Malalcahuello specimens were sent to Bernard d'Abrera in London for the Lycaenidae volume of the series Butterflies of the Neotropical region to represent the diversity of the tribe. The material was documented (cf. D'Abrera 1995: 1254-1257), but some specimens became damaged in transit from London to Budapest – including the holotype of *P. malleco* (recorded as *P. clarea* in the work of D'Abrera).

147. *Pseudolucia hazeorum* Bálint and Johnson, 1993
Pseudolucia hazeorum Bálint and Johnson 1993: 8; Benyamini 1995: 8, d'Abrera 1995: 1254, Peña and Ugarte 2006: 238.
D: V-VIII; FP: 12-1; C: 10, 11.

Comments: A unique species where males and females are distinctive and differ externally from other members of the *plumbea* species group. Widely distributed but usually uncommon along some 750 km from Coquimbo to BioBío Regions on the western slopes of the Andes up to ca 2500 m and across the continental divide at the lower southern Araucanía passes to Neuquén in Argentina. Flies in a single annual brood and occasionally a partial second brood when it may be supported by *Adesmia* spp. in bloom. The larvae feed mostly on perennial *Adesmia* spp. In La Disputada E Metropolitan Santiago, it feeds on *A. confusa* Ulibarri and possibly on *A. volckmanii.* In National Park El Morado SE of Santiago, it shows a preference for *A. gracilis* and in Paso Vergara (Talca, Maule Reg.) larvae were found on prostrate *A. corymbosa* Clos and *A. exilis*.

148. *Pseudolucia valentina* Bálint and Benyamini, 2011 (Pl. XIII, E)
Pseudolucia valentina Bálint and Benyamini 2011: 271.
D: VII-VIII; FP: 12; C: 10.
Comments: Poorly known species, resembles *P. hazeorum*, but smaller and the male dorsal wing surface is violet blue not lustrous indigo. Described from the vicinity of Lago Maule, where the two species occur together, but *P. valentina* flies earlier. According to specimen data, the imagines are in flight during December in Maule and in Mendoza (Argentina).
Etymology: Dedicated to the late Chilean entomologist José Valentin Herrera González (1913-1992), the first reviser of Chilean butterflies (Don Macneill 1992).

The *argentina* species group – the *Adesmia* feeders (alpine spiny cushion-like formation)

Ureta (1949) recorded the high variability of the group but was unable to distinguish the species. This group is closely related to the *plumbea* group, having similar genitalia configurations and somewhat similar wing coloration. Remarkably, all the known species are small, the male dorsal coloration is bright with a conspicuous but thin black margin, and the females are also blue dorsally. The group seems to be more diverse in high mountain regions of north-western Argentina and there are only two endemic species that can be found on the Pacific side of the Andes.

149. *Pseudolucia argentina* (Balletto, 1993) (Pl. XIV, A)
Scolitantides andina Bartlett-Calvert 1894; Elwes 1903: 288 (misidentification).
Cherchiella argentina Balletto 1993: 237.
Pseudolucia aconcagua Bálint and Johnson 1993: 22; Bálint and Johnson 1995: 10 (as synonym of *P. argentina*).
Pseudolucia sirin Bálint 1993: 20; Bálint and Johnson 1995: 10 (as synonym of *P. argentina*), Bálint 1999: 59 (as junior objective synonym of *P. argentina*).
Madeleinea sp. ? d'Abrera 1995: 1254.
Pseudolucia argentina (Balletto); Bálint and Johnson 1995: 10, Bálint 1995: 3, Benyamini 1995: 41, Bálint 1999: 14, Peña and Ugarte 2006: 255.
D: V, 13; FP: 12-2; C: 10.
Comments: The holotype of *Cherchiella argentina* (Type Locality: "Argentine, Chilean border, Fuente de Inca" = Puente del Inca) and *Pseudolucia sirin* (Type Locality: "Chilean-Argentinian border, Puente del Inca") is the same specimen, therefore they are objective synonyms. The holotype of *Pseudolucia aconcagua* comes from the close vicinity of the type locality of the previously mentioned taxa and the specimens share the same specific characters. Therefore, *P. aconcagua* is considered synonymous.The species was first collected in the Puente del Inca region by Elwes, who thought that this was the male of the species he identified as *Itylos andina.* This Argentinian species, which flies in Parque Provincial Aconcagua, near the international pass to Chile, penetrates upper Rio Volcan, San Jose de Maipo, south-east of Santiago, where only two males were collected many years ago. Several visits to the area around Baños Morales and Los

Valdés, where the known hostplant *Adesmia aegiceras* is dominant, were not successful. Further fieldwork is necessary to determine the present status of its existence in Chile. In Argentina, the flight period starts in mid-November and the butterfly is on the wing until mid-February in a single annual brood. In Chile, possibly it is slightly later, from December to February. The status of the populations in Chile is unknown, while in the Argentinean locality the species is much threatened due to grazing of its hostplant by mules. The Argentine authorities in Parque Provincial Aconcagua are now aware of the situation and are protecting the hostplant from further damage.

150. *Pseudolucia sigal* Benyamini and Bálint, 2011 (Pl. XIV, B)
Pseudolucia sigal Benyamini and Bálint 2011: 269.
D: IV; FP: 12(E)-1; C: 1, 11.
Comments: Locally distributed in Rio el Encanto, upper Rio Tres Quebradas, Illapel, Coquimbo Region, Chile. The type locality is a western slope, east of Rio el Encanto and south to south-west of the deserted El Encanto mine. It is close to the continental divide at elevations of 3100-3500 m around its sole hostplant the spiny, cushion-like, *Adesmia aegiceras*. This is the supposed sister species of *Pseudolucia talia* which flies on the Argentinean side, some 250 km to the north.
Etymology: The species has been dedicated to Sigal Benyamini, the youngest daughter of the senior author. Her elder sister Talia Benyamini has been already the patronym of the Argentinean sister species *P. talia*.

The *sibylla* species group – The *Adesmia* feeders (spiny cushion and large shrubs) in the periphery of the Atacama Desert.

The group was named by Balletto as genus *Facula* by monotypy (type species: *Cupido sibylla* Kirby, 1871). Bálint and Johnson (1993) placed four taxa in their *sibylla* group of *Pseudolucia* presenting evidence that "*Facula sibylla*" has several relatives. The imagines of this group are peculiar and easy to separate from all other congeneric species because of the rounded wing shape and hindwing pattern characterized by a medial band formed by spots of reduced size (cf. Bálint and Benyamini 2013). All the species also have special life strategies, as they inhabit the upper puna and the alpine belts. The group was considered an endemic of the Atacama-Coquimbo region, but a member has been discovered in Argentina recently (Benyamini and Bálint 2015). Although some of the members of the group are distinctive and easy to identify, hitherto the application of techniques using molecular markers was unhelpful in reconstructing the internal relationships, and phylogeny of the species recognized by traditional taxonomy were often paraphyletic showing minimal divergences.

151. *Pseudolucia sibylla* (Kirby, 1871)
Lycaena endymion Blanchard 1852: 37 (junior homonym of *Lycaena endymion* Gerhard, 1851, Glaucopsychina, Polyommatini).
Cupido sibylla Kirby 1871: 377 (as replacement of *Lycaena endymion* Blanchard, 1852).
Scolitantides endymion (Blanchard); Draudt 1921: 822.
Pseudolucia sybilla [sic](Kirby); Bálint and Johnson 1993: 20.
Pseudolucia penai Bálint and Johnson 1993: 21; Benyamini 1995: 39, Peña and Ugarte 2006: 251.
Pseudolucia sibylla (Kirby); Bálint 1993: 18, Benyamini 1995: 39, Peña and Ugarte 2006: 250.
D: IV; FP: 11-1; C: 5, 11.
Comments: Peña and Ugarte (2006) recorded the existence of *P. penai* Bálint and *P. sibylla* occurring in the same locations. Since only one species of this group flies there, *P. penai* has to be considered as a junior synonym of *P. sibylla*.
Distributed in the upper part of Paso del Agua Negra between La Serena, Chile and San Juan, Argentina, from Rio La Laguna at 3000 m and up to about 4500 m. The adults fly around *Adesmia aegiceras*, *A. echinus* K. Presl, and *A. echinus* x *A. subterranea* the spiny, cushion-like larval hostplants.

Flight period starts in November at lower elevations and spans to January, February and March upwards in a single annual brood.
Conservation: The extensive, uncontrolled use of this area for summer livestock (overgrazing), places the species under stress. Herds of tens of thousands goats, horses, mules and cattle were observed by the authors in the biotopes inhabited by the species.

152. *Pseudolucia oligocyanea* (Ureta, 1956)
Itylos endymion oligocyanea Ureta 1956a: 159.
Pseudolucia oligocyanea (Ureta); Bálint and Johnson 1993: 20, Benyamini 1995: 40, Peña and Ugarte 2006: 254.
D: II; FP: 10-12(E); C: 7, 11.
Comments: The type material was collected by Luis Peña in Tumbre, Antofagasta at 3700-4000 m from 27.IX.–7.X.1955. This locality, which is close to the native village Talabre (3200 m), was visited several times in the mid-1990s by Benyamini and Ugarte without any sighting of the species. On 7.XII.1999, the senior author, using a GPS reading, decided to look for it exactly in the center of the Pre-Puna belt. Indeed, a few adults were found there at an altitude of 3763 m, flying around the dominant bushes of *Adesmia horrida* Hook. and Arn. its hostplant. A day later, the same altitudinal belt was checked over Socaire some 30 km to the south, where the species was also found, but with few sightings. A year later in October 2000, Alfredo Ugarte collected a single male at 4200 m in Laguna Miscanti, province El Loa indicating that this species is already colonizing the protected areas of Miñique and Miscanti. The rediscovery of this blue after an absence of almost half a century encourages hope that "*Eiseliana rojasi*" Ureta, 1956 which was collected in the same biotope, will also be found. The recent records are from early December, which is in-between the local two springs: September-October (the historical records) and March-April. The perennial hostplant may support several annual broods.
Conservation: In addition to its severely reduced distribution, the species is threatened by: (1) desiccation of the biotope and of the wider region, and (2) overgrazing of domesticated animal stock (goats, sheep, cows, horses and feral donkeys).

153. *Pseudolucia aureliana* Bálint and Johnson, 1993
Pseudolucia aureliana Bálint and Johnson 1993: 21; Benyamini 1995: 40, Peña and Ugarte 2006: 252-253.
D: III; FP: 11-1; C: 7, 11.
Comments: An extremely local species found until now only south of the miners village of Inca de Oro, 1600-1800 m, Atacama Region, along the margins of its main access road, C17. The average annual rainfall is about 12 mm barely enough for the desert shrubs. However, the road serves as an irrigation canal, draining rainwater to its margins and the largest larval hostplants are present in ditches alongside the road. The very tops of coastal clouds, the eastern limits of which formerly just covered the biotope, provided a degree of humidity to assist with the survival of desiccated plants. The hostplant is the sticky *Adesmia atacamensis* Phil. and possibly *Adesmia argyrophylla* Phil. that also grows in the biotope.
The flight period is November–January, is in one or two annual broods.
Conservation: The species is highly endangered for several reasons: (1) extremely small and fragile biotope, (2) global warming has already affected the clouds that retreated towards the coast, further contributing to desiccation of the biotope, (3) the rapid development of nearby mines in Diego de Almagro, El Salvador, Potrerillos and other localities, contributed to a sudden growth of traffic to and from Copiapo along C17 that has become a highway inside the biotope, threatening the flight of these rare butterflies, (4) the straight road along the type locality with some green vegetation in its boundaries became a preferred place to build "Animitas", roadside shrines for casualties of car accidents along the road. Three such "animitas" were built in km milestones 61, 63.5 and 69.5 all in the last five years within this small locality. Each includes some "garden" with cultivated plants, or parking that contributes to the butterfly conservation problems. Animita 69.5 is the largest one, which includes a wide parking lot with ornamental plants including invasive

Acacia and *Prosopis* trees. This special biotope should be protected as a natural reserve and the "animitas" removed out of the butterfly life zone to at least 13 km SE Inca de Oro.

154. *Pseudolucia pascualama* Benyamini and Bálint, new species (Pl. XIV, C)

urn:lsid:zoobank.org:act:42D33A9D-98BD-46AC-8E3E-3104E20F2CA1

D: III; FP:1(E); C: 10, 11.

Diagnosis and description: Habitus (see Pl. XIV, C): Dorsally, the species resembles members of the *P. sibylla* group because of the presence of a delicate white marginal border, but based on forewing underside coloration and pattern it is more *P. collina*-like, as the ground color is orange and the postdiscal pattern is heavy and strongly displaced towards the margin. The male dorsal wing surface is bronze without any trace of blue scales (somewhat similar to *P. oligocyanea*, but in that species there is blue scaling on the hindwing postbasal region), hindwing marginal area with indistinct black dashes in spaces between veins; female similar but with light blue basal suffusion. Hindwing underside with distinctive medial pattern comprising a series of rectangular spots in different sizes (in congeners these spots are rounded). Male genitalia is typical for the group (Pl. XVII, J).

Description: Male wings. Dorsal wing coloration brown, with bronze tint and white marginal border typical for the species-group; hindwing with vestigial submarginal black spots in spaces between veins. Ventral forewing surface from base to postmedian area orange, with a row of black dashes in spaces between veins running from costal to inner margin, costal and anal margin area grey; submarginal area greyish-white with faint pattern, antemarginal region white; hindwing pattern complex "*sibylla*-like" (see Bálint and Johnson 1993, fig. 6), with series of black postbasal and median spots with white frames, forming postbasal and medial ruptive bands running from costa to anal margin, submargin with a larger black spot in in cell CuA2. Female wings. Forewing dorsal surface coloration blue in basal, orange in medial and greyish-white in marginal areas; hindwing dorsal surface blue in basal and brown in median areas, but submarginal area greyish-white with black spots. Ventral coloration and pattern as in male. Genitalia: Typical of *sibylla* group (Bálint and Johnson 1993, figs. O, P: males, and K: female), female organ somewhat more slender and with concave henial terminus in dorso-ventral view.

Measurements (in mm): Forewing costal length: 8 (male; n =1); 8 (female; n =1) male genitalia valva (n = 1): AB = 1.00, C = 0.62, CD = 0.29, E = 0.80, EF = 0.09.

Type material: Holotype male, set dorsally, in moderate condition (worn, right wings slightly broken, abdomen missing: dissected), with labels: (1) "Chile, Atacama // Paso Pascua Lama 3070 m // 04 January 2014 // Leg. Ofir Tomer" (white label, printed), (2) "DBC-4960" (yellow label, printed), (3) "B" (white label, handwritten). Paratype (allotype), with the same data (female: DBC-4961). Both specimens have been dissected: Bálint gen. prep. nos 1519 (paratype female) and 1520 (holotype male). Holotype and the paratype are deposited in the Research Collection of Dubi Benyamini (Beit Arye, Israel).

Etymology: The name is a Latinized noun with feminine gender, taking the Spanish name "Pascua Lama", used to signify the type locality.

Comments: The species is known only from the type material. The holotype with its bronze dorsal wing surface is indeed curious. Inspection under larger magnification did not reveal any trace of mishandling that could have resulted in the loss of structural coloration. The worn condition of the types suggested an earlier flight period. Therefore, on 20.12.2014 the first author visited the type locality again and proceeded along the transect four kilometers upwards along road D-115 to the top of the mountain pass at 3565 m (milestone km 84). Two, common *Adesmia* spp. were in full bloom: the cushion-like *A. aegiceras* and the larger shrub *A*. aff. *pinifolia* were searched carefully, but not a single blue was observed.

155. *Pseudolucia maricunga* Bálint and Benyamini, 2013 (Pl. XIV, D)

Pseudolucia maricunga Bálint and Benyamini 2013: 177.

D: II-III; FP: 11-12; C: 10, 11.

Comments: Recently discovered species. The holotype and some paratypes were from Maricunga, province Copiapó of Atacama, from elevations close to 4000 m, but further paratypes were collected in Antofagasta (Cordillera de Domeyko, Parque Nacional Llullaillaco). The hostplant is the spiny cushion-like *Adesmia aegiceras*, but other local *Adesmia* spp. are possible larval hostplants: *A. eremophila* Phil. *A. frigida* Phil. and *A. hystrix* Phil.

Etymology: Named after the type locality, which is a mountain pass descending to Salar Maricunga.

156. *Pseudolucia domeyko* Benyamini and Bálint, new species (Pl. XIV, E)

urn:lsid:zoobank.org:act:3F119AD2-35A0-4E35-AA94-FCB04D10A5B4

D: III; FP: 12(E); C: 10, 11.

Diagnosis and description: Habitus (see Pl. XIV, E): The species superficially resembles *P. aureliana* with shiny male violet (but somewhat lighter) blue dorsal forewing surface coloration strongly angle dependent, with thin white marginal border in both wings and black spots in hindwing submarginal area, plus ventral hindwing pattern typical for the group. However, dorsal forewing structural blue coloration is restricted to postbasal area (in *P. aureliana* males structural coloration is more extensive, lacking only in the forewing apical region and in females, apical area is often khaki brown). Male genitalic structure is typical for the group (Pl. XVII, K).

Description: Male wings. Dorsal forewing coloration lustrous violet blue in basal and medial areas, reddish brown in postmedian and submarginal regions, hindwing entirely blue; both wings with submarginal pattern, vestigial in forewing but well visible in hindwing via black spots and conspicuous white marginal border; fringes black at vein termini, white between veins. Ventral forewing surface from base to postmedian area pale orange with faint discal pattern comprising two parallel white lines and a row of black dashes in spaces between veins running from costal to inner margin, costal and anal margin area grey; submarginal area greyish-white with dark distal and lighter basal row of spots, anteromarginal region white; hindwing pattern complex "*sibylla*-like" (see Bálint and Johnson 1993, fig. 6) with a series of black postbasal and median spots with white frames, forming postbasal and medial ruptive bands running from costa to anal margin, submargin with grey spots in spaces between veins, but spot in cell CuA2 larger and black. Female wings, as in male, but with colors deeper, pattern more extensive. Genitalia typical of the *sibylla* species group (see for male fig. O, for female fig. K in Bálint and Johnson 1993) but in lateral view the male organ with more robust valva with straight lower costa and the female genitalia henia is also more robust compared with other members of the group. Measurements (in mm): Forewing costal length: 9.5 (male holotype = 1); 9.5 (female paratype = 1); male genitalia valva (n = 1): AB = 0.94, C = 0.24, CD = 0.27, E = 0.30, EF = 0.01.

Type material. Holotype male, set dorsally, in almost perfect condition (left antenna missing), with labels: (1) "Chile, Atacama // 20km S. of Pircas Negras // Cord. de Domeyco // 3923 m // 21/12/2014 // Leg. Dubi Benyamini" (white label, printed) and (2) "DBC-4972" (yellow label, printed). Paratypes with the same data, no. 1 (male: DBC-4970; Bálint gen. prep. No. 1653). No. 2 (female: DBC-4973; Bálint gen. prep. No. 1654), no. 3 ("allotype" female: DBC-4971; not dissected); Holotype and all the paratypes are deposited in the Research Collection of Dubi Benyamini (Beit Arye, Israel).

Etymology: The name is a Latinized noun referring to the type locality region of the species. The region was named after Ignacy Domeyko (1802–1889), a Chilean explorer with Polish origin, member and later rector of the academic faculty of the University of Chile.

Comments: According to unpublished results yielded by usage of molecular markers, *P. domeyko* appeared always as sister to the whole *sibylla*-group. This confirms the distinctiveness of the species expressed in the taxonomic terms above, using morphological characters provided by adult wings and anatomy. All the types were collected over *Adesmia aegiceras*, the suspected hostplant.

The *andina* species group – the *Astragalus* feeders

Some of the group-members were placed in *Cherchiella* by Balletto (1993), but they can be discriminated from the *plumbea*-group members based on genitalia traits, and the dorsal wing surfaces in both sexes that are brown and lacking structural blue coloration. Some species display a heavy silvery or bronze tint, especially the males. All are specialists, having as their larval hostplants the pioneer plant genus *Astragalus*, one that is highly toxic for animal livestock (cf. Coburn Williams and Gómez-Sosa 1986). As a result this species group is highly threatened by local shepherds who spray herbicide on the *Astragalus* hostplants. The toxic plant ("yerba loca") kills goats, cows and horses, with up to five animals lost per year

157. *Pseudolucia andina* (Bartlett-Calvert, 1893)
Scolitantides andina Bartlett-Calvert 1894: 832; Elves 1905: 288.
Cherchiella andina (Bartlett-Calvert); Balletto 1993: 236.
Pseudolucia andina Bálint and Johnson 1993: 19; Bálint 1993: 21, Benyamini 1995: 18, Bálint *et al*. 2001: 161, Peña and Ugarte 2006: 246.
D: V&(13); FP: 12(E)-2; C: 1.
Comments: Distributed at higher elevations of the Andes from approximately 2100 m to 3800 m. Other, lower level flying "*andinas*" with brown-orange coloration are different species. This silvery-bronze species is known today from the following localities in Chile: Portillo (3050-3800 m), La Parva (2800-3000 m), El Morado National Park (2100-2550 m); and Paso Bermajo in Argentina. In these locations several *Astragalus* species are used as hostplants, the most common is *Astragalus cruckshanksii* (H. and A.) Grisebach.
Flight period starts in early December and lasts to February in one or two broods, depending on temperature and local conditions. The eggs are usually laid on the central stem of the plant, just above the soil and sometimes on the leaves or the calyx of the *Astragalus* buds and flowers.

158. *Pseudolucia barrigai* Benyamini and Bálint, 2011 (Pl. XV, A)
Pseudolucia barrigai Benyamini and Bálint 2011: 259.
D: VII; FP: 11-3; C: 10.
Comments: This species is restricted in distribution to the Maule region above ca 1900 m, but has also been found across the Andes at Las Leñas (Mendoza) Argentina. Two local *Astragalus* larval hostplants are used: *A. pehuenches* Niederl and *A. cruckshanksii* – their long period in bloom alongside rivulets enables at least two annual broods.
Etymology: Dedicated to the Chilean coleopterist Eng. Agr. Juan Enrique Barriga of Los Niches, Curico, who was the first to collect this species in Paso Vergara. On 13 November 2009 he inaugurated the leading website for Neotropical beetles (www.Coleoptera-Neotropical.org).

159. *Pseudolucia kechico* Bálint, Benyamini and Johnson, 2001
Pseudolucia kechico Bálint, Benyamini and Johnson 2001: 152.
D: XI; FP: 12-1; C: 9, 11.
Comments: This rare species was described from a few specimens collected in Chile Chico in January and December 1960, during two visits to the region by the late Luis Peña. The senior author visited the type locality several times, without any sighting of the species. On 6.1.1999, a single plant of *Astragalus patagonicus* (Philippi) Spegazzini, possibly representing the larval hostplant, was found growing beneath a *Colliguaja odorifera* (Euphorbiaceae) bush on the eastern border of the town. In an extensive search to the south, only two more plants were found between Cochrane and Paso Roballo, 67 km south-west of Chile Chico. This species probably has a single annual brood.

Conservation: The species became locally extinct following the eruptions of Hudson Volcano in 1971 and 1991, when the whole area around Chile Chico was covered with 20 cm deep volcanic ash, ensuring that any diapausing larvae were unable to emerge to the surface. At the request of the senior author, a local biology teacher (Prof Jaime Luciano Maripillan Perales) launched a wide search around Chile Chico for the butterfly and its *Astragalus* hostplant. He took his pupils into the field and, with photographs of the plant in hand, they searched several times between November 1999 and February 2000, without success. In 2001, 2002 and 2005 the first author enlarged its search southwards to Lago Jeinimeni, ca 45 km S Chile Chico and finally, on 13-14.12.2012, *Astragalus patagonicus* was found 15.5-16.6 km S of Chile Chico on south-eastern slopes of hills that were possibly protected from Hudson's volcanic ash. Eggs and larvae found on the fruits belonged to *Strymon* aff. *suprema* Johnson, Miller and Herrera, 1992, but no early stages of *P. kechico* were found. Nevertheless, the finding of *kechico*'s larval hostplant in the SE of Chile Chico raises new hope that the butterfly may still exist in Chilean or Argentinean Patagonia. Further south along Ruta 40, it is replaced by its vicariant species *Pseudolucia magellana* (see next entry).
Etymology: Named after the type locality and the characteristic K-shaped marks on the ventral hind wings.

160. *Pseudolucia magellana* Benyamini, Bálint and Johnson, 1995
Pseudolucia magellana Benyamini, Bálint and Johnson 1995a: 3; Benyamini 1995: 30, Bálint, Benyamini and Johnson 2001: 162, Peña and Ugarte 2006: 249.
D: XII; FP: 12(E); C: 9.
Comments: This rare species is known in Chile from only one male and one female collected by Professor Arthur M. Shapiro and the senior author in Rio Baguales near Cerro Guido east of the national park Torres del Paine. The species has been also recorded in Argentina (Bálint et al. 2001).
Eggs were laid on *Astragalus* aff. *mendocinus*, *A. palenae* (Philippi) Reiche, *A. patagonicus* and *A. patagonicus* x *A. cruckshanksii*. Most probably it has only a single annual brood.
Conservation: Locally extinct in Rio Baguales due to catastrophic overgrazing. The new owner of the area has cleared the land of livestock and is allowing the necessary time for recovery, prior to opening for eco-tourism, thus providing new hope for natural re-establishment of the species from Argentina.

161. *Pseudolucia luzmaria* Benyamini and Bálint, 2011 (Pl. XV, B and XVI, A)
Pseudolucia kinbote Bálint and Johnson 1993: 18 (*nomen dubium*; see comments).
Pseudolucia luzmaria Benyamini and Bálint 2011: 263.
D: IV; 1-3; C: 6, 11.
Comments: The species *P. luzmaria* is locally common in upper Rio Illapel, where the first specimen was collected in Rio Tres Quebradas by Alfredo Ugarte and named after his wife Luzmaria. It is also recorded from the valley of Rio de los Pelambres (Cuncumen, Los Pelambres). It occurs over 2800 m, where it flies in a single annual brood around its hostplants: *Astragalus berterianus* (Moris) Reiche, *A. looseri* I. M. Johnston and *A. pehuenches.* On 16.12.2010, three specimens were collected by the first author and colleague Ofir Tomer in Rio Tascadero, between 2420 and 2750 m asl, flying over its local larval hostplant *Astragalus looseri*. This new locality within the Lapis Lazuli mine valley is ca 50 km SE of Tulahuén, E Combarbala, Coquimbo, but only about 40 km NE of its type locality in Rio Tres Quebrads, upper Rio Illapel.

The species is endangered by local shepherds, who destroy the hostplant by spreading glyphosate-based herbicides to protect their cattle from this toxic plant. On 27.1.2004, the senior author witnessed a dead cow that had possibly consumed the *Astragalus* at upper Valle de la Yerba Loca over Rio Illapel, where *P. luzmaria* adults were observed in flight.

Etymology: The species was dedicated to Luzmaria Ugarte the wife of Alfredo Ugarte, co-author of this paper.
Comments on nomenclatural problems caused by the name *Pseudolucia kinbote*: The name *P. kinbote* has been erroneously synonymized with *P. scintilla* (see Bálint 1995, and Bálint and Benyamini 2001: 128). During the preparation of the present paper, the third author returned to the subject, and concluded that the name *Pseudolucia kinbote* cannot be accepted objectively for the following reasons:

(1) The original description was based on two male individuals with diagnosis resembling *P. luzmaria*. At least one of the specimens had been dissected and it was indicated that the holotype was deposited in "FMNH" (= Field Museum of Natural History);

(2) The original description was supplemented by a black-ink drawing of the male genitalia valva as fig. "K" with the caption: "*Pseudolucia kinbote* holotype male (UMCE)" (= Universidad Metropolitana de Ciencias de la Educación, Santiago, Chile).

Ad 1: The original description was supplemented by a female specimen documentation in halftone, but it was indicated (erroneously) in the legend that it was a male; subsequently the very same specimen was captioned as "*Pseudolucia kinbote* holotype ♂ (FMNH)" ([Johnson] 1995);

Ad 2: The original description and the figure documentation contradicted the statement about the holotype deposition.

In the FMNH website (via the butterfly database) the documentation of *Pseudolucia kinbote* "holotype" is available (Pl. XVI, A) showing a male individual different than that illustrated by Bálint and Johnson (1993) and [Johnson] (1995); and this specimen represents the taxon we know under the name *P. andina* that does not occur in the Illapel valley. The true holotype of *P. kinbote* must be found, identified and documented, and according to the identity of that specimen the name has to be put in synonymy.

162. *Pseudolucia munozae* Benyamini and Bálint, 2011 (Pl. XV, C)
Pseudolucia munozae Benyamini and Bálint 2011: 265.
D: VII; FP: 10-1(M); C: 2, 11.
Comments: Presently known only from two localities in the lower slopes of the Andes. Adults were recorded from Radal, Reserva Nacional de Siete Tazas (Seven Waterfalls) and nearby Alto Vilches, Reserva Nacional Altos del Lircay, both about 55 km east of Talca. This area was also called "Parque Ingles" = English Park. Adults were observed above the treeline and on the edges of forests, around *Astragalus cruckshanksii*, the supposed larval hostplant (det. E. Gómez-Sosa). According to the limited material, the flight period starts in October and ends in mid-January. A local species, possibly not endangered. More information is required to define the exact distribution and conservation status.
Etymology: Dedicated to the Chilean botanist Eng. Agr. Melica Muñoz, the former curator of the National Herbarium at Quinta Normal, Santiago. For over two decades she helped the senior author to identify plants related to Chilean butterflies.

163. *Pseudolucia avishai* Benyamini, Bálint and Johnson, 1995
Pseudolucia avishai Benyamini, Bálint and Johnson 1995: 1; Benyamini 1995: 29, Peña and Ugarte 2006: 247.
D: IV; FP: 12-1; C: 1, 11.
Comments: Confined to the upper Los Pelambres valley, Illapel, Coquimbo over 2550 m. This was the first recorded myrmecophilous lycaenid from Chile and the whole Neotropical Region (Benyamini and Bálint 1995). It has a single annual brood. In the lab, specimens emerged also in February and March suggesting a second generation, depending on weather condition and availability of hostplants.

Conservation: The biotope of the type locality was completely destroyed by Los Pelambres mine company and is nowadays submerged below an acid lake. In a rescue expedition funded and organized by the Los Pelambres Mine Company, the butterfly was rediscovered on 29.1.2015 by Benyamini and Ugarte in Rio Piuquenes, approximately 5 km north-west of Los Pelambres mine, where it flies together with *Pseudolucia asafi* and the local rare white *Hypsochila pelambres* between 2600 and 2700 masl. Following the rediscovery of these species, the Los Pelambres mine management decided to protect it by closing the whole valley to livestock and public activity, thus saving the larval hostplant, *Astragalus looseri*.

164. *Pseudolucia asafi* Benyamini, Bálint and Johnson, 1995

Pseudolucia asafi Benyamini, Bálint and Johnson 1995: 2; Benyamini 1995: 30, Peña and Ugarte 2006: 248.

D: IV; FP: 12-1; C: 7, 11.

Comments: An extremely local species that was discovered in "La Holla"; a "vega" over and west of Cespedes, upper Hacienda Illapel, Coquimbo. The blues were observed between the altitudes 2500 and 2800 m. It has as single annual brood. Availability of hostplant may support a second brood. The eggs are laid on the leaves and stems of *Astragalus looseri* and possibly also on *A. cruckshanksii*. Final instar larvae diapause under stones in the winter, emerging the following spring. A shortage of food will initiate diapause in younger larvae.

Conservation: The species is highly threatened by local shepherds who spray herbicide on the *Astragalus* hostplant killing at least 80% of La Holla plants. When last visited in early 2002, fewer than five individual butterflies were observed in the lower eastern side of "La Holla", where few hostplants still survived at the periphery of the "vega". On 29.1.2015, in the Los Pelambres mine rescue project involving the lost *P. avishai* and *Hypsochila pelambres*, a few *P. asafi* specimens were observed flying together with *P. avishai* along Rio Piuquenes, near its larval hostplant *Astragalus looseri*, some 5 km NW of Los Pelambres mine. This was the first time that *P. asafi* was found out of its type locality at La Holla, improving its chances of survival in a new and protected area by the mine company – see *P. avishai* above.

165. *Pseudolucia henyah* Bálint, Benyamini and Johnson, 2001 (Pl. XV, D)

Scolitantides andina f. "HORSTI" nov. *f.* (hembra), Ureta, 1949: 122 (unavailable name).

Pseudolucia henyah Bálint, Benyamini and Johnson, 2001: 157.

D: IV-V(13); FP: 10-12; C: 6, 11.

Comments: First discovered and described by Ureta, but the name proposed cannot be applied as it was established as name for a female infrasubspecific form. This low flying, brown-orange "*andina*", is distributed along the coast and the coastal ranges (Cordillera de la Costa) of Valparaíso (Las Vizcachas), Metropolitan (Cuesta la Dormida) and Coquimbo coast south of Frey Jorge (Huentelauquen). It is an extremely local species, observed in Cuesta la Dormida flying around its larval hostplant, a tall unidentified *Astragalus* with flat curved fruits. Samples of the plant were sent by the senior author to the Instituto de Botánica Darwinion in San Isidro, Buenos Aires, Argentina, where it was identified by Edith Gómez-Sosa as a species close to *Astragalus verticillatus* (Phil.) Reiche. Later, guided by the first author, the botanist travelled to Chile to observe this strange plant in its natural biotope. Collected material was subsequently described as *Astragalus johnstonii* Gómez-Sosa (1997), a species new to science. At the type locality, *Astragalus berterianus* with its greenish-red fruits is suspected as being another larval host. *P. henyah* has a single annual brood.

Conservation: Endangered due to fragmented and isolated populations, and by the action of local shepherds, aware of the toxic effects of the larval hostplant on their livestock. During the last visit of the first author to the type locality on 1.1.2018, neither *Astragalus* spp. were found in this mountain pass. Possibly, this is because the "Camanchaca" coastal clouds / heavy fog that maintained high humidity at the type locality has disappeared due to the greenhouse effect, or perhaps *P. henyah* has become locally extinct because of climate change. If this is typical for the whole La Campana National Park encircling Cuesta la Dormida

and other coastal biotopes in Central Chile, it means that other local butterfly species are under stress and may even have disappeared. During the visit, only a few survivors of the formerly flourishing *Pseudolucia ugartei* were observed, together with the common *P. chilensis*, but the other four species *Strymon bicolor*, *S. probabila*, *S. shapiroi*, and *P. henyah* were not observed (Benyamini 1995, Table 9: 28).
Etymology: Dedicated to Henyah Benyamini the mother of the first author.

166. *Pseudolucia johnsoni* Benyamini and Bálint, 2011 (Pl. XV, E)
Pseudolucia johnsoni Benyamini and Bálint 2011: 262.
D: VIII; FP: 12; C: 9, 11.
Comments: Based on wing coloration and pattern the taxon was placed in the *andina*-subgroup. The species is known only from the holotype male collected in Las Cabras, Chillán, Bio Bío Reg. by the late Luis Peña in 1952. Despite repeated search efforts during visits to the type locality and the region, the species was not found. We consider the species as locally extinct. On 21.XI.2016 a single similar female was collected by Francisco Ramirez (Las Condes, Santiago) 12 km SW laguna Icalma, 2010 masl Araucania. It is 260 km south of *johnsoni* type locality and its real identity should be checked by addtional material (males) from the same area.
Etymology: Dedicated to Kurt Johnson, the ex-curator of butterflies in the American Museum of Natural History NY, who introduced us to the fascinating world of Neotropical lycaenids.

167. *Pseudolucia faundezi* Benyamini and Bálint, 2011 (Pl. XV, F)
Pseudolucia faundezi Benyamini and Bálint 2011: 260.
D: IX; FP: 11; C: 9, 11.
Comments: The species is known only from the holotype male collected in Volcán Lonquimay, La Araucanía Reg., by the late Luis Peña in 1990, and identified in Budapest as *P. andina*. When more information became available regarding *P. andina* and its relatives (cf. Bálint and Johnson 1993, 1995b, Bálint *et al.* 2001), the specimen was reinterpreted as representing the southernmost taxon of the andina-subgroup. Two decades after collecting the holotype specimen, efforts to locate the population and to find its *Astragalus* larval hostplant did not yield any results and the species is regarded by us as locally extinct.
Etymology: Dedicated to the Chilean botanist Prof. Luis Faúndez of Universidad de Chile. Best known to his friends as "El Chino", he supported the first author with plants determinations since the early 1990's.

Genus *Madeleinea* Bálint, 1991

Very recently, the genera *Itylos* and *Madeleinea* Bálint, 1993 were considered as sister lineages and have been placed in synonymy based on molecular analysis (Vila *et al*. 2011). However, characters provided by the imagines (wing venation, genitalia and life history) grossly contradict this classification and support previous views accepting both genera as distinct (Bálint in prep.); therefore, we discuss them separately. *Madeleinea* is an exclusively Andean genus distributed in the Paramo and Puna belts of the high Andes from southern Colombia via Ecuador, Peru and Bolivia to Jujuy in Argentina, plus Arica y Parinacota and Atacama regions in northeastern Chile. Its distribution in S America resembles the northern extension of another Polyommatinae genus – *Pseudolucia* with overlapping of both genera in S Bolivia, N Argentina (Jujuy) and E mountainous Antofagasta NE Chile. However, regarding generic classification see the genus *Itylos*. The genus has been reviewed by Bálint and Johnson (1995d).

168. *Madeleinea pelorias* (Weymer, 1890)
Lycaena pelorias Weymer 1890: 121.
Itylos pelorias (Weymer); Ureta 1956a: 182.
Madeleinea pelorias (Weymer); Bálint and Johnson 1995d: 14, Benyamini 1995: 42, Peña and Ugarte 2006: 257.
D: XV, I, II; FP: 1-4; C: 10.
Comments: This fast-flying, silvery blue inhabits the Puna and Altiplano belts of the Andes in northern Chile above the elevation of 3000 m. Specimens are always associated with large spiny bushes of *Adesmia melanthes* and *A. spinosissima* and, indeed, eggs and one typical greenish-red lycaenid larva were found on *A. melanthes*.

169. *Madeleinea ludicra* (Weymer, 1890)
Lycaena ludicra Weymer 1890: 122.
Itylos ludicra (Weymer); Ureta 1949: 114.
Madeleinea ludicra (Weymer); Bálint and Johnson 1995a: 13, Peña and Ugarte 1996: 256.
Madeleinea sigal Benyamini, Bálint and Johnson 1995: 2; Benyamini 1995: 43, Peña and Ugarte 2006: 256 and 258, a new synonym of *M. ludicra.*
D: XV; FP: 1-4; C: 4.
Comments: The species *L. ludicra* had been described from a single female specimen collected on the slopes of the Volcán Tacora (Arica). Subsequently, the same species was named as *M. sigal* based on the holotype male, allotype female and two male paratypes from Parinacota. The allotype female was much lighter in coloration and patterning on both wing surfaces, resulting in the erroneous conclusion that the sample represented a hitherto undiscovered *Madeleinea* species. Subsequently, more material became available, with the species being found also at Volcán Tacora, as well as at the type locality of *M. sigal.* Consequently, it is evident that the two taxa represent the same biological species, as in the new samples there are darker females. Thus, we consider *M. sigal* a synonym of *M. ludicra*.
In distribution, it is confined to the Puna belt from about 3500 m to the Altiplano at 4200 m. Specimens were observed near Putre on *Lupinus* sp., which is the suspected hostplant (see also Serrudo et al. 2013).

Genus *Paralycaeides* Nabokov, 1945
The genus was erected by Nabokov (1945) and was subsequently reviewed (Bálint and Johnson 1994c). Hitherto, the number of the recognized species was three; the one that has been recorded in Chile seems to have become adapted to conditions regulated by intensive agriculture and innovation.

170. *Paralycaeides vapa* (Staudinger, 1894) (Pl. XVI, B)
Cupido vapa Staudinger 1894: 78.
Itylos vapa (Staudinger); Draudt 1921: 882, Ureta 1956a: 183.
Paralycaeides vapa (Staudinger); Bálint 1993: 23, Bálint and Johnson 1994c: 119, Benyamini 1995: 43.
D: XV; FP: ?; C: 4.
Comments: The species was recorded from Chile by Ureta (1956a) indicating the occurrence at "Puna" and "Leuquepalca" as "en nuestro país". Peña in his personal copies of Ureta's papers (1947/1956) marked the whole entry of "*Itylos vapa*" with the note "Perú" (Pl. XVI, C). This view resulted in the species being omitted from the book, "Las mariposas de Chile". The indication of "Puna" can be considered to denote the Puna belt, typical for the high Andes north to the region Atacama, so it can be anywhere in the high altitude areas of the region. However, "Leuquepalca" is an extant locality in Chile. According to López Silva (1983: 688) "Lequiapalca" is a pantano or quebrada at 18º10' (W) 069º17' (S) 4 km NW of Parinacota, at an elevation of 4550 m.

The species had been recorded by the first author in 1994 in the Altiplano, just over the Bolivian side crossing the international border leaving Chilean territory (Benyamini 1995: 43-44). There was no obvious biological barrier that could separate the territories of the two countries, so it was suspected that *P. vapa* occurs also in Chilean territory. This is confirmed by the overlooked data published by Ureta. The species was reared in Bolivia and N Argentina on *Astragalus* aff. *garbancillo* Cav. (Benyamini 1995: 43 and breeding notes 2018) and on *Trifolium amabile* Kunth (Serrudo et al. 2013: 75). *A. garbancillo* is unknown from Chile (Rodriguez et al. 2018 and Melica Muñoz pers. comm.) but it can possibly switch to *Astragalus arequipensis* Vogel, a common Altiplano plant.

Appendix

Nymphalidae, Heliconiinae

171. *Dione juno miraculosa* Hering, 1926 (Pl. XVI, D)
D: XV; FP: 10-2; C: 3, 10.
Comments: The north Chilean border with Peru is also the northern port of entry of new species to Chile. This time, *Dione juno*, the second species of the genus to arrive in Chile (*Dione glycera* was the first), appeared in Arica. The small phenotype represents the taxon *miraculosa* described from the Arequipa region of Peru.
On 28.1.2019, Héctor Vargas sent the following email to the first author: "I obtained two adults which were reared from larvae collected on a cultivated *Passiflora edulis* in the urban area of Arica City. The larvae were collected by my brother Marcelo Vargas-Ortiz in August 2018 and the adults emerged in September 2018. *Dione juno miraculosa* is currently (January 2019) very abundant in the city and in the Azapa Valley, where *P. edulis* is cultivated".

D. juno is a spectacular butterfly, easy to detect and observe, so it is unlikely that it was overlooked hitherto. Therefore, we can assume with certainty that *D. juno* migrated from South Peru to Northern Chile in mid-2018, found a plentiful supply of available hostplants and might already have become established in Arica and nearby transverse valleys.

CONCLUSIONS

Composition of the fauna - Part III/1 of the Chilean list includes 46 species of Lycaenidae (Polyommatinae). Estimating the number of species of Lycaenidae (Theclinae) in Part III/2 as 25 and adding one more nymphalid (*Dione juno*) we arrive at a total of 196 butterfly species recorded in Chile (see composition in Table 1).

Comparing our new checklist with the catalogue in Peña and Ugarte (2006), a further 27 species are added to the previously reported 169 species (Table 1, updated). Importantly, the number of new species to Chile is actually 39, as 12 species are removed from the catalogue, either synonymized, or representing historical mistakes of single records of Lycaenidae species. An explanation of the treatment of questionable species will be given in the next and final Part III/2.

Part III/1 Summary:

The Lycaenidae is the largest family of the Chilean butterflies; with 71 species or more, it is almost double that of the Satyrinae (38 spp.), the Hesperiidae (37 spp.), Pieridae (33 spp.) and all Nymphalidae (54 spp.).

Table 1 (Part II update) – Composition of the Chilean butterfly families (*estimated number)

Family	Num. of species	Num. of species (%)	Num. of species (Peña and Ugarte, 1997)
Papilionidae	1	0.51%	1
Pieridae	33	16.83%	29
Nymphalidae (Part 1 - Danainae, Heliconiinae, Nymphalinae, Libytheinae)	16	8.16%	11
Nymphalidae (Part 2 - Satyrinae)	38	19.39%	34
Lycaenidae Part 3/1 (Polyommatinae)	46	23.47%	29
Lycaenidae Part 3/2 (Theclinae)	25*	12.76%	30
Hesperiidae	37	18.88%	35
Total	196	100 %	169

Butterfly distribution (Lycaenidae) in 15 regions in Chile – Table 2 and Figure 1 list the number of lycaenid species per region; maximum number of species are 12 in Coquimbo IV Region, 11 in Valparaiso, 9 in Maule, 7 in each of the regions: Arica and Parinacota, Antofagasta, Atacama and Bio Bío. Five species fly in Tarapaca and Araucania, and four in O'Higgins region. Just two species fly in Aisen XI region, one in each region of Los Rios and Magallanes and, quite surprisingly, not even one species is recorded until now from Los Lagos (XIV) Region. However, the relatively high number of species of Region XV (Arica and Parinacota) as expressed in Fig. 1, signifies its northern location on the border with Peru and Bolivia as being Chile's northern gates to southern expanding / migrating species from these two countries. The last contribution, *Dione juno miraculosa* (Nymphalidae), is the latest example of this ongoing process (Vargas 2013; Vargas, Mielke and Casagrande 2005; Vargas and Lamas 2011; Vargas, Cerdeña, and Lamas, 2015).

Flight period of the species – this is depicted in months in Table 3 and Figure. 2. The highest number of species is found on the wing in December and January, with 38 and 34 species respectively, November and February with 24 and 21, October and March with 17 and 15, September and April with 10 and 8. Five species fly in August and the lowest number (two species) fly in each of the months May, June and July.

Conservation status – is summarized in Table 4 where:
No fewer than 27 species (58.7%) of the Polyommatinae are geographically restricted = endemic, more than any other Chilean family. The Satyrinae with 21.1%, Hesperiidae (13.5%) and Pieridae (2.9%) are far behind. This high level of endemism reflects the isolation of many Polyommatinae, *Pseudolucia* spp. in the high Andes.
18 species (39.1%) and 2 species (4.3%) respectively are not endangered or possibly not endangered; 3 species (6.5%) are rare.
9 species (19.5%) are under increasing stress (categories 5, 6, 7, and 8).
4 species – *Nabokovia ada*, *Pseudolucia kechico*, *P. johnsoni* and *P. faundezi* (8.7%) are locally or fully extinct.
No Polyommatine is known to be a migrant, though *Leptotes trigemmatus* may expand beyond its permanent distribution and appear within cities, e.g. Santiago (1994).
For 8 species – *Pseudolucia argentina*, *P. barrigai*, *P. domeyko*, *P. hazeorum*, *P. malleco*, *P. maricunga*, *P. pascualama* and *P. valentina* (17.4%) we do not have sufficient data; this gap in our knowledge should be closed quickly while we still have time to launch conservation plans for endangered spp.

Table 2 (updated from part II) - Butterfly species distribution in Chilean political regions

Latitude / Region	Papilionidae	Papilionidae %	Pieridae	Pieridae %	Nymphalidae (Part 1)	Nymphalidae (Part 1) %	Nymphalidae (Part 2)	Nymphalidae (Part 2) %	Lycaenidae (Part 3.1)	Lycaenidae (Part 3.1) %	Hesperiidae	Hesperiidae %	total	total %
18.5° - Arica-Parinacota (XV)		0.0	12	35.3	6	40.0	4	10.5	7	15.2	17	45.9	46	23.6
20° - Tarapacá (I)		0.0	8	23.5	3	20.0	3	7.9	5	10.9	7	18.9	26	13.3
24° - Antofagasta (II)		0.0	11	32.4	2	13.3	4	10.5	7	15.2	8	21.6	32	16.4
27.5° - Atacama (III)	1	100	8	23.5	4	26.7	2	5.3	7	15.2	8	21.6	29	14.9
30.5° - Coquimbo (IV)	1	100	10	29.4	7	46.7	9	23.7	12	26.1	10	27.0	48	24.6
33° - Valparaíso (V)	1	100	11	32.4	6	40.0	15	39.5	11	23.9	14	37.8	57	29.2
33.5° - Metropolitana (13)	1	100	10	29.4	7	46.7	15	39.5	7	15.2	16	43.2	55	28.2
34.5° - O'Higgins (VI)	1	100	9	26.5	7	46.7	17	44.7	4	8.7	14	37.8	51	26.1
35.5° - Del Maule (VII)	1	100	9	26.5	8	53.3	18	47.4	9	19.6	16	43.2	60	30.7
37° - Del Biobío (VIII)	1	100	10	29.4	7	46.7	25	65.8	7	15.2	18	48.6	67	34.4
38.5° - De la Araucanía (IX)		0.0	11	32.4	7	46.7	21	55.3	5	10.9	15	40.5	58	29.7
40° - De los Lagos (XIV)		0.0	8	23.5	6	40.0	18	47.4	0	0.0	14	37.8	46	23.6
42° - De los Ríos (X)		0.0	5	14.7	5	33.3	12	31.6	1	2.2	10	27.0	33	16.9
46° - De Aisén (XI)		0.0	3	8.8	4	26.7	9	23.7	2	4.3	7	18.9	25	12.8
52° - Magallanes (XII)		0.0	6	17.6	4	26.7	7	18.4	1	2.2	2	5.4	20	10.3
Rapa Nui (Isla Pascua)		0.0	0	0.0	1	6.7	0	0.0	0	0.0	0	0.0	1	0.5

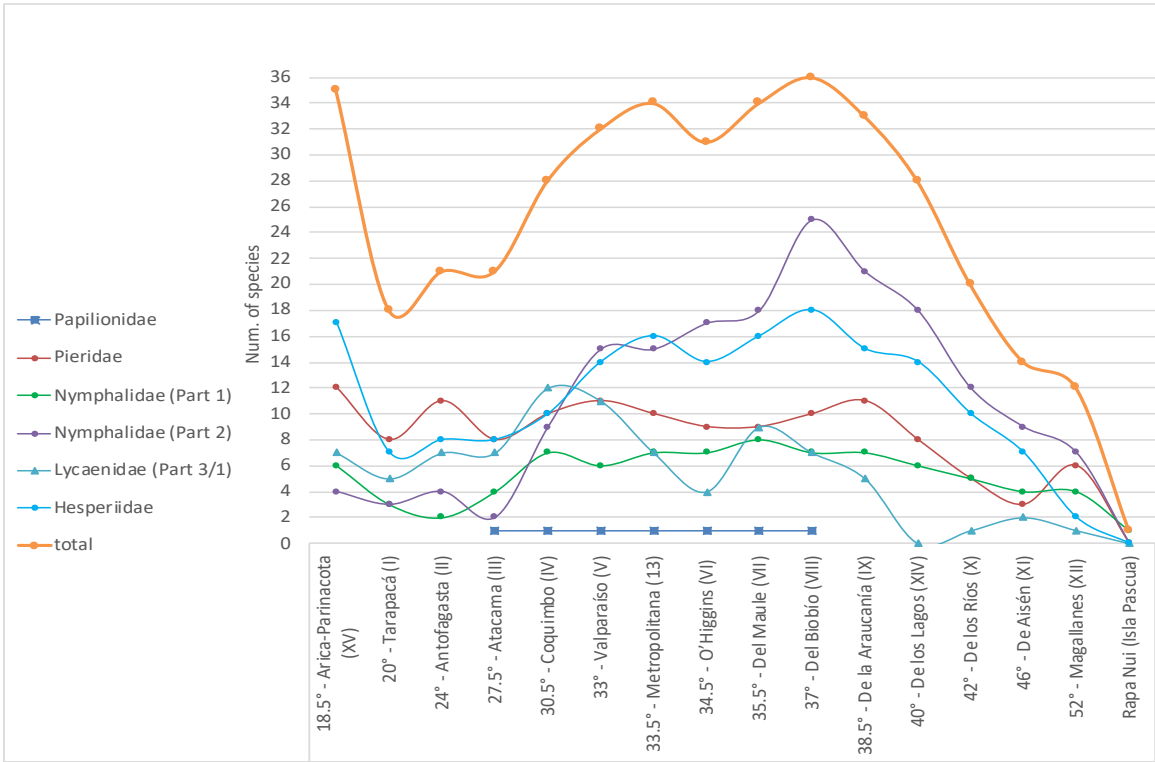


Figure 1 (Fig 3. updated from part II) Butterfly species distribution in Chilean political regions.

Table 3 (updated from part II) - Phenology of Chilean butterflies

	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
Nymphalidae (Part 2)	28	26	21	7	0	0	0	1	2	8	17	31
Nymphalidae (Part 2) %	73.7	68.4	55.3	18.4	0.0	0.0	0.0	2.6	5.3	21.1	44.7	81.6
Lycaenidae (Part 3/1)	34	21	15	8	2	2	2	5	10	17	24	38
Lycaenidae (Part 3/1) %	73.9	45.6	32.6	17.4	4.3	4.3	4.3	10.9	21.7	36.9	52.2	82.6
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	134	121	93	57	18	12	12	22	35	62	85	126
total %	68.3	61.7	47.4	29.1	9.1	6.1	6.1	11.2	17.8	31.6	43.3	64.2

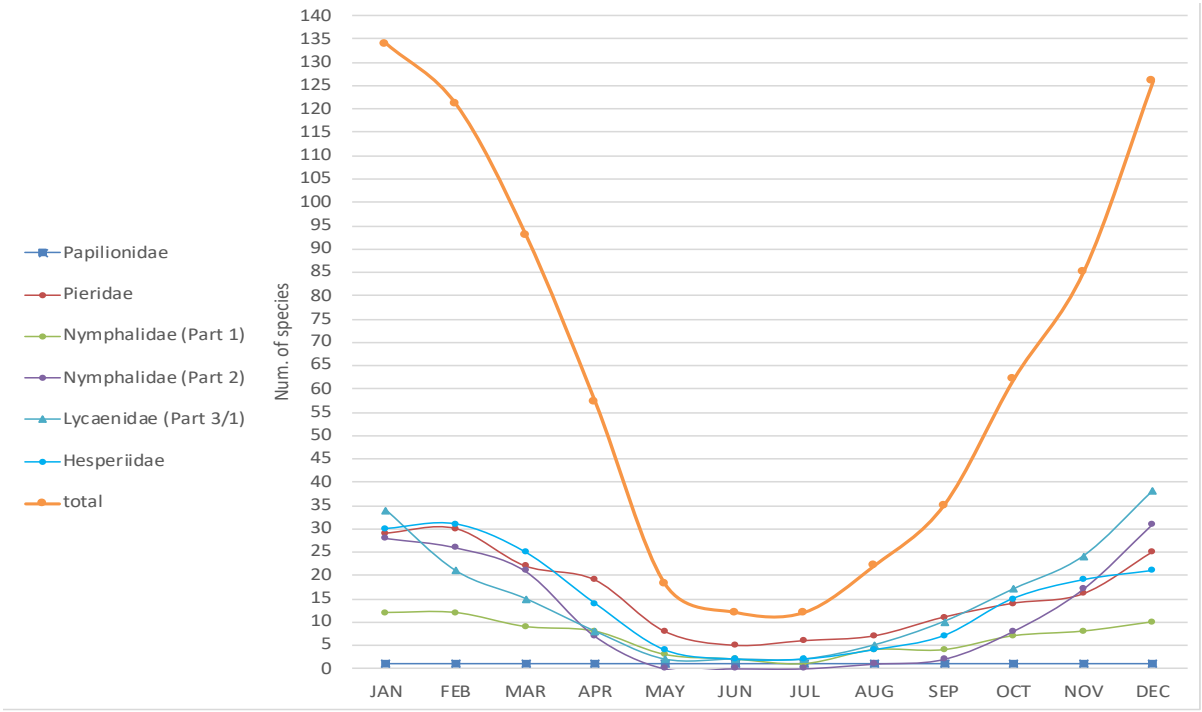


Figure. 2 (Fig 4. updated from part II) - Phenology of Chilean butterflies by month

Table 4 (updated from part II) - Summary of butterfly conservation status in Chile.

	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	2	10	6						1	
Nymphalidae (Part 1) %	40.0	13.3	66.7	40.0						6.7	
Nymphalidae (Part 2)	25	8		6	4	3	2	1		8	8
Nymphalidae (Part 2) %	65.8	21.1		15.8	10.5	7.9	5.3	2.6		21.1	21.1
Lycaenidae (Part 3/1)	18	2		3	2	2	5		4	8	27
Lycaenidae (Part 3/1) %	39.1	4.3		6.5	4.3	4.3	10.8		8.7	17.4	58.7
Hesperiidae	14	7	2	3		8		1		11	5
Hesperiidae %	37.8	18.9	5.4	8.1		21.6		2.7		29.7	13.5
total	74	21	16	30	8	14	8	2	8	41	41
total %	37.7	10.7	8.1	15.3	4.1	7.1	4.1	1	4.1	20.9	20.9

ACKNOWLEDGEMENTS

The authors would like to express their special appreciation to the staff of the Muso Nacional de Historia Natural, Chile at Quinta Normal; the curator of the butterfly 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 for him useful lists of specimens from their collection. We are 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 us the opportunity to check their well-preserved butterfly collection. Professor Héctor Vargas selflessly shared his own new faunistic data and observations with the authors.

Several leading botanists helped us to identify hostplants and nectar sources. In Chile: Eng. Agr. Melica Muñoz, the former curator of the National Herbarium at Quinta Normal, Santiago, Prof. Luis Faundez of Universidad de Chile; the late Dr. Otto Zöllner of Valparaiso University. In Argentina: Prof. Emilio Ulibarri and Dra. Edith Gómez-Sosa both ex Instituto de Botánica Darwinion, San Isidro, Buenos Aires; Dr. Roberto Kiessling, Dra. Iris Peralta and the late Eduardo Mendez of CONICET, Mendoza.

DNA sequencing and molecular analysis were carried out in the Butterfly Diversity and Evolution Lab led by Dr. Roger Vila (Barcelona, Spain).

The myrmecophilous attending ants were identified by Roy Snelling† of LA N. H. Museum, Stephen Cover at the Museum of Comparative Zoology, Harvard University and John Lattke of UCLA Davis USA, Maracay Univ. Venezuela and Universidade Federal do Paraná, Brazil.

In the field and in the lab, the first author received logistical 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. He is also one of the first entomologists to breed the local Satyrinae. In the hostile environment of Volcán Tacora (Reg. XV of Arica and Parinacota) the field support of Barbara Knapton of Putre and the CONAF staff of Arica chapter was essential to the success of our expeditions. Francisco Ramirez of Las Condes, Santiago collected near laguna Icalma, Araucania a female of possibly the locally extinct *Pseudolucia johnsoni* a great contribution to our knowledge of this "lost" species. On several expeditions and in the lab, the professional support of Ofir Tomer (Na'ale, Israel) was of great value. 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 the first author's hosting family during many visits to Chile; their house was his hospitable home in Santiago. 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 will address in part III/2 of this article. Gifted Leah Benyamini prepared colour Plates XII to XVII. Eddie John, Cowbridge, UK edited a draft of the manuscript. Our sincere thanks to Francisco Urra Lagos of the editorial desk of this journal for his final editing. To all these people and institutions we greatly appreciate their contribution to this paper.

In Budapest, Mr Gergely Katona (HNHM) helped the project in various ways, especially in digital documentation and manuscript preparation. During the preparation of the manuscript, Zsolt Bálint was supported by the Hungarian scientific projects OTKA K 111741 and K 115724.

REFERENCES

(Additions to Parts 1and2)

BÁLINT, ZS.
1993 A Catalogue of Polyommatine Lycaenidae (Lepidoptera) of the Xeromontane Oreal Biome in the Neotropics as Represented in European Collections. Reports of the Museum of Natural History, University of Wisconsin 29: 1-28 pls III-IV.

BÁLINT, ZS.
1995 A Review of Recent Literature and Taxonomic Synonymy in the Neotropical Polyommatinae (Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin 49: 1-10.

BÁLINT, ZS. and D. BENYAMINI.
2013 *Pseudolucia maricunga* sp. n., a new high Andean butterfly from northern Chile (Lepidoptera, Lycaenidae: Polyommatinae). Folia entomologica hungarica 74: 175–183.

BÁLINT, ZS. and D. BENYAMINI.
2017 Corrected synonymies: the identities of *Strymon bicolor* (Philippi, 1859) and *Strymon heodes* (Druce, 1909) (Lepidoptera: Lycaenidae). Opuscula Zoologica Budapest 48(1): 61–69

BÁLINT, ZS. 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) 29: ii + 42p.

BÁLINT, ZS. and K. JOHNSON.
1994a Polyommatine lycaenids of the oreal biome in the neotropics, Part I. The Thecline-like taxa (Lepidoptera: Lycaenidae). Acta zoological hungarica 40: 109-123.

BÁLINT, ZS. and K. JOHNSON.
1994b Polyommatine lycaenids of the oreal biome in the neotropics, Part II. The *Itylos* section (Lepidoptera: Lycaenidae, Polyommatini). Annales historico-naturales Musei nationalis Hungarici 86: 53-77.

BÁLINT, ZS. and K. JOHNSON.
1994c Polyommatine lycaenids of the oreal biome in the neotropics, Part IX. Taxonomic synopsis of the high Andean and austral lycaenid genus *Paralycaeides* Nabokov, 1945 (Lepidoptera: Lycaenidae). Annales historico-naturales Musei nationalis Hungarici 87: 103-122.

BÁLINT, ZS. and K. JOHNSON.
1995a Species Diagnostics of the Genus *Leptotes* in Continental South America (Lepidoptera: Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin (Stevens Point) 44: 1-24.

BÁLINT, ZS. and JOHNSON, K.
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, ZS. 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, ZS. and K. JOHNSON.
1995d 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, ZS., K. KERTÉSZ, G. PISZTER, Z. VÉRTESY and L.P. BIRÓ.
2012 The well-tuned Blues: The role of structural colours as optical signals in the species recognition of a local butterfly fauna (Lepidoptera: Lycaenidae: Polyommatinae). Royal Society Journal Interface 9(73): 1745-1756.

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

BARTLETT-CALVERT, W.
1893 Nuevos lepidópteros de Chile. Anales de la Universidad de Chile 84(17): 813-834.

BENYAMINI, D.
1995 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. and ZS. 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 ZS. BÁLINT.
2011 Descriptions of eight new *Pseudolucia* species from Chile (Lepidoptera: Lycaenidae: Polyommatinae). Annales historico-naturales Musei nationalis Hungarici 103: 257-276.

BENYAMINI, D. and ZS. BÁLINT.
2015 Descriptions of eight new *Pseudolucia* species from Argentina with an updated list of species distributed in the austral regions of South America (Lepidoptera, Lycaenidae: Polyommatinae). Folia entomologica hungarica 76: 173-216.

BENYAMINI, D., ZS. BÁLINT and K. JOHNSON.
1995a 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., BÁLINT, ZS. and JOHNSON, K.
1995b 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.

BLACKWELL, S.H. and K.JOHNSON (EDS).
2016 Fine Lines. Vladimir Nabokov's scientific arts. Yale University Press, New Haven and London, xiv + 318 pp.

COBURN WILLIAMS, M. and E. GÓMEZ-SOSA.
1986. Toxic Nitro Compounds in Species of *Astragalus* (Fabaceae) in Argentina. Journal of Range Management 39(4): 341-344.

D'ABRERA, B.
1995 Butterflies of the Neotropical Region. Part VII. Lycaenidae. Victoria, Black Rock, Hill House. pp. 1098-1270, figs i-xi.

DOGNIN, P.
1887 Diagnoses de lépidoptères nouveaux de l'Equateur. Le Naturaliste (2)1(16): 188-190.

DOGNIN, P.
1895 Lépidoptères de Loja et environs. Annales de la Société entomologique de Belgique 39(2): 105-118.

DRAUDT, M.
1919-1921 Familie: Lycaenidae. In: Seitz, A. (Ed.), Die Gross-Schmetterlinge der Erde. Stuttgart, Alfred Kernen Verlag, pp 739-824.

GÓMEZ-SOSA, E.
1997 *Astragalus johnsonii* sp. nov. (Fabaceae) y Relaciones con el Complejo *A. verticillatus* (Phil.) Reiche. Gayana Bot. 54(1): 31-37 (https://biodiversitylibrary.org/page/28578001)

GUERRA SERRUDO, J.F., A.F. GUERRA CAZÓN and Y.A. GUERRA CAZÓN.
2013 Mi Guía de Mariposas del Valle de La Paz. My Butterfly Guide of Valley of La Paz. Chuquiyaw Ohriwa Tuqin Pilpinut Yatxatawi. Universidad Tecnológica Boliviana, La Paz, 142 pp.

GUERRA SERRUDO, J.F., G. SIEBEL, R. VILA, D. BENYAMINI and ZS. BÁLINT.
2018 A remarkable record of the genus *Pseudolucia* from Bolivia (Lepidoptera: Lycaenidae). Opuscula Zoologica Budapest, 49(1): 23–31.

HEMMING, F.
1960 Annotationes lepidopterologicae. London, Hepburn and Sons Ltd. 2: 37-72.

JOHNSON, K.
1995 Captions to Photo plate V. Reports of the Museum of Natural History, University of Wisconsin (Stevens Point) 46: (7 -8).

JOHNSON, K. and ZS. BÁLINT.
1995 Distinction of *Pseudochrysops*, *Cyclargus*, *Echinargus* and *Hemiargus* in the Neotropical Polyommatini (Lepidoptera, Lycaenidae). Reports of the Museum of Natural History, University of Wisconsin (Stevens Point) 54: 1-14.

JOHNSON, K. and S. COATES.
1999 Nabokov's Blues. The Scientific Odyssey of a Literary Genius. Zoland Books, Cambridge, Massachusetts, xii + 372 pp.

KIRBY, W.F.
1871 A Synonymic Catalogue of Diurnal Lepidoptera. London, John Van Voorst. vii + 690 pp.

KÖHLER, P.E.
1934. Dos lepidópteros argentinos nuevos. Revista de la Sociedad Entomológica Argentina 6(1): 39-40.

LAMAS, G.
2004 Lycaenidae. Polyommatinae. – In: LAMAS, G. (ed.): Checklist: Part 4A. Hesperioidea – Papilionoidea. In: HEPPNER, J. B. (ed.): Atlas of Neotropical Lepidoptera. Volume 5A. – Association for Tropical Lepidoptera, Scientific Publishers, Gainesville, pp. 138-140.

LÓPEZ SILVA, E.
1983 Listado de Nombre Geograficos Desde Visviri (17° 35' Latitud Sur) a Chaiten (42° 55' Latitud Sur). Instituto Geográfico Militar, Santiago, Chile, pp (i-viii), 1-780 (Tomo I: A-M), 781-1558 (Tomo II: M-Z).

MABILLE, P.
1889 Diagnoses de lépidoptères nouveaux. Bulletin de la Société philomathique de Paris (7)9(2): 55-70.

PEÑA, L.E. and A.J. UGARTE.
2006 Las Mariposas de Chile. Editorial Universitaria, 2nd Edition. Santiago de Chile. 359 pp.

PISZTER, G., K. KERTÉSZ, ZS. BÁLINT and L.P. BIRÓ.
2016 Variability of the Structural Coloration in Two Butterfly Species with Different Prezygotic Mating Strategies. PLoS ONE 11(11): e0165857. doi:10.1371/journal.pone.0165857.

PYRCZ, T.W., A.J. UGARTE, P. BOYER, A.M. SHAPIRO and D. BENYAMINI.
2016 An updated list of the butterflies of Chile (Lepidoptera, Papilionoidea and Hesperioidea) including distribution, flight period and conservation status. Part II, subfamily Satyrinae (Nymphalidae), with descriptions of new taxa. Boletín del Museo Nacional de Histroia Natural, Chile, 65: 31-67.

RODRIGUEZ, R., †C. MARTICORENA, D. ALARCON, C. BAEZA, L. CAVIERES, V.L. FINOT, N. FUENTES, A. KIESSLING, M. MIHOC, A. PAUCHARD, E. RUIZ, P. SANCHEZ and A. MARTICORENA.
2018 Catálogo de las plantas vasculares de Chile. Gayana Bot. 75(1): 1-430.

STAUDINGER, O.
1894 Hochandine Lepidopteren. Deutsche entomologische Zeitschrift "Iris" 7(1): 43-100.

URETA, E.
1947 Nuevos Ropaloceros (Sic.) (Lep.) de Chile. Boletín del Museo Nacional de Historia Natural (Santiago de Chile) 23: 47-61.

URETA, E.
1956a Nuevos Rhopaloceros (Lep.) de Chile. Boletín del Museo nacional de Historia Natural (Santiago de Chile) 26(6): 159-185.

URETA, E.
1956b Nuevas especies de Lycaenidae (Lep. Rhopalocera) de Chile. Boletín del Museo nacional de Historia natural (Santiago de Chile) 26(6): 257-260.

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

VARGAS, H. A.
2014 Lycaenid caterpillars (Lepidoptera, Lycaenidae) eating flowers of *Dalea pennellii* var. *chilensis* (Fabaceae) in the northern Chilean Andes. Revista brasileira de Entomologia 58(3): 309-312.

VARGAS, H.A., J. CERDEÑA and G. LAMAS.
2015 *Zerene cesonia limonella* Lamas (Pieridae): first distribution record in Chile and first host plant record. Journal of the Lepidopterists' Society 69: 326-327.

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

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.

VILA, R., CH.D. BELL, R. MACNIVEN, B. GOLDMAN-HUERTAS, R.H. REE, CH.R. MARSHALL, ZS. BÁLINT, K.D. JOHNSON, D. BENYAMINI and N.E. PIERCE.
2011 Phylogeny and palaeoecology of *Polyommatus* blue butterflies show Beringia was a climate-regulated gateway to the New World. Proceedings of the royal Society of London (B) 278(1719): 2737-2744.

WALLENGREN, H.D.J.
1860 Lepidopterologische Mittheilungen. Wiener entomologische Monatschrift 4(2): 33-46.

WINTER, W.D.Jr.
2000 Basic techniques for observing and studying moths and butterflies. Memoirs of the Lepidopterists' Society 5: xviii + 444 pp.

Appendix: Checklist of Polyommatinae (Lycaenidae) species recorded in Chile

Column 1: Serial numbers continued from previous parts I-II; Column 2: Sequence of species presented in Part III/1; Columns 3: scientific binomen with author name and year of description.

1	2	3
125.	1	*Itylos titicaca* (Weymer, 1890)
126.	2	*Hemiargus ramon* (Dognin, 1887)
127.	3	*Nabokovia faga* (Dognin, 1895)
128.	4	*Nabokovia ada* Bálint and Johnson, 1993
129.	5	*Leptotes trigemmatus* (Butler, 1881)
130.	6	*Pseudolucia chilensis* (Blanchard, 1852)
131.	7	*Pseudolucia collina* (Philippi, 1860)

132.	8	*Pseudolucia dubi* Bálint, 2001
133.	9	*Pseudolucia oraria* Bálint and Benyamini 2001
134.	10	*Pseudolucia vera* Bálint and Johnson, 1993
135.	11	*Pseudolucia benyamini* Bálint and Johnson, 1995
136.	12	*Pseudolucia ugartei* Bálint and Benyamini 2001
137.	13	*Pseudolucia scintilla* (Balletto, 1993)
138.	14	*Pseudolucia zoellneri* Benyamini and Bálint 2011
139.	15	*Pseudolucia charlotte* Bálint and Johnson, 1993
140.	16	*Pseudolucia lanin* Bálint and Johnson, 1993
141.	17	*Pseudolucia plumbea* (Butler, 1881)
142.	18	*Pseudolucia zina* Benyamini, Bálint and Johnson, 1995
143.	19	*Pseudolucia patago* (Mabille, 1889)
144.	20	*Pseudolucia arauco* Bálint, Benyamini and Johnson, 1995
145.	21	*Pseudolucia annamaria* Bálint and Johnson, 1993
146.	22	*Pseudolucia malleco* Bálint and Benyamini, new species
147.	23	*Pseudolucia hazeorum* Bálint and Johnson, 1993
148.	24	*Pseudolucia valentina* Bálint and Benyamini, 2011
149.	25	*Pseudolucia argentina* (Balletto, 1993)
150.	26	*Pseudolucia sigal* Benyamini and Bálint 2011
151.	27	*Pseudolucia sibylla* (Kirby, 1871)
152.	28	*Pseudolucia oligocyanea* (Ureta, 1956)
153.	29	*Pseudolucia aureliana* Bálint and Johnson, 1993
154.	30	*Pseudolucia pascualama* Benyamini and Bálint, new species
155.	31	*Pseudolucia maricunga* Bálint and Benyamini, 2013
156.	32	*Pseudolucia domeyko* Benyamini and Bálint, new species

157. 33 *Pseudolucia andina* (Bartlett-Calvert, 1893)

158. 34 *Pseudolucia barrigai* Benyamini and Bálint, 2011

159. 35 *Pseudolucia kechico* Bálint, Benyamini and Johnson, 2011

160. 36 *Pseudolucia magellana* Benyamini, Bálint and Johnson, 1995

161. 37 *Pseudolucia luzmaria* Benyamini and Bálint, 2011

162. 38 *Pseudolucia munozae* Benyamini and Bálint, 2011

163. 39 *Pseudolucia avishai* Benyamini, Bálint and Johnson, 1995

164. 40 *Pseudolucia asafi* Benyamini, Bálint and Johnson, 1995

165. 41 *Pseudolucia henyah* Bálint, Benyamini and Johnson, 2001

166. 42 *Pseudolucia johnsoni* Benyamini and Bálint, 2011

167. 43 *Pseudolucia faundezi* Benyamini and Bálint, 2011

168. 44 *Madeleinea pelorias* (Weymer, 1890)

169. 45 *Madeleinea ludicra* (Weymer, 1890)

170. 46 *Paralycaeides vapa* (Staudinger, 1894)

FIGURES AND CAPTIONS

Plate XII. Imagines of *Pseudolucia* Nabokov, 1945, representing species endemic for Chile or very rare in the country

A. *Pseudolucia dubi* Bálint, 2001 Male: Chile, Coquimbo, 10 km S. of Illapel, Cuesta Los Crystales 450 m, 23/09/1995, Leg. Dubi Benyamini, Paratype. Female: Chile, Coquimbo, 10 km S. of Illapel, Cuesta Los Crystales 450 m, 23/09/1995, Leg. Dubi Benyamini, Paratype.

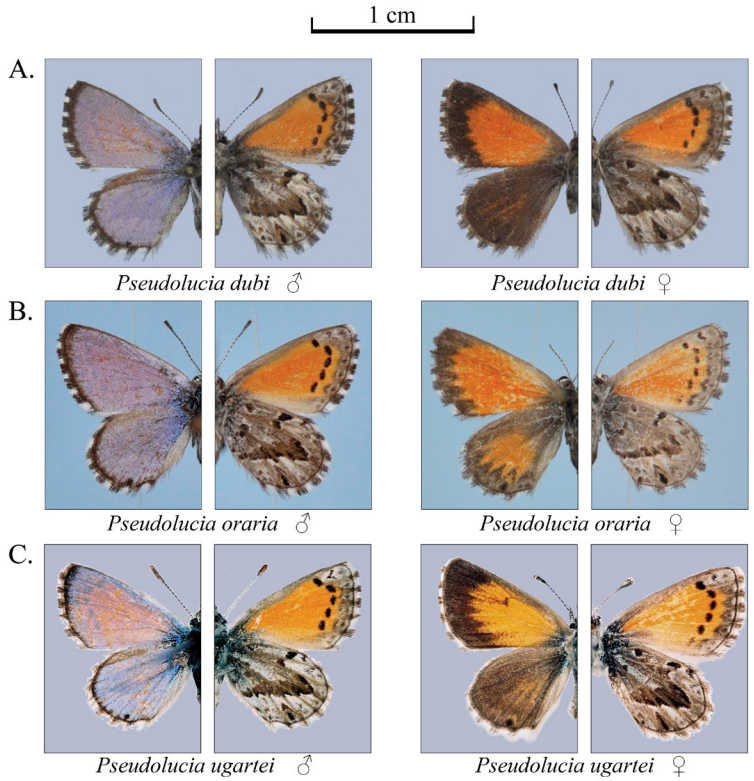
B. *Pseudolucia oraria* Bálint and Benyamini 2001 Male: Chile, Atacama, 3.4 km N of Huasco, Pacific Coastal Dunes sea level, 01/01/1999, Leg. Dubi Benyamini. Female: Chile, Atacama, 3.4 km N. of Huasco, Pacific Coastal Dunes sea level, 11/12/1999, Leg. Dubi Benyamini.

C. *Pseudolucia ugartei* Bálint and Benyamini 2001 Male: Chile, Valparaiso, Cuesta La Dormida, Quillota 1250 m, 08/10/1995, Leg. Dubi Benyamini. Female: Chile, Valparaiso, Cuesta La Dormida, Quillota 1250 m, 08/10/1995, Leg. Dubi Benyamini.

D. *Pseudolucia scintilla* (Balletto, 1993) Male: Chile, Coquimbo, Rio Tres Quebradas, 2000 m, 02/01/2002, Leg. Dubi Benyamini. Female: Chile, Coquimbo, Rio Tres Quebradas, 2000 m, 02/01/2002, Leg. Dubi Benyamini.

E. *Pseudolucia zoellneri* Benyamini and Bálint 2011 Male: Chile, Maule, Estereo del Fiero, Rio Teno 1900 m, 16/01/2003, Leg. Dubi Benyamini. Female: Chile, Maule, Paso Pehuenche o del Maule 2245 m, 01/03/2005, Leg. Dubi Benyamini.

Pseudolucia collina sub-group *collina.*



Pseudolucia collina sub-group *scintilla*

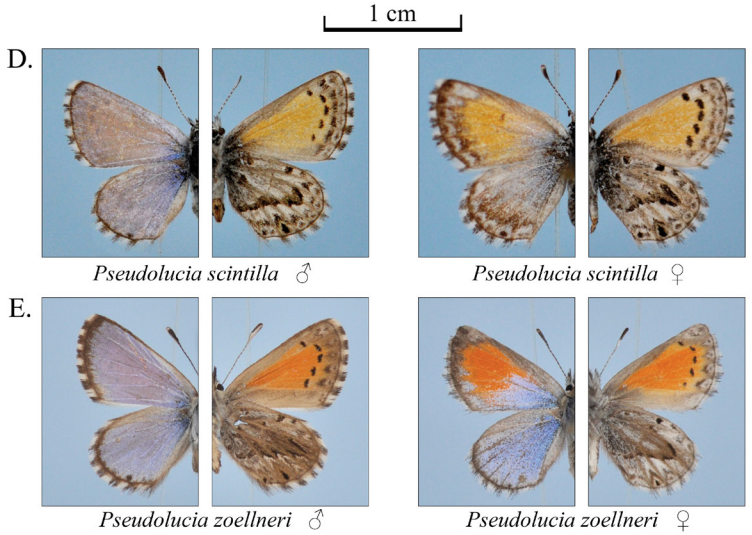


Plate XII

Plate XIII. Imagines of *Pseudolucia* Nabokov, 1945, representing species endemic for Chile or very rare in the country

A. *Pseudolucia zina* Benyamini, Bálint and Johnson, 1995 Male: Chile, Santiago Metropolitan, Embalse El Yeso 2800 m, 22/11/1996, Leg. Dubi Benyamini. Female: Chile, Santiago Metropolitan, Embalse El Yeso 2800 m, 13/11/1993, Leg. Dubi Benyamini.

B. *Pseudolucia patago* (Mabille, 1889) Male: Chile, Aisen, 1.5 km E. of Chile Chico, Chile-Argentina Border, 250 m, 09/01/1999, Leg. Dubi Benyamini. Female: Chile, Aisen, 1.5 km E. of Chile Chico, Chile-Argentina Border, 250 m, 09/01/1999, Leg. Dubi Benyamini.

C. *Pseudolucia arauco* Bálint, Benyamini and Johnson, 1995 Male: Chile, Araucanía, Vn. Villarica 1407 m, 28/12/1999, Leg. Dubi Benyamini, Paratype. Female: Chile, Araucanía, Vn. Llaima 1200-1400 m, 04/01/1998, Leg. Dubi Benyamini.

D. *Pseudolucia malleco* Bálint and Benyamini, new species Male: Chile, Araucanía, Malleco, Malalcahuello 1200 m, 27/11/1990, Leg. L. E. Peña, Holotype. Female: Chile, Araucanía, Malleco, Malalcahuello 1200 m, 27/11/1990, Leg. L. E. Peña, Paratype (Allotype).

E. *Pseudolucia valentina* Bálint and Benyamini, 2011 Male: Chile, Maule, Paso Pehuenche o del Maule 2264 m, 21/12/2010, Leg. Dubi Benyamini. Female: Chile, Maule, Paso Pehuenche o del Maule 2264 m, 21/12/2010, Leg. Ofir Tomer.

Pseudolucia plumbea group

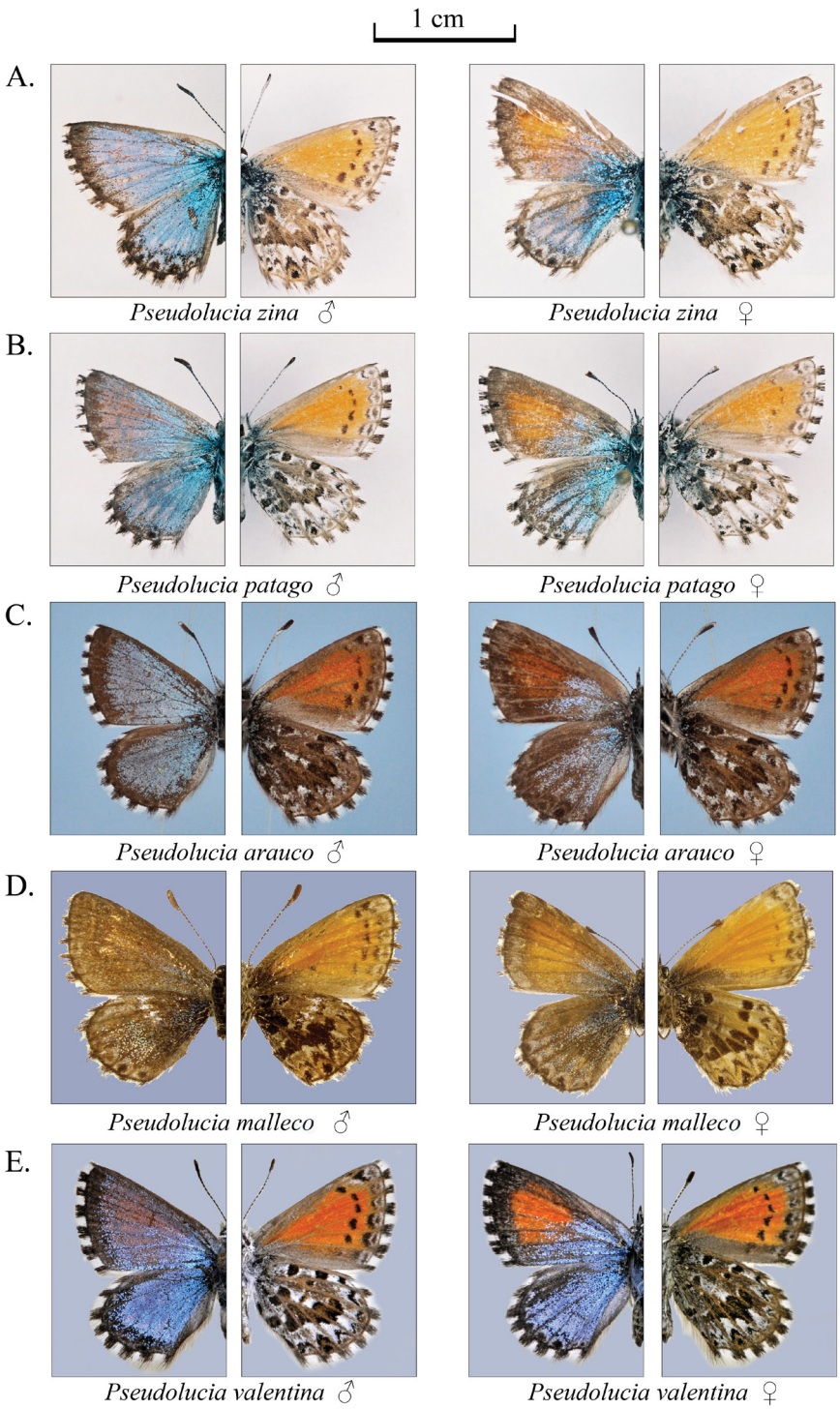


Plate XIII

Plate XIV. Imagines of *Pseudolucia* Nabokov, 1945, representing species endemic for Chile or very rare in the country

A. *Pseudolucia argentina* (Balletto, 1993) Male: Argentina, Mendoza, Los Horcones, Parque Provincial Aconcagua 2800 m, 01/01/1995, Leg. Dubi Benyamini. Female: Argentina, Mendoza, Los Horcones, Parque Provincial Aconcagua 2800 m, 01/01/1995, Leg. Dubi Benyamini.

B. *Pseudolucia sigal* Benyamini and Bálint 2011 Male: Chile, Coquimbo, Illapel, Cespedes, Tres Qdas, Rio El Encanto, 3200-3300 m, 09/01/2002, Leg. Dubi Benyamini, Holotype. Female: Chile, Coquimbo, Illapel, Cespedes, Tres Qdas, Rio El Encanto, 3200-3300 m, 09/01/2002, Leg. Dubi Benyamini.

C. *Pseudolucia pascualama* Benyamini and Bálint, new species Male: Chile, Atacama, Paso Pascua Lama 3070 m, 04/01/2014, Leg. Ofir Tomer, Holotype. Female: Chile, Atacama, Paso Pascua Lama 3070 m, 04/01/2014, Leg. Ofir Tomer, Paratype (allotype).

D. *Pseudolucia maricunga* Bálint and Benyamini, 2013 Male: Chile, Copiapo, Maricunga, Cuesta Codoceo 3933 m, 11/12/2012, Leg. Dubi Benyamini. Female: Chile, Copiapo, Maricunga, Cuesta Codoceo 3933 m, 11/12/2012, Leg. Dubi Benyamini.

E. *Pseudolucia domeyko* Benyamini and Bálint, new species Male: Chile, Atacama, Cord. de Domeyko, 20 km S. of Pircas Negras 3923 m, 21/12/2014, Leg. Dubi Benyamini, Holotype. Female: Chile, Atacama, Cord. de Domeyko, 20 km S. of Pircas Negras 3923 m, 21/12/2014, Leg. Dubi Benyamini, Paratype (allotype).

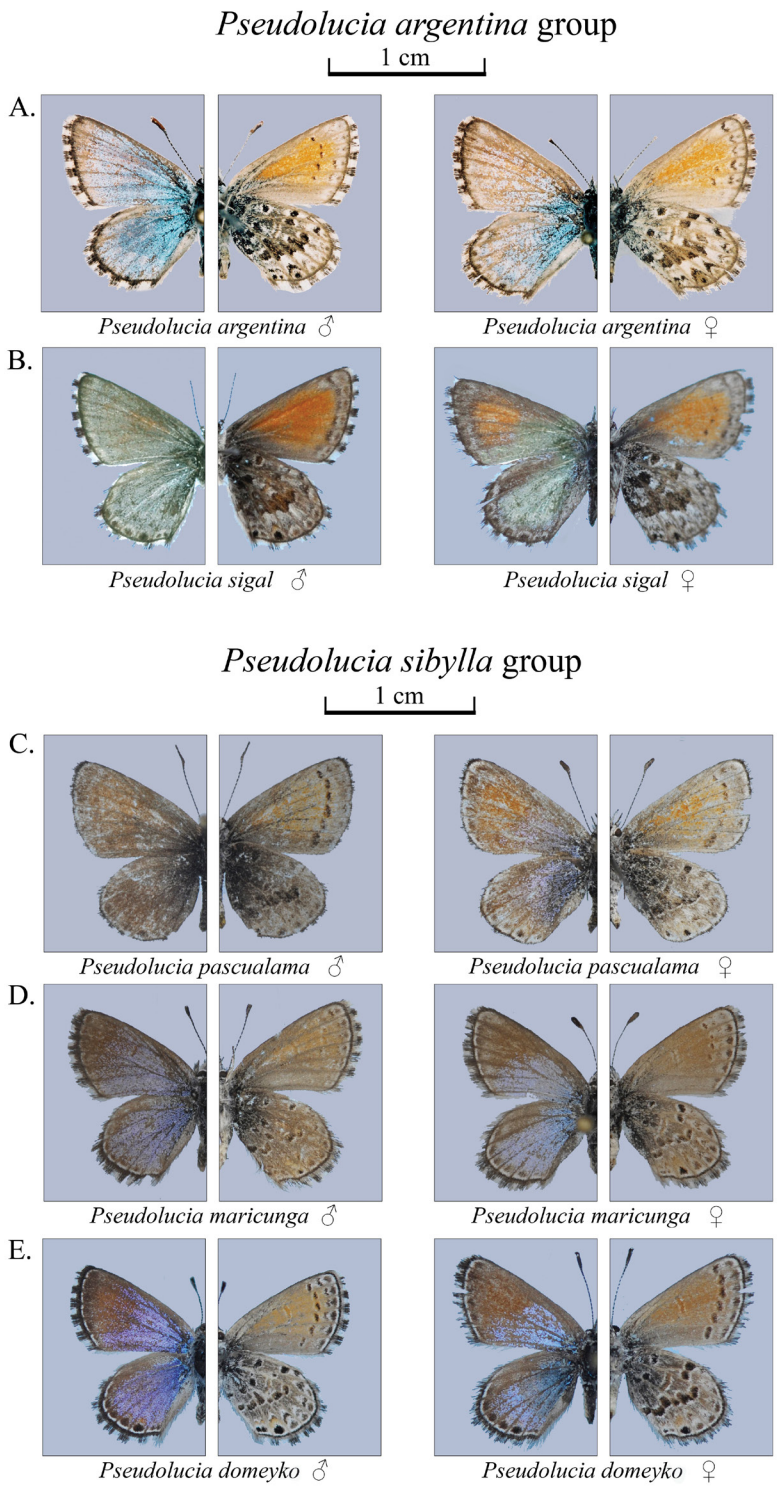

Pseudolucia argentina group
1 cm
A.
Pseudolucia argentina ♂
Pseudolucia argentina ♀
B.
Pseudolucia sigal ♂
Pseudolucia sigal ♀
Pseudolucia sibylla group
1 cm
C.
Pseudolucia pascualama ♂
Pseudolucia pascualama ♀
D.
Pseudolucia maricunga ♂
Pseudolucia maricunga ♀
E.
Pseudolucia domeyko ♂
Pseudolucia domeyko ♀

Plate XIV

Plate XV. Imagines of *Pseudolucia* Nabokov, 1945, representing species endemic for Chile or very rare / extinct in the country.

A. *Pseudolucia barrigai* Benyamini and Bálint, 2011 Male: Chile, Estero del Fiero, Rio Teno, Mina Biobío 2200 m 07/01/2003, Holotype, Leg. Dubi Benyamini. Female: Argentina, Mendoza, Valle de Las Leñas 2150 m 05/01/2003, Leg. Dubi Benyamini.

B. *Pseudolucia luzmaria* Benyamini and Bálint, 2011 Male: Rio Tres Quebradas, Coquimbo, Chile 22/02/2002 Leg. Dubi Benyamini and Alfredo Ugarte, Holotype. Female: Rio Tres Quebradas, Coquimbo, Chile 14/02/2002 Leg. Dubi Benyamini and Alfredo Ugarte.

C. *Pseudolucia munozae* Benyamini and Bálint, 2011 Male: Chile, El Radal, Cord. Talca 900-1160 m, 23-30/11/1957, Leg. L. E. Peña, Holotype. Female: Chile Maule Alto Vilches, Talca 21-24/11/64, Leg. L. E. Peña.

D. *Pseudolucia henyah* Bálint, Benyamini and Johnson, 2001 Male: Chile Valparaiso Cuesta la Dormida, Chacabuco 1150 m, 04/11/1995, Leg. Dubi Benyamini, Holotype. Female: Chile Valparaiso Cuesta la Dormida, Chacabuco 1150 m, 04/11/1995, Leg. Dubi Benyamini, Paratype.

E. *Pseudolucia johnsoni* Benyamini and Bálint, 2011 Male: Chile, Biobío, Chillán, Las Cabras 03/12/1952, Leg. L.E. Peña, Holotype.

F. *Pseudolucia faundezi* Benyamini and Bálint, 2011 Male: Chile, Biobío, Volcán Lonquimay, 22/11/1990, Leg. L. E. Peña, Holotype.

Pseudolucia andina group

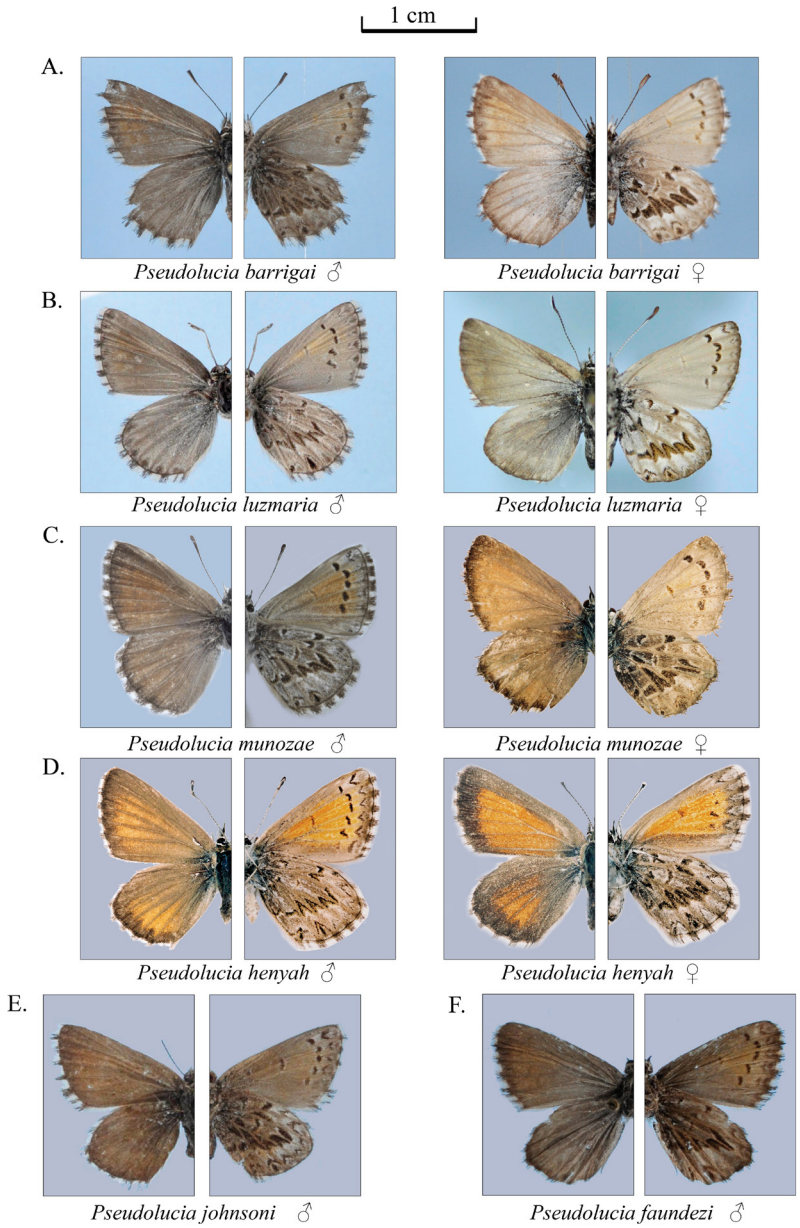


Plate XV

Plate XVI. A specimen with historical interest, species recorded as new for the Chilean fauna and an old reference on the occurring of *P. vapa* in Chile

A. "Holotype" specimen of *Pseudolucia kinbote* Bálint and Johnson, 1993 Dorsal and ventral views, and labels.

B. *Paralycaeides vapa* (Staudinger, 1894) Male: Bolivia, La-Paz, Batallas 3800 m, 10/02/1994, Leg. Dubi Benyamini. Female: Argentina, Jujuy, Tilcara, Huacalera, 17/02/1994, Leg. Bob Eisele.

C. Manuscript, erroneous hand written note "Peru" of L. E. Peña regarding "*Itylos vapa*" in reprint of the paper "Nuevos ropalóceros de Chile" of Rojas E. Ureta (1956a) - (Benyamini reprint collection).

D. *Dione juno miraculosa* Hering, 1926 Male and Female: Chile, Arica y Parinacota, Arica, August/2018, breeder: Héctor Vargas.

Pseudolucia kinbote

1 cm

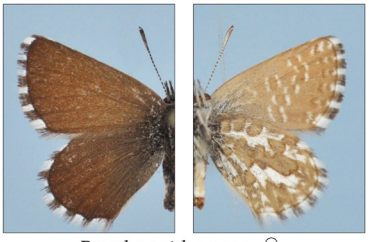
A.

Paralycaeides vapa

1 cm

B.

Paralycaeides vapa ♂



Paralycaeides vapa ♀

C.

APARTADO DEL BOLETÍN DEL
MUSEO NACIONAL DE HISTORIA NATURAL

Tomo XXVI 1 9 5 6 N.º 6

Dr. Emilio Ureta R.— Nuevos RHOPALOCEROS (*Lep.*) de Chile..... 159

NUEVOS RHOPALOCEROS 188

Itylos vapa (Stgr).

1894. *Cupido vapa* Staudinger. Iris VII, p. 78.

Diagnosis de Draudt (in Seitz):

"Esta especie es próxima a *koa* Druce, es arriba de un tono café, con anchas franjas blancas. La faz inferior es bastante parecida a *koa*, pero mucho más clara; la raya del ala anterior de color blanco-plateado, se extiende hasta el mismo margen anterior y en él se encuentran, más o menos en el centro, tres manchas redondas de color básico café pálido; la mancha blanca bajo la célula central es más extendida y llega casi hasta la base."

Perú

DISTRIBUCIÓN GEOGRÁFICA Y ÉPOCA DE VUELO: Perú (Cuzco); Bolivia, 3000-4000 m. (La Paz, Huallantani, Cocapota).. En nuestro país: Puna, 5-II-1949; Lequepalca, 4150 m., 14-I-1949, Sr. L. Peña coll.

En nuestro país: Puna, 5-II-1949; Lequepalca, 4150 m., 14-I-1949, Sr. L. Peña coll.

Nymphalidae, Heliconiinae

1 cm

D.

Dione juno miraculosa ♂

Dione juno miraculosa ♀

Plate XVI

Plate XVII. A-H, *Pseudolucia collina* species group female genitalia terminalia (henia) in lateral aspect, all in same magnification (scale bar: 0.6 mm).

A. *Pseudolucia collina* (Philippi, 1859) Santiago: San Jose de Maipo (Bálint, gen. prep. no. 553).

B. *Pseudolucia dubi* Bálint, 2001 Coquimbo: Cerro de la Virgen (Bálint, gen. prep. no. 749).

C. *Pseudolucia oraria* Bálint and Benyamini, 2001 Atacama: Huasco (Bálint, gen. prep. no. 974).

D. *Pseudolucia vera* Bálint and Johnson, 1993 Araucanía: Volcán Lonquimay (Bálint, gen. prep. no. 582).

E. *Pseudolucia benyamini* Bálint and Johnson, 1995 Valparaiso: Pichicuy (Bálint, gen. prep. no. 437).

F. *Pseudolucia ugartei* Bálint and Benyamini, 2001 Valparaiso: Cuesta la Dormida (Bálint, gen. prep. no. 631).

G. *Pseudolucia scintilla* (Balletto, 1993) Coquimbo: Hacienda Illapel (Bálint, gen. prep. no. 761).

H. *Pseudolucia zoellneri* Benyamini and Bálint, 2011 Talca: Paso Vergara (Bálint, gen. prep. no. 1049).

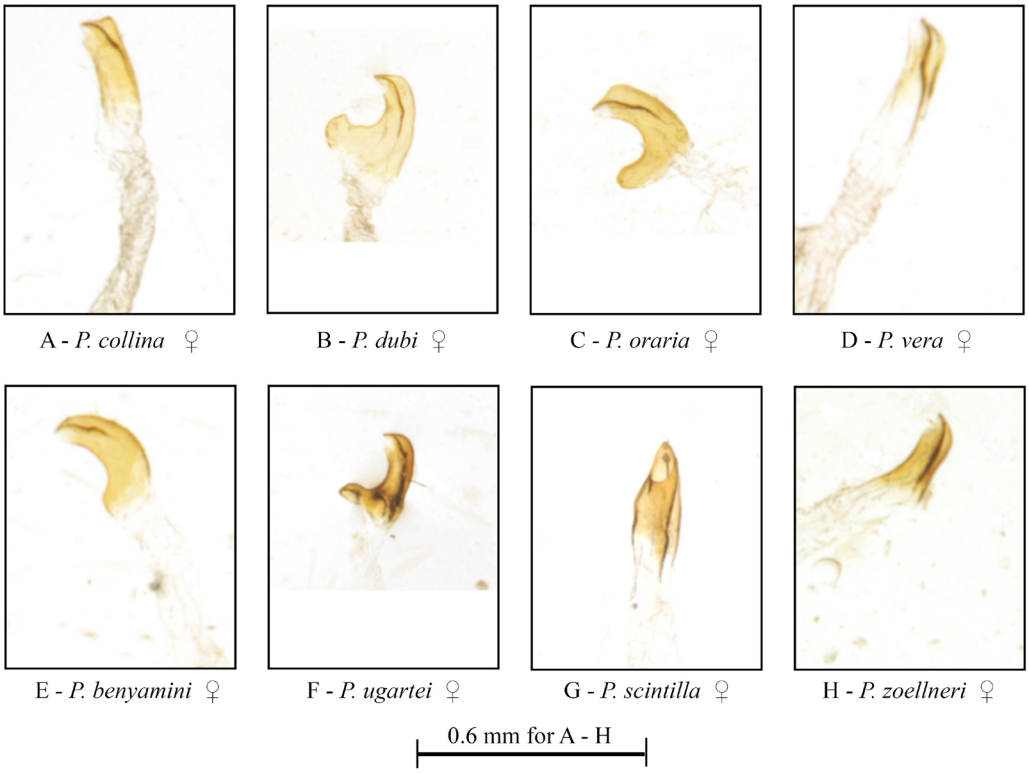
Plate XVII. I-K, Male genitalia armatures of *Pseudolucia* Nabokov, 1945 species described as new; dimensions are given in the texts.

I. *Pseudolucia malleco* sp. n. Holotype male (mounted on slide, Bálint gen. prep. no. 317).

J. *Pseudolucia pascualama* sp. n. Holotype male (in vial, Bálint gen. prep. no. 1520).

K. *Pseudolucia domeyko* sp. n. Paratype male (in vial, Bálint gen. prep. no. 1653).

Recibido: 08/abri/2019; Aceptado: 09/sep/2019; Administrado por Francisco Urra.



A - *P. collina* ♀ B - *P. dubi* ♀ C - *P. oraria* ♀ D - *P. vera* ♀

E - *P. benyamini* ♀ F - *P. ugartei* ♀ G - *P. scintilla* ♀ H - *P. zoellneri* ♀

0.6 mm for A - H

I - *P. malleco* ♂ J - *P. pascualama* ♂ K - *P. domeyko* ♂

I -K : For proper measurements see main text.

Plate XVII