

**CONTRIBUTION TO THE KNOWLEDGE OF THE BUTTERFLY FAUNA
(LEPIDOPTERA: PAPILIONOIDEA) OF GRAN CANARIA
(CANARY ISLANDS, SPAIN)**

Luka ŠTURM

Department of Food Science and Technology, Biotechnical Faculty,
University of Ljubljana, Jamnikarjeva 101, SI-1000 Ljubljana, Slovenia,
e-mail: luka.sturm@bf.uni-lj.si

Abstract – Gran Canaria is a good example of an island where we can observe endemic species of butterflies as well as the colonisation of new ones. In this article previously unknown localities of some butterfly species observed in December 2019 are being reported. This includes new locations of newly arrived species (*Cacyreus marshalli* and *Leptotes pirithous*), as well as new locations of some native ones (*Vanessa cardui*, *Lycaena phlaeas* and *Pieris rapae*). Most importantly, new location of a rare butterfly *Azanus ubaldus* is also reported, being observed in the NW part of the island for the first time. According to my finds and previous observations newly introduced species are consolidating themselves fast across the entire island.

KEY WORDS: Lepidoptera, Gran Canaria, *Azanus ubaldus*, *Leptotes pirithous*, *Cacyreus marshalli*, new localities, introduced species

Izvleček – PRISPEVEK K POZNAVANJU FAVNE METULJEV (LEPIDOPTERA: PAPILIONOIDEA) OTOKA GRAN CANARIA (KANARSKI OTOKI, ŠPANIJA)

Gran Canaria je lep primer otoka na katerem lahko opazujemo endemne vrste metuljev, kot tudi razširjanje vrst, ki so otok poselile pred kratkim. V tem članku so podana prej neznana nahajališča nekaterih vrst metuljev z lokacij, ki so bile obiskane v decembru 2019. To vključuje nova nahajališča za nekaj na novo prispelih vrst (*Cacyreus marshalli* in *Leptotes pirithous*), kot tudi nova nahajališča za nekaj avtohtonih vrst (*Vanessa cardui*, *Lycaena phlaeas* in *Pieris rapae*). Predvsem pa je bila odkrita tudi nova lokacija redkega metulja vrste *Azanus ubaldus*, ki je bila prvič opažena na SZ delu otoka. Kot kažejo naše najdbe in prejšnja opazovanja, se novo naseljene vrste hitro razširjajo po otoku in utrjujejo svojo prisotnost.

KLJUČNE BESEDE: Lepidoptera, Gran Canaria, *Azanus ubaldus*, *Leptotes pirithous*, *Cacyreus marshalli*, nova nahajališča, tujerodne vrste

Introduction

Islands are often very interesting places for observing unique flora and fauna because of their isolation, which results in high percentage of endemism. Besides that, they are also very important for observation of colonisation of organisms by natural or anthropogenic pathways. The colonisation by new inhabitants can happen gradually over hundreds of years in the case of plants and slow moving organisms, or can be very fast and sudden in the case of more mobile ones. This is also the case of butterflies, which can spread rapidly over the new environments when the conditions are right (Juan et al. 2000; Emerson 2003).

A perfect example of that is the island of Gran Canaria, especially because of the favourable climate conditions, which persist all year round. Here we can observe the colonisation of some parts of the islands by butterfly species, which were absent prior to the 20th century. Some of those have been reported only in the last two decades, while others expanded rapidly over the last few. Some of the examples are the Monarch (*Danaus plexippus*), the Desert babul blue (*Azonus ubaldus*), the Common zebra blue (*Leptotes pirithous*) and the Geranium bronze (*Cacyreus marshalli*) (Olivier and Van der Poorten 1992; Wiemers 1995; Wiemers et al. 2013; Naranjo Morales et al. 2018).

In this article new locations of butterfly species, including some of the previously mentioned, are reported. It is known that most of the species found on the island can be seen all year round because of the warm climate, therefore it is worth mentioning, that the observations were made in mid-December. This is especially important since most of the prior studies focused on spring (because of the more favourable humid conditions) or summer months (Wiemers 1995; Wiemers et al. 2013; Naranjo Morales et al. 2018).

Geographical characteristics of the region

Gran Canaria is a roughly 16 million years old volcanic island, located approximately 200 km west of African continent in the Atlantic Ocean. With its 1530 km² it is the third largest island in the archipelago of Canary Islands. Its highest point reaches 1949 m with Pico de las Nieves (third highest in the archipelago), which combined with its landscape diversity and fragmentation gives rise to all kind of different environments (Wiemers 1995; Schmincke & Sumita 1998). This is consequently reflected in its high number of butterfly species (26), surpassing or equalling (La Palma and La Gomera (26)) all of the other islands in its group, except Tenerife (27) (Naranjo Morales et al. 2018; Naranjo Morales & Suárez Ramos 2019).

As mentioned before, Gran Canaria has a mild subtropical climate with warm temperatures that show little seasonal variation (monthly means are between 18 °C in January and 24°C in August) (Wiemers 1995). Its climate is strongly influenced by the humid trade winds from the northeast, which in combination with the altitude of the volcanoes and the drier northwest winds blowing at higher levels, produce an inversion zone and marked vegetation zones with clouds banks at around 1000 m on

the northeast slopes. Thus the northeast side of the island is relatively humid while the south and northwest sides are relatively dry. As a result, different vegetation zones are distinguished: Arid subtropical scrub (up to 250 m), semiarid to humid subtropical scrub and woods (from 250-600 m on the northeast side and from 250-1000 m on the south and northwest side), humid laurel forest in the cloud belt on the northeast side (600-1000 m) and humid to dry temperate pine forest (from 1000-2000 m) which is substituted with scrub where the conditions are not favourable (Juan et al. 2000; Emerson 2003). Besides the habitats in the four main vegetation zones, very important butterfly habitats on the island are also those of the anthropogenic origin. Especially important in this regard are different parks and gardens in the villages and cities, as well as fields and plantations with the exotic flora, which can be found throughout the island and are the primary habitats of the recently introduced butterfly species (Naranjo Morales et al. 2018).

The localities in this article cover almost all of the different environments found on the island – sand dunes, arid, semiarid and humid scrub, semiarid and humid pine forests, laurel forest, lakes and especially anthropogenic environments such as gardens, fields and city parks. In this respect the chances to observe all butterfly species that are flying in December on Gran Canaria were enhanced.

Results

List and description of localities

Exact locality and details regarding coordinates (WGS 84 Web Mercator projection; EPSG:3857), altitude, habitat and date of each observation are given. In the case of broader locality, coordinates are given for the most appropriate observation spot. The localities are given in the order of the observation dates.

1. Calle de la Calzada (Barranco de Guiniguada); coordinates: X: 28.065077, Y: -15.463480; 260-315 m; mostly anthropogenic: humid scrub with deciduous trees, parks, gardens; 9.12.2019
2. Puerto de las Nieves; coordinates: X: 28.101054, Y: -15.708923; 5-55 m; mostly anthropogenic: arid scrub, parks, gardens; 10.12.2019
3. El Risco (Parque Natural Tamadaba); coordinates: X: 28.046660; Y: -15.727383; 75-140 m; mixed anthropogenic and natural: arid scrub, gardens (some with acacia trees); 10.12.2019
4. La Aldea de San Nicolas de Tolentino; coordinates: X: 27.974804, Y: -15.778552; 70-100 m; mostly anthropogenic: arid scrub, gardens, banana plantations; 10.12.2019
5. Barranco de La Aldea de San Nicolas (Mirador del Molino); coordinates: X: 27.992790, Y: -15.693976; 70-700 m; mostly natural: arid to semiarid scrub, very few gardens; 10.12.2019
6. Cruz de Tejeda; coordinates: X: 28.005481, Y: -15.599639; 1520 m; mostly natural: humid pine forest with grasslands, very few gardens; 11.12.2019

7. Tejada; coordinates: X: 27.994413, Y: -15.614928; 1030-1075 m; mostly anthropogenic: semiarid scrub with deciduous trees, gardens, parks; 11.12.2019
8. Roque Nublo; coordinates: X: 27.967494, Y: -15.604835; 1600-1640 m; natural: semiarid pine forest; 11.12.2019
9. Pico de las Nieves-Roque Redondo; coordinates: X: 27.957621, Y: -15.557664; 1870-1940 m; natural: semiarid pine forest; 11.12.2019
10. Las Palmas; coordinates: X: 28.150416, Y: -15.427583; 10-50 m; anthropogenic: gardens, parks; 12.12.2019
11. Agüimes; coordinates: X: 27.904122, Y: -15.447502; 265-285 m; anthropogenic: gardens, parks; 13.12.2019
12. Barranco de las Vacas; coordinates: X: 27.913614, Y: -15.474998; 500-555 m; natural: arid-semiarid scrub; 13.12.2019
13. Maspalomas; coordinates: X: 27.744037, Y: -15.599220; 5-35 m; mixed anthropogenic and natural: sand dunes with arid scrub and trees, gardens, parks; 14.12.2019
14. Moya; coordinates: X: 28.108636, Y: -15.582788; 480-490 m; mixed anthropogenic and natural: humid laurel forest with meadows, gardens, parks; 15.12.2019
15. Los Tiles/San Fernando; coordinates: X: 28.094066, Y: -15.583005; 640-700 m; mixed anthropogenic and natural: humid laurel forest with meadows, gardens; 15.12.2019
16. Reserva Natural Especial de los Tilos; coordinates: X: 28.083056, Y: -15.591848; 740-770 m; natural: humid laurel forest; 15.12.2019
17. Fontanales; coordinates: X: 28.057341, Y: -15.610145; 1020 m; mostly anthropogenic: humid pine forest, vegetable gardens, gardens, fields; 15.12.2019
18. Bandama (Caldera de Bandama); coordinates: X: 28.037437, Y: -15.457761; 575-445 m; mixed anthropogenic and natural: semiarid-humid scrub with trees, flower gardens; 15.12.2019
19. Las Crucitas (Barranco de Arguineguin); coordinates: X: 27.776810, Y: -15.666651; 35 m; mixed anthropogenic and natural: dry river bed with acacia trees and scrub; 16.12.2019
20. Barranco de Arguineguin (La Sao, Los Peñones, El Horno, Cercados de Espinos, Las Filipinas, Barranquillo Andrés, Soria); coordinates: X: 27.906031, Y: -15.669504; 140-660 m; mixed anthropogenic and natural: arid scrub, gardens, parks; 16.12.2019
21. Mogan; coordinates: X: 27.883955, Y: -15.723216; 253-260 m; mostly anthropogenic: semiarid scrub, gardens, parks; 17.12.2019
22. Pie de la Cuesta; coordinates: X: 27.900977, Y: -15.710002; 330-365 m; mixed anthropogenic and natural: arid scrub, gardens; 17.12.2019
23. Playa de Tasarte (Barranco de Tasarte); coordinates: X: 27.879702, Y: -15.794059; 70 m; anthropogenic: watermelon field; 17.12.2019
24. Presa del Mulato (lake above Soria); coordinates: X: 27.917387, Y: -15.693824; 760-845 m; natural: arid-semiarid pine forest; 17.12.2019
25. Sardina; coordinates: X: 27.847242, Y: -15.468448; 155-175 m; anthropogenic: gardens, parks; 18.12.2019

26. Arguineguin; coordinates: X: 27.760226, Y: -15.682618; 10-15 m; anthropogenic: gardens, parks; 18.12.2019
27. Santa Lucía de Tirajana; coordinates: X: 27.912729, Y: -15.541533; 695-700 m; anthropogenic: gardens, parks; 19.12.2019
28. Era del Cardón (Barranco de Balos); coordinates: X: 27.869984, Y: -15.492199; 325 m; mostly anthropogenic: arid scrub, gardens; 19.12.2019

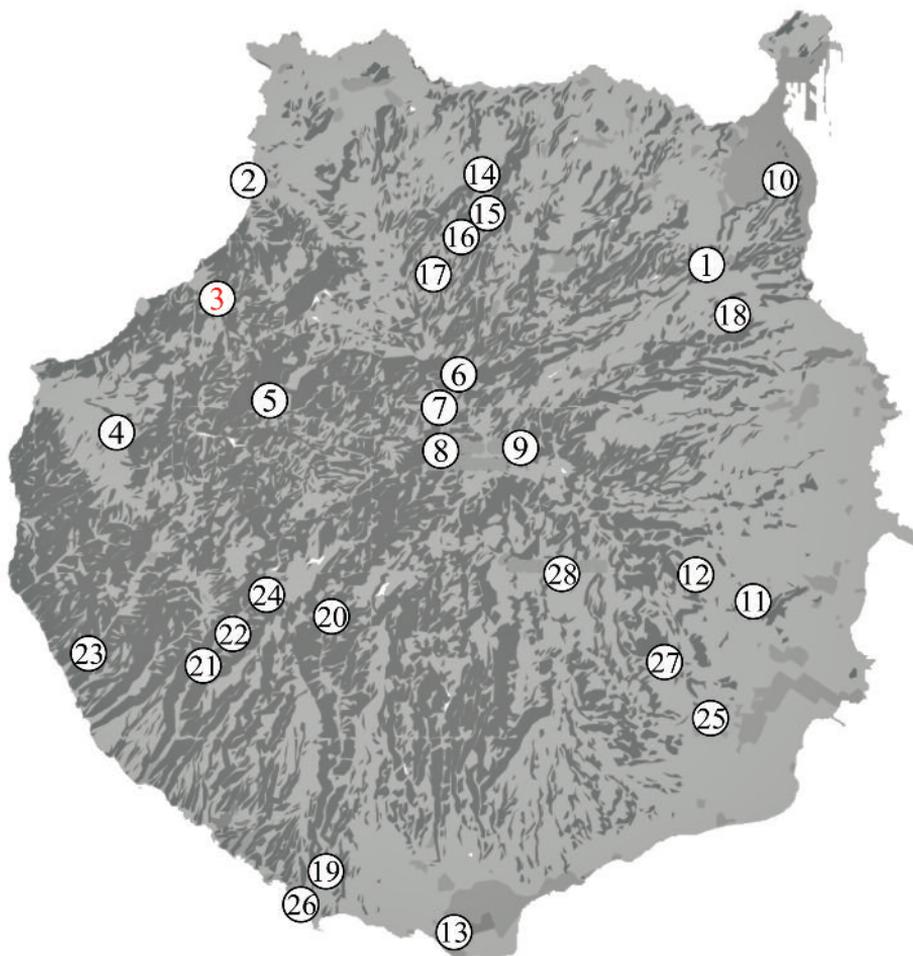


Figure 1: Map of localities of the December 2019 butterfly observations across the island of Gran Canaria. The new locality of *Azanus ubaldus* is marked with the red colour. Figure created with the Snazzy Maps (Snazzy Maps 2019).

Slika 1: Zemljevid nahajališč metuljev opazovanih decembra 2019 na otoku Gran Canaria. Nova lokaliteta metulja *Azanus ubaldus* je označena z rdečo barvo. Slika je izdelana s pomočjo programa Snazzy Maps (Snazzy Maps 2019).

List of species

The nomenclature and taxonomy are in accordance with Wiemers et al. (2018).

Table 1: Distribution of butterflies on Gran Canaria. The localities are indicated by numbers from 1 to 28 as in the list and description of localities.

Tabela 1: Razširjenost dnevnih metuljev na otoku Gran Canaria. Lokalitete so označene s številkami od 1 do 28, enako kot v seznamu nahajališč in njihovih opisov.

Family/species	Locality	Number of locations
Pieridae		
1. <i>Pieris rapae</i>	1, 3, 4, 7, 10, 11, 12, 14, 15, 16, 17, 18, 20, 23, 25, 26, 27, 28	18
Lycaenidae		
2. <i>Azanus ubaldus</i>	3, 19	2
3. <i>Cacyreus marshalli</i>	4, 21, 26, 27	4
4. <i>Leptotes pirithous</i>	23	1
5. <i>Lycaena phlaeas</i>	3, 17, 24	3
6. <i>Zizeria knysna</i>	1, 3, 10, 13, 23, 27	6
Nymphalidae		
7. <i>Danaus plexippus</i>	1, 10, 13, 21, 25, 27	6
8. <i>Vanessa atalanta</i>	10, 16	2
9. <i>Vanessa cardui</i>	1, 2, 3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28	26
10. <i>Vanessa vulcania</i>	1, 18	2

Discussion

In December 2019 visit to Gran Canaria the primary focus was on discovering most of the endemic species on the island and confirming their localities, or more im-

portantly, discovering some new ones. Unfortunately only 10 species out of 26 were observed at 28 visited locations scattered all over the island, with only one being endemic (*V. vulcania*). Despite the fact, that some species are very rare migrants on Gran Canaria (*Danaus chrysippus*, *Catopsilia florella*, etc.) or could not be observed during certain months (including December) because of their life cycles (*Thymelicus christi*, *Hipparchia tamadabae*, etc.) (Wiemers 1995), the number of the observed species is unexpectedly low. One of the possible reasons could be the massive fires that engulfed a large part of the island in August 2019 or more importantly the severe drought that caused them (Copernicus 2019).

After visiting roughly half of the localities, my primary focus shifted from endemic species to the recently introduced ones, since some of them were not even expected to be found in December (*A. ubaldus*), let alone be discovered on new locations. Despite some other species also being found on the previously unknown localities (*V. cardui*, *L. phlaeas*, *P. rapae*), the most intriguing finds were the species that were only recently discovered on the island (*C. marshalli*, *L. pirithous*) or were thought to be very rare and known only from few locations (*A. ubaldus*) (Wiemers 1995; Naranjo Morales et al. 2018). The rest of the discussion will therefore focus mainly on the species of blues (Lycaenidae) that recently invaded Gran Canaria.

***Cacyreus marshalli* (Butler, 1898)**

C. marshalli is a small butterfly mostly found in southern Africa, but has recently colonized its northern part, as well as southern parts of Europe, most Mediterranean and some Atlantic islands (Wiemers et al. 2013). On the island of Gran Canaria it was first observed in July 2005 in the city of Teror (Acosta-Fernández 2005), but has since spread to most of the humid northern parts of the island, mostly to towns and villages, where *Geranium* and especially *Pelargonium* (its larval food plants) abound. Despite being widespread in the humid northern part, the butterfly was thought to be absent from the more arid western and southern part of the island, the only recently discovered locality being Maspalomas (Wiemers et al. 2013; Naranjo Morales et al. 2018). However, the species was recently found in the south also in villages and towns such as Mogan and Santa Lucía de Tirajana according to observations reported on Observation.org (2019).

Surprisingly, the only localities, in which the butterfly was observed during this December visit, also lie in the arid southern and western parts of the island. The species was found on four locations, namely Mogan, Santa Lucía de Tirajana, Arguineguin and La Aldea de San Nicolas de Tolentino. Those observations suggests that the butterfly successfully colonized the remaining - more arid - parts of the island and is now distributed throughout the island, at least in the villages and towns where its larval food plants are available. So far the butterfly was restricted only to the anthropogenic environments and *Pelargonium* plants, but the fear remains that it could also spread to the places with wild *Geranium* species, competing with the

native *Aricia cramera* butterfly. The findings in December also confirm the thesis that the butterfly is on the wing all year round (Wiemers 2013).

***Leptotes pirithous* (Linnaeus, 1767)**

Another recent inhabitant of Gran Canaria is *L. pirithous*, a widespread Pan-African species found throughout the Mediterranean basin. In the Canary Islands it was first recorded on Fuerteventura in 1994 (Kistner & Beck 2000) and it later colonised most of the archipelago. On Gran Canaria it was first observed in Maspalomas in 2011, but has since spread across the island. It mostly inhabits the anthropogenic environments and could thus be found in gardens, parks and fields throughout villages and towns (Wiemers et al. 2013; Naranjo Morales et al 2018).

It flies in continuous broods throughout the year and so far it was reported from northern, eastern and southern part of the island, mostly near the coast (Naranjo Morales et al. 2018). Recently it was also seen further inland in Mogan (Observation.org 2019), which is also the westernmost location reported until now. In this article the first sighting from the west coast, as well as the westernmost location so far, is reported, since the butterfly was observed and photographed in the watermelon field in Playa de Tasarte. It seems that the species is spreading really fast and has already colonized the entire island, which means that the sightings like this in December will not be rare any more.

***Azanus ubaldus* (Stoll, 1782)**

A. ubaldus is a very small butterfly, common in arid environments from northern Africa to India, and is also found in some parts of the Mediterranean region (Gascoigne-Pees 2016). It is one of the rarest butterflies on Gran Canaria, until 2018 known only from three localities – Maspalomas, El Berriel and Barranco de Arguineguin (Naranjo Morales et al. 2018). It was first discovered in 1982 in Maspalomas (Playa de Inglés), but that was not recognised until 1992, when it was correctly identified (Olivier & Van der Poorten 1992). The species was not seen again until 2007, when it was rediscovered on the same locality (Schurian 2008). In 2016 the second locality was discovered (El Berriel), and in 2018 last of its three localities was found (Barranco de Arguineguin). All three known localities lie on the southern part of the island relatively close together, and even though it was speculated that the butterfly will colonize other arid parts of the island, where its food plants are found (especially *Acacia farnesiana* and *Prosopis juliflora*), it was not observed anywhere else (Gascoigne-Pees 2016; Naranjo Morales et al. 2018).

Surprisingly, this December the butterfly was not only observed again in Las Crucitas (Barranco de Arguineguin), thus confirming previous findings, it was also found in a village of El Risco, which lies in the north-western part of the island in

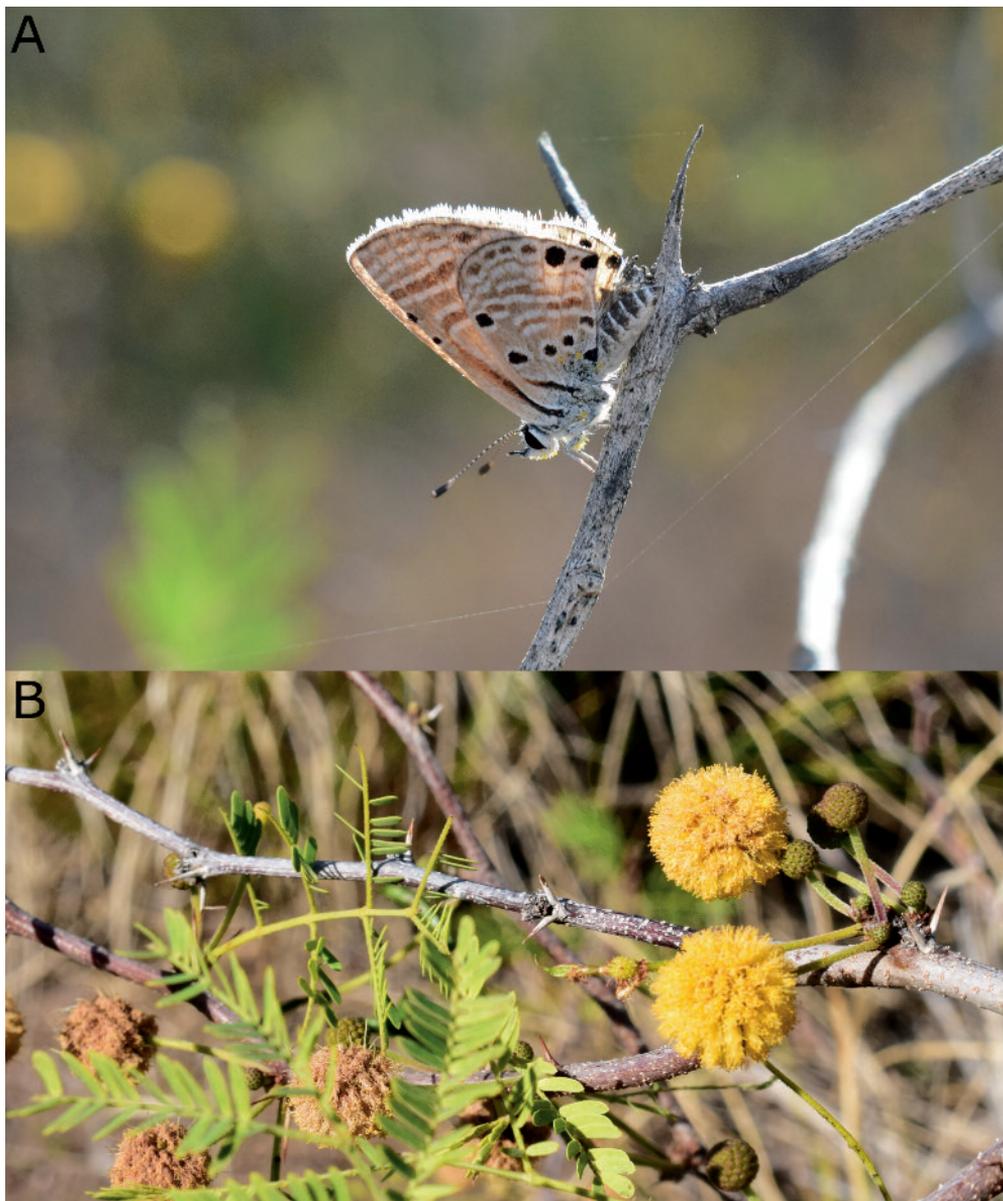


Figure 2: A) *Azanus ubaldus* (Las Crucitas; Barranco de Arguineguin); 16.12.2019.
B) *Acacia farnesiana* found on the locality of El Risco, where *A. ubaldus* was observed; 10.12.2019

Slika 2: A) *Azanus ubaldus* (Las Crucitas; Barranco de Arguineguin); 16.12.2019.
B) *Acacia farnesiana* najdena na lokaciji El Risco, kjer je bil opažen *A. ubaldus*; 10.12.2019

Tamadaba Natural Park, almost on the opposite side of Gran Canaria. At the locality, a single imago was observed flying near a concrete fence, settling briefly on the leaf of a nearby palm, just enough for photographing and identification. At first, the finding came as a total surprise, but later quite a few of its food plants (*A. farnesiana*) were observed in the vicinity. The *A. farnesiana* trees were discovered also at the nearby parking lot, suggesting, that a larger area could be considered as a suitable habitat for the species. It looks like that the butterfly somehow bridged the mountainous gap in between and colonized the new locality. The finding also suggests that there are likely additional colonies present elsewhere on the island since the whole western edge of the island is arid and thus appropriate for its host plants.

As reported by previous authors, the species seems to be active all year round also on the island, and is possibly spreading due to its host plants gaining ground as well (Gascoigne-Pees 2016; Naranjo Morales et al. 2018). It can be thus expected that new localities of this species will be discovered soon on Gran Canaria.

Conclusions

In December 2019 visit of Gran Canaria ten butterfly species were found out of 26 recorded so far (Naranjo Morales et al. 2018; Naranjo Morales & Suárez Ramos 2019), at 28 localities. From the gathered data it can be concluded, that the invading species are becoming more widespread across the island. The most important discovery is a new locality for *A. ubaldus*, a rare inhabitant of the island, which was so far not observed flying in December. The new locality is especially significant, since it was found far away from the previous localities on the opposite side of the island. This also indicates, that new colonies of the butterfly are likely to be found somewhere in between these localities. Those findings confirm that some of the recently introduced species are consolidating on the island and are becoming its permanent residents, mostly due to human influence.

Acknowledgments

Special thanks to prof. Dr. Rudi Verovnik for all the help – the guidance, relevant literature and reviewing the article.

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Received / Prejeto: 7. 1. 2020

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Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Acta Entomologica Slovenica](#)

Jahr/Year: 2020

Band/Volume: [28](#)

Autor(en)/Author(s): Sturm Luka

Artikel/Article: [Contribution to the knowledge of the butterfly fauna \(Lepidoptera: Papilionoidea\) fo Gran Canaria \(Canary Islands, Spain\) 43-54](#)