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PHOTOGRAPHIC SURVEY OF BUTTERFLIES (LEPIDOPTERA: PAPILIONOIDEA) IN SOUTHERN ALGERIA WITH THE FIRST RECORD OF THE SKY-BLUE CUPID, *CHILADES ELEUSIS* (DEMAISON, 1888) FOR THE COUNTRY

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Boulaouad, B.A., Harzallah, B., Missoum, M., Ayyach, K. & Verovnik, R.: Photographic survey of butterflies (Lepidoptera: Papilionoidea) in southern Algeria with the first record of the sky-blue Cupid, *Chilades eleusis* (Demaison, 1888) for the country. Nat. Croat., Vol. 33, No. 1., 159-165, 2024, Zagreb.

During field surveys in recent years in the southernmost part of Algeria in Tamanrasset Province, a photographic account of the butterfly fauna was made. Fifteen species were recorded at four locations. Among these, the sky-blue Cupid, *Chilades eleusis* was recorded for the first time from the country and the north-western part of Africa. The species utilizes small acacia trees (*Vachellia* spp.) as larval host plants and is possibly resident in the studied region. This record extends its known range from sub-Saharan Africa, and apart from its presence along the Nile River in Egypt, represents the only known occurrence of the species in the Sahara realm. More targeted surveys of butterflies in the studied region would be highly recommended.

Keywords: butterfly records, Tamanrasset province, Adrar des Ifoghas, Afrotropical region, checklist, photography

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Tijekom terenskih istraživanja posljednjih godina u najjužnijem dijelu Alžira, u provinciji Tamanrasset, napravljen je fotografski pregled faune dnevnih leptira. Na četiri lokacije zabilježeno je ukupno 15 vrsta. Među njima je i prvi put za državu, a time i sjeverozapadnu Afriku, zabilježen plavac *Chilades eleusis*. Vrsta koristi mala stabla akacije (*Vachellia* spp.) kao biljke hraniteljice i vjerojatno je stalno prisutan u proučavanom području. Taj nalaz proširuje njegovo poznato područje rasprostranjenosti od podsaharske Afrike, i osim prisutnosti uz rijeku Nil u Egiptu, predstavlja jedino poznato pojavljivanje vrste u predjelu Sahare. Preporučljiva su daljnja ciljna istraživanja leptira u proučavanoj regiji.

Ključne riječi: provincija Tamanrasset, Adrar des Ifoghas, Afrotropska regija, popis vrsta, fotografija

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INTRODUCTION

The butterfly fauna of Algeria is relatively well studied and with a long history of studies, as reviewed by Tennent (1996a) in his monograph on the fauna of north-western Africa. Since then, there have been several faunistic papers published (Samraoui, 1998; Remini & Moulaï, 2015; Kacha *et al*., 2017; Berkane *et al*., 2019; Kacha *et al*., 2020; Saouli *et al*., 2022) including the recent discovery of *Azanus jesous* (Stoll, 1782) in Algeria (Bougaham *et al*., 2023). However, all these publications are limited to surveys from the northern, Mediterranean part of Algeria. The butterfly fauna of the Saharan part of the country was last studied by Speidel & Hassler (1986), who surveyed the Lepidoptera of the Ahaggar and Tassili n'Ajjer Mountains and list 24 butterfly species for both mountains combined.

The surveyed region represents the northernmost part of the Adrar des Ifoghas Mountains, which are in the main part situated in neighbouring Mali. The landscape is characterised by rocky granite ridges and outcrops which only rarely rise more than 100 m above the plains. Being in the heart of the Sahara, the region is otherwise dominated by sandy desert. The aforementioned ridges form wadis with enough shelter for the development of diverse vegetation including sparse stands of Acacia (*Vachellia tortilis* (Forssk.), *V. nilotica* (L.)), Tamarisk (*Tamarix aphylla* (L.)), and Green Thorn trees (*Balanites aegyptiaca* (L.)). These are accompanied by bushy vegetation (e.g., genus *Calotropis*, *Lantana*, *Senna*, *Pergularia*…) and perennial plants that flower under favourable conditions. Edges of cultivation surrounding the permanent settlements are also important resources for the local butterflies.

The region south of the Ahaggar Mountains in Algeria has virtually no published records of butterflies, so our main aim was to provide the first overview of the butterfly fauna of the southernmost border regions of Algeria. We discuss the more interesting finds, particularly the newly recorded *Chilades eleusis*, and compare the butterfly fauna of the region to that of the Ahaggar and Tassili n'Ajjer Mountains further north.

METHODS

The surveys were made during three visits: to In Guezzam from 24.XII. to 30. XII.2021, to Timiaouine from 16.X. to 23.X.2022, and to Tin Zaouatine from 1.XI. to 8.XI.2023. Butterflies were photographed sporadically together with documentation of plants and other animals present in the region. The main focus was on birds, which were studied in more detail (Boulaouad *et al*., 2022; 2023a; 2023b; 2024). The identification of butterflies was based on Tennent (1996a) and Larsen (2005). The nomenclature follows Wiemers *et al*. (2018) for the Palaearctic taxa and ADBD (2024) for the Afrotropical.

We observed and photographed butterflies from the following locations:

1. Tawendert village, Tin Zaouatine district, orchards at the northern edge of the village; 20.392331°N, 2.456347°E; 700 m; gardens, sparse stands of acacia trees with undergrowth; 15.X.2022; 1.XI.2023 to 8.XI.2023.
2. Timiaouine, Bordj Badji-Mokhtar district, wide riverbed along the road 40 km north of the town; 20.704653°N, 1.689107°E; 520 m; sparse savanna with predominant Acacia trees (*Vachellia* sp.); 12.X.2022 to 17.X.2022.

3. Tin Zaouatine, orchards and gardens in the town; 19.955556°N, 2.966667°E; 635 m; gardens, desert vegetation with solitary *Balanites aegyptiaca*, *Vachellia* sp. trees at the edge of the town; 1.XI.2023 to 8.XI.2023.
4. In Guezzam, fields and overgrown areas along the road 10 km north of the town; 19.638889°N, 5.773056°E; 405 m; cereal fields, stands of *Balanites aegyptiaca*, *Vachellia* sp. trees; 24.XII.2020 to 30.XII.2020.

RESULTS AND DISCUSSION

The following species were recorded and mostly also photographed during our surveys.

PIERIDAE

Coliadinae

1. *Catopsilia florella* (Fabricius, 1775)

Observations: Tawendert village, Timiaouine, In Guezzam

This is a known migrant species reaching the Canary Islands in the west and distributed throughout the Afrotropical region to Asia (Tennent, 1996a). It is likely permanent in the region as its host plants (*Cassia* sp.) were present around settlements.

Pierinae

2. *Colotis phisadia* (Godart, 1819)

Observations: Tawendert village, Timiaouine, Tin Zaouatine

Specifically linked to stands of its host plant *Salvadoria persica* L., where it can be quite numerous (Tennent, 1996a).

3. *Colotis chrysonome* (Klug, 1829)

Observations: Tawendert village, Timiaouine, Tin Zaouatine

This brightly coloured white has been recently recorded quite far north in the Saharan part of Morocco (Verovnik *et al*., 2018) and is linked to the distribution of its host plant *Maerua crassifolia* Forssk. which was growing sporadically among acacia trees also in the surveyed region.

4. *Colotis liagore* (Klug, 1829)

Observations: Tawendert village, Timiaouine, Tin Zaouatine

This appears to be the only 'orange tip' *Colotis* sp. in southern Algeria. It has been mentioned as occasionally present in southern Algeria by Tennent (1996a) but without exact records. Thus, our findings are the first with the exact location of the species from Algeria.

5. *Belenois aurota* (Fabricius, 1793)

Observations: Timiaouine, Tin Zaouatine

The species is known as a strong migrant and was recorded also further north in Algeria in the Ahaggar Mountains (Speidel & Hassler, 1986).

6. *Euchloe falloui* (Allard, 1867)

Observations: Tin Zaouatine

This is quite an unexpected find so far south in the desert, but it is likely that its host plant *Moricanida* spp. (Tennent, 1996a) is present in the wastelands surrounding the town.

7. *Pontia glauconome* Klug, 1829

Observations: Tawendert village, Timiaouine, Tin Zaouatine, In Guezzam

It is one of the eremic species best adapted to desert conditions with long pupal diapauses enabling it to endure severe droughts (Tennent, 1996a). It was widespread in the surveyed region.

NYMPHALIDAE

Danainae

8. *Danaus chrysippus* (Linnaeus, 1758)

Observations: Tawendert village, Timiaouine, Tin Zaouatine, In Guezzam

One of the most common and visible species in the surveyed region. It was widespread, as was its host plant in the region *Calotropis procera* (Aiton) (Larsen, 2005). The form *D. chrysippus* f. *alcippus* with whitish hindwings was predominant.

Nymphalinae

9. *Vanessa cardui* (Linnaeus, 1758)

Observations: Timiaouine, In Guezzam

The species is known as a strong migrant, so its presence in the flowering fields north of the town was unsurprising.

LYCAENIDAE

Theclinae

10. *Deudorix livia* (Klug, 1834)

Observations: In Guezzam

The species was reported as new for Algeria (Beladis *et al*. 2018) and southern Algeria (Haddad *et al*. 2020), but the authors overlooked that it was already recorded from Ahaggar by Speidel & Hassler (1986) and Tennent (1994).

Polyommatinae

11. *Tarucus* sp.

Observations: In Guezzam

Collected male specimens and genital dissections are required for certain species determination (Tennent, 1996b), so we kept our records at the genus level. According to Tennent (1996b), all three species distributed in northern Africa are also present in Algeria, but only *T. theophrastus* (Fabricius, 1793) was confirmed with genital dissections in the Ahaggar Mountains (Speidel & Hassler, 1986). Given the desert environment in the studied region, *T. rosaceus* (Austaut, 1885), would however be anticipated, as it is the only species penetrating the desert regions of south-east Morocco (Verovnik *et al*., 2018).

12. *Azanus ubaldus* (Stoll, 1782)

Observations: Tawendert village, Timiaouine, Tin Zaouatine

Only mentioned for southern Algeria by Tennent, who depicts a female specimen from Tamanrasset in the Ahaggar Mountains (Tennent, 1996a). It is commonly observed visiting flowering acacia trees which serve as larval host plants as well (Tennent, 1996a). Given its discovery on Lampedusa Island (Caporale & Guidi, 2013) in the Mediterranean, it is likely more widespread in Algeria.

13. *Chilades eleusis* (Demaison, 1888)

Observations: Tin Zaouatine

This is a new species for Algeria and the north-western part of Africa. It is a dry frost-free savanna species distributed mostly in the Sahelian belt south of the Sahara from Senegal and Gambia in the west, to Sudan and Egypt in the east (Larsen, 1990; 2005). The closest known records of the species are from northern Nigeria (Fig. 1), but it is likely present also in neighbouring Mali and Niger. It penetrates furthest to the north along the Nile River, where it is reported to be common around Aswan (Larsen, 1990), reaching Qena in the north (Gilbert & Zalat, 2007). The host plant of the species are low growing shrubs of acacia (Larsen, 2005); incidentally, the perching male depicted (Fig. 2) has been observed on the host plant. That could be considered an indication of a potential permanent residency of this species in southern Algeria, but further observations are required for confirmation.

14. *Zizeeria knysna* (Trimen, 1862)

Observations: Tawendert village, Tin Zaouatine, In Guezzam

According to Tennent (1996a), both *Z. knysna* and *Z. karsandra* (Moore, 1865) are present in Algeria, but their exact distribution is not known. In the plates of the mentioned monograph (Tennent, 1996a), *Z. karsandra* was collected from Tamanrasset in the Ahaggar Mountains. Our available photographic material, however, points only to the presence of *Z. knysna* in the surveyed region. This is otherwise a widespread

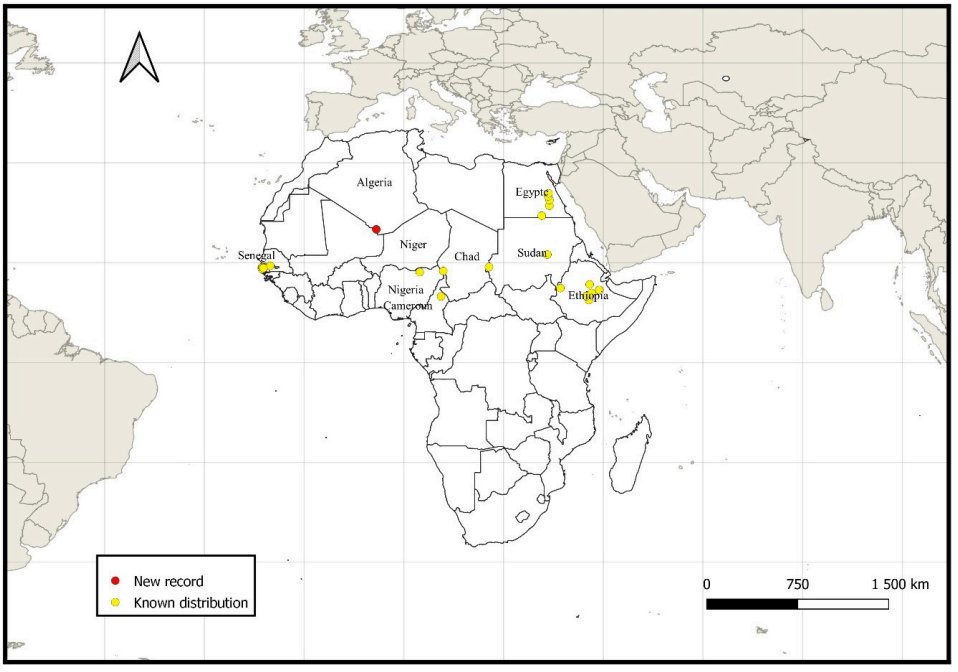

Fig. 1. Known distribution of the sky-blue Cupid, *Chilades eleusis* based on GBIF data and records for Egypt published by Gilbert & Zalat, 2007. The approximate position of the new find in Algeria is indicated.

Figs. 2-5. Butterflies (Lepidoptera, Papilionoidea) photographed in southern Algeria: 2. *Chilades eleusis*, 3. *Colotis liagore*, 4. *Tarucus* sp. (possibly *T. rosaceus*), 5. *Ponita glauconome*.

eremic species distributed from the Canary Islands and the Iberian Peninsula through dry parts of Africa to the western Arabian Peninsula (Larsen, 1984, 2005).

15. *Lampides boeticus* (Linnaeus, 1767)

Observations: In Guezzam

Like *Vanessa cardui*, the species is known as a strong migrant, so its presence in the flowering fields north of the town was expected.

Although our surveys did not specifically target the butterflies and the photographing approach has its limitations (e.g., when genital dissection is required), we believe that our checklist is a good starting point for further research in the region.

Compared to the Ahaggar and Tassili n'Ajjer Mountains (Speidel & Hassler, 1986), the fauna is expectedly depauperate given the more pronounced desert conditions and lack of higher altitudes in the surveyed region. Thus, the majority of species missing further south are typically Palaearctic species, which survived in relict populations at higher altitudes, particularly in the Ahaggar massif. These include *Papilio saharae* Oberthür, 1879, *Euchloe melanochloros* Röber, 1907, *Euchloe charlonia* (Donzel, 1842), *Pontia daplidice* (Linnaeus, 1758), *Melitaea deserticola* Oberthür, 1909, and *Carcharodus stauderi* Reverdin, 1913, the latter being considered possibly extinct at the time Speidel & Hassler (1986) made their surveys. It is unlikely that any of these species would eventually be found further south in Algeria. On the other hand, only the newly discovered *Chilades eleusis* and *Colotis liagore*, both of Afrotropical provenience, were not recorded further north, and it is the Afrotropical realm where we would expect further species to be

Fig. 6. Savanna-like habitat at Timiaouine where several interesting butterflies, including *Colotis liagore* and *Azanus ubaldus*, were found.

eventually found in the region. We hope our publication will initiate further studies of butterflies in the vast region of the Algerian Sahara.

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