Scientific Research Publishing

Advances in Entomology, 2024, 12, 1-17
https://www.scirp.org/journal/ae
ISSN Online: 2331-2017
ISSN Print: 2331-1991

Contribution to the Study of the Afrotropical Pyraustinae Meyrick, 1890 (Lepidoptera, Crambidae): Three New Species from the Southern Arabian Peninsula and Distributional Updates in the Genera *Dysgrammodes* gen.n., *Pyrausta* Schrank, 1802 and *Anania* Hübner, 1823

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How to cite this paper: Seizmair, M. (2024) Contribution to the Study of the Afrotropical Pyraustinae Meyrick, 1890 (Lepidoptera, Crambidae): Three New Species from the Southern Arabian Peninsula and Distributional Updates in the Genera *Dysgrammodes* gen.n., *Pyrausta* Schrank, 1802 and *Anania* Hübner, 1823. *Advances in Entomology*, **12**, 1-17.
https://doi.org/10.4236/ae.2024.121001

Received: September 29, 2023
Accepted: October 31, 2023
Published: November 3, 2023

Abstract

Taxonomic and faunistic results are presented for three genera of the tribe Pyraustini Meyrick, 1890 of the subfamily Pyraustinae Meyrick, 1890 based on material from the southern Arabian Peninsula. The new genus *Dysgrammodes* gen.n. is established and placed in the tribe Pyraustini Meyrick, 1890. It shares synapomorphies in the male genitalia with the genera *Loxostege* Hübner, 1825, *Circobotys* Butler, 1897, *Anania* Hübner, 1823, and *Pagyda* Walker, 1859. Character states differentiating the new genus from these genera are listed. The genus is monotypical, with *Dysgrammodes rubrifascialis* sp.n. as its type species. Taxonomic and faunistic updates are given for the genera *Pyrausta* Schrank, 1802 and *Anania* Hübner, 1823. *Pyrausta flavicilialis* sp.n. is newly described and placed close to the Afrotropical species *Pyrausta centralis* Maes, 2009 and *Pyrausta grisealis* Maes, 2009. *Pyrausta phoenicealis* Hübner, 1818 is reported for the first time in Saudi Arabia. The presence of the genus *Anania* Hübner, 1823 is reported as new to the entomofauna of the Arabian Peninsula. The records are attributed to the new species *Anania interruptalis* sp.n. The new species is recognized as unique among the Afrotropical species of the genus in wing maculation and placed close to *Anania murcialis* (Ragonot, 1895), *Anania hortulata* (Linnaeus, 1758) and *Anania shanxiensis* (Yang & Landry, 2019). The adults of each of the new

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species and of *Pyruasta phoenicealis* (Hübner, 1818), the male genitalia of *Dysgrammodes rubrifascialis* gen.n., sp.n. and of *Pyrausta flavicilialis* sp.n., the female genitalia of *Dysgrammodes rubrifascialis* gen.n., sp.n., *Anania interruptalis* sp.n. and of *Pyruasta phoenicealis* (Hübner, 1818), and the tympanal organs of *Pyrausta flavicilialis* sp.n. and of *Anania interruptalis* sp.n. are described and figured.

Keywords

Pyraloidea, Pyraustini, Taxonomy, Morphology, New Genus, Fauna

1. Introduction

The Pyraustinae Meyrick, 1890 forms the second most diverse subfamily in the Crambidae, comprising 1270 described species distributed over 173 genera and three tribes. A vast majority of the genera are included in the Pyraustini Meyrick, 1890, with no more than five genera attributed to the Portentomorphini Amsel, 1856 and only one genus included in the Euclastini Popescu-Gori & Constantinescu, 1977 [1] [2].

The subfamily has a worldwide distribution. For the Afrotropical zone, recent partial taxonomic revisions with descriptions of new genera and new species have been done by Maes [3]-[14]. Further major taxonomic and faunistic revisions include studies by Vari *et al.* [15], Shaffer & Munroe [16], and Krüger [17]. To date, 160 Afrotropical species of the subfamily are known [18]. An estimated 15% of the Afrotropical species and eight genera are known as endemic [5] [6] [7] [10] [11] [18].

The Arabian Peninsula, however, has remained little explored for the Pyraustinae Meyrick, 1890. The earliest records for the subfamily from its Afrotropical parts were reported by Walsingham & Hampson [19]. A summary of the current research status and a compendium of literature have been given in recent studies by Seizmair [20] [21] [22].

The present paper is intended as a continuation of the latter studies and aims at contributing to the knowledge of the diversity of the Pyraustinae Meyrick, 1890 in the Afrotropical parts of the Arabian Peninsula, which comprise the southern part of Oman (province Dhofar), Yemen, and the south-western parts of Saudi Arabia.

The material presented in this study is attributed to four species, three of which are described as new to science. For one of the new species, the new genus *Dysgrammodes* gen.n. is erected. The other species are assigned to the known genera *Pyrausta* Schrank, 1802 and *Anania* Hübner, 1823. Distributional updates are given for *Pyrausta phoenicealis* (Hübner, 1818). The three genera are attributed to Pyraustini Meyrick, 1890. Diagnostic characters of this tribe include the rhomboid-shaped signum in the female genitalia, the shape of the uncus in the male genitalia—non-capitate, sub-triangular-shaped to conical, the presence of

chaeta in the uncus, and the inner structure of the valva characterized by the presence of a lobar process in the center, the sella [23]. The sella is characterized by a hair bristle, the editum [23]. Differential character states on a generic level include the shape of the uncus, the structure of the chaetae in the uncus and in the editum, and the directedness and composition of the sella [1] [24].

The genera *Pyrausta*, 1802 and *Anania*, 1823 belong to the most diverse genera in the Pyraustini comprising 340 and 117 species worldwide respectively. A revision of the Afrotropical species of the genus *Pyrausta* Schrank, 1802 was performed by Maes [11], with further new Afrotropical species described in subsequent studies by the same author [12] [13]. A first review of the species present on the Arabian Peninsula was conducted by Seizmair [21].

The genus *Anania* Hübner, 1823 is represented in the Afrotropical zone by a total of 29 species [18]. Revisions on the genus were done by Leraut [25] and Tränkner *et al*. [26]. In these studies, autapomorphies in the male and female genitalia were recognized and confirmed for the genus, which resulted in synonymizations of 10 genera. A review of the Afrotropical species of the genus was given by Maes [9] [27] [28].

2. Materials and Methods

2.1. Sampling

The specimens (n = 9) presented in this study belong to samples collected by the author in two expeditions to Saudi Arabia (province Jizan, Fayfa Mts.) in March and September 2022 and in one expedition to Oman (province Dhofar) in November 2021.

The specimens were captured by night using UV-light traps, each equipped with Power-LEDs covering a wave spectrum of 365 nm - 385 nm (LepiLED, Nichia, Tokushima, Japan; EntoLED, Starlight, Weissenburg, Germany). The trapping technique is described in Brehm [29].

2.2. Preparation, Dissection, and Digital Image Processing

The adults were photographed after relaxation and subsequent preparation with a CANON EOS M6 Mark II under an MP-E-65 mm zoom. To examine the genitalia, slide-mounting techniques were applied to the specimens as described in Robinson [30]. The preparation of the genitalia was done under a Motic stereomicroscope (SMZ-171). The slides were photographed using a ToupCam c-mount camera (ToupTek Inc., Zhejiang, China). Image stacking and background normalization procedures were applied to the images using Adobe Photoshop PS, Version 24.0.0.

2.3. Morphological Analyses and Comparisons

Analyses of wing pattern characters and morphological structures in the specimens were done on the images. Structural ratios were calculated on the images

by means of the imaging software ToupView, Version 1.0 (ToupTek Inc., Zhejiang, China).

The specimens in the sample were compared on a broad basis with taxa from the Afrotropical [3]-[14] [16] [27] [28], Oriental [31]-[42], and Palearctic zones [26] [43] [44].

2.4. Terminology and Abbreviations

The descriptions of external and internal character states follow the terminology of Mally *et al.* [1] and Maes [3]. Descriptions of wing venation follow the terminology of Shaffer & Munroe [16]. Abbreviations: ZSM = Zoological State Collection Munich, Germany, n = length of a sample.

3. Results and Discussion

3.1. *Dysgrammodes* gen.n.

Zoobank ID: DA3007BE-93A6-4A0C-B8B6-FAB0ED9A99BA.

Type species: *Dysgrammodes rubrifascialis* sp.n.

External characters (Figure 1): Head: Antenna filiform ciliate, unipectinate in both sexes. Frons flat. Labial palpus porrect, acuminate, medially broadened, and long-scaled in the basal segment, with segment 3 widely protruding from the scales of segment 2. Maxillary palpus vertically upturned in segments 1 - 2, porrect in segments 3 - 4, acuminate. Proboscis is well developed. Thorax: Forewing oblong and narrow, four times as long as broad. Apex acute, downturned. Tornus edged. Costa arched in the distal fourth. R1 widely spaced from R2, running parallel to the costa, terminating closely below the costa in the distal fourth of the wing. R2 and R3 + 4 stem closely approximated. R5 running straight, basally closely approximated to the R3 + 4 stem at the upper angle of the cell, convex in its proximal fifth, then running straight, parallel to the dorsum and equidistant with M1, M2, and M3. Length of the cell relative to the total length of the forewing 0.5. Retinaculum marked as a short hair bristle at the base

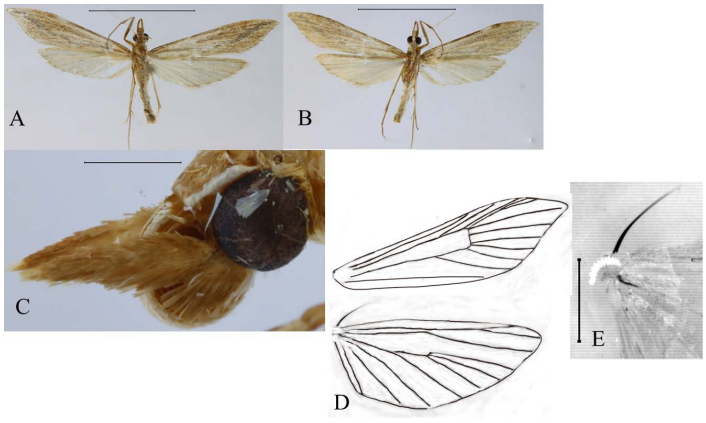

Figure 1. *Dysgrammodes rubrifascialis* gen.n., sp.n., internal characters, holotype, ♀, slide no. 23GP033. (A): Dorsal view. (B): Ventral view. (C): Head profile. (D): Venation. (E): Frenula. Scale bars (A) and (B) = 10 mm, scale bar (C) = 0.5 mm, scale bar (E) = 1 mm.

of the cell. Hindwing oblong, three times as long as broad, apex acute, tornus edged. Costal border straight. Sc + R-Rs stem parallel to the costa. Rs anastomosed with Sc + R in the distal third of the hindwing. M1 closely approximated to the Sc + R-Rs stem in the proximal third of the wing, convex, with the terminal end widely spaced from the apex. M2 and M3 basally closely approximated, M2 slightly arched. M3, CuA1, and CuA2 straight, equidistant. Presence of two frenula differing in length by a factor of 3.5. Legs with outer and inner metathoracic spurs differing in length by a factor of 2.5. Abdomen: Oblong, slender, extending far beyond the inferior margin of the hind wing. Anal tuft present in the male.

Male genitalia (Figures 2(A)-(D)): Uncus conical, globular shaped, chaetose dorsally and laterally, with the chaetae bifid. Scaphium present, marked as two parallel arms in the middle of the uncus. The tuba analis is longer than the uncus. Subscaphium present, marked by slight lateral sclerotizations. Transition uncus—tegumen smooth, posterior end of the tegumen equal in width with the uncus. Pseudognathos present, marked as a lobar structure articulating with the scaphium. Transtilla lobe-shaped, posteriad-directed, transtillum inferior absent. Valva elongate, terminally rounded, with concave costal and ventral borders, running parallel. Costa basally with a globular-shaped dilatation, ventro-distally tapered and strongly sclerotized. Post-basal sacculus broadened. Sella directed toward the aedeagus, with a down-hooked, anteriad-directed projection, and editum present. Chaetae of the editum basally multifid, spatulate, and terminally flattened. Juxta bifid, ventrally slightly invaginated. Vinculum broadened, with a posteriad-directed lobar lateral extension. Saccus short, narrow, v-shaped. Vesica slightly sclerotized, granulate, with the presence of one deciduous cornutus. Coecum membranous.

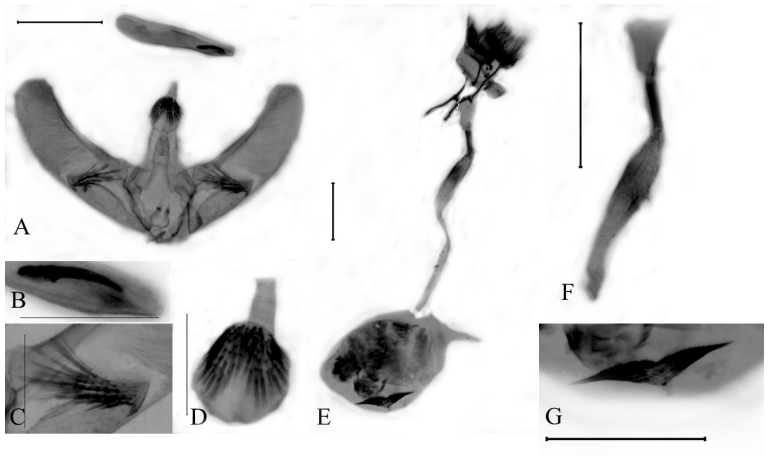

Figure 2. *Dysgrammodes rubrifascialis* gen.n., sp.n., internal characters. ((A)-(D)): Paratype, male genitalia, slide no. 23GP014. (A): Ventral view. (B): Close-up, vesica. (C): Close-up, sella. (D): Close-up, distal uncus. ((E)-(G)): Holotype, female genitalia, slide no. 23GP033. (E): Ventro-lateral view. (F): Close-up, ostium, antrum, posterior ductus bursae. (G) Close-up, signum. Scale bars (A), (E), and (F) = 1 mm, scale bars (B), (C), (D), and (G) = 0.5 mm.

Female genitalia (Figures 2(E)-(G)): Papilla analis ovate, strongly chaetose. The posterior apophysis is unprojected, half as long as the anterior apophysis. The anterior apophysis is medially projected. Ostium membranous, anteriorly constricted, short. Antrum elongate, strongly narrowed, and strongly sclerotized. Posterior ductus bursae widened, sclerotized, and colliculum present. Anterior half of the ductus bursae tapered, and membranous. Corpus bursae wall with one signum of subtriangular shape, with a basal invagination and two oblong, concave-shaped acuminate arms. Appendix bursae present, inserted at the posterior end of the corpus bursae.

Diagnosis: The presence of an editum in the sella, the conical, non-capitate uncus, the parallel tegumen arms, and the elongate third segment in the labial palpus are character states attributing the genus to Pyraustini Meyrick, 1890 [1].

The new genus is closely related with the genera *Loxostege* Hübner, 1825, *Circobotys* Butler, 1897, *Anania* Hübner, 1823, and *Pagyda* Walker, 1859. With these genera, the new genus shares the broadened basal uncus, the sella directed toward the aedeagus, and the spatulate shape of the chaetae in the editum. With *Pagyda* Walker, 1859, the new genus shares an anteriad directed extension at the posterior end of the sella. The new genus is differentiated from these comparative genera in the following internal character states: Transition from the post-basal to the distal uncus: smooth in the new genus, *Loxostege* Hübner, 1825, *Circobotys* Butler, 1897 and *Anania* Hübner, 1823, distinct, from a broadened, sub-triangular shaped post-basal uncus to a strongly narrowed distal uncus in *Pagyda* Walker, 1859; shape of the distal uncus: globular shaped in the new genus and in *Loxostege* Hübner, 1825, sub-rectangular shaped in *Anania* Hübner, 1823, triangular shaped in *Circobotys* Butler, 1897, ovate in *Pagyda* Walker, 1859; structure of the chaetae in the uncus: bifid in the new genus and in *Pagyda* Walker, 1859, simple in *Loxostege* Hübner, 1825, *Circobotys* Butler, 1897 and in *Anania* Hübner, 1823; shape of the transtilla: lobar in the new genus, transtilla inferior absent, triangular-shaped in each of the comparative genera, transtilla inferior present; presence of lobar extensions in the vinculum: present in the new genus, absent in each of the comparative genera; shape of the signum: sub-triangular shaped in the new genus, of fully rhomboid shape in each of the comparative genera. Furthermore, it should be noted that the new genus does not exhibit the apomorphies of *Anania* Hübner, 1823, which are the paired asymmetrical, linguine sclerotizations in the posterior part of the phallus and the digitiform extension of the antrum [26].

The strongly modified shape of the signum—subtriangular shaped with oblong concave arms and the modified transtillum—lobar in shape and bare from transtillum inferior are valued as potentially apomorphic characters of the new genus within in the Pyraustini.

Diversity and distribution: The genus is monotypical. The distribution is Afrotropical, known to date exclusively from south-western Saudi Arabia.

Etymology: The epitheton refers to the strongly reduced line maculation in the forewing and hindwing of the type species (greek: dys- = reduced, -gramm =

structure, lineage). The gender of the genus is feminine.

Dysgrammodes rubrifascialis sp.n.

Zoobank ID: DA54E378-3822-4E8B-BCAF-2BB40D32403E.

Material: Holotype: ♀, Saudi Arabia, province Jizan, Fayfa Mts., 17˚15'50.93"N, 43˚4'32.93"E, 620 m, 19-III-2023, slide no. 23GP033, leg. M. Seizmair, coll. ZSM. Paratype: 1 ♂, Saudi Arabia, province Jizan, 5 km NW Fayfa, 600 m, 24-IX-2022, slide no. 23GP014, leg. and coll. M. Seizmair.

External characters (Figure 1): Wingspan: 16.5 - 25.9 mm. Forewing length: 7.9 - 13.0 mm. Head: Antenna grayish-white in the dorsal flagellum, ocherous in the ventral flagellum, ciliae grayish-white, equal in length with the width of the flagellum. Labial palpus four times as long as broad, double as long as the diameter of the eye, scaling darkish-yellow to brown, sporadically interspersed with grayish-white scales at the base, and with rufous scales in segment 3. Maxillary palpus darkish-brown in segments 1 - 3, grayish-white in segment 4, half as long as the diameter of the eye. Proboscis grayish-white. Frons laterally white scaled, ochreous in the interior. Vertex darkish-gray. Thorax: Tegula and dorsum yellowish-white scaled. Venter yellowish-ochreous. Legs brownish in the femur, grayish-yellowish in the tibia and in the tarsi. Forewing upper side yellowish-brown on the ground, interspersed with reddish fasciae medially and postmedially. Presence of a darkish blue postmedial line developing from the apex, slanted into the antemedial area, terminating there between CuA2 and A1 + 2. Terminal line and fringe reddish. Hindwing upper side yellowish-gray in the ground, bare from maculation. Sc + Rs darkish-brown scaled. Termen with brownish interneural spots. Fringe basally grayish, terminally brownish. The fore- and hindwing undersides are identical to the upper sides.

Male genitalia: As for the genus.

Female genitalia: As for the genus.

Bionomics: The type material was captured on a grassy terrace, interspersed with rocks, located on the verge of a tropical forest zone. The early stages are unknown.

Distribution: The new species is known only from the type locality in southwestern Saudi Arabia (province Jizan).

Etymology: The epitheton refers to one of the external character states, namely the reddish fasciae in the forewing (lat.: ruber = red(dish)).

3.2. Genus *Pyrausta* Schrank, 1802

Diagnosis: The uncus in the male genitalia is triangular or simply rounded. The valva is simple, with its sella lobe-shaped to linguiform and directed anteriad. The shape of the uncus and the sella are viewed as apomorphic characters of the genus [12].

3.2.1. *Pyrausta flavicilialis* sp.n.

Zoobank ID: 1CB55B2D-5B6F-4938-B9C5-43FC02BB008B.

Material: Holotype, ♂, Saudi Arabia, province Jizan, Fayfa Mts., 17˚14'35.66"N, 43˚3'30.72"E, 624 m, 23-III-2023, leg. M. Seizmair, coll. ZSM, slide no. 23GP038.

External characters (Figures 3(A)-(C)): Wingspan: 14.7 mm. Forewing length: 6.6 mm. Head: Antenna grayish-white in the basis and in the ciliae, flagellum yellowish-brown, ciliae equal in length with the width of the flagellum. Labial palpus 4.4 times as long as broad, grayish-white ventrally, brownish dorsally, length relative to the diameter of the eye 1.2. Maxillary palpus brownish and broadened in segments 1 - 2, grayish-yellow, tapered and acuminate in segments 3 - 4, 1.5 times as long as broad, length relative to the labial palpus 0.4. Proboscis brownish-ocherous. Frons and vertex brownish, the vertex with lateral white scaling. Thorax: Dorsum, venter, and tegula ocherous, interspersed with grayish-white scales. Legs yellowish in the procoxa and femur, with the tibia, spurs, and tarsi grayish-white. Forewing 1.7 times as long as wide, costa straight, apex acute, termen obliquely curved, anal border slightly concave. Ground of the upper side rufous, interspersed with yellowish fasciae medially near the anal border. Postmedial area with a yellow reniform spot ranging from the costa to R5. Terminal line and fringe yellow. Hindwing 1.6 times as long as broad, costa straight, apex rounded. Ground of the upper side yellowish-gray, termen deeply yellow, fringe concolorous with the ground. Fore- and hindwing undersides identical with the upper sides. Abdomen: Scaling of the venter and dorsum grayish-white in segments A1 - A5 grayish-white, yellowish-ochreous from segment A6 onwards, anal tuft grayish-white.

Male genitalia (Figure 4(A)): Uncus laterally chaetose, basally broadened, length relative to its maximum width 1.6, scaphium marked as lateral sclerotizations. Tuba analis slender, 1.5 times as long as the uncus, subscaphium marked as fine, rod-shaped sclerites. Valva distally strongly broadened. Costa basally inflated, sclerotized, end of its distal process wide spaced from the apical area, apex medially rounded. Sella strongly broadened in the posterior ridge, with the anterior

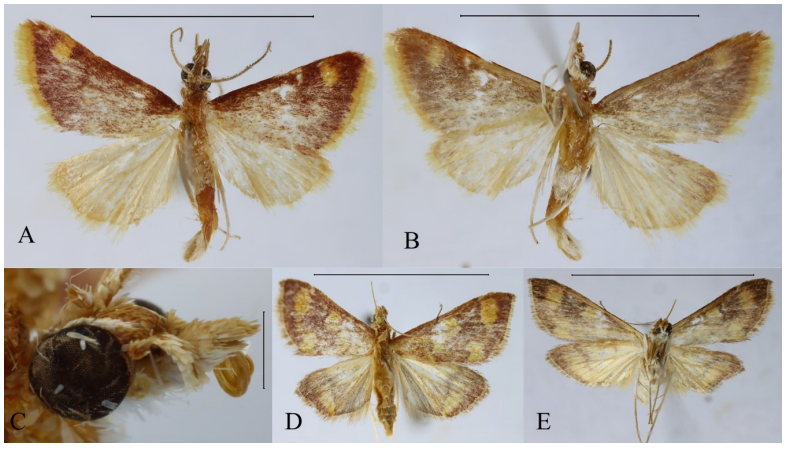

Figure 3. *Pyrausta* Schrank, 1802, external characters. ((A) and (B)): *Pyrausta flavicilialis* sp.n., holotype, ♂, slide no. 23GP038. (A): Dorsal view. (B): Ventral view. (C): Head profile. ((D) and (E)): *Pyrausta phoenicealis* (Hübner, 1818), ♀, slide no. 23GP036. (D): Dorsal view. (E): Ventral view. Scale bars (A), (B), (D), and (E) = 10 mm, scale bar (C) = 0.5 mm.

Figure 4. *Pyrausta* Schrank, 1802, internal characters. ((A) and (B)): *Pyrausta favicilialis* sp.n., holotype, slide no. 23GP038. (A): Male genitalia, ventral view. (B): Tympanal organs. (C): *Pyrausta phoenicealis* (Hübner, 1818), female genitalia, slide no. 23GP036. Scale bars (A), (B), and (C) = 1 mm.

end strongly sclerotized. Chaetae of the editum simple and elongate. Sacculus basally strongly broadened and rounded, post-basally tapered, and sclerotized. Juxta cordate, bi-lobed, with the lobes anteriad-directed. Vinculum strongly broadened. Saccus strongly flattened and u-shaped. Vesica slightly granulate, bare from cornuti.

Female genitalia: The female genitalia are unknown.

Tympanal organs (Figure 4(B)): Bulla tympani invaginated. Ramus tympani strongly sclerotized. Pons tympani oblong and strongly sclerotized. Venula secunda present, running straight and strongly sclerotized.

Diagnosis (Table 1): The new species is externally closest related to the Afrotropical *Pyrausta centralis* Maes, 2009 and *Pyrausta grisealis* Maes, 2009. With these two species, the new species shares the following external character states: ground interspersed with rufous fasciae, presence of a yellow terminal band, and presence of a postmedial spot between the costa and R5 in the forewing. The new species differs from the two comparative species in external and internal character states (Table 1). The male genitalia of the two comparative species have been described and figured by Maes [12].

The key differences between the new species and both the two closely related congeners are the absence of fasciae in the hindwing, the yellow forewing fringe, the broadened apical area of the valva, the broadened u-shaped saccus, and the vesica bare from cornuti.

Bionomics: The type specimen was captured on a terrace covered with patches of grass and shrubs and interspersed with rocks.

Distribution: Known only from the type locality in south-western Saudi Arabia.

Etymology: The epitheton refers to one of the external differential character states, the yellow forewing fringe (lat.: flavus = yellow, lat.: ciliae = fringe).

Table 1. Differential character states—*P. flavicilialis* sp.n., *P. centralis*, *P. grisealis*.

	P. flavicilialis sp.n.	*P. centralis*	*P. grisealis*
External characters			
Presence of interneural spots in the termen (0: absent, 1: present)	0	1	0
Colour of the forewing postmedial spot (0: deeply yellow, 1: rufous)	0	0	1
Presence of grayish fasciae in the hindwing postmedial area (0: absent, 1: present)	0	1	1
Colour of the forewing fringe (0: grayish-brown, 1: deeply yellow)	1	0	0
Internal characters (male genitalia)			
Shape of the apical area of the valve (0: narrowed and medially rounded, 1: broadened and medially rounded, 2: broadened and obliquely rounded toward the ventral border)	1	2	0
Uncus—position of the chaetae (0: lateral, 1: dorsal and lateral)	0	1	1
Uncus—ratio length/maximum width (0: elongate and basally narrow, length/width > 2.5, 1: broadened and short, length/width ≤ 2.0)	1	1	0
Shape of the saccus (0: broadened, flattened, u-shaped, 1: elongate, v-shaped)	0	1	1
Sclerotization of the vesica (0: weak, marked as granulate patches, no cornuti, 1: strong, marked as numerous small spines, 2: strong, marked as several small cornuti)	0	2	1

3.2.2. *Pyrausta phoenicealis* (Hübner, 1818)

Material: Saudi Arabia, province Jizan, Fayfa Mts., 17˚14'35.86"N, 43˚3'90.72"E, 620 m, 23-III-2023, 1 ♀, slide no. 23GP036, 17˚15'51.11"N, 43˚4'9.43"E, 630 m, 21-III-2023, 1 ♀, slide no. 23GP035, leg. and coll. M. Seizmair.

Diagnosis (Figure 3(D) and Figure 3(E)): Wingspan 12.5 - 16.7 mm. Forewing length 6.4 - 9.4 mm. Forewing ground reddish, with brownish-yellow postmedial, medial and basal bands of variable shape. Fringe basally reddish, terminally brownish-yellow. Hindwing ground grayish-yellowish with darkish-brown fasciae postmedially, reddish fasciae sub-terminally, a fulvous line between CuA1 and CuP and a reddish terminal line. Fringe as for the forewing. Abdomen and thorax dorsally brownish-yellowish, ventrally grayish-white. Labial and maxillary palpus brownish-yellow.

Female genitalia (Figure 4(C)): Papilla analis ovate, posterior apophyses

elongate, unprojected, anterior apophyses medially projected, length relative to the posterior apophyses 1.4. Ostium broadened and membranous. Antrum membranous, tube-shaped, three times as long as it is broad. Colliculum present. Ductus bursae strongly broadened, ratio width/length 0.6, posterior portion immediately below the colliculum scobinate, for the rest membranous, diverticulum present in the posterior third. Corpus bursae with a rod-shaped sclerite reaching into the ductus bursae. Rhomboid signum elongate, transversal axis three times as long as the longitudinal axis, invaginated at both ends on the longitudinal axis. Appendix bursae strongly sclerotized.

Distribution: Pantropical [18] [45]. For the Arabian Peninsula, there are historical records from Yemen [19] and recent records from the UAE [45]. The species is reported as new to the entomofauna of Saudi Arabia.

Remarks: The taxonomic relation between the closely related taxa *P. phoenicealis* and *Pyrausta panopealis* (Walker, 1859) needs clarification. *P. panopealis* was removed from synonymy with *P. phoenicealis* by Munroe [46]. Maes synonymized *P. panopealis* with *P. phoenicealis* [13]. Further discussion and references can be found in Landry [47]. The female genitalia of the present material from Saudi Arabia and the material figured by Guillermet [48] under *P. phoenicealis* differ from the material figured by Landry [47] under *P. panopealis* in the absence of strongly sclerotized lobes in the anterior ductus bursae. The Arabian specimens presented in this paper differ from the material by Guillermet [48] and Landry [47] in terms of the strongly sclerotized appendix bursae. A final assessment of the latter character and thus of the taxonomic status of the Arabian populations requires further study.

3.3. Genus *Anania* Hübner, 1823

Diagnosis: The antrum in the female genitalia has a digitiform extension reaching into the ostium. This character state is viewed as autapomorphic for the genus together with the structure of the posterior phallus in the male genitalia, which is characterized by paired asymmetrical linguiform sclerotizations in [26].

Anania interruptalis sp.n.

Zoobank ID: 1ADB4DF8-3F4C-44A9-844B-166B1E217064.

Material: Holotype, ♀, Saudi Arabia, province Jizan, 5 km NW Fayfa, Fayfa Mts., 600 m, 22-IX-2022, slide no. 22GP070, leg. M. Seizmair, coll. ZSM. Paratypes: 1 ♀, same collection data as for the holotype, slide no. 22GP068, 2 ♀♀, Oman, province Dhofar, 4 km W Dalkuth, 01-XI-2021, slide no. 21GP061, 21GP062, leg. and coll. M. Seizmair.

External characters (Figures 5(A)-(C)): Wingspan: 22.5 - 25.7 mm. Forewing length: 10.1 - 12.9 mm. Head: Antenna filiform, flagellum yellowish-white. Labial palpus porrect, broad, width relative to length 0.6, equal in length to the diameter of the eye, grayish-white scaled. Maxillary palpus yellowish, filiform, length relative to the diameter of the eye 0.8. Proboscis yellowish-brown. Frons grayish-brown. Vertex grayish-white. Thorax: Venter, dorsum, tegula, and legs

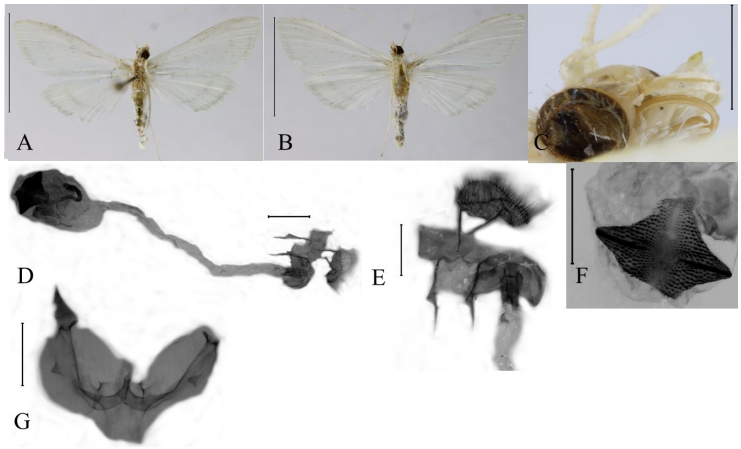

Figure 5. *Anania interruptalis* sp.n., external and internal characters, holotype, ♀, slide no. 23GP070. ((A)-(C)): Adult. (A): Dorsal view. (B): Ventral view. (C): Head profile. ((D)-(F)): Female genitalia. (D): Ventro-lateral view. (E): Close-up, ovipositor, ostium, and antrum. (F): Close-up, signum. (G): Tympanal organs. Scale bars (A) and (B) = 10 mm, scale bars (C) and (F) = 0.5 mm, scale bars (D), (E), and (G) = 1 mm.

grayish-white. Forewing elongate, double as long as wide, costa straight, slightly convex at the apex. Apex and tornus rounded. Termen slightly curved. Anal border straight. Ground of the upper side grayish-white. Costa with blackish fasciae. Postmedial and subterminal lines blackish, strongly interrupted, and fading. Termen and fringe yellowish-gray. Hindwing 1.5 times as long as wide, apex rounded, costa slightly convex, anal border straight. Ground is concolorous with the ground of the forewing. Postmedial and subterminal lines are concolorous with those of the forewing. Postmedial line uninterrupted, running parallel to the termen, ranging from Rs to CuA2. Termen and fringe as for the forewing. The fore- and hindwing undersides are identical to the upper sides. Abdomen: Venter and dorsum grayish-white scaled, with the presence of intersegmental blackish spots.

Male genitalia: The male genitalia are unknown.

Female genitalia (Figures 5(D)-(F)): Papilla analis 2.8 times as long as wide, strongly chaetose. Posterior apophyses unprojected, length relative to the anterior apophyses 0.6. Anterior apophyses medially projected. Ostium split into two broadened, sclerotized, anteriad directed, short, and acuminate lobes. Digitiform extension of the posterior antrum strongly sclerotized, elongate, ranging into the middle of the ostium. Anterior antrum membranous, conical, twice as long as broad. Ductus bursae elongate, uncoiled, constantly slender, and membranous. Signum with short extensions at both ends on the longitudinal axis, concave borders near the edges on the transversal axis, length of the longitudinal axis relative to the transversal axis 0.8.

Tympanal organs (Figure 5(G)): Bulla tympani strongly invaginated. Rama tympani strongly broadened, sclerotized. Venula secunda present, slightly curved, and short. Lobuli present. Ala tympani basally with a rod-shaped, sclerotized projection. Posterior end of the fornix tympani with a triangular dilatation.

Tergo-sternal sclerite elongated.

Diagnosis (Table 2): The new species has a unique wing pattern in the Afrotropical species of the genus. It is externally closest to the Palearctic *Anania murcialis* (Ragonot, 1895) and to the species of the *Anania hortulata* (Linnaeus, 1758) species complex, which comprises the Palearctic *A. hortulata* and the Oriental *Anania shanxiensis* (Yang & Landry, 2019) [42]. With these species, the new species shares the white forewing and hindwing ground and the presence of black postmedial and subterminal lines in the forewing and hindwing. The new species is differentiated from the two species by external and internal character states (Table 2). The adults and female genitalia of the *A. hortulata* species complex are figured by Yang & Landry [42], and those of *A. murcialis* by Alipanah *et al.* [44].

The new species is easily distinguished from each of the comparative species in wing maculation, namely by the absence of an antemedial line and discocellular markings in the forewing and in the interrupted and fading fore- and hindwing postmedial lines.

Table 2. Differential character states of *A. interruptalis* sp.n., *A. murcialis*, and *A. hortulata*-complex.

	A. Interruptalis sp.n.	*A. murcialis*	*A. hortulata*-complex
External characters			
Presence of an antemedial line and a discocellular spot in the forewing (0: absent, 1: present)	0	1	1
Shape of the postmedial lines in the forewing and hindwing (0: tapered to fading, interrupted, 1: broadened, uninterrupted)	0	1	1
Shape of the postmedial line in the hindwing (0: bare from angulation, running parallel to the termen, 1: angled)	0	1	1
Presence of yellowish scales in the dorsal thorax (0: absent, 1: present)	0	0	1
Internal characters (female genitalia)			
Shape of the ductus bursae (0: uncoiled, 1: coiled)	0	0	1
Presence of a bi-lobed structure in the ostium (0: absent, 1: present, composed of lateral, anteriad-directed lobes)	1	0	1
Shape of the lateral lobes in the ostium (0: short, anteriorly acuminate, 1: oblong, anteriorly rounded)	0	-	1

Bionomics: The specimens were captured in meadows with dense vegetation in the herb and shrub layers, on the verge of a tropical forest.

Distribution: The species is exclusively known from the southern parts of the Arabian Peninsula to date—south-western Oman (province Dhofar) and south-western Saudi Arabia (province Jizan).

Etymology: The epitheton refers to an external differential character, namely the strongly interrupted postmedial forewing line.

4. Conclusion

Three new members of the tribe Pyraustini Meyrick, 1890 attributed to three different genera were newly described, namely *Dysgrammodes rubrifascialis* gen.n., sp.n., *Pyrausta flavicilialis* sp.n. and *Anania interruptalis* sp.n. The phylogenetic placement of the new genus *Dysgrammodes* sp.n. in the Pyraustini Meyrick, 1890 was discussed. The presence of the genus *Anania* Hübner, 1823 was reported as new to the entomofauna of the Arabian Peninsula. Topics of further research are the biology (abundance, food plant usage, life cycle) and the distribution patterns of the new species. *Dysgrammodes rubrifascialis* gen.n., sp.n. and *Pyrausta flavicilialis* sp.n. are known to date exclusively from south-western Saudi Arabia, whereas *Anania interruptalis* sp.n. is known from southern Oman and south-western Saudi Arabia. Furthermore, records of *Pyrausta phoenicealis* (Hübner, 1818) were reported for the first time in Saudi Arabia.

Acknowledgements

The author acknowledges Hathal Al-Dhafer (King Saud University, Riyad, Saudi Arabia) for support in the execution of the expeditions by providing the requisite permit document. The author thanks Rudi Verovnik (Biotechnical Faculty, University of Ljubljana, Slovenia), Marco Kosmiac (Advoszina, Slovenia) and Alrabee Ishag (Department of Plant Protection, King Saud University, Riad, Saudi Arabia) for the shared successful expedition to Saudi Arabia, province Jazan in September 2022.

Conflicts of Interest

The author declares no conflicts of interest.

References

[1] Mally, R., Hayden, J., Neinhuis, C., Jordal, B.H. and Nuss, M. (2019) The Phylogenetic Systematics of Spilomelinae and Pyraustina (Lepidoptera: Pyraloidea: Crambidae) Inferred from DNA and Morphology. *Arthropod Systematics and Phylogeny*, **77**, 141-204.

[2] Nuss, M., Landry, B., Mally, R., Vegliante, F., Tränkner, A., Bauer, F., Hayden, J., Segerer, A., Schouten, R., Li, H., Trofimova, T., Solis, M.A., De Prins, J. and Speidel, W. (2023) Global Information System on Pyraloidea. http://www.pyraloidea.org/index.php?id=10

[3] Maes, K.V.N. (1995) Notes on the Genera Epicorsia Hübner, 1818, Deltobotys Mu-

nroe, 1964 and Paracorsia Marion, 1959 with the Description of a New Genus. *Bulletin & Annales de la Société Royale Belge d'Entomologie*, **131**, 79-87.

[4] Maes, K.V.N. (1998) The Genus Placosaris Meyrick, 1897 in the Afrotropical Region with the Description of a New Species (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Lambillionea*, **98**, 25-28.

[5] Maes, K.V.N. (2001) *Herpetobotys* gen.n. with Three New Species from the Afrotropical Region (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Belgian Journal of Entomology*, **3**, 181-188.

[6] Maes, K.V.N. (2001) Pseudognathobotys, New Genus with Two New Species of Pyraustinae (Lepidoptera, Pyraloidea, Crambidae). *Belgian Journal of Entomology*, **3**, 195-200.

[7] Maes, K.V.N. (2001) *Cybalobotys* gen.n. with the Description of Three New Species (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Belgian Journal of Entomology*, **3**, 309-316.

[8] Maes, K.V.N. (2002) The Genus Crypsiptya in Africa with the Description of a New Species and a World Checklist of the Genus Species (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Belgian Journal of Entomology*, **4**, 27-32.

[9] Maes, K.V.N. (2005) Revisionary Notes on the Genus Algedonia with Emphasis on the Afrotropical Region (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Journal of Afrotropical Zoology*, **2**, 73-101.

[10] Maes, K.V.N. (2006) *Powysia* gen.n., a New Genus of Pyraustinae for Eastern Africa (Lepidoptera, Pyraloidea, Crambidae). *Belgian Journal of Entomology*, **8**, 139-145.

[11] Maes, K.V.N. (2006) Thivolleo, a New Genus with Two New Species from Africa (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Revue Suisse de Zoologie*, **113**, 717-726. https://doi.org/10.5962/bhl.part.80370

[12] Maes, K.V.N. (2009) A Checklist of the Pyrausta Species of Africa with Description of a New Species (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Journal of Afrotropical Zoology*, **5**, 41-51.

[13] Maes, K.V.N. (2014) New Taxa of the Subfamily Pyraustinae from the Afrotropical Region (Lepidoptera, Crambidae, Pyraustinae). *Lambillionea*, **114**, 105-112.

[14] Maes, K.V.N. (2019) Description of Four New Species of Crambidae from the Afrotropical Region (Lepidoptera, Pyraloidea, Crambidae). *Metamorphosis*, **30**, 46-50. https://doi.org/10.4314/met.v30i1.9

[15] Vári, L., Kroon, D.M. and Krüger, M. (2002) Classification and Checklist of the Species of Lepidoptera Recorded in Southern Africa. Simple Solutions, Chatswood, i-xxii, 1-385.

[16] Shaffer, J.C. and Munroe, E.G. (2007) Crambidae of Aldabra Atoll (Lepidoptera: Pyraloidea). *Tropical Lepidoptera*, **14**, 1-110.

[17] Krüger, M. (2020) Checklist of the Lepidoptera of Southern Africa. *Metamorphosis*, **31**, 1-201. https://doi.org/10.4314/met.v31i2.2

[18] De Prins, J. and De Prins, W. (2023) Afromoths Online Database of Afrotropical Moth Species (Lepidoptera). https://www.afromoths.net/

[19] Walsingham, T. and Hampson, G.F. (1896) On Moths Collected at Aden and in Somaliland. *Proceedings of the Zoological Society of London*, **1896**, 257-283. https://doi.org/10.1111/j.1096-3642.1896.tb03044.x

[20] Seizmair, M. (2021) Scirpobotys Xanthosomalis gen.nov., sp.nov.—A New Genus and Species of the Pyraustinae (Lepidoptera, Crambidae) from the Arabian Peninsula. *Trends in Entomology*, **17**, 1-8.

[21] Seizmair, M. (2022) The Presence of the Genus Pyrausta Schrank, 1802 (Lepidoptera, Crambidae, Pyraustinae) on the Arabian Peninsula-Faunistic and Taxonomic Notes with Description of a New Species. *Zoological and Entomological Letters*, **2**, 36-41. https://doi.org/10.22271/letters.2022.v2.i1a.30

[22] Seizmair, M. (2023) Contribution to the Study of the Pyraustinae Meyrick, 1890 (Lepidoptera, Crambidae) on the Arabian Peninsula: A New Species of Psammotis Hübner, 1825 from Saudi-Arabia and New Distributional Data on Four Described Species. *Journal of Applied Entomologist*, **3**, 34-41.

[23] Marion, H. (1952) Ebauche d'une classification nouvelle des Pyraustidae. *Revue Française de Lépidoptérologie*, **13**, 260-270.

[24] Maes, K.V.N. (1995) A Comparative Morphological Study of the Adult Crambidae (Lepidoptera, Pyraloidea). *Proceedings and Annals of the Belgian Entomological Royal Society*, **131**, 383-434.

[25] Leraut, P. (2005) Contribution à l'étude dc quelques genres et espèces de Pyraustinae (Lepidoptera: Crambidae). *Nouvelle Revue d'Entomologie*, **22**, 123-139.

[26] Tränkner, A., Li, H. and Nuss, M. (2009) On the systematics of Anania Hiibner, 1823 (Pyraloidea: Crambidae: Pyraustinae). *Nota Lepidopterologica*, **32**, 63-80.

[27] Maes, K.V.N. (1997) Ethiobotys, a New Genus of Pyraustinae from the Afrotropical Region (Lepidoptera: Pyraloidea: Crambidae). *Bulletin & Annales de la Société Royale Belge d'Entomologie*, **133**, 398-402.

[28] Maes, K.V.N. (2003) A World Checklist of the Genus Anania Hübner, 1823 with the Description of a New Species from Africa (Lepidoptera, Pyraloidea, Crambidae, Pyraustinae). *Bulletin & Annales de la Société Royale Belge d'Entomologie*, **139**, 94-96.

[29] Brehm, G. (2017) A New LED Lamp for the Collection of Nocturnal Lepidoptera and a Spectral Comparison of Light-Trapping Lamps. *Nota Lepidopterologica*, **40**, 87-108. https://doi.org/10.3897/nl.40.11887

[30] Robinson, G. (1976) The Preparation of Slides of Lepidoptera Genitalia with Special Reference to the Microlepidoptera. *Entomologist's Gazette*, **27**, 127-132.

[31] Munroe, E.G. and Mutuura, A. (1968) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia I. *The Canadian Entomologist*, **100**, 847-861. https://doi.org/10.4039/Ent100847-8

[32] Munroe, E.G. and Mutuura, A. (1968) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia II. *The Canadian Entomologist*, **100**, 861-868. https://doi.org/10.4039/Ent100861-8

[33] Munroe, E.G. and Mutuura, A. (1968) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia III. *The Canadian Entomologist*, **100**, 974-985. https://doi.org/10.4039/Ent100974-9

[34] Munroe, E.G. and Mutuura, A. (1968) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia IV. *The Canadian Entomologist*, **100**, 985-1001. https://doi.org/10.4039/Ent100986-9

[35] Munroe, E.G. and Mutuura, A. (1969) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia V. *The Canadian Entomologist*, **101**, 299-305. https://doi.org/10.4039/Ent101299-3

[36] Munroe, E.G. and Mutuura, A. (1969) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia VI. *The Canadian Entomologist*, **101**, 897-906. https://doi.org/10.4039/Ent101897-9

[37] Munroe, E.G. and Mutuura, A. (1969) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia VII. *The Canadian Entomologist*,

101, 1069-1077. https://doi.org/10.4039/Ent1011069-10

[38] Munroe, E.G. and Mutuura, A. (1969) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia VIII. *The Canadian Entomologist*, **101**, 1239-1248. https://doi.org/10.4039/Ent1011239-12

[39] Munroe, E.G. and Mutuura, A. (1970) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia IX. *The Canadian Entomologist*, **102**, 294-304. https://doi.org/10.4039/Ent102294-3

[40] Munroe, E.G. and Mutuura, A. (1970) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia X. *The Canadian Entomologist*, **102**, 1489-1507. https://doi.org/10.4039/Ent1021489-12

[41] Munroe, E.G. and Mutuura, A. (1970) Contributions to the Study of the Pyraustinae (Lepidoptera, Pyralidae) of Temperate East Asia X. *The Canadian Entomologist*, **103**, 173-181. https://doi.org/10.4039/Ent103173-2

[42] Yang, Z. and Landry, B. (2019) Allopatric Separation Represents an Overlooked Cryptic Species in the Anania Hortulata Species Complex (Lepidoptera: Crambidae: Pyraustinae): Congruence between Genetic and Morphological Evidence. *The Canadian Entomologist*, **151**, 163-186. https://doi.org/10.4039/tce.2018.70

[43] Slamka, F. (2013) Pyraloidea of Europe, Pyraustinae & Spilomelinae, Identification-Distribution-Habitat-Biology. Vol. 3, Frantisek Slamka, Bratislava.

[44] Alipanah, H., Asselbergs, J., Malm, T. and Slamka, F. (2023) Taxonomic Study of the Subfamily Pyraustinae (Lepidoptera: Crambidae) in Iran. *Zootaxa*, **5289**, 1-82. https://doi.org/10.11646/zootaxa.5289.1.1

[45] Asselbergs, J. (2008) Order Lepidoptera, Superfamily Pyraloidea. In: van Harten, A., Ed., *Arthropod Fauna of the UAE*, Dar Al Ummah Printing, Abu Dhabi, 469-561.

[46] Munroe, E.G. (1976) Pyraloidea Pyralidae Comprising the Subfamily Pyraustinae Tribe Pyraustini (Part 1). In: Dominick, R.B., Ed., *The Moths of America North of Mexico*, E.W. Classey Ltd. and The Wedge Entomological Research Foundation, London, 1-78.

[47] Landry, B. (2015) The Pyraustinae (Lepidoptera, Pyralidae s. l.) of the Galápagos Islands, Ecuador. *Revue Suisse de Zoologie*, **122**, 55-70.

[48] Guillermet, C. (2009) Les Hétérocères, ou papillons de nuit, de l'île de La Réunion. Volume 3. Familles des Pyralidae et Crambidae. Nature Découverte et Partage, Parc National de La Réunion.