

A contribution to the knowledge of Choreutidae in Bulgaria – first records of *Tebenna micalis* (Mann, 1857) and *Tebenna bjer kandrella* (Thunberg, 1784)

Radoslav Valkov

Abstract. Studies on the diversity of choreutid entomofauna in Bulgaria have not been reported hitherto in the entomological literature. This paper provides information on the first sightings of two species, new to Bulgaria. Appearance and behaviour of the adults, based on personal observation in the author's garden (43°28'N, 23°56'E), are described. Photographic material is also included. The paper draws attention to the importance of detailed studies of moth species that are clearly expanding their range.

Samenvatting. Studies naar de diversiteit van choreutid entomofauna in Bulgarije zijn niet uitgevoerd en gerapporteerd in de entomologische literatuur. Dit artikel geeft informatie over de eerste waarnemingen van twee soorten, nieuw voor Bulgarije; uiterlijk en gedrag van de imago's, gebaseerd op persoonlijke observatie in de tuin van de auteur (43°28'N, 23°56'E), worden beschreven. Ook is er fotomateriaal aanwezig. Het artikel vestigt de aandacht op het belang van gedetailleerde studies in de context van mottensoorten die hun verspreidingsgebied duidelijk uitbreiden.

Résumé. Des études sur la diversité de l'entomofaune Choreutidae en Bulgarie n'ont pas été menées et rapportées dans la littérature entomologique. Cet article fournit des informations sur les premières observations de deux espèces, nouvelles en Bulgarie. L'apparence et le comportement des adultes, basés sur une observation personnelle dans le jardin de l'auteur (43°28'N, 23°56'E), sont décrits. Le matériel photographique est également inclus. Le document attire l'attention sur l'importance d'études détaillées dans le contexte des espèces de papillons nocturnes qui étendent clairement leur aire de répartition.

Key words: Bulgaria — Choreutidae – *Tebenna bjer kandrella* – *Tebenna micalis*.

Valkov R.: Tsar Simeon 80A, 3200 Byala Slatina, Bulgaria. rr.valkov@gmail.com

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Introduction

Studies on the diversity of Choreutid entomofauna in Bulgaria have not been carried out and reported in entomological literature. This article provides information on the first records of two species, new to Bulgaria; summary of appearance and behaviour of the adults is based on personal observation in the author's garden at Byala Slatina (43°28'N, 23°56'E).

Materials and methods

The sightings occurred during inspections of a MV moth trap at night. Diakonoff (1986) is used as a main identification aid. Specimens were photographed *in situ* using a Nikon D70 camera, autofocus lens Nikkor 28–80mm f/3.3~5.6; Kenko 12, 20 and 36 mm macro extension tubes and a flash Nikon SB-R200. The resulting photographic output is processed with the RAW conversion software RawTherapee.

Specimens were retained for preparation.

Results

Tebenna micalis (Mann, 1857) and *Tebenna bjer kandrella* (Thunberg, 1784)

On 21.vii.2020 *Tebenna micalis* was recorded near a 125W MV moth trap in the author's garden. This is not

surprising, as it had been previously recorded visiting gardens in Denmark (Buhl *et al.* 2014). The individual was instantly recognised as a choreutid: it displayed the characteristic behaviour observed in *Choreutis nemorana* (Hübner, 1799), including erratic movement at irregular intervals, short energetic flight, typical posture at rest with body and wings tilted upwards (see Valkov 2021). It was photographed resting on a wall following a series of short flights that were caused by the disturbance by the photographer. It is not clear how the specimen reached Bulgaria.

Under the same circumstances, locality and behaviour, another interesting species, *Tebenna bjer kandrella* was found on 19.vi.2020. A notable feature of the moth was its close similarity to *T. micalis*, but *T. bjer kandrella* is distinctly the larger of the two, even when observed under field conditions. Wing pattern, and overall colour appearance are similar. There are indications in the literature that there is a possibility that the two species, irrespective of their geographical distribution, can be confused due to close similarities in external morphology (Aguar & Karsholt 2006). The forewing colour of *T. bjer kandrella* is saturated with more yellow scales. The overall appearance of the "metal" marks and the black scales surrounding them forms a pattern of alternating narrow "metal" spots, white and brown lines which follow wing curvature. In contrast, in *T. micalis* the metallic scales and the dark areas surrounding them form concentric spots, rather than the more complex linear patterns in *T. bjer kandrella* (Figs 1–4).



Fig. 1. *Tebenna micalis*, 125W MV moth trap, 21.vii.2020, Byala Slatina, Bulgaria. © Radoslav Valkov.



Fig. 2. *Tebenna bjerkandrella*, 125W MV moth trap, 19.vi.2020, Byala Slatina, Bulgaria. © Radoslav Valkov.

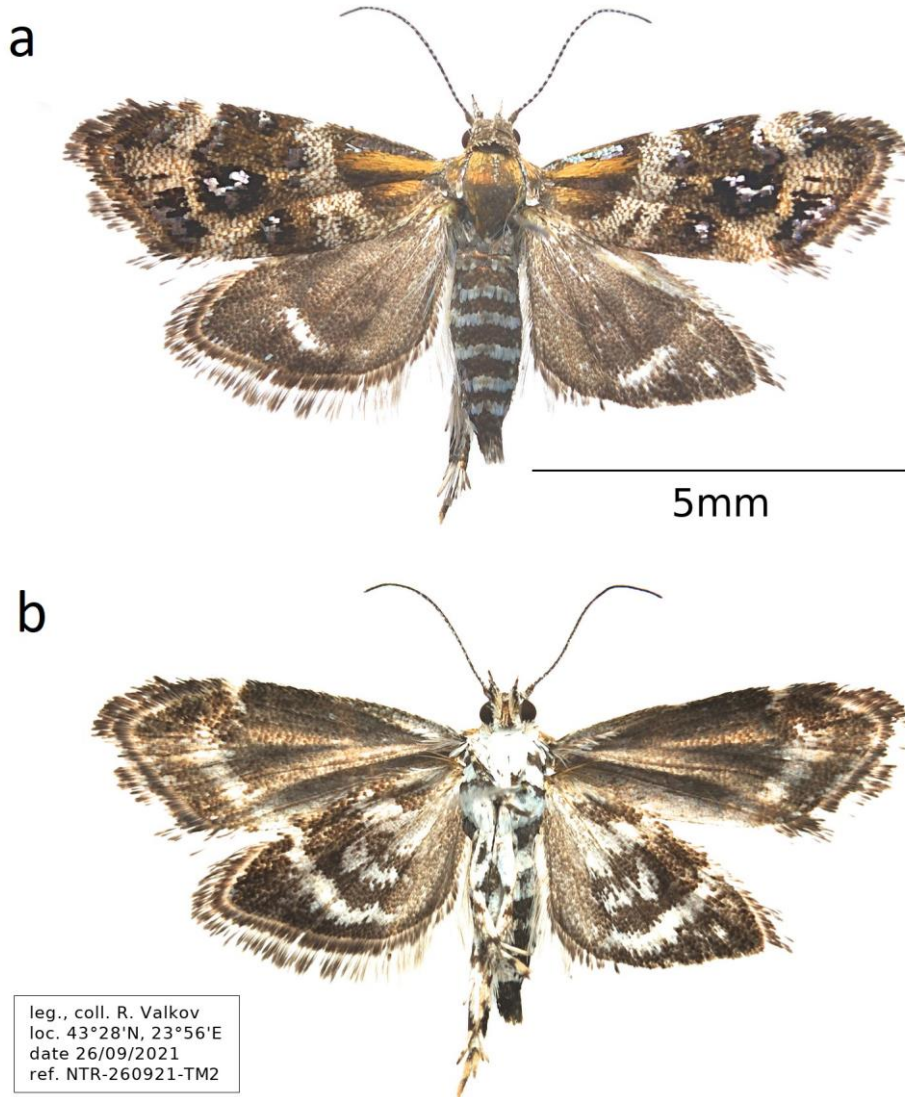


Fig 3. a, b, the most recent record of *T. micalis* for 2021 from 26.ix.2021, 125W MV moth trap, Byala Slatina, Bulgaria. © Radoslav Valkov.

Geographical expansion of the genus *Tebenna* Billberg, 1820

The underlying reasons for the expansion of these two species remain an intriguing area of research, because their occurrence in Bulgaria is not associated with any anthropogenic introduction. Notwithstanding their evident rarity in Bulgaria, their recent arrival as new visitors should be treated with caution, and it is possible that their presence could have been overlooked until recently. For example, Rimšaitė *et al.* (2005) report that

T. bjerkanrella is extending its range in Lithuania. Karsholt & Vieira (2005) show that the range expansion of *T. micalis* is not necessarily a result of human activity. The ability of *T. micalis* to temporarily establish outside its native range can be due to the presence of various *Carduus* species of thistle (Briese 1989) and *Pulicaria dysenterica* (De Prins & Meert 2016). Espinosa *et al.* (2014) report *T. micalis* larvae infesting Artichoke (*Cynara cardunculus*) in Foggia, Italy.

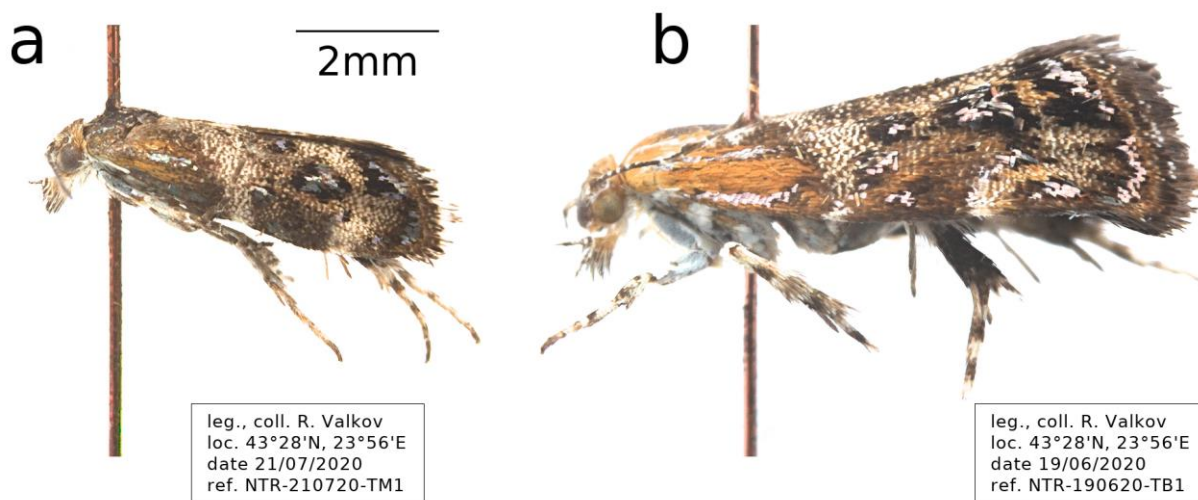


Fig 4. Lateral view of prepared specimens: a, *Tebenna micalis*; b, *Tebenna bjerkanrella*. © Radoslav Valkov.

Conclusions

Both *T. micalis* and *T. bjerkanrella* are known to be diurnal (Lennartsson & Björklund 2014; De Prins & Meert 2016). New records could be the result of man-mediated introduction including trade, or climate change (Lopez-Vaamonde *et al.* 2010). Problems could arise from the risk that any of the aforementioned species might be able to augment larval diet in search of a favourable habitat to establish. For example, *Choreutis nemorana*, a close relative of *T. micalis* and *T. bjerkanrella*, is capable of adjusting its phenology to climate conditions, even if they turn out abnormal (Valkov 2019, unpublished data). *T. micalis* is represented by a one-off infestation incident in Europe and no infestations caused by *T. bjerkanrella* have been discussed in literature to date. Interestingly, *T. bjerkanrella* is among other microlepidopteran species, associated with plants of conservation interest, including *Inula salicina* (Lennartsson & Björklund, 2014), specified as rare, for example in Namur, Belgium (De Prins & Meert 2016). *Tebenna micalis* is parasitised by the hymenopteran parasitoid *Apanteles hemara* Nixon (Fernandez-Triana 2017). A recent example of parasitoid Hymenoptera causing high mortality rate in larvae (larvae collected in nature) concerns *Choreutis nemorana* (Valkov 2019, unpublished data). *Choreutis nemorana* also shows phenological plasticity, resulting in a partially successful third generation in November in Bulgaria (Valkov 2019,

unpublished data). These findings suggest further attention is needed to address potential biological risk from choreutids. Furthermore, the underlying reason for *Tebenna* expanding their geographical range could be justified by the broad temperature tolerance of Choreutidae, as evident from the aforementioned example concerning *Ch. nemorana*.

In conclusion, a more detailed insight into the phenology of Choreutidae would allow better control of undesired infestations. As data on population dynamics is absent for Bulgaria, formulating hypotheses on the reasons for such geographical expansion remains a difficult task. However, migrations of *Tebenna micalis* have been observed in the UK and are shown to be linked with climate change (Sparks *et al.* 2007). Since this is not a new issue, it is important to adopt a multi-strand strategy regarding the depth of data collection, that is not necessarily limited to simply recording new species. Referring to the actual conservation value, utilising the possibilities of natural enemies to their full extent in order to achieve efficient pest control, and studying interactions between choreutids and plants relative to climate change in more detail, would allow better understanding of the importance of Choreutidae in the ecosystem. At present, the Bulgarian records of Choreutidae suggest there is still no evidence that these species cause economic damage, but it would be wise to study the family continuously in more detail.

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