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Article

First record of *Anarta mirabilis* Volynkin from Kazakhstan (Lepidoptera: Noctuidae: Noctuinae: Hadenini)

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Abstract
The poorly known Noctuidae species, *Anarta* (*Calocestra*) *mirabilis* Volynkin, 2014 is reposted from Kazakhstan for the first time. The species was found in Aktobe, Karaganda, Abai and East Kazakhstan Regions of the country. The distributional map and data on the species bionomics are provided.

Key words: hemi-petrophilous species, distribution, petrophytic steppes.

Introduction

Anarta Ochsenheimer, 1816 is a noctuid genus restricted to Palaearctic and Nearctic realms. The genus belongs to the tribe Hadenini of the subfamily Noctuinae (Fibiger *et al.* 2011; Zahiri *et al.* 2013) and comprises about 80 valid species subdivided into seven subgenera (Hacker 1998; Fibiger *et al.* 2011): *Trichoclea* Grote, 1883 (= *Hadula* Staudinger, 1889), *Cardiestra* Boursin, 1963, *Ptochicestra* Hacker, 1998, *Aglossestra* Hampson, 1905, *Calocestra* Beck, 1991, *Pulchrohadula* Hacker, 1998, and *Anarta* Ochsenheimer, 1816 (= *Discestra* Hampson, 1905). The group has been revised by Hacker (1998), who considered *Anarta*, *Trichoclea*, *Hadula* and *Discestra* as distinct genera, but subsequently *Trichoclea*, *Hadula* and *Discestra* have been synonymized with *Anarta* by Fibiger & Hacker (2005).

Anarta mirabilis Volynkin, 2014 has recently been described from West Mongolia and the south-eastern part of the Russian Altai Mountains (Volynkin & Ivanova 2014). Subsequently, in the course of the extensive studies of the Lepidoptera fauna of Kazakhstan, the species was found in a number of localities in

the country. The present paper contains new data on the distribution of this poorly known species in Kazakhstan and data on its bionomics as well.

Material and methods

Abbreviations of the depositories used: CAV = research collection of Anton Volynkin (Leominster, United Kingdom); KNC = research collection of Kari Nupponen (Espoo, Finland); OPC = research collection of Oleg Pekarsky (Budapest, Hungary); PGC = research collection of Pavel Gorbunov (Yekaterinburg, Russia); SMC = research collection of Sergei Melyakh (Yekaterinburg, Russia); STP = research collection of Sergey Titov (Pavlodar, Kazakhstan); ZISP = Zoological Institute of Russian Academy of Sciences (St. Petersburg, Russia). Other abbreviations used in the illustrations: HT = holotype; PT = paratype.

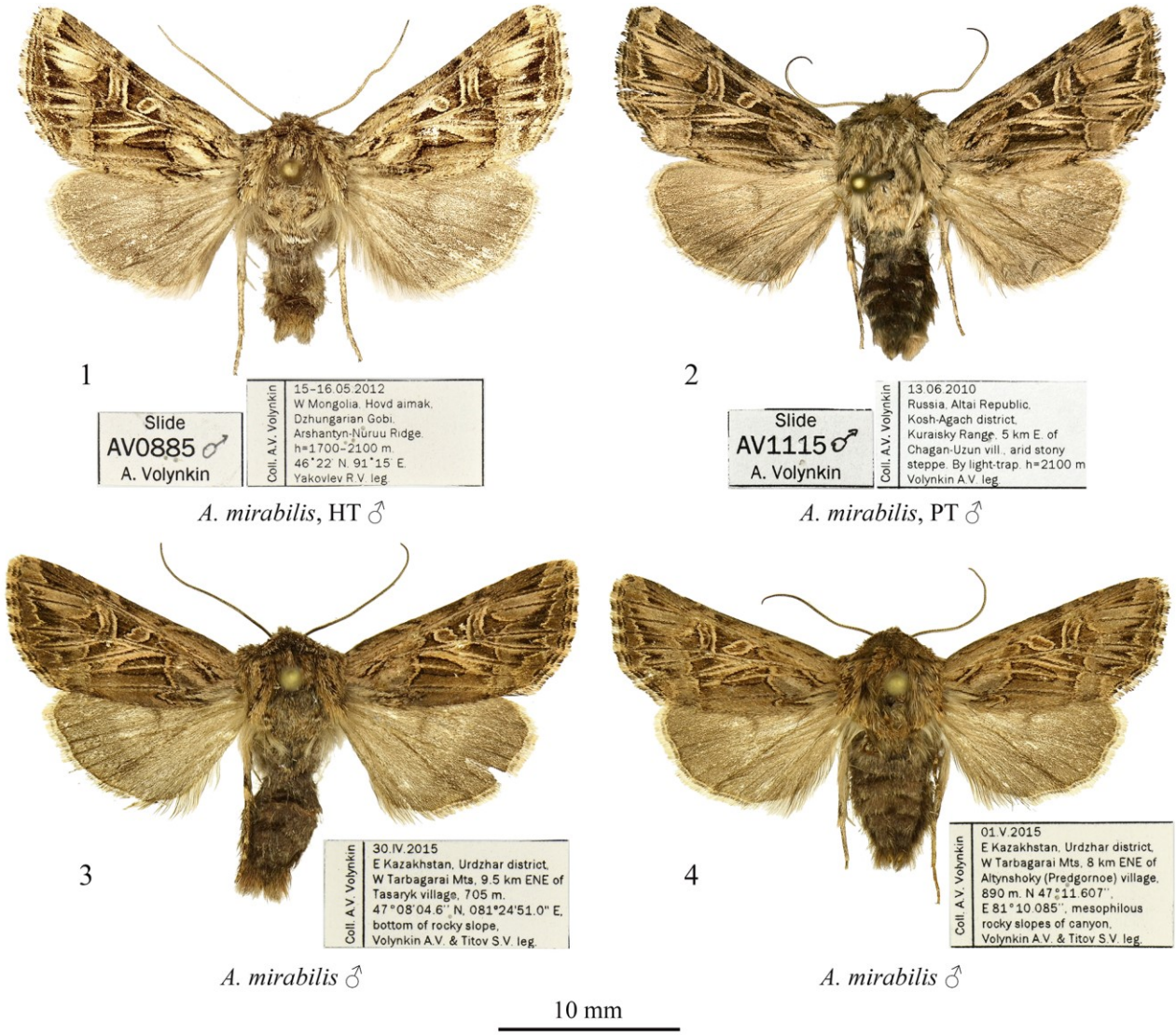
Moths were collected using light traps based on 160W and 250W mercury bulbs, and 8W black light and actinic tubes. The genitalia were dissected and mounted in Euparal on microscope slides. The photographs of adults were taken using a Nikon D3100/AF-S camera equipped with a Nikkor, 18–55 mm lens while the genitalia were imaged using the same camera attached to a microscope with an LM-scope adapter. All photographs were processed using the Adobe Photoshop CC 2018 software. The distribution map was constructed using the online resource SimpleMappr (www.simplemappr.net).

Anarta* (*Calocestra*) *mirabilis Volynkin, 2014
(Figs 1–10)

Anarta (*Calocestra*) *mirabilis* Volynkin *in* Volynkin & Ivanova, 2014, *Zootaxa*, 3784 (5): 596, figs 1–5, 11, 12, 15, 17 (Type locality: “W Mongolia, Hovd aimak, Dzhungarian Gobi, Arshantyn-Nuruu Ridge, h=1700–2100 m, 46°22'N 91°15'E”).

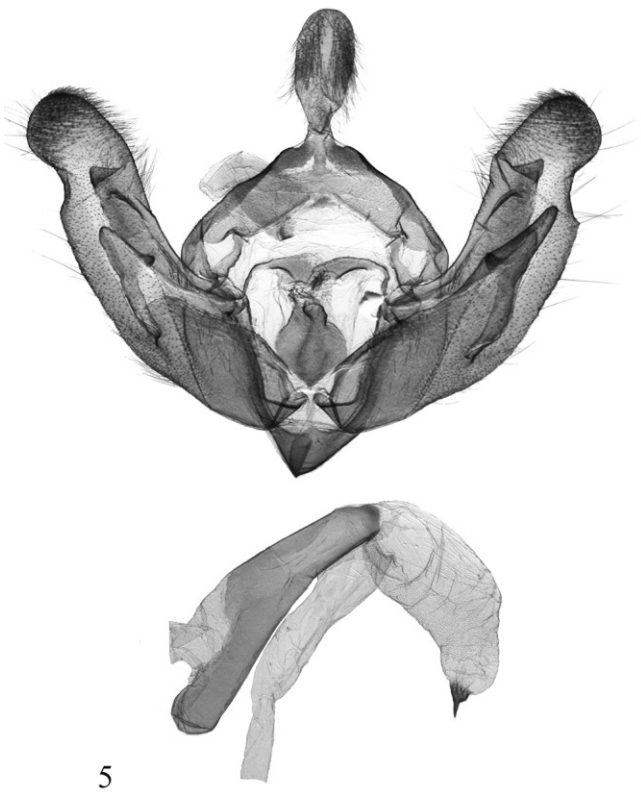
Material examined. 15 males, 3 females, West Kazakhstan, Mugodzhary Mts., 5 km W of Altyndy village, Kuchukbai Mt., 480m, 48°55'N 58°38'E, 6.V.2014, P. Gorbunov and K. Nupponen (PGC, KNC & CAV); 1 female, West Kazakhstan, Irgiz River basin, 17 km NEN of Kurylys settl., saline semidesert, 49°47'N 60°49'E, 13.V.2016, P. Gorbunov leg. (PGC); 22 specimens, Central Kazakhstan, Karaganda Province, 70 km N of Balkhash town, Konyrkulzha Mt., 700m, 47°28'N 74°43'E, 6.V.2017, P. Gorbunov leg. (PGC and OPC); 4 males, 1 female, Central Kazakhstan, Karaganda Province, Kyzylrai Mts, 6 km NW of Shylym aul, 990m, 48°27'N 75°19'E, 7.V.2017, P. Gorbunov leg.; 3 specimens, Central Kazakhstan, Karaganda Province, 55 km SE of Karkaralinsk town, Obaly Mt., 1000m, 49°00'N 75°54'E, 8.V.2015, P. Gorbunov leg. (PGC); 4 males, 6 females, 10.V.2022, Central Kazakhstan, Karaganda Reg., Aktogay District, Bektau Ata Mts, 571m, 47°21'20.18"N 74°44'42.72"E, saline steppe / riverine *Populus* woodland / *Elaeagnus-Haloxylon* thickets / rocks, S.V. Titov leg. (STP); 3 specimens, East Kazakhstan, Bakanas River valley at Barshatas settl., 670m, 48°14'N 78°37'E, 9.V.2017, P. Gorbunov leg. (SMC); 1 male, East Kazakhstan, Tarbagatai Massif, Ayaguz River bank, 1150m, 47°35'N 81°30'E, 13.V.2017, P. Gorbunov leg. (PGC); 1 male, 1 female, East Kazakhstan, Tarbagatai Mts., 10 km S of Kyzyl-Kesek vill., 900 m, 47°47'N 81°59'E, 14.V.2017, P. Gorbunov leg. (PGC); 4 males, 11 females, East Kazakhstan, Manrak Mts., 18 km SW of Tugyl vill., Kusty River, 770 m, 47°38'N 84°08'E, 15.05.2017, P. Gorbunov leg. (SMC); 1 female, East Kazakhstan, 40 km S of Karatogai village, Karaberik Mt., 530m, 48°02'N 84°36'E, 17.V.2015, P. Gorbunov leg. (PGC); 3 specimens, East Kazakhstan, 65 km SE of Semei Sity, Konsar Mt., 340m, 49°57'N, 80°54'E, 22.V.2018, P. Gorbunov leg. (PGC); 1 male, East Kazakhstan, Altai Mts, Bukombai Range, 48°18'N 84°44'E, 700m, 18.V.1992, V. & A. Lukhtanov leg. (CAV); 5 males, 30.IV.2015, East Kazakhstan, Urdzhar district, W Tarbagatai Mts, 9.5 km ENE of Tasaryk village, 705m, 47°08'04.6"N, 081º24'51.0"E, foot of rocky slope, Volynkin A.V. & Titov S.V. leg. (CAV); 3 males, 01.V.2015, East Kazakhstan, Urdzhar district, W Tarbagatai Mts, 8 km ENE of Altynshoky (Predgornoe) village, 890m, N47°11.607' E81°10.085', mesophilous rocky slopes of canyon, Volynkin A.V. & Titov S.V. leg. (CAV); 5 males, 02.V.2015, East Kazakhstan, Ayagoz district, W Tarbagatai Mts, northern spurs, 21 km E of Ayagoz town, 810m, N47°58.425' E80°43.89', meadow near rocks, Volynkin A.V. & Titov S.V. leg. (CAV); 2 males, 1 female, East Kazakhstan. East Kazakhstan Reg., Arkaly Mts., 22 km SW Bakty. 508m. 26.IV.2022, 46.54623° 082.50291° P. Egorov & R. Rakhimov leg. (CAV); 1 female, E Kazakhstan, East Kazakhstan Reg.,

Karabastau Mts., 18 km N Bakty, 707m, 29.IV.2022, 46.82657° 082.70579°, P. Egorov & R. Rakhimov leg. (CAV).



Figures 1–4. *Anarta mirabilis*: adults. Depositories of the specimens: 1 in ZISP; 2–4 in CAV.

Bionomics. The species was found in Kazakhstan in the middle and southern steppe sub-zones (Botanical geography... 2003). *Anarta mirabilis* is a local hemi-petrophilous species inhabiting petrophytic steppes and rocky steppe slopes (Figs 11–14). Only in one locality (Besoba Mt.), it was collected in the clayey desert steppe with minor rubble outcrops. Adults fly from late April to middle May and were collected together with such typical spring Lepidoptera as *Orthosia* spp., *Shargacucullia* spp., *Cucullia inderiensis* Herrich-Schäffer, 1856, *Egira anatolica* (Hering, 1933), *Athaumasta* spp., *Simyra nervosa* ([Denis & Schiffermüller], 1775), *Anarta dianthi* (Tauscher, 1809) (first generation), *Anarta trifolii* (Hufnagel, 1766) (first generation), *Cerastis rubricosa* ([Denis & Schiffermüller], 1775), *Watsonarctia deserta* (Bartel, 1902), *Eudiaphora turensis* (Erschoff, 1874), *Saturnia pavonia* (Linnaeus, 1758), *Phyllodesma ambigua* Staudinger, 1901, *Lycia hirtaria* (Clerck, 1759), *Callophrys rubi* (Linnaeus, 1758), etc. In the regions of the sympatric occurrence with the externally similar *Anarta armata* (Staudinger, 1888), the flight periods of the two species only partly overlap and *A. armata usually* gets on wing two or three weeks later than *A. mirabilis*. However, in East Kazakhstan (Karabastau and Arkaly Mts), specimens of both species in good condition were collected at the same nights. The preimaginal stages and the host plants are unknown.

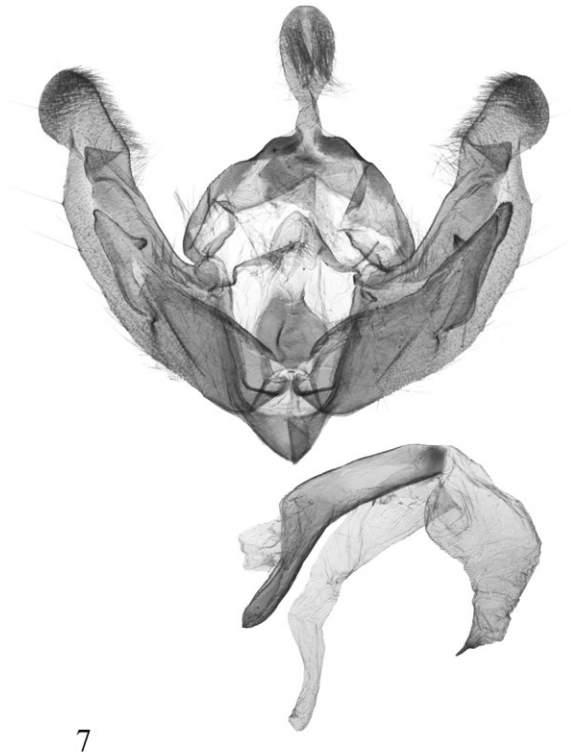


5

***A. mirabilis*, HT**
W Mongolia, Archantyn-Nuruu Ridge, slide AV0885 Volynkin

6

***A. mirabilis*, PT**
Russia, SE Altai Mts, Chuya Steppe, slide AV1115 Volynkin



7

A. mirabilis
E Kazakhstan, W Altai Mts, Bukombai Massif, slide AV1346

8

A. mirabilis
W Kazakhstan, Aktobe Reg., Mugodzhary Mts, slide AV6927

Figures 5–8. *Anarta mirabilis*: male genitalia. Depositories of the specimens dissected: 5 in ZISP; 6–8 in CAV.

Figures 9–10. *Anarta mirabilis*: living adults in nature. 9, East Kazakhstan, Ayagoz district, W Tarbagatai Mts, northern spurs, 21 km E of Ayagoz town, 810m, N47°58.425' E80°43.89', 02.V.2015 (photo by A.V. Volynkin); 10, West Kazakhstan, Mugodzhary Mts., 5 km W of Altyndy village, Kuchukbai Mt., 480m, 48°55' N 58°38' E, 6.V.2014 (photo by P.Yu. Gorbunov).

Figure 11. The habitat of *Anarta mirabilis*: East Kazakhstan, Urdzhar district, W Tarbagatai Mts, 9.5 km ENE of Tasaryk village, 705 m. 47°08'04.6"N, 081º24'51.0"E, 30.IV.2015 (photo by A.V. Volynkin).

Distribution. The species is known from Western Mongolia, south-eastern Russian Altai (Volynkin & Ivanova 2014), and Kazakhstan (Aktobe, Karaganda, Abai and East Kazakhstan Regions) (Fig. 15).

Figure 12. The habitat of *Anarta mirabilis*: East Kazakhstan, Ayagoz district, W Tarbagatai Mts, northern spurs, 21 km E of Ayagoz town, 810m, N47°58.425' E80°43.89', 02.V.2015 (photo by A.V. Volynkin).

Figure 13. The habitat of *Anarta mirabilis*: Central Kazakhstan, Karaganda Reg., Aktogay District, Bektau Ata Mts, 571m, 47°21'20.18"N 74°44'42.72"E, 10.V.2022 (photo by S.V. Titov).

Figure 14. The habitat of *Anarta mirabilis*: West Kazakhstan, Aktobe Region, Mugodzhary Mts., 5 km W of Altyndy village, Kuchukbai Mt., 480m, 48°55'N 58°38'E, 6.V.2014 (photo by P.Yu. Gorbunov

Figure 15. Distribution map of *Anarta mirabilis*.

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