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Article

New data on the distribution of *Cteipolia murina* (Ménétriés, 1848) (Lepidoptera: Noctuidae: Noctuinae: Xylenini)

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Abstract
New data on the distribution of the poorly known Noctuidae species, *Cteipolia murina* (Ménétriés, 1848) is provided, the species is reported from West, Central, Northeast, and the northern Southeast Kazakhstan, and its female genitalia are illustrated and diagnosed for the first time. The authorship of the species is discussed. The similar species, *Cteipolia isotima* Püngeler, 1914 is reported from East Kazakhstan (Saur-Tarbagatai massif) for the first time. Adults, male and female genitalia and habitats of both species are illustrated.

Key words Antitypina, Balkhash Basin, Central Kazakh Upland, Dzhungar Alatau, Saur-Tarbagatai massif, Ural, Xylenina.

Introduction

The genus *Cteipolia* Staudinger, 1896 (originally spelled as *Cteïpolia*) was erected by Staudinger (1896) to solely include the new species *C. sacelli* Staudinger, 1896 from the Issyk Kul area (Kyrgyzstan). Another species of the genus, *Cteipolia isotima* Püngeler, 1914 was described from Dzharkent (Southeast Kazakhstan) (Püngeler 1914). Almost nine decades later, the genus was downgraded to a subgenus of *Dasypolia* Guenée, 1852 by Ronkay & Zilli (1992) and subsequently revised by Ronkay *et*

al. (1995), who described four new species from Central Asia and Turkey. Two more species were described by Ronkay *et al.* (2014) from Central Asia and western Himalaya, and another new species has recently been described from East Siberia (Transbaikalia) (Gordeeva *et al.* 2023). In the latter paper, the authors upgraded *Cteipolia* to generic level and transferred it from the subtribe Antitypina to Xylenina based on the larval morphology and life strategy as well as morphological features of adults.

In their paper, besides the six species reviewed, Ronkay *et al.* (1995) also mentioned the male *Cteipolia* specimen labelled as '*murina* Ménétriés', which is externally similar to *C. isotima* and deposited in the collection of Zoological Institute (St. Petersburg, Russia). The name *murina* Ménétriés was missed by Poole (1989) in his catalogue and Ronkay *et al.* (1995) stated that "As far as we know, this taxon has never been published, therefore it is a manuscript name". However, the description of *murina* was in fact published (Ménétriés 1848) and the taxon was subsequently transferred to *Cteipolia* by Filipjev (1925), that was noticed by Kononenko (2005). *Cteipolia murina* remained known from a single holotype specimen of an uncertain geographical origin ("Sibir. Uralens.") until the senior, the second and the third authors of the present paper collected it in a number of localities in Kazakhstan as well as in the south of the Russian part of the Urals (Orenburg Region and Bashkortostan Republic). The present paper provides new data on the distribution of this little-known species and its previously unknown female is illustrated and diagnosed for the first time.

Material and methods

Abbreviations of the depositories used: BBC = collection of Balázs Benedek (Mohács, Hungary); CAV = collection of Anton Volynkin (Leominster, UK); IGEB = Institute of General and Experimental Biology of the Siberian Department of Russian Academy of Sciences (Ulan-Ude, Russia); KNC = collection of Kari Nupponen (Espoo, Finland); MC/ZSM = collection of Matjaž Černila in the Bavarian State Collection of Zoology (Zoologische Staatssammlung München, Munich, Germany); MfN = Museum of Natural History, Berlin (Museum für Naturkunde, Berlin, Germany); OPC = collection of Oleg Pekarsky (Budapest, Hungary); PGC = collection of Pavel Gorbunov (Yekaterinburg, Russia); SMC = collection of Sergey Melyakh (Yekaterinburg, Russia); STP = collection of Sergey Titov (Pavlodar, Kazakhstan); ZISP = Zoological Institute of Russian Academy of Sciences (St. Petersburg, Russia). Other abbreviations used: HT = holotype; PT = paratype; ST = syntype.

In the type label citations, each label is cited verbatim and different labels are separated by a forward slash ("/") whereas the different lines of the same label are separated by an upright slash ("|"). Any additional data are provided in square brackets. The content of the labels of additional specimens examined is edited/translated in accordance with English grammar and unified.

The genitalia were dissected and embedded in Euparal on microscope slides. The photographs of adults were taken using a Nikon D3100/AF-S camera equipped with a Sigma 105 mm F2.8 EX DG Macro OS lens, a Canon EOS 5D Mark II camera equipped with Canon EF 100 mm f / 2.8L Macro USM lens, and a Canon PowerShot A480 camera. The genitalia were imaged using a Nikon D3100/AF-S camera attached to a microscope with an LM-scope adapter. Adults in nature were imaged using a Canon 5D Mark II & Canon 5D Mark IV camera equipped with a Canon EF 100 mm f / 2.8L Macro USM lens and a Canon Speedlite 600EX-RT & YongNuo YN-24EX Macro TTL flash (Sergey Titov), and a Nikon D7100 camera equipped with a AF Micro Nikkor 105mm 1:2.8 D lens (Pavel Gorbunov). The photo of the landscape at Zhartas natural landmark (Pavlodar Region) was taken using a DJI Phantom 4 PRO drone. All photographs were processed using the Adobe Photoshop CC 2018 software.

The male and female genitalia terminology follows Fibiger (1997) and Kononenko (2010). The distribution map was constructed using the online resource SimpleMappr (www.simplemappr.net).

Results

Cteipolia murina (Ménétriés, 1848)
(Figs 1–4, 11–14, 17, 18, 22)

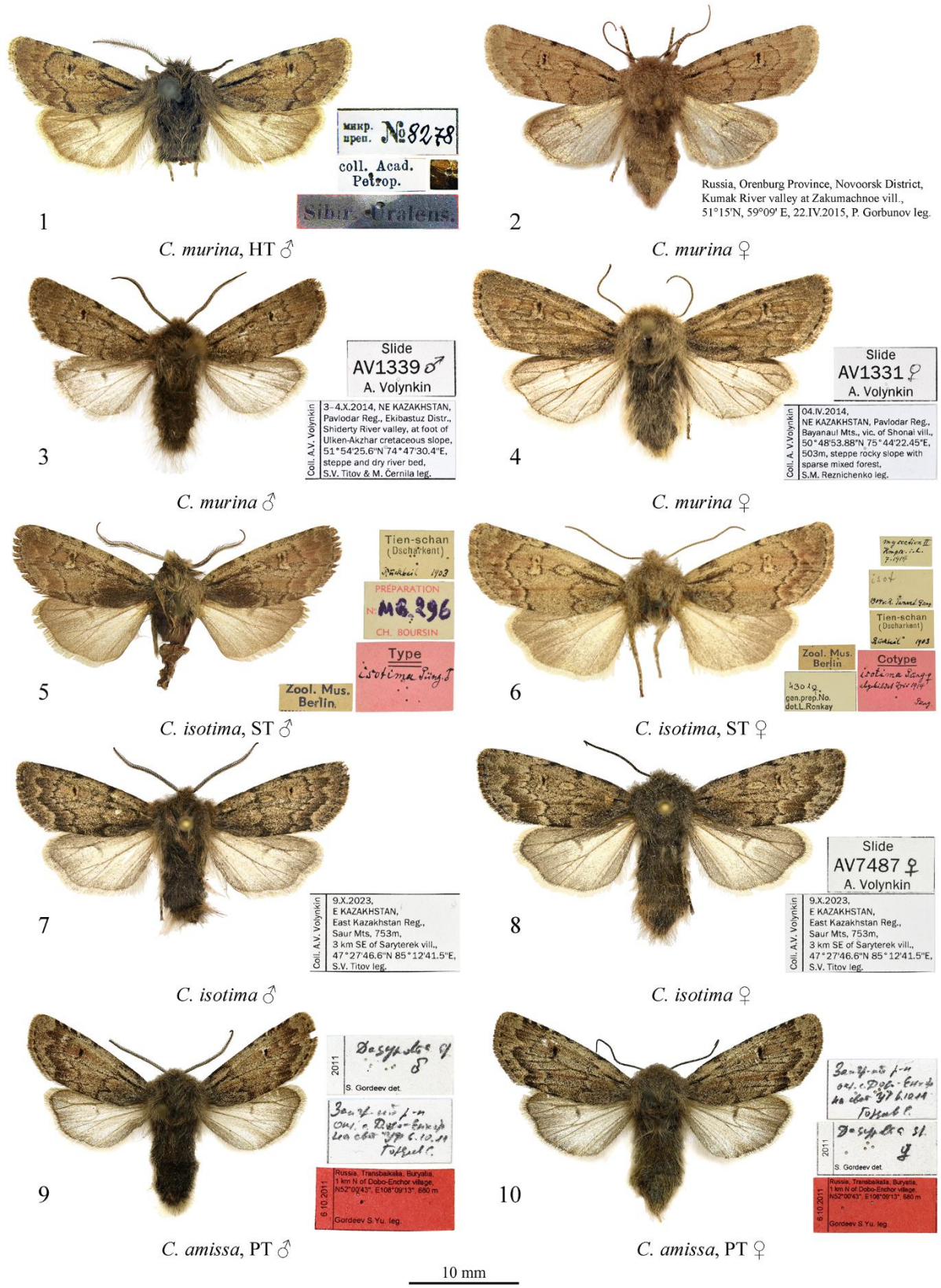
Diloba murina Ménétriés, 1848, *Mémoires de l'Académie impériale des sciences de St.-Pétersbourg*, 4: 699, pl. 6: 8 (Type locality: "les steppes au delà de l'Oural" ["the steppes beyond the Urals"]).

Type material examined. **Holotype** (by monotypy) (Figs 1, 17): male, “Sibir. Uralens.” / “coll. Acad. | Petrop.” / “микр. [micr.] | преп. [prap.] №8278” / square piece of golden foil, slide No.: 0386 Matov (ex prep. No. 8278) (ZISP).

Additional material examined. **RUSSIA**: 1 female, Orenburg Province, Novoorsk District, Kumak River valley at Zakumachnoe vill., 51°15'N, 59°09'E, 22.IV.2015, P. Gorbunov leg. (KNC); 1 female, Bashkortostan Republic, Khaybullinsky District, Tanalyk River basin at Adel’ vill., 51°53'N 58°32'E, 17.IV.2022, P. Gorbunov & V. Zurilina leg. (PGC); 1 male, same data as previous, 9.X.2022 (PGC); **KAZAKHSTAN**: 1 male, West Kazakhstan, Aktobe Province, 15 km NE of Emba town, chalk hills, 48°55'N, 58°18'E, 11.X.2013, P. Gorbunov leg. (KNC); 1 female, West Kazakhstan, Mugodzhary Mts, 5 km W of Altyndy vill., 480m, 48°55'N, 58°38'E, 12.X.2013. K. Nupponen leg. (KNC); 4 females, West Kazakhstan, Irgiz River basin, Aiyrkyzyl Sands, 24 km W of Irgiz settl., 48°37'N 60°50'E, 8.IV.2019, P. Gorbunov leg. (BBC, SMC); 1 male, Karaganda Region, Asyl, 11.X.1936 (ZISP); 1 male, Central Kazakhstan, Karaganda Province, 70 km N of Balkhash town, Konyrkulzha Mt., 680m, 47°27'N, 74°43'E, 7.X.2014. P. Gorbunov leg. (OPB); 2 females, 04.IV.2014, NE Kazakhstan, Pavlodar Reg., Bayanaul Mts., vic. of Shonai vill., 50°48'53.88"N 75°44'22.45"E, 503m, steppe rocky slope with sparse mixed forest, S.M. Reznichenko leg. (STP, CAV); 2 females, 12.IV.2016, NE Kazakhstan, Pavlodar Region, Zhartas natural landmark, 51°38'7.49"N 74°39'54.86"E, S.V. Titov & M. Černila leg. (STP, MC/ZSM; 10 males, 3–4.X.2014, NE Kazakhstan, Pavlodar Reg., Ekibastuz Distr., Shiderty River valley, at foot of Ulken-Akzhar cretaceous slope, 51°54'25.6"N 74°47'30.4"E, steppe and dry river bed, S.V. Titov & M. Černila leg. (STP, MC/ZSM, CAV); 1 female, same data as previous but 11.IV.2016 (STP); 1 female, NE Kazakhstan, Pavlodar Reg., Ekibastuz Distr., western shore of Shiderty reservoir, 51°48'2.09"N 74°35'26.55"E, steppe, S.V. Titov leg. (STP); 1 male, 1 female, same data as previous but 17.IV.2017 (STP); 2 males, 7.X.2014, SE Kazakhstan, Almaty Reg., Aksu Distr., SE Balkhash Basin, Kushikzhal Sands, 2.5 km W of Matay, 440m, 45°5322.1"N 78°41'01.9"E, M. Černila & S.V. Titov leg. (CAV).

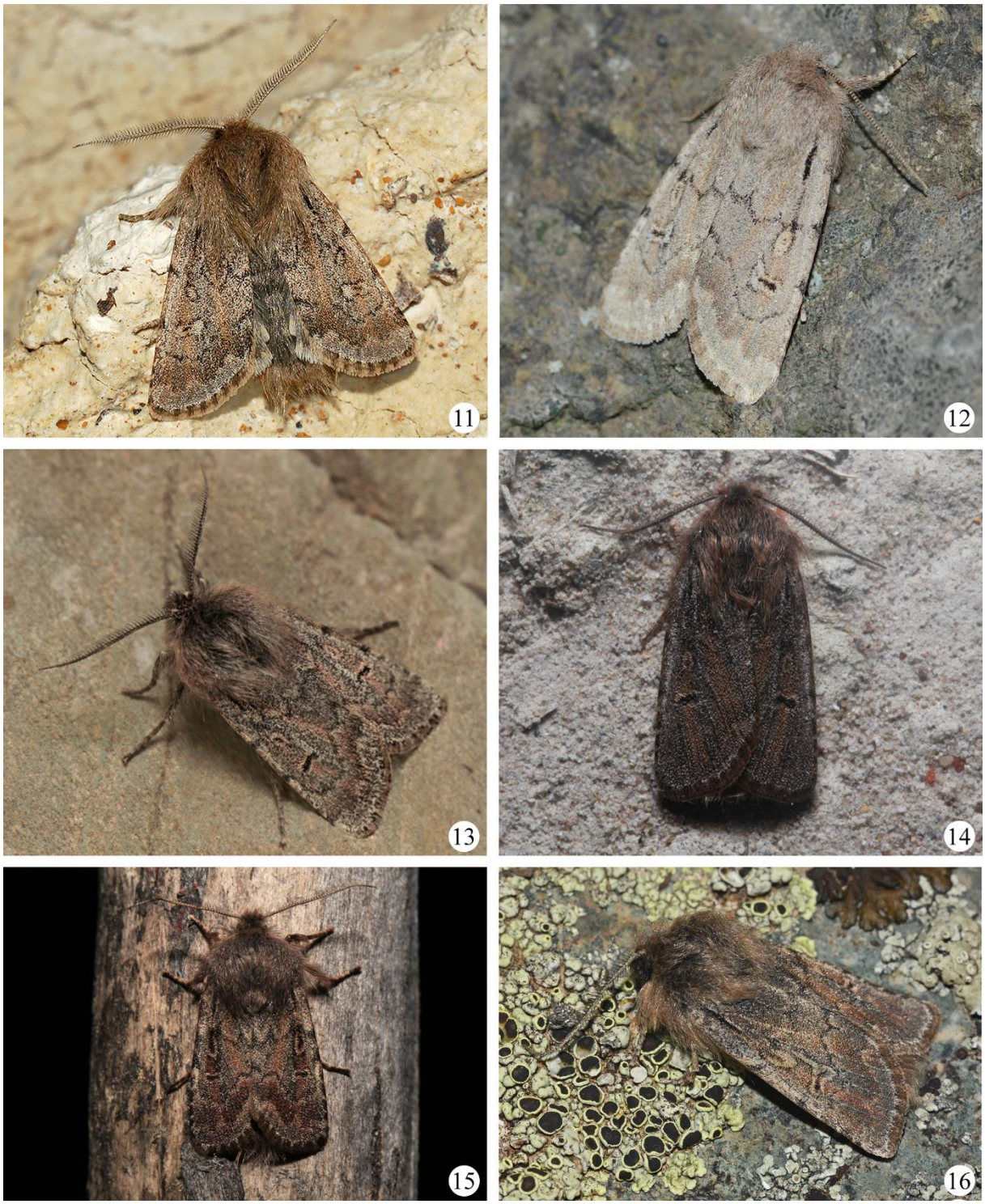
Notes. **(1)** In the 12th volume of the fundamental book series ‘Noctuidae Europaeae’, Fibiger *et al.* (2010) erroneously attributed the authorship of *C. murina* to Eduard Eversmann (as *Dasypolia* (*Cteipolia*) *murina* (Eversmann, 1848)). However, *Orthosia murina* Eversmann, 1848 described from the south-western foothills of Ural Mountains is a junior subjective synonym of *Agrotis cinerea* ([Denis & Schiffermüller], 1775), and a junior secondary homonym of *Phalaena noctua murina* Goeze, 1781 (Poole 1989). **(2)** The type locality of the species, “the steppes beyond the Urals” (Ménétriés 1848) or “Sibir.[ia] Uralens.[is]” (according to the label) most probably is situated in the east of the Orenburg or Chelyabinsk Region. **(3)** The species was described from a single specimen (Ménétriés 1848), which should be treated as the holotype by monotypy. **(4)** *Cteipolia murina* is most similar to *C. isotima* known from Dzhungar Alatau and Saur-Tarbagatai mountain massifs (Kazakhstan) and *C. amissa* Gordeev, Gordeeva, G. Ronkay & L. Ronkay, 2023 recently described from Transbaikalia (Russia). The male genitalia structures of this species complex are very uniform and the male clasping apparatus appears to be poorly informative for species identification. In contrary, the female genitalia structures are diagnostic. The female genitalia of *C. murina* display minor but recognisable differences from *C. isotima* in their signa bursae size and shape therefore these two taxa are treated as distinct species in the present paper. However, the range of variability of their female copulatory organs remains unstudied and it is still possible that *C. isotima* is conspecific to *C. murina*. Clarification of this question requires the examination of more extensive materials of both sexes from various localities along with molecular analysis.

Diagnosis. *Cteipolia murina* is externally quite polymorphic (Figs 1–4, 11–14) and is very similar to *C. isotima* (Figs 5–8, 15, 16), from which it differs only in its slightly less contrast forewing pattern. The male genitalia of the two taxa (Figs 17–20) are almost alike and the only structure displaying a recognisable difference is the uncus, which is somewhat longer in *C. murina*. However, it is currently impossible to say if the length of uncus is stable and can be used as reliable diagnostic character. Compared to *C. isotima* (Fig. 23), the female genitalia of *C. murina* (Fig. 22) have a broader posterior (narrow) section of the corpus bursae, shorter signa bursae, and a broader appendix bursae. Unlike *C. murina* and *C. isotima*, *C. amissa* (Figs 9, 10) has a somewhat broader distal section of the valva in the male genitalia (Fig. 21), and a broader antrum and considerably longer signa bursae in the female genitalia (Fig. 24).

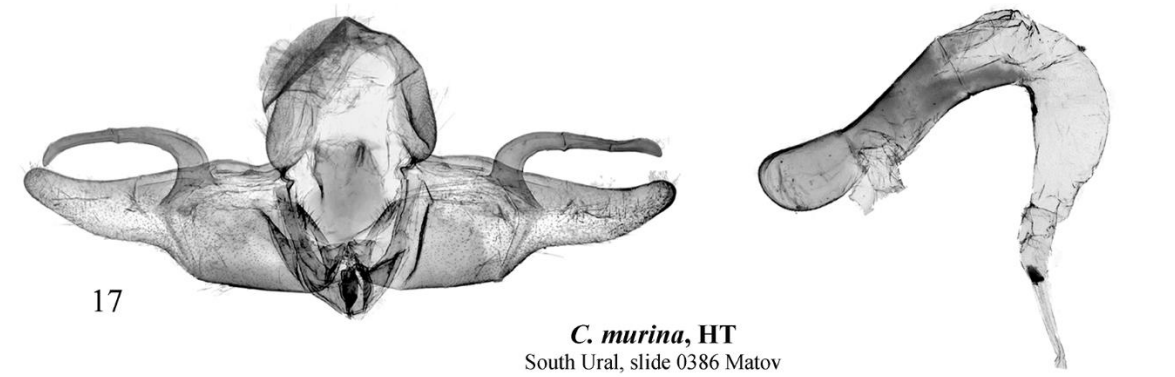


Figures 1–10. *Cteipolia* spp.: adults, dorsal view. Depositories of the specimens: 1 in ZISP; 2 in KNC; 3, 4, 7 and 8 in CAV; 5 and 6 in MfN; 9 and 10 in IGEB (photo by S. Gordeev).

Distribution. The species is found from the Russian part of the southern Ural as well as West, Central and Northeast Kazakhstan (Fig. 25).

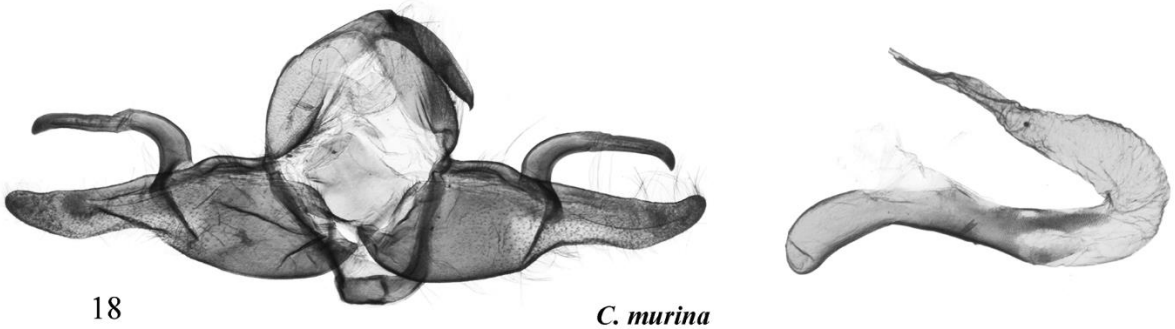


Figures 11–16. *Cteipolia* spp.: adults in nature. 11, *C. murina*, male, Kazakhstan, Aktobe Province, 15 km NE of Emba town, 11.X.2013 (photo by P. Gorbunov); 12, *idem.*, female, Russia, Orenburg Province, Kumak River valley at Zakumachnoe vill., 22.IV.2015 (photo by P. Gorbunov); 13, *idem.*, male, NE Kazakhstan, Pavlodar Reg., Ulken-Akzhar, 3.X.2014 (photo by S.V. Titov); 14, *idem.*, same locality as previous, 3.X.2014 (photo by S.V. Titov); 15, *C. isotima*, SE Kazakhstan, Dzhungar Alatau, Cherkasay Valley, 4.X.2015 (photo by S.V. Titov); *idem.*, 16, male, Kazakhstan, Tarbagatai Mt. Range, Bazar River bank, 6.X.2018 (photo by P. Gorbunov).



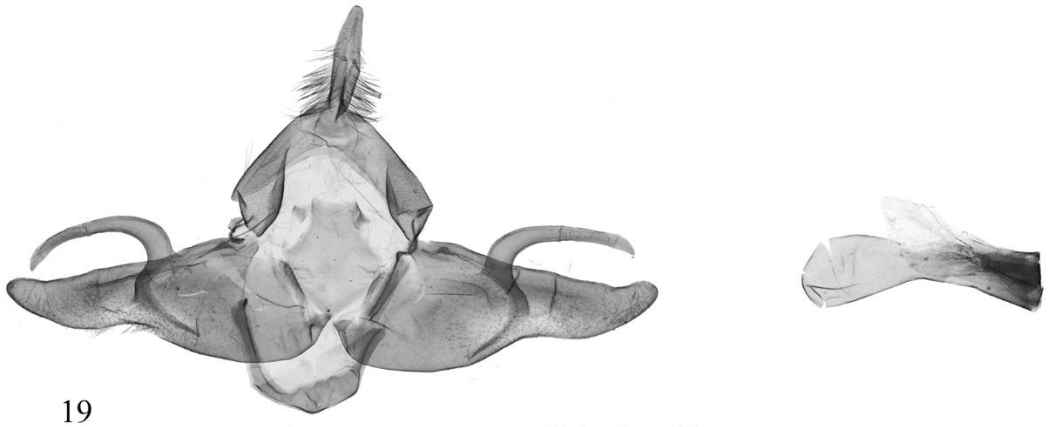
17

***C. murina*, HT**
South Ural, slide 0386 Matov



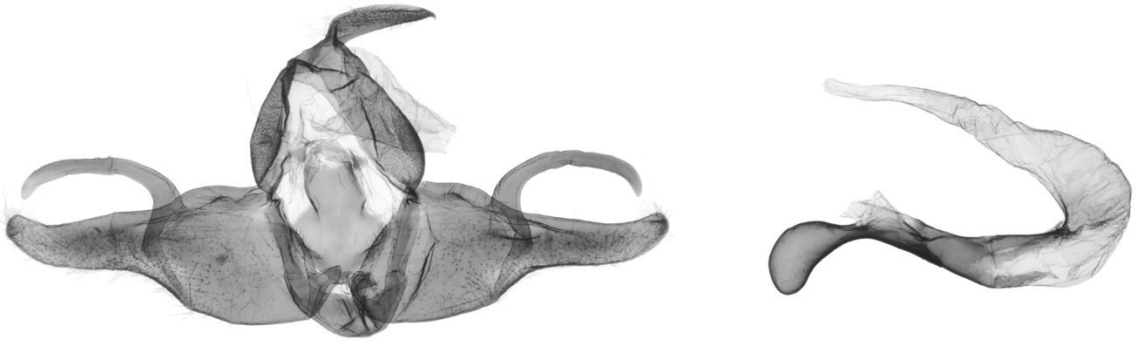
18

C. murina
NE Kazakhstan, Ak Zhar, slide AV1337 Volynkin



19

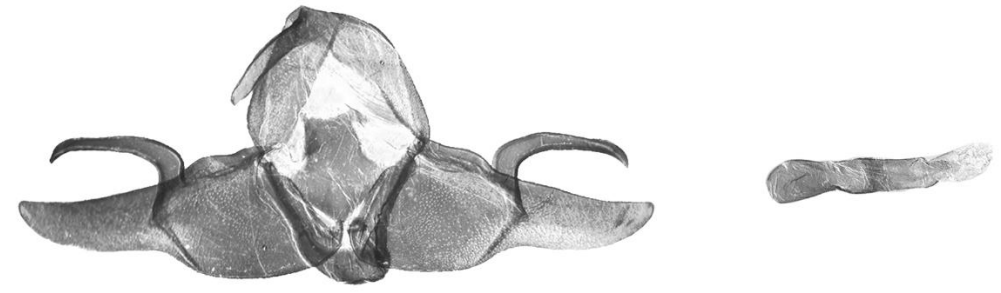
***C. isotima*, ST**
SE Kazakhstan, Dzharkent, slide M.B. 296 Boursin



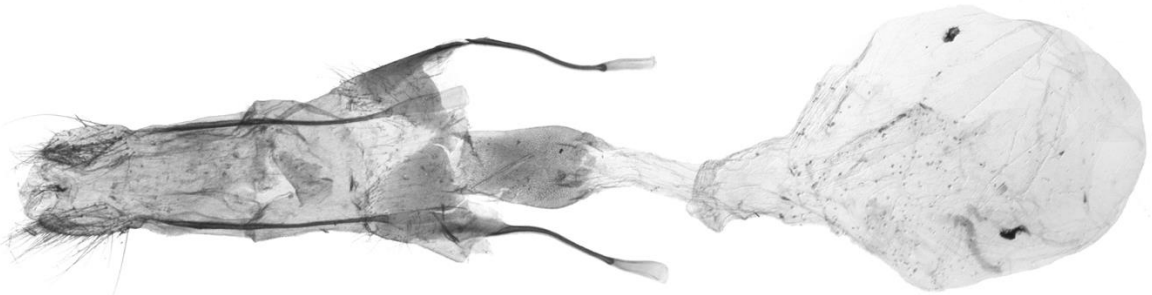
20

C. isotima
E Kazakhstan, Saur Mts, slide AV7486 Volynkin

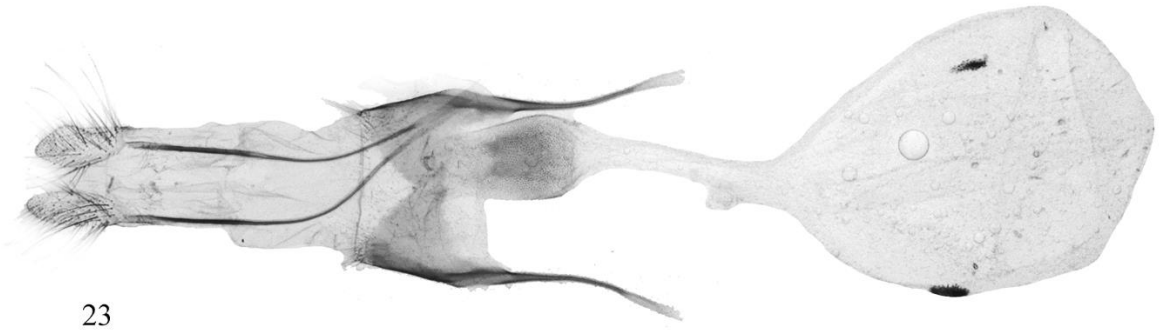
Figures 17–20. *Cteipolia* spp.: male genitalia, ventral view. Depositories of the specimens dissected: 17 in ZISP; 18 and 20 in CAV; 19 in MfN.



21 ***C. amissa*, PT**
Russia, Transbaikalia, Republic of Butyatia



22 ***C. murina***
NE Kazakhstan, Bayanaul Mts, slide AV1331 Volynkin



23 ***C. isotima*, ST**
SE Kazakhstan, Dzharkent, slide RL4301 Ronkay

24 ***C. amissa*, PT**
Russia, Transbaikalia, Republic of Butyatia

Figures 21–24. *Cteipolia* spp.: male (21) and female (22–24) genitalia, ventral view. Depositories of the specimens dissected: 21 and 24 in IGEB (photo by T. Gordeeva); 22 in CAV; 23 in MfN.

Bionomics and behavior. *Cteipolia murina* is found in a number of diverse habitats and landscapes (Figs 26–32). Most specimens were collected in stony steppes or southern steppes (including steppe and rocky slopes in Bayanaul Mountains) (Figs 26–29). In some places (e.g., Emba River valley and Ulken-Akzhar slope in Shidery River valley) the species is associated with vast chalk outcrops (Figs 30, 31).

In the Irgiz River basin, the moths were collected in hummocky sands overgrown with sparse bushes and low trees of the genera *Calligonum*, *Salix*, *Halimodendron*, *Atrophaxis*, and *Elaeagnus* (Fig. 32). Adults of both sexes fly in October; females overwinter and are active in March–April. In the Shidery River valley and at the Ulken-Akzhar cretaceous slope, within a radius of ca. 3 meters from the actinic light traps equipped with 8W tubes, adults were observed at night (ca. 23:00) actively running along rocks and chalk outcrops, apparently preferring walking to flying. In contrary, adults attracted to the MV light remained motionless for a long time.

Figure 25. Distribution map of *Cteipolia murina* and *C. isotima* in Kazakhstan and Russia.

Figure 26. Habitat of *Cteipolia murina*: Russia, Orenburg Province, Novoorsk District, Kumak River valley, 22.IV.2015 (photo by P. Gorbunov).

Figure 27. Habitat of *Cteipolia murina*: Russia, Bashkortostan Republic, Tanalyk River basin at Adel' village, 18.IV.2022 (photo by P. Gorbunov).

Figure 28. Habitat of *Cteipolia murina*: Central Kazakhstan, Karaganda Province, 70 km N of Balkhash town, Central Kazakh Upland, Konyrkulzha Mt., 7.X.2014 (photo by P. Gorbunov).

Figure 29. Habitat of *Cteipolia murina*: NE Kazakhstan, Pavlodar Region, Central Kazakh Upland, Zhartas natural landmark (photo by T. Abylkhasanov).

Figure 30. Habitat of *Cteipolia murina*: West Kazakhstan, Aktobe Province, 15 km NE of Emba town, 11.X.2013 (photo by P. Gorbunov).

Figure 31. Habitat of *Cteipolia murina*: NE Kazakhstan, Pavlodar Reg., Central Kazakh Upland, Ulken-Akzhar, 3.X.2014 (photo by S.V. Titov).

Figure 32. Habitat of *Cteipolia murina*: West Kazakhstan, Irgiz River basin, Aiyrkyzyl Sands, 8.IV.2019 (photo by P. Gorbunov).

Cteipolia isotima Püngeler, 1914
(Figs 5–8, 15, 16, 23)

Cteipolia isotima Püngeler, 1914, *Deutsche entomologische Zeitschrift Iris*, 28: 41, pl. 2, fig. 11 (Type locality: [SE Kazakhstan, foothills of Dzhungar Alatau Range] "Tien-shan, Dscharkent").

Type material examined. **Syntypes**: male (Figs 5, 19), "Tien-schan | (Dscharkent) | Rückbeil 1903" / pink label "Type | isotima Püng. ♂" / "Zool. Mus. | Berlin" / "Préparation | № M.B. 296 | Ch. Boursin" (MfN); female (Figs 6, 20), "Tien-schan | (Dscharkent) | Rückbeil 1903" / pink label "Cotype | isotima Püng. ♀ | abgebildet Iris 1914 / Püng." / "isot / 1904 v. R. Tancré Püng." / "my section II | Hmpsn. i. l. | 7-1914" / "Zool. Mus. | Berlin" / "4301♀ | gen.prep.No. | det.L.Ronkay" (MfN).

Additional material examined: 1 male, 4.X.2015, SE Kazakhstan, Almaty [currently Zhetysu] Region, Dzhungar Alatau, Cherkasay Valley, 1580m, 44°46'33"N 78°55'59"E, S.V. Titov & M. Černila leg. (CAV); 2 males, 05.X.2023, E Kazakhstan, Monrak Ridge, N slope, 24 km W of Karabulak vill., N47°33'54.0" E84°21'18.4", 735m, gorge with scree slopes, S.V. Titov leg. (CAV); 5 males, 2 females, 9.X.2023, E Kazakhstan, East Kazakhstan Reg., Saur Mts, 753m, 3 km SE of Saryterek vill., 47°27'46.6"N 85°12'41.5"E, S.V. Titov leg. (CAV); 1 male, East Kazakhstan, Saur Mts, 20 km S of Zaisan town, Bol'shoi Zhemenei River, 1600m, 47°17'N 84°54'E, 5.X.2018, P. Gorbunov leg. (PGC); 1 female, same data as previous but S. Melyakh leg. (SMC); 2 males, East Kazakhstan, Manrak Mts, 20 km SW of Tugyl settl., Kusty River bank, 900m, 47°34'N 84°04'E, 6.X.2018, P. Gorbunov leg. (BBC); 5 males, East Kazakhstan, Tarbagatai Mt. Range, Bazar River bank, 32 km S of Kyzykesik, 1000m, 47°35'N 82°04'E, 7.X.2018, P. Gorbunov leg. (BBC, SMC).

Diagnosis. See above under *C. murina*.

Figure 33. Habitat of *Cteipolia isotima*: SE Kazakhstan, Zhetysu Region, Dzhungar Alatau, Cherkasay Valley (photo by S.V. Titov).

Distribution. Currently known from Southeast (Püngeler 1914) and East Kazakhstan (present study) (Fig. 25). Both the specimens from the south-eastern Balkhash Basin examined are males and it is currently impossible to identify them with sure as they may belong to *C. murina*. In the present paper, those specimens are provisionally assigned with *C. isotima* but the identification of this population

requires confirmation through the study of female genitalia and molecular methods. In the East Kazakhstan, the known species' range reaches the Saur Mountains and the occurrence of *C. isotima* in the Altai Mountains is also expected but there is still no material collected in that region yet. In the Russian part of the Altai Mountains (Altai Republic, Ongudai District), a male specimen probably also belonging to *C. isotima* was observed and imaged (K. Romanov, pers. comm., and https://www.inaturalist.org/observations/70874914). Unfortunately, it is currently impossible to identify the Russian Altai population due to the lack of the material available for examination.

Figure 34. Habitat of *Cteipolia isotima*: East Kazakhstan, East Kazakhstan Province, Monrak Ridge, 05.X.2023 (photo by S.V. Titov).

Figure 35. Habitat of *Cteipolia isotima*: East Kazakhstan, East Kazakhstan Reg., Saur Mts, 753m, 3 km SE of Saryterek vill., 9.X.2023 (photo by S.V. Titov).

Bionomics and behavior. In Dzhungar Alatau and Saur-Tarbagatai massifs, *C. isotima* is found in gorges with steppe and rocky slopes sparsely overgrown with various bushes. (Figs 33–35). In the south-eastern Balkhash Basin, *C. isotima* was found in a sand desert overgrown with sparse bushes and

low trees of the genera *Halimodendron*, *Calligonum*, *Haloxylon*, *Tamarix*, *Populus* and *Elaeagnus* (Fig. 36). Adults of both sexes fly in October; by analogy with other species of the genus, females apparently overwinter and are active in March–April. In the Saur-Tarbagatai massif, the peak activity of adult individuals was observed by the senior author of the present paper in the evening twilight, all the specimens were attracted to the light of the MV bulb while no one specimen was collected with use of the traps equipped with 8W actinic tubes. The aforementioned male from the Russian part of the Altai Mountains was observed on 8 March 2021 flying in the day time during a thaw (K. Romanov, pers. comm.). Due to the lack of observations made during the thaw in other habitats of *Cteipolia*, it is impossible to say if this remarkable behavior was an accident due to the lack of snow cover (winters at the observation area in the central Russian Altai are usually snowless) or (less likely) is typical of the genus also in areas with established snow cover.

Figure 36. Habitat of *Cteipolia murina*: SE Kazakhstan, Almaty Reg., SE Balkhash Basin, Kushikzhal Sands, 7.X.2014 (photo by M. Černila).

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