

On the rediscovery of *Ethmia discrepitella* (Rebel, 1901) with remarks on brachyptery in females of *Ethmia* (Ethmiidae)

DMITRY F. SHOVKOON

Department of Biology, Samara State University, Academica Pavlova street, 1, 443011 Samara, Russia;
e-mail: shovkoon@mail.ru

Abstract. Brachyptery in the female of *Ethmia discrepitella* (Rebel, 1901) is discussed. New data on the flightless female and a distribution map for the species are given. A lectotype of *Psecadia discrepitella* Rebel, 1901 is designated and transferred from the collection of St. Petersburg State University to the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia). This male and the male and female paralectotypes are figured. The female genitalia are described.

Резюме. В статье рассмотрен уникальный для семейства Ethmiidae факт брахиптерии самок *Ethmia discrepitella* (Rebel, 1901). Приводятся новые данные по строению гениталий и жилкованию крыльев нелетающей самки, а также по распространению этого малоизвестного вида. Обозначены типовые экземпляры, найденные при изучении коллекции Санкт-Петербургского государственного университета (переданные впоследствии на хранение в Зоологический Институт Российской Академии Наук). Приводятся изображения типовых экземпляров и гениталий паролектотипа.

Introduction

At the end of March 2005 I collected a couple of unusual *Ethmia* specimens *in copula* during an expedition to the south of the Orenburg Region, in the Dombarovka district (Russia). Moths were characterized by distinct sexual dimorphism; female had strongly shortened forewings and rudimentary hindwings. Copulation was observed in the evening, on a dry stem of wormwood (*Artemisia* sp.), and lasted more than one hour. Later, the two moths were identified as *Ethmia discrepitella* (Rebel, 1901) (Figs 1–2). The description of the species was based on two males and one female collected at the end of April in the Orenburg province in 1892. The sexual dimorphism of the species was mentioned by Rebel (1901a) himself and the detailed description of the brachypterous female was originally given as follows (here translated): “... *Psecadia Discrepitella* n sp. ♂ ♀. I am giving here also a description of an unusual sexual dimorphism of a European species ... It has rudimentary forewings with strongly concave outer margin but weakly pointed apex, and cilia come from here directly to terminal angle. Also, both black points are distinct here, but one at the end of the middle cell comes much further outwards. Hind wings are reduced to very small rounded lobes (about 1 mm long and 0.5 mm wide). Expanse 7.3–8.5 mm, female 2.8 mm. Size ♂ 15–18, ♀ 7 mm...”. We can add to the description that the abdomen of the female has yellow intersegmental lateral spots.

Rebel (1901a) also writes that he didn't keep the type specimens; he had borrowed the moths from St. Petersburg collector Mr. Hansen and they were probably returned back to Russia.

No indications on the whereabouts of the type specimens of *Ethmia discrepitella* were given also in both large revisions of the Ethmiidae by Sattler (1967) and Danilevsky (1980). Sattler (1967) specified that the female of the species was known only from

the description of Rebel (1901a). Danilevsky (1980) also characterized the sexual dimorphism of the species and the presence of rudimentary wings in its female, but there were no references to specimens studied and therefore it is not quite clear if Danilevsky really saw any or just cited the original description of Rebel.

In searching for the types of *Ethmia discrepittella* I examined all material of this species kept in the collection of the Zoological Institute of the Russian Academy of Sciences (ZISP, St. Petersburg, Russia). Along with my predecessors, I found no type specimens originating from the Orenburg Region in this Institute. However, I discovered three specimens of the species in the collection of St. Petersburg State University. They were 1 brachypterous ♀ and 2 ♂ (Figs 3–5) collected on 28–29th April 1892 in the south of the Orenburg Region («Orenb-g. mer.»). Thus, I have no doubts that these specimens were used by Rebel for describing the species and therefore shall be considered syntypes of *Psecadia discrepittella*. All these specimens were transferred from St. Petersburg State University to ZISP. A lectotype of *Psecadia discrepittella* is here designated for the purpose of nomenclatorial stabilization.

Abbreviations

ZISP Zoological Institute of Russian Academy of Sciences (St. Petersburg, Russia)

Ethmia discrepittella (Rebel, 1901)

(Figs 1–3)

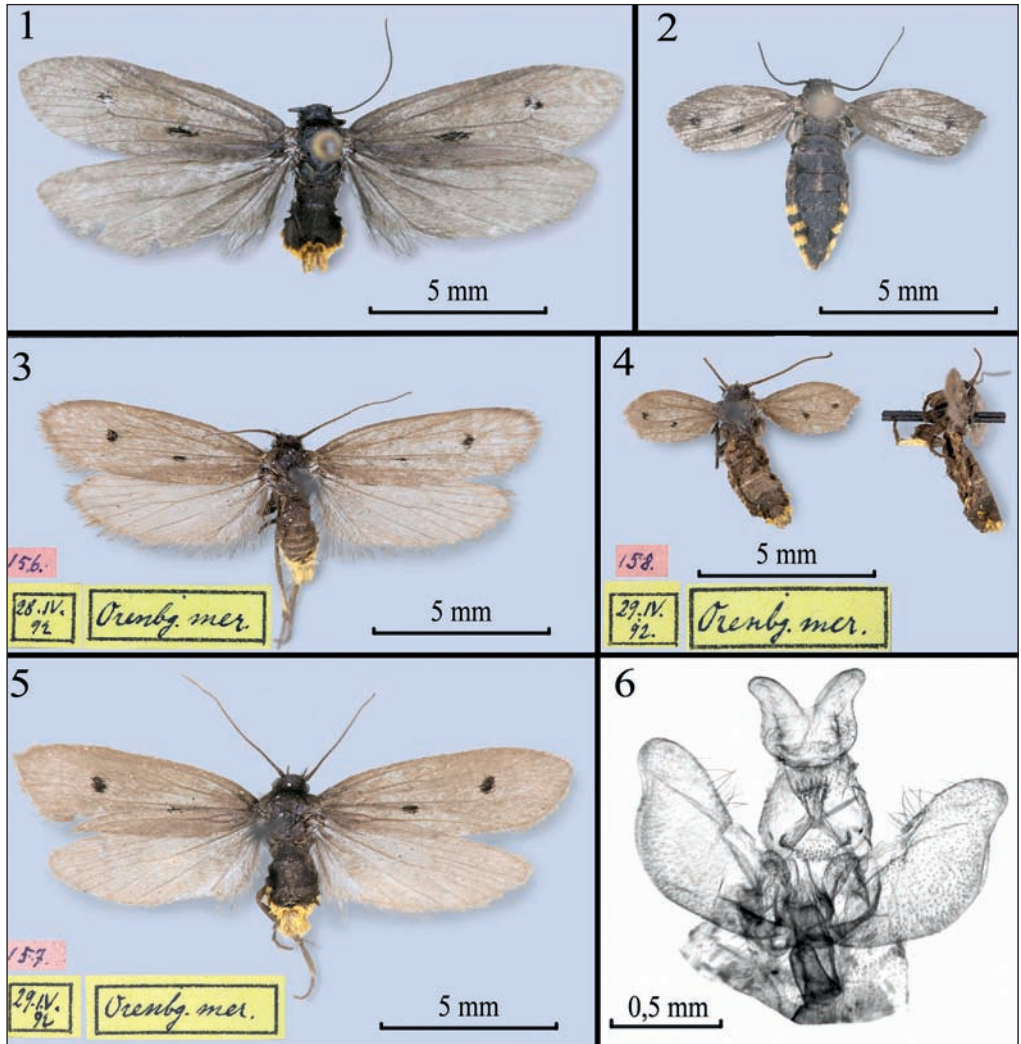
Psecadia discrepittella Rebel, 1901a: 172. Type locality: [bei Orenburg] Orenburg Region, Russia.

References: Rebel 1901b: 68 (*Psecadia*); Sattler 1967: 88; Danilevsky 1969: 179; Danilevsky 1980: 324; Zagulajev 1981: 644; Dubatolov et al. 1997: 162; Anikin et al. 2007: 282 (*Ethmia*).

Material. Lectotype (here designated): ♂ *Psecadia discrepittella* Rebel, 1901 '156' <pink rectangle, written in blue ink>, '28.IV.192' <yellow square written in black ink>, 'Orenb-g. mer.' <yellow rectangle written in black ink>, 'LECTOTYPUS. | ♂ *Psecadia discrepittella* | Rebel 1901 | design. Shovkoon D. 2008' <red rectangle, printed in black ink> (in coll. ZISP). – Paralectotypes: 1♂ 1♀ same data (ZISP). – Additional material. 5♂ Guberli (ZISP). 1♂, 1♀ 21.05.2005, Russia, Orenburg Region, Dombrovskiyi Distr., N 50°46'36", E 59°16'55", leg. Shovkoon D.F. (ZISP).

Description of female. Venation of forewing (Fig. 8) agreeing well with that of the male and Ethmiidae in general although R-Cu cell rather elongated and with very shortened veins connected with it (R_2 - R_5 , M_1 - M_3 , both Cu). Hindwings reduced to very small rounded lobes (about 0.5 mm wide) with venation extremely simplified: traces of R-Cu cell and single vein (presumably R or M branch) hardly appreciable. Jugum and frenulum present but not coupling because of very small hindwing.

Female genitalia (Fig. 7). Papillae anales rounded, setose. Eighth tergite medially interrupted by membrane. Posterior apophyses slender, as long as papillae, anterior ones wedge-shaped and pointed (Figs 7, a, c), slightly longer than anterior apophyses of *Ethmia pyrausta* Pallas, 1771 (Sattler 1991). Antrum sclerotized with small sclerotized appendix (Fig. 7 b). Ductus bursae very long, spiral, with 5 complete turns. Corpus bursae rather large, spherical with big spherical appendix. Signum large, covered with more or less uniform teeth, asymmetric (Figs 7, d), in middle with roughly jagged crest (Fig. 7 e).



Figs 1–6. *Ethmia discrepittella*. 1. Male and 2. Female, Dombarovka district of Orenburg Region (ZISP). 3. Male lectotype (ZISP). 4. Female paralectotype (ZISP). 5. Male paralectotype (ZISP). 6. Male genitalia of paralectotype of *Ethmia discrepittella*.

Comments. The genitalia of the ♂ paralectotype (Fig. 6) are kept in a mixture of glycerol and ethanol, as are those of the female dissected. My examination confirms that the specimens whose genitalia were previously illustrated as belonging to *Ethmia discrepittella* (Sattler 1967; Danilevsky 1980; Zagulajev 1981) are really conspecific with the types.

Ethmia discrepittella belongs to the *pyrausta*-species group. The group was originally based on two taxa: *E. pyrausta* (Pallas, 1771) and *E. discrepittella*. However, Pallas (1771) provided only scanty information in the original description of *E. pyrausta*. He wrote that the moths were found in the spring “Volga”. Owing to special research

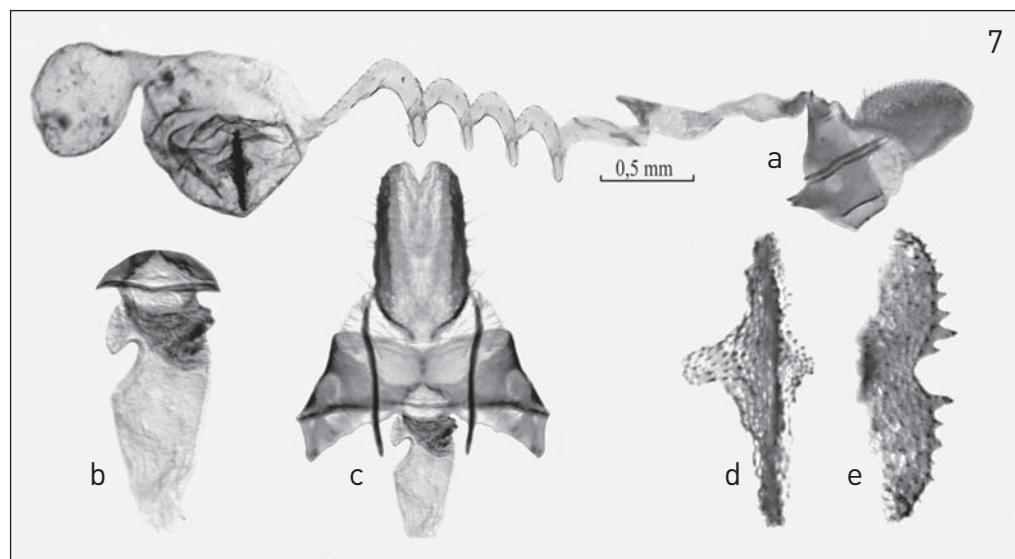
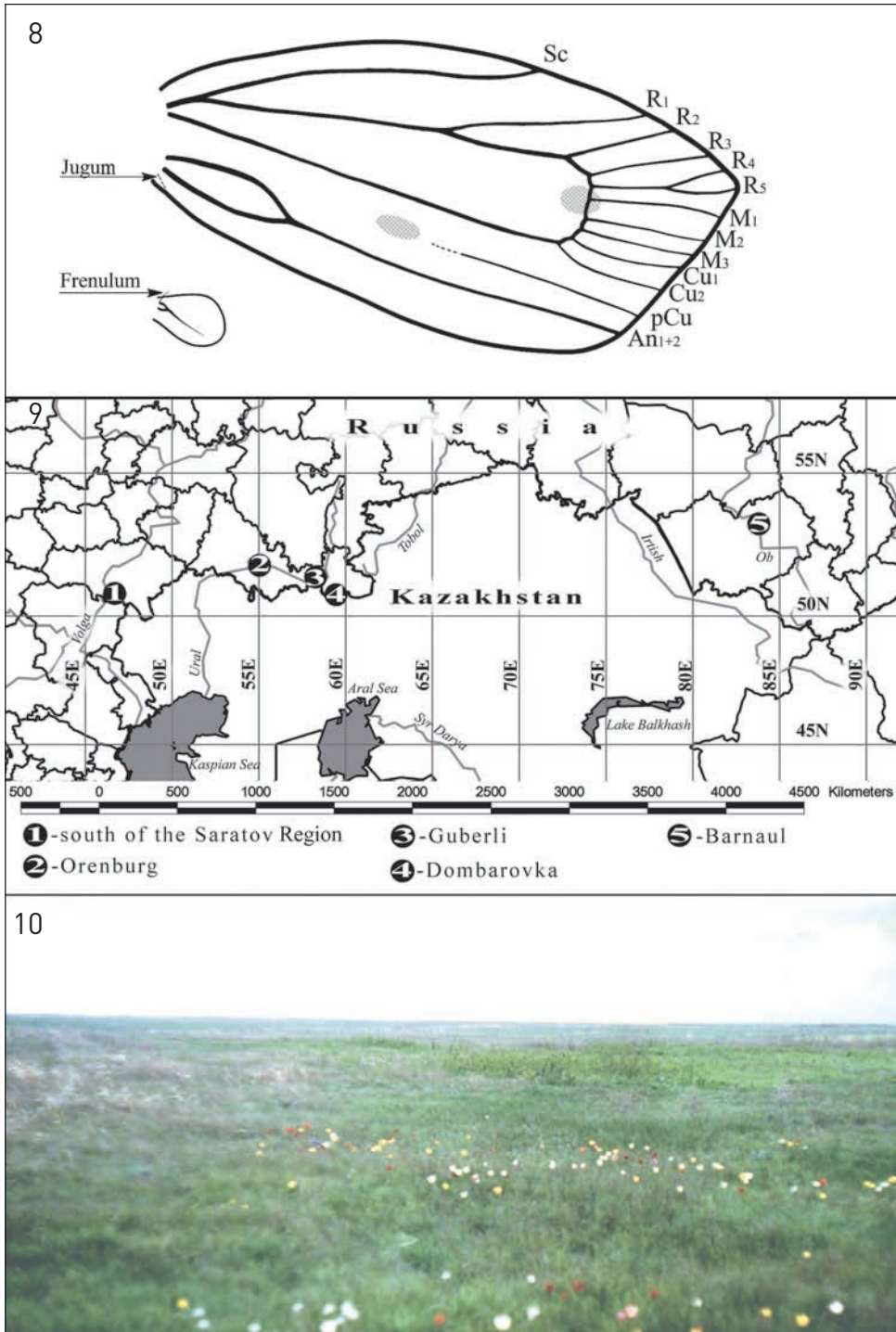


Fig. 7. Female genitalia of *Ethmia discrepitella*, moth from the Dombrovka district of the Orenburg Region. **a.** general view; **b.** ventral view; **c.** ostium and antrum; **d.** signum, dorsal view and right-side view.

efforts by S. A. Sachkov (1991) it is authentically known that *Ethmia pyrausta* was described from the vicinity of Samara and that the syntypes were collected in late April or the beginning of May, 1769.

Distribution (Fig. 9). The distribution of *Ethmia discrepitella* is little known and for a long time the species was considered to be endemic to the Orenburg Region, until new data concerning its presence in the Altai (Dubatolov et al. 1997) and in the Saratov Region (Anikin et al. 2007) became published. Unfortunately we did not have the opportunity to investigate this material. One male was found by V. Anikin (Anikin et al. 2007) in the south of the Saratov Region and two males were collected in the beginning of the 20th Century at Barnaul (now kept in Siberian Zoological Museum, Institute of Animal Systematic and Ecology, Siberian Division of Russian Academy of Sciences (Novosibirsk)). Most probably these moths were collected in the middle of May (Dubatolov et al. 1997).

Life history. Our moths (Figs 1–2) were collected in salt steppes (Fig. 9) where wormwood-gramineous assemblages growing on dark-chestnut soils prevail. The significant presence of wormwood (*Artemisia*) and salt-adapted vegetation gives a spotted character typical of southern steppes. The vegetation is mostly composed of *Stipa zaleskii* Wilensky, *S. capillata* L., *S. lessingiana* Trin. & Rupr., *S. korshinskyi* Roshev, *Festuca valesiaca* Gaud., *Koeleria gracilis* Pers., *Phleum phleoides* (L.) Karst. (all Poaceae), *Artemisia dracunculus* L., *A. austriaca* Jacq., *A. frigida* Willd. (all Asteraceae), *Caragana frutex* (L.) C. Koch (Fabaceae), *Thymus marshallianus* Willd. (Lamiaceae), *Thalictrum minus* L. (Ranunculaceae), and other plants. Also in May, tulips (*Tulipa* sp.) are flowering.



Figs 8–10. *Ethmia discrepittella*. 8. Wing venation of female. 9. Distribution map. 10. The Orenburg steppe in May, where *E. discrepittella* occurs.

The close relationship of *E. discrepittella* and *E. pyrausta* suggests similar or closely related host-plants for both. The larva of *pyrausta* feeds on species of *Thalictrum* (Sattler 1991). *Thalictrum minus* L. occurs in the locality, and it is possible that it is also a host-plant for the larva of *E. discrepittella*.

Discussion. Since the original description the female brachyptery of *Ethmia discrepittella* remained uncorroborated. Our findings confirm this unique attribute.

Brachyptery has evolved independently several times in moths. This phenomenon, which is almost entirely restricted to females, occurs in at least 26 of the 120 families (Heppner 1991; Sattler 1991). Kuznezov (1929), who studied wing reduction in Geometridae, and Sattler (1991), who reviewed wing reduction in Lepidoptera and analyzed implications of inability to fly, wrote that brachyptery in females of moths of the Northern Hemisphere is particularly found in winter, early vernal, and late autumnal species.

This phenomenon is present in other species of Ethmiidae. One more case of brachypterous female is known for *Ethmia charybdis* Powell, 1973. This moth is distributed in California, Nevada, and Mexico (Opler et al. 2006) and like *Ethmia discrepittella*, it is found in the early spring (in the beginning of April). Also, as proposed by Danilevsky (1969), it can be expected that the female of the winter moth *Dasyethmia hiemalis* will be discovered to be brachypterous. In the original description of the species, Danilevsky (1969) remarks on the correlated simplification of the genital structures of the males of these species in connection with their cold habitat. Thus, *Ethmia discrepittella* is not the unique representative of the family with brachypterous female.

Acknowledgments

I want to thank Dr András Kun (Budapest) for his active cooperation, consultations, and for providing literature on Ethmiidae. I am indebted to Dr Sergey Yu. Sinev (St. Petersburg) for providing access to the collection of ZISP. I wish to express my sincere thanks to Prof. Dr Alexander A. Stekolnikov (St. Petersburg), who kindly agreed to transfer type specimens to the ZISP. I express my thanks to Dr Fedor V. Konstantinov and Mrs Svetlana V. Nedoshivina (both from St. Petersburg) for their help in my search for types. I wish to express my sincere thanks to Dr Vadim V. Zolotuhin (Uljanovsk) and Dr Tatyana A. Trofimova (Samara) for their help during all stages of the preparation of the paper. I thank Dr Sergey A. Sachkov (Samara) for correcting a draft of the manuscript and improvements of the language. I am very grateful to Mr Sergey V. Kornev (Orenburg) for his friendly support and for the organization of expeditions to the Orenburg Region of Russia. Also I am very thankful to Dr Klaus Sattler for reviewing and improving the manuscript.

References

- Anikin, V. V., S. A. Sachkov & V. V. Zolotuhin 2007. "Fauna Lepidoptera Volgo-Uralensis" 150 years later: changes and additions. Part 12. Ethmiidae et Scytrididae (Insecta, Lepidoptera). – *Atalanta* **38** (1/2): 279–291.
- Danilevsky, A. S. 1969. Two remarkable new species of winter months from the desert of Soviet Central Asia: *Dasyethmia hiemalis* gen. et sp. n. (Lepidoptera, Ethmiidae) and *Cheimatoptera pennigera* gen. et sp. n. (Lepidoptera, Geometridae). – *Entomologicheskoe obozrenie* **48** (1): 176–191 (in Russian).
- Danilevsky, A. S. 1980. A key to Ethmiidae (Lepidoptera) of the European part of the USSR. – *Entomologicheskoe obozrenie* **59** (2): 322–345 (in Russian).
- Dubatolov, V. V., P. Ya. Ustjuzhanin & V. K. Zintshenko 1997. A review of the Ethmiidae of the Asian part of Russia and neighbouring territories. – *Atalanta* **28** (1/2): 161–171.
- Heppner, J. B. 1991. Brachyptery and aptery in Lepidoptera. – *Tropical Lepidoptera* **2**: 11–40.

- Kusnezov, N. Ya. 1929. *Malacodea* Tengstr. and European *Operophtera* Hb. species. A study in micropterism. – Russkoe Entomologicheskoe obozrenie **23** (1): 9–31 (in Russian).
- Opler, P. A., H. Pavulaan, R. E. Stanford & M. Pogue 2006. Butterflies and Moths of North America. Bozeman. – MT: NBII Mountain Prairie Information Node. – http://www.butterfliesandmoths.org/species?l=3176&chosen_state=*
- Pallas, P. S. 1771. Reise durch verschiedene Provinzen des russischen Reichs. – Zweyter Theil. Buch 1. – Kayserliche Akademie der Wissenschaften, St. Petersburg. 504 pp. 23 pls.
- Rebel, H. 1901a. Neue palaearktische Tineen. – Deutsche Entomologische Zeitschrift *Iris* **13**: 169–174.
- Rebel, H. 1901b. Famil. Pyralidae-Micropterygidae. – *In*: O. Staudinger & H. Rebel, Catalog der Lepidopteren des palaearktischen Faunengebietes **2**. – Berlin, 368 pp.
- Sachkov, S. A. 1991. Lepidoptera described by P. S. Pallas from Samara and outskirts – Bulletin Samarskaja Luka **1**: 108–110 (in Russian).
- Sattler, K. 1967. Ethmiidae. – *In*: H. G. Amsel, F. Gregor & H. Reisser (eds), Microlepidoptera Palaearctica **2** (1+2). – Georg Fromme, Wien, xviii + 185 pp., 106 pls.
- Sattler, K. 1991. A review of wing reduction in Lepidoptera. – Bulletin of the British Museum (Natural History). Entomology **60**: 243–288.
- Zagulajev, A. K. 1981. Family Ethmiidae. pp. 638–651. – A key to insects of European part of the USSR **4** (2). – Leningrad (in Russian).