Wittoecia – a new genus of Zeuzerinae (Lepidoptera, Cossidae) from the Federal Democratic Republic of Ethiopia

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Received 20 July 2020 | Accepted by V. Pešić: 31 July 2020 | Published online 4 August 2020.

Abstract
The present paper contains the description of a new Cossidae genus, Wittoecia gen. n. (type species, by monotypy Azygophleps brehmi Yakovlev & Witt, 2016) from the Federal Democratic Republic of Ethiopia. The new combination Wittoecia brehmi (Yakovlev & Witt, 2016) comb. n. is established. With 8 color and 7 black-and-white figures.

Key words: Cossidae, new genus, taxonomy, faunistics, Afrotropics, Ethiopia, Eastern Africa, Thomas J. Witt.

Introduction
The genus Azygophleps Hampson, 1892 (type species (by monotypy) – Hepialis scalaris Fabricius, 1775) now includes 34 species, locally common in the southern Palearctic and in Paleotropic khoron (Daniel 1963, 1964; Arora 1976; Hua et al. 1990; Yakovlev & Dubatolov 2013; Yakovlev et al. 2015; Yakovlev & Witt 2017). The type species of the genus is A. scalaris (Fabricius, 1775) recorded as a pest of Sesbania grandiflora, S. roxburghii, S. bispinosa, S. javanica, S. sesban (Fabaceae), the flowers of which are used as vegetables in tropical regions, and on Crotalaria (Fabaceae) grown as siderat and shade on coffee trees plantations. Widely distributed in tropical Africa, A. inclusa (Walker, 1856) damage Indigofera (Fabaceae) (Vari et al. 2002) which is widely used in production of natural dyes (indigo and basma). Examining most of the nomenclature types of the genus Azygophleps representatives (during a complete revision of the genus) we established its characteristic apomorphic features, in particular, a very thick aedeagus with a large cornutus in the lateral surface of the vesica. Due to the conducted research, the status and taxonomic position of a number of taxa will be revised. In particular, it concerns Azygophleps brehmi Yakovlev & Witt, 2016, described on a series of eight males collected in the province of Oromia (Central Ethiopia) (Yakovlev & Witt 2016). The male genitalia characteristics in this little studied species differ sharply from the known species of the genus Azygophleps, thus, A. brehmi represents a Cossidae genus new to science. Its description is given below.
Material and methods

Adults of Cossidae were collected using light traps. Male genitalia were mounted in euparal on slides following Lafontaine and Mikkola (Lafontaine & Mikkola 1987; Lafontaine 2004). The adults were photographed using iPhone7. The genitalia preparations were photographed using a Olympus DP74 camera attached to an Olympus SZX16 stereomicroscope.

Taxonomical part

Wittoecia gen. n.
https://zoobank.org/urn:lsid:zoobank.org:act:C6EC2069-700E-44AF-8DE1-0CD9583CE1E1
Type species (by monotypy) Azygophleps brehmi Yakovlev & Witt, 2016 (Figs 1–2, 8)

Description. Size medium (fore wing length 22–24 mm). Antenna goblet-like, bipectinate, very long crest processes in two proximal thirds of antenna (processes 4 times longer than rod diameter), very short crest processes in distal third (processes equal to antenna rod diameter). Thorax and abdomen covered with light-yellow hairs. Fore wing elongated, creamy, with reticulated pattern of black strokes: more dense and wide along costa, anal edge and in distal cell, significantly thinner submarginally. No pattern of strokes in cubital area. Hind wing creamy, with poorly expressed reticulated pattern of thin grey undulated strokes in submarginal and marginal areas (except for anal area). Fringe on all wings light-creamy, almost white.

Male genitalia (GenPrMWM 25284, 33185). Uncus short, triangle, apically sharp; tegumen wide; gnathos arms short, not fused, basally thick, distally narrowing gradually; valve narrow, long, with smooth parallel edges, apically rounded; juxta large, oval, with small semicircular cut on dorsal surface; saccus long, massive, tapered, apically sharp; aedeagus thin, 1/4 shorter than valve, basally thick, slightly narrowing to distal end, slightly curved throughout its length, small rod-like cornutus in lateral surface of vesica.

Female unknown.

Diagnosis. Externally, the new genus is most close to the genus Azygophleps (Figs 3–4, 9–10), from which it clearly differs in the male genitalia (in Azygophleps, the aedeagus is thick with a large cornutus in the lateral surface of the vesica, the gnathos arms are long and thin, not fused). From the genus Phragmacossia Schawerda, 1924 (type species, by original designation – Phragmatoecia (sic) reticulata Püngeler, 1900) (Figs 5, 11) distributed in the south of Palaearctic and south-east Asia the new genus differs in a more variable pattern on the fore wing, the massive uncus and the short gnathos arms. In the male genital structure, it is most close to the genus Phragmataecia Newman, 1850 (type species, by monotypy – Noctua arundinis Hübner, 1808) (Figs 6, 12), widely spread in the Palaearctic and Paleotropics, from which it differs in the more variable fore wing pattern, larger size and very thick base of the uncus. Externally, the new genus resembles to the genus Zeuzeropecten Gaede, 1930 (type species, by original designation – Zeuzeropecten lactescens Gaede, 1930) (Figs 7, 13), distributed in east Africa and Madagascar, but differs in its very short saccus (in Zeuzeropecten sp., the saccus is very long) and longer uncus (in Zeuzeropecten sp., the uncus is very short).

Composition. The new genus is monotypic, it includes only one species – Wittoezia brehmi (Yakovlev & Witt, 2016) comb. n.

Distribution. Recorded only for Central Ethiopia (Oromia region) (Fig. 14).

Habitat. Mountain forests on the alt. of 2350–2388 m (Fig. 15). Adult flight period: April–May.

Etymology. The new genus is named after Thomas J. Witt (1947–2019) (Fig. 16) the world largest collector of Lepidoptera, founder of the Witt Museum (Munich, Germany), organizer of the fund “Thomas-Witt-Stiftung zur Förderung der Wissenschaft und Forschung im Bereich der Zoologischen Systematik”. Thomas J. Witt was awarded with the Ritter-von-Spix-Medal of Zoologischen Staatssammlung Munchen in 2001. He also received an honorary doctorate from the University of Munich in 2013.
Figures 1−7. Adult males of Zeuzerinae: 1. *Wittoecia brehmi* (Yakovlev & Witt, 2016) **comb. n.**, holotype (Museum Witt, Munich); 2. *W. brehmi*, paratype (Museum Witt, Munich); 3. *Azygophleps scalaris* (Fabricius, 1775), Mali, Mopti region, Dogon Plateau, 400−800 m, Nov.–Dec. 2010, leg. Müller, Kravchenko, Traore & al. (Museum Witt, Munich); 4. *A. inclusa* (Walker, 1856), Zambia, Jiwundu Swamp, S 11°51′54″ / E 25°33′20″, 20−22.x.2014, light trap, leg. Smith, Takano & Oram (individual number: ANHRTUK: 00052313, African Natural History Research Trust, Leominster, GB); 5. *Phragmacossia ariana* (Grum-Grshimailo, 1899), Tajikistan, Gissar Mts., Kondara, 38°50′N / 68°50′E, July 1998, ex coll. A. Schintlmeister (Museum Witt, Munich); 6. *Phragmataecia castaneae* (Hübner, 1790), “S. Russland, Rostov/Don, Nedwigovka, 10.vi.1991, leg. A. Poltawsky, coll. [A.] Schitlm[eister]” (Museum Witt, Munich); 7. *Zeuzeropecten combustus* (Kenrick, 1913), Madagascar, Ranomafana, 40 km NE Fianarantsoa, 900 m, 30.xii.2003−3.i.2004, leg. S. Murzin & A. Shamaev (Museum Witt, Munich).
Figures 8–13. Genitalia of males of Zeuzerinae: 8. *Wittoecia brehmi* (Yakovlev & Witt, 2016) **comb. n.**, paratype (Genitalpräparat Heterocera N 33.185, Museum Witt, Munich); 9. *Azygophleps scalaris* (Fabricius, 1775), Mali, Mopti region, Dogon Plateau, 400–800 m, Nov.–Dec. 2010, leg. Müller, Kravchenko, Traore & al. (Genitalpräparat Heterocera N 32.924, Museum Witt, Munich); 10. *A. inclusa* (Walker, 1856), Zambia, Jiwundu Swamp, S 11°51′54″ / E 25°33′20″, 20–22.x.2014, light trap, leg. Smith, Takano & Oram (ANHRT Gen Slide 00075, African Natural History Research Trust, Leominster, GB); 11. *Phragmacossia ariana* (Grum-Grshimailo, 1899), Tajikistan, Gissar Mts., Kondara, 38°50′N / 68°50′E, July 1998, ex coll. A. Schintlmeister (Genitalpräparat Heterocera N 33.161, Museum Witt, Munich); 12. *Phragmataecia castaneae* (Hübner, 1790), “S. Russland, Rostov/Don, Nedwigovka, 10.vi.1991, leg. A. Poltawsky, coll. [A.] Schitlm[eister])” (Genitalpräparat Heterocera N 32.709, Museum Witt, Munich); 13. *Zeuzeropecten combustus* (Kenrick, 1913), Madagascar, Ranomafana, 40 km NE Fianarantsoa, 900 m, 30.xii.2003–3.i.2004, leg. S. Murzin & A. Shamaev (Genitalpräparat Heterocera N 33.167, Museum Witt, Munich).
Figure 14. Map of distribution of *Wittoecia brehmi* (Yakovlev & Witt, 2016) comb. n.

Figure 15. Habitat of *Wittoecia brehmi* (Yakovlev & Witt, 2016) comb. n. (photo by Harald Sulak).
Discussion
The taxonomy of Zeuzerinae in the Old World needs a detailed revision. A separate tribe Cecryphalini Yakovlev & Witt, 2018 (type genus, by original designation – Cecryphalus Schoorl, 1990) (Yakovlev, Sokolova & Witt 2018) has already been allocated. A group of taxa with a thin outgrowth on the abdominal edge of the valve is considered as a special group, which probably requires isolation into a separate tribe. It includes the Neotropical genera Morpheis, Bryocestia, Klageziana, and Allocryptobia (Donahue 1980; Penco, Yakovlev & Witt 2016; Yakovlev et al. 2019; Yakovlev, Naydenov & Penco 2020), African genus Acosma Yakovlev, 2011, revised in 2019 (Yakovlev 2019), and some representatives of the Australian genus Sympycnodes Turner, 1932, united into “Sympycnodes digitata group” (Kallies & Hilton 2012). Additionally, an important diagnostic feature having a taxonomic significance is the aedeagus structure. The Palaearctic and Paleotropical genera Zeuzerinae: Aethalopteryx Schoorl, 1990, Alophonotus Schoorl, 1990, Azygophles, Bergaris Schoorl, 1990, Chalcidica Hübner, 1820, Duomitus Butler, 1880, Eburgernellus Schoorl, 1990, Endoxyla Herrich-Schäffer, 1854, Hermophyllon Schoorl, 1990, Oreocossus Aurivillius, 1910, Panau Schoorl, 1990, Paralophonotus Schoorl, 1990, Phragmacossia, Pseudeuzezeria Schoorl, 1990, Rapdalus Schoorl, 1990, Relluna Schoorl, 1990, Skeletophyllon Schoorl, 1990, Trismelasmos Schoorl, 1990, Xyleutes Hübner, 1820, Zeuzera Latreille, 1804 have this important feature: a very large aedeagus with a massive fusiform cornutus in the lateral side of the vesica, while the genera Phragmataecia, Wittoecia, and Zeuzeropecten differ in a fundamentally different structure of the aedeagus: thin, with poorly pronounced ribbon-like sclerite in the lateral surface of the vesica or without cornutus. Thus, using complex approaches (morphological and molecular-genetic) later we will be able to give a clearer analysis of the subfamily Zeuzerinae generic system.

Figure 16. Thomas J. Witt in January 2019 (photo by R. Yakovlev).
Acknowledgements

The author is indebted to Mr Richard Smith and Dr Gy. László (Leominster, GB), for the opportunity to study the Cossidae material in the collection of the African Natural History Research Trust; and to Mr Thomas J. Witt† for his kind assistance provided during examining of the Cossidae material in the Museum Witt. The author is also grateful to Anna K. Ustjuzhanina (Tomsk, Russia) for linguistic corrections of the manuscript.

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