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A new species of the genus *Klinzigedia* Căpușe, 1971 (Lepidoptera: Coleophoridae) from Iran

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Abstract. A new species *Klinzigedia sultankutensis* Anikin, **sp. n.** is described from Iran, Mazandaran Province. The species resembles most closely *Klinzigedia phlomidella* (Christoph, 1862) but has well differences in its external appearance and genital morphology. Larva of the new species feeds on *Phlomis herba-venti* L. Adult male and female, their genitalia as well as larval case are illustrated and data on the known distribution are given. A male of the new species has elongated and pointed to the top sacculus with small rectangular tooth near apex, phalotheca almost twice shorter as in *K. phlomidella*. The antrum of a female of *K. sultankutensis* **sp. n.** is slightly expanded in the median part and is more narrowed to the caudal part of the ductus than in *K. phlomidella*. The number of bristled spinelets on each plate on the abdominal tergite I of *K. sultankutensis* **sp. n.** is 46–49 in male and 57–63 in female.

Key words: Lepidoptera, Coleophoridae, *Klinzigedia*, new species, Iran.

Новый вид рода *Klinzigedia* Căpușe, 1971 (Lepidoptera: Coleophoridae) из Ирана

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Резюме. Новый вид *Klinzigedia sultankutensis* Anikin, **sp. n.** описан из Ирана, провинция Мазандаран. Вид наиболее близок к *Klinzigedia phlomidella* (Christoph, 1862), но имеет хорошие отличия во внешнем виде и в морфологии гениталий. Гусеница нового вида питается на *Phlomis herba-venti* L. Приведены иллюстрации имаго обоих полов, их генитальных структур, чехлика гусеницы. Самец нового вида имеет удлинённый и заостренный к верхушке саккулус с небольшим прямоугольным зубцом у вершины, фаллотека почти вдвое короче, чем у *K. phlomidella*. У самки *K. sultankutensis* **sp. n.** антрум немного расширен в срединной части и более сужен к каудальной части дуктуса, чем у *K. phlomidella*. Число шиповидных хет на каждой пластинке брюшного tergита I у самца *K. sultankutensis* **sp. n.** составляет 46–49, а у самки 57–63.

Ключевые слова: Lepidoptera, Coleophoridae, *Klinzigedia*, новый вид, Иран.

Introduction

A lot of species belonging to several genera have been known and described from Iran during the last century by specialists on microlepidoptera [Toll, 1952, 1959a, b, c; Amsel, 1977; Baldizzone, 1994a, b]. More than 170 species were known from Iran to the end of the 20th century [Baldizzone et al., 2006].

Species of the genus *Klinzigedia* Căpușe, 1971 are usual for various open landscapes of steppe and forest-steppe in southern regions of the Palaearctic in lowlands and mountains up to 3000 m. This small Palaearctic genus includes seven species (*K. anelpista* (Baldizzone, 1994), *K. implicitella* (Fuchs, 1903), *K. inusitatella* (Caradja, 1920), *K. onopordiella* (Zeller, 1849), *K. phlomidella* (Christoph, 1862), *K. phlomidis* (Stainton, 1867), *K. wockeella* (Zeller, 1849)). Known larvae feed exclusively on plants of the genus *Phlomis* (family Lamiaceae) having native distribution from the Mediterranean region, across Central Asia to Inner Mongolia in China. Stenoligophagy of those casebearers determines the range of the genus *Klinzigedia* corresponding to distribution of the genus *Phlomis* [Anikin, 2007, 2010].

Below we describe a new species from Iran belonging to the genus *Klinzigedia* from the tribe Klinzigediini due very characteristic habitus, ochreous groundcolor with lined wing pattern, shape of labial palps, equipment of abdominal tergites and the structure of genitalia.

Material and methods

The material was collected by the second author during his expedition in late April–early May 2017 in the Elborz Mountain area and the Turkmen-Khorasan Mountains (Figs 1, 2). The feeding caterpillars of the new species were found on leaves of *Phlomis herba-venti* (Fig. 3). The larvae mined the lower side of the host plant leaves (Fig. 4) like the most other caterpillars of this family. Collected larvae in cases (Fig. 5), after feeding for a few more days, pupated and imago emerged in 2–3 weeks in a laboratory. All photos in nature were taken by K.A. Kolesnichenko.

Five preparations were processed following standard techniques for morphological studies of the genitalia [Robinson, 1976]. The photos of adult specimens and larval case were taken with an Olympus Tough TG-5. The genitalia were photographed from genitalia slides

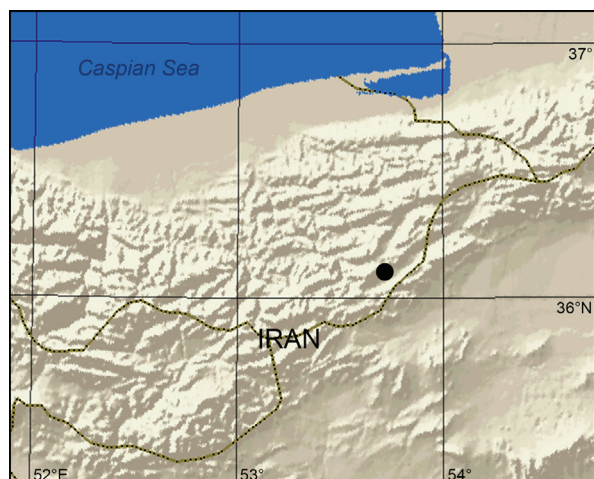


Fig. 1. The type locality of *Klinzigedia sultankutensis* sp. n.
Рис. 1. Типовое местонахождение *Klinzigedia sultankutensis* sp. n.

in ventral view with Mikmed-6 Microscope with camera Levenhuk C1400 NG. All photos are taken by the first author.

The material is deposited in:

ZISP – Zoological Institute of the Russian Academy of Sciences (St Petersburg, Russia);

SarSU – Saratov State University (Saratov, Russia).

Klinzigedia sultankutensis Anikin, sp. n.
(Figs 4–12)

Material. Holotype, ♂ (ZISP): "IRAN, Mazandaran Prov., S macroslopes of Albus Mts., E Sultan-Kut Mt., 80 km SE Sarit, 5 km NE Folladmahaleh v., N 36°06'14" E 53°43'16", 20–21.05.2017, K. Kolesnichenko leg., ex l. 21.05.2017 on *Phlomis herba-venti* L.". Paratypes: 5♂ (1♂ in ZISP, 4♂ in SarSU), 2♀ (1♀ in ZISP, 1♀ in SarSU), same locality and date as holotype, ex l. 9–31.05.2017, on *Phlomis herba-venti* L.

Diagnosis. The new species is the closest to *Klinzigedia phlomidella* described from southern part of Russia ("bei Sarepta") by Christoph [1862]. In contrast to *K. phlomidella* (Christoph, 1862) which has small pointed top of the sacculus without tooth in male genitalia, *Klinzigedia sultankutensis* sp. n. has elongated and pointed

to the top sacculus with small rectangular tooth near apex. The new species has phallotheca almost twice shorter as in *K. phlomidella*. The right rod of the phallotheca in *K. sultankutensis* sp. n. on dorsal margin is with two rectangular pointed teeth, the smaller one is located near the top and the bigger one is on 1/3 length from the top, while *K. phlomidella* has only one large tooth on the top of the right rod. *Klinzigedia sultankutensis* sp. n. has in vesica one long cornutus, the same as the tegumen length, slightly curved in the median part and raised in front, but *K. phlomidella* has the cornutus smoothly curved along the entire length and shorter than tegumen on 1/3. In a female of *K. phlomidella* the basal part of sterigma is elongated rectangular, shorter and wider than one in *K. sultankutensis* sp. n. The antrum of *K. phlomidella* is more expanded in the median part and is not narrowed to the caudal part of the ductus. The number of bristled spinelets on each plate on the abdominal tergite I in *K. sultankutensis* sp. n. is twice more numerous than in *K. phlomidella*.

Description. Imago (Figs 6, 7). Wingspan of male 26–27.5 mm, female – 27–28.3 mm. Head, thorax and postocular scales light ochreous. Proboscis very long, almost reaches the end of abdomen. Labial palpus ochreous. Antenna yellowish-ochreous, annulated with dark yellow rings, scapus concolorous with head. Basal antennal segment 4 times longer than wide, forms short brush. Antennae on half of its length covered with loose adjoining scales, segments of flagellum length 0.5 times longer than wide, slightly ringed in upper part. Forewing ochreous, suffused with light yellowish-ochre scales in basal part, veins R and M clearly visible and covered with dark ochre scales. Costal fringe long, basally concolorous with light wing apex. Hindwing and fringe pale dark brown. Abdomen pale yellowish-ochreous, tergal patches 2 times longer than wide.

Larva and case. Feeds and pupates in case (Fig. 5), mining the lower surface of leaf on *Phlomis herba-venti* L. (Lamiaceae). The larva makes case bounding the small pieces of the host plant leaves by silk. Case 18–22 mm long and 5–7 mm wide, grayish-yellow color, with brown tinge. The larva develops from April to May.

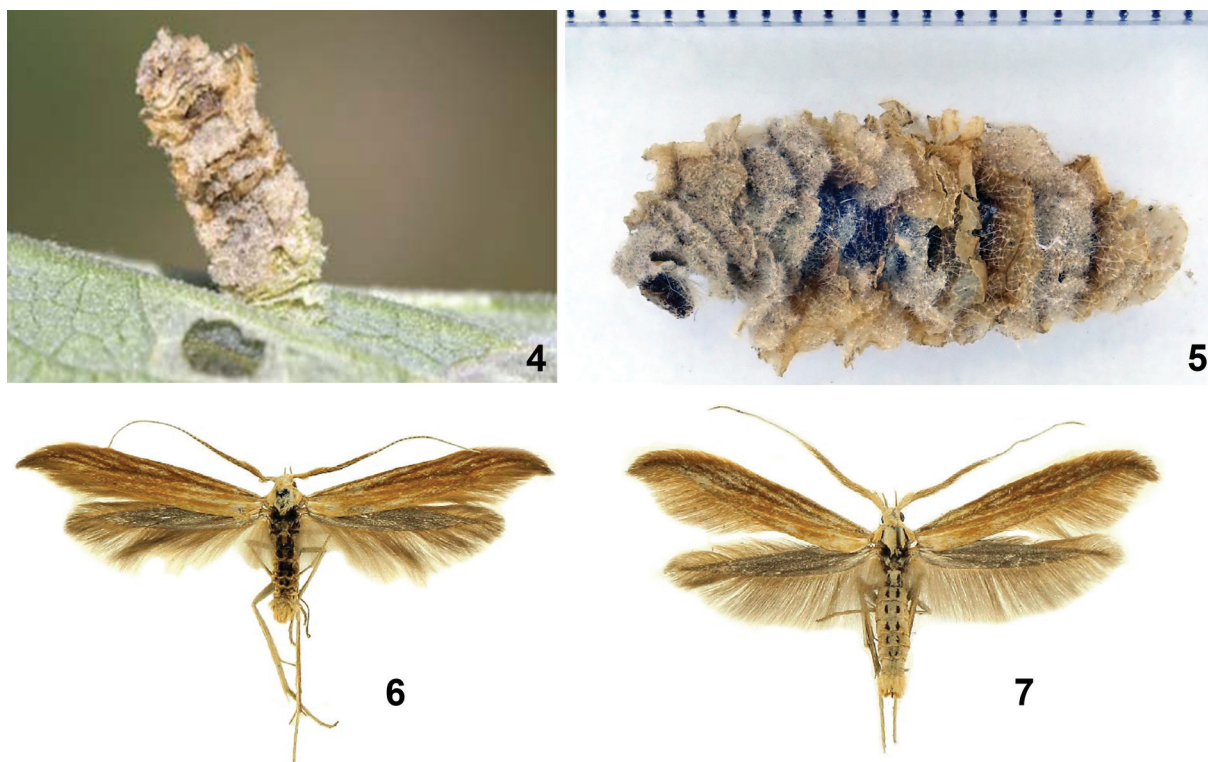
Male genitalia (Fig. 8). Gnathos almost oval, arms twice long. Tegumen narrow, extending basally, pedunculi very short. Cucullus finger-shaped long, half extended beyond sacculus. Valvula as broad as cucullus, ventral margin rectangularly shaped, surface covered with rare short bristles. Transtilla broad, mace-shaped, sharply tapered towards apex. Sacculus well sclerotized; elongated to the top and pointed, with small rectangular tooth



Figs 2–3. Biotope and host plant of *Klinzigedia sultankutensis* sp. n.
2 – lower part of the gorge in the Foulad Mohaleh village vicinity, Mazandaran Province, Iran; 3 – *Phlomis herba-venti* L. (Lamiaceae).

Рис. 2–3. Биотоп и кормовое растение *Klinzigedia sultankutensis* sp. n.

2 – нижняя часть ущелья в окрестностях села Фулад Мохале, провинция Мазандаран, Иран; 3 – *Phlomis herba-venti* L. (Lamiaceae).



Figs 4–7. Cases and imagos of *Klinzigedia sultankutensis* sp. n.

4–5 – cases: 4 – with larva mining on the leaf underside of *Phlomis herba-venti*, 5 – case of larvae; 6–7 – imagos: 6 – male, holotype, 7 – female, paratype.

Рис. 4–7. Чехлики гусеницы и имаго *Klinzigedia sultankutensis* sp. n.

4–5 – чехлики: 4 – мина гусеницы на обратной стороне листа *Phlomis herba-venti*, 5 – чехлик гусеницы; 6–7 – имаго: 6 – самец, голотип, 7 – самка, паратип.

near apex, ventral margin rounded, ending in sharp angle; dorsal margin lightly convex. Phallotheca dorsally expanded, with two dark sclerotized rods, left rod on dorsal margin with rectangular sharp tooth on 1/4 length from the top, right rod on dorsal margin with two rectangular sharp teeth, smaller one located near the top and bigger one on 1/3 length from the top. In vesica one longer cornutus same as tegument length, slightly curved in the middle and raised in front.

Abdominal tergites of male (Fig. 9). Tergal disk about 2 times longer than wide. Abdominal tergite I bristled by 46–49 spinelets on each plate; patches shorter on the following tergites and have 65–67 spinelets on each.

Female genitalia (Figs 10, 11). Ovipositor elongate, telescopic. Papillae anales very narrow, medially as wide as 1/5 of the length. Anterior apophyses 0.3 times shorter than sterigma length, posterior apophyses 3.3 times longer than anterior apophyses. Sterigma sclerotized well laterally at base of apophyses and has elongate rectangular shape, 3.5 times as wide as long, distal part triangular shape, with edge slightly concave relative to ostium bursae, caudal margin strong rounded, with a row of 7–8 not long bristles on each side of ostium. Ostium broadly U-shaped, wide and deep almost to middle of plate. Antrum goblet shaped slightly expanded in the middle, very short and well sclerotized. Ductus bursae very long, thin and transparent, caudal part with two short rods (without central) covered with small dark spinules, middle part bag-shaped, covered with little spines on the right inner surface. Corpus bursae elongate, signum relatively large, base narrow, spine slender, almost straight.

Abdominal tergites of female (Fig. 12). Tergal disk about 1.5 times longer than wide. Abdominal tergite I bristled by 57–63 spinelets on each plate; patches a bit narrower on the following tergites and have 73–76 spinelets on each.

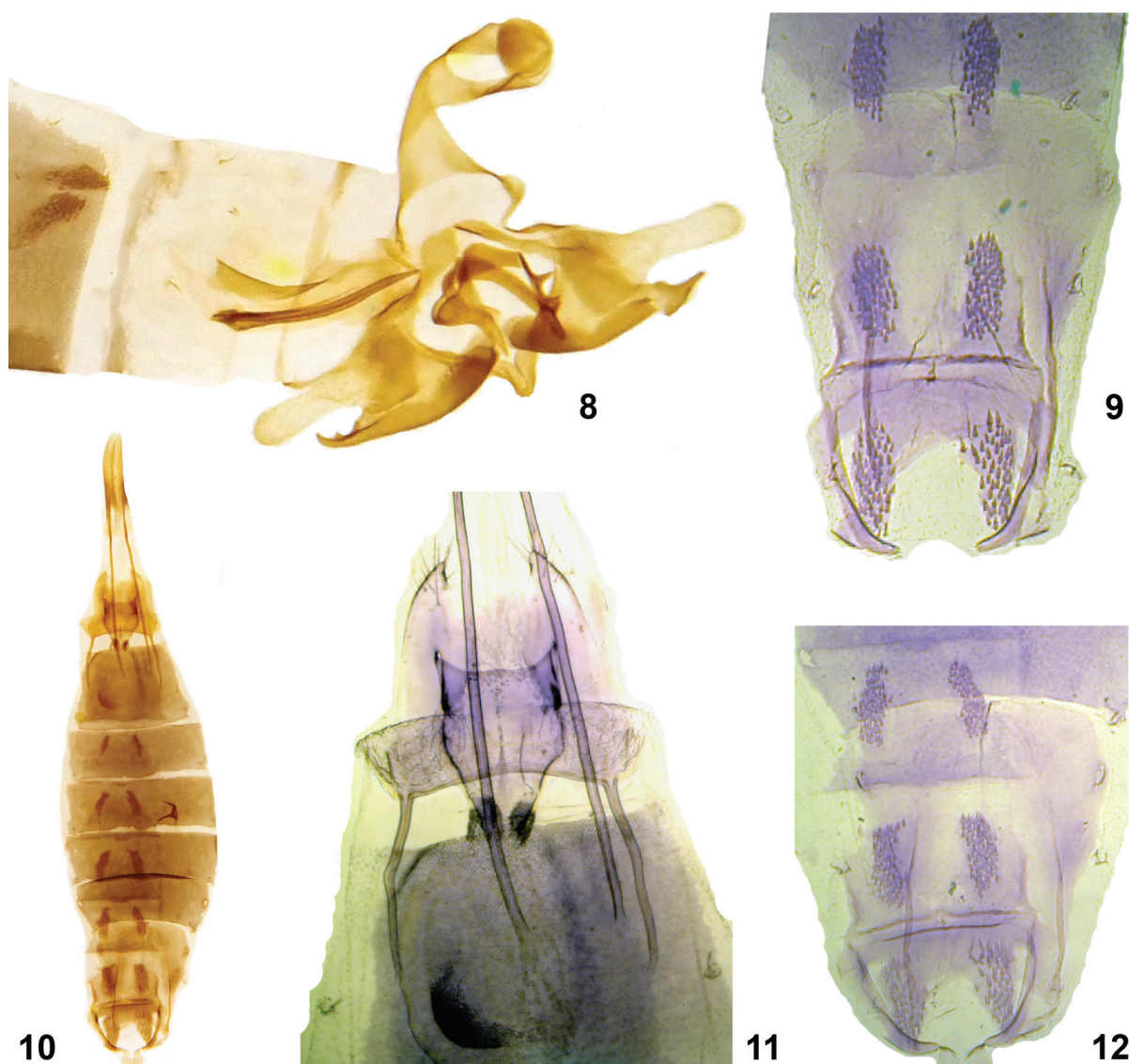
The type locality description. The type locality of the new species is montane stepped landscapes with shrubs along the southern slopes (Fig. 2). The gorge is located parallel to the Elborz Range, 5 km north of Foulad Mohalleh village in Semnan Province, Iran. The altitude is 2015 m a.s.l., the mountain peaks exceed 2300 m. The stabilized clayed coarse-rubble scree with rock outcrops is covered with *Juniperus polycarpus* sparse forest. *Acer monspessulanum persicum* can be found at the foot of the slope. The shrub layer is represented by two species of *Cerasus*, *Spiraea* sp., *Berberis* sp., and *Rosa* sp. The lower tier comprises polster xerophytic shrubs and dwarf shrubs: *Artemisia* spp., *Acantholimon* spp., *Onobrychis cornuta*, *Astragalus* spp. (including *Tragacantha*). In May the soil is covered with sparse grass sod of Gramineae containing some annual Compositae (Asteriaceae), Cruciferous (Brassicaceae), *Geranium* sp., *Ferula* sp., *Tulipa lehmanii*, *Cousinia thomsonii* and *Phlomis herba-venti*.

Distribution. Iran, Mazandaran Province.

Etymology. The new species is named after its type locality in Iran near mountain Sultan-Kut, where it was collected.

Discussion

Klinzigedia sultankutensis sp. n. has all diagnostic characters for species of the genus *Klinzigedia* which were allocated to the separate tribe Klinzigediini on the basis of



Figs 8–12. *Klinzigedia sultankutensis* sp. n., details of structure.

8 – male genitalia (holotype); 9 – abdominal tergites of male; 10 – female genitalia (paratype); 11 – antrum; 12 – abdominal tergites of female.

Рис. 8–12. *Klinzigedia sultankutensis* sp. n., генитальные структуры.

8 – гениталии самца (голотип); 9 – абдоминальные тергиты самца; 10 – гениталии самки (паратип); 11 – антрум; 12 – абдоминальные тергиты самки.

biological and morphological characteristics [Falkovitsh, 2003]. The monophyly of the tribe was supported using the genetic marker COI mDNA [Anikin et al., 2016a, b]. The larvae of species of this genus have one main peculiarity, known caterpillars of four species (*K. anelpista*, *K. inusitatella*, *K. phlomidella*, *K. phlomidis*) feed on plants of the genus *Phlomis* and one species (*K. wockeella*) on plants of the close genera – *Stachys*, *Betonica*, *Ballota*, and belong to the steno-oligophagous ecological group. Rarely mature caterpillars of *K. onopordiella* can finish feeding on Asteraceae [Falkovitsh, 1996]. According to our studies the larva of *K. sultankutensis* sp. n. has only one host plant *Phlomis herba-venti* which confirm the stenoligophagy of *Klinzigedia* species.

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