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## A new species of *Catocala* Schrank, 1802 (Lepidoptera: Noctuidae (sensu lato): Erebinae) from Kazakhstan

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Here we describe a new Palearctic species in the noctuid genus *Catocala*. The new species, *C. toropovi* sp. n., differs from sympatric and morphologically similar *C. repudiata* Staudinger, 1888 and *C. optima* Staudinger, 1888, by wing pattern, male genitalia, and COI 5' mitochondrial DNA. It is recorded from Kazakhstan, with adults having been collected at ultraviolet lights and baited sugar ropes.

The 5' region of the mitochondrial gene Cytochrome Oxidase Subunit I (658 base pairs) was sequenced by Paul Hebert's lab at the University of Guelph as described in Hebert et al (2003), with sequences aligned by eye in Mesquite version 2.75 (Madison & Madison 2011). Hebert combination of diagnostic COI 5' characters for *C. toropovi* was obtained via the map characters function of WinClada (Nixon 2002), with *C. toropovi* existing in an unresolved polytomy with other sequenced Salicaceae-feeding species.

Genitalia were dissected by HLK after submerging abdomens in 10% KOH for approximately 48 hours. The aedeagus was removed from the capsule and photographed prior to everting the vesica with a syringe of 99% isopropyl alcohol. The capsule was photographed in several aspects with the hairs and scales covering it intact, and then after their removal. Subsequently, the capsule was separated into valve+vinculum, juxta+anellus, and uncus+tegumen. Staining using chlorazol black was used only on the ductus ejaculatorius. Prolegs and metalegs were also submerged with KOH, and then the scales and hairs were removed with fine forceps.

Genitalia photographs were taken by HLK with Automontage or GT Vision imaging systems. Three dimensional genitalic structures were photographed in 99% alcohol with fiber optic halogen lighting. Only the juxta/anellus and abdominal skins were flattened and dried between two glass slides, although the lateral images of the uncus+tegumen were obtained when these structures were held in place by a piece of convex glass. Dissections were preserved in 99% ISOH in screw cap vials with polyseal caps.

The use of some genitalic terminology for *Catocala* is inconsistent or controversial among different sources, including the terms cucullus, sacculus, valvula, saccus, and aedeagus. This paper uses terminology as shown at the web link "Genitalia Structural Terminology for *Catocala* and Related Genera" at <http://www.lepidopterabiodiversity.com/home.htm>. The vesica of *Catocala* is highly three provided, bulbous, with radiating lobes and overlapping diverticula that are badly distorted/destroyed by slide mounting. For describing the vesica and identifying homologous lobes, HLK has developed a system that numbers lobes/diverticula present in most or all *Catocala* from 1–13 (see preceding link). Some of these lobes vary from simple to bilobed or trilobed between species or species groups, and are labeled Na, Nb when bilobed or Na, Nb, Nc when trilobed. Lobes and diverticula are labeled with this numbering system herein.

Institutional acronyms are as follows: AFM = Alessandro Floriani (Milan, Italy); BMNH = British Museum Natural History, (London, England); ZSM = Zoologische Staatssammlung, München (Germany); NRCV = Nature Research Centre (Vilnius, Lithuania); RJB = Robert J. Borth, (Milwaukee, U.S.A); STB = Sergey Toropov, (Bishkek, Kyrgyzstan).

**Female.** Unknown.

**Biology and distribution.** Nineteen male specimens were collected at ultraviolet light during August 2012 and 2013 in southeast Kazakhstan. Habitat at the collection site is a leafy forest (tugay) on the floodplains of the Ili River and its tributary Charyn, dominated by *Populus diversifolia* Schrenk ex Fisch. & C. A. Mey, *Halimodendron* sp. and bushes of *Elaeagnus commutata* Bernh. ex Rydb., and a few grasses, *Glycyrrhiza* sp. A single old specimen from the same vicinity is in the BMNH with a stated collection date of 15 July, earlier than all recent records. In the Ili locality the floodplain is less than 500 meters wide and all moths were collected about 150 meters away from the river, between 11.30 P.M. and 2.30 A.M. Other Salicaceae-associated *Catocala* collected with *C. toropovi* included *C. repudiata*, *C. optima*, *C. remissa* and *C. artobolevskiji* Sheljuzhko, 1943.

**Etymology:** Named after prominent Central Asian Lepidoptera specialist Sergey Toropov, whose collecting first brought this species to our attention.

**Remarks.** Other species/specimens with genitalia illustrated: Dissection No. 2014HLK:2009: *C. optima*, male, Kazakstan, Ili River, Barakhudzir, 6.viii.2013, Toropov leg. (RJB); Dissection No. 2010HLK:614: *C. optima*, male, DNA Voucher No.: 6115-050906-TA, Tadjikistan, Darvaz Mountains, Tigrovaya Balka Reserve, 30.viii–10.ix.2006, V. Gurko (RJB); Dissection No. 2014HLK:2010: *C. repudiata*, male, China, Xinjiang, W. Taklimeshan desert, Yarken He River valley, tugay forest, 1140 m, N 39° 21.953' E 78° 11.639', 9–12.vi.2013, Floriani leg. (RJB); Dissection No. 2013HLK:1742: *C. repudiata*, male, DNA Voucher No.: 6083-050802-TA, Tadjikistan, W. Pamir Mountains, Rushan District, 1000 m, 5.viii.2002. V. Gurko.

Supplemental plates with larger and more extensive images are available at <http://www.lepidopterabiodiversity.com/home.htm> under "Supplemental Plates for Published Articles."

**COI 5' Mitochondrial DNA:** *C. toropovi* specimen [GenBank No. KJ960234] has the following sequence for COI 5' positions 1-658. A single position was polymorphic among four sequenced specimens: 619(C&T).

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AAC TTTATATTTTATTTTGG AATTTGAGCAGGAATAGTAGGA ACTTCACTAAGATTATTAATTCGAGCT
GAATTAGGTAATCCTGGTCTTTAATTGGAGATGATCAAATCTATAATACTATTGTTACAGCTCATGCTTT
TATTATAATTTTTTTTATAGTTATAACCAATTATAATTGGAGGATTTGGTAATTGATTAGTACCTTTAATATTA
GGAGCTCCTGATATAGCTTTTCCTCGTATAAATAATATAAGTTTTTGACTTCTACCCCTCATTAACCTT
ATTAATTTCAAGAAGAATTGTAGAAAATGGAGCAGGA ACTGGATGAACAGTTTATCCCCCTTTCTT
CTAATATTGCTCATAGAGGTAGTTCAGTAGATTTAGCTATTTTTTTCATTACATTTAGCTGGAATTTCTTCA
ATTTTAGGAGCTATTAATTTTACTACAATCATTAACATACGATTAATAATTTAATTTGATCAAATA
CCTTTATTTGTTTGAGCTGTAGGAATTA CTGCATTTCTTCTTCTTTTTCATTACCAGTATTAGCTGGAG
CTATTACTATACTCTTA ACTGATCGAAATTTAAACACTTCTTTTTTTGACCCCGCTGGAGGAGGAGATC
CTATTTTATATCAACATTTATTT
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