A new species of Melanoplus (Orthoptera: Acrididae: Melanoplinae) from the cedar glades of Tennessee, USA

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Abstract

Melanoplus ingrami n. sp. is described from the cedar glades of central Tennessee.

Key words

Melanoplus, cedar glade, Tennessee

Introduction

The cedar glades of the Central Basin of Tennessee (Fig. 1a) have long been noted for their unique flora (Gattinger 1887, 1901; Harper 1926; Quarterman 1950a, 1950b; Baskin & Baskin 1999). These glades possess fourteen endemic plants, the highest number of any of the Southeastern glade communities. While much attention has been given to the flora (See Quarterman 1993 and Baskin & Baskin 1999 for summaries) and vertebrate faunas of the glades (Jordan et al. 1968, Jordan 1986, Shultz 1930), little attention has been paid to the insect fauna: there is only one study, which attempted to focus on all invertebrates of a single glade, conducted from 1929 to 1930. (Meyer 1937).

To document the insect fauna of this unique habitat, the Mississippi Entomological Museum (MEM) selected the area as the destination for the 1997 and 2009 William H. Cross Annual Collecting Expeditions. No Orthopteran specialist was on staff at the MEM in 1997, but I became involved by 2009. From the start of the 2009 expedition, the Orthopteran fauna of the glades proved interesting, as the first grasshopper specimen collected proved to be an undescribed species of Melanoplus, the subject of the present paper.

Methods

Attempts to identify the Melanoplus specimens from the cedar glades were made with Blatchley (1920), Dakin & Hays (1970), Hebard (1934), Helfer (1972) and by checking material against Melanoplinae specimens in the MEM, Academy of Natural Sciences of Philadelphia (ANSP), and the United States National Museum.

Habitus and internal genitalia photographs were taken with a Leica M16 stereoscope equipped with a Leica DFC420 camera at different stages during dissection. Images were then automontaged with Leica Application Suite. External genitalia drawings were made with a drawing tube mounted on a Leica MZ 12.5 stereomicroscope.

Measurements were made with a measuring reticle mounted inside a Leica MZ12.4 stereomicroscope. Abdomens in Orthoptera specimens can be contracted or distended, thus providing a wide range of variation; therefore, overall length of the specimens was measured from the fastigium vertex to the distal end of the hind femur, viewed laterally. Tegminal length was measured laterally at its greatest length.

Results

Melanoplus ingrami, new species


Etymology.—This species is named in honor of Wayne (Buddy) Ingram, interpretive officer and naturalist of Cedars of Lebanon State Park, for his enthusiastic assistance with the logistics of this study and for sharing his vast knowledge of the glades and the region.

Male Description.—

Measurements.—In mm (n = 10). Length 16.6-19.4 (mean = 17.9); pronotum length 3.5-4.3 (mean = 3.9); tegmina length 3.0-4.3 (mean = 3.6); hind femur length 8.6-10.5 (mean = 9.5); cerci length 0.8-1.0 (mean = 0.9); basal width of cerci 0.4-0.7 (mean = 0.6); mid-cercal width 0.3-0.4 (mean = 0.3); cerci apex width 0.2-0.4 (mean = 0.2).

Color.—Antenna light brown. Antennal crescent complete. In living specimens (Fig. 1b), head, thorax, and tegmina brownish gray dor-sally, in preserved (Fig. 2a, b.) dark gray dorsally and cream colored ventrally; dorsal surface of head with a dark triangle; pronotum, legs, and abdomen sprinkled with dark brown spots. A lateral, black postocular stripe extends from the caudal margin of the eye to the third, fourth, or fifth abdominal tergite. The stripe is absent from the metazona of the pronotum and is cut by a light diagonal stripe on the metathorax, whitish in living specimens. Below the postocular stripe, head, pronotum, and a portion of the anterior segment of the mesothorax grayish-white. Tegmina dark gray. Abdomen light brown sprinkled with dark spots. Hind femora with two faint dark stripes dorsally that may continue laterally on the medial area, and the knee black. Hind tibia glaucous to yellow-brown with black tipped spines.

Head slightly wider than pronotum. Disk of pronotum with lateral margins diverging posteriorly; median carina distinct, but low on the prozona, and slightly elevated and arching on the metazona; anterior and median sulci present laterally; indistinct near the dorsal carina, posterior sulci dissecting the dorsal carina; posterior pronotal margin slightly rounded. Tegmina ovate, tips rounded; dorsal margins attingent, typically extending about halfway

Submitted October 1, 2010, accepted November 15, 2010
Female.

Measurements.—In mm (n = 10). Length 17.1-22.2 (mean = 20.4); pronotum length 4.6-5.5 (mean = 4.9); tegmina length 3.4-4.6 (mean = 4.1); hind femur length 11.1-12.3 (mean = 11.9); dorsal angle of upper ovipositor valves 135º.

Much larger, plumper than male. (Fig. 2c, d) Coloration similar to male, but with a faint diamond-shaped pattern on the dorsal surface of the pronotum and with the postocular stripe extending to the eight or ninth abdominal tergite, depending on the individual. Glaucous coloration typically covers less of the hind tibia than in males, but the amount varies between individuals of each sex. Cercus (Fig. 5c) triangular. Upper valves of ovipositor (Fig. 5c) armed with several teeth anteriorly.
of the cedar glades. Habitat have since spurred further studies of the Orthopteran fauna indicates that this species may be a cedar glade dependent species. This species was not found along disturbed roadsides that had a little canopy cover, and patchy herbaceous cover. Plants commonly found in areas where Melanoplus curtipendula seems to primarily be a denizen of the gravel zone of the cedar glades, as this is where the majority of individuals were encountered. The gravel zone of the cedar glades is the most xeric of the communities next to bare rock and is characterized by shallow (0-5 cm) gravel-covered soil, little canopy cover, and patchy herbaceous cover. Plants commonly found in areas where M. ingrami was collected include Bouteloua curtipendula, Crotan monaghymus, Dalea gattingeri, Echinacea tennesseensis, Grindelia lancifolia, Hedyotis spp., Leavenworthia spp., Manfreda virginica, Nostoc commune, and Rattiitha pinnatta. On one occasion two individuals were collected in the grassy barren zone of the glades. This species was not found along disturbed roadsides that had a similar gestalt of cedar glades, in some cases adjacent to undisturbed glade habitat, a fallow hayfield, and several types of forest, which indicators that this species may be a cedar glade dependent species. The discovery of this novel species and the unique nature of the habitat have since spurred further studies of the Orthopteran fauna of the cedar glades.

**Paratypes.** Other than the holotype, all specimens examined in this study are designated as paratypes. Specimens are deposited in the Academy of Natural Sciences of Philadelphia (ANSP), Mississippi Entomological Museum (MEM), and the University of Michigan Museum of Zoology (UMMZ).


**Diagnosis.**—Males of this species key to the Melanoplus tribulus group in Blatchley (1920) and Melanoplus moresi Blatchley in Hebard (1934). In fact, M. moresi Blatchley and Melanoplus rusticus (Stål), another member of the tribulus group, occur in the forests adjacent to the glades. However, M. ingrami differs from members of the tribulus group mainly in the coloration of the body, the broken postocular stripe, the raised carina on the metastoma, and unique internal male genitalia. At this time, the species group to which M. ingrami belongs is uncertain.

**Habitat.**—Quarterman et al. (1993) broke the heterogeneous glade habitat into several zones. Melanoplus ingrami seems to primarily be a denizen of the gravel zone of the cedar glades, as this is where the majority of individuals were encountered. The gravel zone of the cedar glades is the most xeric of the communities next to bare rock and is characterized by shallow (0-5 cm) gravel-covered soil, little canopy cover, and patchy herbaceous cover. Plants commonly found in areas where M. ingrami was collected include Bouteloua curtipendula, Crotan monaghymus, Dalea gattingeri, Echinacea tennesseensis, Grindelia lancifolia, Hedyotis spp., Leavenworthia spp., Manfreda virginica, Nostoc commune, and Rattiitha pinnatta. On one occasion two individuals were collected in the grassy barren zone of the glades. This species was not found along disturbed roadsides that had a similar gestalt of cedar glades, in some cases adjacent to undisturbed glade habitat, a fallow hayfield, and several types of forest, which indicates that this species may be a cedar glade dependent species. The discovery of this novel species and the unique nature of the habitat have since spurred further studies of the Orthopteran fauna of the cedar glades.

**Acknowledgements**

I thank Buddy Ingram for his logistical assistance with the survey of the cedar glades insect fauna, Dan Otte and David Nickle for allowing access to the ANSP and USNM respectively, Matt Dakin for his assistance in attempts to identify the specimens. This project was funded by the William H. Cross Collecting Expedition Fund. This is publication J-11904 of the Mississippi Agricultural and Experiment Station. Specimens were collected under a permit from the Tennessee Natural Heritage Program.

**Literature Cited**


Fig. 3. Ectophallus showing cingulum and emerging aedeagus. a. Lateral view. b. Dorsal. c. Close-up rear view of aedeagus.

Fig. 4. Internal male genitalia of *Melanoplus ingrami*. a-d. Dorsal, lateral, ventral and caudal views of phallic complex, respectively. e-g. Close up dorsal, lateral and caudal views of aedeagus. h. Close-up caudal view of aedeagus with cingulum and membranous material removed. i-k. Phallic complex with cingulum removed. l-m. Epiphallus caudal and dorsal views, respectively. For color version, see Plate XI.

Fig. 5. External terminalia. a. Supra-anal plate. b. Male cercus. c. Terminalia of female abdomen.

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