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## Pupal cases of three Nearctic species of *Machimus* (Diptera: Asilidae)

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### Abstract

The pupal cases of the Nearctic robber flies, *Machimus latapex* Martin, 1975, *M. occidentalis* (Hine, 1909), and *M. prairiensis* (Tucker, 1907) are described. They are compared with the previously described pupal cases of six other Nearctic species of *Machimus*. The pupal case of *M. latapex* and facial sheaths and posterior antennal processes of *M. occidentalis* are illustrated.

**Key words:** Asilinae, Asiloidea, immature Diptera, Insecta, pupa

### Introduction

Approximately 188 species of *Machimus* occur throughout most of the world except Australia and New Zealand (Geller-Grimm 2012). In the Nearctic region there are 31 species, but the pupal cases of only six species have been described in detail (female *M. erythrocnemius* (Hine, 1909), *M. lecythus* (Walker, 1849), male *M. notatus* (Wiedemann, 1828), male *M. occidentalis* (Hine, 1909), *M. paropus* (Walker, 1849), and *M. snowii* (Hine, 1909)) (Dennis *et al.* 2008a; Scarbrough and Kuhar 1995).

Here we describe the pupal cases of a male *M. latapex* Martin, 1975, and female *M. occidentalis* and *M. prairiensis* (Tucker, 1907).

### Material and methods

The following descriptions are based on pupal cases and associated adults in the National Museum of Natural History, Washington, D. C. (USNM). The authors confirmed the identification of the adults using the keys found in Hine (1909) and Martin (1975). Our descriptions follow the format found in Dennis and Barnes (2012) and Dennis *et al.* (2008a, b).

The morphological characteristics of the pupal cases include those for the head, thorax, and abdomen. The head has anterior and posterior antennal processes, and ventral mouthpart sheaths. The thorax has on each side a prothoracic spiracle, anterior mesothoracic spines, and a posterior mesothoracic callosity or tubercle and spine. Ventrally on the thorax there are wing and leg sheaths (leg sheath 1/foreleg sheath, leg sheath 2/midleg sheath, and leg sheath 3/hind leg sheath). Abdominal segments 1–8 have dorsal spines and/or spurs, and dorsolateral, lateral or postspiracular, and ventral bristlelike spines. Abdominal segment 9 has dorsal and ventral posterolateral processes, and ventral callosities and/or tubercles.