

## **Depositional setting and fossil insect preservation: A study of the late Eocene**

### **Florissant Formation, Colorado**

Jenell Thoene Henning,<sup>1</sup> Dena M. Smith,<sup>1\*</sup> César R. Nufio,<sup>2</sup> And Herbert W. Meyer<sup>3</sup>

<sup>1</sup>*University of Colorado, CU Museum of Natural History—Paleontology, Boulder, Colorado, 80309-0265, USA, Jenell.Thoene@colorado.edu, Dena.Smith@colorado.edu;*

<sup>2</sup>*University of Colorado, CU Museum of Natural History—Entomology, Boulder, Colorado, 80309-0265, USA, nufio@colorado.edu;* <sup>3</sup>*Florissant Fossil Beds National Monument, 15807 Teller County Road 1, Florissant, Colorado, 80816, USA, herb\_meyer@nps.gov*

*\*Corresponding author.*

Keywords: taphonomy, environment, lithology, shale, Lagerstätten

### **ABSTRACT**

To study how lacustrine depositional environments influence the preservation of insects, the abundance, size, and quality of insect specimens were compared across shale, mudstone, and siltstone within the Florissant Formation of Colorado. These lithologies were chosen because they reflect differences in associated energy, grain size, and presence of diatom layers. Eight hundred and twenty-three fossil insects were collected from a single stratigraphic section within the lacustrine deposits of the Florissant Formation (late Eocene). Sampling across these lithologies was associated with low specimen collection rates (3.7–5.6 insects collected per collector-day) that did not differ across the sedimentary environments. In addition, the relative abundance of insect orders did not differ across the sedimentary environments. Specimens were significantly smaller and less variable in size within the siltstone than they were within the shale and mudstone, likely due to differences in temporal and spatial averaging. Overall, 56% of insect specimens were disarticulated and 66% were considered of low quality. Insect disarticulation levels, preservation quality, and specimen orientation did not differ across all lithologies in general and for the other three insect orders, despite differences in coleopteran (beetles) preservation in siltstone where they were less disarticulated and more commonly preserved in a lateral position. This indicates that insect specimens of the quality typically associated with shale deposition also can be found in mudstone and siltstone, which increases the areas within lakes that can be sampled and compared for paleoecological studies.