

ABSTRACT

Merope tuber Newman (Mecoptera: Meropeidae) is a rare North American species of earwigfly, which is closely related to common scorpionflies. "Earwigfly" refers to three different species: the Western Australian *Austromerpe poulton*, the South American *Austromerpe brasiliensis*, and finally, the Eastern North American *Merope tuber*. This last species was the focus of our study. Johnson's 1995 study was based on 160 earwigflies, where he measured the female abdomen length, male and female forewing length, and male basistylus and dististylus length. In their 2014 study, based on 82 earwigflies, Skvarla, Hartshorn, and Dowling measured head width, pronotum width, forewing length, abdomen length, basistylus length, and dististylus length. In our study of 504 earwigflies, we are measuring head width, pronotum length, pronotum width, pterothorax length, abdomen length, forewing length, basistylus length, and dististylus length. This project was started in February, at this point we have measured about 2/5 of the specimens. This collection of 504 earwigflies is most likely the largest collection of any earwigflies in the world, and provided an excellent dataset for a comprehensive morphometric analysis. We plan to incorporate morphometrics to our measurements and seek to corroborate our results with previous findings.



Fig 1: 76 specimens collected from one site in one week.

INTRODUCTION

Our goal with our study was to fill in a gap in entomological knowledge using a unrepresented sample size given the rarity of the specimen. By measuring this many specimens in such a thorough many, we have far more comprehensive morphological data compared to previous studies. Despite being discovered in 1838, no study of *Merope tuber* Newman, the North American earwigfly, has taken place of this size. On this poster we compare the data from our study with two others. Johnson's 1995 study was based on 160 earwigflies, where he measured the female abdomen length, male and female forewing length, and male basistylus and dististylus length. In their 2014 study, based on 82 earwigflies, Skvarla, Hartshorn, and Dowling measured head width, pronotum width, forewing length, abdomen length, basistylus length, and dististylus length. In our study of 504 earwigflies, we are measuring head width, pronotum length, pronotum width, pterothorax length, abdomen length, forewing length, basistylus length, and dististylus length.

MATERIALS and METHODS

Pan Traps: Pan traps are rectangular pans (Fig 2.) that measure 22.5 x 27.5 x 7.5 cm that're placed on the forest floor in Cave Run. They are filled with saltwater and dish soap which results in a solution with very little surface tension. 18 pans would left on the forest floor for a week at a time.. They were divides as 6 per site with 3 sites. Collecting ran for two seasons through June-August 2011 and May-December 2012.

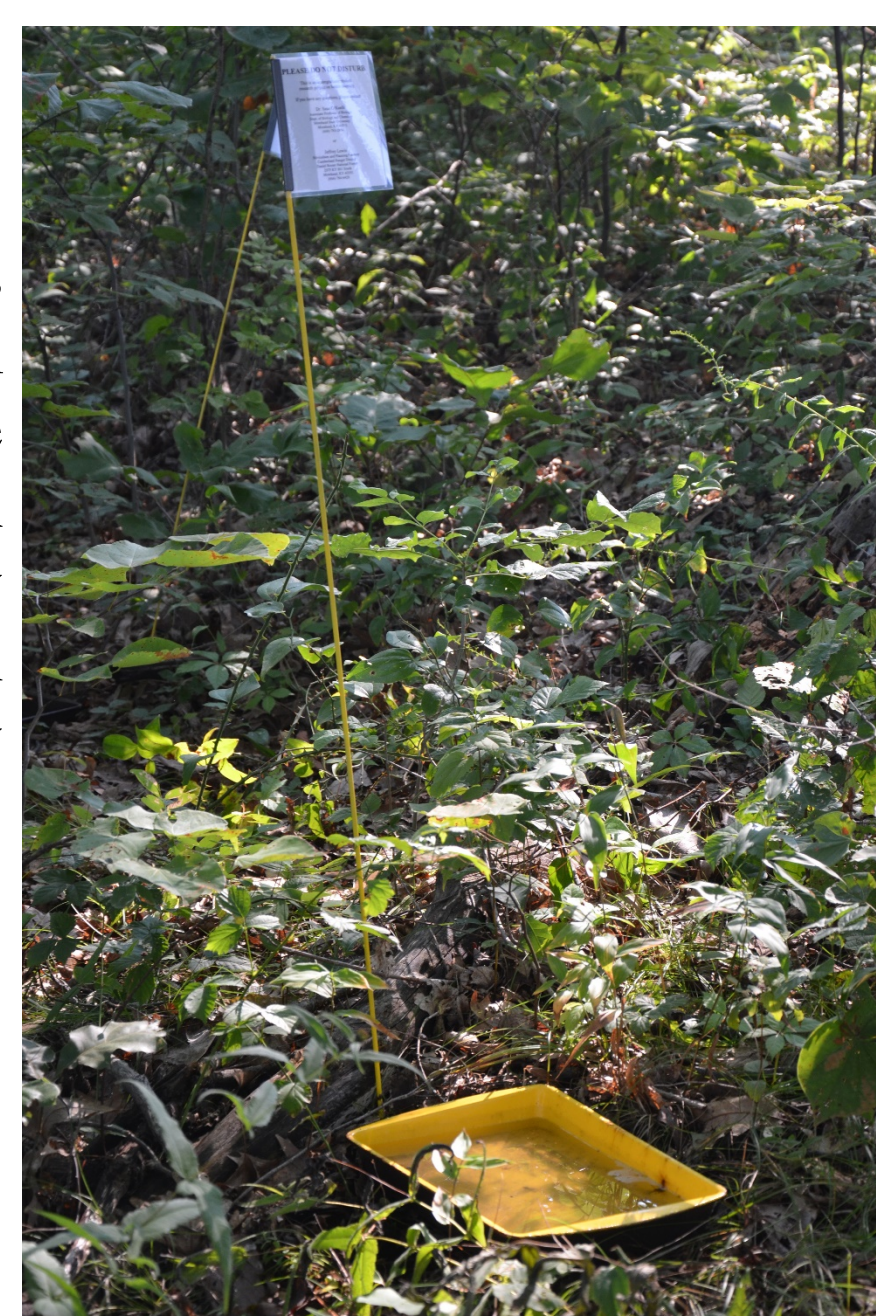


Fig. 2: Example of yellow pan trap in situ.

Our collection of 504 specimens (Fig 3.) is the largest, that we know of, in the country and in recorded literature. (Fig. 1) is from one set of traps, from one week.

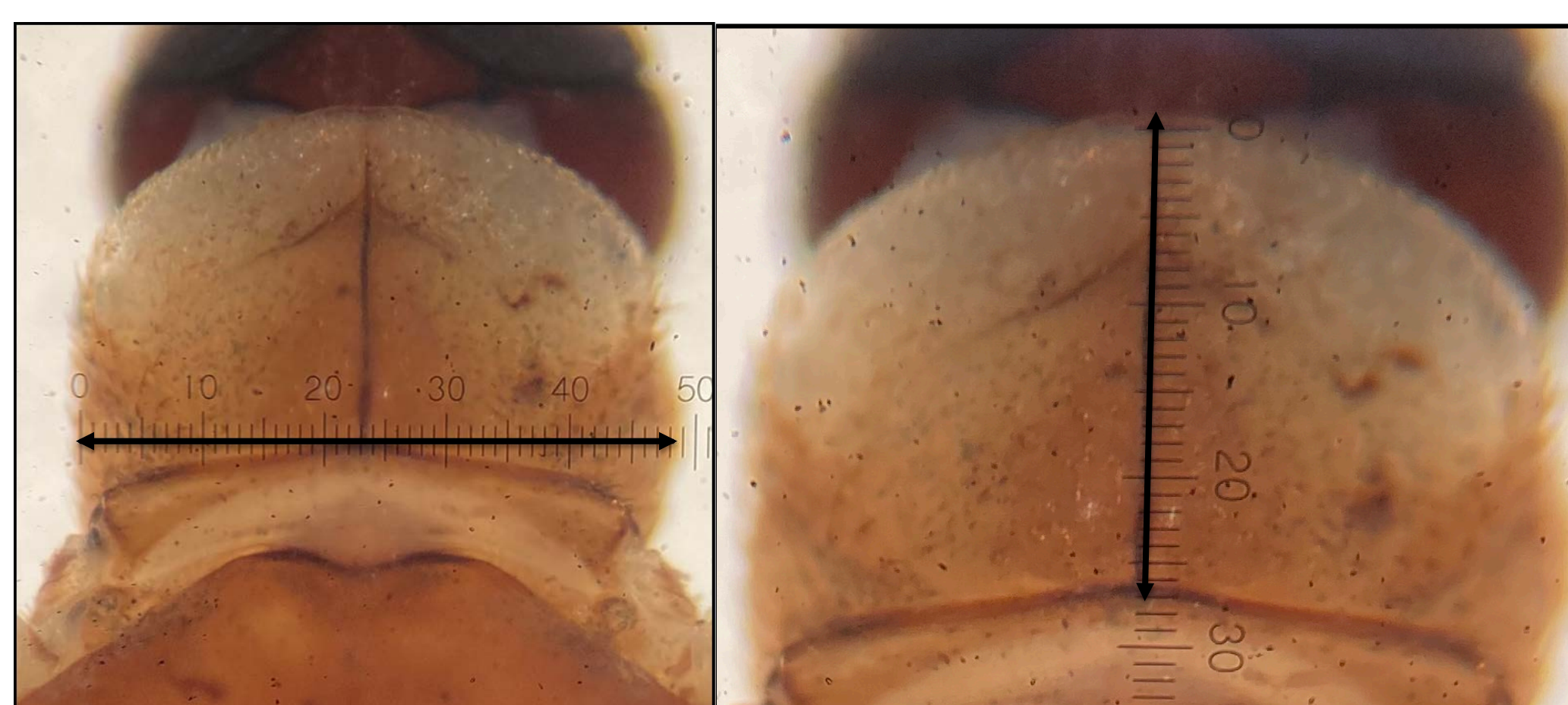


Fig. 3. Specimens stored in ethanol.

We used variable settings to more accurately measure each part of the insects. This, while taking longer, allows for more precise morphometric data to be collected. The head (Fig. 4), pronotum width (Fig. 5), and pronotum length (Fig. 6) were measured at x4 magnification, which has 41 tick marks equaling 1 mm. The Pterothorax Length (Fig. 7) was measured at x3 magnification, which has 31 tick marks equaling 1 mm.



Fig. 4: Head is measured from apex to apex of eyes in a ventral position.



Figs. 5 and 6: Pronotum width is measured from apex to apex of the inferior portion of the pronotum in a dorsal position.. Pronotum length is measured along the midline from anterior margin to the posterior margin of the pronotum.

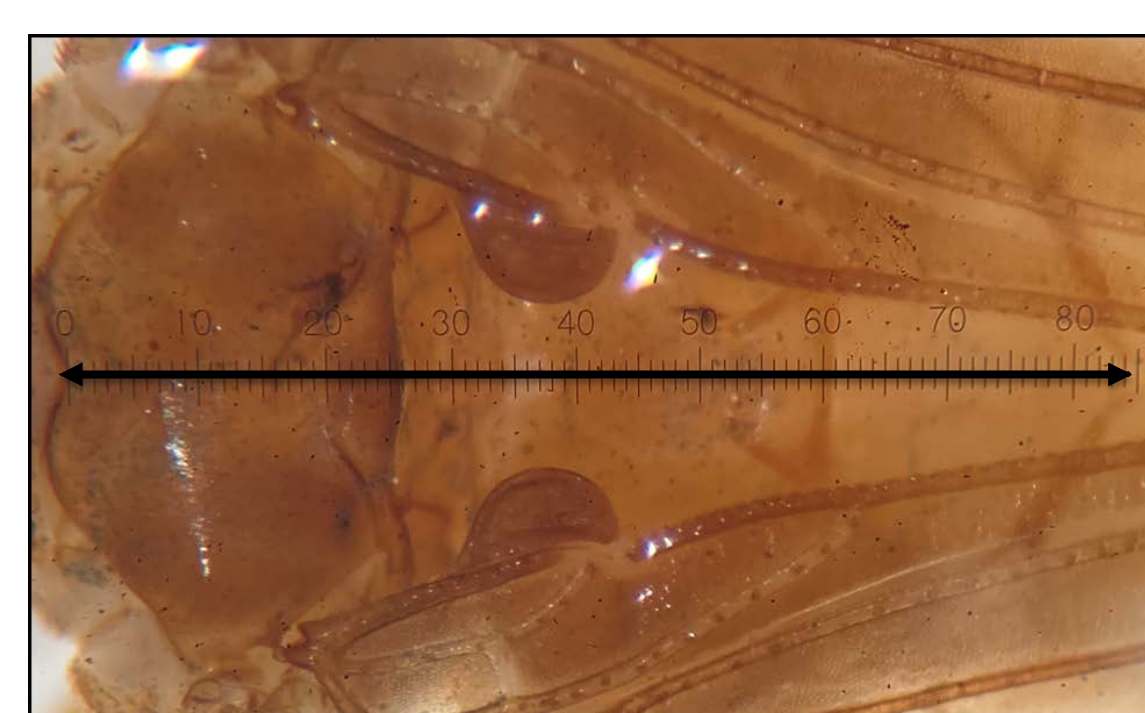


Fig. 7: Pterothorax is measured by pulling the wings apart and measuring from the apex of the pterothorax to posterior margin of the metascutum.

The right wing (Fig. 8) of each specimen was measured at x0.8 magnification which has 8 ticks equaling 1 mm. The abdomen length (Fig. 9) was measured at x1 magnification which has 10 ticks equaling 1 mm. Right Basistylus (Fig. 10) and Dististylus (Fig. 11) length were both measured at x1.5 magnification which has 16 ticks equaling 1 mm.

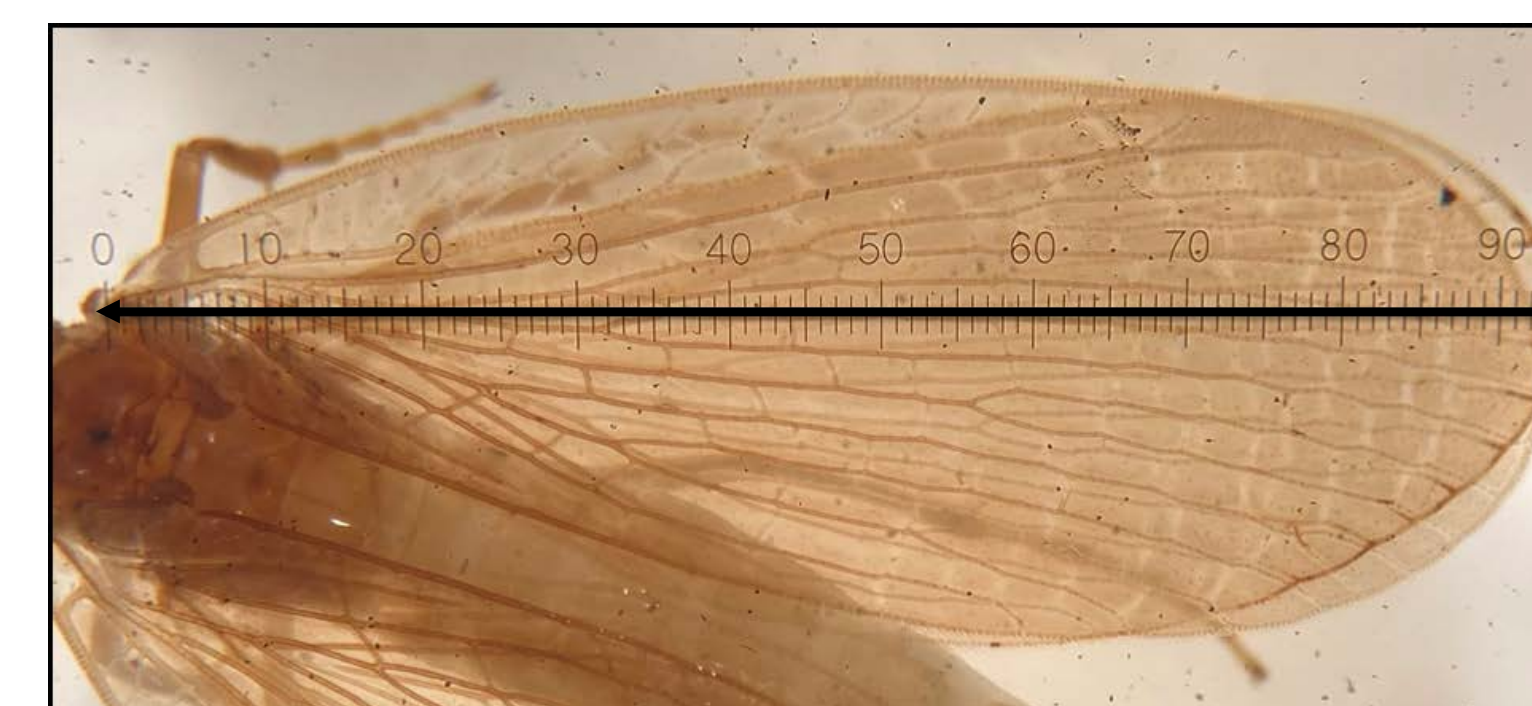


Fig. 8: Right wings of each specimen were measured dorsally from apex to apex of the wing.

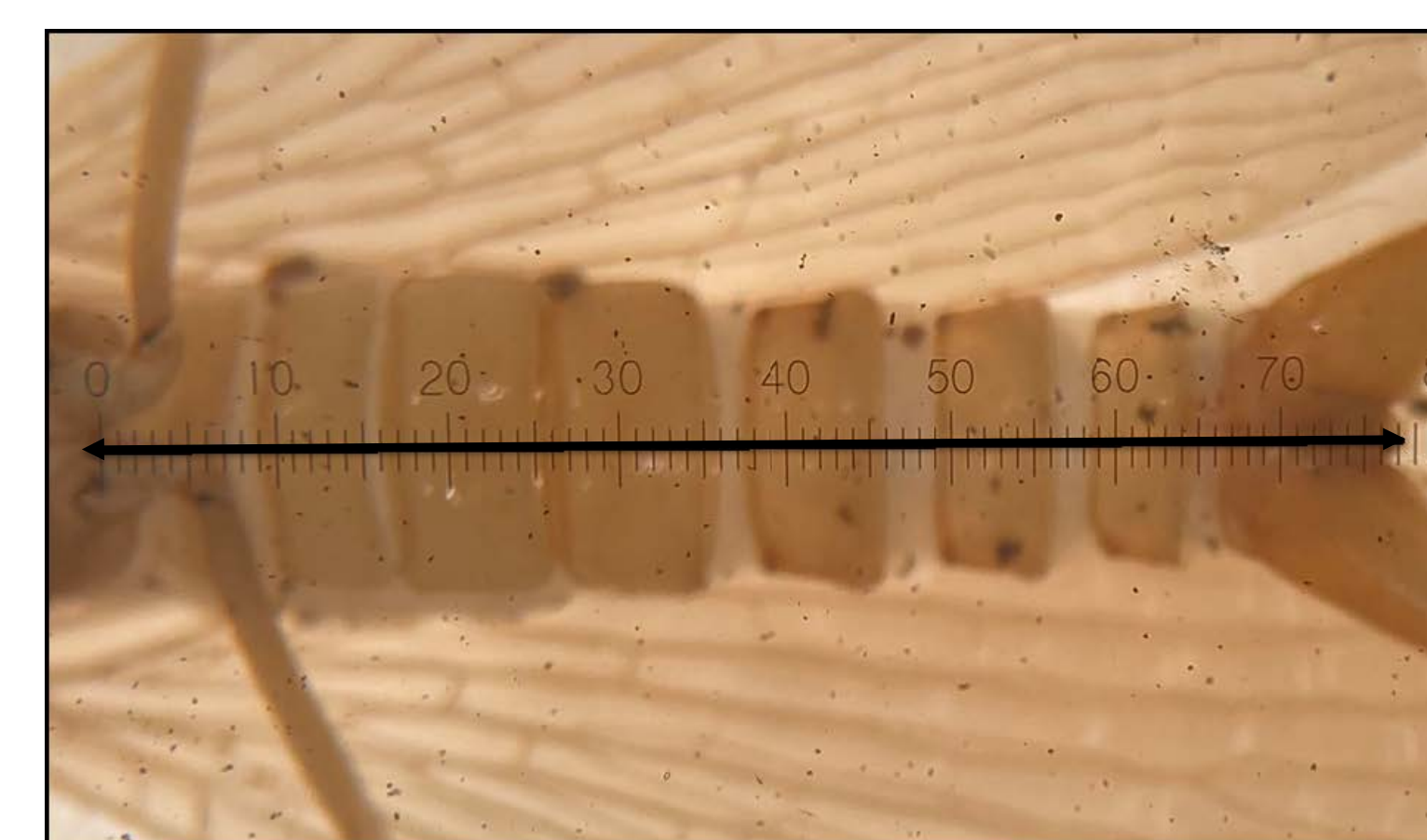
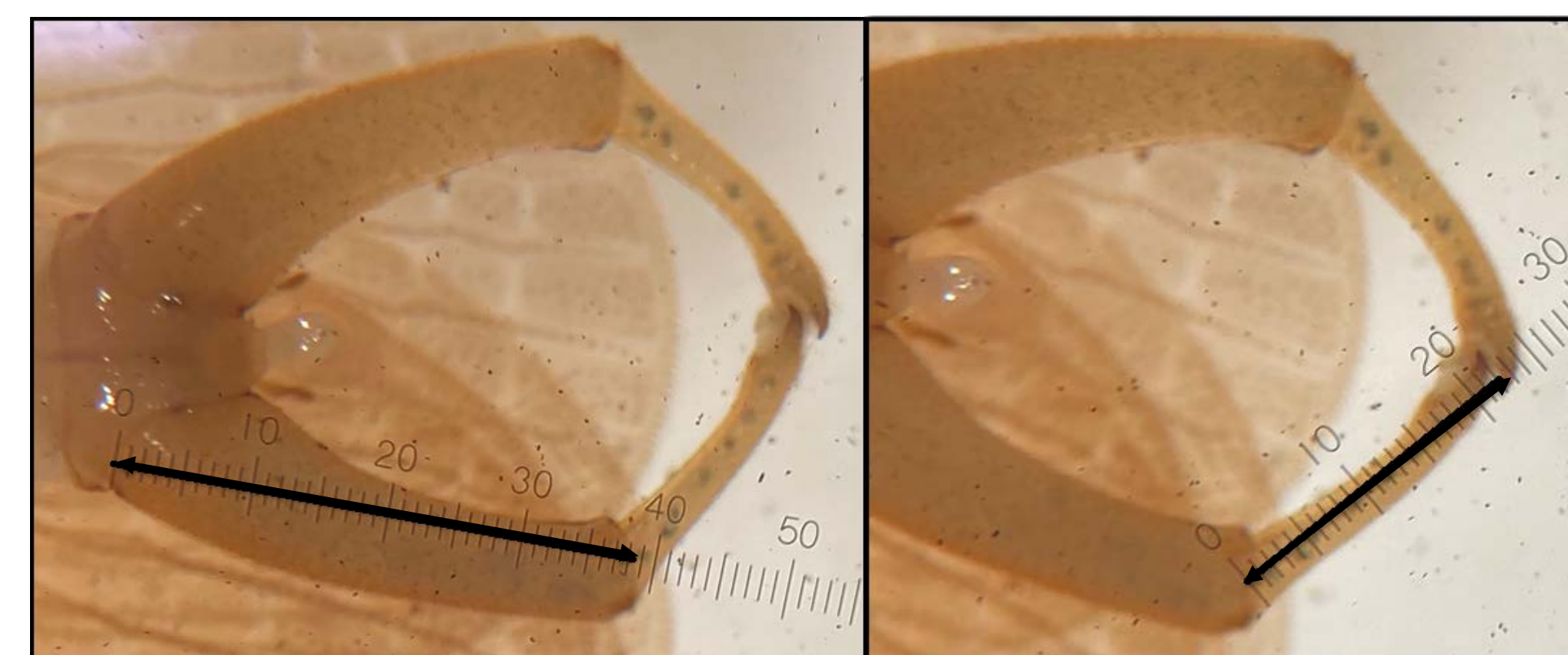


Fig. 9: Abdomen is measured from base of (where legs are) to distal apex of abdomen in case of females or origin of claspers in males.



Figs. 10 and 11: Right Basistylus is measured dorsally from lateral proximal end of joint to center distal joint. Right Dististylus length is measured dorsally from center of joint to tip of clasper.

RESULTS

Table 1: A collection of our data compiled into a minimum, maximum, and mean. This only represents half of our data to date.

	Minimum (mm)	Maximum (mm)	Mean (mm)
Head Width	0.78	1.46	1.16
Pronotum Width	0.92	1.56	1.24
Pronotum Length	0.53	1.07	.73
Pterothorax Length	2.12	3.54	2.84
Abdomen Length	5.1	11.1	8.22
Forewing Length	9.75	15.12	12.57
Basistylus Length	2	5.6	4.5
Dististylus Length	1.12	3.31	2.56
Clasper Total Length	3.12	8.91	7.6

DISCUSSION

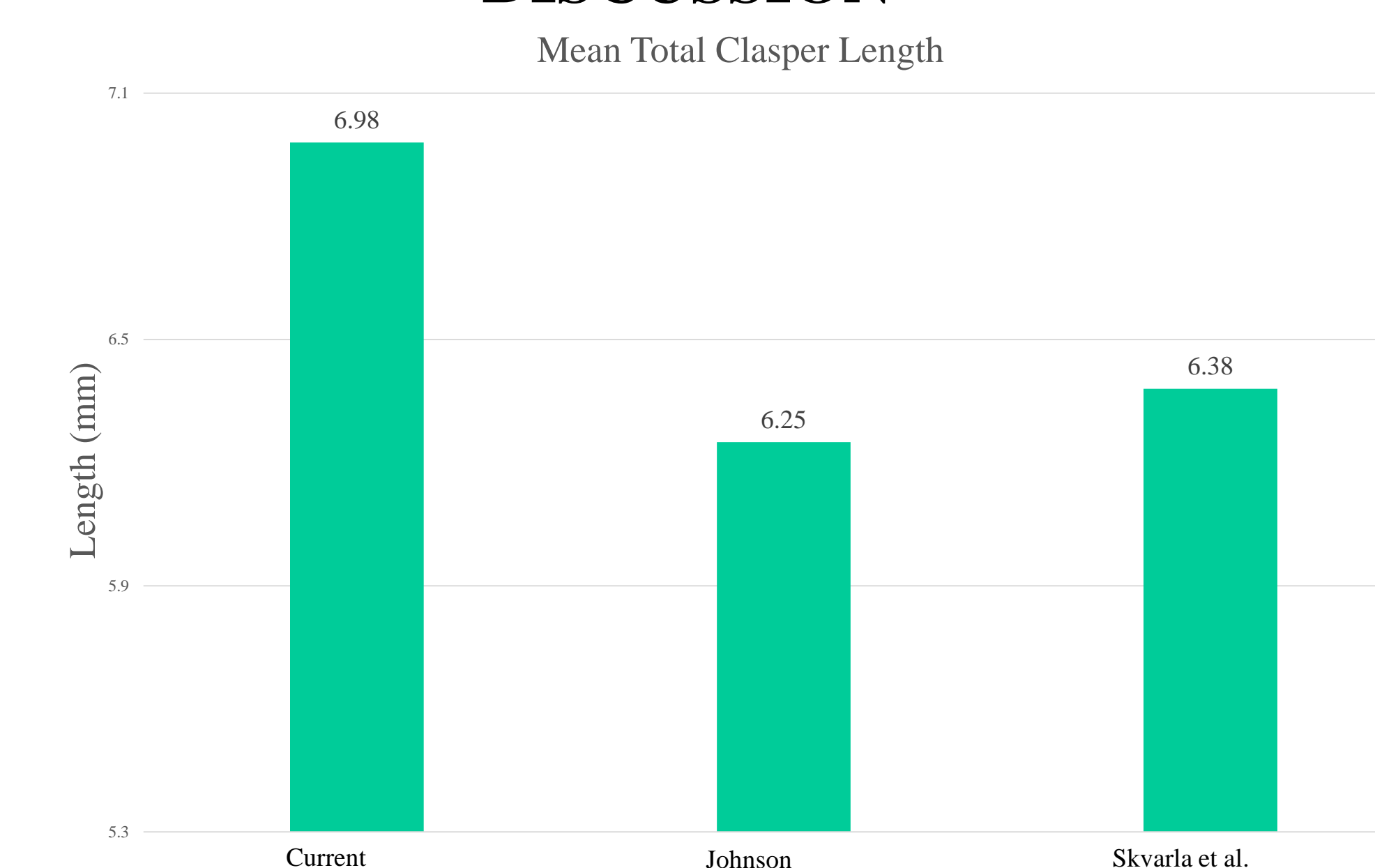


Fig. 12: A comparison between the mean total clasper lengths of each study.

Johnson's (1995) study measured the following parts of 160 earwigflies: Abdomen length: min 3.61 mm, max 7.21 mm, mean 5.64 mm. Forewing length: min 8.84 mm, max 14.88 mm, mean 11.67 mm. Basistylus length: min 1.98 mm, max 5.70 mm, mean 3.91 mm. Dististylus length: min 1.16 mm, max 3.49 mm, mean 2.34 mm.

Skvarla, Hartshorn, and Dowling's (2014) study measured the following parts of 82 specimens: Head width: min 0.77 mm, max 1.39, mean 1.1 mm. Pronotum width: min 0.95 mm, max 1.69 mm, mean 1.36 mm. Abdomen length: min 4.07 mm, max 8.96, mean 6.12. Forewing length: min 8.86, max 13.39 mm, mean 11.76 mm. Basistylus length: min 2.21 mm, max 5.09 mm, mean 4.05 mm. Dististylus length: min 1.47 mm, max 2.91 mm, mean 2.34.

Our study has measured the following parts of 234 out of 504 specimens: Head width: min 0.78 mm, max 1.46 mm, mean 1.16 mm. Pronotum length: min 2.12 mm, max 3.54, mean 2.84 mm. Pronotum width: min 0.92 mm, max 1.56 mm, mean 1.24 mm. Pterothorax length: min 2.12 mm, max 3.54 mm, mean 2.84 mm. Abdomen length: min 5.1 mm, max 11.1 mm, mean 8.22 mm. Forewing length: min 9.75 mm, max 15.12 mm, mean 12.57 mm. Basistylus length: min 2 mm, max 5.6 mm, mean 4.5 mm. Dististylus length: min 1.12 mm, max 3.31, mean 2.56 mm.

This is our preliminary comparison of our data to the other two studies'. We've yet to do a statistical analysis, measuring began only in February, but are planning to do one in our paper. We plan to extrapolate our data to compare potential regional differences between populations, as well as gain a comprehensive morphometric mean. Soft body parts, like the abdomen, distend easily due to fluid, but hard body parts, like the head, pronotum, and claspers can be more accurately compared. For example, our head width and pronotum width is comparable with Skvarla et al.'s. The mean between Johnson (1995) and Skvarla et al. (2014) forewing length, which is another body part that isn't warped easily is comparable, while ours is notably larger.

ACKNOWLEDGEMENTS

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