

## Abstract

The paraphyletic group Nematocera is highly diversified in both body morphology and life strategies. Based on sex chromosome morphology, it can be divided into four groups defined as early as the mid-20th century. All these systems are based on the presence of the XY/XX sex chromosomes or the loss of the Y chromosome. The different groups are distinguished based on whether the chromosomes are differentiated, whether chiasmata are present and whether the Y chromosome is retained. However, later research has shown much higher sex chromosome diversity, mostly in groups with homomorphic gonosomes. Even though most representatives of this group do not have differentiated sex chromosomes, we find the recurrence of differentiated gonosomes and even the  $X_1X_2Y_1Y_2$  /  $X_1X_1X_2X_2$  and ZW/ZZ sex systems, which are less typical for Diptera. These findings suggest that the form of sex chromosomes in Diptera may not be as stable as previously thought. The recently discovered non-homology of gonosomes across the Diptera, including several representatives of Nematocera, supports this idea. Multiple independent gonosome formation could also explain the diversity of primary sex-determining factors in those groups where these factors are known.

Key words: Nematocera, *Phlebotomus*, *Lutzomyia*, sex chromosomes, sex determination