

Supplementary figures

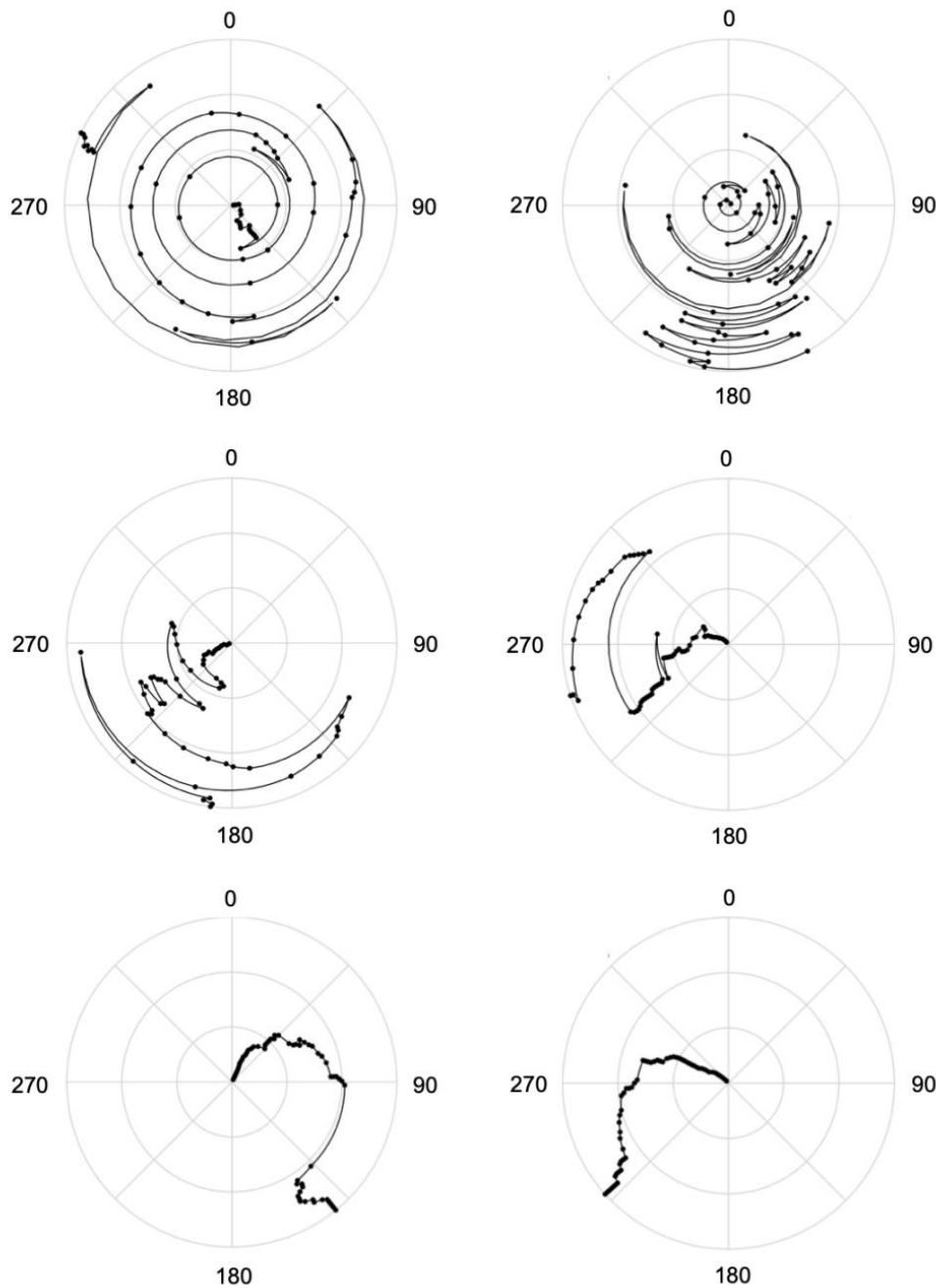


Figure S1. Orientation of a subset of individual captive-reared eastern North American migratory monarch butterflies (*Danaus plexippus*) reared on swamp milkweed (*Asclepias incarnata*) grown under control conditions (i.e., no clothianidin added to soil; $n = 6/12$). Individual monarchs were flown in a flight simulator for 10 minutes (5 direction samples/sec) in Guelph, ON in September 2018 and the circular mean (\bullet) is plotted for every 10 seconds (50 direction samples; radius = 10 minutes).

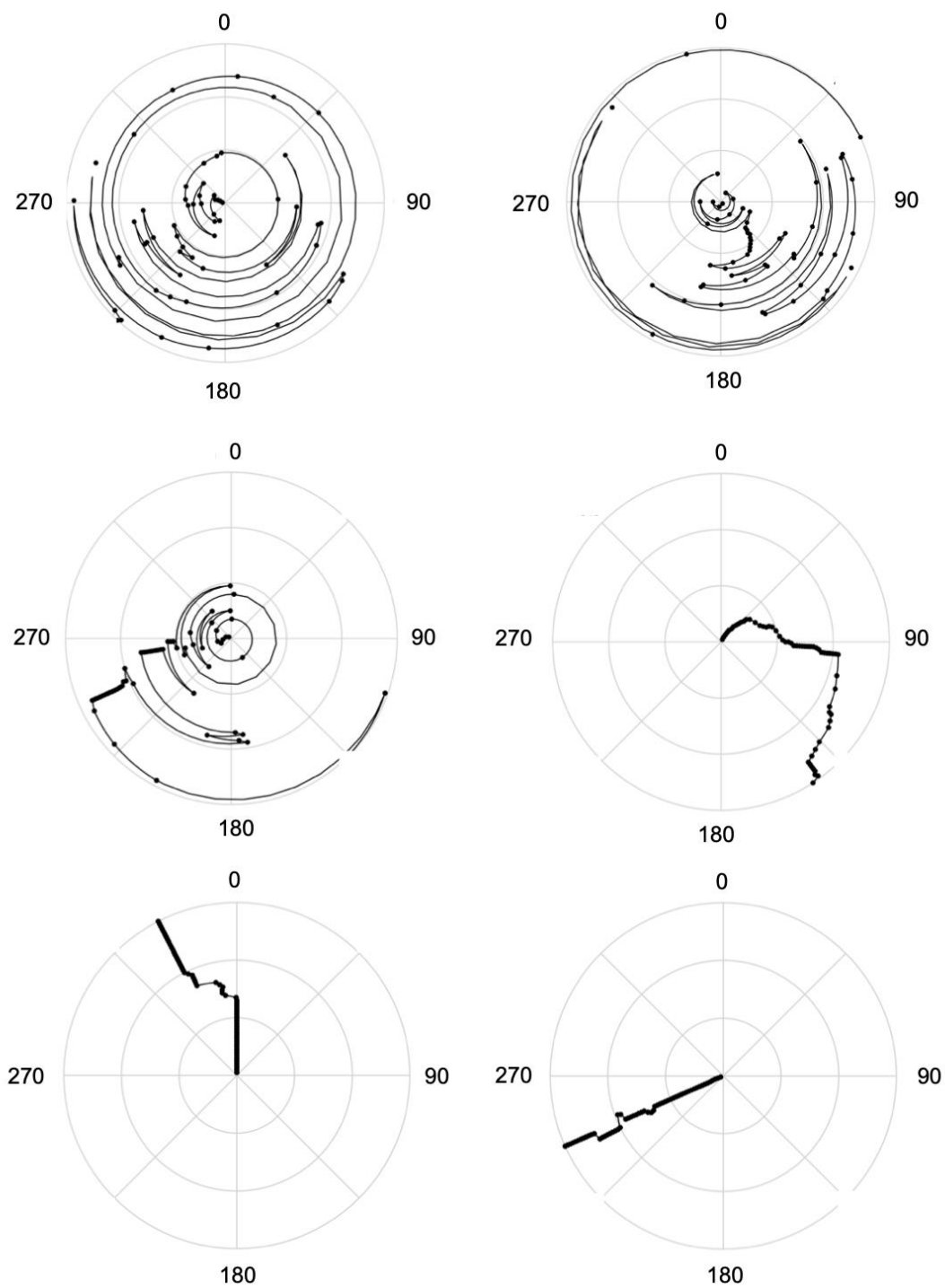


Figure S2. Orientation of a subset of individual captive-reared eastern North American migratory monarch butterflies (*Danaus plexippus*) reared on swamp milkweed (*Asclepias incarnata*) grown in 15 ng/g (i.e., low dose; n = 6/9) clothianidin treated soil. Individual monarchs were flown in a flight simulator for 10 minutes (5 direction samples/sec) in Guelph, ON in September 2018 and the circular mean (•) is plotted for every 10 seconds (50 direction samples; radius = 10 minutes).

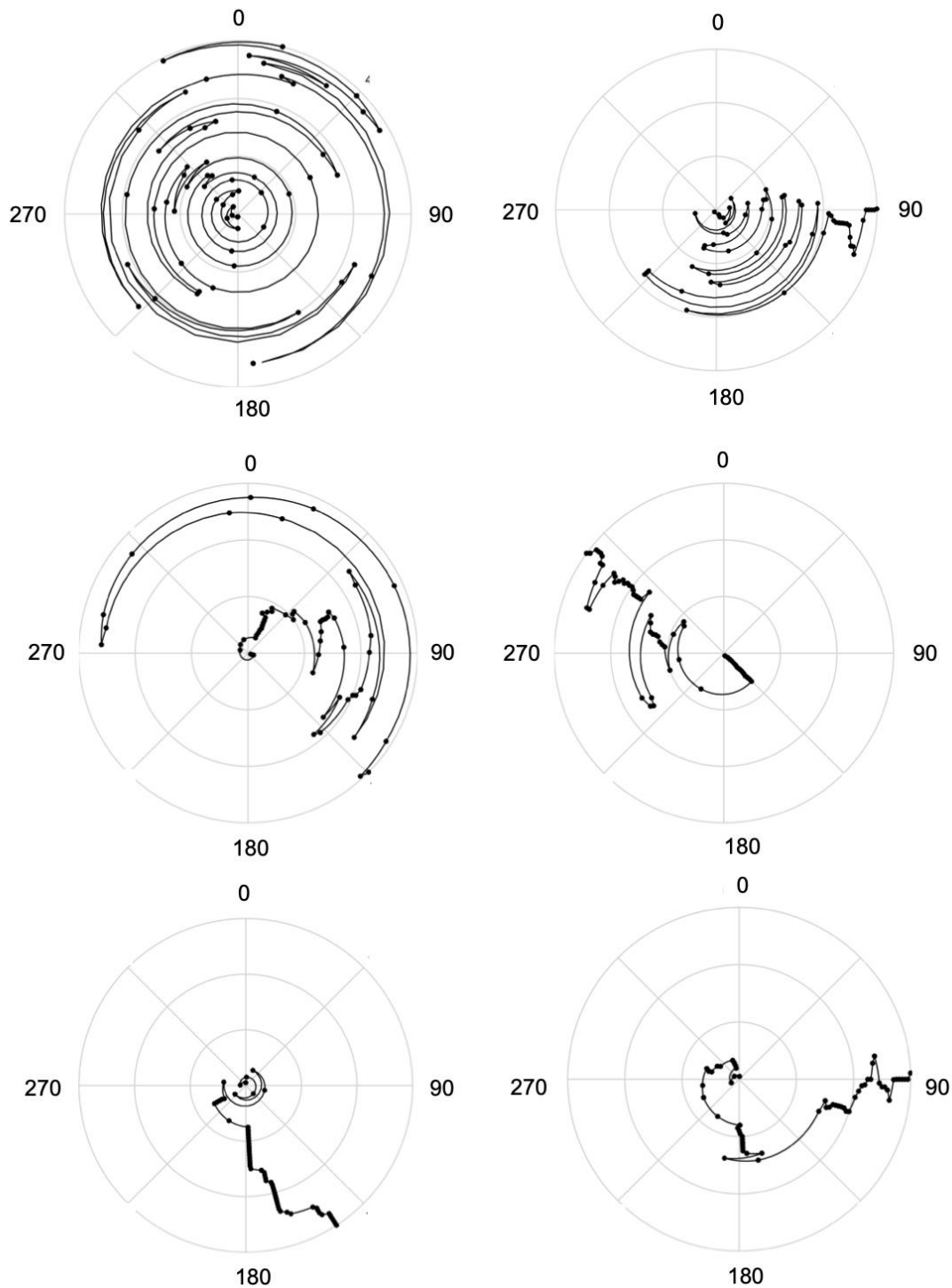


Figure S3. Orientation of a subset of individual captive-reared eastern North American migratory monarch butterflies (*Danaus plexippus*) reared on swamp milkweed (*Asclepias incarnata*) grown in 25 ng/g (i.e., high dose; n = 6/18) clothianidin treated soil. Individual monarchs were flown in a flight simulator for 10 minutes (5 direction samples/sec) in Guelph, ON in September 2018 and the circular mean (•) is plotted for every 10 seconds (50 direction samples; radius = 10 minutes).

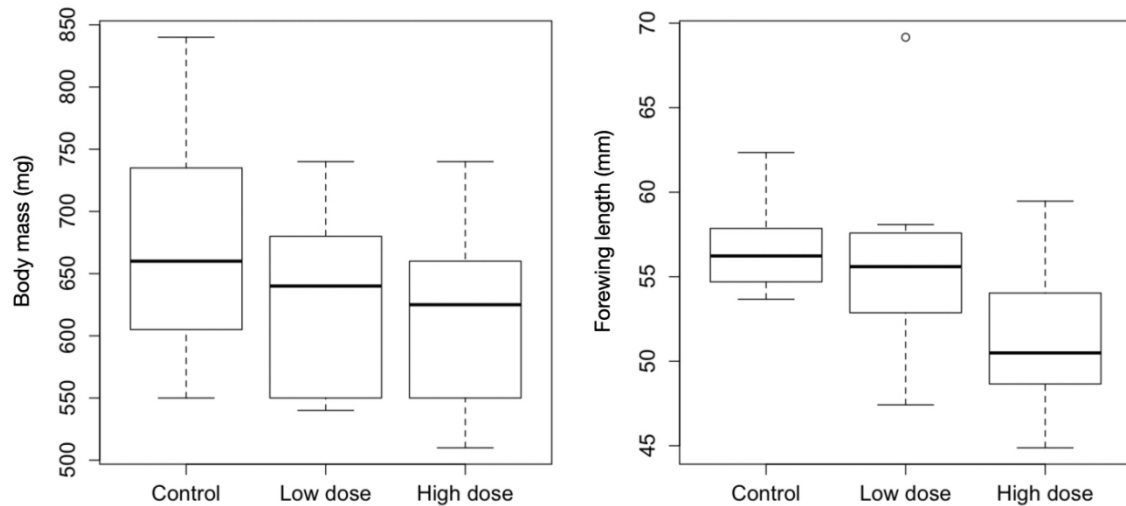


Figure S4. Variation in body mass (mg) and forewing length (mm) of Eastern North American migratory monarch butterflies (*Danaus plexippus*) reared on swamp milkweed (*Asclepias incarnata*) grown in untreated control (0 ng/g; n = 12), 15 ng/g (i.e., low dose; n = 9), and 25 ng/g (i.e., high dose; n = 18) soil in environmental chambers simulating autumn conditions until pupation, then tested in an outdoor flight simulator to record flight orientation (between 0°-359°). In each box and whisker plot the thick horizontal bar is the median, whilst the lower and upper edges represent the 25% and 75% quartiles respectively. Whiskers indicate the maximum and minimum values that are not outliers, and outliers are represented by open circles.