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SUPPLEMENTARY INFORMATION

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Population differences in aggression are shaped by tropical cyclone-induced selection

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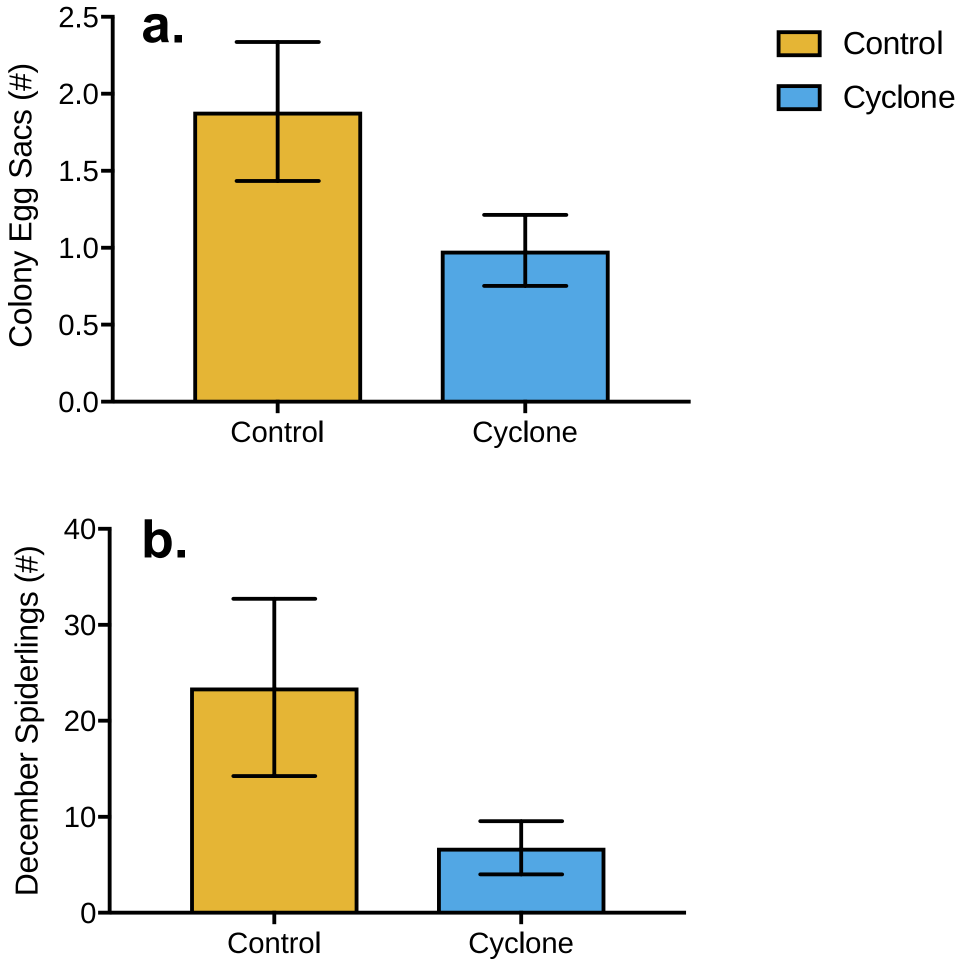
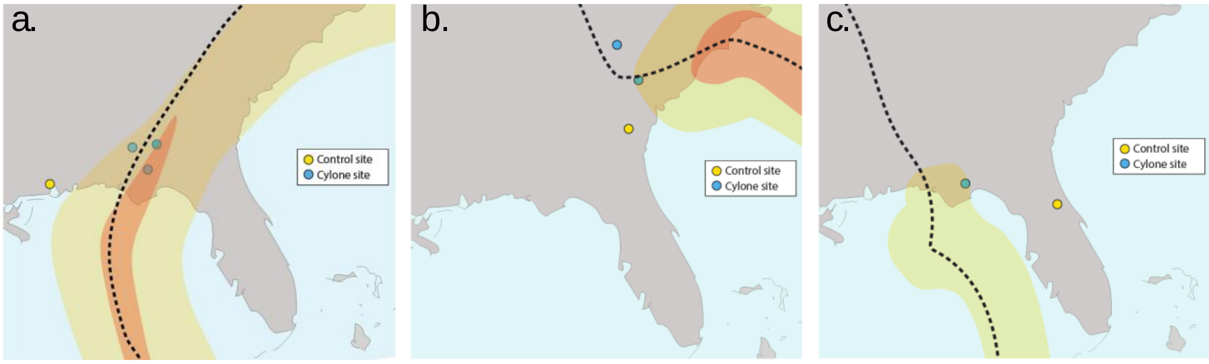
Supplemental Data

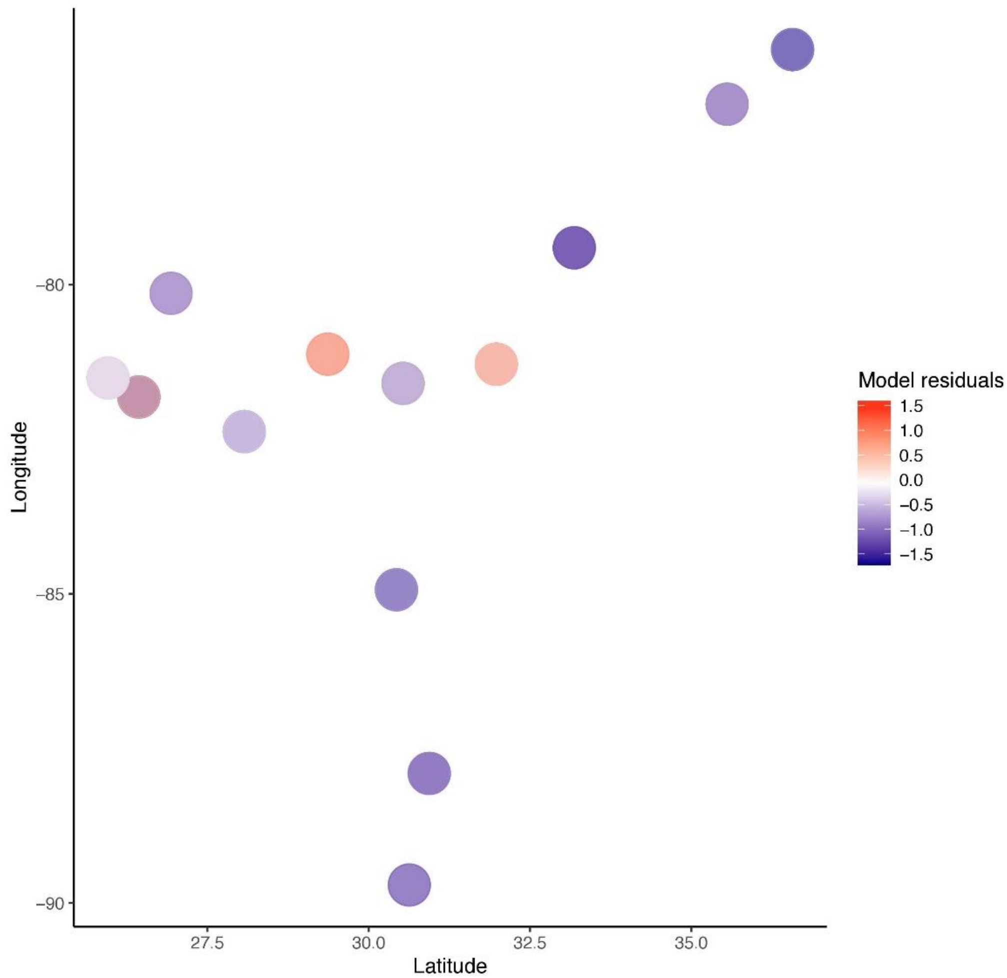


Supplemental Figure 1. The effect of tropical cyclones on colony fecundity. Colony egg sac numbers (N=239; 61 control, 178 cyclone-disturbed a) and December spiderlings (N=126 colonies; 37 control, 89 cyclone-disturbed; b) in control (yellow) and tropical cyclone-disturbed (blue) sites.



Supplemental Figure 2. Paths for Hurricane Michael (a), Hurricane Florence (b) and Tropical Storm Alberto (c). Control sampling sites are represented by yellow circles, and tropical cyclone sampling sites are represented by blue circles. Orange shading indicates regions that experienced tropical storm-force winds, and red shading indicates regions that experienced tropical cyclone-force winds. Trajectories showing wind field histories were adapted from archive graphics at the National Hurricane Centre, National Oceanic and Atmospheric Administration.

Supplemental Figure 3. Historical tropical cyclone paths from 1918 to 2018. Blue lines represent the individual paths of tropical cyclones over the last 100 years, and grey circles represent the historic sampling sites we used for our retrospective analysis.



Supplemental Figure 4. Residuals of our model for the effect of number of tropical cyclone strikes on a county on colony aggressiveness. Colour indicates the value of the residual for each site, with blues being negative values and reds being positive. There is no clear clustering of residuals of the same value.

Cyclone	Date (2018)	Site ID	Strike/Control	Lat, Long	Sampling Dates (2018)
Alberto	May 29	Bulow Creek, FL	Control	29.365825, -81.124608	May 27 – June 1
		Warrior, FL	Strike	30.473771, -84.407016	
Florence	Sept 15	Ogeechee River, GA	Control	31.977358, -81.286831	Sept 12-18
		Broad River, SC	Strike	34.485128, -81.424724	
		Orangeburg, SC	Strike	33.483913, -80.874374	
Michael	Oct 11	Tensaw River, AL	Control	30.937683, -87.904230	Oct 10-13
		Earle May Boat Basin, GA	Strike	30.897549, -84.599125	
		Fort Gaines, GA	Strike	31.638637, -85.049025	
		Sutton Park, GA	Strike	31.599279, -84.141509	

Supplemental Table 1. Tropical cyclone, site information and number of colonies sampled for the tropical cyclone-induced selection analyses.

Site	**Lat, Long**	**# of Colonies**	**# of cyclones since 1918**
Bulow Creek, FL	29.365825, -81.124608	24	5
Estero River, FL	26.437736, -81.816947	15	7
FakahatcheeCanal, FL	25.960031, -81.509276	15	10
Grandaddy Branch, FL	30.531806, -81.596483	15	1
Lettuce Late, FL	28.071191, -82.377040	15	7
Longbranch, MS	30.628408, -89.708327	15	3
Loxahatchee River, FL	26.936639, -80.139995	15	9
Milbranch, FL	30.429233, -84.934480	15	2
Northwest River, VA	36.567894, -76.198857	15	2
Ogeechee River, GA	31.977358, -81.286831	16	3
South Santee River, SC	33.185478, -79.404023	15	4
Tar River, NC	35.553723, -77.081867	15	4
Tensaw River, AL	30.937683, -87.904230	21	5

Supplemental Table 2. Site information and number of colonies sampled for the geographic survey analyses.

Supplementary Methods 1.

Geographic Survey

In summer 2018, we performed a large-scale geographic meander survey across the Gulf and Atlantic coasts of the United States to test for associations between colony behavior and a history of tropical cyclone strikes. Sites were selected haphazardly and opportunistically based on the presence of many *A. studiosus* colonies and accessibility to a suitable shoreline where all the focal colonies resided immediately above a waterbody. We selected 13 such sites spread across 5-degrees latitude (Extended Data Table 2). We used our knowledge of these sites to guide the selection of our tropical cyclone strike sites in fall. This is because establishing study sites in the tropical cyclone's trajectory immediately prior to its landfall is a time-sensitive matter.

For each colony we assessed the following variables: number of adult females present in the colony, the diameter of the branch supporting the entire web of the colony, it's height above the water, its web volume, and the number of attackers the colony deployed to simulated prey. We used the same protocols described above for the geographic survey component of our studies.

County by count tropical cyclone strike counts over the past 100 years were obtained on *IBTrACS: Tropical Cyclone Best Track* database version 4.

We chose a 100-year window in *IBTrACS* for a number of reasons. First, 100 years gives us a more extensive gradient of tropical cyclone-proneness with which to test for an association with colony behavior, rather than a small number of values (e.g. 0,1,2) that a smaller window would create. Second, smaller temporal windows of observation (i.e., just a few years) are far noisier estimates, because of chaotic nature of each individual storm. Longer windows of consideration thus give us with a more informed sense of the long-term storm regimes at each site. Third, 100 years avoids extending the tropical cyclone counts back to the 1800s, which we have reason to be more skeptical of, and which the National Hurricane Centre at NOAA also typically excludes from its analyses.

As we understand it, the *IBTrACS* database compiles data on tropical cyclone tracks from numerous agencies in different basins. When a tropical cyclone appears in more than one basin, it can therefore feature twice in the dataset. However, as our study is, relative to the entire globe, very geographically concentrated, we thus consider it unlikely that tropical cyclones crossing different basins will be impacting upon our study sites.

Furthermore, there are numerous agencies in the USA that record tropical cyclone track data. The *IBTrACS* version 4.0 documentation states that "While these agencies are generally orthogonal, there are cases where a system is provided in more than one source. In this case, the report from the highest source is used". Therefore, each tropical cyclone should only feature a single time in the dataset. Each tropical cyclone has a unique "Storm Identifier" to facilitate this point. USA agencies also assign tropical cyclone tracks an "Automated Tropical Cyclone Forecasting" identifier, and record when multiple tracks make up the same tropical cyclone. This safeguards against the duplication of any tropical cyclone track appearing multiple times in the dataset.

Finally, even if there is some small amount of over (or under) counting of storm events in our dataset, it should be randomly distributed among sites (given sites were chosen well before we ever looked at the *IBTrACS* dataset). Inaccuracy in tropical cyclone counts should therefore not be responsible for the trend that we have detected, and instead, should be working to obscure any genuine trends.