**Electronic Supplemental Material**

**Adding parasites to the guppy-predation story: insights from field surveys**

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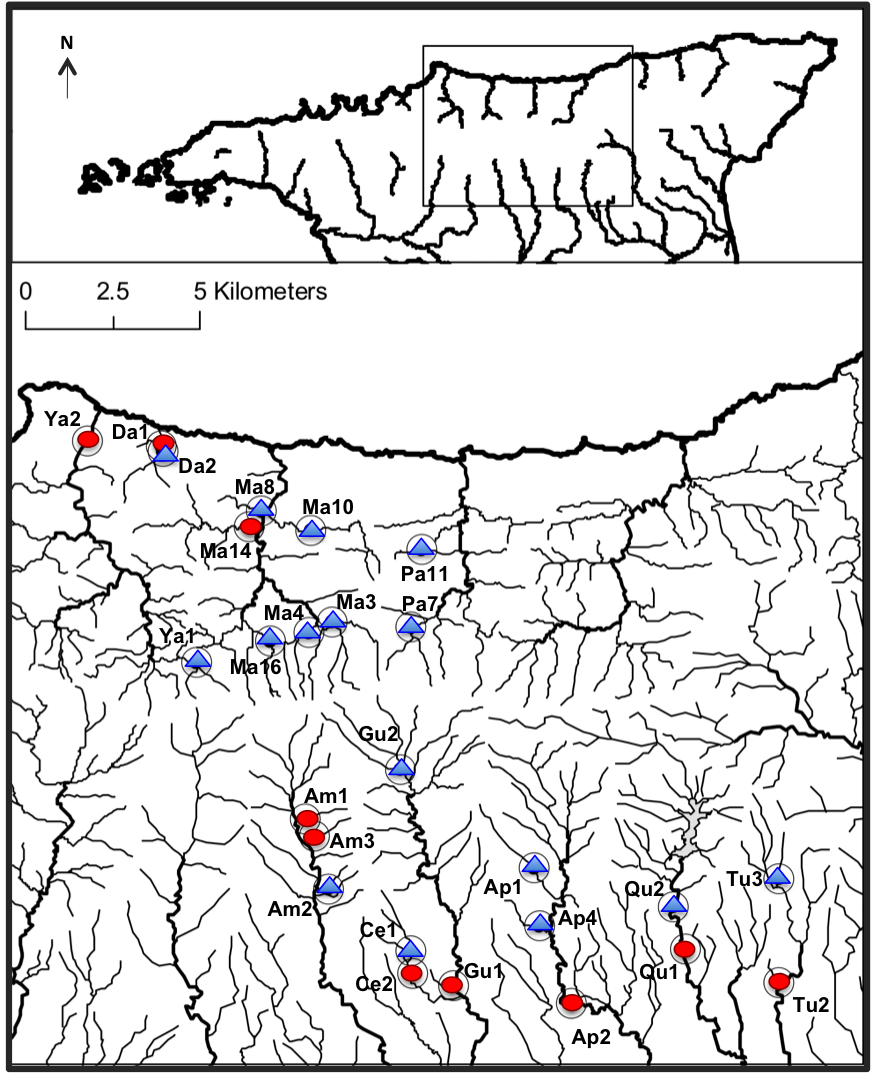
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Online Resource 1.Locations of the 26 sampling sites, and thus also guppy “populations,” in northern Trinidad. Triangles indicate low-predation sites and circles indicate high-predation sites. Site abbreviations and UTM coordinates are shown in Online Resource 2.



Online Resource 2*.* Site information for sampling efforts in both 2009 and 2010

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Site | Map legend | UTM Coordinates  (x, y) | Predation Regime (H-high, L-low) | Sample Size  2009 | Sample Size 2010 | *Gyrodactylus* |
| Arima 1 | Am1 | 686581  1183042 | H | 68 | 51 | Yes |
| Arima 2 | Am2 | 687219 1181021 | L | 60 | 50 | No |
| Arima 3 | Am3 | 686815  1182528 | H | 65 | 45 | Yes |
| Aripo 1 | Ap1 | 693188 1181605 | L | 68 | 49 | Yes |
| Aripo 2 | Ap2 | 694231 1177709 | H | 60 | 50 | Yes |
| Aripo 4 | Ap4 | 693328 1179939 | L | 54 | 50 | No |
| Damier 1 | Da1 | 682413 1193774 | H | 66 | 50 | Yes |
| Damier 2 | Da2 | 682467 1193620 | L | 58 | 47 | No |
| El Cedro 1 | Ce1 | 689627  1179248 | L | 69 | 51 | Yes |
| El Cedro 2 | Ce2 | 689674 1178592 | H | 68 | 52 | Yes |
| Guanapo 1 | Gu1 | 690856  1178253 | H | 62 | 52 | Yes |
| Guanapo 2 | Gu2 | 689337 1184456 | L | 76 | 51 | No |
| Marianne 3 | Ma3 | 687359 1188702 | L | 20 | 50 | No/Yes (2009/2010) |
| Marianne 4 | Ma4 | 686692 1188425 | L | 68 | 49 | Yes |
| Marianne 8 | Ma8 | 685300  119193 | L | 68 | 51 | Yes |
| Marianne 10 | Ma10 | 686711 1191358 | L | 73 | 50 | No |
| Marianne 14 | Ma14 | 684934 1191469 | H | 62 | 50 | Yes |
| Marianne 16 | Ma16 | 685561 1188185 | L | 69 | 44 | No |
| Paria 11 | Pa11 | 689942 1190784 | L | 66 | 51 | Yes |
| Paria 7 | Pa7 | 689639 1188582 | L | 72 | 48 | Yes |
| Quare 1 | Qu1 | 697548 1179275 | H | 69 | 53 | Yes |
| Quare 2 | Qu2 | 697183 1180514 | L | 43 | n/a | Yes (2009 only) |
| Turure 2 | Tu2 | 700200 1178350 | H | 66 | 45 | Yes |
| Turure 3 | Tu3 | 700200  118130 | L | 75 | 48 | No |
| Yarra 1 | Ya1 | 683415 1187541 | L | 60 | 44 | Yes |
| Yarra 2 | Ya2 | 680306 1193940 | H | 13 | 44 | Yes |

Online Resource 3. Detailed information on the assessment of body morphometrics and hue, saturation, and brightness

*Body morphometrics*

The five morphometric measurements (areas in mm2, lengths in mm) made on all fish were: body area (area within the perimeter of the body, including the head but excluding the fins), standard length (distance from the tip of the snout to the mid-lateral caudal peduncle), body depth (dorsal to ventral distance measured at the anterior insertion of the dorsal fin and perpendicular to the lateral midline of the body), tail area (area within the perimeter of the tail), and tail length (distance from the lateral midline of the caudal peduncle to the mid-lateral edge of the tail).

*Hue, saturation, and brightness*

We quantified hue, saturation, brightness (HSB) where hue (0-360°) refers to the colour’s location on a standard colour wheel, where red is approximately 0°, green is approximately 120°, and blue is approximately 240°. Saturation (0-100%) is the intensity or purity of the colour; i.e., the amount of grey in proportion to the hue, where grey is 0% and fully saturated is 100%. Brightness (0-100%) refers to the relative lightness/darkness of a colour, black being 0%, and white 100%. These measurements are based on the human visual system ([Stevens et al. 2007](#_ENREF_2)) and so do not reveal how guppies or their predators would view these spots. As noted above, however, they do provide a means to assess some important aspects of colour variation.

The above HSB measurements were performed only for black, orange, yellow, and green spots because these spots are common and pigment-based, making them more consistently quantifiable from photographs (as opposed to structural colours). To obtain the measurements, each spot (previously selected and outlined using ImageJ by LCD) on a male fish was made into its own layer in Photoshop. Three representative points, each approximately 1002 pixels, were then haphazardly chosen within each colour spot and HSB data were recorded for each. To account for any potential variation in lighting effects across photographs, the above HSB procedure was also applied to the corresponding colour (black, orange, yellow, and green) on the colour standard within the photo of the fish. The HSB values of each guppy colour spot were then divided by the HSB values for the corresponding colour standard ([Martin and Johnsen 2007](#_ENREF_1); [Yasir and Qin 2009](#_ENREF_3)). For instance, the saturation of orange spots was divided by the saturation of the orange colour standard. All HSB data were collected by a single person (Cameron Mojarrad) who was blind to fish origin and parasitism level.

*Literature Cited*

Martin CH, Johnsen S (2007) A field test of the Hamilton-Zuk hypothesis in the Trinidadian guppy (*Poecilia reticulata*). Behav Ecol Sociobiol 61:1897-1909

Stevens M, Parraga CA, Cuthill IC, Partridge JC, Troscianko TS (2007) Using digital photography to study animal coloration. Biol J Linn Soc 90:211-237

Yasir I, Qin JG (2009) Effect of light intensity on color performance of false clownfish, *Amphiprion ocellaris* Cuvier. J World Aquacult Soc 40:337-350

Online Resource 4. Individual body morphology results from ANOVAs examined in relation to sex, predation regime, parasitism, their interactions, and site nested within predation as a random factor at the individual (*infection presence* and *parasite abundance*) level. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Body Area | | Body Depth | | Body Length | | Tail Area | | Tail Length | |
| *Infection Presence* | t | P | t | P | t | P | t | P | t | P |
| Sex | -9.881 | **<0.0001** | -6.56 | **<0.0001** | -11.78 | **<0.0001** | -4.355 | **<0.0001** | -3.42 | **0.0007** |
| Predation | 3.536 | **0.0004** | 4.28 | **<0.0001** | 2.92 | **0.0035** | 2.779 | **0.0055** | 1.72 | 0.0861 |
| Parasitism | 2.029 | **0.0426** | 1.63 | 0.1033 | 2.41 | **0.0160** | 1.209 | 0.2270 | 1.04 | 0.2982 |
| Sex\*Pred | -3.587 | **0.0003** | -3.09 | **0.0020** | -2.97 | **0.0030** | -2.627 | **0.0087** | -1.81 | 0.0701 |
| Sex\*Para | -1.612 | 0.1071 | -0.83 | 0.4081 | -1.60 | 0.1095 | -1.048 | 0.2946 | -0.78 | 0.4328 |
| Pred\*Para | -1.928 | 0.0540 | -1.56 | 0.1191 | -2.19 | **0.0290** | -1.302 | 0.1932 | -1.00 | 0.3166 |
| Sex\*Pred\*Para | 1.194 | 0.2328 | 0.54 | 0.5908 | 1.25 | 0.2111 | 0.573 | 0.5665 | 0.41 | 0.6854 |
| *Parasite Abundance* |  |  |  |  |  |  |  |  |  |  |
| Sex | -12.055 | **<0.0001** | -8.05 | **<0.0001** | -14.27 | **<0.0001** | -5.330 | **<0.0001** | -4.03 | **0.0001** |
| Predation | 3.198 | **0.0014** | 3.99 | **0.0001** | 2.57 | **0.0102** | 2.660 | **0.0079** | 1.65 | 0.0988 |
| Parasitism | 0.603 | 0.5466 | 0.19 | 0.8502 | 0.91 | 0.3467 | 0.826 | 0.4089 | 1.11 | 0.2677 |
| Sex\*Pred | -3.268 | **0.0011** | -2.98 | **0.0029** | -2.52 | **0.0117** | -2.644 | **0.0083** | -1.84 | 0.0654 |
| Sex\*Para | -0.617 | 0.5370 | -0.13 | 0.8954 | -0.50 | 0.6179 | -0.836 | 0.4036 | -0.99 | 0.3239 |
| Pred\*Para | -0.515 | 0.6065 | -0.04 | 0.9714 | -0.67 | 0.5052 | -0.759 | 0.4481 | -0.86 | 0.3916 |
| Sex\*Pred\*Para | 0.598 | 0.5498 | 0.17 | 0.8622 | 0.55 | 0.5819 | 0.567 | 0.5706 | 0.21 | 0.8352 |

Online Resource 5. Spot numbers as the response variables in MANCOVAs examined in relation to predation regime, parasitism, and their interaction at the individual (*infection presence*) and population (*prevalence* and *mean abundance*) levels. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | Population level – *prevalence* | | | Population level – *mean abundance* | | |
| Variable | F | d.f. | *P* | F8, 14 | *P* | F8,14 | | *P* |
| Predation | 2.7125 | 8, 697 | **0.0060** | 0.3371 | 0.9368 | 0.3202 | | 0.9449 |
| Parasitism | 1.1661 | 8, 697 | 0.3171 | 1.7603 | 0.1695 | 1.6814 | | 0.1888 |
| Pred\*Para | 0.8995 | 8, 697 | 0.5163 | 1.3771 | 0.2868 | 0.7124 | | 0.9734 |
| Body Size | 0.8631 | 8, 697 | 0.5474 | 0.1801 | 0.9900 | 0.2474 | | 0.6779 |
| Site (Predation) | 3.9670 | 192, 5325.8 | **<0.0001** |  |  |  | |  |

Online Resource 6.Relative colour areas as the response variables in MANCOVAs examined in relation to predation regime, parasitism, and their interaction at the individual (*infection presence*) and population (*prevalence* and *mean abundance*) levels. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | Population level – *prevalence* | | Population level – *mean abundance* | | |
| Variable | F | d.f. | *P* | F8,14 | *P* | F8,14 | *P* |
| Predation | 9.9204 | 8, 697 | **<0.0001** | 0.4974 | 0.8387 | 0.4609 | 0.8638 |
| Parasitism | 2.0874 | 8, 697 | **0.0349** | 1.4526 | 0.2585 | 0.7039 | 0.6844 |
| Pred\*Para | 3.0639 | 8, 697 | **0.0021** | 0.9313 | 0.5211 | 0.6540 | 0.7223 |
| Body Size | 0.7203 | 8, 697 | 0.6737 | 0..8130 | 0.6033 | 0.7440 | 0.6541 |
| Site (Predation) | 6.6322 | 192, 5325.8 | **<0.0001** |  |  |  |  |

Online Resource 7. Individual spot number results from ANCOVAs examined in relation to predation regime, parasitism, their interaction, and site nested within predation as a random factor at the individual (*infection presence*) level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black | | Blue | | Fuzzy Black | | Green | |
|  | t | P | t | P | t | P | t | P |
| Predation | 0.353 | 0.7239 | -0.455 | 0.6491 | 0.512 | 0.6085 | -0.564 | 0.5732 |
| Parasitism | 0.273 | 0.7851 | 0.018 | 0.9854 | 0.915 | 0.3603 | 0.720 | 0.4720 |
| Pred\*Para | -0.757 | 0.4493 | -0.532 | 0.5947 | -0.503 | 0.6337 | -0.443 | 0.1342 |
| Body Size | 1.024 | 0.3063 | 1.043 | 0.2974 | -0.477 | 0.6152 | -1.499 | 0.6578 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Orange | | Silver | | Violet | | Yellow | |
|  | t | P | t | P | t | P | t | P |
| Predation | -1.24 | 0.2141 | -0.009 | 0.9925 | 0.011 | 0.9911 | 1.620 | 0.1057 |
| Parasitism | -0.98 | 0.3269 | 0.784 | 0.4330 | -0.025 | 0.9803 | 1.030 | 0.3036 |
| Pred\*Para | 0.93 | 0.6228 | -0.304 | 0.7612 | 0.485 | 0.6275 | -1.057 | 0.2907 |
| Body Size | 0.49 | 0.3518 | -0.932 | 0.3516 | 0.370 | 0.7113 | 0.214 | 0.8310 |

Online Resource 8. Individual spot number results from ANCOVAs examined in relation to predation regime, parasitism, and their interaction at the population (*prevalence*) level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black | | Blue | | Fuzzy Black | | Green | |
|  | F | P | F | P | F | P | F | P |
| Predation | 0.000 | 0.996 | 0.353 | 0.559 | 0.142 | 0.710 | 0.691 | 0.415 |
| Parasitism | 0.209 | 0.652 | 0.308 | 0.585 | 1.475 | 0.238 | 1.118 | 0.302 |
| Pred\*Para | 0.021 | 0.886 | 0.487 | 0.493 | 1.638 | 0.215 | 0.231 | 0.636 |
| Body Size | 0.005 | 0.944 | 0.152 | 0.701 | 0.146 | 0.706 | 0.023 | 0.880 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Orange | | Silver | | Violet | | Yellow | |
|  | F | P | F | P | F | P | F | P |
| Predation | 0.228 | 0.638 | 0.028 | 0.869 | 0.006 | 0.937 | 1.365 | 0.256 |
| Parasitism | 3.177 | 0.092 | 0.751 | 0.396 | 0.004 | 0.951 | 0.392 | 0.538 |
| Pred\*Para | 0.080 | 0.780 | 3.522 | 0.075 | 0.069 | 0.795 | 0.045 | 0.834 |
| Body Size | 0.027 | 0.872 | 0.108 | 0.746 | 0.413 | 0.527 | 0.347 | 0.562 |

Online Resource 9. Relative colour area results from individual ANCOVAs examined in relation to predation regime, parasitism, their interaction, and site nested within predation as a random factor at the individual (*infection presence*) level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black | | Blue | | Fuzzy Black | | Green | |
|  | t | P | t | P | t | P | t | P |
| Predation | 0.924 | 0.3557 | -0.908 | 0.3641 | 0.834 | 0.4047 | -0.850 | 0.3957 |
| Parasitism | 0.087 | 0.9305 | -8.822 | 0.4111 | -0.940 | 0.3477 | 0.054 | 0.9566 |
| Pred\*Para | 0.200 | 0.8415 | 2.108 | **0.0353** | -0.272 | 0.4326 | 0.180 | 0.8572 |
| Body Size | 0.656 | 0.5117 | 1.180 | 0.2383 | 0.785 | 0.7857 | -0.628 | 0.5301 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Orange | | Silver | | Violet | | Yellow | |
|  | t | P | t | P | t | P | t | P |
| Predation | 1.374 | 0.1700 | -0.639 | 0.5231 | 0.183 | 0.8548 | 1.316 | 0.1885 |
| Parasitism | 0.620 | 0.5358 | 0.035 | 0.9724 | 0.215 | 0.8301 | -0.045 | 0.9641 |
| Pred\*Para | 0.159 | 0.8736 | -0.205 | 0.8374 | 0.680 | 0.2873 | -0.341 | 0.5699 |
| Body Size | -0.208 | 0.8355 | -0.106 | 0.9153 | 1.065 | 0.4967 | -0.569 | 0.7331 |

Online Resource 10. Relative colour area results from individual ANCOVAs examined in relation to predation regime, parasitism, and their interaction at the population (*prevalence*) level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black | | Blue | | Fuzzy Black | | Green | |
|  | F | P | F | P | F | P | F | P |
| Predation | 0.711 | 0.409 | 0.196 | 0.662 | 1.339 | 0.260 | 0.971 | 0.336 |
| Parasitism | 0.186 | 0.671 | 0.262 | 0.6141 | 0.179 | 0.676 | 0.144 | 0.708 |
| Pred\*Para | 1.195 | 0.287 | 3.88 | 0.0841 | 2.665 | 0.117 | 0.653 | 0.135 |
| Body Size | 0.033 | 0.857 | 0.229 | 0.6371 | 0.062 | 0.805 | 2.410 | 0.428 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Orange | | Silver | | Violet | | Yellow | |
|  | F | P | F | P | F | P | F | P |
| Predation | 1.769 | 0.198 | 0.710 | 0.409 | 0.010 | 0.921 | 1.366 | 0.256 |
| Parasitism | 0.800 | 0.381 | 3.766 | 0.066 | 0.21 | 0.886 | 0.203 | 0.657 |
| Pred\*Para | 0.564 | 0.461 | 1.443 | 0.243 | 0.045 | 0.833 | 0.064 | 0.802 |
| Body Size | 0.183 | 0.673 | 0.001 | 0.974 | 0.500 | 0.487 | 1.332 | 0.261 |

Online Resource 11.Colour spot properties (hue, saturation, and brightness of blue, orange, yellow and green spots) as the response variables in MANOVAs examined in relation to predation regime and parasitism at the individual (*infection presence* and *parasite abundance*) and population (*prevalence* and *mean abundance*) levels. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | | Individual level – *parasite abundance* | | | |
| Variable | | F | d.f. | | *P* | F | d.f. | | *P* | | |
| Predation | | 4.4859 | 12, 333 | | **<0.0001** | 4.4906 | 12, 333 | | **<0.0001** | | |
| Parasitism | | 1.6162 | 12, 333 | | 0.0854 | 2.0314 | 12, 333 | | **0.0211** | | |
| Pred\*Para | | 2.5571 | 12, 333 | | **0.0030** | 3.1405 | 12, 333 | | **0.0003** | | |
| Site (Predation) | | 2.5275 | 288, 3621.2 | | **<0.0001** | 2.5528 | 288, 3621.2 | | **<0.0001** | | |
|  | Population level – *prevalence* | | | | Population level – *mean abundance* | | | | |
| Variable | F12, 11 | | *P* | | F12,11 | | *P* | | |
| Predation | 1.6044 | | 0.2210 | | 1.6344 | | 0.2122 | | |
| Parasitism | 0.7035 | | 0.7229 | | 0.7525 | | 0.6844 | | |
| Pred\*Para | 0.2816 | | 0.9805 | | 0.1951 | | 0.9955 | | |

Online Resource 12. Hue, saturation and brightness results from individual ANOVAs examined in relation to predation regime, parasitism, their interaction, and site nested within predation as a random factor at the individual (*parasite abundance*) level. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Black Hue | | Green Hue | | Orange Hue | | Yellow Hue | |
|  | t | P | t | P | t | P | t | P |
| Predation | 1.300 | 0.1940 | -1.43 | 0.1524 | -1.606 | 0.1087 | -0.11 | 0.9146 |
| Parasitism | -0.580 | 0.5619 | 0.79 | 0.4284 | -0.661 | 0.5089 | 0.08 | 0.9381 |
| Pred\*Para | -0.384 | 0.7013 | 0.70 | 0.4861 | 0.081 | 0.9355 | -0.62 | 0.5323 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black Saturation | | Green Saturation | | Orange Saturation | | Yellow Saturation | |
|  | t | P | t | P | t | P | t | P |
| Predation | 1.198 | 0.2314 | 2.046 | **0.0414** | 1.16 | 0.2473 | 0.40 | 0.6892 |
| Parasitism | -0.884 | 0.3770 | 0.098 | 0.9216 | -0.63 | 0.5272 | 0.50 | 0.6208 |
| Pred\*Para | 1.126 | 0.2605 | -1.268 | 0.2054 | 0.56 | 0.5776 | 0.34 | 0.7356 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Black Brightness | | Green Brightness | | Orange Brightness | | Yellow Brightness | |
|  | t | P | t | P | t | P | t | P |
| Predation | 0.674 | 0.5007 | -0.04 | 0.9703 | 0.63 | 0.5264 | 0.41 | 0.6803 |
| Parasitism | -1.248 | 0.2125 | -0.53 | 0.5937 | 0.91 | 0.3632 | 0.43 | 0.6697 |
| Pred\*Para | 0.084 | 0.9334 | 1.07 | 0.2845 | -0.93 | 0.3543 | 0.19 | 0.8464 |

Online Resource 13. Hue, saturation and brightness results from individual ANOVAs examined in relation to predation regime, parasitism, and their interaction at the population (*prevalence*) level.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Black Hue | | Green Hue | | Orange Hue | | Yellow Hue | |
|  | F | P | F | P | F | P | F | P |
| Predation | 1.834 | 0.189 | 0.724 | 0.404 | 2.493 | 0.129 | 0.261 | 0.614 |
| Parasitism | 0.003 | 0.958 | 0.325 | 0.574 | 0.000 | 0.987 | 1.199 | 0.285 |
| Pred\*Para | 0.606 | 0.445 | 0.014 | 0.905 | 1.393 | 0.250 | 0.073 | 0.789 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Colour | Black Saturation | | Green Saturation | | Orange Saturation | | Yellow Saturation | |
|  | F | P | F | P | F | P | F | P |
| Predation | 1.927 | 0.179 | 0.664 | 0.424 | 1.506 | 0.2315 | 0.105 | 0.749 |
| Parasitism | 0.636 | 0.433 | 3.335 | 0.081 | 0.109 | 0.9924 | 0.389 | 0.539 |
| Pred\*Para | 0.072 | 0.792 | 0.142 | 0.701 | 0.350 | 0.4520 | 0.307 | 0.585 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Black Brightness | | Green Brightness | | Orange Brightness | | Yellow Brightness | |
|  | F | P | F | P | F | P | F | P |
| Predation | 0.53 | 0.474 | 0.014 | 0.907 | 0.264 | 0.613 | 0.166 | 0.688 |
| Parasitism | 0.68 | 0.418 | 1.183 | 0.289 | 0.673 | 0.421 | 2.054 | 0.166 |
| Pred\*Para | 0.12 | 0.732 | 0.104 | 0.750 | 0.213 | 0.649 | 0.012 | 0.915 |

Online Resource 14. Body size results from MANOVAs examined in relation to sex and predation regime at the individual and population level. Parasitism is not included in these analyses. P values < 0.05 are in bold type.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Individual level – *infection presence* | | |  | Population level - *prevalence* | | |
| Variable | F | d.f. | P |  | F5, 20 | P |
| Predation | 151.51 | 5, 1550 | **<0.0001** |  | 5.944 | **0.0016** |
| Sex | 553.48 | 5, 1550 | **<0.0001** |  |  |  |
| Sex\*Pred | 4.10 | 5, 1550 | **0.0011** |  |  |  |
| Site (Predation) | 29.53 | 120, 7647.3 | **<0.0001** |  |  |  |

Online Resource 15. Spot number results from MANCOVAs examined in relation to predation regime at the individual and population level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate. Parasitism is not included in these analyses. P values < 0.05 are in bold type.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | Population level – *prevalence* | |
| Variable | F | d.f. | P | F8, 16 | P |
| Predation | 2.7160 | 8, 699 | **0.0060** | 0.3328 | 0.9406 |
| Body Size | 0.8727 | 8, 699 | 0.5391 | 0.1774 | 0.9909 |
| Site (Predation) | 4.0238 | 192, 5341.1 | **<0.0001** |  |  |

Online Resource 16. Relative colour area results from MANCOVAs examined in relation to predation regime at the individual and population level. A principal component generated of the five body size variables (body, standard length, body depth, tail area, and tail length) was used as the covariate. Parasitism is not included in these analyses. P values < 0.05 are in bold type.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | Population level – *prevalence* | |
| Variable | F | d.f. | P | F8, 16 | P |
| Predation | 9.9415 | 8, 699 | **<0.0001** | 0.5111 | 0.8309 |
| Body Size | 0.7220 | 8, 699 | 0.6722 | 0.7244 | 0.6687 |
| Site (Predation) | 6.7902 | 192, 5341.1 | **<0.0001** |  |  |

Online Resource 17.Colour spot property (hue, saturation, and brightness of blue, orange, yellow and green spots) results from MANOVAs examined in relation to predation regime at the individual and population level. Parasitism is not included in these analyses. P values < 0.05 are in bold type.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Individual level - *infection presence* | | | Population level – *prevalence* | | |
| Variable | F | d.f. | P | F12, 13 | P |
| Predation | 4.5125 | 12, 335 | **<0.0001** | 1.8957 | 0.1334 |
| Site(Predation) | 2.5897 | 288, 3642.8 | **<0.0001** |  |  |

Online Resource 18. Results from a likelihood ratio test which compared the fit of the two different models (inclusion versus exclusion of parasitism) with an F-test at both the individual and population level.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Individual level  *infection presence* | | Individual level  *parasite abundance* | | Population level  *prevalence* | | Population level  *mean abundance* | |
| Guppy trait | F | *P* | F | *P* | F | *P* | F | *P* |
| Body Size | 1.3493 | 0.1362 | 1.0344 | 0.4159 | 0.56993 | 0.8277 | 0.6073 | 0.7977 |
| Spot Number | 0.4054 | 0.9817 | 0.5092 | 0.9438 | 1.6222 | 0.1231 | 1.2149 | 0.3126 |
| Relative Spot Area | 0.4550 | 0.9671 | 0.5507 | 0.9203 | 1.1377 | 0.3677 | 0.7446 | 0.7293 |
| Colour Spot Properties (HSB) | 1.0872 | 0.3524 | 1.8904 | **0.0065** | 0.4702 | 0.9647 | 0.4167 | 0.9817 |