Inter-population variation in the intensity of host manipulation by the fish acanthocephalan *Pomphorhynchus tereticollis*: are differences driven by predation risk?

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**Fig.S1** Map of the sites (Bèze, Cuisance, Norges and Vingeanne) that were prospected for the study and the distances one to another.



**Fig.S2** Cliff's delta effect sizes (with 95% CI) for changes in physiological state (total (pro)phenoloxydase activity, antioxidant capacity both corrected by total protein content, and total protein content corrected by the weight of individuals) for Bèze, Cuisance, Norges and Vingeanne localities, respectively. Negligible, small, medium and large effects correspond to |d| lower than 0.15, 0.33, 0.47 and higher than 0.47, respectively (Romano et al. 2006). Numbers above the error-bars correspond to the numbers of gammarids used (I=infected, U=uninfected).



**Fig.S3** Physiological parameters: (a) proteins plotted against the weight of individuals, (b) antioxidant capacity and (c) total (pro)phenoloxidase activity both plotted against total protein content, in interaction with the status of individuals (infected (N=211) or uninfected (N=219)). Solid circles and lines correspond to infected individuals and empty circles and dashed lines to uninfected ones.

**Tab.S1**. Models selection tables for General Linear Model (GLM) for the study of variation in prevalence. The table is shortened to the first 10 models and are ranked from the best one (lowest AICc, on the top) to poorer ones (higher AICc, at the bottom). Complex model is represented in bold. The line represents the threshold that separates the set of best models (above the threshold) that can be used to assess the contribution of each predictor. The threshold is chosen according to a significant gap in delta AICc from one model to another.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Intercept** | **Total fish biomass** | **Gammarid density** | **Gammarid size** | **Total fish biomass : Gammarid density** | **R²** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| **1** | -9.32 | -0.67 | 1.95 | -2.74e-04 |  | 1.77e-02 | 4 | -1152.91 | 2313.80 | 0 | 0.38 |
| **2** | -10.22 | -0.69 | 2.06 |  |  | 1.75e-02 | 3 | -1153.99 | 2314 | 0.18 | 0.35 |
| **3** | **-11.60** | **-0.27** | **2.35** | **-2.80e-04** | **-0.07** | **1.77e-02** | **5** | **-1152.88** | **2315.80** | **1.94** | **0.14** |
| **4** | -10.79 | -0.60 | 2.16 |  | -0.02 | 1.75e-02 | 4 | -1153.99 | 2316 | 2.18 | 0.13 |
| **5** | -0.27 | -0.27 |  | -8.88e-04 |  | 8.63e-03 | 3 | -1206.04 | 2418.10 | 104.25 | 0 |
| **6** | -1.78 | -0.28 |  |  |  | 6.18e-03 | 2 | -1220.35 | 2444.70 | 130.88 | 0 |
| **7** | -1.93 |  |  | -1.03e-03 |  | 3.03e-03 | 2 | -1238.73 | 2481.50 | 167.65 | 0 |
| **8** | -1.82 |  | -0.02 | -1.03e-03 |  | 3.03e-03 | 3 | -1238.72 | 2483.40 | 169.63 | 0 |
| **9** | -3.77 |  |  |  |  | 0 | 1 | -1256.38 | 2514.80 | 200.94 | 0 |
| **10** | -4.07 |  | 0.05 |  |  | 1.39e-05 | 2 | -1256.30 | 2516.60 | 202.78 | 0 |

**Tab.S2.** Models selection tables for Beta-regressions for the study of variation in (a) phototaxis and (b) refuge-use. Total PO-PPO activity and antioxidant capacity (TEAC) are corrected by the weight of individuals. Tables are shortened to the first 10 models and are ranked from the best one (lowest AICc, on the top) to poorer ones (higher AICc, at the bottom). Complex models are represented in bold. The lines represent the thresholds that separate the set of best models (above the thresholds) that can be used to assess the contribution of each predictor. The thresholds are chosen according to a significant gap in delta AICc from one model to another.

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| **(a)** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Model** | **Intercept** | **Total fish biomass** | **Total PO-PPO activity** | **Prevalence** | **Status** | **TEAC** | **Total fish biomass : Status** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| 1 | -2.80 | 0.38 | 0.16 |  | + |  | + | 6 | 296.12 | -580 | 0 | 0.29 |
| 2 | -2.78 | 0.37 |  |  | + |  | + | 5 | 294.94 | -579.70 | 0.29 | 0.25 |
| 3 | -2.78 | 0.37 | 0.17 |  | + | -1.98e-07 | + | 7 | 296.19 | -578.10 | 1.93 | 0.11 |
| 4 | -2.84 | 0.38 | 0.16 | 0.52 | + |  | + | 7 | 296.17 | -578.10 | 1.97 | 0.11 |
| 5 | -2.79 | 0.37 |  | 0.11 | + |  | + | 6 | 294.95 | -577.70 | 2.34 | 0.09 |
| 6 | -2.79 | 0.37 |  |  | + | 2.99e-08 | + | 6 | 294.95 | -577.70 | 2.34 | 0.09 |
| **7** | **-2.82** | **0.38** | **0.17** | **0.47** | **+** | **-1.87e-07** | **+** | **8** | **296.23** | **-576.10** | **3.92** | **0.04** |
| 8 | -2.80 | 0.37 |  | 0.12 | + | 3.44e-08 | + | 7 | 294.95 | -575.60 | 4.41 | 0.03 |
| 9 | -1.62 | 0.21 | 0.18 |  | + |  |  | 5 | 284.39 | -558.60 | 21.40 | 0 |
| 10 | -1.59 | 0.20 |  |  | + |  |  | 4 | 282.90 | -557.70 | 22.34 | 0 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **(b)** |  |  |  |  |  |  |  |  |  |  |  |  |
| **Model** | **Intercept** | **Total fish biomass** | **Total PO-PPO activity** | **Prevalence** | **Status** | **TEAC** | **Total fish biomass : Status** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| 1 | -1.73 | 0.14 |  |  | + |  | + | 5 | 185.27 | -360.40 | 0 | 0.31 |
| 2 | -1.68 | 0.14 |  |  | + | -5.31e-07 | + | 6 | 185.76 | -359.30 | 1.08 | 0.18 |
| 3 | -1.73 | 0.14 | -0.05 |  | + |  | + | 6 | 185.38 | -358.60 | 1.84 | 0.12 |
| 4 | -1.67 | 0.14 |  | -0.65 | + |  | + | 6 | 185.35 | -358.50 | 1.91 | 0.12 |
| 5 | -1.60 | 0.13 |  | -0.90 | + | -5.73e-07 | + | 7 | 185.91 | -357.50 | 2.86 | 0.07 |
| 6 | -1.68 | 0.14 | -0.02 |  | + | -4.99e-07 | + | 7 | 185.78 | -357.30 | 3.11 | 0.07 |
| 7 | -1.66 | 0.14 | -0.05 | -0.75 | + |  | + | 7 | 185.49 | -356.70 | 3.70 | 0.05 |
| **8** | **-1.60** | **0.13** | **-0.03** | **-0.94** | **+** | **-5.36e-07** | **+** | **8** | **185.94** | **-355.50** | **4.87** | **0.03** |
| 9 | -0.74 |  |  |  | + |  |  | 3 | 179.74 | -353.40 | 6.97 | 0.01 |
| 10 | -0.76 |  |  |  | + | -6.54e-07 |  | 4 | 180.51 | -352.90 | 7.48 | 0.01 |

**Tab.S3.** Models selection tables for General Linear Models (GLMs) for the study of variation in (a) total protein content, (b) antioxidant capacity and (c) total (pro)phenoloxidase activity. Tables are shortened to the first 10 models and are ranked from the best one (lowest AICc, on the top) to poorer ones (higher AICc, at the bottom). Complex models are represented in bold. The lines represent the thresholds that separate the set of best models (above the thresholds) that can be used to assess the contribution of each predictor. The thresholds are chosen according to a significant gap in delta AICc from one model to another.

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| **(a)** |  |  |  |  |  |  |  |  |  |  |  |
| **Model** | **Intercept** | **Locality** | **Status** | **Gammarid weight** | **Status : Gammarid weight** | **R²** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| **1** | **9.22** | **+** | **+** | **0.02** | **+** | **0.22** | **8** | **-1044.40** | **2105.10** | **0** | **0.95** |
| 2 | 8.59 | + | + | 0.04 |  | 0.20 | 7 | -1048.36 | 2111 | 5.84 | 0.05 |
| 3 | 10.24 | + | + |  |  | 0.16 | 6 | -1058.89 | 2130 | 24.83 | 0 |
| 4 | 9.09 | + |  | 0.04 |  | 0.16 | 6 | -1059.80 | 2131.80 | 26.65 | 0 |
| 5 | 8.83 |  | + | 0.02 | + | 0.16 | 5 | -1060.88 | 2131.90 | 26.76 | 0 |
| 6 | 7.98 |  | + | 0.04 |  | 0.13 | 4 | -1066.95 | 2142 | 36.86 | 0 |
| 7 | 10.89 | + |  |  |  | 0.11 | 5 | -1071.17 | 2152.50 | 47.33 | 0 |
| 8 | 8.56 |  |  | 0.05 |  | 0.09 | 3 | -1077.92 | 2161.90 | 56.75 | 0 |
| 9 | 9.72 |  | + |  |  | 0.05 | 3 | -1085.52 | 2177.10 | 71.95 | 0 |
| 10 | 10.45 |  |  |  |  | 0 | 2 | -1097.37 | 2198.80 | 93.62 | 0 |

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| **(b)** |  |  |  |  |  |  |  |  |  |  |  |
| **Model** | **Intercept** | **Locality** | **Status** | **Gammarid weight** | **Status : Gammarid weight** | **R²** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| 1 | 310200 | + | + | 1446 |  | 0.14 | 7 | -5608.67 | 11231.60 | 0 | 0.62 |
| **2** | **319400** | **+** | **+** | **1200** | **+** | **0.14** | **8** | **-5608.16** | **11232.70** | **1.06** | **0.36** |
| 3 | 323000 | + |  | 1515 |  | 0.12 | 6 | -5613.38 | 11239 | 7.35 | 0.02 |
| 4 | 369300 | + | + |  |  | 0.10 | 6 | -5616.96 | 11246.10 | 14.51 | 0 |
| 5 | 313800 |  | + | 944 | + | 0.08 | 5 | -5622.20 | 11254.50 | 22.94 | 0 |
| 6 | 386300 | + |  |  |  | 0.08 | 5 | -5622.30 | 11254.70 | 23.14 | 0 |
| 7 | 297100 |  | + | 1367 |  | 0.07 | 4 | -5623.64 | 11255.40 | 23.77 | 0 |
| 8 | 312400 |  |  | 1423 |  | 0.05 | 3 | -5628.36 | 11262.80 | 31.17 | 0 |
| 9 | 351000 |  | + |  |  | 0.02 | 3 | -5634.95 | 11276 | 44.36 | 0 |
| 10 | 370300 |  |  |  |  | 0 | 2 | -5640.38 | 11284.80 | 53.20 | 0 |

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| **(c)** |  |  |  |  |  |  |  |  |  |  |  |
| **Model** | **Intercept** | **Locality** | **Status** | **Gammarid weight** | **Status : Gammarid weight** | **R²** | **Df** | **Log Likelihood** | **AICc** | **Delta** | **Weight** |
| 1 | 5.78 | + | + | 0.01 |  | 0.18 | 7 | -369.79 | 753.80 | 0 | 0.57 |
| **2** | **5.84** | **+** | **+** | **0.01** | **+** | **0.19** | **8** | **-369.04** | **754.40** | **0.59** | **0.43** |
| 3 | 5.69 |  | + | 0.01 | + | 0.15 | 5 | -378.38 | 766.90 | 13.07 | 0 |
| 4 | 5.60 |  | + | 0.01 |  | 0.14 | 4 | -379.91 | 767.90 | 14.08 | 0 |
| 5 | 6.11 | + | + |  |  | 0.15 | 6 | -379.26 | 770.70 | 16.88 | 0 |
| 6 | 5.89 | + |  | 0.01 |  | 0.13 | 6 | -382.48 | 777.10 | 23.31 | 0 |
| 7 | 5.72 |  |  | 0.01 |  | 0.09 | 3 | -391.94 | 789.90 | 36.09 | 0 |
| 8 | 6.25 | + |  |  |  | 0.09 | 5 | -392.79 | 795.70 | 41.89 | 0 |
| 9 | 5.97 |  | + |  |  | 0.06 | 3 | -400.30 | 806.70 | 52.81 | 0 |
| 10 | 6.12 |  |  |  |  | 0 | 2 | -413.18 | 830.40 | 76.55 | 0 |