Supplementary Material for

Mutualistic cleaner fish maintains high escape performance despite privileged relationship with predators

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Figure S1. Body size (total length in cm) of all individuals tested. Red = adults; Blue = juveniles. Species names are abbreviated (see Fig. 1 for full names).

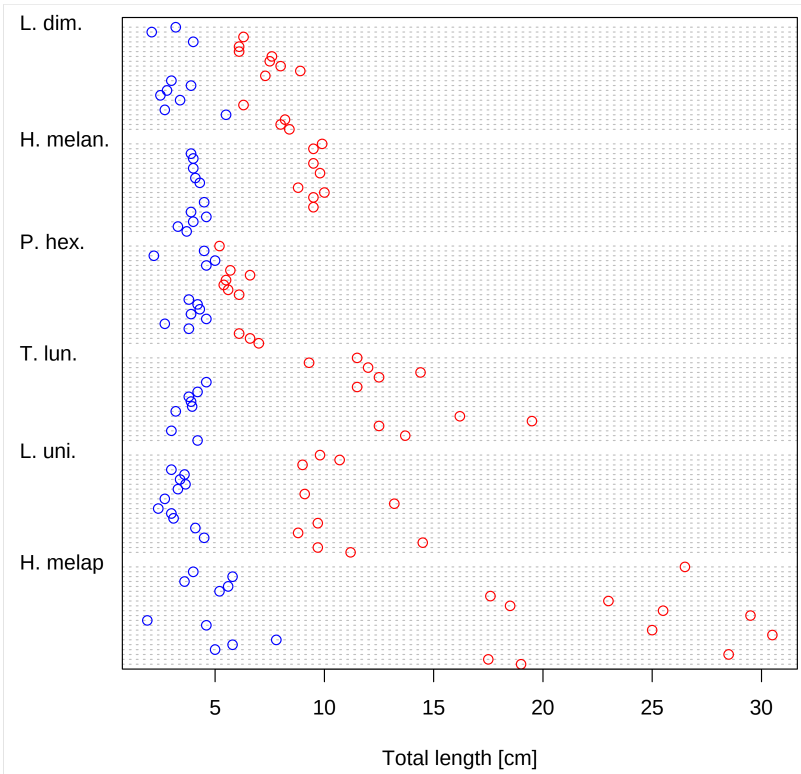

Figure S2. Performance of the six study species: maximum velocity (U_{max} ; plots 1-2) and maximum acceleration (A_{max} ; plots 3-4). Plots display the mean and 95% confidence interval (C.I.) predicted by the linear mixed-effects models for adults (left column) and juveniles (right column). The obligate cleaner (*L. dimidiatus*) is displayed in green; facultative cleaners, appear in red and non-cleaners, in black. Different letters indicate that the C.I. do not overlap for more than half of the error bar length, and thus represent significant differences below α = 0.05 [1]. Plots were created with the R package "effects" [2]. Species names are abbreviated (see Fig. 1 for full names).

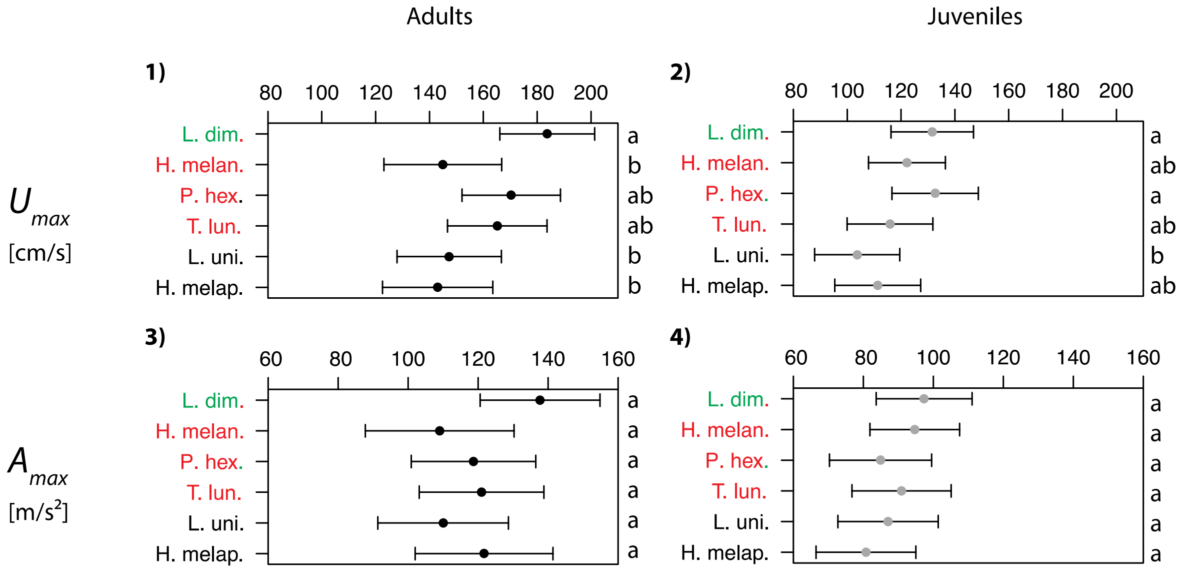

Table S1. Results from the linear mixed-effects models with maximum velocity (U_{max} ;a) and maximum acceleration (A_{max} ; b) as response variables, for adult and juvenile fishes.

			Adults				Juveniles			
Response	**Predictor**	**d.f.**	**Sum Sq.**	**F**	**P-value**		**Sum Sq.**	**F**	**P-value**	
1) U_{max}										
	sin(Angle)	1	818	0.45	0.504		2365	3.73	5.64 e^{-2}	
	Dist. stim.	1	194	0.11	0.745		10519	16.6	1.02 e^{-4}	***
	Trial	1	52	0.03	0.866		991	1.56	0.219	
	Observer	1	942	0.52	0.474		979	1.54	0.219	
	Species	5	32011	3.51	5.01 e^{-3}	**	8378	2.64	3.65 e^{-2}	*
2) A_{max}										
	sin(Angle)	1	681	0.47	0.496		650	1.14	0.288	
	Dist. stim.	1	793	0.54	0.462		7513	12.3	6.84 e^{-4}	***
	Trial	1	6365	4.36	0.038	*	349	0.57	0.451	
	Observer	1	37.8	0.03	0.873		190	0.31	0.579	
	Species	5	11256	1.54	0.192		3138	1.03	0.413	

d.f., degrees of freedom ; Sum Sq., Sum of Squares; ***P***<0.05; ****P***<0.01; *****P***<0.001

Table S2. Proportion of time that each species spent inside the reef matrix over two hours of field observations.

Species	**% time in reef**	**std**	**Min**	**Max**	**Pairwise comparisons**
L. dimidiatus	0.004	0.012	0	0.033	b
H. melanurus	0.025	0.050	0	0.133	b
P. hexataenia	0.212	0.215	0	0.633	a
T. lunare	0.000	0.000	0	0.000	b
L. unilineatus	0.008	0.024	0	0.067	b
H. melapterus	0.021	0.059	0	0.167	b

std., standard deviation; Min, Minimum; Max, Maximum; different letters indicate significant differences across species (α = 0.05).

Supplementary analyses controlling for body size

We used two approaches to assess whether differences in body size affect the results we present in the manuscript: 1) we included size as a covariate in the model and 2) we divided D_{esc}, $D_{esc\text{-}stim}$, U_{max} and A_{max} by the size of the individual to obtain relative (rather than absolute) performance measures and re-ran the analyses. The second approach is commonly used to control for size in fast-start performance analyses [3].

These analyses can be reproduced using the archived code, including the diagnostic plots used to assess model fit and the effect plots to visualize model predictions. The table below summarizes the output of each analysis.

Adults			**Juveniles**		
Original analysis	**Size as fixed effect**	**Size corrected variables**	**Original analysis**	**Size as fixed effect**	**Size corrected variables**
1) Latency					
Dist. Stim *** Species ***	Dist. Stim. *** TL **	-- --	Dist. Stim. *** Species ***	Dist. Stim. *** Species *	-- --
2) Turning Rate					
Species ***	Species *** TL **	-- --	Dist. Stim. *** Species **	Dist. Stim. *** Species ** TL ***	-- -- --
3) D_{esc}					
Species ***	Species ***	Species ***	Dist. Stim. ***	Dist. Stim. ***	Dist. Stim. *
4) $D_{esc\text{-}stim}$					
Dist. Stim *** Species **	Dist. Stim. *** Species ***	Dist. Stim. *** Species ***	Dist. Stim *** Species **	Dist. Stim. *** Species **	Dist. Stim. *** Species *** Angle *
5) U_{max}					
Species **	Species *	Species ***	Species * Dist. Stim. ***	Species * Dist. Stim *** Angle *	Species ** Dist. Stim. *** Angle *
6) A_{max}					
Video *	Video *	Video * Species ***	Dist. Stim ***	Dist. Stim. ***	Dist. Stim. ** Species *

Dist. Stim. = Distance to Stimulus; TL = Total Length; Angle = Angle to Stimulus. In each analysis (Original, Size as fixed effect, Size corrected variables) and for each variable, the table indicates which predictor came out as significant. P < 0.05; **P < 0.01; ***P < 0.001.

Including size as a covariate

Including size as a covariate in the model qualitatively changed the results only for escape latency in adults. In this case, size (but not species) was as a significant predictor in the models ran on all six response variables. Size was also a significant predictor of turning rate in both adults and juveniles but so was species. The trend we observed in the effect plots suggests that including size as a covariate generally decreased differences among species. This result was expected because size and species are collinear in our dataset; hence the variance will be distributed between these two predictors. The issue of collinearity was confirmed by the fact that the VIFs (Variance Inflation Factor, a measure of collinearity) reached higher values in this second analysis versus the one presented in the main text. In our original analysis, VIFs never reached values above 1.91; however, in this analysis, VIFs for species and size regularly reached values above 6 (max = 7.76). Therefore, we believe that this supplementary analysis is not statistically sound.

Adjusting response variables for size

In this case, the main effect of species was never affected by transforming any of the six response variables. Furthermore, the effect plots suggest that the differences we observed in our original analysis are even more pronounced when we consider relative measures of escape performance. This is sensible since the two smallest species were already the best performers in absolute terms, and relating performance to body length puts the smallest individuals at an advantage, thus increasing the patterns already observed. Nevertheless, we focus on absolute performance in the main text because we are interested in how far a fish can escape from a threat, irrespective of its size.

References

1. Cumming, G., Fidler, F. & Vaux, D. L. 2007 Error bars in experimental biology. *J. Cell Biol.* **177**, 7–11.

2. Fox, J. 2003 Effect displays in R for generalised linear models. *J. Stat. Softw.* **8**, 1–27.

3. Domenici, P. & Blake, R. 1997 The kinematics and performance of fish fast-start swimming. *J. Exp. Biol.* **200**, 1165–1178.