|  |  |  |  |
| --- | --- | --- | --- |
|  | ***S. purpuratus*** | ***L. pictus***  | ***A. punctulata*** |
| $N$**[per cell]** | 2.0 x 104 b | 6.3 x 104 b | 3.0 x 105 f |
| $$N\_{1/2}$$ | 2.9 x 104 c | 3.6 x 104 c | 1.8 x 104 c |
| $D$ **[cm2 s-1]** | 2.4 x 10-6 c | 2.4 x 10-6 c | 2.4 x 10-6 e |
| ***Kon* [M-1 s-1]** | 2.7 x 107 b | 2.4 x 107 b | 5.0 x 107 f |
| $s$**[cm]** | 1.87 x 10-8 c | 1.66 x 10-8 c | 3.46 x 10-8 c |
| $Δt$ **[s]** | 0.39 ± 0.08 a | 0.52 ± 0.22 a | 0.60 |
| $v$**[cm s-1]** | 71.8 x 10-4 c | 88.5 x 10-4 c | 100 x 10-4 c |
| $∆$***r* [cm]** | 28 ± 6 x 10-4 a | 46 ± 14 x 10-4 a | 60 x 10-4 |
| ***L* [cm]** | 39.2 ± 2.2 x 10-4 d | 48.7 ± 2.1 x 10-4 d | 50 x 10-4 e |
| ***a* [cm]** | 1.39 x 10-4 c | 1.56 x 10-4 c | 1.58 x 10-4 c |
| ***Pe*** | 4.2 x 10-1 (sphere)6.0 x 10-2 (cylinder) g | 5.8 x 10-1 (sphere)7.4 x 10-2 (cylinder) g | 6.6 x 10-1 (sphere)8.3 x 10-2 (cylinder) g |

**Supplementary File 1**

**Parameters of the chemoattractant sampling model for each species.**

Note that the main differences between species are the number of receptors $N$. $N\_{1/2}$ number of receptors that allows half maximal binding rate for any concentration of chemoattractant, i.e. π*a/s*. *D* diffusion coefficient of the chemoattractant; $Kon$ association rate constant; $s$effective radius of the chemoattractant (as proxy of chemoattractant receptor's binding site radius); $Δt$ sampling time (time to swim half the circumference in the boundary close to the water-glass interface); *v* mean linear speed of the spermatozoa, i.e.$ ∆$*r/*$∆t$; $∆r$ sampling distance (circumference diameter); *L* length of sperm flagellum; *a* spermatozoa radius, assuming that flagella are spheres; *Pe* Peclet number for a spherical cell approximation (sphere), or cylindrical flagellum geometry (cylinder). a Measured in this study (mean ± sd); N = 3 sea urchins; n = 495 (*S. purpuratus*), n = 56 (*L. pictus*) spermatozoa. b Nishigaki et al., 2001; Nishigaki and Darszon, 2000. c Calculated in this study (see section ***1.1. On the estimate of maximal chemoattractant absorption***). d Measured in this study (mean ± sd); N = 1 sea urchin; n = 26 (*S. purpuratus*), n = 39 (*L. pictus*) spermatozoa. e Kashikar et al., 2012. f Pichlo et al., 2014 reported 6.5 x 10-8 cm for the resact radius. g Calculated in this study.