

Fig. S1. Cry II protein in the firebug *P. apterus*. Top schemes illustrate two key protein domains in wt and mutant proteins, respectively. The grey box depicts the detail DNA sequence with corresponding amino acid residues underneath. Red nucleotides indicate insertion/substitution specific to *cry II*⁰⁴ mutant. Underlined nucleotides highlight the stop codon (TGA), which is depicted as asterisk in the protein.

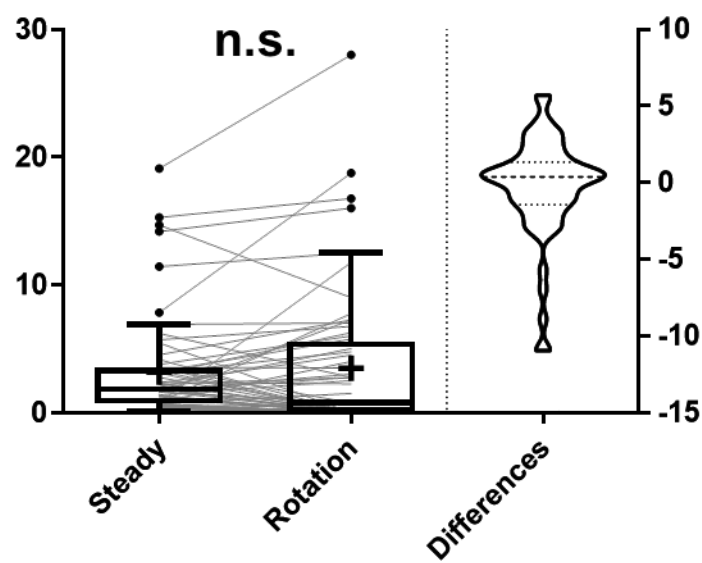
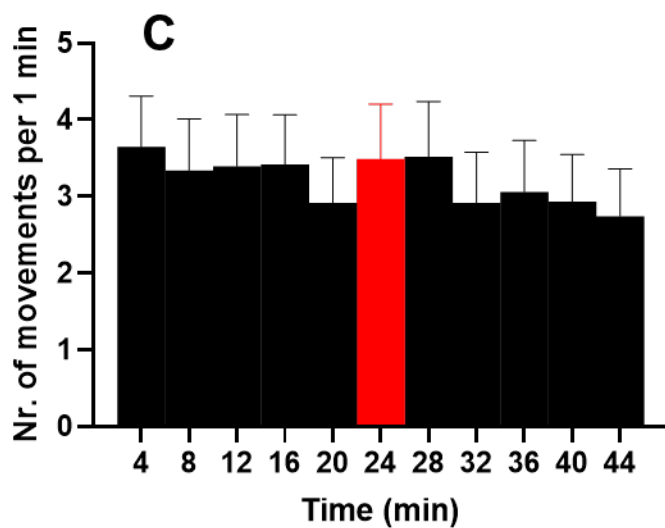
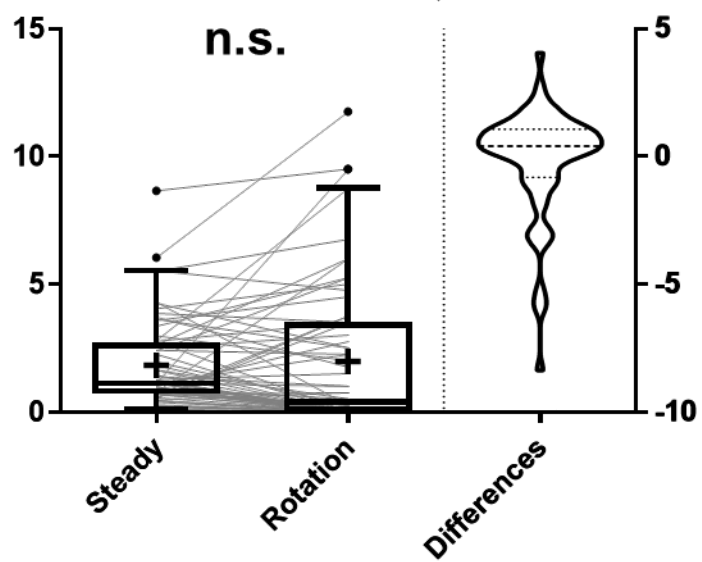
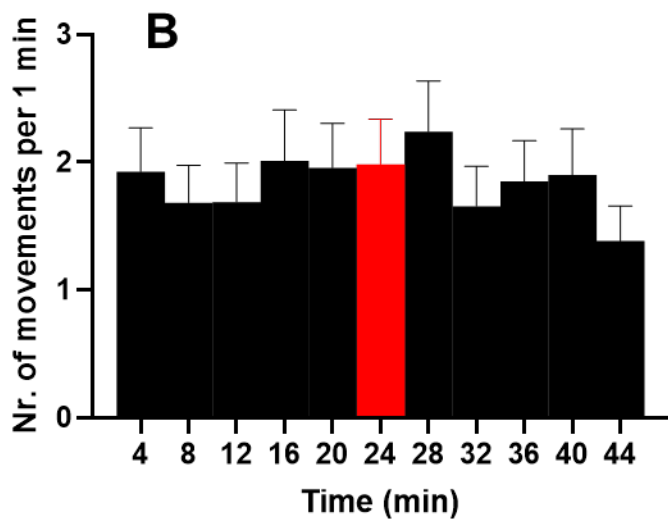
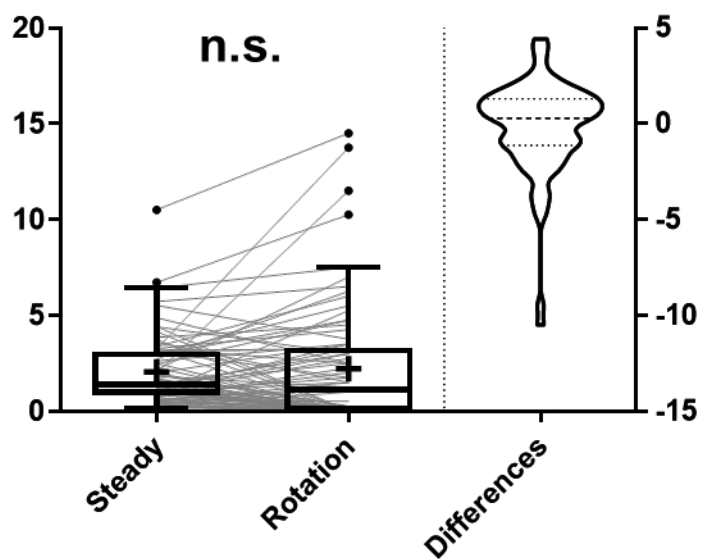
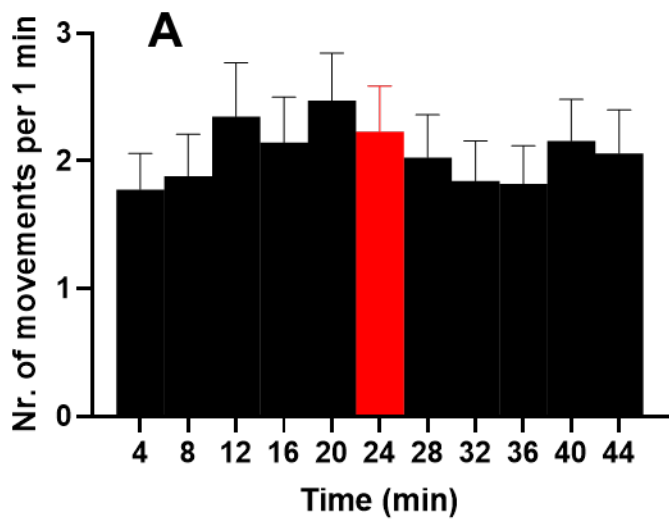


Fig. S2. Wildtype male control samples under blue-green light. (A) Spontaneous activity of untrained males with no MF rotation during the test ($n=78$, $P=0.7360$). (B) Activity of untrained males under application of MF rotation ($n=64$, $P=0.7205$). (C) Activity of trained males but with no MF rotation during the test ($n=60$, $P=0.7535$). Neither of samples shows MIF. The diagrams on the left show the means with the SEM of the number of movements per 1 min. The black 4 min bars represent periods of steady field, the red 4 min bar represents the period of magnetic field rotation. The box plots depict the mean activity per minute for the two conditions "Steady" and "Rotation", with the individual pairs connected by a grey line from the same data. The box plots show Median, 25th, and 75th percentiles, Tukey whiskers and outliers (Means are given as +). Distributions of individual differences are shown to the very right. Since normality is not secured, a paired, two-tailed t-test in combination with a permutation test was applied. One asterisk indicates $P<0.05$, two asterisks indicate $P<0.01$.

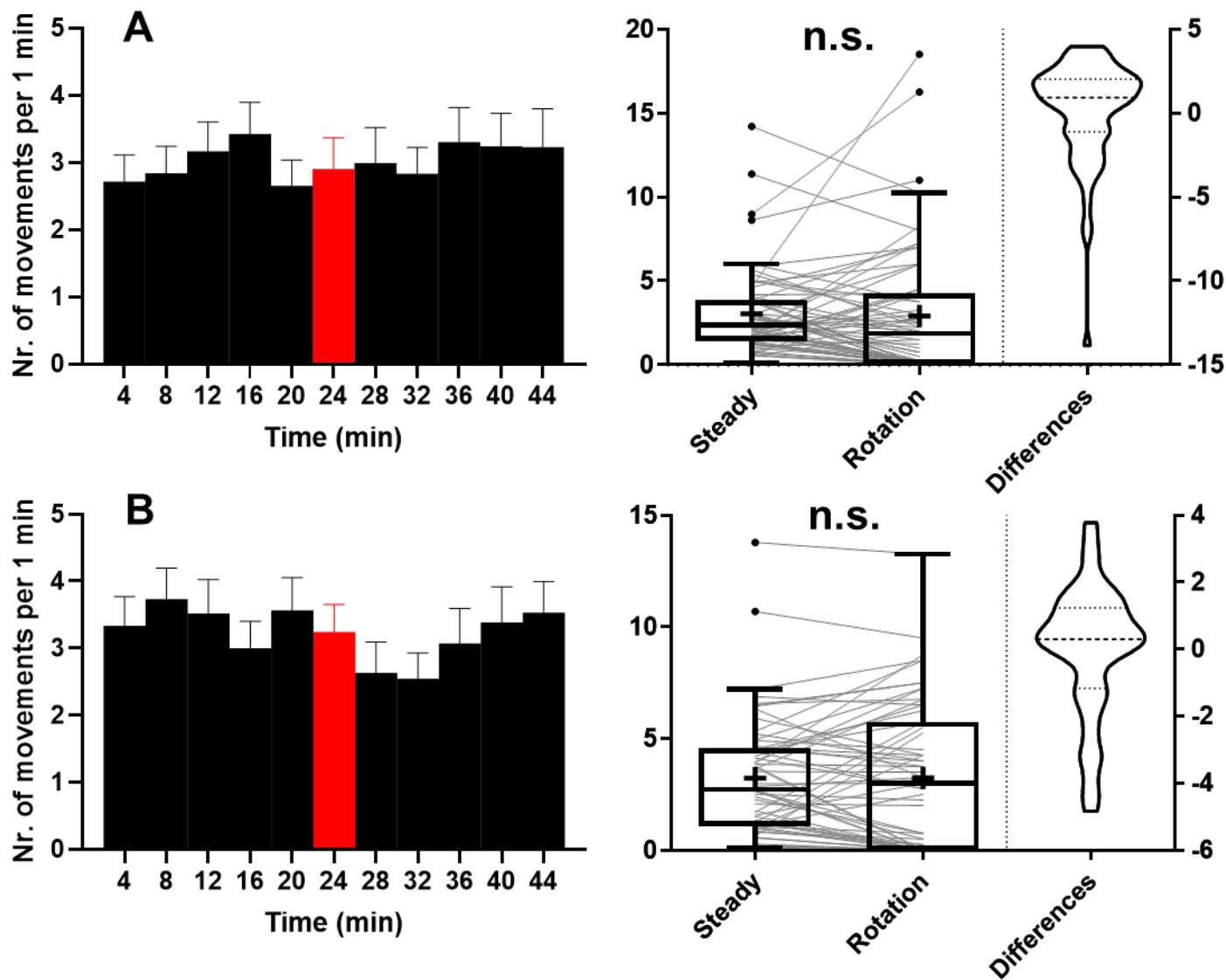


Fig. S3. Wildtype female control samples under blue-green light. (A) Spontaneous activity of untrained females with no MF rotation during the test ($n=66$, $P=0.3567$). (B) Activity of untrained females under applied MF rotation ($n=61$, $P=0.5164$). Neither sample shows MIF. Diagrams and legends above.

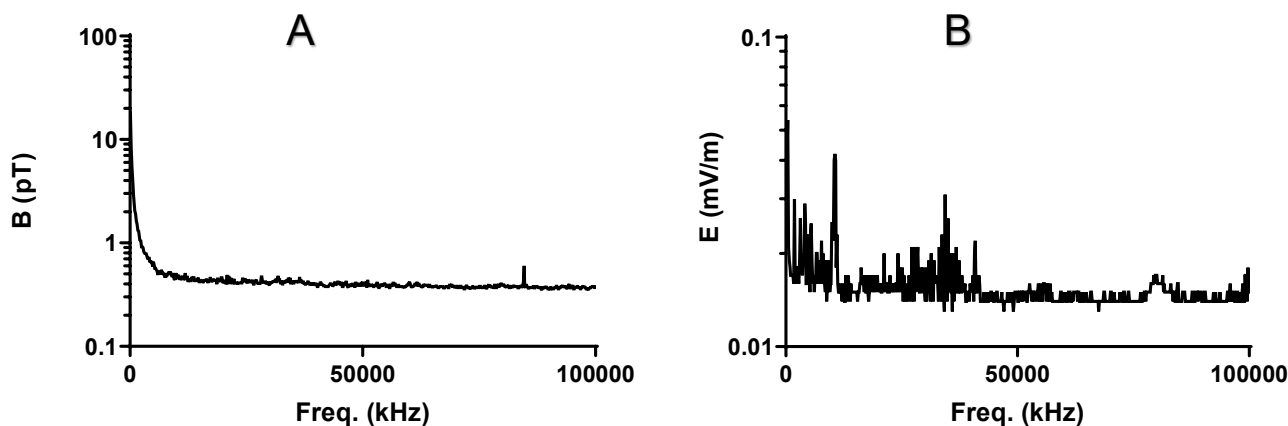


Fig. S4. Radiofrequency silent background in the shielded chamber. The magnetic (A) and electric (B) components of radiofrequency spectrum parts 100 kHz-100 MHz. Note that the measured values are very low, and that irrelevant electric field noise penetrates from power supplies at around 30-40 MHz. An active Schwarzbeck HFS 1546 antenna was used for the magnetic component and an active Schwarzbeck EFS 9218 antenna was used for the electric component. The R&S FSC3 spectrum analyzer recorded the max-hold signal for 10 min with the RMS detector. The resolution bandwidth was set to 10 kHz.

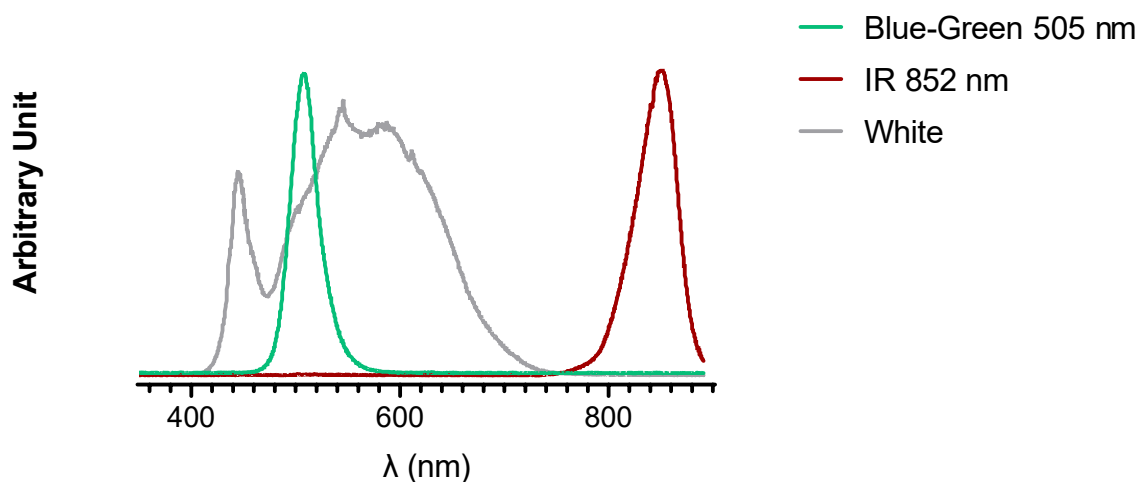
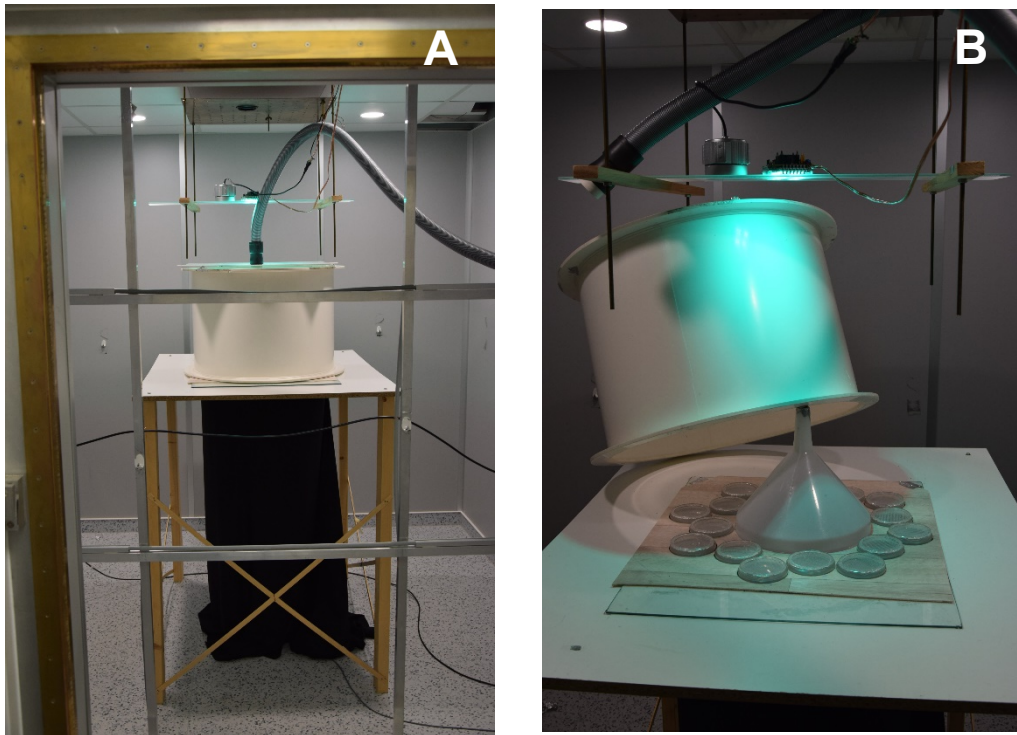


Fig. S5. Wavelength spectra of lights used in the experiment. Blue-green 505 nm LED, Infra-red 852 nm LED, White ceiling light.



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Fig. S6. A) The arena located in a shielded chamber. Note the hose leading the hot air from outside the chamber fixed in a translucent white plastic lid. LED lights illuminate the arena from above, the camera capturing the scene from below is covered with a black cloth. B) Detail of 16 Petri dishes around the funnel, each positioned in a plastic template base on a glass pane. The funnel disperses the hot air coming from above.