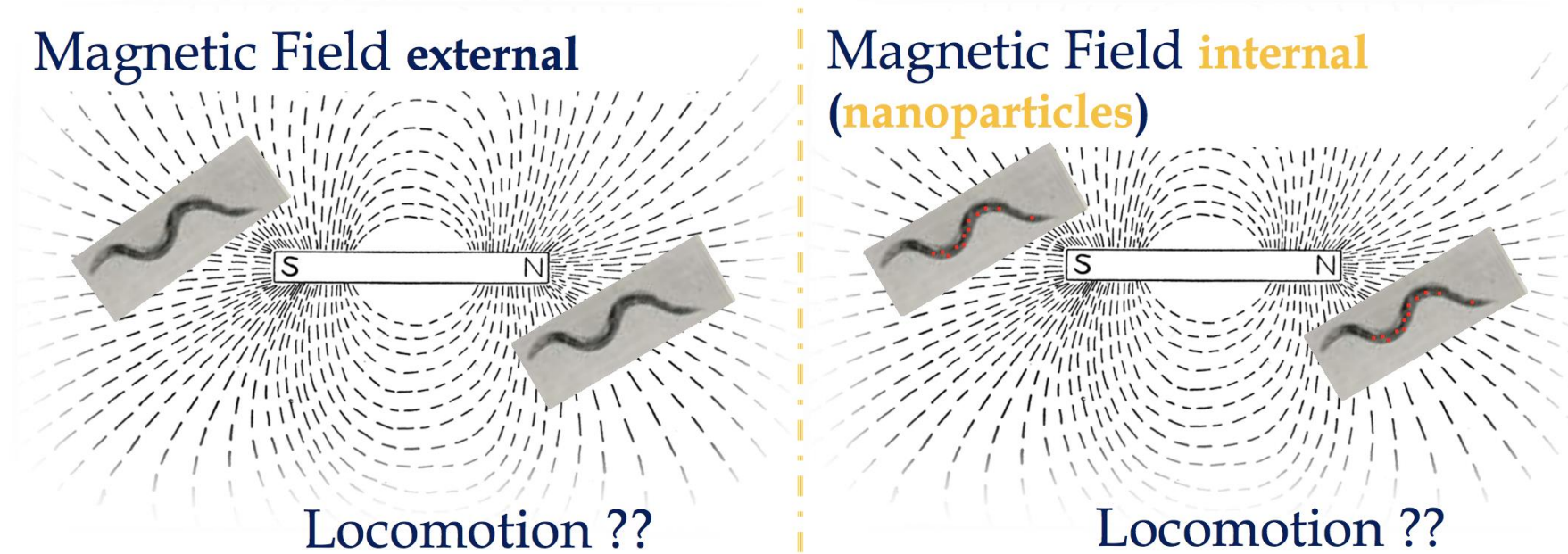


Background

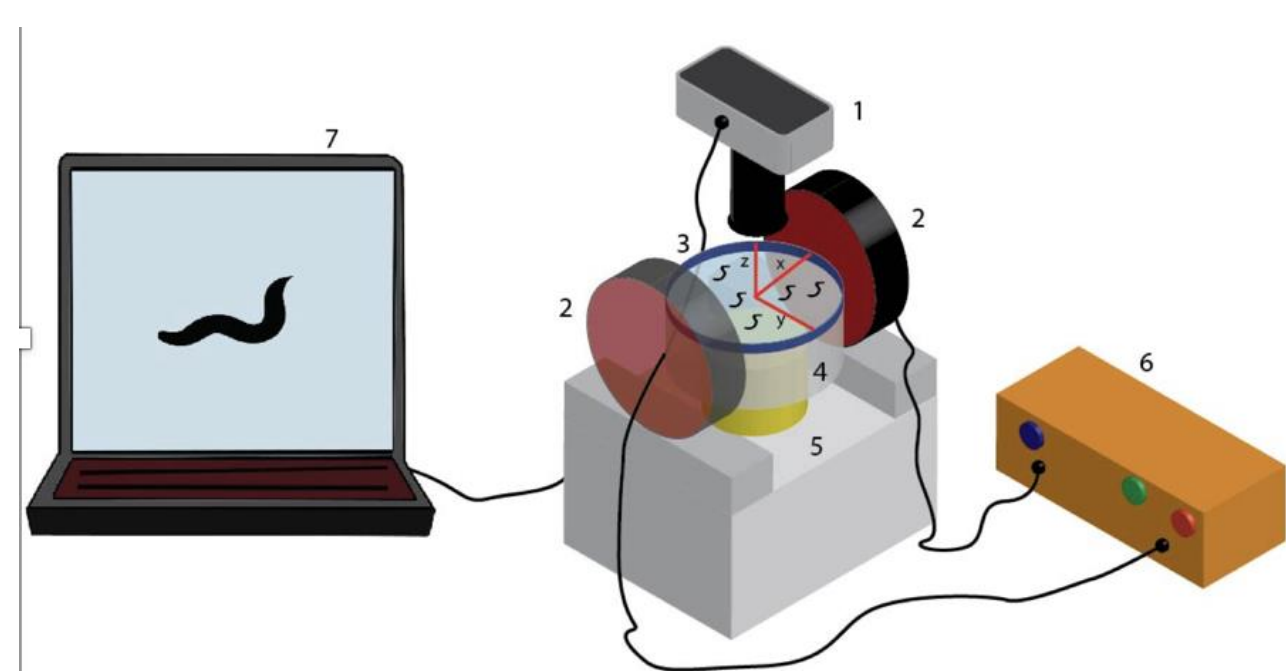
- The effects of magnetic field (MF) on living organisms is associated with activity linked to the modern way of living. (1)
- C. elegans* is a successful resource to study MF effects on various types of cells and tissues. (2)
- Nanoparticles uptake by *C. elegans* worms has been a successful means to evaluate toxicity of materials. (3)
- C. elegans* locomotion can be used to assess impact on behavior (4)

Objectives



Use locomotion as a quantifiable and revealing behavioral expression to determine the effect of MF gradient on *C. elegans*.

Experimental Setup

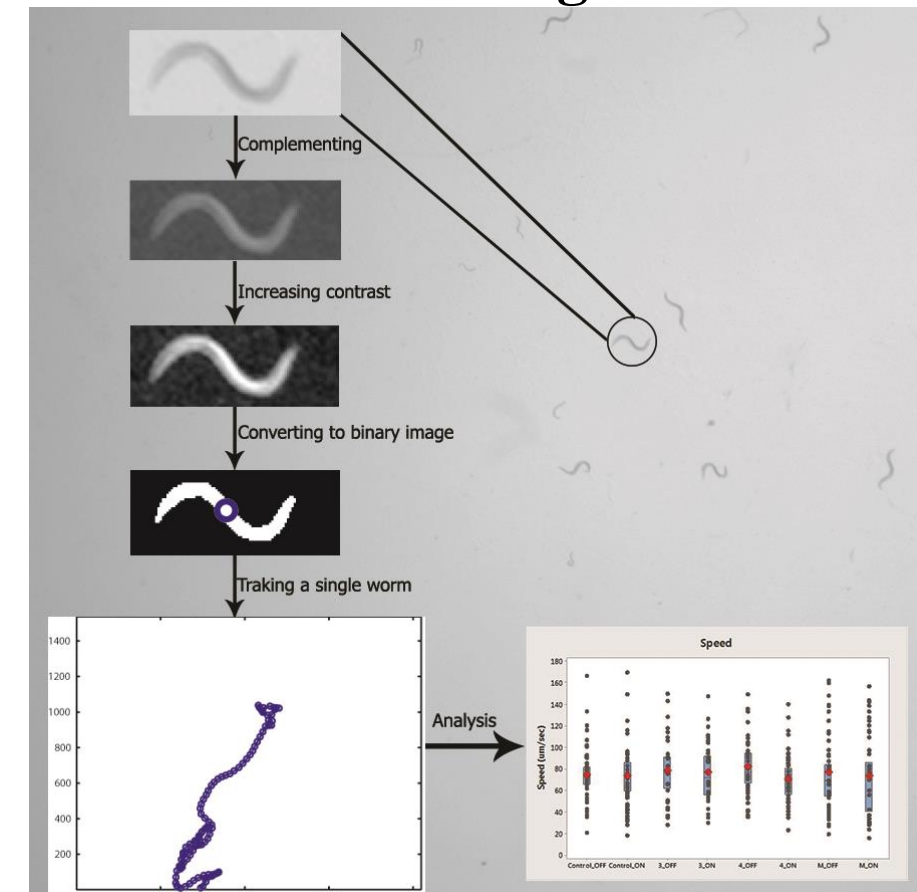


1: Objective lens and camera; 2: Electromagnets; 3: NGM plate with *C. elegans*, with schematic of plate orientation; 4: Auxiliary base; 5: Bright light source; 6: Power supply; 7: Computer and software.

Group	Particle Size	Coating	Magnetic properties	Fluorescence
Group C	-	-	-	-
Group 1	1 μ m	Streptavidin	Superparamagnetic, iron core	No
Group 100	100 nm	No	Magnetic, dextran iron oxide composite	Rhodamine
Group 40	40 nm	-COOH	Magnetic, iron oxide (magnetite)	No

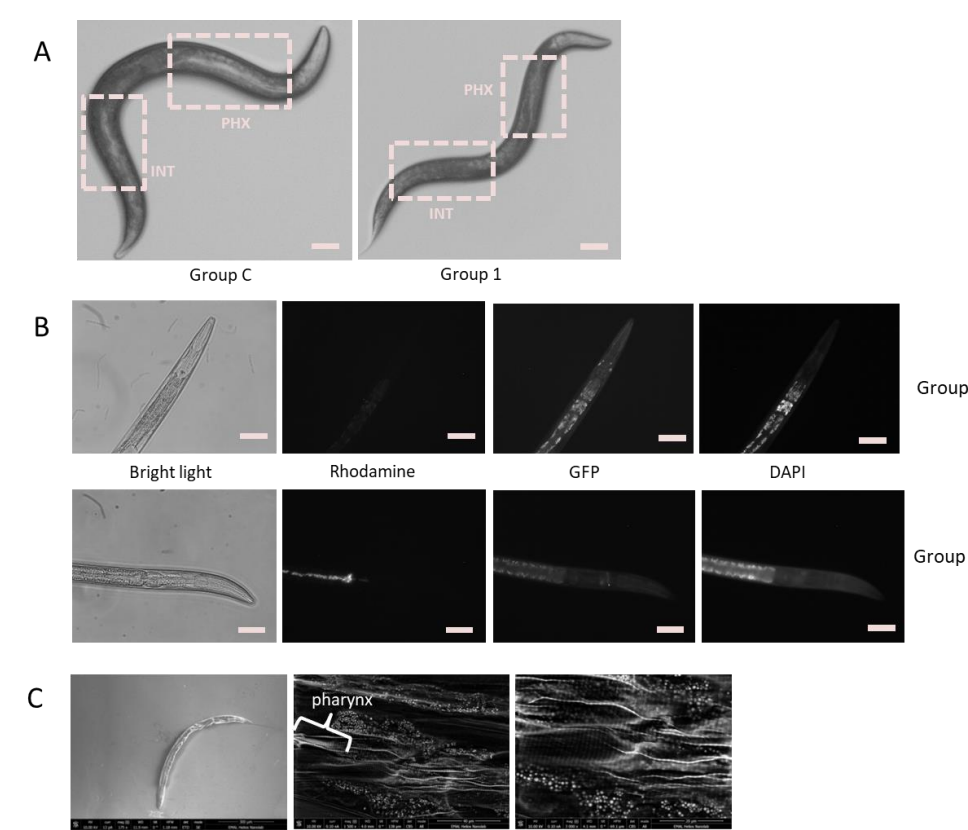
Methods

Worms recording and tracking



Locomotion Features Analysis (5)

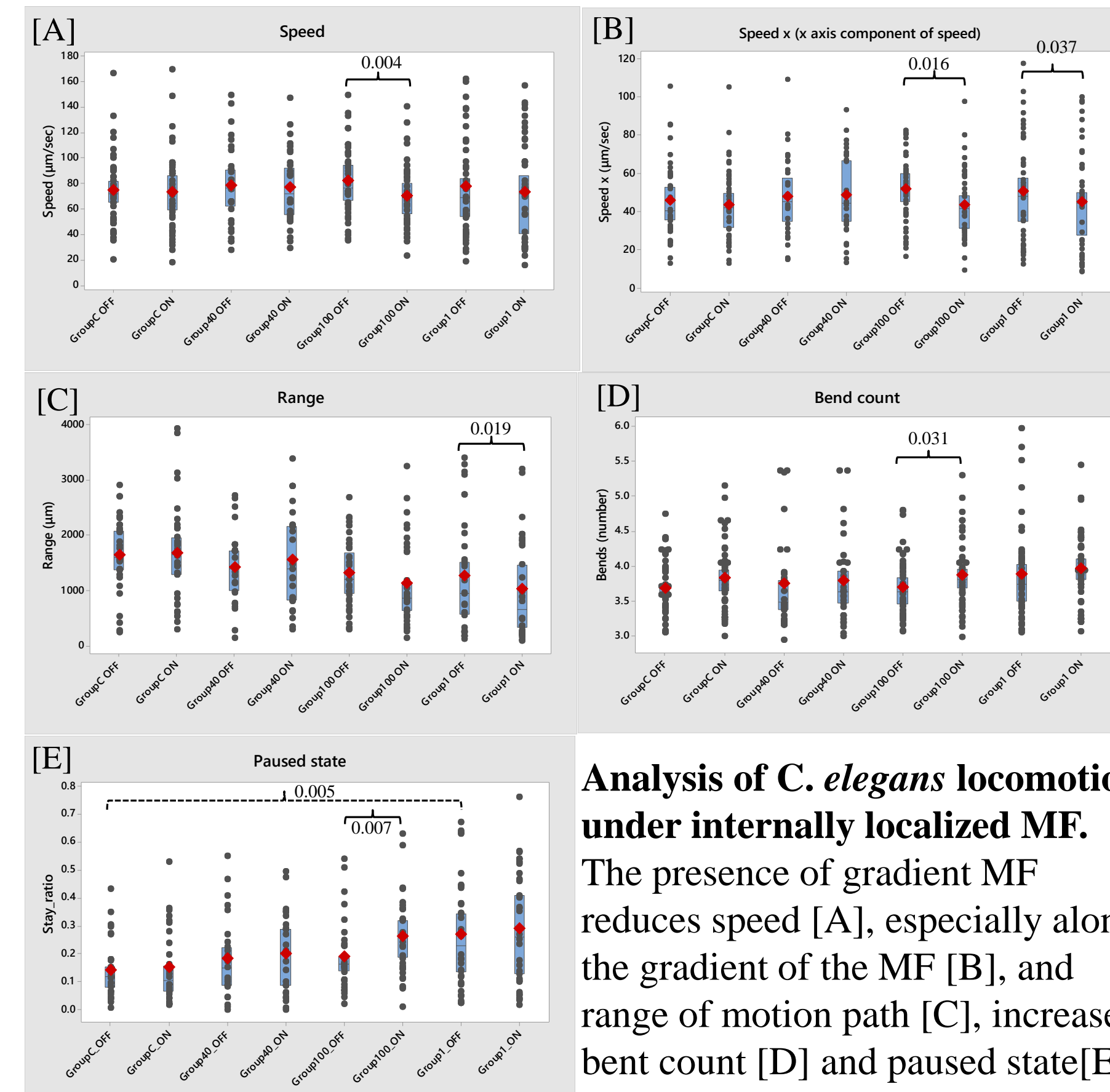
- Morphology: Length, Centroid.
- Posture: Bends, Bend count.
- Motion: Motion state, Velocity.
- Path: Path Curvature, Range.



Discussion & Conclusions

- Internally localized MF, generated by magnetic nanoparticles, affects the dynamics of *C. elegans* locomotion (8).
- MF alone does not have an impact on worms' locomotion.
- The gradient of the MF (up to 2×10^5 T/m, 1 μ m particles) is well above the threshold that may impact mechano-sensitive ion channels (10^3 T/m) (9).
- Findings are added to the discussion on *C. elegans* magnetotaxis (6) and are among the few available data on the *in vivo* effect of internally localized MFs (7).
- The effect of localized MFs on animals' behavior, combined with use of particles with different properties, could pave the way for further studies on the sensitivity of biological systems to MFs.

Results



Next steps

To test targeted neurons that could be affected by gradient MF, such as DVA neuron, with its mechanosensitive TRPN channels, and VB, VD, DB, DD motor neurons.

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