Abstract Submitted
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Mechanism of cell alignment in groups of Myxococcus xanthus bacteria[1] RAJESH BALGAM, OLEG IGOSHIN, Rice University — *Myxococcus xanthus* is a model for studying self-organization in bacteria. These flexible cylindrical bacteria move along. In groups, *M. xanthus* cells align themselves into dynamic cell clusters but the mechanism underlying their formation is unknown. It has been shown that steric interactions can cause alignment in self-propelled hard rods [1] but it is not clear how flexibility and reversals affect the alignment and cluster formation. We have investigated cell alignment process using our biophysical model of *M. xanthus* cell [2] in an agent-based simulation framework under realistic cell flexibility values. We observed that flexible model cells can form aligned cell clusters when reversals are suppressed but these clusters disappeared when reversals frequency becomes similar to the observed value. However, *M. xanthus* cells follow slime (polysaccharide gel like material) trails left by other cells and we show that implementing this into our model rescues cell clustering for reversing cells. Our results show that slime following along with periodic cell reversals act as positive feedback to reinforce existing slime trails and recruit more cells. Furthermore, we have observed that mechanical cell alignment combined with slime following is sufficient to explain the distinct clustering patterns of reversing and non-reversing cells as observed in recent experiments [3]. **References** 1. Peruani, F., et al., Phys. Rev. E, 2006. 2. Balagam, R., et al., PLoS Comput Biol, 2014. 3. Thutupalli, S., et al., 2014. http://arxiv.org/pdf/1410.7230.pdf

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Oleg Igoshin
Rice University

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