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Emergence of synchronisation in flagella of variable length[1]
MARCO POLIN, DAMTP, University of Cambridge, IDAN TUVAL, IMEDEA, Mallorca, Spain, RAYMOND GOLDSTEIN, DAMTP, University of Cambridge —
Chlamydomonas reinhardtii is a unicellular green alga that can swim by the concerted breaststroke-like beating of its two flagella. When the flagella are synchronised the organism moves along a straight helical path, while a large difference in the two beating frequencies induces sharp turns. Even in the synchronous state, however, the two flagella have slightly different intrinsic frequencies, and synchrony is guaranteed only by the presence of a sufficiently strong interflagellar coupling. Although the magnitude of this coupling is consistent with the value derived from a rough hydrodynamic estimate, no direct experimental test for the role of hydrodynamic in interflagellar coupling is available. In order to better understand the origin of interflagellar coupling, we employ high- speed imaging to study the dynamics of the two flagella of *Chlamydomonas* as they regrow after mechanically induced deflagellation. Our results show that the duration of synchronised motion is strongly dependent on flagellar length. We discuss this dependence in light of hydrodynamic models of flagellar synchronisation.

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Marco Polin
DAMTP, University of Cambridge

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