## Lévy walks emerging from collective behaviours: A New Frontier

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Movement patterns resembling Lévy walks, often attributed to the execution of an advantageous searching strategy, are found in a wide variety of organisms, from cells to humans. Although the mechanisms underlying these patterns vary, in the past, they have been mostly related to sparsely distributed independent individuals. Here, I report on recent and ongoing studies of swarming bacteria, midge swarms and termite swarms where the occurrence of Lévy walks can be attributed to the collective, rather than individual movements. It is shown how Lévy walks in swarming bacteria can be attributed to chaotic propulsion through the collective flow. Lévy walks in swarming midges are attributed to the emergence of multiplicative (speed-dependent noise) whilst Lévy walks in termite swarms are attributed to simple social interactions. I thereby identify 3 distinct pathways for the emergence of Lévy walking from collective behaviours. The findings add to the growing realization that nature is not working with a blank canvas, as Lévy walks can arise for free, and that as a consequence many organisms are predisposed to Lévy walks. Nonetheless, there could be selection for maintaining these patterns of movements, if they are advantageous. I suggest that the emergence of Lévy walks from collective behaviours is ubiquitous occurring across taxa and across scales.