

# The “color” of sexual smells in a copepod

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Copepods, a form of zooplankton, are an important link between autotrophs and higher trophic levels in the earth’s freshwater and marine food webs. We investigate chemical aspects of mating in the marine copepod *Temora longicornis* (Copepoda, Calanoidea). Our emphasis is the female pheromone signaling in form of well-defined trails for males to follow, observed in [1]. The viscous environment and the properties of the odorants play important roles as the spread of the pheromone trail limits the time during which it is useful for tracing. A key observation from our earlier work is the ability of a searching male to detect the direction of the female and to correct its swimming direction if necessary. We propose a mathematical model for the spread of a pheromone from a moving source and carry out numerical simulations of two possible detection mechanisms. We find that a searching agent that is capable to detect a ratio outperforms a searcher that depends on the gradient of a single compound. Moreover, we implement a simple, yet efficient design for the olfactory apparatus using the Leaky Integrate-and-Fire neuronal model. Our results suggest that *T. longicornis*’ sex pheromones consist of blends of chemical compounds and that a ratio detection mechanism similar to that in airborne insects is at work.

## References

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