Modeling mating encounters in insects: the molecular collisions framework and the associated numerical correction.

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Ideal gas models are a paradigm used in Biology for the phenomenological modeling of encounters between individuals of different types. These models have been used to approximate encounter rates given densities, velocities and distance within which an encounter certainly occurs. When using mass action in two-sex populations, however, it is necessary to recognize the difference between encounters and mating encounters. While the former refers in general to the (possibly simultaneous) collisions between particles, the latter represents pair formation that will produce offspring. In this talk I will show how an easy dimensional reduction argument and simulated data help to discriminate between the two cases. In addition, variability in mating encounter rates (due to environmental stochasticity) is numerically explored through random fluctuations on the new mass action proportionality constant. The simulations show how the conditioned time to extinction in a population subject to a reproductive Allee effect is affected.