

# A host-parasite model for a two-type cell population

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## Abstract

A host-parasite model is considered for a population of cells that can be of two types, A or B, and exhibits unilateral reproduction: while a B-cell always splits into two cells of the same type, the two daughter cells of an A-cell can be of any type. The random mechanism that describes how parasites within a cell multiply and are then shared into the daughter cells is allowed to depend on the hosting mother cell as well as its daughter cells. Focusing on the subpopulation of A-cells and its parasites, the model differs from the single-type model recently studied by BANSAYE [1] in that the sharing mechanism may be biased towards one of the two types. Main results are concerned with the nonextinctive case and provide information on the behavior, as  $n \rightarrow \infty$ , of the number A-parasites in generation  $n$  and the relative proportion of A- and B-cells in this generation which host a given number of parasites. As in [1], proofs will make use of a so-called random cell line which, when conditioned to be of type A, behaves like a branching process in random environment. This is joint work with Sören Gröttrup.

## References

- [1] V. Bansaye. Proliferating parasites in dividing cells: Kimmel's branching model revisited. *Ann. Appl. Probab.*, 18(3):967–996, 2008.