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Regulation and stability of host-parasite population interactions

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Several models describing the dynamics of host-parasite associations are discussed. The models contain the central assumption that the parasite increases the rate of host mortalities. The parasite induced changes in this rate are formulated as functions of the parasite numbers per host and hence of the statistical distribution of the parasites within the host population. The parameters influencing the ability of the parasite to regulate the growth of its host's population, and the stability of parasite induced equilibria, are examined for each model. Three specific categories of population processes are shown to be of particular significance in stabilizing the dynamical behaviour of host-parasite interactions and enhancing the regulatory role of the parasite. These categories are overdispersion of parasite numbers per host, nonlinear functional relationships between parasite burden per host and host death rate, and density dependent constraints on parasite population growth within individual hosts.

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