

Life expectancy and reproduction

SIR—Recent developments in life-history theory predict that organisms will alter reproductive behaviour if life expectancy declines¹⁻³. Here we report that a parasitic wasp responds to changes in barometric pressure associated with thunderstorms, which are known to cause considerable mortality among small, frail insects⁴.

Parasitic wasps usually do not lay eggs in low-quality (already parasitized) hosts; this is an adaptive behaviour for maximizing lifetime reproduction^{2,3}. We predicted³ that wasps will oviposit in such poor hosts if the gain in lifetime reproduction associated with acceptance is higher than it would be for rejection. This trade-off is determined in part by the availability of hosts (habitat quality) and in part by life expectancy, which can change very suddenly with the approach of storms. The two main predictions of the theory³ are that a wasp will spend more time on a patch of previously parasitized hosts and will superparasitize (lay an egg in a previously parasitized host) more often if the risk of mortality increases.

To manipulate the perceived quality of

the habitat, we raised the parasitic wasp *Leptopilina heterotoma*⁵ on host patches with only unparasitized fruit fly larvae (good world, G) or only parasitized larvae (bad world, B) (see ref. 3 for explanation). To manipulate perceived life expectancy, we conducted the experiment under steady barometric pressure (S) as would occur during a fair summer day or rapidly dropping barometric pressure (D) as would occur several hours before the onset of a large storm. We placed wasps and patches containing only parasitized hosts in sealed plastic chambers, which were then connected to a microprocessor-driven air pump controlling internal air pressure. At the start of the experiment, we randomly chose the boxes to correspond to the steady pressure or dropping pressure, which decreased at 1 mbar per hour. Six hours later, we released the wasps individually on to the patches and recorded times on patches and number of superparasitisms.

The wasps are sensitive to barometric pressure in the manner predicted by theory. Wasps in the low life-expectancy treatments searched longer ($P < 0.02$; part a in the figure), encountered more hosts and superparasitized more frequently ($P < 0.00014$, part b). Explanations other than decrease in life expectancy are possible, but our previous work³ shows that wasps respond in a similar manner to a completely different cue (photoperiod) that indicates short life expectancy. Hence it is life expectancy and not the cue that is shaping reproductive behaviour. We cannot firmly state that the wasps respond only to dropping barometric pressure or to changes in barometric pressure. However, the point could be moot as it may be the indication of change (and the uncertainty associated with such change) that has shaped the behaviour of the wasps.

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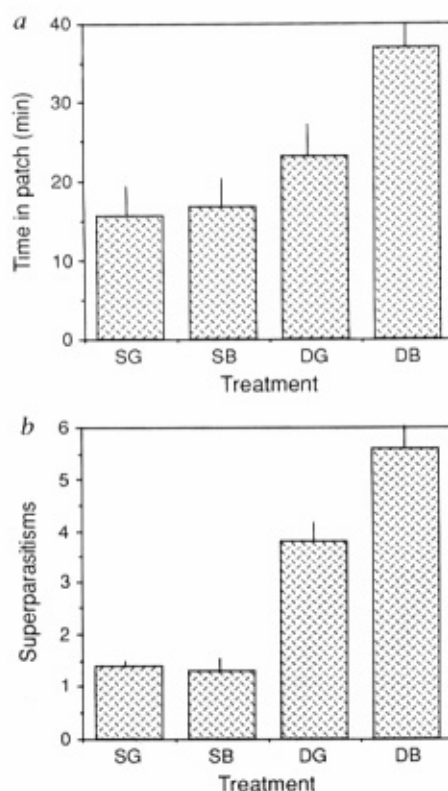
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a. Amount of time wasps allocated to searching patches before emigrating. SG, steady pressure, good world; SB, steady pressure, bad world; DG, dropping pressure, good world; DB, dropping pressure, bad world. b. Number of times wasps superparasitized. Data are shown with \pm standard error.

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