

Malaria bugs can tell good times from bad

BY GREG RUSSELL

SCIENTISTS have found that malaria parasites can differentiate between good times and bad – a discovery that could aid the development of new treatments.

Researchers at Edinburgh and Toronto universities found that the reproduction strategy used by the disease-causing parasites is more sophisticated than previously thought, and is similar to that found in more complex organisms.

Their findings could help them better predict how the parasites respond to adverse conditions, such as treatment with anti-malarial drugs.

The Edinburgh and Toronto teams used a mathematical model, along with experiments, to examine when malaria parasites decide to put greater efforts into reproduction.

To survive in a host such as a person or an animal, they replicate asexually in the blood, causing disease. They

must produce specialised sexual forms in order to reproduce and spread the infection to new hosts.

Researchers found that parasites alter how much effort they invest in survival versus the amount afforded to reproduction, according to how well they can grow inside a host.

When conditions are good and parasites are growing well, they can afford to reproduce and spread to new hosts, they found. But in poor conditions, parasites delay reproduction and divert their efforts to replicating asexually, prioritising survival in the host.

The scientists say this can make infections harder to clear.

If conditions are catastrophically bad and the parasite population plummets – following treatment with a strong dose of anti-malarial drugs, for example – they invest as much as possible in reproduction in a last-ditch effort to spread to new hosts.

Developing treatments that prompt parasites to invest more in reproduction and less

in the disease-causing asexual stages, while also blocking their spread to other hosts, could help to combat the disease.

“Understanding patterns of parasite allocation to reproduction matters because within-host replication is responsible for disease symptoms and between-host transmission determines disease spread,” said the team, whose study is published in the journal *PLOS Pathogens*.

It was supported by the BB-SRC, the Royal Society, Wellcome, the Human Frontiers Science Program and others.

Dr Petra Schneider, of the University of Edinburgh’s School of Biological Sciences, who led the study, said: “It is really exciting to discover that these small blood parasites follow the same reproductive strategies as more complex animals, like insects, birds and mammals.

“Being able to predict how parasites balance reproduction and survival could improve the outcomes of treatment,” she added.

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