MATING  ●  It's fight or flight for male dung beetles.

Armless rivalry

Male dung beetles *Oxthophagus taurus* come in two forms: large with long, curved horns and small with no horns. Large males guard females within breeding tunnels underneath dung pats and use their horns to fight off rivals. But, without weapons, what do small males do?

To see if males need horns to get a mate, biologists Armin Moczek and Douglas Emlen of Duke University, USA, staged contests between males in an artificial glass-sided nest. They found that hornless males fought and evicted each other but never won a fight against a horned competitor. Nevertheless, hornless males still managed to mate. They either managed to slip past big males or avoided them by using small intersections between tunnels. They then mated with the females before the guarding males could do anything to stop them.

The researchers noticed that big males had difficulty manoeuvring within tunnels— their large horns scraped the walls and got in the way—and wondered whether the lack of horns helped small males evade larger rivals. Comparison of how fast different males travelled through the narrow tunnels showed that small, hornless males were capable of outrunning their horned rivals to gain access to females.

When it comes to mating, small males do just as well as large ones—they simply use different tactics. While big males use their weapons to fight over mates, small males—unencumbered by horns—can speed their way to success (*Animal Behaviour*, vol. 59, pp459-66).

ANGELA TURNER

PARASITISM  ●  Sticklebacks with tapeworms grow faster.

Fat chance of infection

If you're the type who regularly tucks away third helpings of pudding without adverse effects on your waistline, then you're probably not stranger to the comment: 'You must have a tapeworm.' Unless, that is, you're a stickleback, because new research shows that sticklebacks with tapeworms actually grow faster than uninfected fish.

Biologists Stephen Arnott, Iain Barber and colleagues from the Universities of Glasgow and Edinburgh compared the growth rates of two groups of three-spined sticklebacks *Gasterosteus aculeatus*, one of which had been infected with the tapeworm *Schistocephalus solidus*. Though both groups grew at similar rates prior to infection, following infection, fish with tapeworms grew faster (excluding the weight of the tapeworm) and even appeared to be in better body condition than non-infected fish.

The mechanism behind the growth spurt is the subject of further research. It may be that infected fish eat more. But it's also possible that they process food more efficiently or are not so active, burning up less energy than parasite-free fish.

Neither is it clear whether the increased growth rate is the result of the parasite manipulating the fish to its own advantage or of a response to infection on the part of the stickleback. To complete its lifecycle, the tapeworm relies on its stickleback host being eaten by a bird (see box), and some birds, such as cormorants, select the largest fish from a population. Alternatively, putting on weight rapidly may be an infected stickleback's way of reducing the chances of starvation over winter (*Proceedings of the Royal Society of London series B*, vol. 267, pp657-63).

STUART BLACKMAN

FACTFILE

Wheels of fortune

The tapeworm *Schistocephalus solidus* must successfully parasite three different hosts to complete its lifecycle. After hatching from its egg, the tiny, free-swimming 'coracidium' stage needs to be eaten by a small crustacean called a copepod. To continue its development, the tapeworm then relies on the copepod being eaten by a fish, which, in turn, must be ingested by a fish-eating bird. And if all this wasn't improbable enough, the tapeworm's eggs, which pass out in the bird's faeces, have to be deposited into freshwater for the whole process to begin again.