Insulin signalling regulates clonal raider ant reproductive cycles

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Clonal raider ants (*Ooceraea biroi*) are secondarily queenless. The workers reproduce through thelytokous parthenogenesis, and colonies experience stereotyped reproductive cycles, alternating between reproductive phases (where workers simultaneously oviposit) and brood care phases (where workers regress their ovaries and care for the larvae). These cycles are regulated by the presence of larvae, which inhibit the ovaries of the adults and induce brood care. Using RNA-Seq, we found that larvae suppress insulin signalling in the brains of the adults. Surprisingly, this change in insulin signalling occurs in the absence of detectable changes in the adults' nutritional state. Experimentally increasing insulin signalling overrides this larval suppression and causes the workers to activate their ovaries, breaking the colony cycle and inducing a fixed reproductive division of labour. This explains how the *O. biroi* colony cycles are regulated, and may also explain similar cycles in other dorylines. Moreover, although clonal raider ants are queenless, some adults (intercastes) have greater reproductive potential than others. Intercastes are larger than workers, and have larger ovaries. We found that larvae that eat more food tend to eclose as intercastes, and that intercastes tend to have higher baseline insulin signalling, which may explain why they are also less sensitive to larval reproductive suppression.