Why do social insect queens live so long? Workers take on the queen’s burdens

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Reproduction almost universally shortens lifespan. Why is this the case, if boosting both would increase evolutionary fitness? Social insects seem to have overcome this fundamental life history trade-off between fecundity and longevity. In colonies of honeybees, ants and termites, queens are highly fecund and have a long lifespan, much longer than that of non-reproducing workers, although both share the same genetic background. Reproduction even seems to increase the longevity of queens. Why the fecundity-longevity trade-off is remolded in social insects is still unclear. One plausible yet untested hypothesis is that the absence of the trade-off in queens comes with costs for workers. Considering social insects as superorganisms, workers may be equivalent to the “disposable soma” of a multicellular organism. They protect and support the queen but are to some extent disposable because, similar to the germline, reproduction is channeled through the queen. We tested this hypothesis in the termite *Cryptotermes secundus* by experimentally increasing the fecundity of queens and analyzing the short- and long-term impact on queens and workers. Combining ultimate fitness measures, proximate gene expression analyses and behavioral experiments, we found that enhanced fecundity had no obvious consequences for queens but instead negatively affected workers. Workers had reduced fitness and gene expression patterns over the long-term revealed signs of disrupted development. Thus, the fecundity-longevity trade-off seems shifted from within-an-individual (queen) to a trade-off between colony members (i.e. queens and workers), providing support for the superorganismal view of social insects.