Signaling health versus parasites. (in press at The American Naturalist)

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Abstract:

The Hamilton-Zuk hypothesis, that parasite-host co-evolution can maintain heritable variation in fitness, has inspired a very successful research program on sexual selection on signals of health. The immunocompetence handicap hypothesis was developed to provide a handicapping mechanism to stabilize the correlation between signals and health. In earlier papers, I showed that handicap signaling is a special case, not a general law that we can rely on to deduce relative costs across signalers of different quality at equilibrium. The essential requirement for reliable signaling is that higher quality signalers are more efficient: they get greater marginal fitness returns from an incremental increase in the signal. This does not undermine the Hamilton-Zuk hypothesis or the immunocompetence mechanism, but it does raise doubts about a widespread assumption that is commonly used to test these hypotheses – that sexual selection on signals of health implies the choice of mates with the fewest parasites. Immunity and parasites might play a fundamental role in many biological signaling systems, but viability-indicating traits are not necessarily parasite-load-indicating traits. Theory allows for the possibility that high-quality big-signalers have greater health and more parasites than low-quality small-signalers (and the data suggest that in many systems they do). This means that we cannot test the Hamilton-Zuk hypothesis or the immunocompetence handicap hypothesis by counting parasites. More generally, we cannot understand sexual selection on signals of health by focusing on the viability costs of signals.