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Mosaic nature of intercastes and evolutionary implications in ants

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Ant colonies occasionally produce individuals called intercastes that are morphologically highly variable but always intermediate between queens and workers. Qualitative characters such as ocelli number and presence of wing buds suggest that these developmental anomalies are mosaics of queen and worker traits. Because of their rarity, intercastes have been little studied. However, they may be involved in the evolution of novel morphological castes such as ergatoid queens. Indeed, ergatoid queens can also be interpreted as mosaics recombining a queen reproductive apparatus with a worker thorax. In order to test whether intercastes are effectively mosaic phenotypes for quantitative characters, we used morphometric techniques to compare the co-variation between head, pronotum, mesonotum and propodeum in 28 queens, 123 workers and 37 intercastes of *Mystrium rogeri*. In accordance with our hypothesis, we found that these four modules are more independent from one another in intercastes than in queens and workers. Interestingly, our sample of intercastes partially bridges the gap between queen and worker morphologies, resulting in a continuous reaction norm from small workers to large queens, contradicting the classic view of a discrete queen/worker caste polyphenism. The shape of the reaction norm differs among modules, and this may determine the panel of intercaste phenotypes that can be produced. The evolution of ergatoid queens from intercastes is plausible only if some intercastes have behaviors consistent with reproduction. Behavioral tests showed that intercastes are often dominant and that some of them can attract males and mate, thereby demonstrating their reproductive potential. Our results therefore support the hypothesis that intercastes may be at the origin of the evolution of novel castes.