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ABSTRACT BOOK

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PP-070
Conservation status of Apis mellifera ruttneri inferred from whole genome sequences

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Apis mellifera ruttneri is the native honey bee subspecies from the Maltese islands (Malta, Comino and Gozo). This African-lineage subspecies is adapted to the harsh environmental conditions and to the limited forage season of these islands. For many years, it was considered highly hybridized, due to the large and sustained importation of foreign subspecies, especially A. m. ligustica, perceived by many beekeepers as superior or for commercial reasons. Recent studies based on morphometry and mitochondrial DNA have suggested the occurrence of A. m. ruttneri, particularly in the main island. Conservation initiatives and a breeding program have been developed, but to date its conservation status is not fully known. As part of the MEDIBEES project, here, over 50 A. m. ruttneri georeferenced colonies collected from across Malta, as well as 50 several reference subspecies (A. m. ligustica, A. m. siciliana, A. m. iberiensis, A. m. sahariensis, and A. m. intermissa) were whole genome sequenced. The population structure and admixture were assessed from genome-wide single nucleotide polymorphisms using model and distance based-methods. The results show varying levels of admixture proportions of A. m. ruttneri with C-lineage honey bees across Malta but also a shared ancestry with the honey bees of north Africa, consistent with the putative natural colonization from Africa in ancient times.

PP-071 [Bee Biology]
Modeling the effects of honey bee (*Apis mellifera*) premature self-removal behavior on colony survival

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Honey bees are currently being challenged by multiple biotic and environmental factors, many of which act concomitantly to affect colony health and productivity. One negative effect of stress is accelerated age polyethism wherein stressed bees perform tasks at a younger age than healthy bees. Mathematical models of accelerated age polyethism have demonstrated that colonies that exhibit accelerated foraging ultimately collapse. We recently documented an extreme example of accelerated age polyethism, a behavior we are calling premature self-removal. General developmental stress was shown to cause honey bees to remove themselves from the colony before they could fly, leading them to die prematurely. In this study we modeled this premature self-removal behavior to determine the effects of self-removal on colony survival. In order to do this, parameters from previous honey bee models were used to inform our base model. Onto this we added stress-driven self-removal behavior. We found that premature self-removal has the potential to accelerate colony collapse and trigger higher rates of the similarly detrimental precocious foraging behavior. More extreme stress was found to lead to higher rates of self-removal. We found the stress point at which there is a high enough rate of self-removal and precocious foraging to ultimately lead to colony collapse. This will be beneficial in informing beekeepers of management practices in regard to stress levels such as mite thresholds and pesticide contamination points past which colony collapse is likely.