



VIRANT: viral dynamics in ant communities across Italian ecosystems

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Ants (Hymenoptera, Formicidae) constitute the largest family of eusocial insects and exert profound ecological influence across most terrestrial ecosystems. Their abundance, advanced level of sociality, and numerous interactions make ants excellent model organisms for eco-ethological studies, particularly in the field of "ecology and sociobiology of disease." For example, through their presence on numerous plant species and their close interactions with them, ants may act either as simple hosts or as vectors of pathogens transmitted to and from other insects, including hymenopteran pollinators. The main objective of the project VIRANT financed by NBFC was carry on an a first extensive screening of Italian ant species to assess the presence and distribution of viral agents in various ecological conditions. Sampling was conducted on a national scale across 14 regions, yielding 839 samples (425 ants and 414 bees) for comparative analysis. The genetic screening covered 20 viral strains identified in the literature as affecting ants and bees. Results revealed widespread viral circulation, with 82.1% of ants and 88.6% of bees infected by two or more viruses. Bee-associated viruses were highly prevalent in ants; for example, 62.4% of the samples tested positive for Acute Bee Paralysis Virus and 61.9% for Chronic Bee Paralysis Virus. The findings underscore the critical importance of monitoring viral transmission among potential entomological vectors. Understanding the dynamics underlying pathogen presence in social insects is essential for safeguarding biodiversity and ecosystem health. The project generated a substantial baseline dataset that will be valuable for future research in disease ecology and conservation biology.