



Magic traits drive the emergence of pathogens

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Résumé en anglais

An important branch of evolutionary biology strives to understand how divergent selection for an ecologically important trait can foster the emergence of new species specialized on different niches. Such ecological speciation is usually difficult to achieve because recombination between different subsets of a population that are adapting to different environments counteracts selection for locally adapted gene combinations. Traits pleiotropically controlling adaptation to different environments and reproductive isolation are therefore the most favourable for ecological speciation, and are thus called “magic traits”. We used genetic markers and cross-inoculations to show that pathogenicity-related loci are responsible for both host adaptation and reproductive isolation in emerging populations of *Venturia inaequalis*, the fungus causing apple scab disease. Because the fungus mates within its host and because the pathogenicity-related loci prevent infection of the non-host trees, host adaptation pleiotropically maintains genetic differentiation and adaptive allelic combinations between sympatric populations specific to different apple varieties. Such “magic traits” are likely frequent in fungal pathogens, and likely drive the emergence of new diseases.

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