

COMPARISON THEOREMS OF PHYLOGENETIC SPACES AND ALGEBRAIC FANS

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With recent developments in the acquisition of biological data and progress in genetics, biology has become a data-rich discipline; for example, biologists have wielded CRISPR to track a mammal's development from a single egg into an embryo with millions of cells [5], which creates a demand for a deeper understanding of evolutionary histories. I will report my results on comparison theorems between phylogenetic spaces that represent evolutionary histories and algebraic fans over simplicial complexes which arise in the moduli space of smooth marked del Pezzo surfaces. I will show homeomorphisms between their projective spaces and simplicial complexes formed by root subsystems. Furthermore, I will present embeddings between spaces of phylogenetic trees and networks, and that between the projective spaces of phylogenetic trees and networks. Knowing the correspondence between mathematics and genomic structures may expedite the discovery of the missing pieces in biology whose counterparts are naturally expected in mathematics, and equip investigations in phylogeny with more mathematical tools from algebraic geometry and tropical geometry [7, 3, 6].

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