Counting H-free graphs

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In this talk, we shall survey a large body of enumerative results in the context of H-free graphs, that is, graphs not containing a copy of a fixed graph H as a subgraph. In particular, we shall show how the recent "hypergraph containers" theorem of Balogh, Morris, and the speaker, proved independently by Saxton and Thomason, allows one to derive (for each H) an approximate structural description of a typical (random) H-free graph with a given number of vertices and edges. In several interesting cases, such as when H is a clique, these approximate structural descriptions may be made precise. We shall also mention several challenging open questions.