Counting 3-connected bipartite planar maps

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Abstract: We provide a solution to the problem of counting rooted 3-connected bipartite planar maps. Our starting point is the enumeration of bicoloured planar maps according to the number of edges and monochromatic edges, following Bernardi and Bousquet-Mélou (2011). The decomposition of a map into 2- and 3-connected components allows us to obtain the generating functions of 2- and 3-connected bicoloured maps. Setting to zero the variable marking monochromatic edges we obtain the generating function of 3-connected bipartite maps, which is algebraic of degree 26. We deduce from it an asymptotic estimate for the number of 3-connected bipartite planar maps of the form $t \cdot n^{-5/2} \cdot g^n$, where $g = 1/r \sim 2.40958$, $t > 0$, and r is an algebraic number of degree 10. This is joint work with Clément Requilé and Juanjo Rué.