

We say that an algebraic variety is unirational if it can be parametrized by rational functions, rational if moreover the parametrization can be chosen to be one-to-one. A very classical problem, called nowadays the Luroth problem, asks whether a unirational variety is necessarily rational. This holds for curves (Luroth, 1875) and for surfaces (Castelnuovo, 1894); after various unsuccessful attempts, it was shown in 1971 that the answer is quite negative in dimension 3: there are many examples of unirational varieties which are not rational. Up to 3 years ago the known examples in dimension  $>3$  were quite particular, but a new idea of Claire Voisin has significantly improved the situation. I will survey the colorful history of the problem, then explain Voisin's idea, and how it leads to a number of new results.