The discovery of new drugs and treatments is a very complex process at the interface of medicine, biology, chemistry and pharmacy. A survey of the top 50 best-selling drugs on the market in 2016 shows that while biologicals are on the rise, small organic molecules still make up the majority of this list. The further development of reactions that can facilitate the synthesis of drug-like molecules is therefore highly desirable.

In this thesis, a number of novel reactions involving triple bonds (alkynes) is described. The conducted research was initially centered around the activation of these triple bonds using gold catalysis, which led to the synthesis of various heterocycles like quinolizinium salts, fused indoles and spiropseudoindoxyls in generally good isolated yields.

At a later stage, an efficient metal-free transformation of a polarized alkyne towards spiropseudoindoxyls was also developed. In a number of cases, computational chemistry was applied to acquire more insights in the mechanism of these transformations.

The syntheses of the spiropseudoindoxyls in particular opened up a new entries towards an underdeveloped class of spirocyclic compounds which can find applications in medicinal chemistry programs.