A New Approach to Brassinolide and its Biosynthetic Precursors

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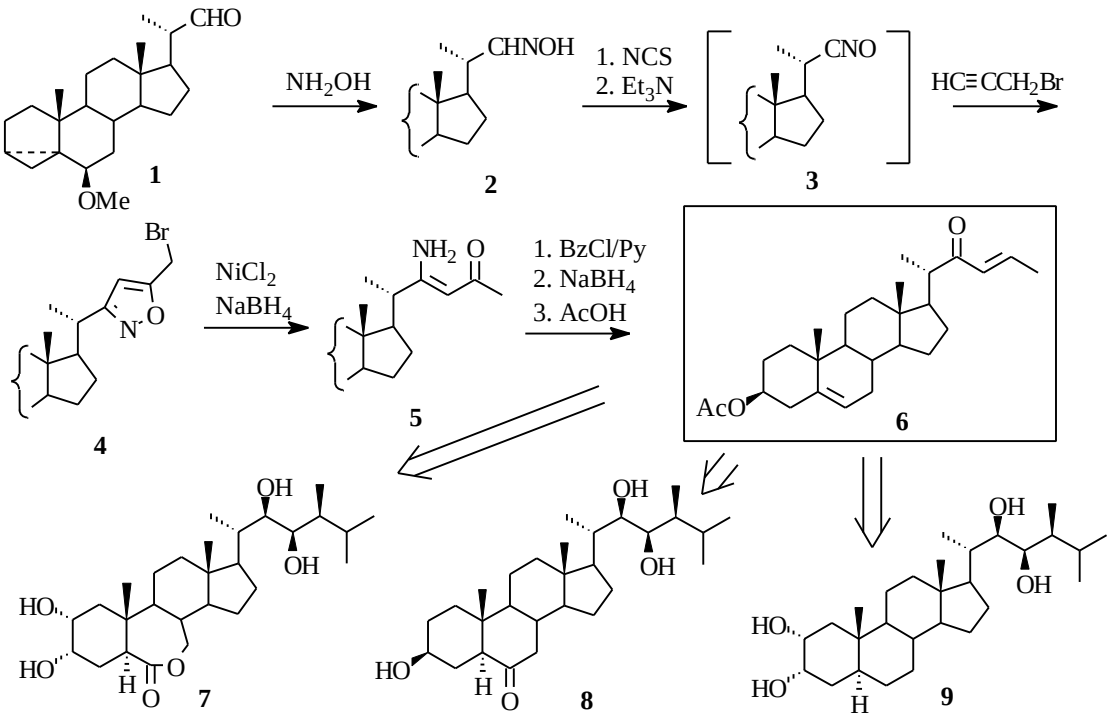
Since 1979 synthesis of brassinolide has been a challenging goal for many chemists working in this field. The most difficult problem which has to be solved for preparation of brassinolide and congeners is construction of the side chain. A number of approaches to a solution of this problem made use of steroidal Δ^{23}-22-ketones, transformation of which into derivatives containing the side chain characteristic of brassinolide is well known.



Here we would like to report a new route to brassinolide **7**. Many its biosynthetic precursors like teasterone **8** and 6-deoxobrassinolide **9** could be obtained also from the key intermediate **6**. The proposed methodology is based on the 1,3-dipolar cycloaddition reaction of the steroidal nitrile oxide with low-molecular acetylene. The unstable nitrile oxide **3** was generated from the oxime **2** *via* successive steps of chlorination - dehydrochlorination, and without isolation it was reacted with propargyl bromide to give the bromoisoxazole **4**. Hydrogenolysis of the latter proceeded with simultaneous debromination to afford the enaminoketone **5**. Benzoylation of **5** followed by hydride reduction and acid-catalysed rearrangement led to the enone **6**. Its transformation into brassinosteroids and some analogues was carried out according to known methods.