

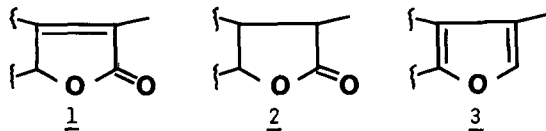
A CONVENIENT SYNTHESIS OF THE 3-METHYL-2(5H)-FURANOID
STRUCTURAL UNIT UNDER MILD CONDITIONS.

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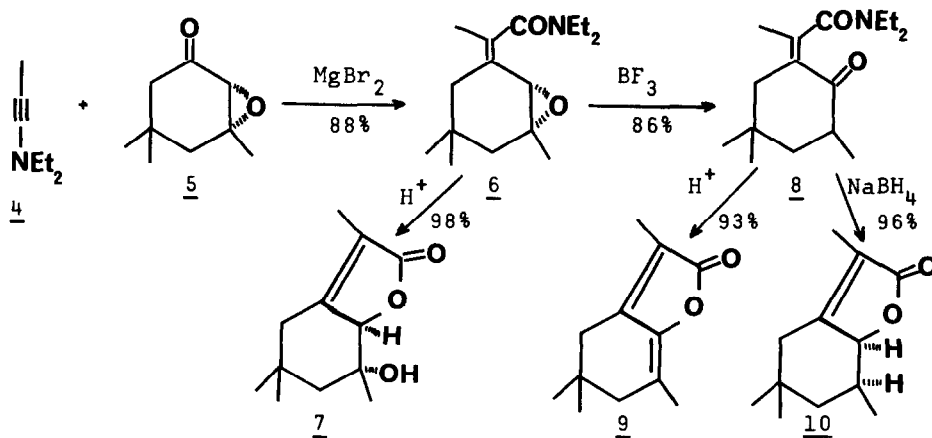
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The title unit¹ (1) together with its readily accessible derivatives 2² and 3^{3,4} are found in many naturally occurring compounds (especially sesquiterpenes). Recently syntheses of various 2(5H)-furanones have been reported^{5,6}, but very few of these methods can actually be utilized for the total synthesis of complex natural products.



During studies⁷ on the reaction of 1-diethylaminopropyne⁸ (4) with (hetero)aromatic acylloins and α -diketones a convenient preparation of trisubstituted 2(5H)-furanones was observed. However, this method failed with aliphatic or alicyclic α -hydroxy- and α -diketones. On the other hand, α -epoxyketones react smoothly with 4 to give the 3-methyl-2(5H)-furanoid moiety (Scheme 1).



In the presence of dry MgBr_2 4 reacts smoothly with 5⁹ giving the amide 6 as the only product in 88% yield.¹⁰ The stereochemistry of the double bond of 6 is exclusively (Z), confirmed by NMR-assignments¹¹ and by the facile lactonisation of 6 under mildly acidic conditions¹¹ to produce the hydroxylactone 7 in nearly quantitative yield. Cyclohexanone oxide similarly leads to the (Z)-configuration, indicating that the ring methyl groups have no influence on the reaction. Thus the epoxide ring together with the weak Lewis-acid (MgBr_2) presumably directs the oxetene rearrangement¹² of the ynamine to give only one isomer of 6.

The treatment of 6 with BF_3 -etherate furnished in 86% yield the ketone 8, which could be cyclized to the lactone 9 in a mildly acidic medium.¹¹ The reduction of 8 with NaBH_4 gave smoothly to lactone 10 in 96% yield by spontaneous cyclization and expulsion of diethylamine.

The stereochemistry of 7 and 10 was confirmed by the spectral data¹¹ published and by NMR-assignments.

The mild method described above provides a facile access to hydroxylactones such as 7 (in two steps), or to lactones such as 9 and 10 (in three steps), under very mild conditions in overall yields of 76%, 71% and 73%, respectively. Work is now in progress to apply this method to the total synthesis of representative sesquiterpenes.

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