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Facile Synthesis of Zymosterol and Related Compounds*

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Facile preparations of cholesta-8,24-dien-3 β -ol, zymosterol (1) and the related 7,24-diene (2), 5,7,24-triene (3) and 8,14,24-triene (4), all of which are potential intermediates of cholesterol or ergosterol biosynthesis, are described.

5-Cholene-3 β ,24-diol 3-tetrahydropyranyl ether is oxidized to the 24-aldehyde, which is then converted into the 3 β -acetoxy-24-acetal (5) mp, 124—126°C through acetalization and acetylation. Successive treatment of 5 with *N*-bromosuccinimide, *tetra-n*-butylammonium bromide and *tetra-n*-butylammonium fluoride gives chola-5,7-diene-3 β -tetrahydropyranyloxy-24-acetal (6, 43% yield), the common synthetic progenitor of all the targeted sterols. Isomerization of 6 with *p*-toluenesulfonic acid gives the 8,14-diene (7) in 55% yield, after basic hydrolysis. Catalytic hydrogenation of the 5,7-diene (6) and 8,14-dien-3 β -ol (7) gives the 7-ene (8), or a mixture (*ca.* 1 : 1) of the 8(9)-ene (9) and the 8(14)-ene (10), respectively.

Deacetalization of the corresponding acetates of 9 plus 10 followed by Wittig reaction with isopropylidene triphenylphosphorane yields, after saponification, a mixture (*ca.* 1 : 1) of zymosterol (1), and cholesta-8(14), 24-dien-3 β -ol in 40% yield. Recrystallization of this material from methanol gave zymosterol, mp 109-111°C. In the same manner, deacetalization of 6, 7, and 8 followed by Wittig reaction gives the 5,7,24-triene (3), 8,14,24-triene (4) and 7,24-diene (2), respectively.

HPLC and GC behaviors of these sterols, which would be useful for their identification in biological systems, are also described.

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