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Sterol Metabolism in Insects: Dealkylation of Phytosterol to Cholesterol

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Insects obtain indispensable sterol by the modification of C–24–alkylated dietary sterols. Since this process is extremely important for insects, they have employed a diversified enzyme system with an excellent ability to dealkylate a variety of phytosterols, regardless of whether the C–24–alkyl group is methyl or ethyl, whether the stereochemistry at C–24 is *R* or *S*, and whether the C–22 double bond is present or absent. The dealkylation of phytosterol is carried out by three successive reactions: dehydrogenation, epoxidation, and epoxide fragmentation. The resulting desmosterol is eventually hydrogenated to cholesterol. The crucial step is fragmentation of epoxide, and this reaction appears to occur in a highly stereoselective manner, as evidenced from the *pro*–*S*– and *pro*–*R*–methyl groups of fucosterol (24*R*, 28*R*)–epoxide being transformation to the (*Z*)– and (*E*)–methyl groups, respectively, of desmosterol. Experimental evidences of all these results obtained by the use of the silkworm *Bombyx mori* have been presented. Also discussed are sterol structure requirement of *B. mori*, and inhibitors of sterol metabolism in insects.

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