SUMMARY OF CONCLUSIONS

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The following eight series comprising different types of molecular structures and dimensions have been prepared and their various transitions have been determined.

A. Cholesterogenic homologous series :

I Cholesteryl p-n-alkoxybenzoates.

II Cholesteryl trans-p-n-alkoxycinnamates.

III Cholesteryl trans-p-n-alkoxy-α-methylcinnamates.

IV Cholesteryl 4-n-alkoxy-1-naphthoates.

V Ortho, meta and para - substituted benzoates of cholesterol.

B. Nematogenic homologous series :

VI Biphenyl 4-p-n-alkoxybenzoates.

VII Biphenyl 4-trans-p-n-alkoxycinnamates.

VIII Trans-p-n-alkoxy-α-methylcinnamic acids.

The first four series exhibit cholesteric and smectic mesophases. Compared to cholesteryl n-alkanoates, the mesophases of these series are thermally more stable. The higher thermal stabilities of these mesophases may be attributed to the arene side chain in the acyl group. The series II- cholesteryl trans-p-n-alkoxycinnamates exhibits higher thermal stabilities than those of series I- cholesteryl p-n-alkoxybenzoates and series III- cholesteryl trans-p-n-alkoxy-α-methylcinnamates as series II is longer and more polarizable than series I and less broad compared to series III. Series IV- cholesteryl-4-n-alkoxy-1-naphthoates is thermally least stable. This is attributed to the increased breadth of series IV; it has a naphthalene nucleus in the acyl side chain, having substitution in 1,4-position. Decrease is more pronounced in the smectic thermal stability compared to the decrease in the cholesteric thermal stability. This behaviour is similar to that observed in nematogenic series where increase in the breadth has more pronounced effect on the smectic thermal stabilities compared to that on the nematic thermal stabilities. Thus the effect of chemical constitution on cholesteric mesophase is similar to that on the nematic phases.

In the case of series V- substituted benzoates of cholesterol, all the *ortho* and *para* derivatives exhibit enantiotropic cholesteric mesophases, whereas, *meta*- substituted derivatives are monotropic cholesteric except cholesteryl *m*-nitrobenzoate, which is enantiotropic cholesteric. The group efficiency orders for the *ortho*, *meta* and *para* derivatives compare well with the group efficiency orders obtained for pure nematic and mixed nematic mesophases by other workers (67, 219, 220, 303). This further supports the view that cholesteric mesophase is nematic in type.

All the cholesteryl compounds exhibit colours in the cholesteric mesophase. At the juncture of the cholesteric-smectic transition the plane texture displays different colours over a short temperature interval while cooling. In the series of *p*-n-alkoxybenzoates of cholesterol, the last two members do not display any visible colours.

The first two of the nematogenic series are esters of arene acids. Generally aliphatic esters of acids exhibit smectic mesophases. Here, both these series exhibit normal behaviour observed in a nematogenic series, giving smectic and nematic mesophases. The thermal stabilities of series VII- biphenyl 4-trans-p-n-alkoxycinnamates are higher than those of series VI- biphenyl-4-p-n-alkoxybenzoates. This can be easily explained as the molecules of series VII are a little longer and more polarizable than those of series VI.

Series VIII- trans-p-n-alkoxy-α-methylcinnamic acids is purely nematic, whereas the corresponding trans-p-n-alkoxycinnamic acid series is both smectic and nematic. In series VIII, the α-methyl substituent increases the breadth of the molecules to such an extent that they do not exhibit smectic mesophases. This shows that if the breadth is increased considerably the smectic mesophase can be eliminated from the homologous series. The nematic thermal stability of series VIII is much less than that of trans-p-n-alkoxycinnamic acid series. This can also be attributed to the increased breadth of series VIII- trans-p-n-alkoxy-α-methylcinnamic acids due to the presence of α-methyl substituent.