Summary
The work incorporated in this thesis forms a contribution to the synthesis of benzo(k)phenanthridine system. Two methods based on appropriately substituted 4-phenylquinoline derivatives have been developed: One involved AlCl₃-catalysed rearrangement of 4-phenyl-2,3-dihydrofuro(2,3-b)quinolines obtained from 4-phenyl-2-quinolone-3-acetic acids as well as 4-phenyl-3-vinylquinolin-2(1H)-ones into 7,8-dihydrobenzo(k)phenanthridin-6(5H)-ones. The phenanthridones were heated with POCl₃ to give the corresponding 6-chloro-7,8-dihydrobenzo(k)phenanthridines which were then subjected to an allylic bromination-dehydrobromination sequence to give the corresponding 6-chlorobenzo(k)phenanthridines. Hydrogenolysis of the 6-chlorobenzo(k)phenanthridines using 10% Pd - C furnished the corresponding 6-dehalobenzo(k)phenanthridines. The parent as well as several of its derivatives were synthesised utilising this novel rearrangement technique.

The ready rearrangement of 4-phenyl-2,3-dihydrofuro(2,3-b)quinolines with AlCl₃ to 7,8-dihydrobenzo(k)phenanthridin-6(5H)-ones has been mechanistically accounted. 2-Quinolylethyl primary carbenium ion is invoked as the transient species. It is assumed that its stability is due to the \( \pi \)-complex formation with the \( \pi \)-electron cloud of the proximal C₄-phenyl group. Evidence has been adduced
by way of several reactions to attest the correctness of our assumption.

During the mechanistic investigation, it was found that the reaction of 4-phenyl-3-vinylquinolines with anhydrous Aluminium chloride led to 7-methyl-7H-indeno-(2,1-c)quinolines. This incidently provided a good preparative route to indeno(2,1-c)quinoline system as exemplified by the synthesis of several of its derivatives. The cyclization of 4-phenyl-3-vinylquinolines to the indeno-(2,1-c)quinolines could also be accomplished with protic acids like PPA or sulphuric acid.

In the other route developed for the construction of benzo(k)phenanthridines, the 4-phenyl-2-quinolone-3-acetic acid was cyclised by heating with PPA to form 8-hydroxybenzo(k)phenthridin-6(5H)-one. Interestingly, this was found to be converted into 6-chlorobenzo(k)-phenanthridine when heated with POCl₃. Several 4-phenyl-2-quinolone-3-acetic acids were transformed into the corresponding 6-chlorobenzo(k)phenanthridines by this novel two step reaction.

The structures of the various products have been attested by IR, ¹H-NMR and elemental analysis.