In our attempt to synthesize heterocyclo-fused cycloheptindoles, the precursors 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles were prepared by the Fischer indole cyclisation of the respective hydrazones, which were obtained by the Japp-Klingemann reaction of diazotised aniline derivatives with 2-hydroxymethylenecycloheptanone.

1-Oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles were subjected to mixed aldol condensation with benzaldehyde to afford the intermediates 2-benzylidene-1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles, which were then reacted with hydrazine hydrate and hydroxylamine hydrochloride to yield 3-phenyl-4,5,6,11-tetrahydroisoxazolo[4',3':6,7]cyclohept[b]indoles and 3-phenyl-4,5,6,11-tetrahydro-2H-pyrazolino[4'3':6,7]cyclohept[b]indoles respectively. Further 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles were exploited to achieve 5H,6,7,12,13-tetrahydroindolo[2',3':7,6]cyclohept[b]indoles upon reaction with phenyl hydrazine in glacial acetic acid in a single step with quantitative yield.

An attempt to derive a synthetic route for 2-methyl-4-oxopyrano[2',3':7,6]cyclohept[b]indoles from 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles and two moles of glacial acetic acid yielded simple acylated 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles. The orientation and reactivity effects of the substituents were studied. Further, these products were screened for their antibacterial and antifungal activities.

With an aim to derive 1-amino-2-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles, the precursors of pyrido[2',3':7,6]cyclohept[b]indoles, 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles were reacted with hydroxylamine hydrochloride in pyridine to obtain 1-hydroxyimino-1,2,3,4,5,10-hexahydrocyclohept[b]indoles. These were then reacted with acetic anhydride and acetyl chloride in pyridine with an expectation to afford 2-acetoxy-1-N,N-diacetylamino-3,4,5,10-tetrahydrocyclohept[b]indoles but 1-N-acetylamino-2-hydroxy-3,4,5,10-tetrahydrocyclohept[b]indoles were obtained. Alternatively, the reaction
of 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles with o-aminoacetophenone under acidic condition afforded the desired 6-methyl-7,8,9,14-tetrahydroquinolino[2',3':7,6]cyclohept[b]indoles along with the dimerised product of o-aminoacetophenone derivative. Further, the reaction of 1-hydroxyimino-1,2,3,4,5,10-hexahydrocyclohept[b]indoles with acetyl chloride at room temperature yielded 2-methyl-4,5,6,11-tetrahydrooxazolo[4',5':7,6]cyclohept[b]indoles

1-Semicarbazono-1,2,3,4,5,10-hexahydrocyclohept[b]indoles obtained from the reaction of 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles with semicarbazide hydrochloride were utilised to construct 4,5,6,11-tetrahydro-1,2,3-selenadiazolo[4',5':6,7]cyclohept[b]indoles by reaction with selenium dioxide in acetic acid, and screened for their antibacterial activities.

In our attempt to synthesize carbazole bearing heterocycles, 1-oxo-1,2,3,4-tetrahydrocarbazoles were reacted with thiosemicarbazide hydrochloride to afford 1-thiosemicarbazono-1,2,3,4-tetrahydrocarbazoles which were then cyclised using acetic anhydride with a view to obtain 1-(5-spiro-4-acetyl-2-amino-Δ2-1,3,4-thiadiazoline)-1,2,3,4-tetrahydrocarbazoles, but unexpected products 1-N,N-diacyetaminocarbazoles were encountered and screened for their antibacterial activities. The same synthons, 1-oxo-1,2,3,4-tetrahydrocarbazoles were condensed with thiophene-2-carbaldehyde to obtain 2-thienylidene-1-oxo-1,2,3,4-tetrahydrocarbazoles, which were successfully irradiated with UV light to afford 2-thienyl-3,4-dihydrooxeteno[2,3-a]carbazoles. 2-Benzylidene-1-oxo-1,2,3,4-tetrahydrocarbazoles were condensed with hydrazine hydrate in acetic acid and thiourea to yield 2-acetyl-3-phenyl-3,3a,4,5-tetrahydropyrrozolo[3,4-a]carbazoles and 4-phenyl-1H-3,4,5,6-tetrahydro-2-thiopyrimido[4,5-a]carbazoles respectively.

With a view to arrive indolochromanones, 1-hydroxycarbazoles were reacted with 3,3-dimethylacryloyl chloride in presence of aluminium iodide and acetonitrile. Interestingly, three products namely, 2-(3',3'-dimethylacryloyl)-1-hydroxycarbazoles, indolo chromanones and 2,2-dimethyl-6-(3',3'-dimethylacryloyl)-2H,11H-indolo[3,2-h]chroman-4-ones were obtained. 1-Hydroxycarbazoles were condensed with cinnamic
acid in presence of freshly fused finely powdered zinc chloride and phosphorus oxychloride to yield 2-cinnamoyl-1-hydroxycarbazoles, which on oxidative cyclisation using dimethyl sulphoxide and iodine afforded 4-oxo-2-phenylpyrano[2,3-a]carbazoles. The same synthons were utilized to obtain 2-methyl-4-oxopyrano[2,3-a]carbazoles upon reaction with ethyl acetoacetate in presence of freshly fused finely powdered zinc chloride and phosphorus oxychloride. To our knowledge there is no report in the literature on the synthesis of 2-methyl- or 2-aryl- 4-oxopyrano[2,3-a]carbazoles. From biogenetic point of view, there exists a possibility for the formation of these compounds in the plant body; yet their isolation has not been reported. Hence, it needs further extensive search in plant material for their presence.

Mass spectral fragmentations of 1-oxo-1,2,3,4,5,10-hexahydrocyclohept[b]indoles, 9-methyl-5H,6,7,12,13-tetrahydroindolo[2',3':7,6]cyclohept[b]indoles, 1-semicarbazono-1,2,3,4,5,10-hexahydrocyclohept[b]indoles, 4,5,6,11-tetrahydro-1,2,3-selenadiazolo[4',5':6,7]cyclohept[b]indoles, 10-methyl-3-phenyl-3,4,5,6-tetrahydro-2H-pyrazolino-[4',3':6,7]-cyclohept[b]indoles, 1-thiosemicarbazono-1,2,3,4-tetrahydrocarbazoles, 2-acetyl-3-phenyl-3,3a,4,5-tetrahydropyrazolino[3,4-a]carbazoles and 2,8-dimethyl-4-oxopyrano[2,3-a]carbazoles were also interpreted.

As part of our study on quinoline heterocycles, a novel and efficient synthetic route to 3-prenyl-2-quinolinone, 2-isopropylfuro[2,3-b]quinolines and 3,4-dihydro-2,2-dimethyl-2H-pyrano[2,3-b]quinolines were developed. 3(1'-Carboxy-3'-methylbut-1'-enyl)-2-quinolinones were decarboxylated using ethanolamine followed by Prevost reaction with HgO/I2/AcOH and AgOAc/I2/AcOH to yield 2-isopropylfuro[2,3-b]quinolines and 3-acetoxy-2,2-dimethyl-2H-pyrano[2,3-b]quinolines respectively, where as cyclisation using a few drops of conc sulphuric acid in ethanol gave 3,4-dihydro-2,2-dimethyl-2H-pyrano[2,3-b]quinolines. The intermediates, 3-prenyl-2-quinolinones were isolated and characterized. It was pertinent to mention here that the decarboxylation of 3(1'-carboxy-3'-methylbut-1'-enyl)-2-quinolinones using ethanolamine proved to be a convenient shorter route on account of the number of steps involved. Among the 2,2-dimethyl-2H-pyrano[2,3-b]quinolines which were realized by this synthetic route, the 2,2-dimethyl-4-methoxy-2H-
pyrano[2,3-\textit{b}]quinoline was of importance. Its hydrolysis with ethanolic hydrochloric acid forms a convenient route for synthesizing khaplofoline with improved yield.

The plausible mechanism has also proposed for the formation of new products. All the compounds prepared were unambiguously characterized by their IR, $^1$H NMR, $^{13}$C NMR, mass spectral and elemental analyses.