Dependence of man on plant kingdom and his wonder and curiosity regarding the natural world is well known. The demand of the herbal products has increased enormously day by day and this has led to the exploration of plant and animal world. Of the various plant families Apocynaceae, Rutaceae, Compositae, Menispermaceae, Piperaceae etc. are well known for producing compounds which are directly or indirectly used as medicine or perfumery chemicals or are utilised as intermediates for the preparation of useful compounds. The chemical investigation of plant material is also important in establishing the taxonomy of plants.

The chemical investigation of the Menispermaceae species *Stephania glabra* carried out earlier led to the isolation of two unusually oxygenated protoberberinum salts besides some known protoberberines. These novel alkaloids designated glebrine and giorbrinine were tentatively assigned as 10,11-dihydroxy-2,3,9-trimethoxy-protoberberinum salt and 11-hydroxy-2,3,9,10-tetramethoxy-protoberberinum salt, respectively.

The investigator intended to arrive at the unambiguous structures for the said alkaloids. For this purpose some penta oxygenated protoberberines with three oxygen functions in ring D were synthesised and the results have been discussed in this part. A new synthetic route to norcoralydine, a natural product was also developed.
The recent years have seen the advent of modern sophisticated physical tools which are now being widely applied in solving structures and stereochemistry of complex organic molecules. The most recent one of these is the $^{13}$C NMR spectroscopy. The second part of the thesis describes the $^{13}$C NMR spectral studies of some polyoxygenated benzene derivatives occasionally found as a part of the natural molecules. The $^{13}$C NMR spectral studies of some natural amides and related compounds (potential synthons for the synthesis of isoquinoline alkaloids), some benzylisoquinolines and some protoberberine alkaloids are also described in this part.