CONCLUDING REMARKS

Medicinal chemistry is best to be defined as an interdisciplinary research area incorporating different branches of chemistry and biology. Medicinal chemistry and pharmaceutical chemistry are disciplines at the intersection of chemistry, especially synthetic organic chemistry, and pharmacology and various other biological specialties, where they are involved with design, chemical synthesis and development for market of pharmaceutical agents, or bio-active molecules. The organic compounds find vast applications in all branches of chemistry and biochemistry. The voluminous work done on organic compounds by various chemists, the following empirical conclusions was arrived.

The study of heterocycles is an evergreen field in the branch of organic chemistry and always attracts the attention of scientists working not only in the area of natural products but also in the synthetic organic chemistry. Commonly majority of the published work in organic chemistry involves at least one heterocyclic ring. Moreover, in providing us with a wealth of fascinating molecular arrays, over half of which posses heterocyclic constitution, nature presents a most cogent argument for developing an appreciation for this area. Heterocyclic chemistry is a vast and expanding area of chemistry because of the obvious applications of compounds derived from heterocyclic rings in pharmacy, medicine, agriculture and other fields. The chemistry of heterocyclic compounds is as relevant as that of aliphatic or aromatic compounds. Their study is of great interest both from the theoretical as well as practical standpoint.

One of the main objectives of organic and medicinal chemistry is the design, synthesis and production of molecules having value as human therapeutic agents. During the past decade, combinatorial chemistry has provided access to chemical libraries based on privileged structures, with heterocyclic structures receiving special attention as they belong to a class of compounds with proven utility in medicinal chemistry.

Medicinal chemistry is the discipline concerned with determining the influence of chemical structure on biological activity and in the practice of medicinal chemistry developed from an empirical one involving organic synthesis of new
compound based largely on the modification of structure and then identifies their biological activity. Medicinal chemistry concerns with the discovery, development, interpretation and the identification of mechanism of action of biologically active compounds at the molecular level. Various biologically active synthetic compounds have five-member nitrogen-containing heterocyclic ring in their structures. An important aspect of medicinal chemistry has been to establish a relationship between chemical structure and pharmacological activity. It has been established that half of the therapeutic agents consists of heterocyclic compounds. The heterocyclic ring comprises of very core of the active moiety or the pharmacophore.

Organic chemistry is an important area of chemistry. It offers the potential for the design of novel therapeutic and diagnostic agents and hence for the treatment and understanding of diseases which are currently intractable.

It seemed worthwhile to draw a certain remarks regarding the work described in this thesis. In view of the biological importance of hydantoin, imidazopyridine, difluoroindole derivatives which exhibit anticonvulsant, antimycobacterial, anti-amnesic, antibacterial and antifungal activities, were studies of the prepared compounds.

In summary, eighty eight hydantoin derivatives have been synthesized and evaluate pharmacological activity of the synthesized compounds. The synthesized compounds have essential pharmacophore model such as one aryl ring (R), one electron donor atom (D), and a second donor atom in close proximity to the NH group forming a hydrogen bond acceptor (HBA)/donor (HBD) unit. The titled compounds possessed all the required pharmacophoric elements as the phenyl ring attached to the nitrogen moiety can be referred to the aryl ring (R - Lipophilic Aryl Ring), the nitrogen of the hydantoin ring can act as a Hydrogen Bond Donor (HBD) and the amide keto group of the hydantoin ring act as a hydrogen bond acceptor (HBA). The proposed hydantoins seems to resemble better with phenytoin. With this as background, the present work highlights the importance of the synthesis of prototypes of diazaspirohydantoins and studies their anticonvulsant activity.

Synthesis and characterization of novel imidazo[4,5-c]pyridine derivatives and evaluate the antimicrobial and antioxidant activity. PA-824, are exciting
candidates for the treatment of tuberculosis and presently is undergoing clinical trials. This prompted us to synthesize a series of imidazo[4,5-c]pyridine derivatives and check their antimycobacterial potential. Totally forty one imidazo[4,5-c]pyridine derivatives were synthesized and the synthesized compounds was evaluated for antimycobacterial activity against *Mycobacterium tuberculosis*.

Twenty four 4,4-difluoro-8-(propan-2-yl)-2,3,4,5-tetrahydro-1*H*-pyrido[4,3-b]indole derivatives have been synthesized and characterized by elemental analysis, FT-IR, $^1$H NMR and mass spectra. The synthesized molecules were screened for anti-amnesic activity. It was thought of interest to replace the methyl of latrepirdine with its bioisoster isocynates. Further, the 3D structural similarity between latrepirdine and the designed pyrido[4,3-b]indoles was checked by indirect type of molecular modeling studies. Low root mean square distance value suggested good 3D structural similarity between the designed molecule and latrepirdine. This prompted us to synthesize a series of pyrido[4,3-b]indole derivatives and check their anti-amnesic activity. The antioxidant of the newly synthesized compounds is performed using DPPH method. The anti-amnesic effect of difluoroindole derivatives was evaluated against scopolamine induced memory loss and *In vitro* acetylcholinesterase inhibition activity using rat brain homogenate.

The activity of the all prepared compounds has been tested against different microorganisms. Based on the present results, all the synthesized compounds have been screened against two bacteria *viz.*, *Escherichia coli* and *Staphylococcus aureus* and two fungi namely *Aspergillus niger* and *Aspergillus flavus* by disc diffusion method. All the studied compounds have very good antibacterial and antifungal activity and these compounds are also compared with standard antibacterial agent chloramphenicol and antifungal fluconazole. The microbial results indicate the studied compounds also having good bactericidal and fungicidal activities. The single crystal X-ray structure was carried out for few compounds, since some of the development of single crystal was successful.

The results obtained in the present investigation have encouraged the author and his research supervisor to continue to synthesize new type of biologically active hydantoin, imidazopyridine, indole derivatives. Preparation, characterization and biological studies on drugs have also been greater attraction for organic chemists in the field of medicinal chemistry and challenge of the future.