CHAPTER I

INTRODUCTION
The world today due to changing food and living habits of human being is faced with the challenging problem of saving human life from various ordeal and naturally compells. The scientists all over the world to ponder over the problem arising seriously and find a solution from the natural resources around us, while the omnipotent has been kind enough to bestow for us.

Plants have provided mankind a large variety of potent drugs to alleviate sufferings from diseases. Inspite of spectacular advances in synthetic drugs in recent years some of the drugs of plant origin have still retained their importance. The use of plant based drugs in the western world is increasing.

Our ancient Ayurvedic system of medicine is predominantly a plant-based materia medica making use of our native plants. Many herbal preparations have found their way in the pharmacopoeias of other countries. It is obvious that those traditional medicines which have withstood the test of time, must be effective. The validity of claims of many of these preparations have been substantiated by modern scientific methods and techniques. Now these preparations are in active use in modern clinical practice.
Nowadays there is a general feeling that the bulk of the drugs in use are synthetic. This is, however, not true. Surveys carried out in U.S.A. has revealed that approximately 50% of all prescriptions dispensed contained one or more products of natural origin. The importance of plant products in modern medicine even in a highly advanced society as that of U.S.A. can be seen from the data of national survey conducted in 1968. It was found that 25% of all prescriptions dispensed contained a crude plant material, or a crude plant extract or a purified active principle. Over 90 crude drugs or crude extracts from plants and some 76 pure active plant drugs were found in the prescriptions.

In recent years the most important drugs that have come from plant sources and their clinical use are vinblastine and vincristine from Catharanthus roseus. This plant was reported to be efficacious in diabetes. The isolation of the anticancer drugs from the plant is accidental and has come by random screening. Although there is a very minor difference in the chemical structure of vinblastine and vincristine. The clinical effects of these two drugs differ considerably. Vinblastine is preferred in the treatment of Hodgkin's disease and leukaemia of children because of its better
tolerance. Vincristine is superior to vinblastine in the treatment of lymphosarcoma, but this is in part counter-balanced by greater toxicity.

In recent years few drugs from medicinal plants which have come into clinical use are: Peruvoside, a cardioactive glycoside from Thevetia nerifolia, Sparteine with oxytocic from Sarothamnus scoparius, valerian from valeriana spp., which has CNS depressant activity; monoterpane iridoids from medicinal plants Picrorrhiza kurroa of the family Gentianaceae. These bitter glycosides are used as bitter tonics, stomachic and febrifuge including antimalarial.

Authorress therefore looked for available flora having, therapeutic values and was fascinated by the Impatiens plants which are reported to have medicinal values like this.

The plant of this genera are valued for their emetic, cathartic, diuretic, antihaemorrhoidal and anti-inflammatory properties have been under investigations since last over 50 years.

The Impatiens genera^1-4^ belongs to the family Balsaminaceae and consists of the species, Impatiens balsamina Linn, Impatiens nolitangere Linn, Impatiens
Impatiens aureamuhl, Impatiens bioflora, Impatiens parviflora D.C., Impatiens chinensis Linn, Impatiens tripetala Roxb, Impatiens scabrida D.C., Impatiens glandulifera Roxb. These plants are less succulent, annual, biennial herbs rarely becoming shrubby. They are chiefly native to the mountaineous regions of tropical Asia and Africa, but are also found in the north temperature zone and in south Africa. Some of the species occur in India and several of them are endemic and show restricted distribution in certain regions.

The work on Impatiens plant was first carried out in 1932 by Karrer P. and Morf S., who isolated taraxanthin<sup>5</sup> (I) from the leaves of Impatiens nolitangere. In addition to taraxanthin, several flavonoids were reported to have been isolated by various workers during the period 1958 to 1974. The details of various investigations on the flavonoid and quinonoid constituents from the plants of Impatiens genera are summarised in the table (I);
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<thead>
<tr>
<th>PLANT</th>
<th>PART</th>
<th>FAMILY</th>
<th>COMPOUNDS ISOLATED</th>
<th>STRUCTURE</th>
<th>REFERENCE</th>
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<td>Impatiens balsamina</td>
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<td>Balsami naceae</td>
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<td>Kaempferol</td>
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<td>Quercetin</td>
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<td>Leucocyanidin</td>
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<td>Quercetin</td>
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<td>4-naphthoquinone</td>
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<td>-arabinoside</td>
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<td>Roots</td>
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<td>Chloroplast of leaves</td>
<td>Balsami naceae</td>
<td>Kaempferol-3</td>
<td>VIII</td>
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<td>-arabinoside</td>
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<td>4-naphthoquinone</td>
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During a survey for flavonoids in Indian plants of important medicinal value, flavonoids are potential fungicides, being non-toxic to human and domestic
animals.\textsuperscript{15-17} Some of the synthetic flavonoids also show antiviral and antimicrobial activities.\textsuperscript{18-20}

All the flavonoids exhibited a marked degree of toxicity against both the fungi and bacteria. The presence of a $\gamma$-pyrone ring may be responsible for the antifungal activity.\textsuperscript{21}

Drumov, D. and Pashov, D. prepared an extract from the flowers of Robinia Pseudoacacia (Leguminosae), decreased blood urea levels in experimentally induce hyperazotemictic rats, led to the discovery that the flavonoid Robinin (XIV) was the constituent, responsible for this activity.\textsuperscript{22}

![Chemical Structure of XIV]

Silybin (Silymarin), a flavolignan, which was isolated from the seeds of Silybum marianum (Compositae),
is used for the treatment of liver disorders. Silybin has a marked antihepatotoxic effect.\textsuperscript{23-31} Flavone Baicalein has been found to be useful for inhibit allergic reactions.\textsuperscript{32}

Several flavonoids including quercetin, kaempferol, naringenin, rutin and naringenin-7-O-\textbeta-D-glucoside are reported to inhibit both the exudative and proliferative phases of inflammation in cotton pellet induced edema at a does of 20 mg/kg.\textsuperscript{33}

A novel flavanone 2',4',7-trihydroxy-5-methoxy-8'-flavanone (XV) was isolated from Sophora angustifolia, has been patented as a therapeutic agent for digestive ulcer.\textsuperscript{34}

\[
\text{Prunsid}e^{35} (\text{XVI}) \text{a new flavonoid isolated from the extracts of the fruits of Prunus japonica (Rosaceae).}
\]
Recently some reports have also appeared on few quinonoidal constituents of plant origin reporting about their activity in vitro against some bacteria.

In addition to this, several naphthaquinones have been shown to be highly active against several plant fungal pathogens in vitro, including chimaphillin, juglone (XVII), lawsone (XVIII) phylloquinone and menadione.38

Lithospermum euchromum (Boraginaceae) roots have yielded dehydroxy-shikonin, which was shown to be active in vitro mainly against gram positive bacteria.39

Most of the flavonoids have been isolated from family compositae and occasional examples of occurrence of flavonoids in other families viz. Rosaceae, Leguminocae, Podocarpaceae, Graminae, Balsaminaceae, Moraceae, Ebenaceae, Boraginaceae.
Some recent studies of flavonoid and quinonoid constituents and application of separation and spectroscopic techniques in the isolation and structural elucidation is evident by the fact that large number of important papers are being published in the Journals of repute. Some of the recent works on flavonoid and quinonoid constituents are:

1. Luteolin-7-O-(6-O-α-L-Arabinofuranosyl)-β-D-Gluco-pyranoside from Dacrydium laxifolium leaves. 40

2. Cleroflavone, a new C-methylflavone, 7-hydroxy-5, 4'-dimethoxy-6-methyl flavone from the leaves of Heynea trijuga. 41

3. Flavonoids by Solidago species; Quercetin, Kaempferol, Isorhamnetin from the flowers of S.canadensis, S.scabra, S.gigantea. 42

4. A kaempferol-3-rhamnosyl-glucosyl-galactoside from leaves of Pettophorum africanum. 43

5. A novel polyhydroxyflavone glucoside from Tylosia scarabaeoides leaves. 44

6. Rhamnocitrin-3-O-glucuronide from the flowers of Verbesina encelioides. 45

7. New flavanones from the roots of Prosopis juliflora. 46
8. Flavonol glycosides from the aerial parts of Epimedium "ubescens. 47

9. Quercetin-3-O-Galactosyl →(1→6)-Glucoside, A compound from narrow leaf vetch with antibacterial activity. 48

10. Flavonoid glycosides of Artemisia monosperma and A. herba-alba. 49

11. 7, 2′-4′-trihydroxy-3′-methoxy-isoflavone from Zollernia paraensis. 50

12. Novel Anthrone-Anthraquinone Dimer from the leaves of Aloe elgonica. 51

13. An anthraquinone glycoside from Rhamnus pallasii. 52

14. Knipholone, a unique anthraquinone derivative from Kniphofia foliosa. 53

15. Cytotoxic antileukemic anthraquinones from Morinda parvifolia. 54

The above deliberations clearly transpire that there is still enough scope for adequate phytochemical and pharmacological investigations on (i) Impatiens balsamina Linn1−4 (N.O. Balsaminaceae) and (ii) Impatiens scabrida55 D.C. (N.O. Balsaminaceae) and hence the authoress thought it worthwhile to carry out further systematic investigations of these plants and her findings are summarised below;
The **phytochemical investigation of flavonoids** and **quinonoids** have been receiving great attension during recent years because of their important **pharmacological values**.

**Medicinal use** attributed to members of the natural order Balsaminaceae are well known and so it attracted our attension on (i) *Impatiens balsamina* (Linn), (ii) *Impatiens scabra* (D.C.), natural order Balsaminaceae and therefore took up the challenging task of revealing the secret of their therapeutic values by carrying out their systematic phytochemical investi- gations by the aid of both classical degradative methods and modern spectroscopic techniques and findings are described below.

**CHAPTER - I**

**ISOLATION AND STUDY OF A NOVEL ANTHRAQUINONE GLYCOSIDE; 1,3, DIMETHOXY-6-METHYL ANTHRAQUINONE-8-O-β-D-GLUCOPYRANOSYL (1→4)-O- α-L-RHAMNOPYRANOSIDE FROM THE SEEDS OF IMPATIENS BALSAMINA LINN (FAM. BALSAMINACEAE).**

The rectified spirit extract of the water soluble part of the concentrated 95% ethanolic extract of dried and powdered seeds of *Impatiens balsamina* Linn
when it yielded a novel anthraquinone glycoside (0.66%).
molecular formula, $C_{29}H_{34}O_{14}$, m.p. 238-240°C and $M^+606$
(EIMS) has been described in this chapter.

Various colour reactions, chemical degradations
and spectral data led to the identification of the
compound as; 1,3-dimethoxy-6-methyl anthraquinone-8-O-$\beta$-D-
glucopyranosyl (1→4)-O-\(\alpha\)-L-rhamnopyranoside (I).

CHAPTER - II

ISOLATION AND STUDY OF A NOVEL APIGENIN
GLYCOSIDE; APIGENIN-4'-O-$\beta$-D-GLUCOPYRANOSIDE FROM THE
SEEDS OF IMPATIENS BALSAMINA LINN (FAM. BALSAMINACEAE).
The ethylacetate soluble fraction of the water soluble part of the concentrated 95% ethanolic extract of dried and powdered seeds of *Impatiens balsamina* Linn when worked up, yielded a flavonoidal glycoside (0.086%), molecular formula $C_{26}H_{28}O_{14}$, molecular weight $M^+ 564$ (EIMS). It was identified on the basis of different colour reactions, chemical degradations and UV, IR, $^1$HNMR and Mass spectroscopy as; Apigenin-4'-$O$-$\beta$-$D$-xylofuranosyl (1$\rightarrow$4)-$O$-$\beta$-$D$-glucopyranoside (II).
CHAPTER - III

ISOLATION AND STUDY OF A NOVEL LUTEOLIN GLYCOSIDE; LUTEOLIN-5-O-α-L-RHAMNOPYRANOSYL (1→4)-O-B-D-GLUCOPYRANOSIDE FROM THE STEMS OF IMPATIENS SCABRIDA D.C. (FAM. BALSAMINACEAE).

The methanolic extract of the water soluble part of concentrated 95% ethanolic extract of the stems of Impatiens scabrida D.C. yielded a novel Luteolin glycoside (0.096%), molecular formula, C_{27}H_{30}O_{15}, m.p. 227°C and M^+ 594 (EIMS), which was identified as; Luteolin-5-O-α-L-rhamnopyranosyl (1→4)-O-B-D-glucopyranoside (III).
CHAPTER - IV

ISOLATION AND STUDY OF A NOVEL GOSSYPETIN GLYCOSIDE; GOSSYPETIN-7-O-β-D-GLUCOPYRANOSIDE FROM THE STEMS OF IMPATIENS SCABRIDA D.C. (FAM. BALSAMINACEAE).

The methanolic extract of the water soluble part of concentrated 95% ethanolic extract of the stems of Impatiens scabrida D.C. yielded a novel flavonoidal glycoside (0.084%), molecular formula, C_{21}H_{20}O_{13}, m.p. 208°C and M^+ 480 (EIMS). It was identified on the basis of different colour reactions, chemical degradations and UV, IR, ^1HNMR and Mass spectroscopy as; Gossypetin-7-O-β-D-glucopyranoside (IV).
REFERENCES


