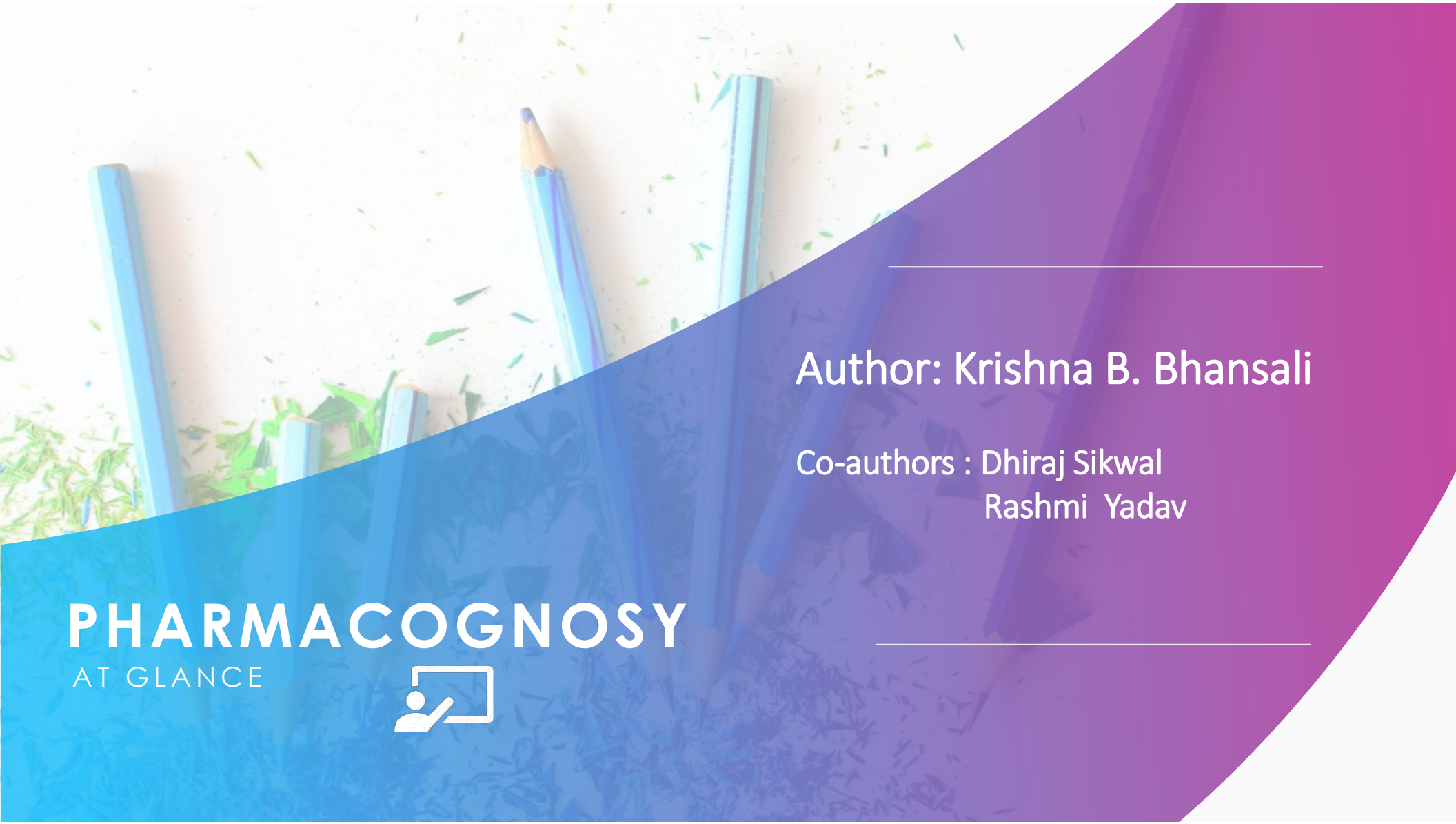

PHARMACOGNOSY

AT GLANCE

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PHAMACOGNOSY AT GLANCE

The Pharmacognosy at glance has envisaged for students appearing for GPAT, NIPPER, Drug control officer and universities examinations. It has been designed with short and precise information in form of tables, flow charts and tree diagrams. This book extracts all valuable information to small pocket sized format for easy and quick revision for students.

Salient features:

- First time precise & short pharmacognosy book available in mobile application.
- All classification with supreme enlightenment.
- Harmonized all pharmacognostic drug with their chemical constituents, therapeutic uses, and microscopy and chemical tests in simple format.
- All data with easy reminding tricks and rapid learning
- Explains by diagrammatic presentation, flow charts and tree diagrams.
- Covers complete syllabus of pharmacognosy.
- It is a unique book provides all accessible information at glance for students for quick and easy revision.
- First time chapter wise hyperlinking in pharmacy mobile app.

PHARMACOGNOSY AT GLANCE

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A. BIOLOGICAL SOURCE, CHEMICAL CONSTITUENT AND PHARMACEUTICAL USES

1. Glycosides

1.1 Anthracene/Anthraquinone glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Aloe	Dried latex of leaves of *Aloe barbadensis* (Curaca Aloe) *Aloe ferox* (Cape Aloe) *Aloe perryi* (Socotrine Aloe) *Aloe africana* (Cape Aloe) Family-Liliaceae	Aloeemodin(freebase),Emodin,aloin(barbaloin), isobarbaloin, aloesin. Positive for borax test,bromine test,modified borntragers test. ***Special test***: Nitrous acid test,Nitric acid test,cupraloin test(klunges)	Purgative,External aid to painfulinflammation, important ingredient in benzoin tincture,relief in itching and pains,use along with carminative
Rhubarb/ Rheum, Radix rhei	Rhizomes and roots of *Rheum officinale* *R. palmatum* *R. emodi* *R. webbiaum* Family-Polygonaceae	Anthraquinones with COOH moiety-rhein,Glucorhein; Anthraquinones without COOH moiety-Emodin,Aloe-emodin,Chrysophanol;Palmidin-A,B,C,gallic acid, tannin,rheinolic acid, pectin,calcium oxalate Positive to modified borntrager test	Chronic eczema,psoriasis, trichophytosis,keratolytic agent,bitter,stomachic,diarrhea,purgative

<table>
<tr>
<td>CascaraSagrada /Chitten bark</td>
<td>Driedbark of Rhamanus purshiana
Family-Rhamnaceae</td>
<td>Barbaloin,deoxybarbaloin (chrysaloin),cascarosides A,B,C &D, emodin, casanthranol

Positive for Modified borntragers test due to C-glycosides</td>
<td>Stimulant,laxative</td>
</tr>
<tr>
<td>Senna/
Senna leaf,Tinnevelley senna,Indian senna</td>
<td>Dried leaflets of Cassia acutifolia (Alexandria senna),C. angustifolia (Indian/ tinnevelley senna)
Family-Leguminoseae

<table>
<tr><th>Microscopic constant</th><th>Indian senna</th><th>Alexandrian senna</th></tr>
<tr><td>vein islet no.</td><td>19-22 (about)</td><td>25-29 (about)</td></tr>
<tr><td>Stomatal index</td><td>17-20 (about)</td><td>11-13 (about)</td></tr>
<tr><td>Palisade ratio</td><td>7 or 5 (about)</td><td>9 or 7 (about)</td></tr>
</table>
</td>
<td>Sennosides A,B,C & D, dimeric glycosides-rhein,aloe emodin, Isorhamnetin,kampterol(phytosterol),chrysaphanoc acid,caoxalate, Salicylic acid,mucilage.Anthraquinone ring at acidic group (COOH)-Sennosides A,B high purgative property and ring at acidic group (CH_2OH)-Sennosides C,D low purgative property

*Positive for Modified borntragers test Shows red color with ruthenium red solution</td>
<td>Purgative
Carminative

Note: Allied drug;Dog senna (cassia obavata) leaf is obovata shape
Palthe senna(C. auriculata) crimson color obtained with H_2SO_4
Adulterants: Argel leaves
Coriario leaves</td>
</tr>
<tr>
<td>Hypericum/
St.Jonhs wort</td>
<td>Dried aerial parts of Hypericum perforatum
Family-Hypericaceae</td>
<td>Hypericin,hyperforin</td>
<td>Antidepressant</td>
</tr>
</table>

Colchineal	Dried full grown female insects enclosing young larvae of *Coccus cacti* Family-Coccidae	Carminic acid	Colouring agent

1.2 Phenol glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Arbutin/ Bearberry leaves	Dried leaves of *Bergenia crassifolia* Family-Saxifragaceae	Arbutin,methyl arbutin,quercetin,gallic acid,ursolic acid,tannin	Diuretic, antiseptic on urinarytract, astringent
Salicin/ Willow bark	It is obtain by bark,leaves,flower of *Salix fragilis,* *S. purpurea* Family-Saliaceae	Salicin,emulsin,saligenin,saliretin	Analgesic,bitter stomachic,antirheumatic agent

1.3 Steroid glycosides/Cardiac glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Digitalis/foxglove	Dried leaves of *Digitalis purpurea* Family-Scrophulariaceae	Primary glycoside-Purpurea glycosidesA,B,& C Secondary glycoside- digitoxigenin,	Cardiotonic,controls of CHF,atrial flutter,atrial fibrillation,supraventrica

	Leaves dried at dark and temperature not exceeding 60^0C	gitoxigenin,gitaloxigenin,tannin,gallic,benzoic acids,digitalin,diginin,gitin	lur tachycardia and premature extra systoles Substituents/Adulterants: Great mullein leaves-leaves of verbascum Thapsus Primarose leaves- leaves of primula vulgaris Comfrey leaves- leaves of symphytum officinale
Squill/Sea onion, Jangli pyaj	Indian squill-dried slices of the bulbs of *Urginbea indica* Europian or red squill-freshly slices of the inner bulbs of *Urginea maritime* Family-Liliaceae	Cardiac glycosides(0.3%): scillaren A,B alcohol soluble extractives(20-40%),mucilages(40%)& calcium oxalate	Cardiotonic,stimulant,expectorant, antiasthmatic, chronic bronchitis.
Strophanthus	Dried and ripe seeds of *Strophanthus kombe Strophanthus gratus(*G-strophanthin,**Ouabain***)* Family-Apocynaceae	K-strophanthoside, K-strophanthride β,cymarin and main aglycone pat is strophanthidin It shows positive for Baljet test,legal test and killer-killani	Intravenously for treating emergency cardiac conditions, orally strophanthin is not active
Thevetia	Dried leaves of *Thevetia nerifolia* Family- Apocynaceae	Thevetin	Cardiotonic

1.4 Flavonoid glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Rutin/Melin	Dried plant part of *Fagopyrum esculentum (***buckwheat plant**) Family-Polygonaceae	Rutin,quercetin	Decrease capillary fragility, retinal hemorrhages
Quercetin (3,3',4',5,7-pentahydroxyl-flavone)	Bark of *Quercus tinctoria* Family-Hippocastanaceae	Quercetin upon hydrolysis yield rhamnose & Quercetin	Antioxidant,antiviral and Hepatoprotective
Gingko	Dried leaves *of Gingko biloba* Family-Gingkoaceae	Gingkolide -A,B,C, kaempoferol, quercetin,isorhamnetin,ginkgetin,ginkolic acid	Vascular disorders, Raynaud disease, severe sepsis,asthma(ginkolideB)sugar coated tablet form use contain extract
Silymarin/Milk thistle	Ripe seeds *of Silybus marianum* Family-Asteraceae	Silybin,Silycrystin,silydianin,silyhermin,betaine,apigenin,silybonol	Liver disorders, hepatoprotective, use in cirrhosis

1.5 Flavanone glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Hesperidin/ Cirantin	Rind or peel or unripe, green citrus fruits; Bitter orange (*Citrus aurantium*),Lemons(*Citrus limonis*) Family-Rutaceae	Hesperidin	Minimizing capillary fragility,Hypertension,treatment of cardiovascular, Carminative

1.6 Furanocoumarin glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Khellol glucoside/ Visnaga	Seeds of *Ammi visnaga* Family-Umbelliferae Seeds of *Eranthis hyemalis* Family-Ranunculaeae	Khellin,visnagin	Coronary vasodialator, potent smooth muscle relaxant, angina pectoris,asthma, whooping cough, renal pain
Psoralen/Lata kasturi	Dried ripe fruits of *Psoralea corylifolia* Family- Leguminoseae	Psoralen,isopsoralen,psolaridin,8-methoxypsoralen,bergapten,angilicin,isobergapten,psoralenol,bavachromanol,fixed oil, essential	Leprosy, leucoderma, skin diseases, snake bite, stomachic, anthelmintic ,diuretic, laxative

		oil,raffinose	

1.7 Cyanogenetic/cyanophoric glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Bitter almond	Dried ripe kernels of *Prunus amygdalus* Family-Rosaceae	Amygdalin, Hydrolysis product-prunacin, mandelonitrile, benzaldehyde, Hydrocyanic acid	Sedative due to HCN content, demulscent in skin-lotion (oil form)
Wild cherry bark	Driedbark of *Prunus serotina* Family- Rosaceae	Prunasin (mandelonitrile glucoside),*p*-coumaric acid,scopoletin,gallic acid,benzalehyde,hydrocyanic acid	Flovoured vehicle in cough syrup, sedative expectorant
Linseed/Flax seed	Dried fully ripe seeds of *Linum usitatissiumum* Family-Liliaceae	Linamarin, fixed oils(33-43%),mucilage present in testa(6%),proteins(25%) and linase enzyme	Liniments & lotion,treatment in scabies,skin disease

1.8 Thioglycosides/Isothiocynate glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Black mustard/ brown mustard	Dried ripe seeds of *Brassica nigra,B. juncea* **White mustard** Dried ripe seeds of *B. alba* Family-Liliaceae	Beta glucopyranoside termed as sinigrin or allyl glucosinolate, fixed oil(30%), proteins(20%) and volatile oil.	Rubefacient, counter irritant, emetic in higher doses, condiment.

1.9 Steroidal saponin

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Dioscorea/Yam, Rheumatism root	Dried tubers of *Dioscorea delitoidea* Family-Dioscoreaceae	Diosgenin 4-6% aglycon part, starch 75%,phenolic compound, sapogenase enzyme	Treatment of rheumatism arthritis,sex-harmones, oral contraceptive preparation, corticosteroids used.
Solanum khasianum/ glyco alkaloid	Dried and full grown berries of *Solanum khasianum* Family-Solanaceae	Solasonine,solasodine and fixed oil	Starting material for the synthesis of steroidal drugs.
Shatavari/ Shatamuli	Dried roots and leaves of *Asparagus racemosus* Family-Liliaceae	Four Steroidal saponin shatavarin I-IV, shatavarin I is major glycoside present	Galactogogue to promote the flow of milk, tonic, diuretic, antioxytocic,nervine disorder and

			rheumatism,uterine blocking activity
Safed musali	Peeled tuberous roots of *Chlorophytum borovovillianum* Family-Liliaceae	Hicogenin	General tonic
Gokhru	Dried fruits *Tribulus terrestris* Family-Zygophyllaeae	Steroidal sapogenins	Diuretics

1.10 Triterpenoid saponin

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ginseng/Ninjin	Dried roots of *Panax ginseng (Korean), P. japonica (japanese), P. notoginseng (indian),* Family-Araliaceae	Triterpenoid saponin, ginsenosides (major), panaxosides, chikusetsu saponins, oleanolic acid, panaxadiol, panaxatriol	Tonic, stimulant, anaemia carminative, diuretic, adaptogenic (antistress)
Liquorice	Dried, peeled or unpeeled,roots, rhizomes or stolon of *Glycyrrhiza glabra* Family-Leguminoseae	Glycyrrhizin(glycyrrhizin acid) saponin like glycosides, its 50 times sweet than sugar,hydrolysis product glycyrrhetinic acid with two moles of glucuronic acid,carbenoxolone is oleandane	Demulscent,expectorant ,masking agent for bitter drug,flavouring agent in beverage,treatment in rheumatism,addition disease,inflammation

		derivative having mineralocorticoid activity& use in antiulcer,liquiritin,isoliquiritoside, mannitol,20% starch,umbelliferone and herniarin coumarin derivative present.	Note: Itenhances sodium& fluid retention, promotes potassium depletion thus causescardiac problems or hypertension so avoids maximum consumption.
Senega/Snakeroot	Dried roots and roots stock of *Polygala senega* Family-Polygalaceae	Two triterpenoid saponin glycosides that are senegin (4%), polydallic acid (5.5%),senegenin, senegenic acid, presenegenin,polygalitol,fixed oil, resin,sucrose	Expectorant, chronic bronchitis,emetic
Bacopa/Bramhi	Fresh stems and leaves of *Bacopa monnieri* Family-Scrophulariaceae	Bacoside A,B and bacogenin A,B also contain Asiatic acid,brahmic acid	Insanity,epilepsy,nervetonic,cardiotonic,diuretic, antiasthmatic,mild laxative
Quillaja/ Panama bark	Ineer dried bark of *Quillaja saponaria* Family-Rosaceae	Triterpenoid saponin glycosides, quilliac acid, sapotoxin,tannins,starch, etc.	Mineral water industry, shampoo liquid,emulsifying agent,foaming agent

1.11 Aldehyde glycosides

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Vanilla	Full grown,unripe fruit of *Vanilla planifolia* Family-Orchidaceae	2-2.75% vanillin, glucovanillin, vanillin alcohol	Flavouring agent

1.12 Bitter glycosides/others

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Picrorhiza/Katki, Indian gentian	Dried rhizome of *Picrorhiza kurroa* Family-Scrophulariaceae	Bitter glycosides,picroside I,picroside II and kutkoside-these are monoterpene iritoid glycosides,resin, sugar & tannins	Stomachic,febrifuge,laxative,antibacterialand also used in treatment ofjaundice activity
Kalmegh	Dried leaves and tender shoots of *Andrographis paniculata* Family-Acanthaceae	Andrographolide	Bitter tonic, anthelmentic, hepatoprotective
Gentian/Radix	Dried rhizome & roots of *Gentiana lutea* Family-Gentianaceae	Gentiopicrin also known as gentiopicroside (2%), amarogenin bitter in taste, amaroswerin gentioside, gentinin, gentisic acid	Bitter tonic in anorexia,dyspepsia,improve dull appetite

Chirata	Dried plant of *Swerlia chirata* Family-Gentianaceae	Ophelic acid,bitter glycoside, chiratin, amarogentin, alkaloids-gentianine, gentiocrucine	Bitter tonic, febrifuge, dyspepsia,diuretic, antiepileptic
Gymnema	Dried leaves of *Gymnema sylvestre* Family-Asclepiadaceae	Gymnemic acid	Antidiabetic

2. Alkaloids

2.1 Indole alkaloids- *Amino acid tryptophan is the biochemical precursor

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ergot	A fungal sclerotium of *Claviceps purpurea* in ovary of rye plant *Secele cereale* Family- of fungus Claviciptaceae, Family of rye-Graminae	Ergometri**nine**,ergotami**nine:**dextrorotatory alkaloids and water soluble Ergotam**ine**,ergometr**ine**: laevorotatory alkaloids and water insoluble Positive for Van-urk reagent Showsblue color with p-dimethylaminobenzaldehyde	Oxytocic,prevent postpartum haemorrhage, use in migrane It is controlled substance-LSD
Nux vomica/Crow fig	Dried ripe seeds of *Strychnos nuxvomica* Family-Loganiaceae	1.2% Strychnine,brucine,α-colubrine,β- colubrine, novacine	CNS stimulant,bitter tonic,stomachic

Physostigma/ Calabar beans	Dried ripe seeds of *Physostigma venonosum* Family-Leguminosae	Physostigmine,physovenine, eseramine, eseroline,calabatine,calabasine	Cholinergic,glaucoma(ophthalmic)
Rauwolfia/ Sarpagandha	Roots and rhizomes of *Rauwolfia serpentina* Family- Apocynaceae	Reserpine,deserpidine,rescinnamine, ajmalcine, yohimbine,ajmaline	Hypotensive, tranquilizer,
Vinca	Entire plant of *Catharanthus roseus* Family- Apocynaceae	Vincristine,vinblastine, catharanthine, vindoline,	Aniticancer,mostly used in hodgkins disease and leukemia

2.2 Isoquinoline alkaloids- *Tyrosine/phenylalanine and DOPA is the biochemical precursor (amino acid)

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Opium	Dried latex from the capsules of *Papaver somniferum* Family- Papaveraceae	Morphine,codeine,narcotine,papaverine,heroin,opium alkaloids are present as salts of meconic acid,protopine and hydrocotarnine are the minor opium,sugar,mucilage	Narcotic analgesic,diarrhea, hypnotic sedative,local irritation of bronchial tract,apomorphine is emetic

Curare	Dried extract of stems & leaves of various plants from Family- Loganiaceae	d-tubocurarine chloride,curine,curarine,isochondrodendrin,cycleanine,chondrocurine	Skeletal muscle muscle relaxant,neuromuscular blocking actions
Ipecacunha/ Ipecac	Roots and rhizomes of *Cephalis ipecacuanha*,*C.acuminate* Family- Rubiaceae	Emetine,cephaline,psychotrine,o-methyl psychotrine,emetamine,ipecacuanhin Positive for frohdes reagent	Antiamoebic,emetic,expectorant
Berberis	Roots and rhizomes of *Berberis aristata* Family- Berberidaceae	Berberine,hydrastine	To control uterine haemorrhage

2.3 Tropane alkaloids- *Ornithine or arginine is the biochemical precursor(amino acid)

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Bellodona/Deadly night shade leaf	Dried leaves & flowering tops of *Atropa bellodona or A.acuminata* Family-Solanaceae ***Atropine is changed to l-hyoscyamine by an enzyme when the plant is dry, thus the plant is more active when dry**	l-hyoscymine,atopine racemic mixture,belladonine,scopoletin, hyoscine,pyridine, starch, mucilage	Anticholinergic, antispasmodic, bronchodilator

Datura hub/Angels trumpet	Dried leaves & flowering tops of *Datura metel* Family-Solanaceae	Scopolamine(hyoscine),hyoscyamine,atropine	Anticholinergic, deodanal ulcers
Hyoscyamus/ Henbane	Dried leaves & flowering tops of *Hyoscyamus niger* Family-Solanaceae	Tropane alkaloids like l-hyoscyamine,hyoscine	Anticholinergic, antispasmodic,purgative and sedative
Stramonium/ Thornapple leaves	Dried leaves & flowering tops of *Datura stramonium* Family-Solanacea	l-hyoscyamine,hyoscine, atropine	Anticholinergic,mydriatic ,controlsmotionsickness
Duboisa/Cork-tree	Dried leaves of *Duboisa myoporoides* Family-Solanaceae	Scopolamine	Anticholinergic
Coca	Dried leaves of *Erythroxylon coca* Family-Erythroxyaceae	Cocaine,cinnamyl cocaine,α-truxilline Price of leaves determined by ecgonine-get-cocaine	Local anaesthetic,stimulant

2.4 Quinoline alkaloids- *Amino acid tryptophan is the biochemical precursor

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Cinchona/Peruian bark	Dried root & stem bark of *Cinchona calisaya C.officinalis, C.ledgergiana,*	Quinine,quinidine,cinchonine,cinchonidine, cinchotanin acid, quinovin, hydroquinine	Antimalarial,bitter tonic,antipyretic

	C.succirubra Family- Rubiaceae		
Camptotheca/ cancer tree	Dried stem wood*of Camptotheca acuminatal* Family- Nyssaceae	Camptothecin,10-hydroxy camptothecin,10-methoxy camptothecin	Antitumour

2.5 Pyridine alkaloids- *Nicotinic acid is the biochemical precursor

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Areca/Betal nut	Dried ripe seeds of *Areca catechu* Family- Palmae	Arecoline, arecaidine	Respiratory stimulant
Lobelia/ Indian tobacco, Asthma weed	Dried leaves and tops of *Lobelia nicotianefolia* Family- Campanulaceae	Lobeline,lobelanidine,lobelanine	Asthma,Respiratory stimulant

2.6 Imidazole alkaloids- *Amino acid tryptophan is the biochemical precursor

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Jaborandi/ Pilocarpus	Dried leaves of *Pilocarpus jaborandi* Family- Rutaceae	Pilocarpine,pilosine,pilocarpidine	Cholinergic(ophthalmic), used in treatment of glaucoma

2.7 Quinazoline alkaloids-

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Vasaka/Adulsa	Leaves of *Adhatoda vasica* Family- Acanthaceae	Vasicine,vasicinone	Antitussive,expectorant

2.8 Purine alkaloids-

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Cocao seed	Seeds of *Theobroma cacao* Family- Stericulaceae	Theobromine,caffeine	Diuretic, stimulant
Tea	Leaves and leaf buds of *Thia sinesis* Family- Theaceae	Rich source of Caffeine upto 3%&theobromine.Colour of leaves is due to gallotannic acic (15%)	CNS stimulant and diuretic
Cofee	Dried ripe seed of *Caffea Arabica* Family- Rubiaceae	2-3%Caffeine, trigonelline,tannins,proteins,fixed oils,chorogenic acid Positive for murexide test for caffeine identification	Stimulant,diuretic,counter effect over dosage of CNS depressant

2.9 Steroidal alkaloids-

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Veratrum/ hellebore	Dried rhizomes of *Veratrum album,V.viride* Family-Liliaceae	Germidine, protoveratrine A and B	Hypotensive, cardiac depressant
Ashwagandha/ Asgandh	Dried roots or leaves of *Withania somnifera* Family- Solanaceae	Withanine,somniferine,withanolide(streroid)	Sedative,antirheumatic, general debility
Kurchi/ Hollarrhena	Dried roots of *Holarrhena antidysenterica* Family- Apocynaceae	Conessine,isoconessine	Antiamoebic

2.10 Amino alkaloids- Proto Alkaloids

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ephedra/ Ma-huang Ma- anstrigent taste Huang-yellow in colour	Dried stems of *Ephedra gerardiana, E.equisetina,E.sinica* Family- Ephedraceae(Gnetaceae)	Ephedrine,pseudoephedrine, norephedrine, roots contains oxazolidone amino alkaloid	Sympathomimetic,antiasthmatic,treatment of hay fever

Colchicum/Meadow saffron seed	Dried ripe seed and corn of *Colchicum autumnale,C.luteum* Family-Liliaceae	Colchicine,demecolcine, cycloheptatrienolone	Treatment in gout, Rheumatism,induction of polyploidy
Aconite/ Monkshood	Dried roots of *Aconitum napellus* Family- Ranunculaceae *roots are slightly twisted and deeply wrinkled,having rootlet and scars	Aconitine,neopelline,napelline, Neoline,sparteine& hypoaconitine Aconitine hydrolysis gives benzoyl aconine and acetic acid	Rheumatism and sciatica,antiiflammatory, analgesic, *Extremely poisonous drug
Gloriosa/ Glorry lily	Dried rhizomes and roots of *Gloriosa superba* Family- Ranunculaceae	Colchicin	Gout,cancer
Shankhpushpi /Shankhvel	Arieal part of the plant Canscora decussate Family- Gentianaceae	Bitter substance,oleo-resin,triterpenes,alkaloids and xanthones	Fresh juice use as nervine tonic,insanity,epilepsy,nervous debility antiviral activity

3. Terpenoids

3.1 Monoterpenoids containing drugs

Drugs/Synonyms	Biological source(plant part used in distillation)	Chemical constituents/chemical test	Uses

Anise	*Pimpinella anisum (dried ripe fruits)* Family- Umbelliferae	Anethol,methyl chavicol,anisaldehyde	Stimulant,flavouring agent,carminative,expectorant,condiment
Lavender oil	*Lavandula officinalis (fresh flowering tops)* Family- Labiateae	Esters linalyl acetate,linalool,pinene,geraniol,cineol	Aromatic, carminative,flavor
Gaultheria oil	*Gaultheria procumbens (leaves)* Family- Ericaceae	98% methyl salicylate,gaultherin	Counter irritant, rheumatism,vermiscide
Palmarosa/ Rosha oil	*Cymbopogon martini (leaves)* Family- Graminae	Geraniol,linalool,citronella diterpene	Flavour,treatment of rheumatism and skin diseases
Citronella	*Cymbopogon nardus (leaves)* Family- Graminae	Geraniol,citronellal(25-50%),camphene	Flavour,perfume for soap, in mosquito repellant cream
Thyme	*Thymus vulgaris(dried leaves)* Family- Labiateae	Thymol,linalool,carvacrol	Carminative,antispasmodic,flour, expectorant
Camphor	*Cinnamomum camphora(wood)* Family- Lauraceae	Safrole, d-pinene, acetaldehyde, dipentene, cineole(eucalyptol), phellandrene	Flavour,rubefacient counter irritant

Eucalyptus oil/Dinkum oil	*Eucalyptus globulus(fresh leaves)* Family-Myrtaceae	About 80% Cineole (eucalyptol),camphene, phellandrene,citronellal	Counter irritant, antiseptic, chronic bronchitis, expectorant
Lemon grass oil	*Cymbopogon flexuausus,C. citrates (leaves and aerial parts)* Family- Graminae	Citral,nerol,citronella,methyl heptenol,geraniol,dipentene	Flavouring agent,from citral source-β-ionine is prepared and it is starting material for synthesis of vitamin A
Turpentine	*Pinus roxburghii(oleoresin)* Family- Pinaceae	α-pinene, β-pinene,Carene,limonene,turpentine	Counter irritant, rubefacient,expectorant, antiseptic
Peppermint oil/Mentha oil	*Mentha piperita(fresh flowering tops)* Family- Labiateae	Menthol (Indian-70%, Japanese-70-90%, American-80%) pulegone,methone,menthafuram	Antiseptic, Stimulant, flavouring agent,carminative, calcium channel blocking activity causing smooth muscle relaxant
Caraway /Carum	*Carum carvi(dried ripe seeds)* Family- Umbelliferae	About 45-60% Carvone,carvacrol, limonene	Aromatic, Stimulant, carminative,flavor

Cardamom	*Elettaria cardamomum (dried ripe seeds)* Family- Zingiberaceae	α-terpineol,borneol,cineole	Aromatic, Stimulant, carminative,flavoring agent
Coriander	*Coriandrum sativum(dried ripe seeds)* Family- Umbelliferae	Coriandrol,coriandryl acetate, l-borneol,geraniol,pinene and leaves are rich in vitamin A content	Aromatic, Stimulant, carminative,flavoring agent
Ajowan	*Trychyspermum ammi (dried ripe fruits)* Family- Umbelliferae	Volatile oil,proteins, carbohydrates,thymol,p-cymene,terpinene	Aromatic, Stimulant, carminative, antispasmodic,antifungal , Insectisides
Dill/Anethum	*Anethum graveolens (dried ripe fruits)* Family- Umbelliferae	Apiole,carvone, dihydrocarvone, d-limonene, phellandrene	Aromatic, Stimulant, carminative,flavor,use in gripello/gripe water
Fennel	*Foeniculum vulgare(dried ripe fruits)* Family- Umbelliferae	Fenchone (ketone),anethole (phenolic ether sweet in taste,ketone,phellandrene,limolene	Aromatic, Stimulant, carminative, expectorant, flavouring agent
Lemon peel	*Citrus limonis(outer part of pericarp of ripe fruits)* Family- Rutaceae	Limonene, hesperdin, pectin, citral,geranyl acetate,terpineol	Stimulant, carminative
Orange peel	*Citrus aurantium(outer part of pericarp of ripe fruits)* Family- Rutaceae	Hesperidin,isohesperidin, neohesperidin, Vit.C,limonene, auramtiamarin, aurantimarin acid (bitter glycoside) citral	Aromatic, Stimulant, carminative,flavoring

Nutmeg	*Myristica fragrans(dried kernels of seed)* Family- Myristicaceae	Myristicin,saffrole,elimicin,fatty acids like palmitic,oleic,lauric acid,nutmeg butter	Aromatic, Stimulant, carminative,flavor,use in rheumatism,banda soap use in industries
Cassia cinnamon/Cassia bark,Chinese cinnamon	*Cinnamomum cassia(dried stem bark)* Family- Lauraceae Cork is present	Mucilage,coumarin,about 85% cinnamic aldehyde,eugenol	Carminative, Stimulant,flavor,aromatic,spices
Cinnamon/Kalmi dalchini	Cinnamomum zeylanicum*(dried inner bark of shoots)* Family- Lauraceae Keep in cool place with closed container	5-10% Eugenol, bezaldehyde, cuminaldehyde about 60-70%% cinnamic aldehyde, phlobatannins	Carminative, Stimulant, flavor, aromatic, antiseptic, astringent Substituens/adulterants:jungel cinnamon,cinnamon chips,Saigon cinnamon,java cinnamon
Jatamansi	*Nardostachys jatamansi (dried rhizomes)* Family- Valerianaceae	Jatamansic acid, Jatamansone,nardostachone	Sedative,diuretic,antispasmodic,emmunagogue,stomachic,stimulant, antiepileptic
Rasna/Galanga	*Alpinia officinarum (dried rhizomes)* Family- Zingiberaceae	Methyl Cinnamate (about 48%),cineole (about 25%),pinene,camphor,galangin	Aromatic, Stimulant, carminative, antibacterial treatment of rheumatism

Garlic	*Allium sativum(bulb of plant)* Family- Liliaceae	Allicin,allin,iron,phosphourus,copper,propyl disulphide	Carminative, Stimulant, expectorant,anthelmintic,rubefacient
Spearmint/ Mentha viridis	*Mentha spicata(dried leaves and flowering top)* Family- Labiateae	About 50% l- carvone, linalool ,pinene, cineole, phenallandrine	flavouring agent in mouth washesh chewing gums etc.
Tulsi/sacred basil,holy basil	*Ocimum sanctum (fresh and dried leaves)* Family- Labiateae	Approximately 70% Eugenol, methyl eugenol, carvacrol, caryophyllin	Antibacterial,insecticidal ,stimulant,aromatic,immunomodulatory agent
Kapur kachari/spiked ginger lily	*Hedychium spicatum(dried rhizomes)* Family- Zingiberaceae	Paramethoxy cinnamic acid ester,cineole,limonene	Stomachic,carminative, stimulant tonic
Black pepper	*Piper nigrum (dried unripe fruits)* Family- Piperaceae	Piperine,starch,piperidine,l-phellandrone,caryophyllene	Aromatic, stimulant, stomachic,carminative,condiment
Musk	*Moschus moschiferus(dried secretion from pepticle follicle of musk dear)* Family- Cervidae	Musckone,cholesterin,albuminoids ,resin	Perfumery used
Chenopodium oil	*Chenopodium ambrosioides(fresh flowering plant)* Family- Chenopodiaceae	About 0.5 to 1.0% volatile oil,ascaridole,p-cymene,myrcene,1-limolene and camphor	Anthelmintic,intestinal amoebae Contraindicated in pregnant and in patient with impaired

			kidney /liver

3.2 Sesquiterpenoids containing drugs

Drugs/ Synonyms	Biological source	Chemical constituents/chemical test	Uses
Artemisia	*Artemisia cina, A.brevifolia, A.maritima (flower heads)* Family- Compositae	Sanconin,artemisin,cineole,pinene, resin	Anthelmintic,cumulative in action
Sandal wood oil	*Santalum album(heart wood)* Family- Santalaceae	α,β-santalol, santene, santenone, teresantol,santalone,santalene	Treatment in dysuria,usedin perfume
Clove	*Eugenia caryophyllus (dried flower buds)* Family- Myrtaceae	**Eugenol (about 70-90%)**,ester eugenin, caryophyllenes, gallotannic acid, chromone	Dental analgesic, carminative, flavor,stimulant *adulterant-mother-ripened fruit, blown-expanded flowers,clove stalk powdered cloves,exhausted clove
Hops	*Humulus lupulus (female flower)* Family- cannabinaceae	α,β-acid humulone,cohumulone,adhumulone,colupulone,aldupalone	Sedative,spasmolytic

Valerian	*Valeriana walichii (dried rhizomes,root)* Family- Compositae	Chatinine,valerine,borneol formate,valtrate,valerenic acid	In cough,antispasmodic, CNSstimulant,tonic, antianxietic, antidepressant

3.3 Diterpenoids containing drugs

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Taxus /yew	*Taxus baccata,T.cuspidata,T.brevifolia,T.canadonsis(dried leaves,bark,roots)* Family- Taxaceae	Taxol,cephalomannine,10-deacetyl baccatin, baccatin-lll	Anticancer ie. (Interfere with mitotic spindle formation by preventing disassembly of microtubules.)
Coleus	*Coleus forskohlii* Family- Labiateae	Forskolin,coleonol	Vasodialator,cardiostimulant,lowering blood pressure and use in glaucoma

3.4 Triterpenoids containing drugs

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ambergris	*Physeter catoden* Family- Physeteridae	Ambrein,epicoprostemol,coprostemone	Perfume

3.5 Tetraterpenoids and polyterpenoids containing drugs

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Annatto	*Bixa orllana(dried seeds)* Family- Bixaceae	Bixin,trasbixin,norbixin,isobixin	Its antioxidant and protects against ultra violet light, colouring agent for foods,cosmetics
Saffron	*Crocus sativa* Family- Iridaceae	Crocin,crocetin,picrocrocin	Flavor,antispasmodic,em menagogue,stimulant

4. Resins and resins combination

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ginger	*Zingiber officinalis (rhizomes)* Family- Zingiberaceae	Volatile oil,starch(40-60%), zingiberene, curcumene, resin, gingerol, shogaols, gingediols	Aromatic,carminative, Flavoring agent,motion sickness
*Jamaica ginger :scrapped to remove the outer skin and sun dried *shows short and fibrous fracture *T.S shows well marked endodermis which distinguishes the stele and cortex *ginger adulterant identified by water soluble ash and volatile oil content *(aroma - geraniol and citral,pungency and flavor is due to phenolic ketones such as gingerols,zingerone,gingediol) *Pungency of ginger is destroyed by boiling it with 2% solution of sod. hydroxide			

Capsicum	*Capsicum annum(dried ripe fruits)* Family- Solanaceae	Capsaicin-pungency,capsanthin-red color,carotene,pigments ,thiamine,ascorbic acid	Carminative, Stomachic,counter irritant in rheumatism,lumbago
*Pedicle is attached to five toothed calyx, *it contains colourless crystalline and pungent capsaicin which is volatile above 65^0, *capsaicin is not destroyed by boiling it with 2% solution of sod. hydroxide but destroyed by oxidizing agent			
Turmeric /Indian saffron	*Curcuma longa(dried or fresh rhizomes)* Family- Zingiberaceae *C.aromatica use as cervical cancer and antiarthritic agent -Root scars and annulation are present,horny fracture, -T.S of rhizomes shows brick shaped parechymatous cork followed by cork cambium	Volatile oil, curcuminoids (yellow colouring substance), curcumin(50-60%), pinene, camphene, curcumene -curcumin is coloring substance -gives crimson colour with sulphuric acid -gives reddish brown with boric acid,which add alkali changes greenish blue -violet colour with acetic anhydride and sulphuric acid	Anti-inflammatory, condiment ,spice,use in detection of boric acid
Asafoetida/ Devils dung	*Ferula foetida(oleo gum resin from rhizomes)* Family-Umbellliferae *ocuurs in two form:tears and masses,tear is milkfish whitish yellow,maa is agglutinated & mixed with root fragment *specific odour of the drug is due	Resin (40-65%),gum,volatile oil,asaresinotannol, ferulic acid, umbelliferone, umbellic acid -gives reddish brown colour with sulphuric acid -gives green colour with 50% nitric acid -triturate with water gives yellowish orange -free umbelliferone is absent in the drug	Carminative, nervine stimulant, intestinalflatulence

	to sulphur compound	where as present in allied drug in ferula galbaniflua.	
Cannabis/Ganja, Marihuana	*Cannabis sativa(dried flowering tops)* Family-Cannabinaceae/Moraceae	Resin,tetrahydrocannabinol, trigonelline,choline,cannabinol, cannabidiol,cannabidiolic acid,cannabichromene,cannabigerol	Narcotic analgesic, psychotropic *psychotropic activity due to tetrahydrocanabinol
Jalap	*Ipomoea purga (dried tubercles)* Family-Convolvulaceae *tubercle having lenticels	Resin,volatile oil,jalapin,convolvulin	Powerful cathartic
Podophyllum /May aple	*Podophyllum hexandrum, (dried rhizomes),P.emodi* Family-Berberidaceae	Resin-podophyllin,peltatins,kaempferol, asiragalin,podophyllotoxone	Purgative treatment of veneral worts,anticancer
Benzoin	*Styrax benzoin (Sumatra benzoin),S.tonkinesis (Siam benzoin)* Family-Styraceae Sumatra benzoin-aromatic odour Siam benzoin-vanilla like odour	Benzoin and cinnamic acids and their esters, sumaresinolic and siaresinolic acid,coniferyl acetate Siam benzoin differs from Sumatra in contains of insufficient cinnamic acid to give an odour of benzaldehyde when warmed with pot.permagnate solution	Carminative,expectorant ,antiseptic

Tolu of balsum	*Myroxylon balsumum* Family-Leguminasae	Cinnamic acid,benzoic acid,benzoyl benzoate,toluresinotannol,volatile oil,vanillin	Expectorant,antiseptic,flavouring agent
Myrrh	*Commiphora molmol(oleo gum resin)* Family-Burserraceae	Volatile oil,gum,resin, commiphoric acids (ether soluble)	Antiseptic , stimulant *substitute by balsam-dendron mukul known as indian bdellium
Guggul	*Commiphora weightii* Family-Burserraceae	Gum, resin ,steroids, guggulosterone-z, guggulosterol-l	Anti-inflammatory, hypolipidemic(**gugulipid**-guggulosterone)
Boswellia	*Boswellia serrata* Family-Burserraceae	Resin,boswellic acid, volatile oil,sequiterpenes	Rheumatoid arthritis
Colophony/Rosin	*Pinus species* Family-Pinaceae	Resin acids,abietic acid,resene,dihydroabietic acid,dehydroabietic acid	Stimulant diuretic
Balsum of peru	*Myroxylon balsumum* Family-Leguminasae	Resin, Cinnamic acid,benzoic acid, benzoyl benzoate, volatile oil	Scabies,healing of wounds,flavouring agent
Lac	*Lacifer lacca* Family-Lacciferidae	Resin,shelloic acid, aleuritic cid	Sustained release medicaments
Guaiac	*Guaiacum officinale* Family-Zygophyllaceae	Guaiareticacid (diaryl butane), α- and β-guaiaconic acids (70%) and guaiacie acid**.**	Diaphoretic, expectorant ,testing of blood and haemoglobin

5. Tannins

5.1 Hydrolysable Tannins

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Myrobalan /Harda, Haritaki	Dried ripe,mature fruits of *Terminalia chebula* Family-Combretaceae	Chebulic acid,chebulagic acid,gallic acid, glucose, sorbitol	Astringent, stomachic,purgative,ingredient of triphala churna, laxative property due to anthracene present in pericarp,tonic, anthelmintic, treatment of piles
Bahera/Bibhitak	Dried ripe fruits of *Terminalia belerica* Family-Combretaceae	Gallic acid, ellagic acid, phyllembin, ethyl gallate, galloyl glucose,	Astringent,dyspepsia,diarrhoea, ingredient of triphala churna
Arjuna	Dried stem bark of *Terminalia arjuna* Family-Combretaceae	Triterpenoid saponin,arjunolic acid, arjunic acid, arjunogenin,Ellagic acid,β-sitosterol,arjunine,arjunetine,calcium,magnesium salts	Cardiotonic,hypotensive

Tannic acid	Fermented oak galls which are growm on young twigs of *Quercus infectoria* Family-Fagaceae	Gallic acid,glucose,	Astringent for mucous membrane
Amla /Indian goose berry	Dried as well as fresh fruits of *Emblica officinalis* Family-Euphorbiaceae	Vitamin C,phyllembin,tannins,rich in mineral like phosphorus, iron,calcium,pectin,75% moisture in fresh fruits	Diuretic,laxative, ingredient of triphala churna and chyavanprash

5.2 Condensed Tannins

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Ashoka bark	Dried stem bark of *Saraca indica* Family-Leguminosae *Phellem(cork)& phelloderm form the outer most layers.	Catechol,ketosterol,haematoxylin,saponin,activity of drug is due to the presence of steroidal components	Uterine tonic,oxytocic, sedative ,
Black catechu/Cutch	Dried aqueous extract of heartwood of *Acacia catechu* Family-Leguminosae Kattha-cake of extract after	Acacatechin,quercetin,catechutannic acid,not contain chlorophyll and fluroscent substance which is present in pale catechu	**Kattha**-Astringent externally for boils,skin eruptions and ulcers,cough,diarrhea and also cooling

	cooling, centrifuged Cutch-mother liquor left while centrifugation of cake		,digestive properties Cutch- is not use medicinally
Pale catechu/ Gambier	Dried aqueous extract of leaves and young shoots of *Uncaria gambier* Family-Rubiaceae	Catechin (7-33%),catechutannic acid,quercetin and gambier fluorescin Gambier fluorescin- drug+ alchohol + NaOH+petroleum –shaken –shows-geen fluorescence	Astringent for treatment of diarrhea
Pterocarpus /Malbar kino	Dried juice of the plant *Pterocarpus marsupium* Family-Leguminosae	Kinotannic acid,kinored,k-pyrocatechin	Hypoglycemic,powerful astringent

6. CARBOHYDRATES AND PRODUCTS

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Isapgol	*Plantago ovata (dried seeds)* Family-Plantaginaceae ISAP-the horse, GHOL-the ear Means ear of the horse	Pentosan ,mucilage,aldobionic acid,galacturonic acid,rhamnose	Demulscent, laxative, pharmaceutical aid, chronic constipation, amoebic, bacillary dysentery

Psyllium	*Plantago psyllium(dried seeds)* Family-Plantaginaceae Its use as substitute for isapgol	Pentosan,mucilage	laxative,pharmaceutical aid
Bael / Bengal quince	*Aegle marmelos(unripe or half ripe)* Family-Rutaceae	Marmelosin,fucocoumarin,marmesin,psorlin,umbelliferone,vit.C,vit.A, alkaloids like O-methylhalfordinol, isopentyl halfordinol,tannin,carbohydrates,protein,volatile oil	Digestive,antidiarrhoeal, tonic,appetizer
Acacia / Indian gum	*Acacia Arabica(dried gummy exudation of stem)* Family-Leguminosae	Arabin ,enzyme oxidase& perioxidase ,salts of Arabic acid	Suspending agent , emulsifying agent , binding agent,administered intravenously in haemolysis
Guar gum	*Cyamopsis tetragonolobus (powder of endosperm of the seeds)* Family-Leguminosae	Guaran (85%)water soluble and hydrolysis product – galactose,mannose	Binding agent, emulgent, disintegrating agent
Algin (alginic acid)	*Macrocystis pyrifera/Laminaria hyperborsea*	Alginic acid	Thickening and suspending agent

	Family-Phaeophyceae		
Tragacanth	*Astragalus gummifer(dried gummy exudation of stem)* Family-Leguminosae	Tragacanthin,tragacanthic acid,bassorin (60-70%), galactouronic acid *Ruthenium not given red colur with tragacant	Thickening, Demulscent
Pectin	*Citrus limolis,C.aurantium* Family-Rutaceae	D-galactouronic acid,pectic acid	Adsorbent,thickening agent
Gum karaya	*Sterculia urens(dried gummy exudation of tree)* Family-Sterculiaceae	A polysaccharide containing 8% acetyl,37% uronic acid residue,galactose,rhamnose Ruthenium given red colur with karaya	Thickening agent, emulgent, dental adhesive
Agar/agar-agar	*Gelidium amansii(driedgelatious substance)* Family-Gelidaceae	Agarose-resposible for gel strength,agaropectin- resposible for viscocity,galactose	Bulk laxative,bacteriological cultures

Carageenan / Irish moss	*Chondrus cryspus (sulphated extract of the sea weed-carageen)* Family-Rhodophyceae *is found in the intercellular matrix and cell wall of the algae	Kappa-carrageenan,lambda carrageenan,	Demulscent,antidiarrhoeal,pharmaceutical aid,use d in food product
Inulin	*Inula helenium (polysaccharide from bulbs)* Family-Compositae	Fructo-furamose unit	Diagnostic agent,Use in foods and drinks, manufacturing in fructose
Starch	*Zae mays-maize, oryza sativa -rice, triticum aestivum-wheat* Family-Gramineae *Solanum tuberosum-potato, (polysaccharide granules)* Family-Solanaceae	Amylose-water soluble,amylopectin-water insoluble in propotion 1:2 and amylase gives blue colour with iodine	Demulscent,disintegratingagent,nutritive,protective
Dextrin	*Incomplete hydrolysis of starch with dilute acids or by heating dry starch*	Polysaccharide	Adhesive in paper,textile,food industries

Dextran	*Enzymic fermentation of sucrose*	A-D-glucopyranosyl units	Binding,suspending,stabilizing agent,blood plasma expander
Xanthum gum	*Fermentation of glucose*	Mannose,glucose,glucuronic acid Dextran water soluble,insoluble in alcohol	Stabilizer,emulsifying agent
Honey	*Apis melifera(sugar secretion in honey comb)* Family-Apidae	Glucose about 38%, fructose 50%, Natural invert sugar *Artificial invert sugar/adulterant contains furfural which is detected by **fiehes test**	Demulscent,sweetening agent, antiseptic applied to burns, wounds *Crystalline dextrose-Granulated honey
Chitin	*Shells of lobster crab,cell walls of lower plants*	2-acetamide-2-deoxy cellulose,during canning of lobster,crab waste material is formed it contain chitin,deacetylated chitin is known as a chitosan	Wound healing, adhesive to glass and plastics
Lactose	*Disaccharides from mammlian milk*	Disaccharides containing galactose ,glucose	Diluents in tablets,capsules and pharmaceuticals,use in sugar coating

7. Lipids (fixed oil,fats, and waxes)

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Castor oil	*Ricinus communis (seed)* Family-Euphorbiaceae Seed contain 75% kernel and 25% of hull	Ricinoleic about (80%)-viscous and isoricinoleic acid,linoleic,stearic ,isostearic acids,undecenoic acid,sebacic acid	Cathartic,Laxative,lubricant,cosmetics,urethanes
Arachis oil	*Arachis hypogaea(seed kernels)* Family- Leguminosae	Glycerides of oleic,linoleic,palmitic acids,arachidic acid	Base for oily injectables nutritive,lubricant
Olive oil	*Olea europoea (ripe fruit)* Family- Oleaceae	Olein, palmitin and linolein	Vehicle for oily injection and emollient,soften the skin in eczemz, psoriasis
Chaulmoogra oil	*Hydnocarpus wightiana (ripe seeds)* Family- Flacourtriaceae	Hydnocarpic(48%) and chaulmoogric acid (27%)	**Antileprotic,tuberculosis**, psoriasis,rheumatism
Linseed oil	*Linum usitatissimum (ripe seeds)* Family- Linaceae	Fixed oil like glycerides of oleic,linoleic,proteins,mucilage and cyanogenetic glycoside-lanamarin,linase	Lotions, treatment for scabiesliniments,ointment varnish,paint industry

Sesame oil/Gingelly oil/Til ka tel	*Sesamum indicum (seed)* Family- Pedaliaceae	Glycerides of oleic,linoleic,palmitic acids and sesamolin,sesamin are lignin derivative present Badouins test-for identification	Demulcent,laxative,base for oily injectables, nutritive
Corn oil/maize oil	*Zea-mays (embryos)* Family- Gramineae	Oleic,linoleic acids,palmitic,stearic acid phospholipids,vit.E,it also contains ubiquinone	Dietary supplement,margarine, antioxidant activity
Safflower oil	*Cathamus tinctorius* Family-Compositae	Glycerides of oleic,linoleic acids	Edible oil,oleo margarine vegetable ghee
Rice bran oil	*Oryza sativa(cuticle existing between the rice and husk of the paddy)* Family- Gramineae	Glycerides of oleic,linoleic,tocopherol	Food oil,cosmetics
Mustard oil/sarson ko tel	*Brassica nigra,B.juncea(matured seeds)* Family- Cruciferae	Allyl isothiocynate and fatty acid glycerides,sinigrin	Rubefacient,counter irritant,condiment
Neem oil/margosa oil	*Azadirachta indica (matured seeds)* Family- Meliaceae	Glycerides of saturated and unsaturated fatty acids,oleic acid,stearic acids,sulphur containg compounds-nimbidin, nimbin, nimbinin, nimbidol, unsaponifiable-nimbosterol	Non edible oil, cosmetics, spermicidal,anti-viral activity

Cotton seed oil	*Gossypium herbaceum*(*matured seeds*) Family- Malvaceae	Glycerides of saturated and unsaturated fatty acids	Pharmaceutical aid
Wheat germ oil	*Triticum aestivum* Family- Gramineae	Glycerides fatty acids	Nutritive, source of vit.E
Cod liver oil	*Gadus morrhua* Family- Gadidae	Vit. A, vit. D, Glycerides fatty acids, eicosapentaenoic acid, docosahexanoic acid	Deficiency of vit.A,vit.D,emollient, In cure of rickets
Shark liver oil/Oleum selachoids	*Hypoprion brevirostris(fresh and preserved livers of shark)*	Vit. A and Glycerides fatty acids,squalene,omega-3-fatty acids	Deficiency of vit.A, In cure of rickets
Cocao butter /theobroma oil	*Theobroma cocao* Family- Sterculiaceae	Glycerides of stearic, oleic and palmitic acids	Suppository base
Kokum butter	*Garcinia indica* Family- Guttiferae	Glycerides of stearic, linolenic and palmitic acids	Demulscent, emollient, confectionary fat
Lecithin	Soybean oil,egg oil	Phosphates of phosphatidyl choline, phosphatidyl ethanolamine(cephaline)	Source of choline,also used in cosmetic,soaps
Lard	*Sus scrofa* Family- Suidae	Olein,stearin	Ointment base

Carnauba wax/brazil wax	*Copernicia verifera* Family- Palmae	Carnaubic and cerotic acid	Depilatories,cosmetic products
Hydrous wool fat/lanolin	*Ovis aries* Family- Bovidae	Ester of cholesterol and caraubic and oleic acids	Absorbable ointment base
Bees wax	*Apis mellifeca,A.indica* Family- Apidae	Myricyl palmitate,cerotic acid	Hardening agent, ointment base
Spermaceti	Physeter macrocephalus Family- Physeteridae	Cetyl palmitate	Cosmetic creams,source of cetyl alcohol

8. Enzymes

Drugs/Synonyms	Biological source	Chemical constituents/chemical test	Uses
Diastase /Amylase	Human saliva or digestive tract of animals	Amylolytic enzyme	Digestion of starch
Pepsin	Glandular layer of fresh stomach of hog,*Sus scrofa* Family- Suidae	Proteolytic enzyme	Conversion of protein into peptone and proteose
Rennin	Glandular layer of true digesting stomach of calf *Bos Taurus*	Protolytic enzyme	Preparation of cheese and junkets

	Family- Bovidae		
Pancreatin	Pancreas of hog *Sus scrofa* Family- Suidae	Carbolytic, Proteolytic, lipolytic enzymes	Digestive aid for starch, protein and fats
Trypsin	Pancreas of ox, *Box taurus* Family- Bovidae	Proteolytic enzyme	Proteolysis of blood clot,necrotic tissue
Chymotrypsin	Pancreas of ox, *Box taurus* Family- Bovidae	Proteolytic enzyme	In ophthalmology, also as anti-inflammatory for soft tissues
Hyaluronidase	Mammalian (bovine) testes	Amylolytic enzyme	To enhance absorption of *i.m.* or *s.c* injection
Urokinase	Human urine or kidney tissue cultures	Fibronolysis activating enzymes	Lysis of blood clots or fibrin in pulmonary embolism and inferior chamber of eye
Fibrinolysin	Human plasminogen	Proteolytic enzyme	Treatment of thrombotic disorder
Deoxyribonucleae	Beef pancreas	Nucleolytic enzyme	To reduce viscocity of bronchopulmonary secretions

Streptokinase	Culture filtrates of beta haemolytic *streptococci group c.*	Plasminogen activator enzyme	Treatment of thromboembolic disorder
Collagenase	Fermentation of *Clostridium histolyticum*	Proteolytic enzyme	Debridement of dermal ulcers and burns
L -asparginase	Escherichia coli	L -asparginase	Treatment of acute lymphocytic leukemia
Bromelain	Stem of pineapple plant *Ananas comosus* Family- Bromeliaceae	Mixture of Proteolytic enzyme	Anti inflammatory for soft tissue
Papain	Latex of unripe fruit of tropical melon tree *Caraca papaya* Family- Caricaceae	Proteolytic enzyme	Meat tenderizer,clarification of beverages
Seratio-peptidase	Bacteria belonging to genus serratia	Proteolytic enzyme	Anti inflammatory,especially to enhance antibiotic effect

9.0 Proteins drugs

Drugs/Synonyms	Biological source	Chemical constituents	Uses
Malt extract	Barley grains of *Hordeum vulgare* Family- Gramineae	Proteins,maltose,amylotytic enzymes	Nutritive
Protamine sulphate	Sperms or mature testes of fish of family *salmonidae or clupeidae*	Various simple proteins	Heparin antagonist
Heparin sodium	Mammalian tissues like lungs and intestinal mucosa	Glycosamino glycans	Anticoagulant in blood transfusions and vascular surgery
Collagen	White fibres of connective tissues	Glycine and prolene	Preparation of satures
Gelatin	Skin,ligament, tendons and bones of animals	Protein	Manufacture of hard and soft capsule shells
Casein	Milk	Phosphoprotein	Dietary supplement
Kavach	Seeds of *Mucuna prurines* Family- Leguminosae	l-dopa	Use in Parkinson's disease

Yeast	Fungus *Saccharomyces cerevisiae* Family- *Saccharomycetaceae*	Proteins,glycogen,vitamins of B groups	Nutritive, also in brewing industry
Thaumantin	Fruits of *Thaumatococcus denielli* Family- Marantaceae	Protein named as thaumatin	Sweetening agent

B. CLASSIFICATION OF PHARMACOGNOSTIC DRUGS

1. Glycosides

1} Based on the chemical nature of nonsugar (aglycon) moiety

• **Anthraquinone glycoside**: anthaquinone moiety as aglycon eg-senna,aloe,rhubarb
• **Sterol or cardiac glycoside**:aglycon portion is steroid molecule eg-digitalis
• **Saponine glycoside**:eg.-liquorice,dioscorea
• **Cyanogenetic orCyanophore glycoside**: eg.-white cherry bark
• **Isothiocyanate glycoside**:eg.-black mustard
• **Flavonoid& flavone glycoside**:eg.-rutra graveolens, citrus bio flavonoids,hesperidin,naringin,rutin,gentisin,kaempferol
• **Coumarin glycosideor furano coumarin glycosides**: eg-celery fruits,umbelliderone, tobacco
• **Aldehyde glycosides**: eg. -vanilla pods
• **Phenol glycoside**:eg. Salcive,salicin
• **Steroidal glycoside**:eg.Digitalis,strophanthus
• **Lactone glycosides**: eg. Cantharide

2} Based on the linkage between glycon and aglycon portion

*Interaction between OH groups of glycone and hydrogen coming through radicals in medicine like CH,-OH,-SH and –NH present on aglycone part

- **C-glycosides**:They are not hydrolysed by heating with dilute acids/alkalis,but oxidative hydrolysis with $FeCl_3$eg. Like cascara,aloe,colchineal

Glycone- OH + H C-Agycone ⟶ Glycone –C – Agycone +H_2O

- **O-glycosides**: hydrolyzed by heating with dilute acids/alkalis eg. senna, rhubarb

Glycone- OH + H O-Agycone ⟶ Glycone –O – Agycone + H_2O

- **S-glycosides**: isothiocyanate glycoside like sinigrin by black mustard

Glycone- OH + H S-Agycone ⟶ Glycone –S– Agycone + H_2O

- **N-glycosides**: nucleosides, N-glycosidic form

Glycone- OH + H N-Agycone ⟶ Glycone –N– Agycone + H_2O

2. *Alkaloids*

1. **Basis on bioprecursor classification-**

Precursor	**Example of alkaloids**
Lysine	Lupinine,isopelletierine,lobeline,pyridine,quinazolidine
Phenylalanine	Cinnamic acid,coumarin,emetine
Ornithine	Atropine(Tropane,pyrrolidine,pyrrolizidine,polyamine alkaloids),hygrine,ecgonine
Aspartic acid	Nicotinic acid
Ornithine+Acetate+Phenylalanine	Cocaine
Ornithine+Phenylalanine	Viridicatin
Tryptophan	Quinine,lysergic acid (Quinoline,indole derivatives)
Tryptophan/Tryptamine	Reserpine,serpentine,strychnine
Tyrosine/ Phenylalanine	Papaverine,berberine,narcotine,morphine,colchicine, chelidonine,ephedrine
Dopamine	Mescaline,emetine,cephaline
Ornithine+Nicotinic acid	Nicotine

2. Basis on heterocyclic compounds structural classification-

Heterocyclic ring	Source in present	Examples of alkaloids
Tropane /piperidine, N-methyl pyrrolidine	Atropa, scopolia, Datura, Dubosia, Hyoscyamus, Mandragora, coca species,punica granatum	Hyoscyamine,atropine,hyoscine,metaloidine,cocaine,pseudo,pelletierine
Quinoline	Cinchona,Remijia	Quinine,quinidine,cinchonine,cinchonidine
Isoquinoline	Papaver somniferum,corydalis, dicentra,berberidaceae,Ranunculaceae,Papaveraceae,cephaelis,curae plants of menisprermaceae	Papaverine,narceine,narcotine,corydaline,hydrastine,berbine,emetine,cephaline,tubocurarine
Pyrrole and pyrrolidine	Erythroxylon coca,stachys tuberifera,soya bean,leguminosae	Hygrine,stachydrine
Pyrrolizidine	Symphytum species,senecio	Symphitine,echimidine,senecionine,seneciphylline
Pyridine and piperdine	Fenugreek,strophanthus,coffee,conium,areca catechu,lobelia,punica granatum,nicotiana tabacum,piper species castor oil	Trigonelline,conine,arecoline,lobeline,pellentierine,nicotine,anabasine,piperine,ricinine
Indole/Benz pyrrole	Claviceps species,rivea corymbosa,ipomoea violacea,physostigma venenosum,	Ergot alkaloids,lysergic acid amide,clavine alkaloid,physostigmine,serpentine,reserpine,ajmalcine,yohimbine,aspidospermine,

	rouwolfia species, Aspidosperma species catharanthus roseus,strychnos species	vinblastine,vincristine,strychnine,brucine
Phenathrene	Papaver somniferum	Morphine,codeine
Apomorphine	Peumus boldus	Boldine
Norlupinane/lupine	Papilionaceae & leguminosae	Sparteine,cytosine,lupanine,laburinine
Indolizidine	Castanospermum austral Swaninsona species	Castanospermine, swainsoine,pilocarpine
Imidazole /glyoxalline	Pilocarpus species	Pilocarpine
Purine	Coffee,tea,guarana,coca nuts ,cocoa	Caffeine,theophylline,theobromine
Steroidal	Potato shoots,veratrum, schoenocaulon,holarrhena antidysenterica	Solanidine,veratrum,conessine
Terpenoid/Diterpene	Aconitum & delphinium species	Aconitine,aconine, hypoaconitine , atisine,lyctonine
Nonheterocyclic alkaloids/Amino alkaloids	Ephedra ,colchicum species,streptomyces erythreus, solanum paniculactum,taxus brevifolia	Hordenine,ephedrine,colchicines,erythromycin,jurubin,pachysandrine A

3. On the basis of N-atom in amino group

Type of alkaloids	Protoalkaloid	True alkaloid	Pseudo alkaloid
Description	Protoalkaloid do not have a heterocyclic ring with nitrogen atom, they contain quarternary atom with amino group.	True alkaloid containing piperidine or pyridine ring	Biosynthesis not start by amino acid,but other substance
Examples	Ephedrine,Mescaline,chromo Alkaloids,betanines etc.	Pyridine-nicotine Piperidine-coniine Tropane alkaloids etc.	Terpenoid alkaloids-aconitine, Diterpenoid alkaloids-aconitum species, Steroid alkaloids-solanum species,solanine etc.

3. Terpenoids

1. Classification of terpene as per cyclic ring structure-

<table>
<tr><th>1. Monoterpenes</th><th>2. Sesquiterpenes</th><th>3. Diterpenes</th><th>4. Triterpenes</th></tr>
<tr><td rowspan="2">Acyclic monoterpene (open chain structure)-e.g. ocimine,myrcene(hydrocarbon) Geranal ,neral (aldehyde monoterpene) Geraniol,nerol (alcoholic monoterpene)</td><td rowspan="2">Monocyclic sesquiterpene (one ring in structure)- e.g. Zingiberene</td><td>Acyclic diterpene(open chain structure)- e.g.phytol</td><td>Acyclic triterpene(open chain structure)- e.g.squalene</td></tr>
<tr><td>Monocyclicditerpene(one ring in structure)-e.g.d—vitamin A_1</td><td>Tetracyclic triterpene(four ring structure)- e.g.lanosterol,agnosterol</td></tr>
<tr><td rowspan="2">Monocyclic monoterpene(one ring in structure)-e.g.d-phellandrene limolene, terpinene(hydrocarbon) Terpineol,menthol(alcoholic monoterpene) Perillaldehyde,phellandral (aldehyde monoterpene)</td><td rowspan="2">Bicyclicsesquiterpene(two ring in structure)- e.g. Cadalene,santonin</td><td>Bicyclicditerpene(two ring in structure)- e.g. Manool</td><td rowspan="2">Pentacyclic triterpene(five ring structure)-e.g. α-amyrin,ursolic acid,Asiatic acid, β-amyrin,glycyrrhetic acid,lupenol,betullin</td></tr>
<tr><td>Tricyclicditerpene(three ring in structure)- e.g. abietic acid podocarpic acid</td></tr>
</table>

2. Classification of terpene number of isoprene unit-

Class of terpenoid	No. of isoprene units	Molecular formulae
Isoprene unit	1	C_5H_8
Monoterpene	2	$C_{10}H_{16}$
Sesquiterpene	3	$C_{15}H_{24}$
Diterpene	4	$C_{20}H_{32}$
Triterpene	6	$C_{30}H_{48}$
Tetraterpene /carotenoids	8	$C_{40}H_{64}$
Pentaterpene	10	$C_{50}H_{80}$
Polyterpene or rubber material	n	$(C_5H_8)_n$

3. Classification of volatile oil as per functional groups-

Type as per functional group	Examples
Aldehydevolatile oils	Lemon peel, orange peel, cinnamon, citronella oil, lemon-grass, bitter almond
Alcohol volatile oils	Sandalwood, cardamom, coriander, peppermint, orange flower oil, rose oil
Ester volatile oils	Gaultheria ,mustard,lavender
Hydrocarbon volatile oils	Black pepper, turpentine
Ketone volatile oils	Spearmint,buchu,camphor,musk,civet oil
Oxide volatile oils	Chenopodium,eucalyptus
Phenolic ether volatile oils	Anise,fennel,nutmeg
Phenol volatile oils	Clove,thyme,creosote

4. Lipids (fixed oil, fats, and waxes)

4.1 Classification of fixed oils-

On the basis of their ability to absorb oxygen from air:-

Drying oil	Non-drying oil	Semi-drying oil	Animal origin oil
-when exposed to air- undergoes oxidation & form tough and hard film -they usually used in paints and varnishes	-they neither undergoes oxidation nor tough and hard film	-when exposed to air- undergo slightly oxidation & form tough and thin film	Marine animals-cod liver ,shark liver oil, whale oil
Examples - linseed oil Hemp oil Walnut oil Poppy seed oil	Examples - Olive oil Peanut oil Almond oil Croton oil Rice bran oil	Examples- Castor oil Mustard oil Sesame oil Rapeseed oil Cottonseed oil Safflower oil	Terrestrial animals-Lard oil ,Neat-foot oil

4.2 Fatty acids

	Fatty acids	Structural formula	Systemic name	Source
Saturated fatty acids (Non essential)	Acetic acid	CH_3COOH	Ethanoic acid	Food vinegar
	Butyric acid	$CH_3(CH_2)_2COOH$	Butanoic acid	Butter fat
	Caproic acid	$CH_3(CH_2)_4COOH$	Hexanoic acid	Palm kernel oil
	Caprylic acid	$CH_3(CH_2)_6COOH$	Octanoic acid	Coconut oil
	Capric acid	$CH_3(CH_2)_8COOH$	Decanoic acid	Palm oil
	Lauric acid	$CH_3(CH_2)_{10}COOH$	Dodecanoic acid	Coconut oil
	Myristic acid	$CH_3(CH_2)_{12}COOH$	Tetradecanoic acid	Palm oil
	Palmitic acid	$CH_3(CH_2)_{14}COOH$	Hexadecanoic acid	Arachis oil, sesame oil
	Stearic acid	$CH_3(CH_2)_{16}COOH$	Octadecanoic acid	Arachis oil, sesame oil
	Arachidic acid	$CH_3(CH_2)_{18}COOH$	Eicosanoic acid	Mustard, peanut oil
	Behenic acid	$CH_3(CH_2)_{20}COOH$	Docosanoic acid	Mustard, peanut oil, rapeseed oil
Unsaturated fatty acids	**Fatty acids**	**Structural formula**	**No of double bond**	**Source**
	Palmitoleic acid	$C_{15}H_{29}COOH$ (ω7)	One	Cotton seed oil
	Oleic acid	$C_{17}H_{33}COOH$ (ω9)	One	Safflower,corn oil
	Linoleic acid	$C_{17}H_{31}COOH$ (ω6)	Two	Sesame,sunflower oil
	Linolenic acid	$C_{17}H_{29}COOH$ (ω6)	Three	Linseed,soybean oil
	Arachidonic acid	$C_{17}H_{31}COOH$ (ω6)	Four	

5. Resins:

1) Functional groups

Type of resin	Drugs-Examples
Acid resin	Colophony-abietic acid Myrrh –commophoric acid Sandrac-sandracolic acid
Ester resin	Benzoin-benzyl benzoate Storax-cinnamyl cinnamate
Alcohol resin	Balsam of peru- peru resino tannol Gauiaccum resin-Gauic resinol Gurjanbalsam-Gurjuresinol.

2) On basis of Part of resin used

Resin	Cannabis,colophony
Oleo-resin	Ginger,copoiba
Oleo-gum-resin	Asafoetida,myrrh
Balsams	Balsam of peru, balsam of tolu
Glycoresin	Jalap
Resenes	Asafoetida, colophony

6.0 Classification of tannin: -Tannins are classified in two types.

1. Hydrolysable tannin. **2. Condensed tannin.**

Hydrolysable tannins	Condensed tannins
1. They are hydrolysable by acids or enzymes	1. They are more resistant to hydrolysis
2. Chemically they are esters of Phenolic acids	2. They are related to flavonoid pigments.
3. On treatment with acids or enzymes they produce Gallic acid or Ellagic acids.	3. On treatment with acids or enzymes. They decompose into insoluble red compound known as phloba phenes.
4.On dry distillation they are converted into pyrogallols	4. On dry distillation they produce catechol.
5. With iron salts they produce blue colors.	5. With iron salts they produce green colors.
6. Ex. Clove, Myrobalan	6.Ex. Black catechu, Acacia bark.

7.0 Colouring agents

Source of colourant	Colouring constituent	Colour utilize
Colchineal*Dactylopius coccus* (insect)	Carminic acid (anthraquinone C-glycoside)	Purple-red
Annatto seeds of *Bixa orellana*	Bixin (C-24 apocarotenoid), Nor-bixin (for cheese coloration)	Yellow-orange
Saffron*Crocus sativus* dried sigma &styles	Crocin(carotenoid glycoside)	Yellow-orange
Red beet root*Beta vulgaris*	Betalains(indicaxanthin glycoside)	Red
Red rose petals*Rosea gallica*	Anthocyanin	Red
Marigold flowers*Targetes erecta*	Lutein(a carotenoid)Xanthophylls pigment	Yellow-orange
Alkanna*Alkanna tinctoria*	Alkanin (napthoquinone glycoside)	Red
Henna*Lawsonia inermis*	Lawsone(napthoquinone glycoside)	Red
Paprika*Capsicum annum*	Capsanthin,capsorubin(oleo-resin)	Orange
Carrot roots	β-carotenes	Orange
Turmeric*Curcuma longa*	Curcumin	yellow
Monascus*Monascus purperea*	Monascorubin	Red
Caramel	Heating sugar slowly around 170^0C	Dark-brown
Kusum*Carthamus tinctorius*	Carthamin	Dark red
Lycopene *Solanum lycopersicum*	Lycopene (carotene)	Red
Lac dye*Laccifer lacca*	Scarlet pigment present in insects(anthraquinone deravitives)	Red

8. Mineral drugs

Drugs name	Mineral constituent	Uses
Calamine	Zinc oxide and 0.5% of ferric oxide	Skin protectant and astringent,use in itching,pain
Asbestos(amianthus)	Double silicate of calcium and magnesium with little iron montmorillonite	Use in bacterial filters & filtration of caustic alkalies, heat resistant insulator fire proof gloves and clothing
Bentonite (whilkinite)	Zinc oxide and 0.5% of ferric oxide	Emulsifier,suspending agent,use in plasters,lipsticks
Fuellers earth(floridin)	Aluminimum magnesium, silicate(non-plastic)	Cosmetic purposes,dusting powder in different aid,filler for rubber
Chalk	98% of calcium carbonate and 0.5% of magnesium carbonate	Antacid,dietary supplement, tooth powder,dusting powder
Kaolin(china clay ,porcelain clay)	Hydrated aluminimum silicate free from gritty particles, derived from decomposition of the felsper or granite	Light kaolin-Use in enteritis ,heavy kaolin-as apoulutice,Adsorbent,as filter aid
Talc	Hydrated magnesium silicate	As filter aid, lubricant, dusting powder
Kieselguhr (Diatomaceous earth)	Aluminimum silicate	filter aid purpose
Shilagit	Herbo-materials	General tonic,aphrodisiac
Mica	Aluminimum silicate	Refractory bricks,insulation

9. Marine drugs

Class	*Examples*
Cardio vascular active compounds	• **Anthopleurins** (*Anthropleura xanthogrammica*) peptide obtained from coelenterates. • **Laminine** (*Laminaria angustata*) marine algae –basic amino acid with hypertensive effect. • **Eptatretin**(*Eptatretus stoutii*) bronchial heart of hogfish- cardiac stimulant. • **Saxitoxin** (*Saxidomus giganteus*) found in butter clam. • **Spongosine**(*Crypotethia crypta)* extract of Caribbean sponge –nucleoside in nature • **Eledosin**(*Eledone moschata)posterior salivary glands of cephalopod- potent hypotensive* • **ATX-ll**-polypeptides found in sea anemones. • **Autonomium**- isosteric structure like adrenaline and acetylcholine
Cytotoxic compounds	• **Ara-C–** cytosine arabinoside obtained from Caribbean sponges • **Crassin acetate-**(*Pseudoplexaura porosa*) cyclic diterpene from soft corals • **Simularin-**(*Sinularia flexibilis*) from soft coral
Antimicrobial compounds	• **Holotoxin A,B,C-**Sea cucumber **,***Stichopus japonicas***-** antifungal in nature • **Thelpin–**Annelida, *Thelepsus setosus* • **Eunicin–**Gorgonian corals, *Eunica mammosa* • **Acanthelin-** *Acanthella acuta- antitubeculosis agent*

Antibiotic compounds	• **Cycloeudesmol-**Red algae**,***Chondria oppositiclada* • **Variabilin, Ircinin-1-**Sponge**,***Ircinia strobilina*
Anti-inflammatory, antispasmodic compounds	• **Manoalide-non steroidal anti-inflammatory,** *Luffariella variabilis.* • **Tetradotoxin-**liver and ovaries of puffer fishes-strong antispasmodic
Marines toxins	• **Ciguatoxin-**Present in red tide dinoflagellate Gambier discus-toxicus • **Palytoxin-**Present in *Palythoa s*pecies and is most potent coronary vasoconstrictor • **Saxitoxin-** Present in red tide dinoflagellate,*Gonyaulax catenella* • **Brevetoxin-***Ptychodiscus breuis*
Miscellaneous compounds	• **Kainic acid-**Convulsant • **Domoic acid-**Ascaris & pinworm • **Aplysinopsin-**Antidepressant

C. CHEMICAL TEST FOR

ALL PHARMACOGNOSTIC DRUGS

1. Glycosides

Chemical Test	Observation	Conclusion
Modified Born-Trager's Test: Powdered sample+ferric chloride and filtered, to thefiltereate add dilute HCl and organic solvents like Benzene/ether/chloroform. The organic layer isseparated using pipette. To the organic layer add diluteammonia.	Upon standing rose pink colour changes to red	Presence of glycosides eg.aloe emodin,barbaloin
Test For Saponin Glycosides: 1. **Foam test:** Thepowdered drug is shaked well withwater. 2. To the powder add about 80% H_2SO_4.	Foam is develops Shows deep yellowcolour	Presence of saponins Presence of saponins
Antimony Trichloride Test: Solution of the glycoside is heated with antimonytrichloride and trichloroacetic acid**.** **Libermann Burchard Test:** To the powder solution of glycosides is added in $CHCl_3$+aceticanhydride followed by concentrated sulphuric acid	Blue or violet colour is obtain Gives greencolour/bluish green	Presence of cardiacglycosides Presence of cardiacglycosides (Bufenolides,sterol,triterpenoids)
Raymond's Test: A small quantity of glycosides is	Appearance of violetcolor,which	Presence of cardiacglycosides

dissolved in 1ml of about50%ethanol followed by addition of 0.1ml of 1%solution of dinitro benzene in ethanol or methanol. To this solution, 2-3 drops of 20% NaOH solution is added (or) Test solution+hot methanolic alkali.	changesinto blue colour Violet colour isproduce	For activates C21 methylene group Presence of cardiacglycosides
Kedde's Test: Extract the drug with chloroform; evaporate to dryness.Add 1drop of 90% alcohol. Make alkaline with 20%NaOH solution.	Purple colour isdevelops	Presence of cardenolide cardiacglycosides
Baljet's Test: Test solution+picric acid or sodium picrate.	Orange colour isobtain	Presence of digitoxose eg.Digitalis
Xanthohydrol Test: Test sample is heatedwith 0.125% solution of xanthohydrol in glacial acetic acid containing 1% HCl.	Red colour isproduced by deoxy sugars.	Presence of glycosides(for 2-deoxy sugar)
Tollen's Test: Glycoside solution is taken in minute of pyridine andammonial silver nitrate and warmed on water bath.	Formation of silvermirror on the walls oftest tube	Presence of glycosides

Test for Coumarin Glycosides: 1.Alcoholic extract made alkaline. 2. Cover the test tube containing test sample withfilter paper moistened with dilute NaOH sol.Place the covered test tube on water bath forseveral minutes. Remove the pper and expose toUV light.	Shows blue or greenfluorescence The paper shows green fluorescence	Presence of coumaaringlycosides Presence of coumaarin Glycosides
Test for Cyanogentic Glycosides: 1. **Grignard reagent**-Powder of drug is taken in conical flask andmoistens with few drops of water. Moisten apiece of picric acid paper with 5% aq sodiumcarbonate sol. And suspended with by means ofcork in the neck of the flask. Warm gently at about 37^0C **2.** Paper solution of Guaiacum resin in absolute alcoholand allow it to dry on paper. Treat it with$CuSO_4$ solution.	Formation of reddishpurple color Paper turns blue colour	Presence ofcyanogenetic glycosides Presence ofcyanogenetic glycosides
Test for hydroxyl anthrax quinines: Add KOH solution to the samle.	Red colour isproduces	Presence of glycosides

Test for Cyanophoric Glycosides: To the powder in a test tube add little amount of waterand suspend the piece of sodium picrate paper above thedrug. Trapping a top edge between the cork and the tube wall. Allow it to stand for 30minutes. Hydrocholric acidgets evolved.	Picrate paper turns toblack red colour	Presence ofcyanophoric glycosides
Legal Test: The extract of glycoside in pyridine. Sodium nitroprusside or Sodium nitrogenamide solution and NaOH solution (alkaline) are added.	Pink to red colour isdevelops	Presence of cardiacglycosides (cardenolide eg-digitoxose/Digitalis)
Borax test/Schonteten's Test: To a solution (5ml), borax is added and it isheated to dissolve completely. Few drops of the liquid are poured in a test tube filled with water.	Green flourescece isappear	Presence ofanthraquinone glycosides (aloe)
Bromine Test: Thesample added with bromine.	Pale yellow precipitate of tetrabromation	Presence ofanthraquinone glycosides (aloe)
Klunge's or CupraloinTest: Anaqueoussolution of aloe(about 20ml), $CuSO_4$ solution isadded followed by NaCl and 90% alcohol	A purple colour isdevelops	Presence ofisobarbaloin (aloe)

(about10ml).		
Test for Flavonoid Glycosides: To the small quantity of the residue, add lead acetate solution.	Yellow colourprecipitate is formed	Presence of flavonoidglycosides

Note: Cardenolide-steroid has five member lactone ring at position C-17

Bufadienolide-steroid has six member lactone ring at position C-17

2. Akaloids

Chemical Test	Observation	Conclusion
Mayer's test: To small amount of crude drug, add mayer's reagent (potassium mercuric iodide solution)	Gives cream colour or yellow**precipitate**	Presence of alkaloids
Dragendroff's test: To the small amount of crude drug, add dragendroffs reagent (potassium bismuth iodide solution)	Gives reddish brown colour or orange colour	Presence of alkaloids
Wagner's test: To small amount of crude drug, add Wagner's reagent (iodine-potassium iodide solution)	Gives reddish brown colouror brown **precipitate**	Presence of alkaloids
Hager's test:		

To small amount of crude drug, Hager's reagent(saturated solution of picric acid)	Gives yellow**precipitate**	Presence of alkaloids
Van-urk's for indole alkaloids: To a 2-3 ml of solution add p-dimethyl aminobenzaldehyde	Gives blue colour	Presence of Indolealkaloids
Vitali morin test for tropane alkaloids: 2-3ml of samples solution is treated with fuming HNO_3, followed by evaporation to dyness and addition ofmethanolic KOH solution to an acetone solution ofnitrated residue.	White coloration takesplace	Presence of Tropane Alkaloids
Thalleoquin Test for Quinoline Alkaloids: To the powder drug, when Br_2 water and dilute NH_2solution	Gives emerald greencolour	Presence of Quinolinealkaloids

***Reminder-May I dragwags Hag for precipitation with alkaloids.**

3. Tannin

Chemical Test	Observation	Conclusion
Goldbeater's skin test: A small piece of goldbeater's skin is soaked inabout 2% HCI rinsed with distilled water and placed in a	A brown or black colour isproduced on the skin	Presence oftannins

solution oftannin for 5min.The skin piece is washed with distilled water and kept ina solution of $FeSO_4$.		
Gelatin Test: To a solution of tannin (about 1%) aqueous solution of gelatin andNaCl (10%) are added.	A white buff-coloredprecipitate is formed	Presence oftannins
Phenazone Test: A mixture of aqueous extract (5ml) of a dug and sodium andphosphate is heated, cooled and filtered. A solution ofphenazone (about 2%) is added to the filtrate.	A bulky colored precipitateis formed	Presence oftannins
Catechin test (matchstick test): A matchstick is dipped in aqueous plant extract, dried nearburner and moistened with conc HCl.	On warming near a flamethe matchstick wood turnspink or red due to formationof phlorogucinol.	Presence oftannins
Chlorogenic acid test: An extract of clorogenic acid containing drug is treatedwith aqueous NH_3.	A green color is formed onexpsure to air	Presence oftannins
Vanillin-Hydrochoric Acid Test: When the drug is treated with Vanillin-Hydrochoric Acidreagent	Pink or red colour is formed due to formation ofphloroglucinol	Presence oftannins

Gambir-fluroscein test: A mixture of alcoholic extract of pale catechu (about 1g)NaOH solutionand petroleum ether is shakenand kept for sometime.	The petroleum ether layershows green fluorescence	Presence ofgambir (tannin)
A very dilute $FeCl_3$ solution is gradually added to an aqueousextract of hamamels leaves (Hamamelis virginiana)	A blue color is producedwhich is changed to olivegreen as more $FeCl_3$ isadded	Presence oftannins,proanthocyanidins

4. Resins

Chemical Test	Observation	Conclusion
To the extract add 5mL of distilled water	Turbidity is formed	Presence of resins
Alcoholic solution of colophony	It turns blue litmus to red	Presence f diterpenic acid
Alcoholic solution of balsam of tolu	Gives green colour with $FeCl_3$	Presence of toluresino tannols
To a petroleum ether solution ofbenzene, 2-3 drops of H_2SO_4 isadded in a china dish.	Sumatra:reddish brown colour Slam:purple red colour	Presence of resins
0.1g powder in 10mL of$(CH_3CO)_2O$ in	Purple colour	Presence of resins (colophony)

a test-tube and add adrop of concentrated H_2SO_4.		

5. VOLATILE OILS

Chemical Test	Observation	Conclusion
To the section of the drug, add alcoholic solution of sudan lll	Red colour obtained by globules	Presence of volatile oil
To the thin section of the drug, add a drop of tincture alkaline.	Red colour is obtained	Presence of volatile oil

6. FLAVONOIDS

Chemical Test	Observation	Conclusion
Shinoda test: The dry powder extract add about 5-6ml of90% ethanol, few drops pf conc. HCl and small of magnesiumtunings.	Pink colour is observed	Presence of flavonoids

Bate-smith and metcalf test: Sample boiled with 1% HCl	Orange red to blue to red	Presence of flavonoids (anthocyanin,leucoanthocyanin)
To small quantity of residue add leadacetate solution	Yellow colored precipitate is formed	Presence of flavonoids
Add increasing amount of NaOH to the residue	It shows yellow coloration, which decolorizes after addition of acid	Presence of flavonoids

7.Carbohydrates

Chemical Test	Observation	Conclusion
Fehling's solution test: The substance (0.5g) is treated with dilute HCl. Thereaction mixture is neutralized by addition ofNaOH solution and then fehling's solutions 1 & 2 areadded.	Red precipitate of cuprous oxide is produced on heating	Presence of carbohydrates
Molisch test: A solution of carbohydrate is prepared in watercontaining α-naphthol concentrated H_2SO_4isadded along the side of the test tube	A purple ring is formed onthe junction below upperlayer	Presence of carbohydrates

Osazone formulation: A sugar is heated with phenyl hydrazinehydrochloride, sodium acetate and acetic acid	Formulation of yellow crystals of osazone	Presence of carbohydrates
Resorcinol test for ketones (seliwanoff's test): A crystal of resorcinol is added o the solutionand heated with equal volume of concentratedHCl.	Pink colour is produced	Presence of carbohydrates (Differentiate between of monosaccharides and in case of ketonesfructose, honey,hydrolyzed insulin)
Test for pentoses: A solution of materials is heated with equalvolume of HCl containing a littlepholoroglucinol	Red colour is formed	Red colour is formed
Killer-kilani test for deoxysugars: A deoxy sugar is dissolved in acetic acidcontaining a trace of $FeCl_3$ and transferred to the surface of concentrated H_2SO_4	A reddish-brown color isformed at the junction whichturns blue latter on	Presence of carbohydrats (deoxysugars)
Furfural test: The sample is heated in a test tube with a dropof syrupy phosphoric acid to make it intofurfural. A disk of filter paper moistened with adrop of	A pink or red stain appears on the reagent paper	A pink or red stain appears on the reagent paper

about 10% solution of aniline in 10% aceticacid is placed over the mouth of the test tube.The bottom of the test tube is heated for one minute.		
Benedict's test: To the solution, add benedict's reagent andheated on water bath	Solution appears green,yellow or red deendingon concentration of reducingsugar	Presence of carbohydrates
Lead sulphide test: To the alkaline solution of sulphur containingproteins add lead acetate	A black precipitate is formed	Presence of proteins
Heat coagulation test: Heat the test solution in a boiling water bath.	Proteins get precipitated	Presence f proteins

8. FIXED OILS

Chemical Test	Observation	Conclusion
Halphen's test/Bevan's test: 3-4ml of oil is mixed with 1ml of amyl alcohol and1ml of about 1% solution of sulphur in CS_2 for 10minutes in a water bath	Red color is formed (failswhen heated to over 200^0C)	Presence of cotton seedoil

Badouin's test: The oil is shaken with half its volume ofconcentrated HCl containing about 1% of sucrose	Development of pink colour	Presence of sesamol
BP Test for sesamol: The oil is shaken with a furfural sol in aceticanhydride in the presence of H_2SO_4 (mentioned inBP)	Development of bluish-greencolor	Presence of sesamol
Test for persic oil:(*prunus armeniaca*) The oil is shaken with HNO_3	Produces color	Presence of persic oil
Confirmatory test for fixed oil & fat **Using sodium hydrogen sulphate:** 4-6drops oils in a test tube add a-pinch of sodium hydrogen sulphate. **Using sodium hydroxide –** 4-6 drops of oils + 1 ml of about 1 % $CuSO_4$ solution and add 5 drop of 10 % NaOH solution	Pungent odour is produced Blue solution is obtained	Glycerine is present Glycerine is present

9. OTHER GROUPS

Chemical Test	Observation	Conclusion
Test for insulin: To the test solution add solution of α-naphthol andH_2SO_4	Brownish red colour isproduced	Presence of insulin

Test for steroid/Salkowaski test: Extract of drug in$CHCl_3$ + concentrated H_2SO_4	Red colour	Steroids
Test for mucilage: 1. To the test solution add ruthenium red	Pink color is obtained	Presence of mucilage
2. To the test solution add thionine (Lauth's violet)solutionand after 12-15 minutes wash with alcohol	violet red	Presence of mucilage
Test for waxes: To the test solution, add alcoholic alkali solution	Waxes get saponified	Presence of waxes

Name of test	Performed for drug
Baljet test	Cardiac glycosides (Digitalis)
Barfoed's test	Carbohydrates
Biuret test	Proteins
Borax test	Aloes
Borntrager's test	Anthraquinone glycosides (Senna)
Boudouin's test	Sesame oil
Carr-price reaction	Vitamin A
Claud's test	Yellow bees wax
CupraloinTest/Klunge's test	Aloe (isobarbaloin)
Fiehe's test	Invert sugar
Frohdes test	Ipecac alkaloids
Fluorescence test	Pale catechu
Foam test	Saponins
Gold beater skin test	Tannins
Grignard reaction	Cyanogenetic glycosides
Haemolysis test	Saponins
Halphen test	Cholesterol in hydrous wool fat
Hulphen's test	Cotton seed oil
Kedde's test	Cardiac glycosides
Keller Killiani test	Digitoxose
Klunge's/Cupraloin test	Aloes
Kreis test	Rancidity of fats and oils
Legal test	Cardiac glycoside (Digitalis)
Libermann-Buchard test	Steroids

Match-stick test	Black catechu
Modified Van-urk’s test	Indole alkaloids
Molisch’s test	Carbohydrates
Murexide test	Caffeine
Mandelin reagent	Nux vomica
Ninhydrin test	Amino acids
Nitrous/Nitric acid test	Aloes
Noller’s test	Volatile oils
Pesez test	Cardiac glycosides
Phenazone test	Tannins
Raymond’s test	Cardiac glycosides
Saponification test	Fixed oils and fats
Schilber’s test	Alkaloids
Spot test	Fixed oils and fats
Thalleoquin’s test	Cinchona
Tilden’s test	Volatile oils
Van-urk’s test	Ergot alkaloids
Vitali-Morin reaction	Tropane alkaloids (Belladonna)
Umbelliferone test	Asafoetida

D. CLASSIFICATION OF DRUGS ACCORDING TO PHARMACOLOGICAL USES

1.Drugs used on nervous system (Brain)					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**Pharmacological Use**
Hyoscymus	Indian Henbane, Paarsika-yavaani	*Hyoscyamus niger,* Solanaceae	Leaf and flowering top	Tropane alkaloids hyoscyamine,and hyoscine	Sedative. Narcotic drug. Used for convulsions.
Belladonna	Belladonna, Deadly Nightshade leaf,Suuchi	*Atropa belladonna,* Solanaceae	Dried leaves, flowering top	Atropine,(d,l-hyoscyamine), l- scopalomine,hyoscine(atropine is changed to l-hyoscyamineby anenzyme when the plant isdry,**thus the plant ismore active when dry)**starch, sugar, mucilage	Antispasmodic, parasympathetic, depressant, vasoconstrictor, smooth muscle inhibitor, Bronchodilator.
Stromonium	Thornapple leaves	*Datura Stromonium* Solanaceae	Dried leaves, flowering top	Atropine, l-hyoscyamine, hyoscine	Anticholinergic ,mydriatic,sickness, control motion
Aconite	Indianaconite, Monkshood	*Aconitum ferox , Aconitum napellus,* Ranunculaceae	Tuber	Aconitine or nepalline, hypaconitine,neopelline, neoline,sparteine	Narcotic, sedative, antileprotic, anti-inflammatory. Extremely poisonous.

					Analgesis,cardiac depressant,rheumatism Use as liniment in neuralgia,sciatica
Ashwagandha	Winter Cherry, Asgandh, Gandharvagandhaa	*Withania ashwagandha,* (cultivated variety) *W.somnifera*, Solanaceae	Root	Alkaloids – withanine, withananine, withananinine pseudowithanine,somnine,somniferine,somniferinine. steroidal lactones – withanolide	Anti-inflammatory drug for swellingstumours, rheumatismand as asedative and hypnoticin anxiety neurosis
Ephedra	Ma-Huang	*Ephedra sinica, E.Gerardiana* Ephedraceae	Dried stem	Alkaloids ephedrine, phytosterols,pseudoephdrine (alkaloidal amine), tannin,saponin, flavone, oil	Sympathomimetic , Antiasthmatic, diaphoretic, stimulant, decongestant, expectorant ,
Opium	Raw opium, Ahiphena, Aaphuuka,	*Papaver somniferum,* Papaveraceae	Dried poppy juice	Isoquinoline alkaloids , morphine, narcotine, codeine, papaverine and thebaine.	Narcotic,use in diarrhea ,sedative, hypnotic,analgesic antispasmodic.

Cannabis	Indian Hemp, Bhangaa, Indraasana	*Cannabis sativa,* Cannabinaceae	Dried juice leaves of	Cannabisconsist of various classes—cannabinoids, cannabispirans,and various alkaloids,of which -9-tetrahydrocannabinol (THC) is important	hallucinogenic, hypnotic, sedative, analgesic, antiinflammatory, and as an antiemetic in cancer chemotherapy.
Nux vomica	Semina Strychni	*Strychnos Nux-vomica,* Loganiaceae	Seeds	Strychnine, brucine, caffeotannic acid, igasuric acid, loganin	CNS stimulant ,bitter stomachic andtonic
Shankhpushpi	Shivakrandi	*Evolvulus alsinoides,* Convolvulaceae	Aqueous extract of whole plant	Evolvine,beta-sitosterol, stearic,oleic, linoleic acids, pentatriacontane and triacontane	Brain tonic, an aid inconception, astringent, antidysenteric.
Shatavari	Shatmuli, Atirasaa, Shatpadi	*Asparagus racemosus* Asparagaceae	Dried root and leaves	Saponins-shatavarins I–IV.shatavarin IV is a glycosideof sarsasapogenin,sitosterol etc.	Uses like galactagogue, for disorders of femalegenitourinary tract,ulcer-healing agent,intestinal disinfectantand astringent in diarrhea, nervine tonicand in sexual

					debilityfor spermatogenesis
Hypercium/ St.Jonhs wort	Goat weed	*Hypercium perforatum Hypericaceae*	Dried aerial part	**Hyperforin**, hypericin	**Antidepressant**
Duboisia	Cork- tree	*Duboisia myopoides Solanaceae*	Dried leaves	Scopalamine	Anticholinergic
Hops	Humulus	*Humulus lupulus Cannabinaceae*	Dried female flowers	Humulone	Sedative,spasmolytic

2.Laxatives					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**Pharmacological Use**
Aloe	Curacao Aloe, Barbados Aloe, Indian Aloe, Kummari	*Aloe barbadensis, A. Indica, A. Vera,* Liliaceae	Dried Juice of leaves	Anthraquinoneglycosides – aloin,barbaloin,aloe -emodin acemannan,glyburide,	Purgative (causes griping),gel— topicallyemollient, antiinflammatory, antimicrobial -used for wound healing, sunburn.

Rhubarb	Rhubarb	*Rheum officinale, Rheum Palmatum,* Polygonaceae	Rhizome , root	Chrysophanol,chrysophanic acid, emodin, aporetin, phaeoretin, erythroretin, rheumic acid, andrheotannic acid,	Purgative,stomachic, astringent, used forconstipation andatonic dyspepsia
Ispaghula	Blond Psyllium, Isabgol, Indian Psyllium, Spogel	*Plantago ovata,* Plantaginaceae	Seed, husk	Essentialoils with alphapinene,dipentene, linalool,cineol, methyl salicylate,decyl aldehyde, eugenol,anisaldehyde, bergapten,indole,salicylic andbenzoic acids as majorconstituents	Seed shows astringent property where seed coat have demulcent activity
Senna	Alexandrian Senna, Tinnevelly Senna(Indian senna)	Cassia acutifolia, Cassia angustifolia, Leguminosae	Fruit (pods), leaves	Sennoside A and B, Rhein, aloeemodin,kaempferol, isormamnetin, both freeand as glucosides,together with mycricylalcohol the purgativeprinciples are mainlyrecognized to anthraquinonederivatives and theirglucosides.	Purgative (free from astringent action of rhubarb type herbs, but causes gripe), distentionof stomach, vomitingand hiccups

3.Cardiotonic					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**

Digitalis	Grecian Foxglove	*Digitalis lanata, Digitalis purpurea,* Scrophulariaceae	Leaves	Cardiac glycosides foundthrought entire plant	Cardiac stimulant Diuretic,emetic
Arjuna	Arjun	*Terminalia arjuna* Combreataceae	Bark	Triterpenoids saponin,arjunolic acid,arjunolone	Cardiotonic
Indian Squill	Jangli pyas,sea onion	*Urgenia indica* Liliaceae	Dried bulbs	About 0.3% cardiac glycoside Scillaren A and B, proscillaren, mucilage, ca oxalate crystals	Cardiotonic, Stimulant,emetic, expectorant
Thevetia	Yellowo-leander, lucky nut tree	*Thevetia nerifolia Apocynaceae*	Dried seeds	Thevetin ,peruvoside Nerifolin,thevenerin, Peruvosidic acid	Cardiotonic Poisonous plant
Strophanthus		*Strophanthus kombe Apocynaceae*	Dried ripe seeds	Strophanthin, cyamarin k-strophanthoside, trigonelline	Cardiotonic Parenterally given because less oral absorption

4.Carminative and gatric regulator					
Name of	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**

plant					
Coriander	Dhaanyaka, Kustumburu, Dhanika	*Coriandrum sativum,* Umbelliferae	Fruits	Containsvolatile oil, coriandrol, coriandryl acetate, L-borneol, delta-linalool,α-pinene and terpinine. It also containsflavonoids, coumarins,phthalides and phenolicacids (including caffeic and chlorogenic)	Stimulant,aromatic stomachic,carminative, antispasmodic,also hypoglycaemic and anti-inflammatory. Oil use—bactericidal, larvicidal.
Fennel	Madhurikaa, Madhuraa, Shatapushpaa	*Foeniculum vulgare,* Umbelliferae	Fruits	fennel seed contain volatileoils anethole, fenchone andmethylchavicol,flavonoids, coumarins(including bergapten) and sterols	Carminative, stomachic, antispasmodic, galactagogue, diuretic.
Ajowan	Ammi, Carum	*Trachyspermum ammi, Carum copticum,* Umbelliferae	Fruits, Leaf juice Root	It contain a volatile oil, p-cymene phenolic glucoside, constituents of the ajowan oil are the phenols,mainly thymol and somecarvacrol.	Antidiarrhoeal, stimulant. anthelmintic,antifungal carminative,diuretic, febrifuge,antispasmodic
Cardamom	Sukshmailaa.	*Elettaria cardamomum,* Zingiberaceae	Seed	Main constituents are, 1,8-cineole and αterpinylacetate, withlimonene, α-terpineol,sabinene and linalool	Seeduse- carminative antiemetic, stomachic, anti-gripe,antiasthmatic, oiluse - antispasmodic, Antiseptic.

Ginger	Aardraka, (Fresh rhizome), Shunthi, Naagara.(Dried rhizome)	*Zingiber officinale,* Zingiberaceae	Rhizome	Starch about 40%, fat, fibre ontains anessential oil (monoterpene)geranial and neral; sesquiterpenes mainly β sesquiphellandrene, betabisabolene; Aroma by curcumene and α-zingiberene; Pungent principles, consisting of gingerols,shogaols and relatedphenolic ketonederivatives.	Antiemetic, antiflatulent, hypocholesterolaemic, anti-inflammatory, antispasmodic, expectorant, circulatory stimulant, diaphoretic, increases bioavailability of prescription drugs.
Black pepper	Black Pepper , Maricha, Vellaja	*Piper nigrum,* Piperaceae	Fruits	Thefruit contain piperine,piperatine and piperidine, piperyline, piperoleinsA and B	Stimulant,carminative, diuretic, anticholerin, antiasthmatic. used infevers, dyspepsia, flatulence, indigestion, and as mucous membrane andgastro-intestinal stimulant.
Asafoetida	Devil's Dung,	*Ferula assafoetida Ferula rubricaulis, Ferula foetida ,* Umbelliferae	Oleo gum resin obtained by incising the living rhizomes and roots	Resinscontains mainly asaresionotannolsand their esters;farnesiferols,ferulic acid and other	Carminative,stimulates theintestinal andrespiratory tracts andthe nervous system.

				acids,gum,volatile oil and secondary propanylisobutyl disulphide, sulphatedterpenes, pinene, cadineneand vanillin;sesquiterpenoid-coumarins. Ferulic acid with HCI-umbellic acid-loose water gets umbelliferone.	
Nutmeg	Jaatiphala, Myristica, Nux Moschata	*Myristica fragrans* Myristicaceae	Dried kernels of the seeds	Containsmyristicin,elimicin, saffrole,licarin-b and dehydrodiisoeugenol,eugenol and isoeugenol,oleic,lauric and other acids.	Nutmeg is used in flatulency, diarrhoea, nausea and vomiting. mace is used in rheumatism, chronic bowel complaints and asthma.
Cinnamon	Ceylon Cinnamon, Kalmi-Dalchini	*Cinnamomum zeylanicum, Cinnamomum loureirii, Cinnamomum burmanii* Lauraceae	Dried inner bark Of shoots	About 60-70% cinnamaldehyde, alphaandbeta-pinene, pcymeneand limonene, linalool,eugenol.	Leaf use-carminative, antidiarrhoeal, spasmolytic, antirheumatic, hypoglycaemic. essential oil use—fungicidal.
Clove	Lavanga, Devakusum, Devapushpa,	*Syzygium aromaticum,* Caryophyllus	Clove (dried Flowerbud)	Eugenin,triterpene acids,crategolic acid,steroid glucosides.	Carminative, antiinflammatory, antibacterial.

		aromaticus,, Eugenia caryophyllata, Myrtaceae		Eugenol about 70-90% a maincomponent of the oil,caryophyllenes	Flower buds use—antiemetic, stimulant,carminative, used indyspepsia, gastric irritation. Oil use—employed as a localanalgesic for hypersensitive dentlines and carious cavaties

5.Antihypertensive

Name of plant	Synonyms	Biological name	Plant part used	Chemical constituent	PharmacologicalUse
Rauwolfia	Snake root, Sarpgandha	*Rauwolfia serpentina,* Apocynaceae	Root	Indole alkaloids ,antihypertensive alkaloids - reserpine (other chemical like alseroxylone, corganthine,voxinil, rescinamine) antiarrhythmic alkaloids -ajmaline	Anti-arrhythmic anti-hypertensive
Hesperidin	Cirantin	*Citrus aurantium* Rutaceae	Ripe and unripe fruits	Hesperidin(Flavanone glycosides)	Hypertension, treatment of cardiovascular

					,carminative
Colenol	Coleus	*Coleus forskohli*		Colenol/forskolin	Hypotensive

6.Acting on cold and cough (Antussive)					
Name of plant	**Others name**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Adulsa	Malabar-nut, Vasaka, Adulsa	*Adhatoda zeylanica, Adhatoda vasica,* Acanthaceae	Leaves along with tender stem	Quinazoline alkaloids - vasicoline, adhatodine, vasicolinone and vasicinol,vasicinone,deoxyvasicinone, deoxyvasicine	Cold , cough, whooping-cough andchronic bronchitis andasthma as sedativeexpectorant
Tolu Balsam	Balsamum Tolutanum	*Toluifera Balsamum,* Leguminosae	Balsam of the Plant	Toluene, benzylic benzoate,benzylic cinnamate,benzoic acid, cinnamicacid, resins	Expectorant
Tulsi	Holy Basil, Sacred Basil,	*Ocimum Sanctum,* Labiatae	Seed, leaves	Chief components of theessential oil are eugenol,carvacrol, nerol andeugenolmethylether. Leaves contain been reported to have ursolicacid, apigenin,luteolin, apigenin-7-Oglucuronide, luteolin-7-O-glucuronide,orientin	Expectorant, carminative, stomachic, antispasmodic, antiasthmatic, antirheumatic, stimulant, antipyretic and

				and molludistin.	diaphoretic,used ingenitourinary diseases.

7.Antirheumatic					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Guggul	Guggulu	*Commiphora mukul,* Burseraceae	Gum , resin	Guggolestrones E, Z.	Anti-cholesterol, antirhumatic
Colchium	Meadow saffron seed, colchicum	*Colchicum autumnale,* Liliaceae	Seed and the corn ofcolchicum	Colchicines	Antirhumatic, as emetic in poisioning

8.Antitumor					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Vinca	Periwinkle, amaranth	*Catharanthus roseus,* Apocynaceae	Whole plant extract	Indole alkaloids (vincamine, vinblastine) tannins	Anticancer(hodgkins disease, Leukemia) circulatory stimulant (increase blood flowto the brain) Hypotensive

Taxus	Himaliyan yew	*Taxus baccata, Taxus brevifolia* Taxaceae	Dried leaves, bark, & roots	Taxol,cephalomannine,10-deacetyl baccatin lll	Refractory ovarian cancer
Camptotheca	Cancer tree	*Camptotheca acuminatal,* Nyssaceae	Dried stem wood	Camptothecin	Antitumour
Podophyllum	May apple American mandrake	*Podophyllum peltatum Berberidaceae*	Rhizome and leaves	Podophyllotoxin or podophyllin,etoposide, tenoposide	Antitumour,emetic, cathartic

9.Antileprotic					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Chaulmoogra oil	Taraktogenos. Chaulmoogra.	*Taraktogenos Kurzii, Hydnocarpus wightiana, Achariaceae*	Seed oil	Hydnocapic acid primarily constituent for antimicrobial activity, Fixed oil, about 25-50 % containspalmitin, linolein, but mainlyglycerides of two fattyacids— chaulmoogric, and hydnocarpic, starch,proteins, tannin,colouring	Leprosy

				matter	

10.Antidiabetic					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Pterocarpous	Gummi (Resina) , Vengay, Bastard	*Pterocarpus Marsupium,* Papilionaceae/ Fabaceae	Bark juice	Kino-tannic acid, kino-red, kinoin, pyrocatechin (pyrocatechuic acid, catechol),	Diabetes ,diarrhea, pyrosis, menorrhagia, dysentery, leucorrhea,ulcers,
Gymnema	Australian Cow Plant,Ipecacuanha (Indian), Meshashringi, Meshavishaanikaa,	*Gymnema sylvestre,* Asclepiadaceae	Dried Leaves or whole plant	Gymnemagenin, gymnemic acid 1-4	Oral antidiabetic. excitationthe heart &circulatorysystem, stimulates theuterus. used in parageusia and furunculosis.whole diureticemetic, expectorant,astringent, stomachic.
Momordica	Karela, Bitter gourd	*Momocardia charantia* Cucurbitaceae	Freshly green fruits	Charantin(fruits & leaves),polypeptide steroidal saponin-antidiabetic, momordicin(fruits),	Antidiabetic,stomachic, tonic

				ascorbic acid	

11.Diuretics					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Punarnava	Horse-purslane, Hogweed, Rakta-Punarnavaa, Shophaghni.	*Boerhavia diffusa,* Nyctaginaceae	Whole plant	Xanthone, β -ecdysone. flavonoid, arbinofuranoside	Diuretic,anti-inflammatory,antiarthritic, spasmolytic,antibacterial(used for inflammatoryrenal diseases,nephritic syndrome,in cases of ascitesensuing fromearly cirrhosis of liverand chronicperitonitis, dropsyrelated withchronic bright'sdiseases
Gokhru	**Puncture vine** Kshudra (Laghu) Swaadukantaka *Pedalium murex (**Bara gokhru**)-dysuria,gonorrhoea	*Tribulus terrestris,* Zygophyllaceae	Ripen fruit, leaves, root.	Saponins,which under hydrolysis yield: **Sapogenins (leaves & root)**-diosgenin,gitogenin, chlorogenin,ruscogenin **Flavonoids (leaves & fruits)**-rutin, quercetin,kaempferol, kaempferol-3-glucoside	Diuretic,tdemulcent,anti-inflammatory,anabolic,spasmolytic, musclerelaxant,hypotensive, hypoglycaemic. Haemostatic,stomachic,

				and rutinoside, tribuloside havebeen remote fromtheleaves and fruits. Theseeds include carbolinealkaloids— harmane, harmine and harmol.	

12.Antidysenterics					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Ipecacuanha	Ipecacuanha. Ipecac	*Cephaelis ipecacuanha,* Rubiacae	Dried root	Emetine, cephaeline, cephaelic acid, epecacuanhic acid, tannicacid, volatile oil, starch,gum	Antidysenterics, emetic

13.Antiseptic and disinfectant					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Benzoin	Sumatra benzoin	*Styrax benzoin,* Styraceoe	Resinous exudates	Benzaldehyde, vanillin (about 1 %),	Antiseptic and disinfectant

			in use by injury to the tree	phenylpropyl cinnamate, styrol, and styracin, cinnamic acid, benzoic acid	
Myrrh	African Myrrh, Myrrha, Bitter Myrrh,	*Commiphora myrrha*, Burseraceae	Oleo-gum-resin	The gum contains acidicpolysaccharides, volatile oilincluding otherconstituents, eugenol, monoterpenes and furano-sequiterpenes.	Antiseptic anddisinfectant
Neem	Limb, Nila	*Azadirachta indica Melia Azadirachta,* Meliaceae	Leaves, bark, (oil from seed)	Amorphous resin, a crystalline, bitter alkaloid(margosine), margosiaacid, a crystallinesubstance and tannin	Insect repellant, bittertonic, antiseptic and disinfectant
Curcuma	Turmeric, haridra, haldi, halad.	*Curcuma Longa,* Zingiberaceae	Dried rhizome	Containsvolatile oil about 5-10%, turmerones which aresesquiterpene, ketones, Curcumin, Curcuminoids,bitter principles, sugars,starch, resin.	Antiseptic and disinfectant, stomachic, aromatic, stimulant; dyspepsia, flatulence

14.Antimalarial					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Cinchona	Cinchona bark, Jesuit bark.	*Calisaya Weddell, Cinchona officinalis,* Rubiaceae	Quills or in curved pieces of bark	Quinine, quinidine, cinchonine,cinchonidine, quinamine, quinic acid, quinovic acid	Malaria

15.Oxytocics					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Ergot	Ergot of rye, Ergota	*Claviceps purpurea* Clavicititaceae	Dried sclerotium	Alkaloids,ergotamine ,ergometrine ,ergotic acid,ergotinic acid, sclerotic	Oxytocic, hemostatic, motor excitant

16.Liver disorder					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Picrorhiza	Katukaa, Katurohini, Kutki.	*Picrorhiza kurroa,* Scrophulariaceae	Root	Glycosidal bitterprinciple, kutkin found to bea mixture of two	In jaundice, intermittent fever, dyspnoea and

				iridoidglycosides, picroside l and kutkoside alsoobtained were D-mannitol,kutkiol, kutkisteroland a ketone (identical with apocynin).	skin diseases
Kalmegh	Andrographis	*Andrographis paniculata* Family-Acanthaceae	Dried leaves and tender shoots	Andrographolide	Bitter tonic, anthelmentic, hepatoprotective
Silymarin	Milk thistle	*Silybus marianum* Asteraceae/Compositae	Ripe seed	Silybin,silycrystin	Liver disorders

17.Use in gout					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**PharmacologicalUse**
Colchium	Meadow saffron seed	*Colchicum autumnale* Liliaceae	Seed and corn	Colchicine,demecolcine	Use in treatment for gout
Gloriosa	Glory lily	*Gloriosa superb* Liliaceae	Dried rhizome and roots	Colchicin	In Gout ,cancer
18.Immunomodulator and adaptogens					
Name of plant	**Synonyms**	**Biological name**	**Plant part used**	**Chemical constituent**	**Pharmacological Use**

Gudchi	Giloy	*Tinospora cardifolia* Menispermaceae	Seed	Syringin and cordiol	Immunodulator
Echinacea	Black sampson	*Echinacea purpurea* Asteraceae	Dried part	Polysaccharide	Immunodulator
Ashwagandha	Asgandh	*Withania somnifera* Solanaceae	Dried root and stem	Sitoindoside VII and VIII	Immunodulator, antistress

E. MICROSCOPY OF CRUDE DRUGS

1. **STOMATA:** Two kidneys shaped guard cells having chloroplast, covering by subsidary cells i.e epidermal cell

Types of stomata (Depend on arrangement of subsidary cell)

Moss (united guard cell) **Gymnospermous** (oval& partial) **Gramineous**(dumbbellshape) **Dicotyledonous**(Bean shape)

Dicotylendonoustype	
Paracytic or rubiaceous or parallel-celled stomata	Two guard cells covered by two subsidary cells, parallel to axis e.g.cocca,senna leaves
Diacytic or caryophyllaceous or cross-celled stomata	Two guard cell covered by two subsidary cells, arrangement in **right angle** to the stoma e.g. **v**asaka,**p**eppermint,**s**pearmint*
Anisocytic or **cru**ciferous or unequal-celled stomata	Two guard cells covered by three subsidery cell,in which one is large than other two subsidery cells e.g.**B**elladonna,**D**atura,**S**tramonium*
Anomocytic or ranunculaceous or irregular-celled stomata	Stoma is surrounded by varying number of subsidery cells resembling other epidermal cell e.g.buchu,lobelia,digitalis
Actinocytic or radiate-celled stomata	Two guard cells are surrounded by a cirlce of radiating subsidery cells e.g.Bucchancinia,lanzan spreng

***Anisocytic reminder-Anil cumble BDS** doctor

***Diacytic reminder**- **DiVaP**ep**S**i drinks at 90^0C

2. TRICHOME: TQ this is tubular or glandular outgrowth of epidermal cells

Covering trichomes/non glandular	
Unicellular*	**N**ux vomica,**s**trophanthus (lignified trichomes), **s**enna ,**c**annabis,lobelia,tea
Multicellular-unbrached	**1.Uniseriate-**datura,stramonium,digitalis,belladonna
	2.Biserate-calendula officinalis
	3.Multiserate-Male fern
Multicellular-brached	**1.Stellate** (radiating like) **-**Hammamelis
	2.Peltate (shield like) **-**Eleagnus,croton
	3.Candelabra (chandalier like) **-**Verbascum
	4.T-shaped- pyrethrum
Glandular trichomes	
Unicellular glandular trichomes	Piper,vasaka
Multicellular glandular trichomes	Digitalis,bellodona,mentha,cannabis(compositae and labitae family)
Hydathode (piper betal,london pride) *This is organ for absorption or secretion of water	

* **Unicellular reminder-Tea with lobelia on NSSC canteen**

* **Uniseriate reminder- uni**que **stra**nger **dig**nesh **dat**ewith **belladonna**

3. Calcium oxalate crystals or calciphytoliths:

$CaC_2O_4.3H_2O$(tetragonal)**, $CaC_2O_4.H_2O$** (monoclinic)**–**

Type of Calcium oxalate crystals	**Examples**
Prisms or pseudo raphides or styloids or cubical	Senna,hyoscyamous,quassia,liquorice,cascara,quillalia, henbane,Rauwolfia,cascara
Rosettes or cluster crystals (aggregation of crystals)	Rhubarb,stramonium,cascara,senna,clove,jalap,buchu, podophyllum,ipomea,strophanthus,coca,eucalyptus,wild cherry,arjuna
Acicular crystals (long slender,pointed,**bundles**)	Ipecacuanha,squill,veratrum,sarsaparilla,angustura,phytolacca ***Raphides/Scatter needle***-gentian,cinnamon
Microcrystals or sandy crystals (minutes in structures)	Hyoscyamus-tetragonal microspheroids, Henbane- microspheroids Belladonna – monoclinic microspheroids Cinchona-small prisms Capsicum
*__Calciphytoliths__Good diagnostic tool for identification and detection of adulterant in crude drugs *Druse is a group of crystals found in Allium,vitis,morus	

4. EPIDERMIS:

Class of Epidermis	Examples
Straight walled polygonal	Senna, Coca
Beaded type	Digitalis
Wavy type	Hyoscyamus
Wavy walled with striated cuticle	Belladonna
Papillose type	Dog senna, Coca, Stigma of pyrethrum

5. VASCULAR BUNDLES:

Type of vascular bundle	**Examples**
Open collateral	Podophyllum, Valerian
Closed collateral	Senna, Ginger, Vasaka

6. Microscopic evaluation by (Leaf constants)

- **Stomatal number.** : It isaverage no. of stomata present in 1 sq. millimeter of epidermis. The total no is constant for a given **drug.**

Ex.Drug Stomatal no. *Datura stramonium*-87, *Datura innoxia* -141.

- **Stomatal Index**: - Itis the percentage which the number of stomata form to the total no. of epidermal cells, each stoma being counted as one cell. Stomatal index is useful for evaluation of**leaf drug**

I = S *100/(E+ S)I = Stomatal Index, S = No of stomata, E = No of epidermal cell in same area.

Drug	**Stomatal index**
Indian senna	17 to 20
Alexandrian senna	10.8 to 12.6

- **Vein islet number**: - Islet is area surrounded by veins "It is the no. of vein islets per sq.mm of leaf surface. It is constant for given species of drug It is used for evaluation of **crude drug**

Drug	**Vein islet no**
Indian senna	19 – 23
Alexandrian senna	25 – 30

- **Veinterminationnumber:-** It is number of veinilet termination per sq.mm of the leaf surface midway between the midrib and margin

- **Palisade ratio:** - It is the average no of palisade cells beneath one epidermal cell using four continues epidermal cells for the count. It is constant for given leaf. Used for evaluation of **leaf**.

Digitalis purpurea	*3.7*	*to 4.2*
Datura stramonium	*4*	*to 7*
Atropa belladonna	*6*	*to 10*

7. Plant harmones:

Plant growth promoters	
Plant harmones (location)	**Plant harmone function**
Auxins: Seed embryo,young leaves and apical buds meristem (Eg.Indole acetic acid ,4-chloro-indole-3 acetic acid,2-phenylacetic acid,indole-3-butyric acid Synthetic auxins:1-napthaleneacetic acid, 2,4-dichlorophenoxyacetic acid)	• Stimulation of cell elongation,cell division in cambium,lateral root development • delaying leaf senescence • inhibition of lateral bud,root growth • inhibition or promotion of fruit • delaying fruit ripening • stimulates flower parts
Cytokinins: Synthesized in roots,and then transported to other plant parts Eg.Zeatin,kinetin,zeatin-riboside,isopentyl adenine,6-Benzyl adenine	• development of embryo during seed development • inhibition of senescence • stimulation of cell division,growth of lateral buds and apical dominance • stimulation of shoot initiation • leaf cell enlargment that stimulate leaf expansion • Enhancement of stomatal opening • Stimulate stem elongation
Gibberellins(GA_1 to GA_7): Meristem of apical buds,roots,young leaves,embryo	• Promoting vegetative and fruit growth • Development of seedless fruits

(discover first by *gibberella fujikuroi*)	• Delaying senenscence in leaves and citrus fruits • Can end seed dormancy in plants that require light for induction or germination • Increase in the size of leaves
Plant growth modulator	
Ethylene : Ripening fruits,flowers,stems ,roots,tuber and seeds	• Stimulation of fruit ripening • Leaf and fruit abscission • Stimulation of shoot and root growth along with differentiation • Stimulation of flower opening,flower and leaf senescence
Abscisic acid	• Stimulation of closing of stomata • Inhibition of shoot growth • Release of dormancy state • Inducing seeds for synthesizing storage of proteins

8. Difference between organised and unorganised drugs

Organiseddrugs	Unorganised drugs
1.These are organs of plants or animals and are made of cells or definite structure,like flowers, seeds,fruits,insects,etc.	1.These are derived from parts of plants or animal by some process of extraction and followed by purification,if necessary eg.juices, extracts,resin,etc.
2.Botanical or zoological terminolgy can be used to describe these drugs	2.Such terminolgy is inadequate to describe them,but one has to look for their physical character,such as the solubility in various solvents,density,optical rotation,refractive index,etc.as per requirement
3.Thes are solid in nature	3.These are solid,semiolid or liquids in nature eg.oils,gums and balsams
4.Microscopic characters are one of the important crieteria for the identification of organised drugs *Examples*-Clove,ephedra,colchineal,jalap, datura,cinchona	4.Chemical tests and physical standard are confirmatory tests *Examples*-Pepsin,castor oil,tolu of balsam,bees wax,opium,aloe,agar

F. DRUG /MOLECULE IN MEDICINAL PLANT AND its ACTIONS

Drugs made from plants: Drug name, pharmacological action and species

Drug/chemical name	Action/clinical use	Plant source
Acetyldigoxin	Cardiotonic	*Digitalis lanata*
Adoniside	Cardiotonic	*Adonis vernalis*
Aescin	Anti-inflammatory	*Aesculushippocastanum*
Aesculetin	Anti-dysentery	*Frazinus rhychophylla*
Agrimophol	Anthelmintic	*Agrimonia supatoria*
Ajmalicine	Circulatory Disorders	*Rauvolfia sepentina*
Allantoin	Vulnerary	*Several plants*
Allyl isothiocyanate	Rubefacient	*Brassica nigra*
Anabesine	Skeletal muscle relaxant	*Anabasis sphylla*
Andrographolide	Baccillary dysentery	*Andrographis paniculata*
Anisodamine	Anticholinergic	*Anisodus tanguticus*
Anisodine	Anticholinergic	*Anisodus tanguticus*
Arecoline	Anthelmintic	*Areca catechu*
Asiaticoside	Vulnerary	*Centella asiatica*
Atropine	Anticholinergic	*Atropa belladonna*
Benzyl benzoate	Scabicide	*Several plants*
Berberine	Bacillary dysentery	*Berberis vulgaris*
Bergenin	Antitussive	*Ardisia japonica*
Betulinic acid	Anticancerous	*Betula alba*
Borneol	Antipyretic, analgesic,	*Several plants*

	antiinflammatory	
Bromelain	Anti-inflammatory, proteolytic	*Ananas comosus*
Caffeine	CNS stimulant	*Camellia sinensis*
Camphor	Rubefacient	*Cinnamomum camphora*
Camptothecin	Anticancerous	*Camptotheca acuminata*
(+)-Catechin	Haemostatic	*Potentilla fragarioides*
Chymopapain	Proteolytic, mucolytic	*Carica papaya*
Cissampeline	Skeletal muscle relaxant	*Cissampelos pareira*
Cocaine	Local anaesthetic	*Erythroxylum coca*
Codeine	Analgesic, antitussive	*Papaver somniferum*
Colchiceine amide	Antitumor agent	*Colchicum autumnale*
Colchicine	Antitumor agent, anti-gout	*Colchicum autumnale*
Convallatoxin	Cardiotonic	*Convallaria majalis*
Curcumin	Choleretic	*Curcuma longa*
Cynarin	Choleretic	*Cynara scolymus*
Danthron	Laxative	*Cassia species*
Demecolcine	Antitumor agent	*Colchicum autumnale*
Deserpidine	Antihypertensive, tranquillizer	*Rauvolfia canescens*
Deslanoside	Cardiotonic	*Digitalis lanata*
L-Dopa	Anti-parkinsonism	*Mucuna sp*
Digitalin	Cardiotonic	*Digitalis purpurea*
Digitoxin	Cardiotonic	*Digitalis purpurea*
Digoxin	Cardiotonic	*Digitalis purpurea*

Emetine	Amoebicide, emetic	*Cephaelis ipecacuanha*
Ephedrine	Sympathomimetic, antihistamine	*Ephedra sinica*
Etoposide	Antitumor agent	*Podophyllum peltatum*
Galanthamine	Cholinesterase inhibitor	*Lycoris squamigera*
Gitalin	Cardiotonic	*Digitalis purpurea*
Glaucarubin	Amoebicide	*Simarouba glauca*
Glaucine	Antitussive	*Glaucium flavum*
Glasiovine	Antidepressant	*Octea glaziovii*
Glycyrrhizin	Sweetener, Addison's disease	*Glycyrrhiza glabra*
Gossypol	Male contraceptive	*Gossypium species*
Hemsleyadin	Bacillary dysentery	*Hemsleya amabilis*
Hesperidin	Capillary fragility	*Citrus species*
Hydrastine	Hemostatic, astringent	*Hydrastis canadensis*
Hyoscyamine	Anticholinergic	*Hyoscyamus niger*
Irinotecan	Anticancer, antitumor agent	*Camptotheca acuminata*
Kaibic acud	Ascaricide	*Digenea simplex*
Kawain	Tranquillizer	*Piper methysticum*
Kheltin	Bronchodilator	*Ammi visaga*
Lanatosides A, B, C	Cardiotonic	*Digitalis lanata*
Lapachol**.**	Anticancer, antitumor	*Tabebuia sp*
a-Lobeline	Smoking deterrant, respiratory stimulant	*Lobelia inflata*

Menthol	Rubefacient	*Mentha species*
Methyl salicylate	Rubefacient	*Gaultheria procumbens*
Monocrotaline (topical)	Antitumor agent	*Crotalaria sessiliflora*
Morphine	Analgesic	*Papaver somniferum*
Neoandrographolide	Dysentery	*Andrographis paniculata*
Nicotine	Insecticide	*Nicotiana tabacum*
Nordihydroguaiaretic acid	Antioxidant	*Larrea divaricata*
Noscapine	Antitussive	*Papaver somniferum*
Ouabain	Cardiotonic	*Strophanthus gratus*
Pachycarpine	Oxytocic	*Sophora pschycarpa*
Palmatine,	Antipyretic	*detoxicant Coptis japonica*
Papain	Proteolytic, mucolytic	*Carica papaya*
Papavarine	Smooth muscle relaxant	*Papaver somniferum*
Phyllodulcin	Sweetner	*Hydrangea macrophylla*
Physostigmine	Cholinesterase Inhibitor	*Physostigma venenosum*
Picrotoxin	Analeptic	*Anamirta cocculus*
Pilocarpine	Parasympathomimetic	*Pilocarpus jaborandi*
Pinitol	Expectorant	*Several plants*
Podophyllotoxin	Antitumoranticancer agent	*Podophyllum peltatum*
Protoveratrines A, B	Antihypertensives	*Veratrum album*
Pseudoephredrine*	Sympathomimetic	*Ephedra sinica*
nor- Pseudoephedrine	Sympathomimetic	*Ephedra sinica*
Quinidine	Antiarrhythmic	*Cinchona ledgeriana*

Quinine	Antimalarial, antipyretic	*Cinchona ledgeriana*
Qulsqualic acid	Anthelmintic	*Quisqualis indica*
Rescinnamine	Antihypertensive, tranquillizer	*Rauvolfia serpentina*
Reserpine	Antihypertensive, tranquillizer	*Rauvolfia serpentina*
Rhomitoxin	Antihypertensive, tranquillizer	*Rhododendron molle*
Rorifone	Antitussive	*Rorippa indica*
Rotenone	Piscicide, Insecticide	*Lonchocarpus nicou*
Rotundine	Analagesic, sedative,traquillizer	*Stephania sinica*
Rutin	Capillary fragility	*Citrus species*
Salicin	Analgesic	*Salix alba*
Sanguinarine	Dental plaque inhibitor	*Sanguinaria canadensis*
Santonin	Ascaricide	*Artemisia maritma*
Scillarin A	Cardiotonic	*Urginea maritima*
Scopolamine	Sedative	*Datura species*
Sennosides A, B	Laxative	*Cassia species*
Silymarin	Antihepatotoxic	*Silybum marianum*
Sparteine	Oxytocic	*Cytisus scoparius*
Stevioside	Sweetner	*Stevia rebaudiana*
Strychnine	CNS stimulant	*Strychnos nux-vomica*
Taxol	Antitumor agent	*Taxus brevifolia*
Teniposide	Antitumor agent	*Podophyllum peltatum*
Tetrahydrocannabinol(THC)	Antiemetic, decrease occular tension	*Cannabis sativa*

Tetrahydropalmatine	Analgesic, sedative, traquillizer	*Corydalis ambigua*
Tetrandrine	Antihypertensive	*Stephania tetrandra*
Theobromine	Diuretic, vasodilator	*Theobroma cacao*
Theophylline	Diuretic, brochodilator	*Theobroma cacao*
Thymol (topical)	Antifungal	*Thymus vulgaris*
Topotecan	Antitumor, anticancer agent	*Camptotheca acuminata*
Trichosanthin	Abortifacient	*Trichosanthes kirilowii*
Tubocurarine	Skeletal muscle relaxant	*Chondodendrontomentosum*
Valapotriates	Sedative	*Valeriana officinalis*
Vasicine	Cerebral stimulant	*Vinca minor*
Vinblastine	Antitumor, Antileukemic agent	*Catharanthus roseus*
Vincristine	Antitumor, Antileukemic agent	*Catharanthus roseus*
Yohimbine	Aphrodisiac	*Pausinystalia yohimbe*
Yuanhuacine	Abortifacient	*Daphne genkwa*
Yuanhuadine	Abortifacient	*Daphne genkwa*
The following are plants and chemicals which are still under research for cancer and AIDS/HIV:		
(+)-Calanolide A	*Calophyllum lanigerum, Calophyllum teysmanii*	
Conocurovone	*Conospermum incurvum*	
Prostratin,	*Homolanthus nutans*	
9AC (9-aminocamptothecin):	*Cancer*	
Camptothecin	*Cancer*	
Homoharringtonine	*Cephalotaxus harringtonia*	
Perillyl alcohol, flavopiridol	*Dysoxylum binectiferum*	

G. STANDARDISATION OF HERBAL PRODUCTS

❖ ANALYTICAL SPECIFICATION OF SYRUPS- LIQUID ORAL

1. Description,colour,odour(organoleptic)
2. Total ash
3. Acid insoluble ash
4. Water soluble extratives
5. Alcohol soluble extractive
6. pH
7. Total sugar content
8. Viscocity
9. Identification-HPTLC/TLC/GLC
10. Test of heavy/ toxic metals- lead,cadmium,arsenic,mercury
11. Microbial contamination- total bacterial count,total fungal count
12. Test for specific pathogens like
    E.coli,
    Salmonella species,
    S.aureus,
    P.aeruginosa
13. Pesticide residue- Organoclorine pesticides,
    Organophosphorus pesticides,
    Pyrethroids

❖ ANALYTICAL SPECIFICATION OF VATI/GUTIKA- TABLET/PILLS

1. Description,colour,odour
2. Weight variation
3. Disintegration time not more than 15 min
4. Identification-HPTLC/TLC/GLC
5. Assay
6. Test of heavy/ toxic metals- lead,cadmium,arsenic
7. Microbial contamination- total bacterial count,total fungal count
8. Test for specific pathogens like E.coli,salmonella species,S,aureus,p.aeruginosa
9. Pesticide residue-organoclorine pesticides,organophosphorus pesticides,pyrethroids
10. Test for aflatoxin (B1, B2, G1, and G2)

❖ ANALYTICAL SPECIFICATION OF ASAVA AND ARISHTA- FERMENTED LIQUIDS

1. Physical evaluation:Specific gravity at 25 ^{0}C
2. Alcohol content
3. Total acidity
4. Non reducing and reducing sugar

*Others same specification followes as **liquid oral**

❖ ANALYTICAL SPECIFICATION OF CHURNA

1. Description,colour,odour(organoleptic)
2. Total ash
3. Acid insoluble ash
4. Water soluble extratives
5. pH
6. loss of drying
7. Identification-HPTLC/TLC/GLC
8. Particle size-80-120 meshMicrobial contamination- total bacterial count,total fungal count
9. Test for specific pathogens like E.coli,salmonella spp.,S,aureus,p.aeruginosa
10. Pesticide residue-organoclorine pesticides,organophosphorus pesticides,pyrethroids.
11. Shelf life
12. Test for aflatoxin (B1, B2, G1, and G2)

TESTS ON HERBAL PRODUCTS AS PER I.P

- ❖ Foreign Organic Matter
- ❖ Ethanol-Soluble Extractive
- ❖ Water-Soluble Extractive
- ❖ Complete Extraction of Alkaloids
- ❖ Total Solids

H. DEFINATION OF MEDICINAL TERM IN PHARMACOGNOSY

1) **Carminative**: -The drug, which expels gases from gastrointestinal tract, is known as carminative in simply drug removes flatulence
   e. g. Fennel, Dill, Caraway
2) **Expectorant**: - The drug, which increases fluidity of cough & helps in easy removal of cough are known as expectorant.
   e. g. Vasaka, Tolu-balsam, Benzoin.
3) **Purgative**: - The drug which evacuate the bowels,strongly cathartic effect
   e. g. Senna leaf, Aloe,Castor oil, Rhubarb.
4) **Laxative**: - These are the purgatives, which effects in mild action.
   e. g. senna
5) **Cathartic**: - These are drastic purgative stools produced are watery in nature,simply accelerates defecation
   e.g. Castor oil, Rhubarb.
6) **Analgesic**: - The agent which relieves pain by acting on Central Nervous System. They are of two types
   I) Narcotic Analgesics e. g. Opium
   II) Antipyretic Analgesics e. g. Aconite
7) **AntipyreticAnalgesics**: - The drug, which reduces, elevated body temp.
   e. g. Cinchona bark
8) **Diaphoretic**: - Drug, which reduces, elevated body temperature by increasing rate of sweating.
   e. g. Tulsi, Camphor Tulsi, Camphor
9) **Diuretic**: - The drug, which increases rate of Formation & excretion of urine, is known as diuretic.
   e. g. Tea, Buchu leaves

10) **Hypnotic**: - The drug which produce sleep, like Natural sleep, is known as Hypnotic e. g. Opium
11) **Sedative**: - The drug, which lowers activity of any organ or central Nervous System, is recognized as sedative. (Tranquillizer.)
12) **Emetic**: - The drug which produces vomiting.
e. g. Mustard, Ipecac Senega.
13) **Febrifuge**: - The drug which reduce the body temperature.
14) **Oxytocic**: - The drug which causes contraction of uterus.
e. g. Ergot
15) **Anthelmintic**: - The drug, which kills or expels, worms from G. I. T.
e. g. Santonica flower, Chenopodium oil.
16) **Appetizer**: - The drug which increases desire for food
e. g. Cinchona, Nux-vomica.
17) **Aphrodisiac**: - An agent which stimulate sexual desire
e. g. lahsun.
18) **Bitter**: - Bitters are drugs having bitter taste, due to bitter taste they stimulate nerves and stimulate secretion of stomach and appetite.e.g. Chirata, Nux vomica.
19) **Counterirritant**: - Counter irritant is a substance, which when applied is externally produces irritation. This irritation is mild in nature, this irritation reduce the original pain sensation. e. g. Camphor, Turpentine oil, methyl salicylate.
20) **Stomachic**- The drug, which increases secretion of gastric juice & function of stomach, digestion is known as stomachic
e. g.dill,fennel,gentian,rhubarb
21) **Diaphoretic**–drug inducing perspiration. eg.Guaiac

23)**Galactagogue-**drug that promotes or increases the flow of a mother's milk.eg.Shatavari
24)**Parageusia or** Dysgeusia-drug is a distortion of the sense of tasteeg. Drug use as Gymnema
25)**Furunculosis -** This bacterial disease ,repeated occurrence of boils on the skin-Drug use as Gymnema

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THANKs to Mama & Family

"Most failure people are failed not because they did not try well for success but because they give up when are near to success"

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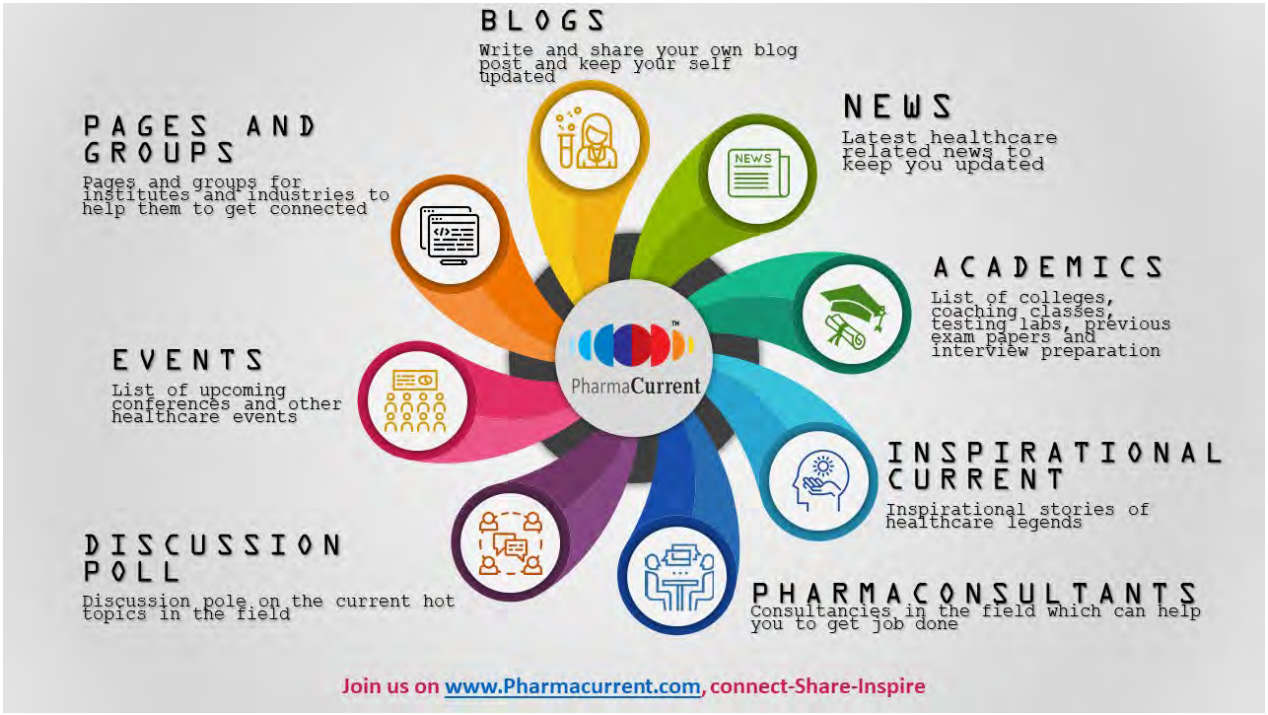
BLOGS
Write and share your own blog post and keep your self updated
NEWS
Latest healthcare related news to keep you updated
ACADEMICS
List of colleges, coaching classes, testing labs, previous exam papers and interview preparation
INSPIRATIONAL CURRENT
Inspirational stories of healthcare legends
PHARMACONSULTANTS
Consultancies in the field which can help you to get job done
DISCUSSION POLL
Discussion pole on the current hot topics in the field
EVENTS
List of upcoming conferences and other healthcare events
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