About OMICS Group

OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and events. Established in the year 2007 with the sole aim of making the information on Sciences and technology 'Open Access', OMICS Group publishes 400 online open access scholarly journals in all aspects of Science, Engineering, Management and Technology journals. OMICS Group has been instrumental in taking the knowledge on Science & technology to the doorsteps of ordinary men and women. Research Scholars, Students, Libraries, Educational Institutions, Research centers and the industry are main stakeholders that benefitted greatly from this knowledge dissemination. OMICS Group also organizes 300 International conferences annually across the globe, where knowledge transfer takes place through debates, round table discussions, poster presentations, workshops, symposia and exhibitions.

About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Amplifying the Worth of Traditional Pharmacopeias by Utilizing Integrative Technologies

Memory Elvin-Lewis, Ph.D., D.Sc.

Professor of Microbiology and Ethnobotany in Biomedicine

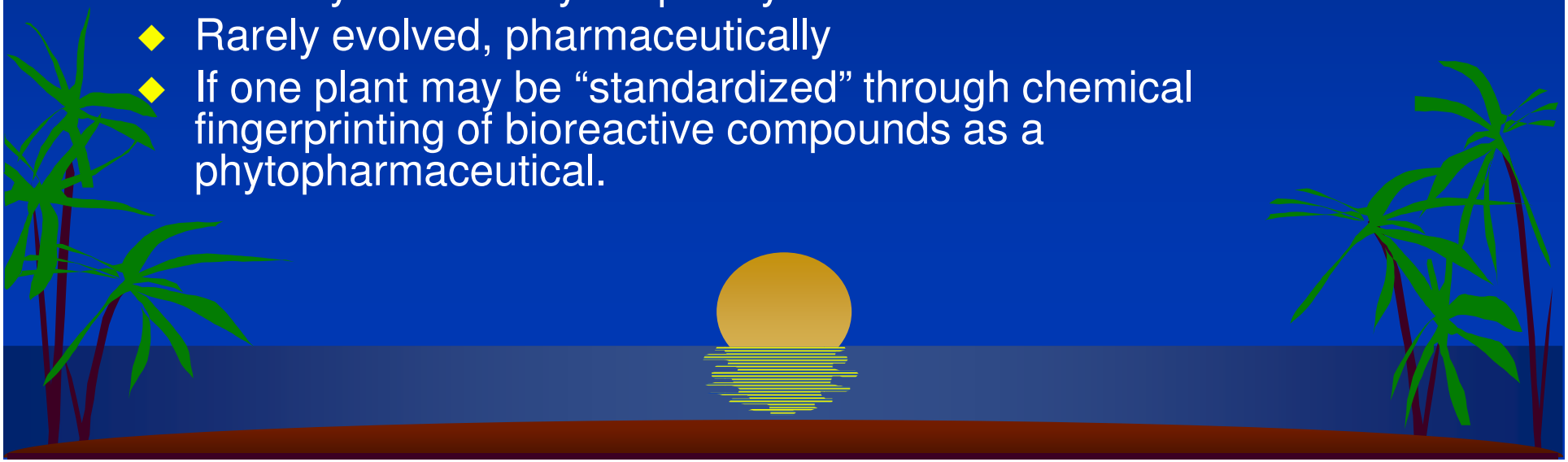
Adjunct Professor of Biology

Washington University in St. Louis

elvin@biology.wustl.edu

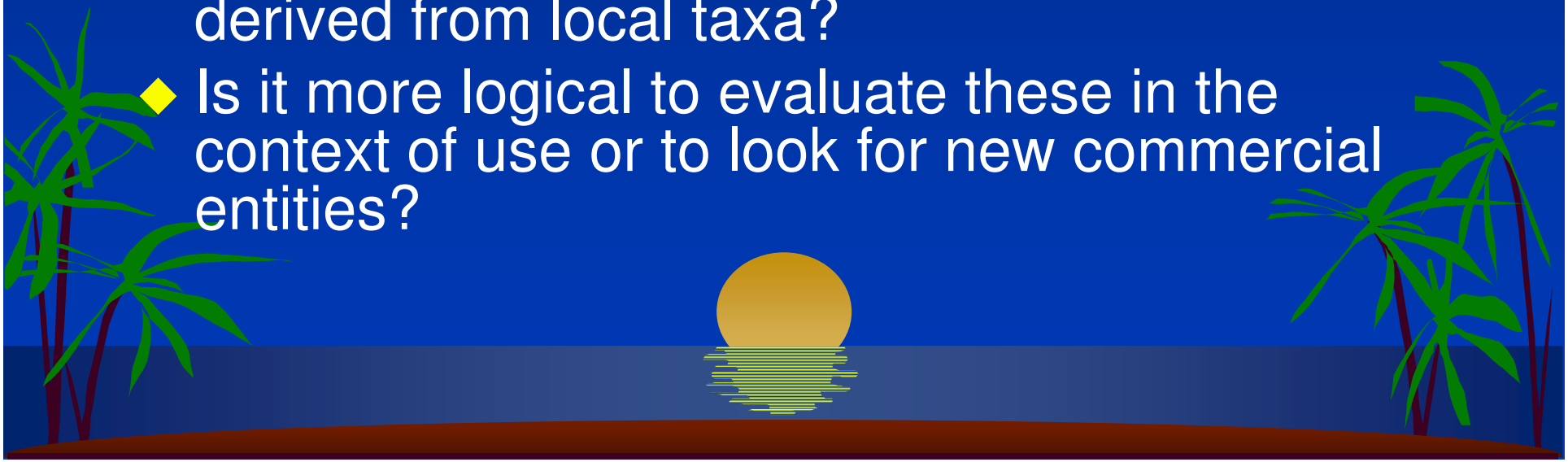
What is an herbal remedy?

- Traditional or serendipitous
- Varies in formulation & preparation
- May contain one or more plants and other components
- Unreliable as to plant identification
- Appropriate clinical validation
- Varies in dosage and treatment regimens
- Usually used for acute not chronic conditions
- Potency and toxicity frequently moderate
- Rarely evolved, pharmaceutically
- If one plant may be “standardized” through chemical fingerprinting of bioreactive compounds as a phytopharmaceutical.



New therapeutics from herbal remedies

- Is there a local, regional, global need?
- Does anecdotal information suggest that there are remedies worthy of study?
- Is there scientific evidence to suggest that regional plants have a therapeutic potential?
- Have therapeutic agents already been derived from local taxa?
- Is it more logical to evaluate these in the context of use or to look for new commercial entities?



How can integrative technologies be utilized to understand and optimize the worth of a traditional pharmacopeia

- By conducting appropriate ethnobotanical/medical surveys to identify those of primary interest to a population.
- By understanding the relative value of plant selections by identifying those of presumptive merit “targeted” for specific disease syndromes or whose traditional uses suggest such a linkage.
- By more carefully matching screening methodologies with known uses.
- By applying dereplication methods through eliciting data available in oral, written and electronic data bases in order to identify what is already known about the medicinal flora and its relationship to others elsewhere.
- By identifying useful remedies within a population whenever a critical need arises by a method called ethnomedical/dental focusing.
- By applying phylogenetic amplification techniques to identify new sources of bioreactive compounds or new treatment targets.
- By utilizing new high throughput and computer based technolgies.

Discovery of New Therapeutics: A team approach

- Intellectual Property Lawyers, National regulatory bodies
- Botanists in: Ethnobotany, Taxonomy, Ecology
- Ethnolinguists, Epidemiologists
- Practitioners of allopathic and alternative medicine
- Biologists: Targeted screening specialists
- Data base analysts
- Pharmacologists and Natural Products Chemists
- Toxicologists
- Medicinal Chemists
- Formulation Chemists
- Commercial Partners: Nutritional Supplement (Botanical), Phytopharmaceutical, Pharmaceutical

What methods are applied to identifying phytomedicines of worth?

- **Primary data**: Identifies known leads **targeted** to a specific disorder e.g., malaria. These data are particularly valuable if knowledge is still being applied and consensus of value and can be correlated with conventional parameters of bioreactivity and efficacy.
- **Doctrine of Signatures:** are not always invalid criteria e.g., as evident by the shape or color of a plant part.
- **Secondary data**: Identifies possible leads from information in the public domain as cited orally or in written and electronic data base form.
- **Dereplications** identify taxa, chemical, and bioreactivity links or used retrospectively following isolation of a bioreactive compound to provide information on parameters of safety and efficacy, alternative sourcing of taxa or its compounds, or identify compounds of equal or greater worth.
- **Preliminary bioreactivity screening**: identifies functional or mechanistic links to traditional uses.

Types of Assays to Detect Bioreactivity

In medical ethnobotany, the human is the first, not the last functional screen - a fact that has rarely been appreciated in recent pharmaceutical drug research studies.

- Functional
  - humans
  - Animals*
  - Cells*
- Mechanistic*

- provides value data
- limited, complex
- general bioreactivity

- specific
- toxicity and use parameters unknown
- may not match any parameters of traditional use
- High throughput technologies for purifying, identifying and characterizing DNA, RNA, proteins and other bioreactive molecules.

The incidence of bioreactivity associated with the type of specimen.

Type	Hit rate
Indiscriminate screening	< 5%
Medicinal Plants	15-25%
Targeted Medicinal Plants (secondary)	40-50%
Targeted Medicinal Plants (primary)	> 75%
Focused data	> 90%

Recent Advances in Screening for bioreactivities associated with toxicity drug discovery & therapy

Pelkonen,O et al. 2012. Omics and its potential impact on R&D and regulation of complex herbal products. J. Ethnopharmacol. 140:587-593

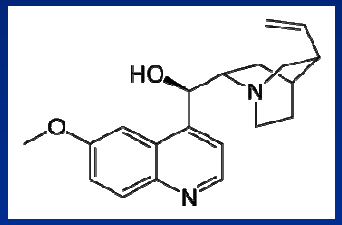
"Omics" High throughput technologies used to analyze various kinds of micro-& macromolecules simultaneously. This technique is useful in toxicity testing, and in the discovery of novel biomarkers for use in translational and clinical studies

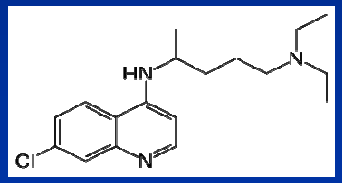
- ADMET (absorption, distribution, metabolism, excretion, toxicity)
  - Herbal substances identification.
  - Major and minor herbal constituents affecting enzyme metabolism.
  - Subcellular organelles (microsomes) for identification and quantification of metabolites.
  - Cells for toxicity testing
  - Volunteers to test pharmacokinetics of herbal components.

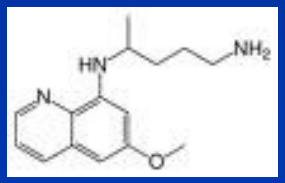
- **Proteomics**: Measures proteins
- **Metabolomics**: comprises the comprehensive and simultaneous profiling of multiple metabolites in a biological system as will as their temporal changes caused by genetic, environmental and pharmaceutically induced effects.
- **Genomics**: multivariant analyses of the genome e.g, defining therapeutic tests for a drug or as **theranostics** useful for identifying personalized therapies for cancer.
- **Transcriptomics**: Measures transcripts

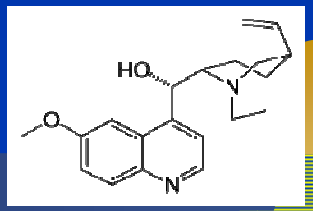
First Commercialized Antimalarial from the Amazonian Rainforest: Useful compounds derived from primary data.

***Cinchona officinalis* (Rubiaceae)**
Named after the Countess of Cinchon, wife of the Viceroy of Peru in 1638 who was cured of malaria using a bark extract.







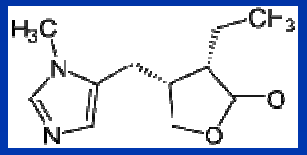


- From Jivaro and neighboring tribal pharmacopeias; popularized by the Jesuits
- Cultivated worldwide in tropics
- Bark contains quinine, isolated in 1823.
- Synthesis of primaquine and chloroquine occurred in the 1930's
- Chloroquine is used as mainstay for treatment until resistance occurred.
- Primaquine is used for relapsing cases.

Isomer quinidine has been used for arrythmia since 1918.

The Value of Primary Data to Modern Medicine and How Integrative Approaches Amplfied these Discoveries

Pilocarpus jaborandi, P. microphyllus



Pilocarpine

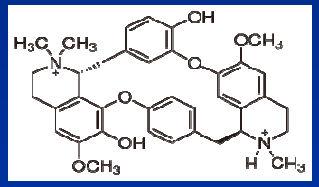
- **Brazilian Amerindians used the leaves for salivation and sweating.**
- **Pilocarpine was isolated in 1877.**
- **It is a parasympathomimetic alkaloid obtained from the leaves of the shrubs from the genus *Pilocarpus.***
- **Pilocarpine is used to treat xerostomia (dry mouth) in cases of radiation treatment or Sjogren's syndrome.**
- **It is also strongly miotic causing pupil constriction and has been used for over one hundred years to treat glaucoma.**

Traditional use with a medicinal potential:

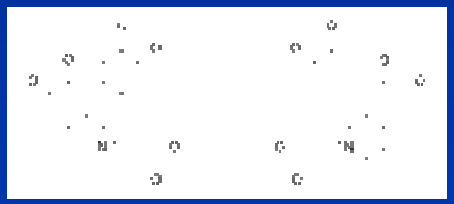
Blow gun darts to muscle relaxant in surgery

Chondrodendron tomentosum & Curarea toxifera (Menispermaceae)

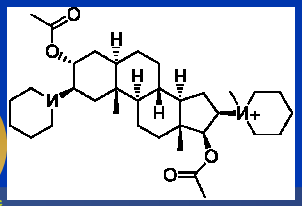
- Curare: used by Amazonian tribes for immobilizing animals during hunting.
- Made from the stem & root bark of *Strychnos* (Loganaceae) and Menispermaceae such as *C. tomentosum* and *C. toxifera*.
- Chondrodendron was once a cottage industry in Amazonia with harvesting of the large lianas from the wild without consideration for managing this resource as a renewable crop. The taxa was becoming endangered hence synthesis of similar compounds.
- (+) tubocurarine isolated & developed in 1950's
- The taxa became indangered hence synthesis of similar compounds in the 1980's.



- Aturcurium



- Vercuronium



These compounds are used as reversible skeletal muscle relaxants in surgical procedures with deep anesthesia.

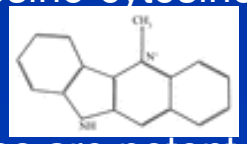
Antimalarial with an Anticancer & anti-Trypanosmal Potential: *Cryptolepsis sanguinolenta* (Periplocaceae)

Bailly C, Laine W, Baldeyro B et al. 2000. DNA intercalation, topisomerase II inhibition and cytotoxic acctivity of the plant alkaloid neocryptolepine. Anticacer Drug des. 15(3): 191-201. Gibbons S, Fallah F, Wright CW. 2003. Cryptolepine hydrochloride: a potent antimycobacterial alkaloid derived from *Cryptolepsis sanguinolenta* *Phytother Res. 17(4)434-436.;* Wright CW. 2007. Recent developments in naturally derived antimalarials: cryptolene analogues. J. Pharm Pharmacol. 59(6): 899-904; Tempesta M. 2010. The clinical efficacy of *Cryptolepsis sanguinolenta* in the Treatment of malaria. Ghana Med. J. 44: (1) 1-2; Ankrah NA. 2010. Treatment of falciparum malaria with a tea-bag formulation of cryptolepis sanguinolenta root. Ghana Med J. 44(1)2.

Yellow roots of this twining liana known as nibima, kadze or gangamau are used as antiinfectives in West African traditional medicines. The Twi and Ewe of Ghana use it for malaria. It is considered a threatened species.

The herbal division of Phyto-Riker Pharmaceuticals has made a medicinal tea for malaria called Phyto-laria® The tea is effective against chloroquine resistant *Plasmodium* strains and is claimed to be effective over 90% of individuals treated.

- It contains indolquinolene alkaloids such as cryptolepene which has been synthesized. It is antimycobacterial and has potent cytotoxicity and antiinflammatory activity suggesting it and its analogues are potential anticancer agents affecting many cancer cell lines. Its activity is related to intercalating with DNA at cytosine-cytosine sites eliciting Topoisomeriae II and microtubule inhibition.



- Its analogues are potent antimalarials and are effective against trypanosomes. Some are hypoglycemic thus lowering lower blood sugar.

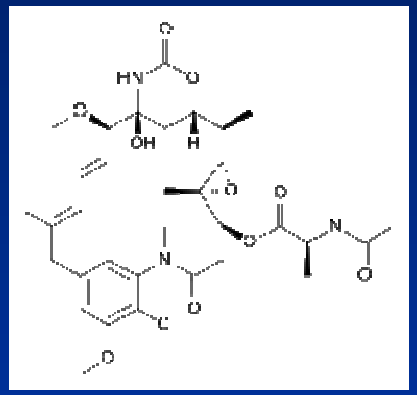
A group of related plants in the Celastraceae.

Maytansines: From traditional African medicine to future cancer treatments.

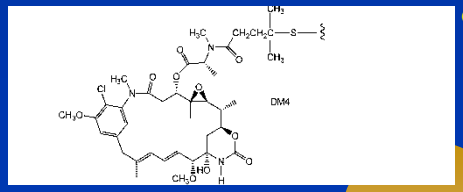
Maytenus spp.

Putterlickia pyracantha

Tryptergium wilfordii



Maytansine

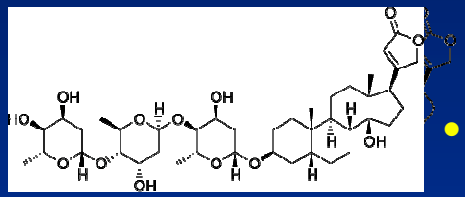


DM4 Analogue

- **In East African traditional medicines, *Maytenus* roots are used to treat cancers and antiinfective conditions.**
- **In the 1970's maytansine was isolated from the Ethiopian *M. serrata* but deemed too toxic to develop.**
- **Maytansinoids were isolated from other species and genera in the Celestraceae such as Puterlickia and Triptergium.**
- **The macrolide, maytansine inhibits the assembly of microtubules by binding to tubuline at the rhioxin binding site thus arresting metaphase and cell division.**
- **To reduce toxicity, immunotargeting strategies have evolved. One analogue, DM4 linked to human mesothelin antibody (anetumab ravtansine) has promise in the treatment of mesothelioma, ovarian, pancreatic and lung adenocarcinomas.**

Digitalis lanata a Bioreactive Plant called Foxglove Identified from a Polyherbal

D. lanata

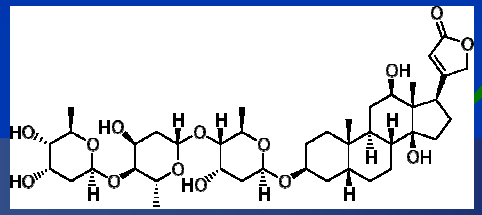


Digitoxin

D. purpurea

D. purpurea is the current source and is grown in plantations.

- Present in pharmacopeias of England and Europe of the 18th century.
- Its leaves were identified by Withering in 1775 from a complex polyherbal as the primary source for the treatment of dropsy (congestive heart failure) and angina pectoris.
- Digitoxin was extracted from its leaves in 1875. Its affects are longer lasting than digoxin and in elderly patients it has lower rate of toxicity than digoxin..
- Rovever C et al.,2000. Comparing the toxicity of digoxin and digitoxin in a geriatric population: should an old drug be rediscovered? South Med J. 93(2): 199-202
- Digoxin (Lanoxin©) is a purified cardiac glycoside, which until recently was favored for the treatment of atrial fibrillation, atrial flutter and sometimes heart failure. Beta blockers are now preferred because digoxin does not confer any mortality benefit in patients with congestive heart failure. It may still be used when ACE inhibitor treatment and diuretics do not reduce symptoms.



Digoxin

In-silico technology: Merging Data Bases

Barlow,DJ 2012. In-silico studies in Chinese herbal medicines research: Evaluation of in-silico methodologies and phytochemical data sources, and a review of research to date. J. Ethnopharmol. 140: 526-534

- **Data bases related to the**:
  - Nature of the remedy
  - Ethnopharmacological data
  - The compounds it contains and their structures.
  - Known phytochemicals
  - Therapeutic targets
  - Potential therapeutic targets
  - Protein data bank

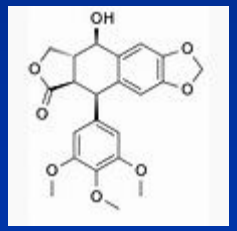
- **Types of software for use in computational studies:**
  - Ligand based screening programs.
  - Parmacophore programs either ligand- or target-based
  - Docking programs used to dock potential molecule ligands into protein active sites and scoring their interaction.
  - Pattern recognition e.g., principle component analysis, multi-dimensional scaling, self organizing maps and cluster analysis.
  - Proteomics and/or genomics data visualization and analysis tools.

"In silico" discoveries in TCM

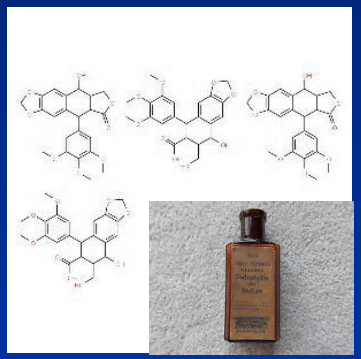
- Fingerprint and docking
- Biofilm inhibition by docking to transcription activation factor TraR.
- Protein based pharmacophores to screen for acetylcholin-esterase (AChE) and cylooxengenase (COX) inhibitors.
- Pharmacophores, docking and QSAR methods to mimic phosphodiesterase 5 (PDE5)
- Aurantiamide acetate from *Artemesia annua.*
- Baicalein
- Scopoletin AChE inhibitor, Sanggenons Cox inhibitor
- Several inhibitors identified from *Epimedium* a tonic used to invigorate Yang.

Doctrine of Signatures: Integrative Approaches Like Semisynthesis Amplfied its Medicinal Value

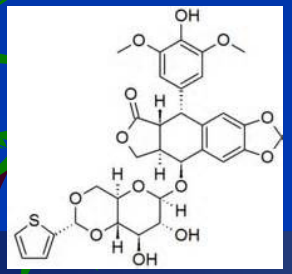
- *Podophyllum peltatum*



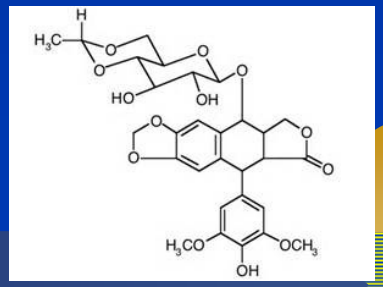
Podophyllotoxin



Podophyllin resin



teniposide



etoposide

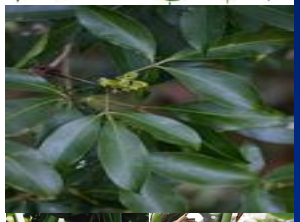
- **Penobscot Indians of Maine used its rhizomes to treat cancers and venereal warts or Condyloma acuminata**

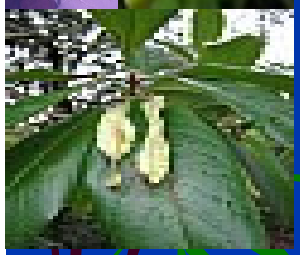
- **As the resin, podophyllin it appeared in the 19th century Materia Medica for the treatment of cancerous tumors, polyps and unhealthy granulations.**
- **Because of toxicity its lignans podophyllotoxin and α and β peltatins were semisynthesized.**
- **Both teniposide and etopside are topoisomerase II inhibitors used for leukemias and lymphomas, brain and bladder tumors and acute refractory leukemias.**

A novel survey derived from secondary data. Conducted in 1975 to determine relevant values of chewing stick/sponge use in Ghana.

Elvin-Lewis, M.. 1979. Empirical rationale for teeth cleaning plant selection. Medical Anthropology 3: 432-458; Adu-tutu, M, Afful Y, Sante-Appeah K, Lieberman D, Hall JB, Elvin-Lewis M. 1979. Chewing stick usage in Southern Ghana. Econ. Bot 33(3): 320-328; 1980. Elvin-Lewis M. Chewing sponges for teeth cleaning. J. Prev. Dent 6. 75-80; Elvin-Lewis M, Hall JB, Adu-tutu M, Afful Y, Asante-Appiah K, Lieberman D. 1980. The dental health of chewing stick users in Southern Ghana: preliminary findings. J. Prev. Dentistry 6: 151-159

- 173 species identified from secondary data
- 870 individuals in all ages from12 tribal/linguistic groups were surveyed to determine which of these species were favored and if these were linked to patterns of efficacy and bioreactivity against dental pathogens by:
  - The types of plants that were used, their ages, the plant part, the time of year collected, its acquisition, preparation and frequency of use.
  - If the nature of the chewing stick influenced their choice e.g., flavor, texture, foaminess etc.
  - How social parameters of age, gender, religion, family or tribe influenced the selection.
  - How dental health was influenced by their use as regards to incidence of apparent dental decay, gum disease and tooth loss.
  - If data sorted by a SAS program according to numerous parameters of interest elicited meaningful correlations.





Favored Ghanaian Chewing-sticks and Sponges

- *Garcinia afzelii , G. epunctata (*Clusiaceae) are most favored (60%) throughout all tribes of Southern Ghana because of their soft, fibrous and sweet bristles. They confer excellent dental health. *G. afzelii* contains antimicrobial benzoid compounds such as 2,6-dimethyoxy-p-benzopquinone and 2,4,6-trimethoxybenzaldehyde. *G. kola* is used by 20% of the population except for the Krobo, it is hard and bitter and is favored by males (88%) because it is considered an aphrodisiac. It contains the bioflavonoid (GKE-1). These species contain 1-2 ppm fluoride (5% W/V) and are broadly antimicrobial against both cariopathogens and periopathogens.

- *Techlea verdoorniana* (Rutaceae) favored by 9 tribes. Cleans efficiently is mild to gums. Active against *Candida albicans*. Contains Nkolbeine, a furoqunoline alkaloid, 7-deacetlyazdione, phenolic furoquinoline alkaloids tecleaverdoornine, tecleaverdine, and tecleine, lupeol, evoxanthine, and tecleanone, tecleanthine, skimmianine, and halfordinine. Fluoride 1.6 ppm (5%w/V)

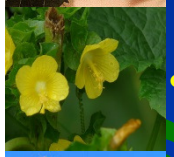
- Ashanti children apply charcoal with the pedicel of *Musa* (Banana] (Musaceae). Musa contains a lectin that prevents adherence of plaque bacteria. Considered to confer excellent dental health to users. Pedicel makes a soft bristle.

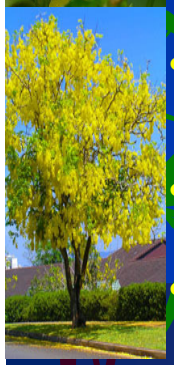
- *Acacia kamerunensis* (Fabaceae:Mimosoideae) is used as chewing sponge with other species used in Africa, Asia and by the Aztecs. The source of antimicrobial activity is not specifically identified but dalbergions, acidic gums or ethyl gallate are possible candidates. The species also contains 1 ppm fluoride. Used by all Southern Ghanians except the Northern tribe and mostly by women (93%). Bedouin women prefer chewing gum arabic, a resin from *Acacia senegal* known to have antiplaque properties**.**

- *Terminalia glaucescens and T. ivornensis* are only used by the Northern tribe as a chewing sponge. These species are considered sweet, bitter and fiibrous and are preferred by women (93%). Yellow tooth staining is a problem. They contain euflorotic concentrations of fluoride and are known to contain tannins which affect adherence of plaque bacteria. Triterpene antibiotics have been isolated from other species. These are active against both cariogenic and periopathogens.

Evaluating Hepatitis Remedies in the Context of Use: Results of an Ethnobotanical Focusing Study

Elvin-Lewis, M. 1999. Therapeutic Evaluation of Hepatitis Remedies: The Usefulness of Ethnomedical Focusing Techniques *in* Conference in Complementary and Alternative Medicine in Chronic Liver Disease, August 22-24; 1999. Elvin-Lewis, M. 1999. Therapeutic evaluation of South American hepatitis remedies. Symposium: South American plants and their chemistry and pharmacology: interactive with human activities. XVI International Botanical Congress, August 1-7, St. Louis, MO; 2002. Elvin-Lewis M, Navarro, M, Colichon, A, Lewis WH. Therapeutic Evaluation of Hepatitis Remedies: The Usefulness of Ethnomedical Focusing Techniques 270-281 in Stepp JR., Wyndham FS, Zarger RK (eds) 7TH INTERNATIONAL CONGRESS OF ETHNOBIOLOGY, October 2000. University of Georgia Press. 717 pp.





- **One quarter (523/2015) of the populations of 14 communities on 4 river systems were surveyed to understand their plant uses to treat hepatitis.**
- Twenty seven species in fourteen plant families were identified as being used. The majority were trees with only a few herbaceous plants represented. 10 fit the "doctrine of signatures" by virtue of their yellow roots, flowers, fruits etc.
- Roots and rhizomes contained ethereal oils, alkaloids, flavanoids and saponins that could be antiviral, diuretic & antiinflammatory; fruits and nuts could be antiinflammatory, as well as being nutritious, young leaves and root buds, antiviral; flowers anthroquinones with purging qualities
- Mestizo and indigenous remedies were quite distinct, with the former also including post Colombian plant introductions such as turmeric.
- Plants were used alone, several together, or sequentially but use was not always the same within a family unit.
- A pattern of favored plants emerged for both populations.
- Substitutions were made when the favored plant/s were unavailable.
- **Of 358 individuals tested for their acute carrier status, 34 were shown to have recently been infected, and 4 others were identified as chronic carriers. Rates of infection on 4 river systems varied from 0.01-0.08% .**
- In mestizo villages infections were related to proximity of an army base (tattooing, prostitutes), biting river flies, carriers with history of disease etc., nearby medical facilities at oil camps, traffic on river systems.
- In indigenous villages infections were related to family and neighbor related, returning former military personnel, drinking masato contaminated with HBV/HDV spittle, immunizations with improperly sterilized needles (once common practice among missionaries).
- Overall when favored bioreactive treatments were applied appropriately, and for an adequate period of time, the duration and severity of disease was significantly reduced as determined by clinical, serological, and physiological parameters.
- Co-infections with HDV were prevented when appropriate treatments were applied at the onset of disease.
- The chronic carrier status was reversed with reduction of liver size and reduced viral load

Where other possibilities lie.

Phylogenetic Amplification: A way of optimizing the therapeutic potential of medicinal plants.

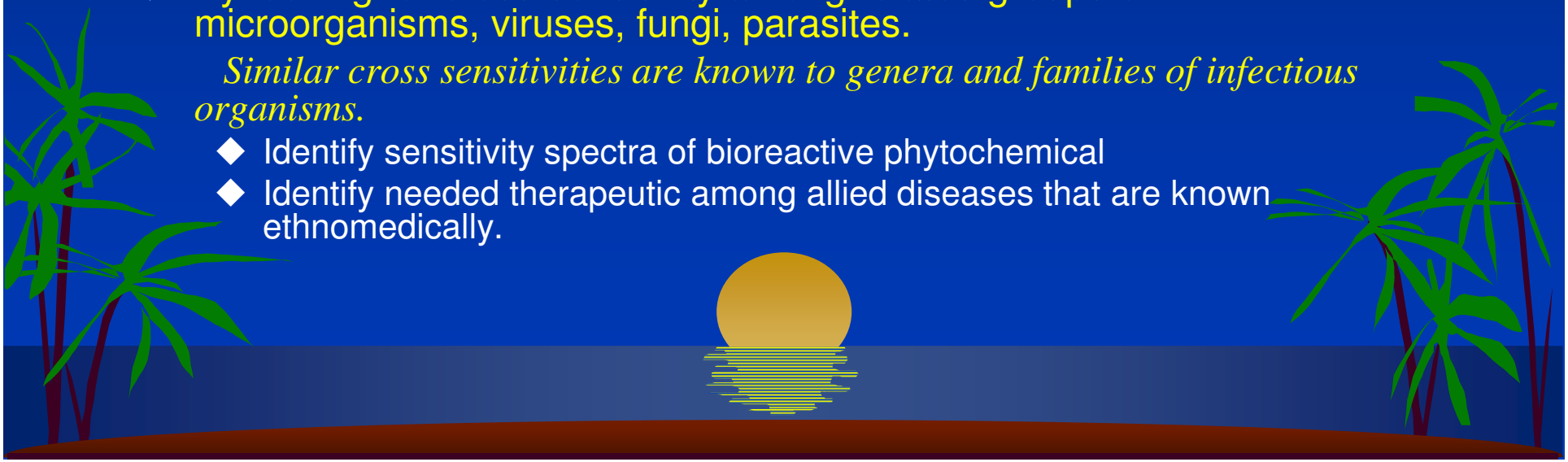
- By looking for similar compounds in related plant species or families particularly as related to their phylogenetic groupings.

  In flowering plants, certain related orders are known to share similar bioreactivities, suggesting a commonality of certain compounds. These are often found in the same phylogenetic group (10 in all) made up of subclasses and/or monophyletic clades. The same can be true for fungi.

  - discover similar bioreactivities and thus medical uses.
  - discover related compounds with greater potencies and value.
  - to address resource management issues.
- By looking for cross-sensitivity among related groups of microorganisms, viruses, fungi, parasites.

  Similar cross sensitivities are known to genera and families of infectious organisms.

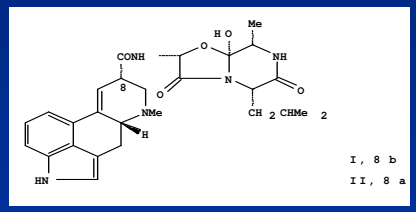
  - Identify sensitivity spectra of bioreactive phytochemical
  - Identify needed therapeutic among allied diseases that are known ethnomedically.

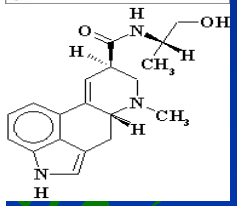


Endophytic parasitic fungi containing Ergot Alkaloids Amazonian and European Connections in the Clavicipitaceae used in Partuition

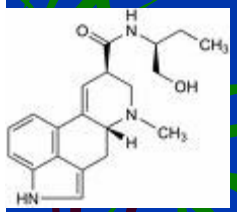
Lewis WH, Elvin-Lewis M. 1990. Obstetrical use of the parasitic fungus Balansia cyperi by Amazonian Jivaro women. Econ Bot 44: 131-133.

Balansia cyperi sclerotia on the species *Cyperus prolixus* (known as piri piri) is commonly used in Amazonia to aid in childbirth. It contains the compound, ergobalansine.





Claviceps purpurea on Secale sereale (rye) is the source of ergot alkaloids such as ergometrine, and methylergometrine. These are strong uterotonics. Their use as parturition aids evolved from European herbalism. In conventional obstetrics they may be used in the 3rd stage of labor or to reduce blood loss in 1st trimester abortion currettage.

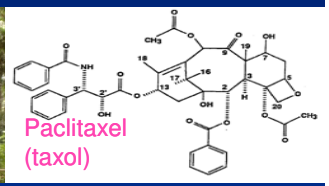


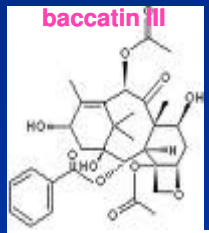
A Retrospective Ethnobotanical Linkage: The West Coast Yew and Other Sources of Taxol (Paclitaxel) and its Derivatives

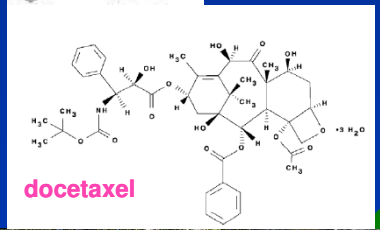
As a mitotic inhibitor that stabilizes microtubules and prevents depolymerization they are used to treat metastatic breast, ovarian and non-small cell lung cancers and infrequently bladder, prostate, oesophageal cancers and melanomas.

- Wood teas of *Taxus brevifolia* used by Upper NorthWest Coastal & AlaskanTsimshian (◄) for cancer (ethnobotanical linkage unknown at time of taxol discovery in 1977 of the isoprenoic compound, paclitaxol or taxol. This grows slowly in the cool coastal forests in the land of the "spirit bear" and was not a suitable source of the compound.
- *T. wallachiana*, valued for cancer in Himalayan medicine, source of baccatins e.g., baccatin III. The ethnobotonical linkage (The Bower Manuscript, 1893) was ignored by NCI at time of taxol discovery.
- *T. baccata* which grows in Europe, SW Asia, NW Africa and Iran is used for other medical, homeopathic and horticultural purposes. Its cultivar (*Taxus* X media 'Hicksii") is the primary source of baccatins such as Baccatin III used in the semisynthetis of docetaxel. used in the treatment of advanced or metastatic breast and non-small cell lung cancers.
- Taxol is also elicited by certain endophytic fungi such as *Taxomyces, Pestalotioposis, Sporomia, Trichothecium, & Aspergillis*. Other unrelated taxa similarly infected with endophytic fungi elicit other taxol derivatives and include temperate species such as Corylus and Ilex and the tropical Guyanian Rubiaceae *Maguireothamnus speciosus* infected with *Seimatoantherium tepuiense*.

Strategies to produce taxol from fungi include fermentative culture, and as a source for genetic engineering.







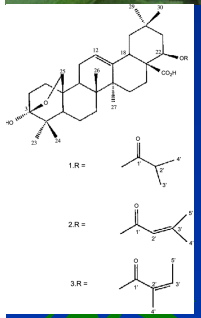
Testing phylogenetic amplification for possible sources of antimalarial compounds. *With the advent of resistance the need to find alternatives is critical!*

Okunade O, Lewis WH.. 2004. Oleanene cchloroquine-sensitive and chloroquine resistant strains of *Plasmodium. Falciparum,* Constituents of *Lantana cujabensis*. Fitotherapy 75 (3-4) 327-331; Okunade AL, Lewis WH, Elvin-Lewis, MP, Casper, SJ Goldberg, DE. 2001. Fitoterapia 72: 717-719 ; Kamaraj C, Kaushik NK, Rahuman, AA et al. Antimalarial activities of medicinal polants traditionally used in the villages of Dharmapuri regions of South India. J Ethnopharmacol. 2012 Jun 14;141(3):796-802

The Indian medicinal species *L. camara* is used to treat malaria and its extracts are effective against both chloroquine-sensitive and chloroquine resistant strains of *Plasmodium falciparum.*

Lantana cujabensis is a common Amazonian and Andean shrub, collected in Aguaruna territory on the Nieva River.

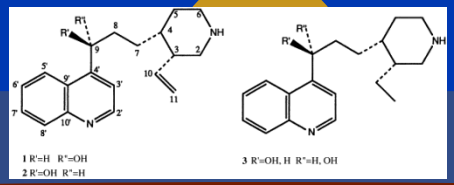
Its crushed leaves are sniffed to treat head colds in Bolivia and elsewhere *Lantana spp.* are valued for their rubafacient and andodynal properties.



Its antiinfective uses are possibly linked to the discovery of a new triterpenoid oleanene3β,25-epoxy-3α-hydroxy-22β-isobutanoyloxyolean-12-ene-28-oic acid **(1)** and two known triterpenoids lantanilic acid **(2)** and camaric acid **(3)** all possessing anti-TB activities.

Also like its Indian counterpart extracts of *L. cujabensis* possessed low activity against *P. falciparum.*

Landenbergia oblongifolia (Rubiaceae) a non medicinal species growing in Kunchin, an OCCAMM Aguaruna village was studied to determine, if like other Rubiaceae , it might be a new source of antimalarial compounds. While its bark yielded three novel cinchoncine-derived alkaloids namely: Epicinchonicinol (1), cinchonidicinol (2) and dihydrocinchonicinol/dihydrocinchonidicinol mixture (3) none of these proved bioreactive in antimalarial assays using the chloroquine-sensitive strain HB-3 of *Plasmodium falciparum.*

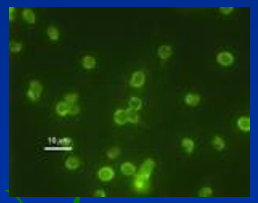


Phylogenetic Applification:

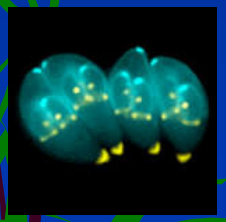
Effects of Malaria Remedies against Apicoplexan protozoa.

Lewis. WH. 2009 . Evaluating and Protecting Pharmacopeia and Traditional Knowledge in Proceedings of Traditions and Tranforations in Ethnobotany. 304-307; Färnert A, Lindberg J, Gil P, *et al.* (2003). Evidence of *Plasmodium falciparum* malaria resistant to atovaquone and proguanil hycrochloride . Case reports . *BMJ* **326** (7390): 628–9.

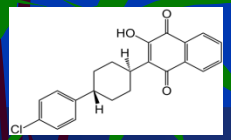
- These 8 reactive plants were tested against related Apicoplexan protozoa (*Cryptosporidium, Cyclospora, Isospora*) *Toxoplasma gondii* protozoa and a fungus *Pneumocystis (carinii) jerovici* known to cause serious AIDS related infections elicited promising leads from 8 taxa. This was particularly true for those antimalarial plants also used to treat diarrhea. Toxoplasmosis is also the leading cause of death due to a food borne illness in the US.



- *Cryptosporidium:* All 7/8 extracts proved positive, with 5 being highly positive. One of these plants was also used to treat diarrhea.

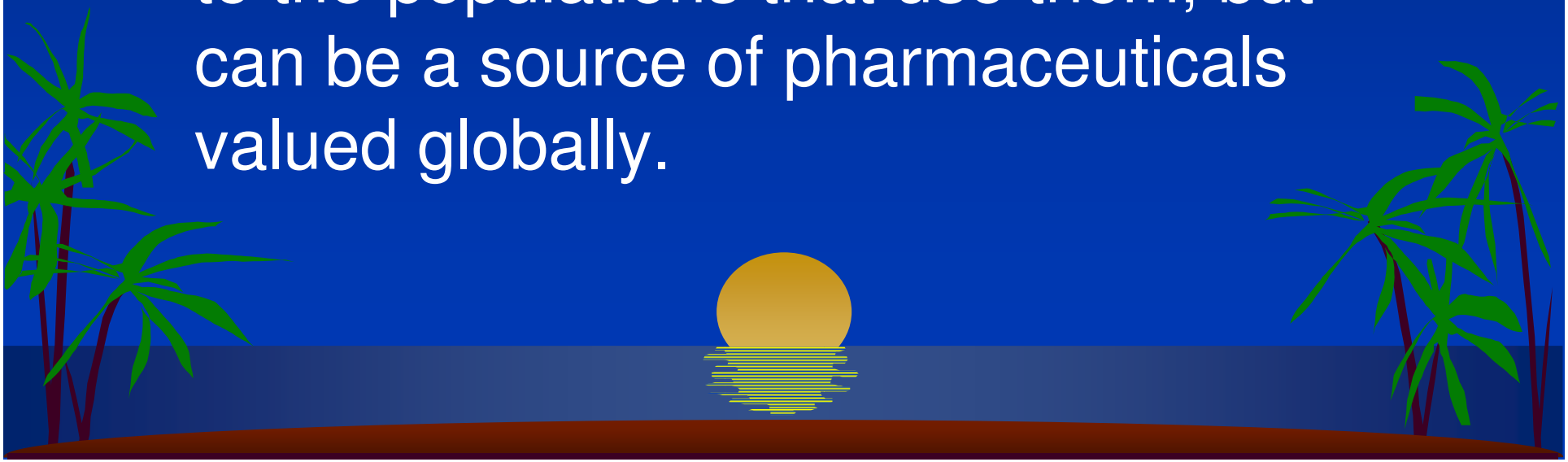


- *Toxoplasma: 7/8* extracts were cytotoxic however 1 extract proved active & with toxicity equal to the standard treatment of the nathoquinone , atavaquone also present with proguanil in the antimalarial composition Malarone. Alone atavaquone has antiparasitic and therapeutic effects when used to treat toxoplasmosis and is effective for mild cases of *Pneumocystis* pneumonia. While *P. falciparum* resistance to atavaquone is known, the bioreactivity of this Amazonian plant had proved otherwise, and thus it is possible the compounds are not similar and might serve as an alternative.



In Conclusion

- These examples have shown that integrative techniques when applied to traditional knowledge of medicinal plants can not only optimize their worth to the populations that use them, but can be a source of pharmaceuticals valued globally.



With Thanks

- To my husband, Dr. Walter Lewis who collaborated with me in understanding the worth of medicinal plants

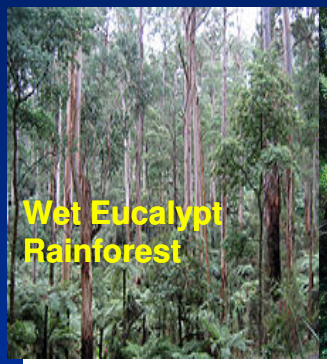
- To peoples of the world that shared with us the worth of their traditional knowledge.
- To the scientists that collaborated with us in all aspects of our research.
- To the many countries that allowed us to work within their boundaries.

Duboisia myoporoides (Solanaceae): The Corkwood Tree

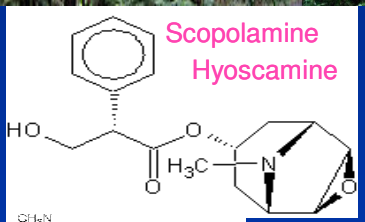
A tree or shrub native to high-rainfall areas of wet Eucalypt rainforests of New South Wales and Queensland in Eastern Australia.

- Considered poisonous, psychoactive, sedative and hypnotic because of its alkaloids e.g, scopolamine (hyoscine) atropine and nicotine.
- Water poured into trunk, drunk next day for stimulant, euphoric, antispasmodic and analgesic effects.
- Used to stupify fish and Emus by aboriginal people
- Leaves are pharmaceutical source of tropane alkaloids, scopolamine and atropine.
- Scopolamine was used for motion sickness as in WW2 D Day, and also now to treat side effects of cancer chemotherapy.
- Atropine as a parasympopatholytic is used to dilate eye pupils and as a muscarinic receptor antagonist is used in resuscitation to speed up the slowed action of the heart and prevent death rattle in dying patients. It also inhibits excessive salivation, tearing, urination, sweating and GI motility and vomiting in organophosphate poisoning.

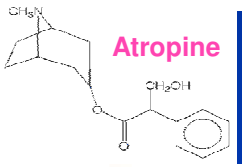
A derivative of scopolamine is the main active ingredient of the drug butylscopalamine , a potent abdominal-specific antispasmodic and analgesic.



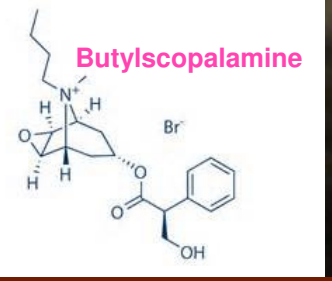
Scopolamine
Hyoscamine



Atropine



Butylscopalamine



Let Us Meet Again

We welcome you all to our future conferences of
OMICS Group International

Please Visit:

www.omicsgroup.com

www.conferenceseries.com

www.pharmaceuticalconferences.com