

Introduction to Biological Classification & Naming



I. Introduction



A. Taxonomy

1. What is it?

I. Introduction



A. Taxonomy

1. What is it?

- Science of naming and classifying groups of organisms

I. Introduction



A. Taxonomy

1. What is it?

- Science of naming and classifying groups of organisms
- Purposed to provide one stable and unique name and classification for every species.

Various common names for *Conium maculatum*:

- Poison hemlock
- Hemlock
- Devil's bread
- Beaver poison
- Herb bennet
- Musquash root
- Poison parsley
- Spotted corobane
- Spotted hemlock



I. Introduction




A. Taxonomy

2. Taxonomic Ranks


The classification of Mango

1. Domain: Eukaryota (4+ kingdoms)
2. Kingdom: Plantae (8-10 phyla)
3. Phylum: Magnoliophyta (2 classes)
4. Class: Magnoliopsida (30+ orders)
5. Order: Sapindales (9 families)
6. Family: Anacardiaceae (82 genera, 700 spp.)
7. Genus: *Mangifera* (69 spp.)
8. Species: *Mangifera indica*



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Lower taxa grouped within higher taxa based on similarities.

I. Introduction

B. Taxonomists


1. What
2. Where



I. Introduction

C. Products


1. Species
 - 1.8 million and counting



I. Introduction

C. Products


1. Species
 - 1.8 million and counting
 - Plant species in PA:
 - Mammal spp. in PA:
 - Herp spp. in PA:
 - Bird spp. in PA:



I. Introduction

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 - Species as units in conservation.




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- Species as objects of study




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- Species as objects of study
- Names to facilitate communication




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1. Species

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- Mammal spp. in PA:
- Herp spp. in PA:
- Bird spp. in PA:
- Species as units in conservation.
- Species as objects of study
- Names to facilitate communication
- Unit commodities of biological trade, agriculture, commerce, law, & medicine



Anti-Cancer Drug Discovery and Development in Brazil: Targeted Plant Collection as a Rational Strategy to Acquire Candidate Anti-Cancer Compounds


DENNIS R.A. MANS, ARIANA B. DA ROCHA, GILBERTO SCHWARTSMANN

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Key Words: Drug discovery, plant products, South America, Complementary medicine, Complementary medicine

ABSTRACT

Throughout medical history, plant products have been used as a source of natural products. In the last few decades, the search for new drugs has been intensified, and the use of natural products has become a rational strategy to acquire candidate anti-cancer compounds. The aim of this study was to acquire candidate anti-cancer compounds from plants collected in Brazil. The collected plant parts (leaves) were washed with water, separated from undesirable materials or plants or plant parts. They were sun-dried for one week after cutting into small pieces and were ground into a fine powder with the help of a suitable grinder (Cafétecator star).



J Vet Diagn Invest 4:60-64 (1992)

Toxicosis in dairy cattle exposed to poison hemlock (*Conium maculatum*) in hay: isolation of *Conium* alkaloids in plants, hay, and urine

Francis D. Galey, Dirk M. Holstge, Edwin G. Fisher


Abstract. Cattle in two herds developed signs of bloating, increased salivation and lacrimation, depressed respiratory distress, ataxia, and death after ingestion of hay that contained large amounts of poison hemlock (*Conium maculatum*). Twenty of 30 Angus cows and calves were affected in the first herd (2 died). In the second herd, 5 of 30 Holstein heifers were affected (1 died). The *Conium* alkaloids, coniine and γ -coniceine, were quantified in the hay, the plants from the responsible hayfield, and the urine of affected animals.

Poison hemlock (*Conium maculatum*) toxicosis has been described in many species of livestock, including cattle, sheep, horses, pigs, goats, and poultry.^{1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100} Clinical signs of acute poison hemlock toxicosis include nervousness, tremors, incoordination, mydriasis, weak heartbeat, cold extremities, coma, and death due to respiratory failure.¹ Several of the *Conium* alkaloids are teratogenic, causing limb deformities and cleft palate in the fetus of animals exposed to the plant or chemicals at susceptible periods during gestation.^{10,11,12} Fetotoxicity apparently results from reduction of fetal movement associated with the paralytic toxins.

Conium maculatum is a 1-3-m erect umbelliferous plant with a hollow, purple-spotted stem and fleshy identified by its branching, compartmentalized, containing tuberous roots and its leaf venation terminates in the notches of serrated leaflets. Poison hemlock toxicosis often follows the fresh plant. Dry material is less likely to be because of the volatility of *Conium* alkaloids. One case of poison hemlock toxicosis in a green-chopped hay has been reported,¹⁹ we aware of reports of such cases from hay. Poison hemlock toxicosis in cattle that ingested terminated hay and describe the demonstration, spectral confirmation, and distribution pattern of coniine and γ -coniceine in hay and urine.

Materials and methods


Case history



I. Introduction

C. Products

2. Higher Taxa & Classifications



I. Introduction

C. Products

2. Higher Taxa & Classifications

Have explanatory or predictive power

e.g. Why does the cashier run away when mangoes roll down the check-out belt?



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Anacardiaceae

From Wikipedia, the free encyclopedia

Anacardiaceae (the **cashew** or **sumac family**) are a family of flowering plants bearing fruits that are drupes and in some cases producing urushiol, an irritant. Anacardiaceae include numerous genera with several of economic importance. Notable plants in this family include cashew (in the type genus *Anacardium*), mango, poison ivy, sumac, smoke tree, and marula. The genus *Pistacia* (which includes the pistachio and mastic tree) usually is now

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e.g. Why does the cashier run away when mangoes roll down the check-out belt?

e.g. Drug Discovery



1700 *J. Nat. Prod.* 2002, 65, 1700–1702

Three New C-14 Oxygenated Taxanes from the Wood of *Taxus yunnanensis*

Arjun H. Banskota, Teppy Usia, Yasuhiro Tezuka, Kyoji Kozada, Nhan Trung Nguyen, and Shigetoshi Kadota*
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Received May 24, 2002

Three new C-14 oxygenated taxane-type diterpenes, hongloushans A–C (1–3), were isolated from the wood of *Taxus yunnanensis* together with four known diterpenes and two lignans. The absolute stereochemistry of the 2-methylbutyryloxy group attached at C-14 of the taxane skeleton was determined to be *S* by GC analysis of the methyl ester of 2-methylbutyric acid obtained after alkaline hydrolysis of 1 and 4 followed by treatment with CH_2N_2 . The complete stereostructure of the known compound 2a, 5a, 10 β -triacetoxy-14 β -[(*S*)-2-methylbutyryloxy]-4(20),11-taxadiene (4) was established for the first time. The isolates obtained were evaluated for their antiproliferative activity toward murine colon 26-L5 carcinoma and human HT-1080 fibrosarcoma cell lines.

The discovery of paclitaxel (Taxol) as a potent anticancer drug, initially isolated from *Taxus brevifolia*, has encouraged several groups all over the world to conduct research work on other *Taxus* species, to isolate potentially more effective paclitaxel derivatives for the treatment of various cancers or as starting materials for semisynthesis.¹ As a consequence, more than 350 taxane-type diterpenoids have been isolated from various *Taxus* plants, and some of them possess interesting anticancer activity.² *Taxus yunnanensis*

1 R₁ = Ac, R₂ = H
3 R₁ = R₂ = H


I. Introduction

C. Products

3. Floras, Manuals, Field Guides & Keys



The flora of PA includes 3000+ plant species and



p. 9

Dichotomous, indented keys:
Couplets & leads

GENERAL KEYS TO FAMILIES

MASTER KEY

- A. non-green, epiphytes or parasites, or plants lacking normally expanded leaves and/or stems Key 1, p. 10
- A. green, not obviously parasites, stems and leaves present
 - B. floating or submersed aquatics Key 2, p. 11
 - B. terrestrial or emergent aquatics
 - C. plants with perennial woody stems
 - D. plants in flower or leaf (spring or summer condition)
 - E. plants in flower but without leaves Key 3, p. 16
 - E. plants in leaf, with or without flowers
 - F. leaves needle- or scale-like, or fan-shaped Key 4, p. 19
 - F. leaves with more or less normally expanded blades
 - G. leaves opposite or whorled
 - H. leaves compound Key 5, p. 10
 - H. leaves simple Key 5, p. 20
 - G. leaves alternate
 - I. leaves compound Key 7, p. 21
 - I. leaves simple Key 8, p. 24
 - D. plants evergreen, semievergreen, or deciduous and leafless (winter condition)
 - J. evergreen or semievergreen trees, shrubs, or woody vines Key 9, p. 25

Master key begins on p. 9

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Sectional Keys follow

Key 4. Woody gymnosperms with leaves needle- or scale-like, or fan-shaped

- A. leaves needle- or scale-like
 - B. evergreen shrubs with flattened needle-like leaves, green (not white-striped) on the underside; seeds borne singly, surrounded by a fleshy red aril when mature Taxaceae, p. 114
 - B. evergreen (or deciduous) trees or shrubs with needle-like or scale-like leaves; seeds borne in a woody or fleshy cone, without an aril
 - C. evergreen trees or shrubs; leaves opposite or in whorls of three, appressed and scale-like or subulate and spreading; cone woody or fleshy, <2 cm long Cupressaceae, p. 112
 - C. evergreen or deciduous trees; needle-like leaves alternate, in fascicles or crowded on short lateral spurs; cone woody, mostly >2 cm long Pinaceae, p. 106
- A. leaves fan-shaped Ginkgoaceae, p. 106

Key 5. Woody angiosperms with opposite or whorled, compound leaves

- A. leaves palmately compound
 - B. shrubs, leaflets short-stalked, leaflet margins entire Vitaceae, p. 814
 - B. shrubs to large trees; leaflets sessile, leaflet margins variously toothed Anacardiaceae, p. 712
- A. leaves pinnately compound
 - C. leaves trifoliate (occasionally with some leaves having 5 leaflets)
 - D. vines Clematis in Ranunculaceae, p. 420
 - D. trees or shrubs

Family keys follow

PINACEAE Pine Family

Monococious, evergreen or deciduous trees with needle-like leaves; seed cones woody, maturing in 1 or 2 years; cone scales spirally arranged and bearing 2 seeds each on the upper surface; in some species the cone scales are subtended by bracts that extend beyond the scales, in others the bracts are shorter and inconspicuous; pollen cones borne singly or clustered, opening in the early spring, then dropping; seeds winged.

- A. deciduous trees; leaves needle-like, alternate, and clustered on short lateral shoots 6. Larix
- A. evergreen trees; leaves needle-like, borne singly or in clusters (fascicles) of 2-5
 - B. leaves in clusters (fascicles) of 2-5 with a scaly sheath at the base at least when young; cone scales mostly with a thickened portion at the tip (umbo) and often bearing a spine 1. Pinus
 - B. leaves borne singly, cone scales without a thickened portion at the tip
 - C. twigs roughened by persistent raised, peg-like leaf bases (sterigmata)
 - D. leaves sessile, square in cross section, tapering at the tip, spirally arranged on the twig 2. Picea
 - D. leaves narrowed to a short petiole, flattened, with a minute notch at the tip, 2-ranked, giving the twig a flattened appearance 4. Thuja
 - C. twigs smooth or nearly so
 - E. leaf scar circular and flush with the twig surface; bracts of the cone scales shorter than the scales 3. Abies
 - E. leaf scar slightly raised on one side; bracts of the cone scales conspicuously longer than the scales 5. Pseudotsuga

p. 106-107

Key to species follows

1. Pinus L.

Evergreen trees with needle-like leaves borne in fascicles of 2-5; seed cones woody with spirally arranged scales, maturing in 2 years; the exposed tips of the cone scales form a thickened apophysis with an umbo (scar), which may or may not bear a sharp spine or prickly; seeds with a broad papery wing.


- A. leaves 5 per fascicle; scaly bracts at the base of the fascicles not persistent; cones cylindrical, usually curved P. strobus
- A. leaves 2-3 per fascicle; scaly bracts at base of fascicle persistent; cones broader at the base
 - B. needles <9 cm long, mostly in 2s
 - C. cone scales spineless
 - D. bark of upper trunk and larger branches orange; needles blue-green; cones symmetrical, persisting on the branches after opening P. sylvestris
 - D. bark of upper trunk and branches brown; needles yellow-green; cones asymmetrical, persisting on the branches mostly in a closed condition P. banksiana
 - C. cone scales with a definite spine
 - E. cones 6-9 cm with very stout, spreading or upwardly curving spines P. pungens
 - E. cones 3-7 cm with slender, straight spines
 - F. rounded or flat-topped tree to 18 m; needles strongly twisted P. virginiana
 - F. erect tree to 40 m; needles slightly twisted P. edmunda

p. 107

II. Names

A. Nomenclatural Codes

1. International Code of Zoological Nomenclature
2. International Code of Nomenclature for Algae, Fungi and Plants



II. Names



B. Species

1. Characteristics of
 - a. Name must be unique*
 - b. Binomial construction

Haliaeetus leucocephalus

Genus

Specific epithet

II. Names



B. Species

1. Characteristics of
 - a. Name must be unique*
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Homo sapiens

Genus

Specific epithet

II. Names



B. Species

1. Characteristics of
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Acacia tortuosa

Genus

Specific epithet





II. Names


B. Species

1. Characteristics of
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 - b. Binomial construction

Boa constrictor



Aloe vera






II. Names

B. Species

1. Characteristics of
 - a. Name must be unique*
 - b. Binomial construction
 - c. Treated as Latin


Acer rubrum (red maple; neuter),
Quercus rubra (red oak; feminine),
Quercus alba (white oak; feminine),
Magnolia grandiflora (southern magnolia, fem.)
Ursus americanus (American black bear)
Haliaeetus leucocephalus (bald eagle)



II. Names

B. Species



1. Characteristics of
2. Honorary Names



II. Names

B. Species

1. Characteristics of
2. Honorary Names
 - a. Honorary genera
Dioscorea (Dioscorides)

II. Names

B. Species

1. Characteristics of
2. Honorary Names
 - a. Honorary genera
Dioscorea (Dioscorides)
Victoria (Queen Victoria, reigned 1837-1901)





II. Names





II. Names

B. Species

1. Characteristics of
2. Honorary Names
 - a. Honorary genera
Dioscorea (Dioscorides)
Victoria (Queen Victoria, reigned 1837-1901)





Victoria gordani Prout, ♀
Victoria Moth



II. Names

B. Species

1. Characteristics of
2. Honorary Names
 - a. Honorary genera
 - b. Honorary epithets
Abies fraseri
(Fraser's Fir)
after John Fraser
(1750-1811)





II. Names

B. Species

1. Characteristics of
2. Honorary Names
 - a. Honorary
 - b. Honorary

Slime mold beetles






II. Names

C. Subspecific Taxa

1. Subspecies
2. Varieties
3. Forms

Symphytichum lanceolatum var. *lanceolatum*
Symphytichum lanceolatum var. *interior*

Zea mays ssp. *mays*
Zea mays ssp. *mexicana*

II. Names

C. Subspecific Taxa

1. Subspecies
2. Varieties
3. Forms
4. Cultivars

Comparison of membrane-bound and soluble polyphenol oxidase in Fuji apple (*Malus domestica* Borkh. cv. Red Fuji).

Food Chemistry 173: 86-91.

D. Supraspecific Taxa

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2. Kingdom: Plantae
3. Phylum: Magnoliophyta
4. Class: Magnoliopsida
5. Order: Sapindales
6. Family: Anacardiaceae
7. Genus: *Mangifera*
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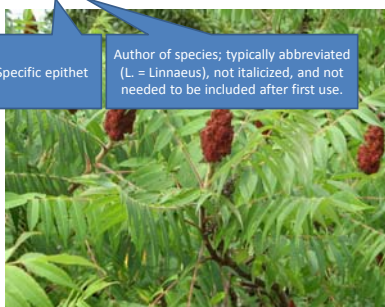

III. Authorship

A. Generalities

Rhus typhina L.

Genus Specific epithet


Author of species; typically abbreviated (L = Linnaeus), not italicized, and not needed to be included after first use.



III. Authorship

A. Generalities

Rhus typhina L.



III. Authorship

B. Two of more authors

Taxus cuspidata Siebold & Zucc.

III. Authorship



C. Parenthetical and combining authors

Toxicodendron radicans (L.) Kuntze

