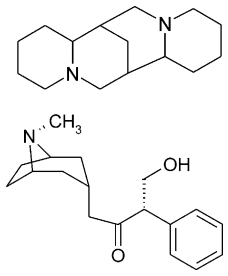
Phytochemistry, 2003, **64**, 3

Evolution of secondary metabolites from an ecological and molecular phylogenetic perspective

Michael Wink

Universität Heidelberg, Institut für Pharmazie und Molekulare Biotechnologie, Im Neuenheimer Feld 364, 69120 Heidelberg, Germany

Molecular phylogenies of the families Fabaceae, Solanaceae and Lamiaceae were reconstructed and employed as a framework to map and to interpret the distribution of some major defence compounds that are typical for the respective plant families. Profiles of adaptive secondary metabolites are often inconsistent which apparently reflect particular life strategies embedded in a given phylogenetic framework



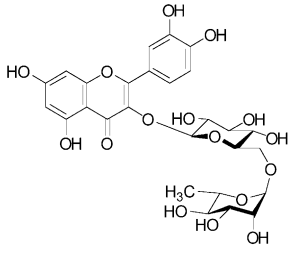
Phytochemistry, 2003, **64**, 21

Flavonoid–insect interactions: recent advances in our knowledge

Monique S.J. Simmonds

Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, UK

Recent contributions to the role of flavonoids in different aspects of insect–plant interactions are reviewed, including the effects of rutin on the feeding behaviour of a range of noctuid larvae.



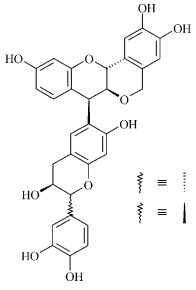
Phytochemistry, 2003, **64**, 31

Phytochemistry of the mopane, *Colophospermum mopane*

Daneel Ferreira, Jannie P.J. Marais, Desmond Slade

National Center for Natural Products Research, Research Institute of Pharmaceutical Sciences, School of Pharmacy, The University of Mississippi, University, MS 38677, USA

The polyphenolic pool of the heartwood of the mopane exhibits extreme diversity and complexity. It comprises a variety of monomeric flavonoids, dimeric proanthocyanidins and profisetinidin-type triflavanoids. The di- and tri-meric proanthocyanidins are accompanied by several functionalized tetrahydropyrano- and hexahydrodipyrano-chromenes that originate from the bi- and tri-flavanoids, respectively, via rearrangement of the pyran heterocycles.



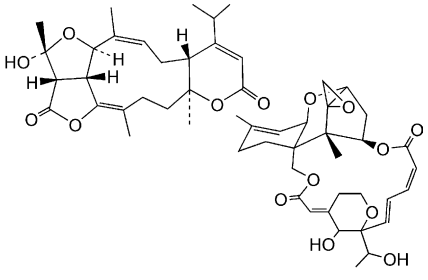
Phytochemistry, 2003, **64**, 53

Stachybotrys chartarum: a fungus for our time

Bruce B. Jarvis

Department of Chemistry & Biochemistry, University of Maryland, College Park, MD 20742, USA

Stachybotrys chartarum and *Memnoniella echinata* are molds found in damp buildings and believed to be responsible in part for building-related illnesses. Herein is reviewed the metabolite picture of these fungi that are known to produce a variety of toxins.



Phytochemistry, 2003, **64**, 61

Thoughts on thearubigins

Edwin Haslam

Department of Chemistry, Dainton Building, University of Sheffield, Sheffield S3 7HF, UK

The chemistry of tea leaf fermentation is reviewed and novel proposals put forward for the structure of the major pigments of black teas—the thearubigins.

(-)-epigallocatechin

(-)-epigallocatechin-3-*O*-gallate

polyphenoloxidase → thearubigins

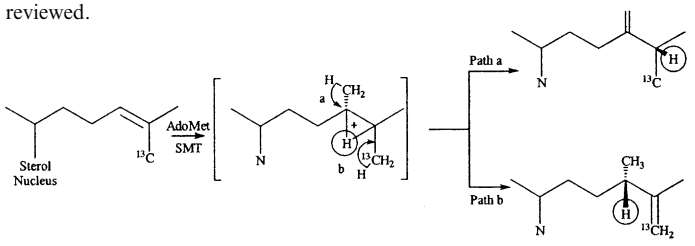
Phytochemistry, 2003, **64**, 75

Enzyme mechanisms for sterol *C*-methylations

W. David Nes

Department of Chemistry and Biochemistry, Texas Tech University, Lubbock, Texas 79409-1061, USA

The reaction and kinetic mechanisms of sterol *C*-methylation are reviewed.



Phytochemistry, 2003, **64**, 97

Polyamines and plant disease

Dale R. Walters

Department of Plant Biology, Scottish Agricultural College, Ayr Campus, Auchincruive Estate, Ayr KA6 5HW, UK

The involvement of free and conjugated polyamines in plant responses to pathogen infection is reviewed, including the possible role of diamine oxidase in producing hydrogen peroxide during defence responses.

$NH_2(CH_2)_4NH_2$

$NH_2(CH_2)_3NH(CH_2)_4NH_2$

$NH_2(CH_2)_3NH(CH_2)_4NH(CH_2)_3NH_2$

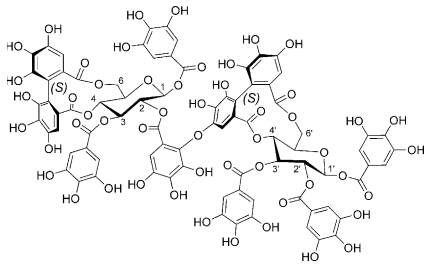
Phytochemistry, 2003, **64**, 109

Biosynthesis of the dimeric ellagitannin, cornusiin E, in *Tellima grandiflora*

Ruth Niemetz[a], Gerhard Schilling[b], Georg G. Gross[a]

[a]*Molekulare Botanik, Universität Ulm, D-89069 Ulm, Germany*
[b]*Universität Heidelberg, Organisch-Chemisches Institut, Im Neuenheimer Feld 270, D-69120 Heidelberg, Germany*

Partially purified enzyme extracts from leaves of *Tellima grandiflora* (Saxifragaceae) catalyzed the oxidative coupling of 1,2,3,4,6-pentagalloyl-β-D-glucose, via intermediate tellimagrandin II, to the dimeric ellagitannin, cornusiin E.



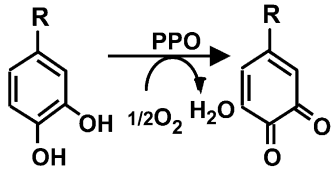
Phytochemistry, 2003, **64**, 115

Biochemical characterization of two differentially expressed polyphenol oxidases from hybrid poplar

Jiehua Wang[a,b], C. Peter Constabel[a]

[a]*Center for Forest Biology and Department of Biology, University of Victoria, Victoria, Canada V8W3N5*
[b]*Department of Biological Sciences, University of Alberta, Edmonton, Canada T6G 2E9*

Two differentially expressed polyphenol oxidase isoforms from hybrid poplar were partially purified and characterized.



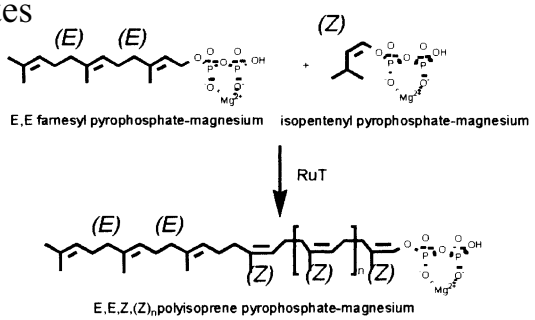
Phytochemistry, 2003, **64**, 123

Activation and inhibition of rubber transferases by metal cofactors and pyrophosphate substrates

Deborah J. Scott[a], Bernardo M.T. da Costa[b], Stephanie C. Espy[b], Jay D. Keasling[b], Katrina Cornish[a]

[a]*USDA-ARS, Western Regional Research Center, 800 Buchanan Street, Albany, CA 94710, USA*
[b]*Department of Chemical Engineering, University of California, Berkeley, CA 94720, USA*

Kinetic analyses indicate that FPP–Metal, FPP, IPP–Metal, Metal, but not IPP alone can interact independently with the rubber transferase active site in three rubber producing plant species.



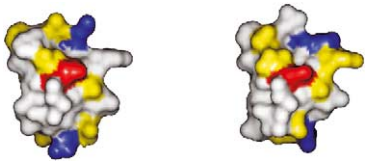
Phytochemistry, 2003, **64**, 135

Primary and 3-D modelled structures of two cyclotides from *Viola odorata*

Erika Svangård[a], Ulf Göransson[a], Derek Smith[b], Chandra Verma[b], Anders Backlund[a], Lars Bohlin[a], Per Claeson[a]

[a]*Division of Pharmacognosy, Department of Medicinal Chemistry, Uppsala University, Biomedical Centre, Box 574, SE-751 23 Uppsala, Sweden*
[b]*Structural Biology Laboratory, Department of Chemistry, University of York, Heslington, YO10 5YW York, UK*

Two cyclotides from *Viola odorata L.* (Violaceae) have been isolated and characterised using experimental and modelling techniques.



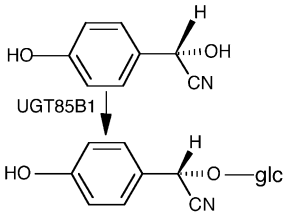
Phytochemistry, 2003, **64**, 143

The in vitro substrate regiospecificity of recombinant UGT85B1, the cyanohydrin glucosyltransferase from *Sorghum bicolor*

Karina Sinding Hansen[a], Charlotte Kristensen[a], David Bruce Tattersall[a], Patrik Raymond Jones[a], Carl Erik Olsen[b], Søren Bak[a], Birger Lindberg Møller[a]

[a]*Plant Biochemistry Laboratory, Department of Plant Biology, Royal Veterinary and Agricultural University, Thorvaldsensvej 40, and Center of Molecular Plant Physiology (PlaCe), DK-1871 Frederiksberg C, Copenhagen, Denmark*
[b]*Department of Chemistry, Royal Veterinary and Agricultural University, Thorvaldsensvej 40, DK-1871 Frederiksberg C, Copenhagen, Denmark*

UGT85B1 has rather broad substrate specificity in vitro but shows regiospecificity, demanding the presence of a sterically unhindered hydroxyl group and being influenced by the stereochemistry and/or interactive chemistry of the substituents on the hydroxyl-bearing carbon atom.



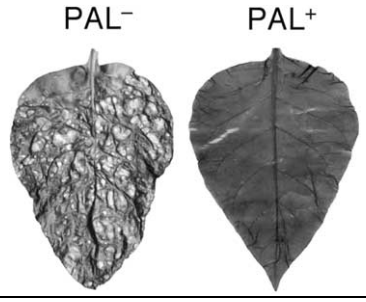
Phytochemistry, 2003, **64**, 153

Phenylpropanoid compounds and disease resistance in transgenic tobacco with altered expression of L-phenylalanine ammonia-lyase

Gail L. Shadle[a], S. Varsha Wesley[a], Kenneth L. Korth[a], Fang Chen[a], Chris Lamb[b], Richard A. Dixon[a]

[a]*Plant Biology Division, Samuel Roberts Noble Foundation, 2510 Sam Noble Parkway, Ardmore OK, 73402, USA*
[b]*John Innes Centre, Norwich Research Park, Colney, Norwich, NR4 7UH, UK*

Tobacco plants over-expressing L-phenylalanine ammonia-lyase have improved resistance to a fungal pathogen. This effect is not the result of increased salicylic acid levels.



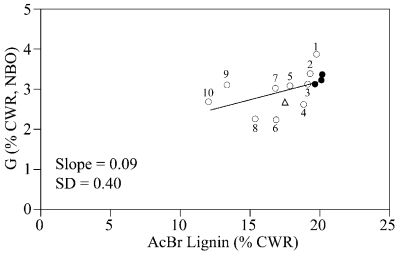
Phytochemistry, 2003, **64**, 163

A lignin-specific peroxidase in tobacco whose antisense suppression leads to vascular tissue modification

Kristopher A. Blee[a], Joon W. Choi[b], Ann P. O'Connell[a], Wolfgang Schuch[c], Norman G. Lewis[b], G. Paul Bolwell[a]

[a]*School of Biological Sciences, Royal Holloway, University of London, Egham, Surrey TW20 0EX, UK*
[b]*Institute of Biological Chemistry, Washington State University, Pullman, WA 99164-6340, USA*
[c]*Syngenta Wheat Improvement Centre, John Innes Centre, Colney, Norwich NR4 7UH, UK*

Down-regulation of a cationic peroxidase TP60, under control of the CAMV 35S promoter, gave transformants with significantly reduced lignin contents; reductions in releasable guaiacyl (G) and syringyl (S) amounts followed similar trends as lignin levels decreased.



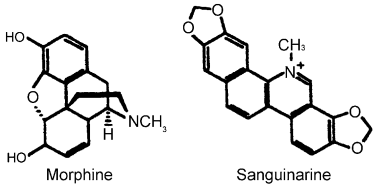
Phytochemistry, 2003, **64**, 177

Developmental and inducible accumulation of gene transcripts involved in alkaloid biosynthesis in opium poppy

Peter J. Facchini, Sang-Un Park

Department of Biological Sciences, University of Calgary, Calgary, Alberta, Canada T2N 1N4,

Molecular clones for the *O*- and *N*-methyltransferases involved in (*S*)-reticuline biosynthesis were isolated from opium poppy. These *c*DNAs were used, together with five others involved in benzylisoquinoline alkaloid biosynthesis, to probe the developmental and inducible accumulation of gene transcripts in opium poppy plants and cell cultures. Most genes display some degree of coordinate regulation.



Phytochemistry, 2003, **64**, 187

Identification of *Erythroxylum* taxa by AFLP DNA analysis

Emanuel L. Johnson, James A. Saunders, Sue Mischke, Charles S. Helling, Stephen D. Emche

Alternate Crops and Systems Laboratory, Plant Sciences Institute, Beltsville Agricultural Research Center, 10300 Baltimore Avenue, Beltsville, MD 20705-2350, USA

One-hundred and thirty-two coca (*Erythroxylum* spp.) samples, including 38 collected from illicit fields in Colombia, South America, were analyzed by AFLP and a dendrogram was constructed to relate their genetic variability.

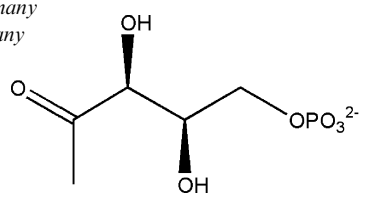
Phytochemistry, 2003, **64**, 199

Early steps of deoxyxylulose phosphate pathway in chromoplasts of higher plants

Monika Fellermeier[a], Silvia Sagner[a], Peter Spiteller[b], Michael Spiteller[c], Meinhart H. Zenk[a]

[a]*Biozentrum der Universität Halle, Weinbergweg 22, D-06120 Halle, Germany*
[b]*Institut für Organische Chemie, Universität München, Butenandtstrasse 5-13, D-81377 München, Germany*
[c]*Institut für Umweltforschung, Universität Dortmund, Otto-Hahn-Strasse 6, D-44221 Dortmund, Germany*

The isolation and structural identification of two intermediates of the deoxyxylulose phosphate pathway (4-diphosphocytidyl-2*C*-methyl-D-erythritol and 2*C*-methyl-D-erythritol 2,4-cyclodiphosphate) in plant chromoplasts is described.



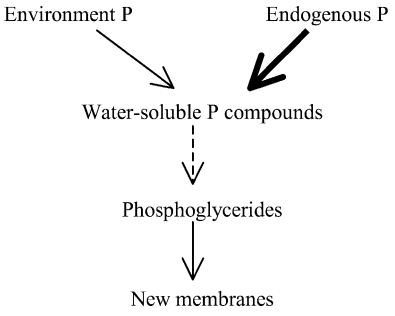
Phytochemistry, 2003, **64**, 209

Lipid metabolism in cultured lichen photobionts with different phosphorus status

Irina A. Guschina[a], Gary Dobson[b], John L. Harwood[a]

[a]*School of Biosciences, Cardiff University, PO Box 911, Cardiff CF10 3US, UK*
[b]*Scottish Crop Research Institute, Invergowrie, Dundee DD2 5DA, UK*

Lipid metabolism in four different algal and one cyanobacterial lichen photobionts was surprisingly little affected by phosphorus availability. This was most probably due to the polyphosphate stores that all these organisms can accumulate.



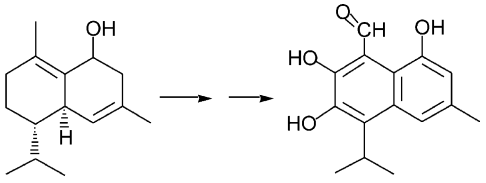
Phytochemistry, 2003, **64**, 219

8-Hydroxy-(+)-δ-cadinene is a precursor to hemigossypol in *Gossypium hirsutum*

Yan-Hong Wang, Guadalupe Davila-Huerta, Margaret Essenberg

Department of Biochemistry and Molecular Biology, Oklahoma State University, Stillwater, OK 74078-3035, USA

Tritium-labeled 8-hydroxy-(+)-δ-cadinene was converted to hemigossypol in cotton cotyledons.



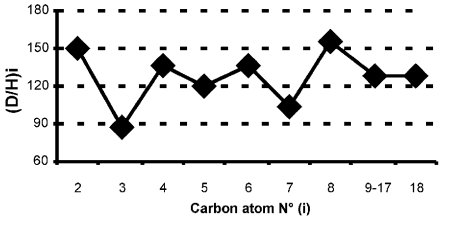
Phytochemistry, 2003, **64**, 227

Quantitative ^{2}H NMR analysis of deuterium distribution in petroselinic acid isolated from parsley seed

Sébastien Guiet[a], Richard J. Robins[a], Michele Lees[b], Isabelle Billault[a,*]

[a]*Isotopic Fractionation in Metabolism Group, LAIEM, CNRS UMR6006, University of Nantes, BP 99208, F-44322 Nantes, France*
[b]*Eurofins Scientific, rue Pierre Adolphe Bobierre, BP 42301, F-44323 Nantes, France*

The distribution in ^{2}H in the unusual fatty acid, petroselinic acid, is reported and found to differ from that in oleic and linoleic acids.



Phytochemistry, 2003, **64**, 235

Changes in the activity of the alternative oxidase in *Orobanche* seeds during conditioning and their possible physiological function

Nurit Bar Nun[a], Dina Plakhine[b], Daniel M. Joel[b], Alfred M. Mayer[a]

[a]*Department of Botany, The Hebrew University of Jerusalem, Jerusalem 91904, Israel*
[b]*Department of Weed Research, Agricultural Organization, Newe-Ya'ar Research Center, Ramat Yishai 30095, Israel*

Dry seed→conditioning→AOX induction→AOX disappearance→ response to stimulant→germination
↘ ↗
Appearance of ROS→AOX activity→removal of ROS

During conditioning of the seeds AOX is first induced and then disappears, when the seeds are ready to respond to a stimulant. Inhibition of AOX or late addition of H_2O_2 inhibit subsequent germination.

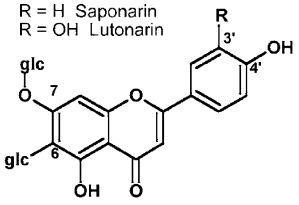
Phytochemistry, 2003, **64**, 243

Contribution of phenolic compounds to the UV-B screening capacity of developing barley primary leaves in relation to DNA damage and repair under elevated UV-B levels

Rainer Schmitz-Hoerner, Gottfried Weissenböck

Universität zu Köln, Botanisches Institut, Gyrhofstrasse 15, D-50931 Köln, Germany

Grown under highly elevated UV-B levels, barley primary leaves accumulated protective compounds, mainly flavones. Nevertheless, an 8-fold increase of thymine dimer (TD) levels were observed over a period of 18 days. The corresponding flavone-deficient mutant accumulated additional DNA damage with up to 9-fold TD contents.



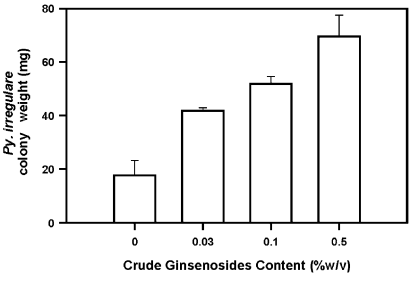
Phytochemistry, 2003, **64**, 257

Ginsenosides stimulate the growth of soilborne pathogens of American ginseng

Robert W. Nicol[a], Lina Yousef[a], James A. Traquair[b], Mark A. Bernards[a]

[a]*Department of Biology, University of Western Ontario, London, ON, Canada N6A 5B7*
[b]*SCPFRC, Agriculture and Agri-Food Canada, London, ON, Canada N5V 4T3*

Ginsenosides were shown to stimulate the growth of soilborne pythiaceous pathogens of American ginseng (*Panax quinquefolius*) in vitro at concentrations mimicking those measured in the rhizosphere of field-grown ginseng plants.



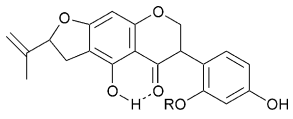
Phytochemistry, 2003, **64**, 265

Isoflavanones from the allelopathic aqueous root exudate of *Desmodium uncinatum*

Muniru K. Tsanuo[a,b], Ahmed Hassanali[b], Antony M. Hooper[c], Zeyaur Khan[b], Festus Kaberia[a], John A. Pickett[c], Lester J. Wadhams[c]

[a]*Chemistry Department, Jomo Kenyatta University of Agriculture and Technology, PO Box 62000, Nairobi, Kenya*
[b]*Behavioural and Chemical Ecology Department, International Centre of Insect Physiology and Ecology. P.O. Box 30772, Nairobi, Kenya*
[c]*Biological Chemistry Division, Rothamsted Research, Harpenden, Herts, Al5 2JQ, UK*

Three isoflavanones, including the two shown were isolated and characterised spectroscopically from the root exudate of the legume *Desmodium uncinatum* (Jacq.) DC. Isolated fractions containing isoflavanone (R = H) induced germination of seeds from the parasitic weed *Striga hermonthica* (Del.) Benth and fractions containing the isoflavanone (R = Me) moderately inhibited radical growth, the first example of a newly identified potential allelopathic mechanism to prevent *S. hermonthica* parasitism.



R = H **2**
R = Me **3**

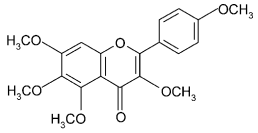
Phytochemistry, 2003, **64**, 275

Variations in lipophilic and vacuolar flavonoids among European *Pulicaria* species

Christine A. Williams[a], Jeffrey B. Harborne[a], Jenny R. Greenham[a], Renée J. Grayer[b], Geoffrey C. Kite[b], John Eagles[c]

[a]*School of Plant Sciences, Plant Science Laboratories, The University, Whiteknights, PO Box 221, Reading, Berks RG6 6AS, UK*
[b]*Jodrell Laboratory, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, UK*
[c]*Institute of Food Research, Colney, Norwich, NR4 7UA, UK*

The major lipophilic flavonoids of European *Pulicaria* species were 6-hydroxyflavonols and/or 6-hydroxyflavones, including, 6-hydroxykaempferol 3,5,6,7,4′-pentamethyl ether. Flavonol 3- and 7-glucuronides were characteristic vacuolar constituents.



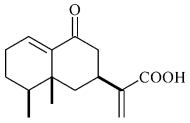
Phytochemistry, 2003, **64**, 285

Phytotoxic compounds from *Flourensia cernua*

Rachel Mata[a], Robert Bye[b], Edelmira Linares[b], Martha Macías[b], Isabel Rivero-Cruz[a], Olga Pérez[a], Barbara N. Timmermann[c]

[a]*Departamento de Farmacia, Facultad de Química, Universidad Nacional Autónoma de México, D.F. 04510 Mexico*
[b]*Jardín Botánico, Instituto de Biología, Universidad Nacional Autónoma de México, D.F. 04510, Mexico*
[c]*Department of Pharmacology and Toxicology, College of Pharmacy, University of Arizona, Tucson, AZ 85721-0207, USA*

Bioassay-directed fractionation of an extract of the aerial parts of *Flourensia cernua* (Asteraceae) led to the isolation of dehydroflourensic acid (**1**), flourensadiol (**2**) and methyl orsellinate (**3**) as active principles. Dehydroflourensic acid (**1**) is a new natural product. Compounds **1**–**3** are phytotoxic against *Amaranthus hypochondriacus* and *Echinochloa crus-galli*, interacted with bovine-brain CaM and inhibited the activation of the CaM-dependent enzyme cAMP phosphodiesterase.



1

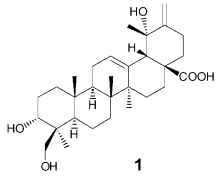
Phytochemistry, 2003, **64**, 293

Isolation and absolute stereochemistry of coussaric acid, a new bioactive triterpenoid from the stems of *Coussarea brevicaulis*

Bao-Ning Su[a], Young-Hwa Kang[a], Rosa Elena Pinos[b], Bernard D. Santarsiero[c], Andrew D. Mesecar[c], D. Doel Soejarto[a], Harry H.S. Fong[a], John M. Pezzuto[a], A. Douglas Kinghorn[a]

[a]*Program for Collaborative Research in the Pharmaceutical Sciences and Department of Medicinal Chemistry and Pharmacognosy, College of Pharmacy, University of Illinois at Chicago, Chicago, IL 60612, USA*
[b]*Facultad de Ciencias, Escuela Superior Politecnica de Chimborazo (ESPOCH), Riobamba, Ecuador*
[c]*Center for Pharmaceutical Biotechnology and the Department of Medicinal Chemistry and Pharmacognosy, College of Pharmacy, University of Illinois at Chicago, IL 60607, USA*

Coussaric acid (**1**), a triterpenoid based on an ursane skeleton, and an oleanane-type triterpene acid, 3-*epi*-spathodic acid, as well as four known compounds, have been isolated from an EtOAc-soluble extract of the stems of *Coussarea brevicaulis*.



1

Phytochemistry, 2003, **64**, 303

Terpenoids from the seeds of *Artemisia annua*

Geoffrey D. Brown[a,b], Guang-Yi Liang[c], Lai-King Sy[b]

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[b]*Department of Chemistry and Open Laboratory of Chemical Biology of the Institute of Molecular Technology for Drug Discovery and Synthesis, Area of Excellence Scheme of University Grant Committee (Hong Kong), The University of Hong Kong, Pokfulam Road, Hong Kong*
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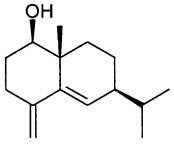
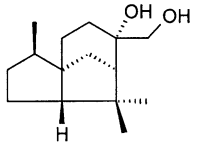
Fourteen sesquiterpenes, three monoterpenes and one diterpene have been isolated from the seeds of *Artemisia annua*.





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α-D-Glucuronosyl-(1→3)-L-galactose, an unusual disaccharide from polysaccharides of the hornwort Anthoceros caucasicus

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Acid hydrolysis of *Anthoceros caucasicus* thallus cell walls yielded substantial amounts of α-D-Glc*p*A-(1→3)-L-Gal. This disaccharide was undetectable in hydrolysates of charophytes, mosses, liverworts and vascular plants. A high proportion of α-D-Glc*p*A-(1→3)-L-Gal is thus an autapomorphy of the hornwort.