

Phytochemistry Vol. 69, No. 1, 2008

Contents

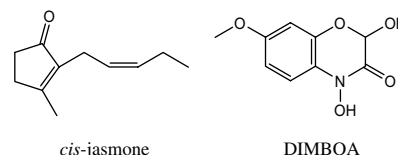
ECOLOGICAL BIOCHEMISTRY

cis-Jasmone induces accumulation of defence compounds in wheat, *Triticum aestivum*

pp 9–17

Maria C. Blassioli Moraes, Michael A. Birkett*, Ruth Gordon-Weeks, Lesley E. Smart, Janet L. Martin, Barry J. Pye, Richard Bromilow, John A. Pickett

The impact of the plant activator, *cis*-jasmone, upon the secondary metabolism of wheat seedlings, *Triticum aestivum* cv. Solstice, was investigated. Increased levels of benzoxazinoids, such as DIMBOA, and phenolic acids were observed in treated plants. These results show, for the first time, that *cis*-jasmone can induce production of compounds capable of directly reducing the development of insect pests, diseases and weeds.



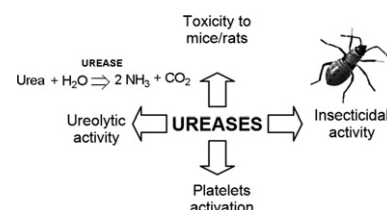
REVIEW

Insights into the role and structure of plant ureases

pp 18–28

Cristian Follmer*

Ureases belong to a group of multifunctional proteins displaying ureolytic activity, toxic properties in mammals, ability to activate blood platelets and insecticidal activity; the latter reinforces the possibility of plant ureases having a protective role against phytopathogens through an entirely different mechanism, unrelated to the release of ammonia.



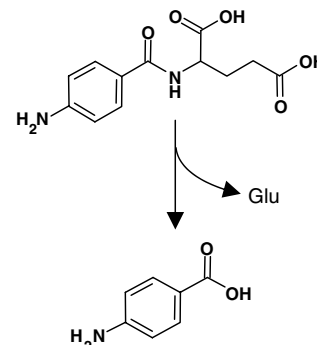
PROTEIN BIOCHEMISTRY

Characterization of the folate salvage enzyme *p*-aminobenzoylglutamate hydrolase in plants

pp 29–37

Gale G. Bozzo, Gilles J.C. Basset, Valeria Naponelli, Alexandre Noiriél, Jesse F. Gregory III, Andrew D. Hanson*

Folate breakdown gives a *p*-aminobenzoylglutamate moiety that can be hydrolyzed to the folate precursor *p*-aminobenzoate. Subcellular fractionation and chromatography indicated that pea and *Arabidopsis* have at least two *p*-aminobenzoylglutamate hydrolase isoforms. Partial purification of the *Arabidopsis* root activity showed it to be a metalloenzyme; the preparation also hydrolyzed folic acid.

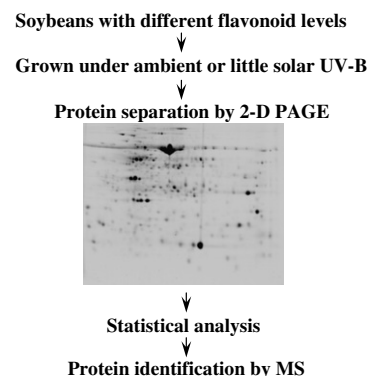


Impact of solar ultraviolet-B on the proteome in soybean lines differing in flavonoid contents

Chenping Xu, Joe H. Sullivan, Wesley M. Garrett, Thomas J. Caperna, Savithiry Natarajan*

Two isolines of soybean Clark cultivar were grown in the field with or without natural levels of UV-B radiation. The proteins were extracted from the 12-days-old primary leaves and separated by 2-D PAGE. The differently accumulated proteins were identified by MS and their functions were discussed.

pp 38–48



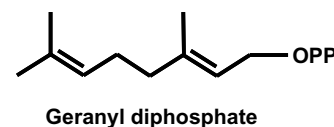
MOLECULAR GENETICS AND GENOMICS

Cloning and characterization of two different types of geranyl diphosphate synthases from Norway spruce (*Picea abies*)

pp 49–57

Axel Schmidt*, Jonathan Gershenzon

Isolation, sequence analysis and heterologous expression of isoprenyl diphosphate synthases from Norway spruce demonstrated two GPP synthases to be present in this species, each a representative of a different homodimeric type.

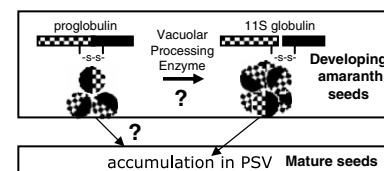


Mature *Amaranthus hypochondriacus* seeds contain non-processed 11S precursors

pp 58–65

María Isabel Molina, Ariana Circosta, María Cristina Añón, Silvana Petruccielli*

Using seed-produced protein fractions and a recombinant amaranth 11S-globulin, it was demonstrated that amaranth mature seeds contain non-processed 11S-globulins (proglobulins). The presence of these precursors is not a consequence of low vacuolar processing enzyme activity in developing amaranth seeds.

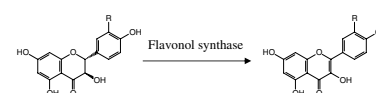


Elucidation of active site residues of *Arabidopsis thaliana* flavonol synthase provides a molecular platform for engineering flavonols

pp 66–75

Chun Song Chua, Daniela Biermann, Kian Sim Goo, Tiow-Suan Sim*

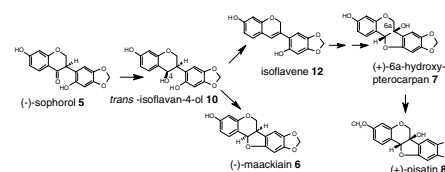
Five residues in *Arabidopsis thaliana* flavonol synthase, H132, F134, K202, F293 and E295, were identified as potential active site residues via tertiary structure superimposition with *A. thaliana* anthocyanidin synthase. The importance of these residues in determining the functionality of the enzyme was investigated through a series of site-directed mutagenesis.



Inactivation of pea genes by RNAi supports the involvement of two similar *O*-methyltransferases in the biosynthesis of (+)-pisatin and of chiral intermediates with a configuration opposite that found in (+)-pisatin

Evans Kaimoyo, Hans D. VanEtten*

RNAi was used to confirm that the biosynthesis of the pterocarpan (+)-pisatin involves chiral intermediates with opposite configuration to that found at C-6a in (+)-pisatin. Cell free extracts convert a chiral isoflavan-4-ol to an achiral symmetrical isoflavene, which might serve as the intermediate through which the configuration is changed to that found in (+)-pisatin.



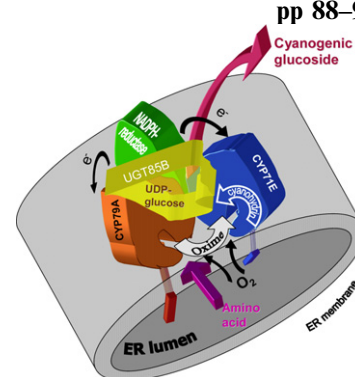
pp 76–87

METABOLISM

Metabolon formation in dhurrin biosynthesis

Kirsten Annette Nielsen, David B. Tattersall, Patrik Raymond Jones, Birger Lindberg Møller*

Metabolon formation in dhurrin biosynthesis was analyzed using stably and transiently expressed fluorescent fusion proteins in Arabidopsis and sorghum.

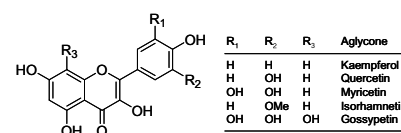


pp 88–98

Metabolic profiling of flavonoids in *Lotus japonicus* using liquid chromatography Fourier transform ion cyclotron resonance mass spectrometry

Hideyuki Suzuki, Ryosuke Sasaki, Yoshiyuki Ogata, Yukiko Nakamura, Nozomu Sakurai, Mariko Kitajima, Hiromitsu Takayama, Shigehiko Kanaya, Koh Aoki*, Daisuke Shibata, Kazuki Saito*

A comprehensive flavonoid analysis using LC-FTICR/MS established the presence of 61 flavonoid metabolites including gossypetin and isorhamnetin derivatives in *Lotus japonicus* accessions MG-20 and B-129. Flavonoid profiling demonstrated that anthocyanins and flavonol glycosides accumulated in a tissue- and development-dependent manner.

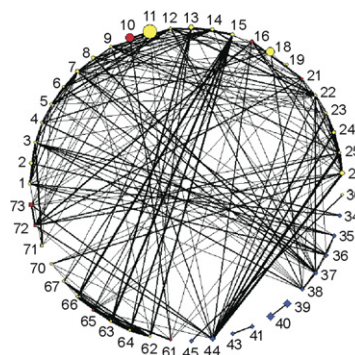


pp 99–111

Metabolite profiling of mycorrhizal roots of *Medicago truncatula*

Willibald Schliemann*, Christian Ammer, Dieter Strack

Extensive analyses of soluble primary and secondary metabolites as well as cell wall-bound phenolics of *Medicago truncatula* roots by GC–MS, HPLC, and LC–MS during the symbiotic interaction with the arbuscular mycorrhizal fungus *Glomus intraradices* are reported. Metabolite data sets were subjected to bioinformatics approaches including HCA, PCA and network analyses.



pp 112–146

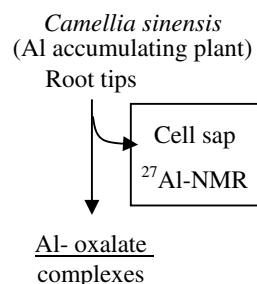
ECOLOGICAL BIOCHEMISTRY

Mechanism for the detoxification of aluminum in roots of tea plant (*Camellia sinensis* (L.) Kuntze)

pp 147–153

Akio Morita*, Osamu Yanagisawa, Satoshi Takatsu, Setsuko Maeda, Syuntaro Hiradate

The ^{27}Al NMR spectrum of cell sap, extracted from tea root tips, suggested that Al–oxalate complexes were major forms of Al in tea roots.



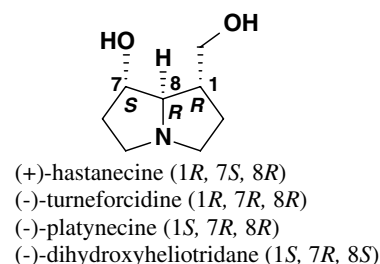
CHEMOTAXONOMY

Pyrrolizidine alkaloids of the endemic Mexican genus *Pittocaulon* and assignment of stereoisomeric 1,2-saturated necine bases

pp 154–167

Juan Camilo Marín-Loaiza, Ludger Ernst, Till Beuerle, Claudine Theuring, Carlos L. Céspedes*, Thomas Hartmann*

Pittocaulon species contain mixed profiles of macrocyclic 1,2-unsaturated pyrrolizidine alkaloids and angeloylestere of different 1,2-saturated necine bases. A GC–MS method for an unequivocal assignment of the stereoisomeric 1,2-saturated necine bases and their discrimination by NMR is presented.



Classification of *Aristolochia* species based on GC–MS and chemometric analyses of essential oils

pp 168–175

Carla S. Francisco, Gisele B. Messiano, Lucia M.X. Lopes*, Aristeu G. Tininis, José E. de Oliveira, Lindolpho Capellari Jr.

Essential oils were obtained from roots of 10 *Aristolochia* species by hydrodistillation and analysed by GC–MS. Multivariate analyses of 80 chemical constituents enabled classification of the species into four morphological groups. These forms of analysis represent an aid in identification of further specimens belonging to these species.

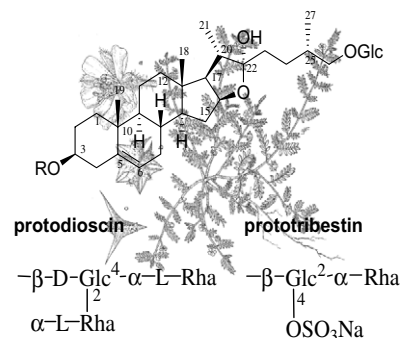


Distribution of steroidal saponins in *Tribulus terrestris* from different geographical regions

pp 176–186

Dragomir Dinchev, Bogdan Janda, Liuba Evstatieva, Wieslaw Oleszek, Mohammad R. Aslani, Ivanka Kostova*

LC–MC analysis of samples of *Tribulus terrestris* from different geographical regions revealed significant differences in their chemical composition. The data suggested the existence of one chemotype common to East South Europe and West Asia and the presence of other chemotypes in India and Vietnam. No clear correlation between the steroidal profile and the burrs morphology was found.

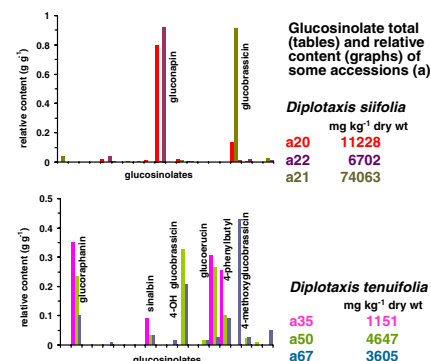


Glucosinolates in *Diplotaxis* and *Eruca* leaves: Diversity, taxonomic relations and applied aspects

pp 187–199

L. Filippo D'Antuono*, Simona Elementi, Roberta Neri

Healthy and tasty: these attributes define edible wild (*Diplotaxis tenuifolia*) and salad rocket (*Eruca sativa*), for their glucosinolate profile, that was characterised by variation in some key components. Ample variability was also detected in other *Diplotaxis*, with extremely glucosinolate-rich species, and strongly characterised profiles, revealing likely taxonomic affinities among taxa previously examined by other criteria, and suggesting potentials of exploitation.



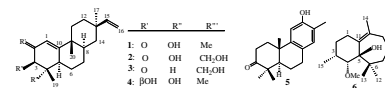
BIOACTIVE PRODUCTS

Antifungal rosane diterpenes and other constituents of *Hugonia castaneifolia*

pp 200–205

Lilechi D. Baraza, Cosam C. Joseph, Joan J.E. Munissi, Mayunga H.H. Nkunya*, Norbert Arnold, Andrea Porzel, Ludger Wessjohann*

3 β -Hydroxyrosa-1(10),15-dien-2-one (**1**), 18-hydroxyhugorosenone (**2**) and 18-hydroxy-3-deoxyhugorosenone (**3**), and 12-hydroxy-13-methylpodocarpa-8,11,13-trien-3-one (**5**) were isolated as antifungal constituents of *Hugonia castaneifolia*, together with 1(10),15-rosadiene-2 β ,3 β -diol (**4**), 4 α -methoxyhimachal-10-en-5 β -ol (**6**) and other weakly or inactive compounds. Hugorosenone also exhibited larvicidal activity.

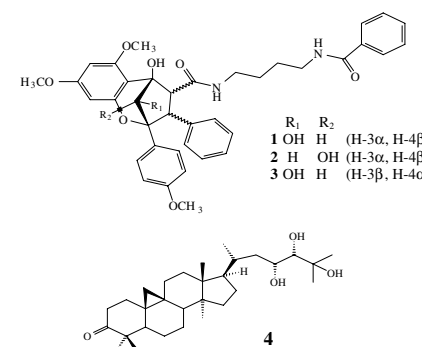


Flavaglines and triterpenoids from the leaves of *Aglaia forbesii*

pp 206–211

Nantiya Joycharat, Harald Greger, Otmar Hofer, Ekarin Saifah*

Three flavaglines and a cycloartane triterpene were identified together with lupeol and lupenone, two pregnane steroids, the bisamide pyrimidinone, the sesquiterpene spathulenol, and a mixture of β -sitosterol and stigmasterol. Some compounds were tested for antituberculosis and antiviral activity.

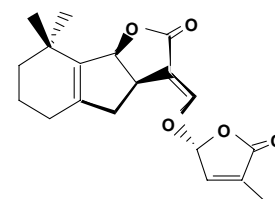


Production of (+)-5-deoxystrigol by *Lotus japonicus* root culture

pp 212–217

Yukihiro Sugimoto*, Tomoki Ueyama

Lotus japonicus roots, cultured in a modified B5 medium, produced and secreted germination stimulants that induced *Striga hermonthica* seed germination. An active compound was isolated from hexane extracts of the roots and the culture filtrate. Based on chromatographic behaviour on PLC, and ¹H NMR, UV, MS and CD spectroscopic analyses, the germination stimulant as identified as (+)-5-deoxystrigol (**1**).

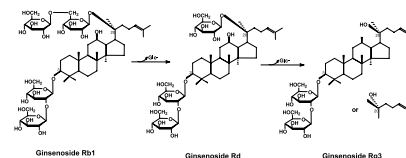


Conversion of major ginsenoside Rb1 to 20(S)-ginsenoside Rg3 by *Microbacterium* sp. GS514

pp 218–224

Le-Qin Cheng, Ju Ryun Na, Myun Ho Bang, Myung Kyum Kim, Deok-Chun Yang*

Fig. 2. Biotransformation pathway for production of ginsenoside Rg3 (1) from Rb1 (2). (a) Ginsenoside Rb1 (2) was converted to ginsenoside Rg3 (1) via Rd (2); (b) ginsenoside Rb1 (2) was converted to ginsenoside Rg3 (1) directly.

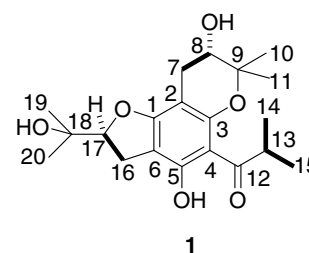


DNA strand-scission by phloroglucinols and lignans from heartwood of *Garcinia subelliptica* Merr. and *Justicia* plants

pp 225–233

Yi-Huang Lu, Bai-Luh Wei, Horng-Huey Ko, Chun-Nan Lin*

Phloroglucinols, garcinielliptones HA (1), HB (2), HC (3), HD (4) and HE (5), isolated from the heartwood of *Garcinia subelliptica*, were identified by extensive analysis of spectroscopic data. In the presence of Cu(II), compound 3 and lignans, isolated from *Justicia* plants, 8, 10 and 11 caused significant breakage of supercoiled plasmid pBR322.

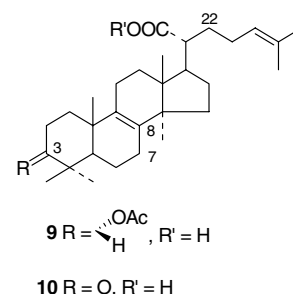


Antiinflammatory triterpenoids and steroids from *Ganoderma lucidum* and *G. tsugae*

pp 234–239

Horng-Huey Ko, Chi-Feng Hung, Jih-Pyang Wang, Chun-Nan Lin*

The antiinflammatory or inflammatory properties of a series of triterpenoids and steroids isolated from *Ganoderma* genus were evaluated in the present paper. Compound 9 showed significant inhibitory effect on fMLP/CB-induced superoxide anion generation from rat neutrophils. Compound 10 showed significant inhibitory effects on release of β -glucuronidase stimulated with fMLP/CB from rat neutrophils and accumulation of NO_2^- in culture media of N9 cells in response to LPS/IFN- γ , respectively. Compound 9 was also able to protect human keratinocytes against damage induced by ultraviolet B (UV B) light, it provides the first evidence that a triterpenoid, i.e. 9, could protect keratinocytes from photodamage.



CHEMISTRY

LC–MS and GC–MS metabolite profiling of nickel(II) complexes in the latex of the nickel-hyperaccumulating tree *Sebertia acuminata* and identification of methylated aldarc acid as a new nickel(II) ligand

pp 240–251

Damien L. Callahan, Ute Roessner, Vincent Dumontet, Nicolas Perrier, Anthony G. Wedd, Richard A.J. O'Hair, Alan J.M. Baker, Spas D. Kolev*

The latex from *Sebertia acuminata* contains the highest concentration of Ni found in any living organism. More than 120 compounds were detected in the latex by GC–MS and a methylated aldarc acid (2,4,5-trihydroxy-3-methoxy-1,6-hexan-dioic acid) was found co-ordinated to Ni^{II} . This is the first time this organic acid has been isolated from biological extracts. After citric acid, it appears to be one of the most abundant small organic molecules present in the latex studied.



Unusual partially 3-*O*-methylated α -galactan from mushrooms of the genus *Pleurotus*

pp 252–257

Elaine R. Carbonero, Ana Helena P. Gracher, Moira Caroline C. Rosa, Giangiacomo Torri, Guilherme L. Sassaki, Philip Albert J. Gorin, Marcello Iacomini*

Indistinguishable partially 3-*O*-methylated galactans were isolated from the edible basidiomycetes *Pleurotus eryngii* and *Pleurotus ostreatoroseus*. They were linear, partially 3-*O*-methylated, (1 \rightarrow 6)-linked α -galactans containing Gal and 3-Me-Gal, in a 3:1 molar ratio. The presence of the structure now described is the first in fruit bodies of mushrooms.

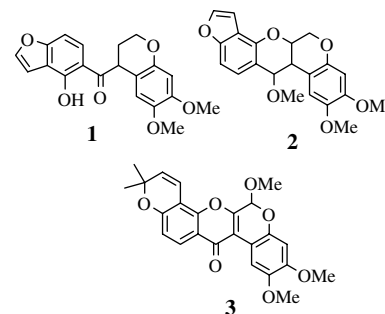
*P. ostreatoroseus**P. eryngii*

Rotenoid derivatives and other constituents of the twigs of *Millettia duchesnei*

pp 258–263

François Ngandeu, Merhatibeb Bezabih*, Dieudonné Ngamga, Alembert T. Tchinda, Bonaventure T. Ngadjui, Berhanu M. Abegaz*, Hanh Dufat, François Tillequin

Three prenylated rotenoids, elliptol (1), 12-deoxo-12 α -methoxyelliptone (2) and 6-methoxy-6a,12a-dehydrodeguelin (3) were isolated from the twigs of *Millettia duchesnei* De Wild.

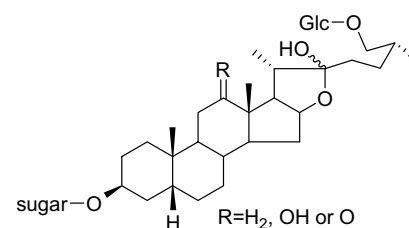


Steroidal saponins from the stem of *Yucca elephantipes*

pp 264–270

Ying Zhang, Ying-Jun Zhang*, Melissa R. Jacob, Xing-Cong Li, Chong-Ren Yang

Ten steroidal saponins with *cis*-fused A/B ring, including a smilagenin glycoside, elephanoside A (4), and the five furostanol bisdesmosides, elephanosides B–F (6–10), were isolated from the stems of *Yucca elephantipes* Regel. (Agavaceae). Of these, two known smilagenin glycosides, Ys-II (1) and Ys-IV (2), showed moderate antifungal activity against *Candida albicans* and *Cryptococcus neoformans*.

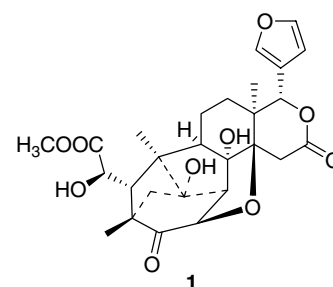


Limonoids from the stem bark of *Khaya grandifoliola*

pp 271–275

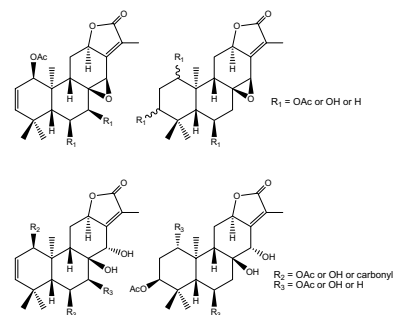
Hua Zhang, Oluwatoyin A. Odeku, Xiao-Ning Wang, Jian-Min Yue*

Limonoids, deacetylkhayanolide E (1), 6*S*-hydroxykhayalactone (2), and grandifolide A (3) were isolated from stem bark of a Nigerian medicinal plant *Khaya grandifoliola*. Their structures were characterized on the basis of spectroscopic methods.



Cytotoxic *ent*-abietane diterpenes from *Gelonium aequoreum***pp 276–287**

Chia-Lin Lee, Fang-Rong Chang, Pei-Wen Hsieh, Michael-Y. Chiang,
Chin-Chung Wu, Zih-You Huang, Yu-Hsuan Lan, Mei Chen,
Kuo-Hsiung Lee, Hsin-Fu Yen, Wen-Chun Hung, Yang-Chang Wu*



Seventeen *ent*-abietane diterpenes, including gelomulides K–X (1–14), were isolated from the leaves of *Gelonium aequoreum* together with three known compounds. Their structures were elucidated by spectroscopic and chemical methods, including NMR, MS, UV, IR, CD, and Mosher's method. The *in vitro* cytotoxic activity of the isolated compounds was determined. Only compounds **1** and **3** showed moderate cytotoxicity against lung (A549), breast (MDA-MB-231 and MCF7), and liver (HepG2) cancer cell lines.

OTHER CONTENTS**Corrigendum****p 288****Announcement: The Phytochemical Society of Europe****pp I–II****Guide for Authors****pp III–XII**

* Corresponding author

The Editors encourage the submission of articles online, thus reducing publication times. For further information and to submit your manuscript, please visit the journal homepage at <http://www.elsevier.com/locate/phytochem>



ELSEVIER

ISSN 0031-9422

INDEXED/ABSTRACTED IN: *Current Awareness in Biological Sciences (CABS)*, *Curr Cont ASCA. Chem. Abstr.*, *BIOSIS Data*, *PASCAL-CNRS Data*, *CAB Inter*, *Cam Sci Abstr*, *Curr Cont/Agri Bio Env Sci*, *Curr Cont/Life Sci*, *Curr Cont Sci Cit Ind*, *Curr Cont SCISEARCH Data*, *Bio Agri Ind*. Also covered in the abstract and citation database SCOPUS®. Full text available on ScienceDirect®.

Available online at



www.sciencedirect.com