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Tümü

Detaylı Arama

ANA SAYFA › SON EKLENEN YAYINLAR › TWO ACYLATED FLAVONOİD GLYCOSİDES FROM S...

Two acylated flavonoid glycosides from Stachys bombycina, and their free radical scavenging activity

Delazar A., Çelik S., Gokturk R. S. , Unal O. , Nahar L., Sarker S.

PHARMAZIE, cilt.60, sa.11, ss.878-880, 2005 (SCI İndekslerine Giren Dergi)

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Özet

Preparative reversed-phase HPLC analysis of the methanol extract of the aerial parts of Stachys bombycina (Lamiaceae) afforded two acylated flavonoids glycosides, chrysoeriol 7-O[6-O-acetyl-beta-D-allopyranosyl]-(1 --> 2)-beta-D-glucopyranoside (1) and apigenin 7-O-beta-D-(6-p-coumaroyl)-glucopyranoside (2), the former being a new natural product. The structures of these compounds were elucidated unambiguously by UV spectroscopic analyses using shift reagents, ESIMS, and 1D and 2D NMR spectroscopic techniques. The free radical scavenging activity of 1 and 2 compounds were assessed by DPPH assay, and the RC50 values were 1.25 x 10(-2) and 7.69 x 10(-4) mg/mL, respectively.

Two Acylated Flavonoid Glycosides from Stachys bombycina, and Their Free Radical Scavenging Activity

March 2006 · Pharmazie 60(11):878-80
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Authors:



Abbas Delazar
Tabriz University of Medical Sciences

S Celik

R S Göktürk

Orhan Unal
Akdeniz University



Dr Lutfun Nahar
Liverpool John Moores University & Pala...



Satyajit Sarker
Liverpool John Moores University

Citations (57) References (19)

... Apigenin-7-O-β-D-(-6''-p-coumaroyl)-glucopyranoside (APG) is one of the major active component in Clematis tangutica which was demonstrated by our group (13). The free radical scavenging activity of APG has been identified, and the antioxidant capacity of this glycoside flavonoe is predominantly attributed to its redox properties (14). Apigenin has been identified to induce significant neuroprotective effect against Parkinson disease(15), Alzheimer's disease (16,17) and ischemic stroke injury (18) in a variety of in vitro or in vivo experimental models. ...

... The MCAO group revealed a significant neurological deficit score when compared to the sham group. Treatment with APG significantly improved the neurological scores, in 50mg/kg (13.63 [10][11][12][13] [14] [15][16]) or 100mg/kg (12.38 [9,14]) respectively, as compared with that in the MCAO group (8.0 [6][7][8][9][10][11][12]). ...

... The MCAO group revealed a significant neurological deficit score when compared to the sham group. Treatment with APG significantly improved the neurological scores, in 50mg/kg (13.63 [10][11][12][13][14][15][16]) or 100mg/kg (12.38 [9, 14]) respectively, as compared with that in the MCAO group (8.0 [6][7][8][9][10][11][12]). ...

Apigenin-7- O - β -D-(-6''- p -coumaroyl)-Glucopyranoside Treatment Elicits Neuroprotective Effect against Experimental Ischemic Stroke

Article Full-text available Jan 2016 · INT J BIOL SCI

Min Cai · Yu-Long Ma · Wei Zhang · Tan Qingrong

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... Flavonoid glycosides are widely present in vegetables and fruits and can be found with different types of glycosides, while xanthone glycosides are mainly found in the families Gentianaceae and Polygalaceae with a glucose moiety [12]. In particular, acetylated flavonoid and xanthone glycosides have been reported as bioactive compounds with antioxidant [13, 14] and antitumor activities [15][16][17][18][19]. The last step in flavonoid biosynthesis is, in some plant species, terminated by acylation, which is known to increase the solubility and stability of glycosylated flavonoids in lipophilic systems [20]. ...

... MHz for 1 H and 75.47 MHz for 13 C, Bruker Biosciences Corporation, Billerica, MA, USA). 13 C NMR assignments were made by 2D HSQC and HMBC experiments (long-range C, H coupling constants were optimized to 7 and 1 Hz). Chemical shifts are expressed in ppm values relative to tetramethylsilane (TMS) as an internal reference. ...

... (3H, m, H-glucose), 3.65-3.60 (1H, m, H-glucose), 2.09 (3H, s, COCH 3), 2.08 (3H, s, COCH 3), 2.06 (3H, s, COCH 3), 2.05 (3H, s, COCH 3), 2.04 (3H, s, COCH 3), 2.01 (3H, s, COCH 3), 2.00 (3H, s, COCH 3), 1.90 (3H, s, COCH 3) ppm; 13 C NMR (CDCl 3 , 75.47 MHz) δ: 173.4 (C-4), 170.6 (COCH 3), 170.5 (COCH 3), 170.3 (COCH 3), 170.2 (COCH 3), 170.0 (COCH 3), 169.7 (COCH 3), 169.5 (COCH 3), 169.4 (COCH 3), 160.9 (C-7), 157.4 (C-2), 156.6 (C-9), 136.3 (C-3), 131.0 (C-1), 130.6 (C-4 tetra-O-acetyl-β-glucopyranosyl) flavone (10). Mp 222-223 • C; IR (KBr) u max : 3442, 2961, 2917, 2847, 1758, 1621, 1572, 1501, 1457, 1235, 1211, 1071 cm −1 ; 1 H NMR (CDCl 3 , 300.13 MHz) ESI +) m/z calcd for C 29 H 28 O 13 [M + H] 585.16027, found 585.15875. ...

Synthesis of New Glycosylated Flavonoids with Inhibitory Activity on Cell Growth

Article Full-text available May 2018 · MOLECULES

Ana Rita Neves · Marta Correia-da-Silva · Patrícia MA Silva · Madalena Magalhães Pinto

View Show abstract

... Sp is endemic in Turkey and it is a 5-10 cm long plant with bushes, flowering at spring and lives at 900-1,100 m, in rocky places of Turkey. The members of the Stachys genus have been used as a medicine for centuries because it contains useful substances such as alpha-and beta-phellandrene, elemol, betulinic acid, D-camphor, delphinidin, hyperoside, saponins, tannins, manganese, urcolic acid, apigenin, rosmarinic acid, oleanolic acid, chlorogenic acid, phenidon, naphthalene and Lavandulifolioside B (Delazar et al. 2005; Ivanova et al. 2009;Savic et al. 2010;Ali et al. 2010;Delazar et al. 2011). In addition, there are a lot of reports on substances characterized by GC-MS such as phenol, flavonoids, germacrene, stachysosides E-H, alpha and beta-pinene, iridoid glycoside and stachyssaponin which are specific to the Stachy genus (Lenherr et al. 1984;Sajjadi and Amiri 2007;Ahmad et al. 2008;Murata et al. 2008;Giuliani et al. 2009;Ozturk et al. 2009). ...

... Flavonoids and glycosides with other substances like germacrene, stachysoosides E-H, pinene, iridoid glycoside and stachyssaponin were found in the extracts of Stachys species according to GC-MS analyzing method (Lenherr et al. 1984;Sajjadi and Amiri 2007;Ahmad et al. 2008;Murata et al. 2008;Giuliani et al. 2009;Ozturk et al. 2009). In addition, there are a lot of substances specified to Stachys species such as chlorogenic asit, phenidon, naphthalene, betulinic-acid, D-camphor, delphinidin, hyperoside, manganese, oleanolic acid, rosmarinic acid, urcolic acid, apigenin and tannin (Delazar et al. 2005; Ivanova et al. 2009;Savic et al. 2010). However, the contents of Stachys petrokosmos leaf extract are not reported. ...

... It could be suggested that the high antigenotoxic effect of Sp in the presence of S9mix was caused by the metabolites of the Stachys extracts. This is because there are a lot of data about the antigenotoxic, anti-cancerogenic and anti-allergic effects of Stachys species from in vivo and in vitro studies (Basaran et al. 1996;Shin 2004; Delazar et al. 2005; Kukic et al. 2006;Amirghofran et al. 2006;Amirghofran et al. 2007;Haznagy-Radnai et al. 2008). It is reported that the anti-oxidant effects of Stachys species arose from the radical scavenger substances acetyl flavonoids and polyphenols (Hollman et al. 1996;Delazar et al. 2005;Kukic et al. 2006). ...

The genotoxic and anti-genotoxic effects of Stachys petrokosmos leaf extract in human lymphocytes using microsomal fractions

Article | Full-text available | Oct 2012

Eyyup Rencuzogullari · Ayşe Mine Yıldız · Mehmet Buyukleyla

... While, in the Iranian traditional medicine, C. tinctoria is used to treat warts, this plant has been used as an emetic, cathartic, and for the treatment of fever elsewhere (Phytochemical and Ethnobotanical Databases, 2005). As a part of our continuing search for natural antioxidants (Delazar et al., 2005 (Delazar et al., , 2006Sarker, 2005a,b;Sarker et al., 2005a,b;Kumarasamy et al., 2004), we now report on the isolation, structure determination, and free radical scavenging activity of four known fl avonoids (1-4) and a new acylated fl avone glucoside, named chrozophorin (5), from the aerial parts of C. tinctoria. ...

... , chrozophorin, 5). The known fl avonoid glycosides were readily identifi ed by direct comparison of the spectroscopic data with published data (Delazar et al., 2005; Mohamed, 2001;Markham;Geiger, 1993;Hashim et al., 1990;Agarwal;Raghunath, 1989;Mabry et al., 1970). The structure of the new compound was elucidated on the basis of comprehensive spectroscopic analyses (e.g. ...

Delazar, A., Talicgi, B., Nazemiyeh, Z., Rezazadeh, H., Nahar, L. and Sarker, S. D.* (2006) Chrozophorin: a new acylated flavone glucoside from Chrozophora tinctoria, Revista Brasileira de Farmacognosia (Brazilian Journal of...

Article | Full-text available | Oct 2006 · REV BRAS FARMACOGN

Talicgi · Abbas Delazar · Hossein Nazemiyeh · Satyajit Sarker

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... While, in the Iranian traditional medicine, C. tinctoria is used to treat warts, this plant has been used as an emetic, cathartic, and for the treatment of fever elsewhere (Phytochemical and Ethnobotanical Databases, 2005). As a part of our continuing search for natural antioxidants (Delazar et al., 2005 (Delazar et al., , 2006Sarker, 2005a,b;Sarker et al., 2005a,b;Kumarasamy et al., 2004), we now report on the isolation, structure determination, and free radical scavenging activity of four known fl avonoids (1-4) and a new acylated fl avone glucoside, named chrozophorin (5), from the aerial parts of C. tinctoria. ...

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Chrozophorin: A new acylated flavone glucoside from Chrozophora tinctoria

Article | Full-text available | Sep 2006 · REV BRAS FARMACOGN

B. Talischi · Hossein Nazemiyeh · Abbas Delazar · Satyajit Sarker

View Show abstract

... The occurrence of several unusual types of flavonoids in the Stachys genus has been previously reported (Delazar et al., 2005; Kotsos et al., 2001;Marin et al., 2004;Meremeti et al., 2004;Serrilli et al., 2005;Skaltsa et al., 2000). ...

... Two acylated flavonoids glycosides, chrysoeriol 7-O-[6-Oacetyl-b-D-allopyranosyl]-(1?2)-b-D-glucopyranoside and apigenin 7-O-b-D-(6-p-coumaroyl)-glucopyranoside, isolated from the methanol extract of the aerial parts of S. bombycina, were assessed by DPPH assay and showed RC 50 values of 1.25 Â 10 À2 and 7.69 Â 10 À4 mg/ml, respectively (Delazar et al., 2005). ...

Phytochemical and Biological studies of Stachys species in relation to chemotaxonomy: A review

Article Jun 2014

Rosa Tundis · Lorenzo Peruzzi · Francesco Menichini

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... Activation of the LTB4/BLT pathways by 5-lipoxygenase (a critical enzyme for LTB4 synthesis) leads to atherosclerotic plaque instability 28,29 . Therefore, selective BLT1 inhibition may be a promising strategy for preventing myocardial ischemia-reperfusion (IR) injury 30 . The current study found that administering LPS decreased the FS (%) and LVEF (%), increased the E/A ratio, and increased the mortality rate, which can be reversed by U75302 pretreatment. ...

... Notably, LTB4 induced NF-κ B activation and augmented proinflammatory cytokine secretion in a BLT1-dependent manner 50 . Furthermore, the BLT1 antagonist reduced inflammation and apoptosis following myocardial IR 30 .In our study, U75302 pretreatment was shown to increase Bcl-2 and decrease Bax and cleaved caspase-3; increase PGC1α , complex I, complex II and OPA1; and increase Iκ B-α and inhibit pNF-κ B, TNF-α and IL-6. These results show that inhibition of BLT1 protects against LPS-induced acute cardiac apoptosis, inflammation and mitochondrial dysfunction, which are consistent with previous studies under other conditions. ...

Inhibition of leukotriene B4 receptor 1 attenuates lipopolysaccharide-induced cardiac dysfunction: Role of AMPK-regulated mitochondrial function

Article Full-text available Mar 2017

Meng Sun · Rui Wang · Qinghua Han

View Show abstract

... A survey of the literature revealed that the composition of the aerial parts and seed oils of A. orientalis from two localities of Iran have been reported previously [2,5], where fenchyl acetate and α-pinene were identified as the main components of the leaf oils, and myrcene and β-pinene in the seed oils. As part of our on-going studies on medicinal plants from the Iranian flora [7][8] [9] [10][11][12][13][14][15][16] [17], we now report on the composition of the volatile oils of the roots and the umbels A. orientalis for the first time, together with the composition of the volatile oils from the fruits and the stems. ...

Nazemiyeh, H., Razavi, S. M., Delazar, A., Asnaashari, S.,, Khoi, N. S., Daniali, S., Nahar, L. and Sarker, S. D.* (2009) Distribution profile of volatile constituents in different parts of Aastrodaucus orientalis (l.) Drude, Records of Natural...

Article Full-text available May 2009 · REC NAT PROD

Seyed Mehdi Razavi · Hossein Nazemiyeh · Abbas Delazar · Satyajit Sarker

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... This suggests that bioactive compounds found to have an antioxidant property might have therapeutic potential by targeting attenuation of oxidative stress in ischemic stroke [37][38][39][40]. As a glycoside flavonoid, APG has been demonstrated to have the capacity to scavenge free radicals and augment antioxidant levels [41]. More importantly, based on its liposoluble constituent and small molecular weight, AGING APG is believed to be able to easily cross the bloodbrain barrier. ...

Apigenin-7-O-β-D-(-6”-p-coumaroyl)-glucopyranoside treatment elicits a neuroprotective effect through GSK-3β phosphorylation-mediated Nrf2 activation

Article Full-text available Nov 2020

Jingwen Wang · Shiquan Wang · Sisi Sun · Wei Zhang

... A number of plant secondary metabolites including cucurbitacins, flavonoids, caffeic acid derivatives and terpenoids have previously been reported from this plant (4-10). As part of our on-going studies on Iranian medicinal plants (11) (12) (13)(14)(15), the isolation and identification of the chemical constituents, namely, isoscoparin [1], isovitexin [2], isoorientin 3'-O-methyl ether [3], 2-O-β -D-glucopyranosylcucurbitacin I [4], 2-O-β -D-glucopyranosylcucurbitacin L [5] of the endemic Iranian species C. colocynthis, and the antioxidant properties of the flavonoids [1][2][3] are described. OMe H 5 Figure 1. ...

Delazar, A., Gibbons, S., Kosari , A. R., Nazemiyeh, H., Modarresi, M., Nahar, L. and Sarker, S. D.* (2006) Flavonoid C-glycosides and cucurbitacin glycosides from Citrullus colocynthis, DARU 14, 109-114

Article Full-text available Jul 2006 · DARU

Gibbons · Kosari · Abbas Delazar · Satyajit Sarker

View

... Taking the results collectively, treatment with the aerial parts of S. lavandulifolia led to a considerable reduction in oxidative stress. In support of this finding, the antioxidant potential of numerous Stachys species, including S. lavandulifolia, has been reported by other investigators (2,15, 21, 22), but this is the first trial in human. Oxidative stress plays a major role in the pathogenesis or progress of many debilitating diseases or conditions in humans such as osteoporosis (23), diabetes (11,(24)(25)(26)(27)(28), islet transplantation (29), inflammatory bowel diseases (12,30), preeclampsia (31), pancreatitis (32), metaltoxicity (6,33), or pesticide poisoning (5). ...

Anti-Oxidative Stress Activity of Stachys lavandulifolia Aqueous Extract in Human

Article Full-text available Feb 2013

Kobra Rahzani · Ali Akbar Malekirad · Akbar Zeraatpishe · Mohammad Abdollahi

... It is also showed that S. lavandulifolia mainly comprises germacrene-D, betaphellandrene, beta-pinene, myrcene and alpha-pinene (Javidnia et al., 2004). Phytochemical and pharmacological studies have suggested that flavonoids presented in ethanolic extract and stachys fractions are responsible for the antisecretory and cytoprotective action of stachys (Delazar et al., 2005; Karioti et al., 2010). In the present study, although the mechanism underlying the antiulcerogenic effect seen here remains unknown, it may be related to the flavonoid derivatives from luteolin present in S. lavandulifolia extract and in active fractions. ...

Gastroprotective effects of Stachys Lavandulifolia extract on experimental gastric ulcer

Article Full-text available Feb 2011 · AFR J PHARM PHARMACO

Fatemeh Nabavizadeh

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... Compound 8 was identified as apigenin 7-O-β-D(-3″,6″-p-E-dicoumaroyl)-glucoside, Anisofolin A, by comparing its spectral data with those available in literature [13][14][15]. Compound 9 was identified as apigenin 7-O-β-D-(-6″-p-E-coumaroyl)-glucoside by comparing its spectral data with the literature [16, 17]. Biological screenings: Antimalarial screening: A primary screening for compounds 1-9 was done as per standard protocols [18] at the 10 μM concentration, and for the crude mixture, a 1 μg/mL concentration was used. ...

Leucas mollissima, a Source of Bioactive Compounds with Antimalarial and Antimycobacterium Activities

Article Jul 2015

Ashish Chinchansure · Manisha Arkile - Shingare · Anurag Shukla · Swati P Joshi

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... It is boiled with cereal foods and the pregnant women used a decoction of it as a body wash, also used as a remedy for syphilis; and treatment of intestinal pain, typhoid and boils [38,39]. The fruit juice is used as eye drops to treat more severe cases, a maceration of leaves and roots is drunk to treat loss of hair and diabetes, and a water extract of aerial parts caused an in-vivo hypoglycemic response in rats [40] Tignokpa et al reported that leaves and stems extracts of Chrozophora senegalensis showed a high anti-plasmodial activity against two chloroquine-resistant Plasmodium falciparum strains, without toxicity in vitro and no toxicity in vivo by oral way in mice. While the leaf extracts alone showed antimicrobial activity against Bacillus subtilis, Staphylococcus aureus, Escherichia coli and Pseudomonas aeruginosa; with highly active on Salmonella typhi. ...

REVIEW: Biochemical Composition and Medicinal Uses of Chrozophora Genus

Article | Full-text available | Jan 2014

Abdalbasit Mariod

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... Compound 8 was identified as apigenin 7-O-β-D(-3″,6″-p-E-dicoumaroyl)-glucoside, Anisofolin A, by comparing its spectral data with those available in literature [13][14][15]. Compound 9 was identified as apigenin 7-O-β-D-(-6″-p-E-coumaroyl)-glucoside by comparing its spectral data with the literature [16, 17]. Biological screenings: Antimalarial screening: A primary screening for compounds 1-9 was done as per standard protocols [18] at the 10 μM concentration, and for the crude mixture, a 1 μg/mL concentration was used. ...

Leucas mollissima, a Source of Bio- active Compounds with Antimalarial and Antimycobacterium Activities

Article | Full-text available | Jul 2015

Manisha Arkile - Shingare · Anurag Shukla · Ashish Chinchansure · Swati P Joshi

... The crude extract of this plant was reported to possess a freeradical-scavenging property (Erdemoglu et al., 2006). As part of our on-going studies on the plants of the Iranian flora (Nazemiyeh et al., 2008(Nazemiyeh et al., , 2007Delazar et al., 2007aDelazar et al., , 2007bDelazar et al., , 2006aDelazar et al., , 2006bDelazar et al., , 2006cDelazar et al., , 2006d Delazar et al., , 2005 Delazar et al., , 2004aDelazar et al., , 2004b, we now report on the isolation, structure elucidation and bioactivity of three iridoid glucosides, phloyoside I (1), phlomiol (2) and pulchelloside (3) from the rhizomes of E. laciniata. ...

Modaressi, M., Delazar, A., Nazemiyeh, H., Fathi-Azad, E., Smith, E., Rahman, M. M., Gibbons, S., Nahar, L. and Sarker, S. D.* (2009) Antibacterial iridoid glucosides from Eremostachys laciniata, Phytotherapy Research 23, 99-103

Article | Feb 2009

Modaressi · Hossein Nazemiyeh · Abbas Delazar · Satyajit Sarker

View

... However, previous phytochemical studies on some other Ornithogalum species revealed the presence of steroidal glycosides [4][5][6][7][8], monoterpene lactone [9] and homoisoflavanone [10] some of which were found to possess antimicrobial, cytotoxic, cytostatic, anticancer, mould-inhibiting and insect deterrant properties [8]. In continuation of our phytochemical and bioactivity studies on the plants from the Iranian flora [11][12][13][14][15][16][17][18] [19] [20][21], we report on the GC-MS analysis VLC fractions of the DCM extract of the bulbs of O. cuspidatum. ...

Nazifi, E., Delazar, A., Movafeghi, A., Nazemiyeh, H., Nahar, L. and Sarker, S. D.* (2008) GC-MS analysis of the dichloromethane extract of the bulbs of Ornithogalum cuspidatum Bert. (Family: Liliaceae) from Iran, Records of...

Article Sep 2008 · REC NAT PROD

Ehsan Nazifi · Abbas Delazar · Ali Movafeghi · Satyajit Sarker

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... Flavonoid acylation with aromatic acids was reported to improve physiological activities, such as UV-absorbing capacity, radical scavenging ability (Delazar et al., 2005; Harborne & Williams, 2000;Alluis & Dangles 1999;Jungblut et al., 1995) pigment stabilization (especially anthocyanins) , and interaction with cellular targets (Ferrer et al., 2008). ...

Enzyme-Mediated Preparation of Flavonoid Esters and Their Applications

Chapter Full-text available Mar 2012

Tibor Maliar · Jana Viskupicova · Miroslav Ondrejovič

View

... Grujic-Jovanovic et al. [28] studied the composition and antibacterial activity of the essential oil of six Stachys species from Serbia and they proved that the essential oil of S. officinalis was the most active. Flamini et al. [29] reported the essential oils of Stachys aleurites, Delazar et al. [30] isolated acylated flavanoid glycosides from S. bombycina. Petrovic et al., [31] studied the composition and antimicrobial activity of essential oil of S. plumosa and reported antimicrobial activity against the bacteria and yeasts tested except Staphylococcus aureus. ...

Antimicrobial Activity of Centaura derderiifolia, Stachys aleurites and Anthemis aciphylla

Data Full-text available Jan 2009

Kiymet Guven · Ersin Karabacak · Sezgin Celik · Ismet Uysal

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... The study was designed to find out the therapeutic potential of Chrozophora tinctoria leaves extract for the management of wound healing in diabetic conditions. Internationally published report suggested that the Chrozophora tinctoria yielded five flavonoid glycosides, (1) quercetin 3-O-rutinoside (rutin), (2) acacetin 7-O-rutinoside, (3) apigenin 7-O-b-D-[(6-p-coumaroyl)]-glucopyranoside, (4) apigenin 7-O-b-D-glucopyranoside, and (5) apigenin 7-O-b-D-[6-(3,4-dihydroxybenzoyl)]-glucopyranoside (chrozophorin) with the last one being a new natural product [15]. ...

Pharmacological Evaluation of Chrozophora tinctoria as Wound Healing Potential in Diabetic Rat's Model

Article Full-text available Jan 2016 · BMRI

Harikesh Maurya · Monika Semwal · Susheel Kumar Dubey

... As a part of our on-going phytochemical and pharmacological evaluation of medicinal plants from the Iranian flora (Delazar et al., 2004 (Delazar et al., , 2005 (Delazar et al., , 2006a, we have evaluated the weight loss effect of the extract and Sep-Pak fractions of C. aurantium var. amara in mice model. ...

Sarker, S. D.*, Habibi, B., Sharifi, T., Asnaashari, S., Nahar, L. and Delazar, A. (2008) Effect of Citrus aurantium var amara on weight change in mice, Oriental Pharmacy and Experimental Medicine 8, 222-227.

Article Nov 2008

Satyajit Sarker · Habibi · Sharifi · Abbas Delazar

View

... Also the HMBC correlation between the methyl proton at δ H 3.91 s and C-3' at δ C 148.6 (J 3) indicated methoxylation of C-3' (Figure 1B). The β orientation of the glucosidic linkage was confirmed was by the large coupling constant of the anomeric proton (7.2 ppm).22, 23 The structure of this compound was confirmed by mass fragments; at m/z 367.1056 characteristic to 6'''-O-acetyl-β-D-diglucopyranoside; at m/z 301.1413 characteristic to chrysoeriol and at m/z 461.2 in the negative mode ESI-MS characteristic to chrysoeriol-7-O-glucoside. The acid hydrolysis of 1 afforded an aglycone and a sugar moiety, which was composed of chrysoeriol and glucose. ...

Phenolic Constituents, Anti-Inflammatory and Antidiabetic Activities of Cyperus laevigatus L.

Article Full-text available Oct 2017

Abdelsamed I. Elshamy · Mohamed El-Shazly · Yomna Mahmoud Yassine · Akemi Umeyama

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... lower phase) to obtain pure APG (content >99.1%). The structure of APG was verified by comparing nuclear magnetic resonance (NMR) data with those reported in the literature (Hideji et al. 1981; Delazar et al. 2005). ...

Apigenin-7- O -β- d -(6″- p -coumaroyl)-glucopyranoside reduces myocardial ischaemia/reperfusion injury in an experimental model via regulating the inflammation response

Article Full-text available Dec 2020

Wei Quan · Shanbo Ma · Yanrong Zhu · Xiaoqiang Li

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... While previous bioactivity studies revealed anti-inflammatory, antioxidant and antimicrobial activities of the essential oils (Takeda et al., 1997; Skaltsa et al., 1999), phytochemical analysis established the presence of megastigmane glycosides and phenylethanoids in the aerial parts of this plant (Takeda et al. 1997). As part of our continuing phytochemical and pharmacological studies on the species of the genus Stachys (Nazemieyh et al., 2006; Delazar et al., 2005a; 2010), we now report the isolation and characterization of three phenylethanoids (1-3) and three flavonoids (4-6) from the aerial parts of S. byzantina, as well as the free-radicalscavenging and the insecticidal properties of the crude extracts, different fractions and isolated compounds. ...

Chemical composition, free-radical-scavenging and insecticidal activities of the aerial parts of Stachys byzantina

Article | Full-text available | May 2010 · ARCH BIOL SCI

Solmaz Asnaashari · S. Seyed Alipour · Abbas Delazar · Satyajit Sarker

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... Malonylation of anthocyanins (aliphatic acylation) stabilize structure, enhance solubility in water, and inhibit enzymatic degradation of glycosides (Nakayama et al. 2003). Flavonoids acylated with aromatic carboxylic acids (specific) improve resistance to light and thermostability (Delazar et al. 2005; Ishihara and Nakajima 2003;Alluis and Dangles 1999;Jungblut et al. 1995). For synthesis of modified flavonoids, its esterification catalyzed by lipase in organic media is a well-studied and well-standardized technique (Chebil et al. 2006(Chebil et al. , 2007. ...

Bioavailability and Nutritional Analysis of Flavonoids

Chapter | Aug 2020

Nand Lal Meena · Pooja Verma · Rachna Pande · Om Prakash Gupta

... All fractions, sub-fractions, and pure compounds were screened by TLC using ethyl acetate (100): formic acid (11): acetic acid (11): water (20) on pre-coated silica gel 60 on aluminum sheets (E-Merck, Darmstadt, Germany). NMR spectra (1 H and 13 C APT) were measured using JEOL JNM-ECA (400 MHz, DMSO-d 6) (Faculty of Pharmacy, Ain Shams University, Egypt) while, ESI-MS was performed using Micromass Quattro II (Ruprecht-Karls-Universität, Heidelberg, Germany) [26] [27][28]. The samples were dissolved in DMSO, run at room temperature, and chemical shifts were given as δ ppm relative to tetramethylsilane (TMS) as an internal standard. ...

Aldose reductase inhibitor form Cassia glauca: A comparative study of cytotoxic activity with Ag nanoparticles (NPs) and molecular docking evaluation

Article | Full-text available | Oct 2020 · PLOS ONE

Samir Osman · Nahla A Ayoub · Safaa A Hafez 1☯ · I D 8☯

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... It has been recognized that the flavonoids acylated with certain aromatic carboxylic acids improved thermostability and light-resistivity of certain flavonoids and thus are involved in physiological actions such as UV-absorbing capacity and the radical scavenging ability (Delazar et al. 2005; Ishihara and Nakajima 2003;Alluis and Dangles 1999;Jungblut et al. 1995). This reaction (mainly with p-coumaric acid) contributes to the pigment stabilization of flavonoids (especially anthocyanins) by aggregation or stacking due to the inter-and intramolecular hydrophobic interactions or the p-p stacking between the flavonoid skeleton and the aromatic ring in the acyl moiety (Ishihara and Nakajima 2003), which protects the oxonium ion from decomposition without the need for any co-pigment or metal cation (Cevallos-Casals and Cisneros-Zevallos 2004; Ishihara and Nakajima 2003;Figueiredo et al. 1999). ...

The potential and practical applications of acylated flavonoids

Article | Full-text available | Jul 2009 · PHARMAZIE

Jana Viskupicova · Miroslav Ondrejovič · Ernest Šturdík

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... Various bioactivities, including antifungal (Tahara et al., 1994; Maruta et al., 1995), antipruritic, antinociceptive (Dai et al., 2002) and hypotensive (Gohar; Elmazar, 1997) properties, of crude extracts or isolated compounds from this plant were reported. As part of our on-going search for plant-derived antioxidants (Delazar et al., 2005; Delazar et al., 2004; Nahar et al., 2005; Sarker et al., 2005a,b; Sarker et al., 2003; Uddin et al., 2004), we now report on the isolation, structure elucidation and antioxidant activity of a new phenolic glycoside, named chenoalbuside (1), from the methanol extract of the seeds of C. album. ...

Chenoalbuside: an antioxidant phenolic glycoside from the seeds of Chenopodium album L. (Chenopodiaceae)

Article | Full-text available | Dec 2005 · REV BRAS FARMACOGN

Dr Lutfun Nahar · Satyajit Sarker

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Chemical Compositions and Antimutagenic Effects of Ethanolic Extracts of Stachys Thirkei and Stachys Annua subsp. Annua Using the Ames Assay

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Pınar Goc Rasgele · Gorkem Dulger

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Antioxidant and vasorelaxant activities of flavonoids from Amygdalus lycioides var. horrid

Article | Full-text available | Jan 2008

Hossein Babaei · Omid Sadeghpour · Dr Lutfun Nahar · Satyajit Sarker

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Gastroprotective effects of Stachys Lavandulifolia extract on experimental gastric ulcer

Article | Full-text available | Mar 2011 · AFR J PHARM PHARMACO

Fatemeh Nabavizadeh · Ali Mohammad Alizadeh · Soheila Adeli · Mohammad Kamalinejad

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THE GENOTOXIC AND ANTI-GENOTOXIC EFFECTS OF AN ENDEMIC SPECIES STACHYS PETROKOSMOS PLANT EXTRACT IN HUMAN LYMPHOCYTES IN THE ABSENCE AND PRESENCE OF METABOLIC ACTIVATOR

Thesis | Full-text available | Jan 2010

Ayşe Mine Yıldız · Eyyup Rencuzogullari

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Antiinflammatory Activities of Hungarian Stachys species and Their Iridoids

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Erzsébet Háznagy-Radnai · Á Balogh · Szilvia Czigle · G Blazsó

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Free-radical Scavenging Flavonol 3-O-glycosides from the Leaves of Ribes biebersteinii Berl.

Article Full-text available Apr 2010 · REC NAT PROD

Lasheni Samira · Fathi-Azad Fatemeh · Abbas Delazar · Satyajit Sarker

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Flavone C-glycosides and cucurbitacin glycosides from Citrullus colocynthis

Article Full-text available Jun 2006 · DARU

Abbas Delazar · Simon Gibbons · Ali Kosari · Satyajit Sarker

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Rhizomes of Eremostachys laciniata: Isolation and Structure Elucidation of Chemical Constituents and a Clinical Trial on Inflammatory Diseases

Article Full-text available Dec 2013

Sadeighe Bamdad Moghadam · Abbas Delazar · Satyajit Sarker · Dr Lutfun Nahar

View Show abstract

Nazemiyeh, H., Bahadori, F., Delazar, A., Ay, M., Topcu, G., Kolak, U., Nahar, L., Majinda, R. R. T. and Sarker, S. D.* (2008) Antioxidant phenolic compounds from the leaves of Erica arborea (Ericaceae), Natural Products Research 22, 1385-…

Article Full-text available Jul 2008

Fatemeh Bahadori · Hossein Nazemiyeh · Abbas Delazar · Satyajit Sarker

View Show abstract

Babaei, H., Sadeghpour, O., Nahar, L., Delazar, A., Nazemiyeh, H., Mansouri, M. R., Poursaeid, N., Asnaashari, S., Moghadam, S. B. and Sarker, S. D.* (2008) Antioxidant and vasorelaxant activities of flavonoids from Amygdalus…

Article Full-text available Sep 2008

Hossein Babaei · Sadeghpour · Dr Lutfun Nahar · Satyajit Sarker

View

128. Delazar, A., Biglari, F., Nazemiyeh , H., Talebpour, A., Imani , Y., Nahar,, L. and Sarker, S. D.* (2006) GC-MS analysis of the essential oils, and the isolation of phenylpropanoid derivatives from the aerial parts of Pimpinella aurea,...

Article Sep 2006 · PHYTOCHEMISTRY

Biglari · Abbas Delazar · Hossein Nazemiyeh · Satyajit Sarker

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Comparison of the Essential Oil Composition of Stachys trinervis Aitch. & Hemsl. and Stachys subaphylla Rech. F

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Mahnaz Khanavi · Behnaz Farahanikia · S. Janbakhsh · Abbas Hadjiakhoondi

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Comparison of the Volatile Composition of Stachys pubescence Oils Obtained by Hydro Distillation and Steam Distillation

Article Full-text available Jul 2014 · Pakistan J Biol Sci

Mahmoud Biglar · Mohammad Reza Shams Ardekani · Fatemeh Farjadmand · Mahnaz Khanavi

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Tyrosinase, Acetyl- and Butyryl-Cholinesterase Inhibitory Activity of Stachys lavandulifolia Vahl (Lamiaceae) and Its Major Constituents

Article Full-text available Jan 2015 · REC NAT PROD

Marco Bonesi · Alessandro Pugliese · Monica R. Loizzo · Rosa Tundis

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Chemical Composition, Free-Radical-Scavenging and Insecticidal Properties, and General Toxicity of Volatile Oils Isolated from Various Parts of Echinophora orientalis

Article Nov 2015 · J ESSENT OIL BEAR PL

Mohammad Yari · Nader Chaparzadeh · Abbas Delazar · Satyajit Sarker

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Chemical Composition, Free-Radical-Scavenging and Insecticidal Properties, and General Toxicity of Volatile Oils of Two Artemisia species Growing Wild in Iran

Article Nov 2015 · J ESSENT OIL BEAR PL

Fariba Heshmati Afshar · Hossein Nazemiyeh · Abbas Delazar · Satyajit Sarker

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Evaluation of Analgesic Activity of Eremostachys laciniata in Mice

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B. Habibi Asl · Omolbanin Mohammadi · Abbas Delazar · Satyajit Sarker

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Inhibitory effect of methanolic extract of Chrozophora tinctoria on lung parenchymal damage caused by paraquat-induced oxidative stress in mice

Article Jun 2011

Hassan Rezazadeh · B.A. Ghasemi · M. Shahidi · B. Habibi Asl

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A New Flavonoid Glycoside (APG) Isolated from Clematis tangutica Attenuates Myocardial Ischemia/Reperfusion Injury via Activating PKCε Signaling

Article Dec 2016 · Biochim Biophys Acta

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Valorisation of stachysetin from cultivated Stachys iva Griseb. as anti-diabetic agent: a multi-spectroscopic and molecular docking approach

Article Jul 2020

Aristeidis Pritsas · Ekaterina-Michaela Tomou · Eleni Tsitsigianni · Helen Skaltsa

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Genus Stachys: A Review of Traditional Uses, Phytochemistry and Bioactivity

Article Full-text available Sep 2020

Christina Barda · Ekaterina-Michaela Tomou · Helen Skaltsa

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Distribution Profile of Volatile Constituents in Different Parts of Astrodaucus orientalis (L.) Drude

Article Full-text available Jun 2009 · REC NAT PROD

Hossein Nazemiyeh · Seyed Mehdi Razavi · Abbas Delazar · Satyajit Sarker

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... However, previous phytochemical studies on some other Ornithogalum species revealed the presence of steroidal glycosides [4] [5] [6] [7] [8], monoterpene lactone [9] and homoisoflavanone [10] some of which were found to possess antimicrobial, cytotoxic, cytostatic, anticancer, mould-inhibiting and insect deterrant properties [8]. In continuation of our phytochemical and bioactivity studies on the plants from the Iranian flora [11] [12] [13] [14] [15] [16] [17] [18] [19] [20] [21], we report on the GC-MS analysis VLC fractions of the DCM extract of the bulbs of O. cuspidatum. ...

... However, previous phytochemical studies on some other Ornithogalum species revealed the presence of steroidal glycosides45678, monoterpene lactone [9] and homoisoflavanone [10] some of which were found to possess antimicrobial, cytotoxic, cytostatic, anticancer, mould-inhibiting and insect deterrant properties [8]. In continuation of our phytochemical and bioactivity studies on the plants from the Iranian flora1112131415161718 19 2021, we report on the GC-MS analysis VLC fractions of the DCM extract of the bulbs of O. cuspidatum. ...

GC-MS Analysis of the Dichloromethane Extract of the Bulbs of Ornithogalum cuspidatum Bert. (Family: Liliaceae) from Iran

Article Full-text available Feb 2008 · REC NAT PROD

Satyajit Sarker · Ehsan Nazifi · Abbas Delazar · Ali Movafeghi

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... Chemical studies have been reported for some Stachys species [10] [11] [12][13][14], as well as various biological properties, such as radical scavenging [15], antioxidant due to polyphenol content [16,17], anxiolytic [18], anticandidal [19,20], antiinflammatory [10], antimycobacterial [21] and antimutagenic [22] activities. A literature survey showed that germacrene-D, α-pinene, β-pinene, β-caryophyllene, caryophyllene oxide, δ-cadinene, myrtenyl acetate, dehydroabietane, pimaradiene, α-copaene, E-nerolidol, abietatriene, linalool, spathulenol and methyl linoleate were the most encountered essential oil components of Stachys species [1,[23][24][25][26][27][28][29][30]. ...

GC-MS Analysis and Antimicrobial Activity of Essential Oil of Stachys Cretica Subsp. Smyrnaea

Article Full-text available Feb 2009

Mehmet Öztürk · Mehmet Emin Duru · Fatma Aydoğmuş Öztürk · Ayhan Ulubelen

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... The crude extract of this plant was reported to possess a freeradical-scavenging property (Erdemoglu et al., 2006). As part of our on-going studies on the plants of the Iranian flora (Nazemiyeh et al., 2008(Nazemiyeh et al., , 2007Delazar et al., 2007aDelazar et al., , 2007bDelazar et al., , 2006aDelazar et al., , 2006bDelazar et al., , 2006cDelazar et al., , 2006d Delazar et al., , 2005 Delazar et al., , 2004aDelazar et al., , 2004b, we now report on the isolation, structure elucidation and bioactivity of three iridoid glucosides, phloyoside I (1), phlomiol (2) and pulchelloside (3) from the rhizomes of E. laciniata. ...

Antibacterial Iridoid Glucosides from Eremostachys laciniata

Article Jan 2009 · PHYTOTHER RES

Abbas Delazar · Satyajit Sarker · Masoud Modarresi · Hossein Nazemiyeh

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Antioxidant phenolic compounds from the leaves of Erica Arborea (Ericaceae)

Article Full-text available Feb 2008

Abbas Delazar · Satyajit Sarker · Hossein Nazemiyeh · Fatemeh Bahadori

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GC-MS analysis of the essential oils, and the isolation of phenylpropanoid derivatives from the aerial parts of Pimpinella aurea

Article Nov 2006 · PHYTOCHEMISTRY

Abbas Delazar · Fahimeh Biglari · Solmaz Esnaashari · Satyajit Sarker

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Alternative and Complementary Antileishmanial Treatments: Assessment of the Antileishmanial Activity of 27 Lebanese Plants, Including 11 Endemic Species

Article Apr 2008

Carole Di Giorgio · F Delmas · Marie Tueni · G Balansard

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Flavonoids and their glycosides, including anthocyanins

Article Jul 2008

Nigel C Veitch · Renée J Grayer

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School of Pharmacy and Drug Applied Research Center[1], Tabriz University of Medical Sciences, Tabriz, Iran, Department of Biology[2], Faculty of Science and Literature, Canakkale 18 Mart University, Canakkale, Turkey, Department of Biology[3], Faculty of Science, Akdeniz University, Antalya, Turkey, Department of Chemistry[4], University of Aberdeen, School of Biomedical Sciences[5], University of Ulster at Coleraine, Londonderry, N. Ireland, UK

Two acylated flavonoid glycosides from *Stachys bombycina*, and their free radical scavenging activity

A. Delazar[1], S. Celik[2], R. S. Göktürk[3], O. Unal[3], L. Nahar[4], S. D. Sarker[5]

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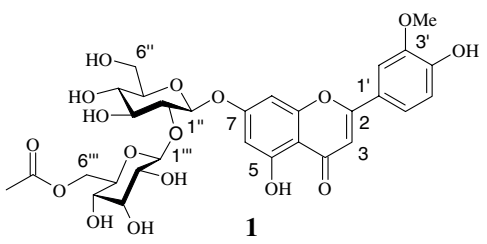
Dr Satyajit D Sarker, School of Biomedical Sciences, University of Ulster at Coleraine, Cromore Road, Coleraine BT52 1SA, Co. Londonderry, N. Ireland, UK
s.sarker@ulster.ac.uk

Pharmazie 60: 878–880 (2005)

Preparative reversed-phase HPLC analysis of the methanol extract of the aerial parts of *Stachys bombycina* (Lamiaceae) afforded two acylated flavonoids glycosides, chrysoeriol 7-*O*-[6-*O*-acetyl-β-D-allopyranosyl]-(1 → 2)-β-D-glucopyranoside (**1**) and apigenin 7-*O*-β-D-(6-*p*-coumaroyl)-glucopyranoside (**2**), the former being a new natural product. The structures of these compounds were elucidated unambiguously by UV spectroscopic analyses using shift reagents, ESIMS, and 1D and 2D NMR spectroscopic techniques. The free radical scavenging activity of **1** and **2** compounds were assessed by DPPH assay, and the RC_{50} values were 1.25×10^{-2} and 7.69×10^{-4} mg/mL, respectively.

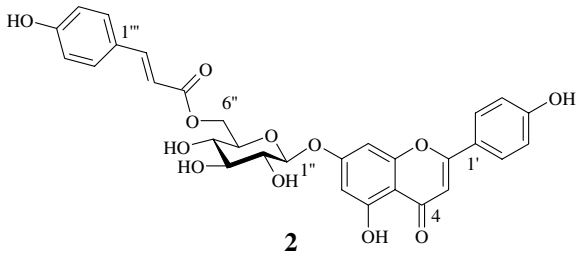
1. Introduction

The subcosmopolitan genus *Stachys* L. comprises more than 270 species and is considered to be one of the largest of the Lamiaceae (Meremeti et al. 2004). *Stachys bombycina* Boiss. is one of the 81 Turkish endemic species of this genus (Bhattacharjee 1982). It grows abundantly only in Antalya, Muğla and Mersin provinces. While there is no report on any previous phytochemical investigation on *S. bombycina* available to date, phytochemical studies on other species of *Stachys* revealed the presence of flavonoid glycosides, phenylethanoid glycosides, iridoid glycosides and terpenoids (Dictionary of Natural Products 2001; ISI Web of Science 2004). We now report on the isolation, structure determination, and free radical scavenging activity of two acylated flavonoid glycosides, chrysoeriol 7-*O*-[6-*O*-acetyl-β-D-allopyranosyl]-(1 → 2)-β-D-glucopyranoside (**1**) and apigenin 7-*O*-β-D-(6-*p*-coumaroyl)-glucopyranoside (**2**), the former being a new natural product, from the aerial parts of *S. bombycina.*



2. Investigations, results and discussion

RP-HPLC analysis of the methanol extract of the aerial parts of *S. bombycina* afforded two acylated flavonoid glycosides which, on the basis of comprehensive spectroscopic analyses (e.g. UV, ESIMS, and 1D and 2D NMR), were characterised as chrysoeriol 7-*O*-[6-*O*-acetyl-β-D-allopyranosyl]-(1 → 2)-β-D-glucopyranoside (**1**) and apigenin 7-*O*-β-D-(6-*p*-coumaroyl)-glucopyranoside (**2**).



Both compounds (**1** and **2**) displayed characteristic UV absorption maxima for a flavone skeleton (Mabry et al. 1970). The ^{1}H NMR and ^{13}C NMR for these compounds (Tables 1 and 2) also confirmed the presence of flavone nucleus in these molecules (Mabry et al. 1970). The ESIMS spectra of **1** revealed $[M + Na]^+$ (positive ion mode) ion peak at m/z 701, and $[M-H]^-$ (negative ion mode) ion peak at m/z 677, suggesting $M_r = 678$ and solving for $C_{31}H_{34}O_{17}$. In the ^{1}H and ^{13}C NMR spectra (Table 1), there were signals for a substituted 5,7,3′,4′-tetrahydroxy flavone nucleus, a glucose moiety, an 6-acetyl allose unit and an aromatic methoxy group. The attachment of the methoxy group at C-3′ was the most feasible option from the biogenetic point of view, and was also supported by the ^{13}C NMR chemical shifts for C-3′ and C-4′ at δ 152.0 and 149.0, respectively. The ^{1}H-^{1}H COSY45 spectrum of **1** (Table 1) revealed ^{1}H-^{1}H couplings and helped to assign all proton resonances. The ^{1}H and ^{13}C NMR data, with the exception of the signal for

Table 1: ^{1}H NMR (coupling constant J = Hz in parentheses) and ^{13}C NMR data, and COSY interaction of compounds 1

Position	Chemical shift δ in ppm		^{1}H-^{1}H interaction obtained from COSY
	δ_H	δ_C	
2	–	165.1	–
3	6.46 s	104.3	–
4	–	182.9	–
5	–	162.0	–
6	6.81 br s	99.3	H-8
7	–	163.7	–
8	6.99 br s	95.9	H-6
9	–	157.7	–
10	–	106.2	–
1′	–	122.1	–
2′	7.59 m	111.1	H-6′
3′	–	152.0	–
4′	–	149.0	–
5′	6.95 m	116.7	H-6′
6′	7.59 m	121.4	H-5′, H-2′
3′-OMe	3.91 s	56.8	–
Glucose moiety			
1″	5.23 d (7.0)	100.4	H-2″
2″	3.20–3.80*	83.6	
3″	3.20–3.80*	78.0	
4″	3.20–3.80*	70.0	
5″	3.20–3.80*	76.7	
6″	3.20–3.80*	61.3	
Allose moiety			
1‴	4.80 d (7.8)	103.4	H-2‴
2‴	3.20–4.10*	72.4	–
3‴	3.20–4.10*	71.7	–
4‴	3.20–4.10*	68.0	–
5‴	3.20–4.10*	72.6	–
6‴	3.20–4.10*	64.9	–
Acyl moiety			
CO	–	171.2	–
CH_3	1.95 s	21.4	–

* Overlapped peaks
Spectra obtained in DMSO-d_6

Table 2: ^{1}H NMR (coupling constant J = Hz in parentheses) and ^{13}C NMR data, and COSY interaction of compounds 2

Position	Chemical shift δ in ppm		^{1}H-^{1}H interaction obtained from COSY
	δ_H	δ_C	
2	–	163.5	–
3	6.49 s	103.7	–
4	–	182.8	–
5	–	157.5	–
6	6.83	100.3	H-8
7	–	165.2	–
8	6.98 s	95.3	H-6
9	–	162.0	–
10	–	106.2	–
1′	–	121.5	–
2′	7.95 d (8.5)	129.4	H-3′, H-6′
3′	6.92 d (8.5)	116.5	H-2′, H-5′
4′	–	162.6	–
5′	6.92 d (8.5)	116.5	H-3′, H-6′
6′	7.95 d (8.5)	129.4	H-2′, H5′
Glucose moiety			
1″	5.18 d (7.5)	100.3	H-2″
2″	3.20–3.90 m	73.8	–
3″	3.20–3.90 m	77.1	–
4″	3.20–3.90 m	70.8	–
5″	3.20–3.90 m	74.7	–
6″	4.47 d (12.15)	64.8	H-5″
Acyl moiety			
1‴	–	125.7	–
2‴	7.38 d (8.3)	131.0	H-3‴, H-6‴
3‴	6.68 d (8.3)	117.0	H-2‴, H-5‴
4‴	–	160.8	–
5‴	6.68 d (8.3)	117.0	H-3‴, H-6‴
6‴	7.38 d (8.3)	131.0	H-2‴, H-5‴
7‴	7.59 d (16.2)	145.8	H-8‴
8‴	6.34 d (16.2)	114.5	H-7‴
9‴	–	167.3	–

* Overlapped peaks
Spectra obtained in DMSO-d_6

the aromatic methoxy (δ_H 3.91 and δ_C 56.8), were comparable with those published for luteolin 7-[6″-acetylallosyl-(1 → 2)glucoside], isolated from *Stachys aegyptiaca* (El-Ansari et al. 1991), and similarly, with the exception of the signals for the acetyl moiety (δ_H 1.95 and δ_C 21.4, 171.2), the NMR data were comparable with published data for chrysoeriol 7-(2″-*O*-β-D-allopyranosyl)β-D-glucopyranoside from *Sideritis grandiflora.* Thus the identity of **1** was confirmed as chrysoeriol 7-*O*-[6-*O*-acetyl-β-D-allopyranosyl]-(1 → 2)-β-D-glucopyranoside, which is a new natural product.

The ESIMS spectra of 2 revealed $[M + Na]^+$ (positive ion mode) ion peak at m/z 601, and $[M-H]^-$ (negative ion mode) ion peak at m/z 577, suggesting $M_r = 578$ and solving for $C_{30}H_{26}O_{12}$. The ^{1}H and ^{13}C NMR spectra (Table 2) of **2**, in addition to the signals associated with the aglycone apigenin, showed signals for a glucose moiety and a *p*-coumaroyl moiety. The deshielded nature of the ^{1}H and ^{13}C NMR signals (δ_H 4.47 and δ_C 64.8) for C-6″ confirmed the attachment of this *p*-coumaroyl moiety at C-6″ of the glucose unit. Apart from the signals associated with the *p*-coumaroyl moiety, all other ^{1}H and ^{13}C NMR signals were comparable to published data for apigenin 7-*O*-β-D-glucopyranoside isolated from *Stachys aegyptiaca* and various other plant sources (El-Ansari et al. 1991; Agarwal and Raghunath 1989). The ^{1}H-^{1}H COSY45 spectrum of **2** (Table 2) displayed ^{1}H-^{1}H couplings and helped to assign key proton resonances. All spectroscopic data including ^{1}H and ^{13}C NMR data of **2** matched perfectly with those published for apigenin 7-*O*-β-D-(6-*p*-coumaroyl)-glucopyranoside (Agarwal and Raghunath 1989; Markham and Geiger 1993; Markham 1982). Thus compound **2** was identified as a known flavone glycoside, 7-*O*-β-D-(6-*p*-coumaroyl)-glucopyranoside.

This is the first report on any phytochemical investigation on *Stachys bombycina*. Previous phytochemical investigations on a number of species of the genus *Stachys* revealed the presence of flavone glucosides, particularly 7-*O*-glucosides, with various kinds of acylation on the sugar moieties (Meremeti et al. 2004). Occurrence of 7-*O*-glucosides of luteolin, apigenin and chrysoeriol are also common in the taxonomically closely related genus *Phlomis* (El-Negoumy et al. 1986; Bucar et al. 1998). Within the genus *Stachys*, the formation of the disaccharyl moiety composed of a glucose and an allose is of common occurrence (Lenherr and Mabry 1987; Lenherr et al. 1984) and has the potential for being used as one of the chemotaxonomic markers for this genus.

Both flavonoids (**1** and **2**) showed prominent free radical scavenging activity (antioxidant activity) in the DPPH assay (Kumarasamy et al. 2001; Takao et al. 1994). The RC_{50} of **1**

and **2** were found to be 1.25×10^{-2} and 7.69×10^{-4} mg/mL, respectively, compared to 2.88×10^{-5} mg/mL for quercetin, a well-known natural antioxidant. The antioxidant activity of these flavonoe glycosides, like other natural phenolic antioxidants is a consequence of the presence of the phenolic moieties in the structures (Kumarasamy et al. 2004). The antioxidant activity of phenolic natural products is predominantly owing to their redox properties, i.e. the ability to act as reducing agents, hydrogen donors and singlet oxygen quenchers, and to some extent, could also be due to their metal chelation potential.

3. Experimental

3.1. General

UV spectra were obtained in MeOH using a Hewlett-Packard 8453 UV-vis spectrometer. NMR spectra were recorded in CD_3OD on a Bruker 200 MHz NMR Spectrometer (200 MHz for 1 H and 50 MHz for 13 C) using residual solvent peak as internal standard. ESIMS analyses were performed on a Finnigan MAT95 spectrometer. HPLC separation was performed in a Dionex prep-HPLC System coupled with Gynkotek GINA50 autosampler and Dionex UVD340S Photo-Diode-Array detector. A Luna C_{18} preparative HPLC column (10 m, 250 mm × 21.2 mm) was used. Sep-Pak Vac 35 cc (10 g) C_{18} cartridge (Waters) was used for pre-HPLC fractionation.

3.2. Plant material

Aerial parts of *S. bombycina* Boiss. were collected in July 2003 from the *Pinus brutia* woods in Antalya, (36 40 910 N, 30 31 730 E), Turkey, about 40 m above sea level. A voucher specimen (Göktürk 5120) representing this collection has been generated in the herbarium of the Department of Biology, Akdeniz University, Turkey.

3.3. Extraction, isolation and structure elucidation

Dried and ground aerial parts (100.0 g) of *S. bombycina* were Soxhlet-extracted successively with *n*-hexane, dichloromethane and MeOH (1.1 L each). All these extracts were separately concentrated using a rotary evaporator at a maximum temperature of 45 °C. The MeOH extract was fractionated on a Sep-Pak, using a step gradient of 10, 20, 40, 60, 80 and 100% MeOH-water mixture (150 ml each) as eluent. Preparative RP-HPLC (gradient elution, 25–70% MeOH in water in 50 min, 20 ml/min) of the Sep-Pak fraction (60% MeOH in water) yielded compounds **1** and **2** (weight 21.3 and 4.7 mg, and retention time 28.4 and 41.2 min, respectively). Structures of these falvonoids were determined conclusively by UV, ESIMS and 1D and 2D NMR analyses.

3.3.1. Chrysoeriol 7-O-[6-O-acetyl-β-D-allopyranosyl]-(1 → 2)-β-D-glucopyranoside (**1**)

Yellow amorphous solid. UV: λ_{max} (MeOH) nm: 252, 270, 346; +NaOMe: 247 sh, 266, 299 sh, 399; +$AlCl_3$: 264 sh, 270, 298, 356 sh, 390; +$AlCl_3$ + HCl: 274, 292 sh, 358, 380 sh; +NaOAc: 259, 275 sh, 350 sh, 408; +NaOAc + H_3BO_3: 251, 268, 346; ^{1}H- and ^{13}C NMR (Table 1). ESIMS: positive ion mode) m/z 701 $[M + Na]^+$ and negative ion mode) m/z 677 $[M-H]^-$.

3.3.2. Apigenin 7-O-β-D-(6-p-coumaroyl)-glucopyranoside (**2**)

Yellow amorphous solid. UV: λ_{max} (MeOH) nm: 253, 273, 294 sh, 321, 346; +NaOMe: 248 sh, 267, 298 sh, 398; +$AlCl_3$: 264 sh, 271, 298, 356 sh, 390; +$AlCl_3$ + HCl: 274, 292 sh, 358, 381 sh; +NaOAc: 259, 275 sh, 349 sh, 408; +NaOAc + H_3BO_3: 251, 269, 346; ^{1}H- and ^{13}C NMR (Table 2). ESIMS: positive ion mode) m/z 601 $[M + Na]^+$ and negative ion mode) m/z 577 $[M-H]^-$.

3.4. Free radical scavenging activity (DPPH assay)

2,2-Diphenyl-1-picrylhydrazyl (DPPH), molecular formula $C_{18}H_{12}N_5O_6$, was obtained from Fluka Chemie AG, Bucks. Quercetin was obtained from Avocado Research Chemicals Ltd, Shore road, Heysham, Lancs. The method used by Takao et al. (1994) was adopted with suitable modifications (Kumarasamy et al. 2002). DPPH (4 mg) was dissolved in MeOH (50 mL) to obtain a concentration of 80 μg/mL.

Qualitative assay: Test compounds **1** and **2** were applied to a TLC plate and sprayed with DPPH solution using an atomiser. It was allowed to develop for 30 min. The colour changes (purple on white) were noted.

Quantitative assay: Compounds **1** and **2** were dissolved in MeOH to obtain a concentration of 0.5 mg/mL. Dilutions were made to obtain concentrations of 5×10^{-2}, 5×10^{-3}, 5×10^{-4}, 5×10^{-5}, 5×10^{-6} 5×10^{-7}, 5×10^{-8}, 5×10^{-9}, 5×10^{-10} mg/mL. Diluted solutions (1.00 mL each) were mixed with DPPH (1.00 mL) and allowed to stand for half an hour for any reaction to occur. The UV absorbance was recorded at 517 nm. The experiment was performed in triplicate and the average absorption was noted for each concentration. The same procedure was followed for the standards (quercetin and trolox).

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