水蕨與姬蕨極性成分之研究

Studies on the polar components of Ceratopteris Thalictroides (L.) Brongn. And Hypolepis punctata (Thunb.) Mett.

中文摘要

本論文以初步活性篩選顯示具抗癌活性之姬蕨與水蕨爲主題，並做進一步化學成分之分離與探討。水蕨全草以甲醇冷浸萃取，浸液經減壓濃縮後，以 n-hexane、Ethyl acetate 及 H2O 分配萃取，經初步藥理活性篩選確定活性部分爲 n-Hexane 及 Ethyl acetate 層，利用各種不同之層析法，經分離與純化後得 22 個化合物：quercetin 3-O-β-D-glucopyranoside (174.2 mg) (CT-1)、ferulic acid (356.9 mg) (CT-2)、p-coumaric acid (11.7 mg) (CT-3)、3-(4-hydroxy-phenyl)-acrylic acid methyl ester (23.8 mg) (CT-4)、p-hydroxy benzaldehyde (7.5 mg) (CT-5)、β-sitosterol and β-stigmasterol mixture (19.8 mg) (CT-6)、stigmast-5-ene-3,7-dione.(6 mg) (CT-7)、pterosin Z (8.1 mg) (CT-8)、pterosin A (4 mg) (CT-9)、pterosin V (6 mg) (CT-10)、pterosin K (3.5 mg) (CT-11)、pteroside Z (80 mg) (CT-12)、pterosin D 3-O-β-D-glucopyranoside (209 mg) (CT-13)、12-chloro-pterosin D 3-O-β-D-glucopyranoside (14mg) (CT-14)*、ceratopteroside B (38 mg) (CT-15)、ceratopteroside C (36.6 mg) (CT-16)、ceratopteroside D (3.5 mg) (CT-17)*、ceratopteroside E (6 mg) (CT-18)*、6-O-p-coumaroyl-D-glucopyranoside (28 mg) (CT-19)、3-O-p-coumaroyl-D-glucopyranoside (33.3 mg) (CT-20)、4-O-p-coumaroyl-D-glucopyranoside (5 mg) (CT-21)、kaempherol 3-O-β-glucopyranoside (20 mg) (CT-22)。其中 CT-14、CT-17、CT-18 爲 pteroside 類中之新化合物。其他如 CT-1、CT-2、CT-3、CT-4、CT-5、CT-6、CT-7、CT-14、CT-17、CT-18、CT-20、CT-21、CT-22 皆爲本植物中首次發現之化合物。姬蕨全草鮮品之甲醇萃取物，經以 n-Hexane、Ethyl acetate 及 H2O 分配萃取，並取具有活性之水層，藉由各種層析法，共分離出 6 個化合物。利用各種光譜分析鑑定其主要架構，分別爲：Caffeic acid (14 mg) (HP-1)、2R,3R pterosin-L-13-O-β-D-glucopyranoside (26.8 mg) (HP-2)、7’, 8’-Dihydro-7’-(4’-hydroxy-3’-methoxyphenyl)-3-(hydroxymethyl)-1-benzofuranpropanol 4’-O-β-glucopyranoside (29.1 mg) (HP-3)、6, 7’-dihydroxyisolariciresinol 4’-O-β-glucopyranoside (49.1 mg) (HP-4)*、(+)-Lariciresinol 4’-O-β-D-glucopyranoside (56.3 mg) (HP-5)、(+)-Pinoresinol 4’-O-β-D-glucopyranoside (6 mg) (HP-6)。其中 HP-4 爲新化合物。其他如 HP-1、HP-2、HP-3、HP-5、HP-6 爲本植物中首次發現之化合物，活性部分則尚待評估。

英文摘要

In the course of our preliminary anticancer screeing program, we found that the MeOH extract of Ceratopteris thalictroides (L.) Brongn and Hypolepis punctata (Thumb.) Mett. exhibited cytotoxic activity. Thus. It intrigued us to further chemical investigation of these two plants. The MeOH exctract of whole fresh ferns of C. thalictroides was divided into fractions soluble in hexane, ethyl acetate, and H2O. From EtOAc fraction 22 compounds were isolated by Diaion, Sephadex LH-20, ODS, and silica gel column chromatography. Based on the 1D, 2D NMR and HRMS spectroscopic techniques, the structures were characterized as : quercetin 3-O-β-D-glucopyranoside (CT-1)、ferulic acid (CT-2)、p-coumaric acid (CT-3)、3-(4-hydroxyphenyl)-acrylic acid methyl ester (CT-4)、p-hydroxy benzaldehyde (CT-5)、β-sitosterol and β-stigmasterol mixture (CT-6)、stigmast-5-ene-3,7-dione (CT-7)、pterosin Z (CT-8)、pterosin A (CT-9)、pterosin V (CT-10)、pterosin K (CT-11)、pteroside Z (CT-12)、pterosin D 3-O-β-D-glucopyranoside (CT-13)、12-chloro-pterosin D 3-O-β-D-glucopyranoside (CT-14)、ceratopteroside B (38 mg) (CT-15)、ceratopteroside C (CT-16)、ceratopteroside D (CT-17)、ceratopteroside E (CT-18)、6-O-p-coumaroyl-D-glucopyranoside (CT-19)、3-O-p-coumaroyl -D-glucopyranoside (CT-20)、4-O-p-coumaroyl-D-glucopyranoside (CT-21)、kaempherol 3-O-β-glucopyranoside (CT-22).Among these, compounds CT-14, CT-17, and CT-18 are newly discovered. The others, CT-1~CT-7, CT-14, CT-17~CT-18, CT-20~CT-22 were isolated from C. thalictroides (L.) Brongn. for the first time.

Similarly, the MeOH extract of fresh plant of Hypolepis punctata was divided into fractions soluble in n-hexane, ethyl acetate and H2O. These fractions were subjected to various chromatography and cytotoxic screening. Totally, six compounds were isolated from this fern, and their structures were determined to be caffeic acid (HP-1)、2R,3R pterosin-L 13-O-β-D-glucopyranoside (HP-2)、7’,8’-Dihydro-7’-(4’-hydroxy-3’-methoxyphenyl)-3- (hydroxymethyl)-1 Benzofuranpropanol 4’-O-β-glucopyranoside (HP-3)、6, 7’-dihydroxyisolariciresinol 4’-O-β-glucopyranoside (HP-4)、(+)-Lariciresinol 4’-O-β-D-glucopyranoside (HP-5)、(+)-Pinoresinol 4’-O-β-D-glucopyranoside (HP-6)。Compound HP-4 is newly discovered, and the rest five compounds were first found in this fern.