云南青牛胆块根的化学成分研究

程春梅,戴云,黄相中*,朱芸,戴建辉,刘晓芳,王炯

(云南民族大学化学与生物技术学院,云南 昆明 650031)

摘　要:**目的**　对云南青牛胆块根的化学成分进行研究。**方法**　用常压硅胶柱色谱、反相色谱、薄层色谱及 Sephadex LH-20 柱色谱法分离,根据理化性质和波谱数据鉴定其结构。**结果**　分离得到 11 个化合物,分别鉴定为古伦宾(columbin,**1**)、非洲防己苷 C(palmatoside C,**2**)、去氧黄藤苦素(绿白黄藤素,fibleucin,**3**)、巴马亭(palmatine,**4**)、药根碱(jatrorrhizine,**5**)、非洲防己碱(columbamine,**6**)、20-hydroxyecdysone(**7**)、abutasterone(**8**)、2-deoxy-20-hydroxyecdysone 3-*O*-β-*D*-glucopyranoside(**9**)、(+)-lyoniresinol-2α-*O*-β-*D*-glucopyranoside(**10**)和α-*D*-glucopyranosyl-(2 →1)-α-*D*-glucopyranoside(**11**)。**结论**　所有化合物均为首次从云南青牛胆中分离得到。

关键词:防己科;云南青牛胆;巴马亭;药根碱

中图分类号:R284.1　　**文献标识码**:A　　**文章编号**:0253-2670(2010)05-0689-04

Chemical constituents from roots of *Tinospora sagittata* var. *yunnanensis*

CHENG Chun-mei, DAI Yun, HUANG Xiang-zhong, ZHU Yun, DAI Jian-hui,
LIU Xiao-fang, WANG Jiong

(School of Chemistry and Biotechnology, Yunnan University of Nationalities, Kunming 650031, China)

Abstract: Objective To study the chemical constituents from the roots of *Tinospora sagittata* var. *yunnanensis*. **Methods** Various chromatographic techniques were used to isolate and purify the constituents. The structures were elucidated by chemical evidence and spectral methods. **Results** Eleven compounds were isolated and identified as columbin (**1**), palmatoside C (**2**), fibleucin (**3**), palmatine (**4**), jatrorrhizine (**5**), columbamine (**6**), 20-hydroxyecdysone (**7**), abutasterone (**8**), 2-deoxy-20-hydroxyecdysone 3-*O*-β-*D*-glucopyranoside (**9**), (+)-lyoniresinol-2α-*O*-β-*D*-glucopyranoside (**10**), and α-*D*-glucopyranosyl-(2 →1)-α-*D*-glucopyranoside (**11**). **Conclusion** All compounds are isolated from *T. sagittata* var. *yunnanensis* for the first time.

Key words: Menispermaceae; *Tinospora sagittata* var. *yunnanensis* (S. Y. Hu) H. S. Lo; palmatine; jatrorrhizine

云南青牛胆 *Tinospora sagittata* var. *yunnanensis* (S. Y. Hu) H. S. Lo 系防己科青牛胆属植物,为一变种。该属植物全世界有 34 种,我国有 6 个种,集中分布在西南和南部各省区[1]。民间云南青牛胆的块根以药材金果榄入药,有清热解毒、利咽、止痛之功效,临床用于治疗急性咽喉炎、扁桃体炎等[2]。目前尚未见对该植物化学成分以及药理活性的研究报道。为了从云南青牛胆植物中寻找具有生物活性的天然产物,对该植物的化学成分进行了研究,并从该植物块根的正丁醇部位中分离鉴定了 11 个化合物。通过理化常数的测定以及各种光谱数据的分析,分别鉴定为古伦宾(columbin,**1**)、非洲防己苷 C(palmatoside C,**2**)、去氧黄藤苦素(绿白黄藤素,fibleucin,**3**)、巴马亭(palmatine,**4**)、药根碱(jatrorrhizine,**5**)、非洲防己碱(columbamine,**6**)、20-hydroxyecdysone(**7**)、abutasterone(**8**)、2-deoxy-20-hydroxyecdysone 3-*O*-β-*D*-glucopyranoside(**9**)、(+)-lyoniresinol-2α-*O*-β-*D*-glucopyranoside(**10**)和α-*D*-glucopyranosyl-(2 →1)-α-*D*-glucopyranoside(**11**)。所有化合物均为首次从云南青牛胆中分离得到,而化合物 **8**、**10** 和 **11** 为首次从该属植物中分离得到。

1　仪器与材料

X-4 数字显微熔点测定仪;Bio-Rad FTS-135 型

---

①**收稿日期**:2009-11-23

基金项目:云南省教育厅基金资助项目(07Y41403)

*通讯作者　黄相中(1974—),男,副教授,主要从事天然药物化学的研究。　E-mail:huangxiangzhong@ynni.edu.cn

红外光谱仪,KBr 压片;UV210A 型紫外光谱仪;Bruker AV 400 核磁共振仪;VGZAB-2F 质谱仪;反相 Rp-18(25～40 μm)材料,Sephadex LH-20 均由德国 Merck 公司生产;柱色谱硅胶和薄层色谱硅胶 GF_{254} 均为青岛海洋化工厂产品。

云南青牛胆 2007 年 9 月采自云南红河州,由云南大学生物系马绍宾教授鉴定为 *Tinospora sagittata* var. *yunnanensis* (S. Y. Hu) H. S. Lo。

2 提取与分离

云南青牛胆块根 10.0 kg,用 95 %乙醇冷浸提取 3 次,合并滤液减压浓缩得浸膏(1.0 kg)。浸膏混悬于适量水中,依次用石油醚、醋酸乙酯和正丁醇萃取,回收得正丁醇部分浸膏 380 g。将正丁醇部分浸膏经普通硅胶柱色谱,以氯仿-甲醇(20∶1～2∶1)进行梯度洗脱,得到组分 Fr 1～Fr 8。组分 Fr 1,Fr 4,Fr 5,Fr 6以及 Fr 7,Fr 8经反复硅胶柱色谱、Sephadex LH-20 及反相硅胶柱色谱等手段分离纯化得化合物 **1**(13 mg)、**2**(50 mg)、**3**(12 mg)、**4**(20 mg)、**5**(18 mg)、**6**(13 mg)、**7**(15 mg)、**8**(8 mg)、**9**(10 mg)、**10**(8 mg)及 **11**(25 mg)。

3 结构鉴定

化合物 1:白色针晶,mp 184～185 ℃。IR ν_{max}^{KBr} (cm^{-1}):1 780,1 750,1 508,1 022,875,812;ESI-MS *m/z*:381[M + Na]$^+$;^1H-NMR($DMSO-d_6$,400 MHz)δ:5.30(1H,d,*J* = 4.4 Hz,H-1),6.52(1H,dd,*J* = 2.4,2.0 Hz,H-2),6.20(1H,d,*J* = 3.2 Hz,H-3),1.26～1.30(1H,m,H-6a),1.60～1.65(1H,m,H-6b),1.90～1.98(1H,m,H-7a),2.33～2.38(1H,m,H-7b),5.55(1H,dd,*J* = 4.0,4.0 Hz),6.65(1H,m,H-14),7.69(1H,s,H-15),7.72(1H,s,H-16),0.85(3H,s,OCH_3-19),1.10(3H,s,OCH_3-20);^{13}C-NMR($DMSO-d_6$,100 MHz)δ:73.7(C-1),130.9(C-2),136.2(C-3),80.9(C-4),37.3(C-5),26.2(C-6),17.4(C-7),43.8(C-8),35.1(C-9),46.2(C-10),40.9(C-11),70.7(C-12),125.8(C-13),109.7(C-14),144.3(C-15),141.0(C-16),174.1(C-17),175.2(C-18),24.2(C-19),27.6(C-20)。以上数据与文献报道基本一致[3],故鉴定为古伦宾。

化合物 2:白色粉末,mp 175～176 ℃。IR ν_{max}^{KBr} (cm^{-1}):1 780,1 750,1 508,1 022,875,812;ESI-MS *m/z*:543[M + Na]$^+$;^1H-NMR(CD_3OD,400 MHz)δ:5.33(1H,dd,*J* = 4.8,1.2 Hz,H-1),6.59(1H,dd,*J* = 6.0,2.4 Hz,H-2),6.64(1H,dd,*J* = 4.8,5.2 Hz,H-3),1.98～1.96(1H,m,H-6a),1.60～1.49(1H,m,H-6b),2.20～2.10(1H,m,H-7a),2.04～2.00(1H,m,H-7b),2.60(2H,dd,*J* = 1.2,1.2 Hz,H-8),1.84(1H,s,H-10),2.42(1H,dd,*J* = 4.4,4.4 Hz,H-11a),2.01(1H,dd,*J* = 1.6,1.2 Hz,H-11b),5.61(1H,dd,*J* = 4.0,4.0 Hz,H-12),6.59(1H,d,*J* = 1.2 Hz,H-14),7.82(1H,dd,*J* = 1.6,1.2 Hz,H-15),7.90(1H,m,H-16),1.09(3H,s,H-19),1.25(3H,s,H-20),4.73(1H,d,*J* = 1.6 Hz);^{13}C-NMR(CD_3OD,100 MHz)δ:71.4(C-1),130.4(C-2),131.2(C-3),86.2(C-4),38.6(C-5),26.8(C-6),17.1(C-7),43.9(C-8),34.8(C-9),46.0(C-10),40.9(C-11),69.8(C-12),125.3(C-13),108.3(C-14),143.6(C-15),140.1(C-16),173.8(C-17),175.3(C-18),23.2(C-19),26.8(C-20),100.1(C-1′),73.5(C-2′),73.8(C-3′),71.4(C-4′),76.9(C-5′),61.2(C-6′)。以上数据与文献报道基本一致[4],故鉴定为非洲防己苷 C。

化合物 3:白色固体,mp 211～212 ℃。IR ν_{max}^{KBr} (cm^{-1}):1 780,1 705,1 508,1 022,875,812;ESI-MS *m/z*:379[M + Na]$^+$;^1H-NMR(CD_3OD,400 MHz)δ:5.04(1H,d,*J* = 4.0 Hz,H-1),6.48(1H,dd,*J* = 8.0,4.0 Hz,H-2),6.20(1H,dd,*J* = 6.4,4.0 Hz,H-3),1.77(1H,dd,*J* = 16.0,4.0 Hz,H-6a),2.15(1H,dd,*J* = 12.0,3.2 Hz,H-1),6.57(1H,*J* = 8.0,3.2 Hz,H-7),1.75(1H,s,H-10),1.93(1H,dd,*J* = 12.0,8.0 Hz,H-11a),2.13(1H,d,*J* = 6.4 Hz,H-11b),4.98(1H,d,*J* = 8.0 Hz,H-12),6.53(1H,s,H-14),7.54(1H,s,H-15),7.61(1H,s,H-16),1.00(3H,s,OCH_3-19),0.95(3H,s,OCH_3-20);^{13}C-NMR(CD_3OD,100 MHz)δ:72.9(C-1),132.4(C-2),138.3(C-3),78.2(C-4),36.4(C-5),30.7(C-6),136.1(C-8),42.9(C-9),52.2(C-10),46.1(C-11),71.5(C-12),126.1(C-13),110.0(C-14),145.0(C-15),141.4(C-16),175.4(C-17),170.1(C-18),23.5(OCH_3-19),27.0(OCH_3-20)。以上数据与文献报道基本一致[3],故鉴定为去氧黄藤苦素。

化合物 4:黄色针晶,mp 235～236 ℃。UV λ_{max}^{MeOH} nm:267,350;ESI-MS *m/z*:375[M + Na]$^+$;^1H-NMR($DMSO-d_6$,400 MHz)δ:7.71(1H,s,H-1),7.10(1H,s,H-4),3.24(3H,t,*J* = 6.0 Hz,H-5),4.95(2H,t,*J* = 6.0 Hz,H-6),9.89(1H,s,H-8),8.22(1H,d,*J* = 9.2 Hz,H-11),8.03(1H,d,

J = 9.2 Hz, H-12), 9.01 (1H, s, H-13), 3.94 (3H, s, OCH_3-2), 3.88 (3H, s, OCH_3-3), 4.11 (3H, s, OCH_3-9), 4.08 (3H, s, OCH_3-10); ^{13}C-NMR (DMSO-d_6, 100 MHz) δ: 111.8 (C-1), 149.2 (C-2), 151.9 (C-3), 109.2 (C-4), 129.1 (C-4a), 26.5 (C-5), 56.3 (C-6), 145.9 (C-8), 133.6 (C-8a), 150.7 (C-9), 144.1 (C-10), 123.9 (C-11), 127.3 (C-12), 121.8 (C-12a), 120.3 (C-13), 138.2 (C-13a), 119.4 (C-13b), 62.4 (OCH_3-10), 57.5 (OCH_3-9), 56.6 (OCH_3-3), 55.9 (OCH_3-2)。**以上数据与文献报道基本一致**[3]，**故鉴定为巴马亭。**

化合物 5：橙黄色针晶，mp 185～186 ℃。UV λ_{max}^{MeOH} nm: 267, 350; ESI-MS m/z: 361 $[M+Na]^+$; ^{1}H-NMR (CD_3OD, 400 MHz) δ: 7.80 (1H, s, H-1), 7.46 (1H, s, H-4), 3.23 (2H, t, J = 6.4 Hz, H-5), 4.95 (2H, t, J = 6.0 Hz, H-6), 9.70 (1H, s, H-8), 8.08 (1H, d, J = 8.4 Hz, H-11), 8.02 (1H, d, J = 8.0 Hz, H-12), 8.81 (1H, s, H-13), 4.04 (3H, s, OCH_3-2), 4.18 (3H, s, OCH_3-9), 4.15 (3H, s, OCH_3-10); ^{13}C-NMR (CD_3OD, 100 MHz) δ: 115.4 (C-1), 149.0 (C-2), 151.5 (C-3), 112.5 (C-4), 129.9 (C-4a), 26.8 (C-5), 57.2 (C-6), 145.2 (C-8), 135.0 (C-8a), 151.5 (C-9), 145.1 (C-10), 123.8 (C-11), 127.9 (C-12), 122.9 (C-12a), 120.5 (C-13), 139.5 (C-13a), 119.0 (C-13b), 56.5 (OCH_3-2), 62.1 (OCH_3-9), 57.0 (OCH_3-10)。**以上数据与文献报道基本一致**[3]，**故鉴定为药根碱。**

化合物 6：黄色针晶，mp 177～178 ℃。UV λ_{max}^{MeOH} nm: 267, 350; ESI-MS m/z: 361 $[M+Na]^+$; ^{1}H-NMR (CD_3OD, 400 MHz) δ: 7.68 (1H, s, H-1), 6.88 (1H, s, H-4), 3.23 (2H, t, J = 6.4 Hz, H-5), 4.95 (2H, t, J = 6.0 Hz, H-6), 9.75 (1H, s, H-8), 8.12 (1H, d, J = 9.2 Hz, H-11), 8.02 (1H, d, J = 8.8 Hz, H-12), 8.78 (1H, s, H-13), 4.04 (3H, s, OCH_3-3), 4.22 (3H, s, OCH_3-9), 4.12 (3H, s, OCH_3-10); ^{13}C-NMR (CD_3OD, 100 MHz) δ: 114.5 (C-1), 148.3 (C-2), 150.5 (C-3), 114.5 (C-4), 128.9 (C-4a), 26.3 (C-5), 56.2 (C-6), 144.8 (C-8), 134.0 (C-8a), 150.5 (C-9), 144.3 (C-10), 122.9 (C-11), 126.7 (C-12), 121.8 (C-12a), 119.5 (C-13), 138.9 (C-13a), 118.0 (C-13b), 55.5 (OCH_3-3), 56.0 (OCH_3-9), 61.1 (OCH_3-10)。**以上数据与文献报道基本一致**[3]，**故鉴定为非洲防己碱。**

化合物 7：白色针晶，mp 232～233 ℃。ESI-MS m/z: 503 $[M+Na]^+$; ^{1}H-NMR (CD_3OD, 400 MHz) δ: 1.81 (1H, d, J = 4.8 Hz, H-1a), 1.97 (1H, d, H-1b), 3.84 (1H, t, J = 3.6, 1.6 Hz, H-2), 3.97 (1H, t, J = 3.6, 1.2 Hz, H-3), 1.70 (1H, d, J = 1.6 Hz, H-4a), 1.88 (1H, t, J = 9.6, 4.4 Hz, H-4b), 3.17 (1H, t, H-5), 5.83 (1H, d, J = 2.4 Hz, H-7), 3.85 (1H, t, J = 4.0, 3.6 Hz, H-9), 1.62 (1H, m, H-11a), 1.79 (1H, t, J = 2.4, 2.0 Hz, H-11b), 1.77 (1H, t, J = 2.4, 2.0 Hz, H-12a), 2.03 (1H, t, J = 7.2, 4.8 Hz, C-12b), 2.41 (1H, dt, J = 4.8, 3.2 Hz, H-15a), 1.88 (1H, t, J = 3.6, 2.4 Hz, H-15b), 2.41 (1H, m, H-16a), 1.89 (1H, m, H-16b), 3.15 (1H, t, J = 4.0, 2.0 Hz, H-17), 0.99 (3H, s, H-18), 0.91 (3H, s, H-19), 1.62 (3H, s, H-21), 3.97 (1H, d, J = 4.0 Hz, H-22), 1.88 (1H, m, H-23a), 2.00 (1H, m, H-23b), 1.82 (1H, t, J = 3.6, 7.2 Hz, H-24a), 2.15 (1H, m, H-24b), 1.31 (3H, s, H-26), 1.32 (3H, s, H-27); ^{13}C-NMR (CD_3OD, 100 MHz) δ: 37.9 (C-1), 67.3 (C-2), 67.1 (C-3), 31.4 (C-4), 50.4 (C-5), 205.1 (C-6), 120.7 (C-7), 166.6 (C-8), 33.7 (C-9), 37.4 (C-10), 19.7 (C-11), 30.4 (C-12), 48.4 (C-13), 83.8 (C-14), 30.4 (C-15), 19.7 (C-16), 49.1 (C-17), 16.7 (C-18), 23.0 (C-19), 76.5 (C-20), 20.1 (C-21), 77.0 (C-22), 26.0 (C-23), 41.0 (C-24), 69.9 (C-25), 27.6 (C-26), 28.3 (C-27)。**以上数据与文献报道基本一致**[6]，**故鉴定为** 20-hydroxyecdysone。

化合物 8：白色针晶，mp 243～244 ℃。ESI-MS m/z: 519 $[M+Na]^+$; ^{1}H-NMR (CD_3OD, 400 MHz) δ: 3.67 (1H, m, H-2), 3.85 (1H, s, H-3), 2.39 (1H, dd, J = 2.8, 1.2 Hz, H-5), 5.85 (1H, d, J = 2.4 Hz, H-7), 3.17 (1H, m, H-9), 2.35 (1H, t, J = 4.8 Hz, H-17), 0.99 (3H, s, H-18), 0.91 (3H, s, H-19), 1.25 (3H, s, H-21), 3.97 (1H, s, H-22), 3.53 (1H, d, J = 2.4 Hz, H-24), 1.17 (3H, s, H-26), 1.21 (3H, s, H-27); ^{13}C-NMR (CD_3OD, 100 MHz) δ: 36.0 (C-1), 67.3 (C-2), 67.1 (C-3), 31.4 (C-4), 50.4 (C-5), 205.0 (C-6), 120.8 (C-7), 166.5 (C-8), 33.7 (C-9), 37.9 (C-10), 19.6 (C-11), 30.4 (C-12), 48.4 (C-13), 83.8 (C-14), 31.4 (C-15), 20.1 (C-16), 49.1 (C-17), 16.7 (C-18), 23.0 (C-19), 76.4 (C-20), 20.1 (C-21), 77.1 (C-22), 31.6 (C-23), 79.0 (C-24), 72.0 (C-25), 24.8 (C-26), 23.1 (C-27)。**以上数据与文献报道基本一致**[7]，**故鉴定为** abutasterone。

化合物 9:**白色固体**, mp 275～276 ℃。ESI-MS *m/z*:649[M + Na]$^+$;^{1}H-NMR(CD$_3$OD, 400 MHz) δ: 5.72 (1H, d, *J* = 1.6 Hz, H-7), 0.86 (3H, s, OCH$_3$-18), 0.79 (3H, s, OCH$_3$-19), 1.11 (3H, s, OCH$_3$-21), 1.09 (3H, s, OCH$_3$-26), 1.11 (3H, s, OCH$_3$-27);^{13}C-NMR (CD$_3$OD, 100 MHz) δ: 27.9 (C-1), 29.0 (C-2), 78.0 (C-3), 29.7 (C-4), 50.6 (C-5), 205.1 (C-6), 122.0 (C-7), 168.9 (C-8), 29.7 (C-9), 37.5 (C-10), 21.1 (C-11), 31.7 (C-12), 48.6 (C-13), 85.4 (C-14), 32.7 (C-15), 21.1 (C-16), 49.7 (C-17), 18.1 (C-18), 24.2 (C-19), 75.3 (C-20), 73.2 (C-21), 77.9 (C-22), 27.4 (C-23), 42.4 (C-24), 71.7 (C-25), 29.7 (C-26), 29.0 (C-27), 102.9 (C-1′), 73.2 (C-2′), 78.5 (C-3′), 71.3 (C-4′), 78.2 (C-5′), 62.8 (C-6′)。**以上数据与文献报道**[3] **基本一致,故鉴定为** 2-deoxy-20-hydroxyecdysone 3-*O*-β-*D*-glucopyranoside。

化合物 10:**白色固体**, mp 122～123 ℃。ESI-MS *m/z*:605[M + Na]$^+$;UV $\lambda_{\max}^{\mathrm{MeOH}}$ nm:221, 280;^{1}H-NMR(CD$_3$OD, 400 MHz) δ: 4.43 (1H, d, *J* = 5.6 Hz, H-1), 2.12 (1H, m, H-2), 1.71 (1H, m, H-3), 2.64 (1H, dd, *J* = 7.2, 2.4 Hz, H-4a), 2.70 (1H, dd, *J* = 7.2, 3.6 Hz, H-4b), 6.43 (1H, s, H-5), 3.71～3.93 (1H, m, H-2a), 3.71～3.93 (1H, m, H-3a), 6.60 (1H, s, H-2′), 6.45 (1H, s, H-6), 4.62 (1H, d, *J* = 2.4 Hz, H-1″), 3.85 (3H, s, OCH$_3$-6), 3.83 (3H, s, OCH$_3$-8), 3.77 (3H, s, OCH$_3$-3′), 3.77 (3H, s, OCH$_3$-5′);^{13}C-NMR(CD$_3$OD, 100 MHz) δ: 41.9 (C-1), 45.3 (C-2), 39.2 (C-3), 32.4 (C-4), 106.4 (C-5), 146.2 (C-6), 138.0 (C-7), 147.2 (C-8), 125.0 (C-9), 128.8 (C-10), 70.1 (C-2a), 64.8 (C-3a), 137.5 (C-1′), 105.5 (C-2′), 147.6 (C-3′), 133.0 (C-4′), 147.6 (C-5′), 103.4 (C-6′), 102.8 (C-1″), 73.8 (C-2″), 76.8 (C-3″), 70.1 (C-4″), 76.6 (C-5″), 61.4 (C-6″), 55.2 (OCH$_3$-6), 58.8 (OCH$_3$-8), 55.5 (OCH$_3$-3′), 55.5 (OCH$_3$-5′)。**以上数据与文献报道基本一致**[8] **,故鉴定为** (+)-lyoniresinol-2α-*O*-β-*D*-glucopyranoside。

化合物 11:**白色晶体**, mp 158～159 ℃。ESI-MS *m/z*:365[M + Na]$^+$;^{13}C-NMR(DMSO-*d*$_6$, 100 MHz) δ: 92.7 (C-1), 77.2 (C-2), 72.4 (C-3), 71.0 (C-4), 72.8 (C-5), 61.6 (C-6), 97.4 (C-1′), 73.5 (C-2′), 73.5 (C-3′), 71.0 (C-4′), 72.8 (C-5′), 61.6 (C-6′)。**以上数据与文献报道基本一致**[9] **,故鉴定为** α-*D*-glucopyranosyl-(2 → 1)-α-*D*-glucopyranoside。

参考文献:

[1] 罗献瑞, 赵素云. 中国防己科资料 [J]. 广西植物, 1986, 6(1-2): 49-61.

[2] 江苏新医学院编. 中药大辞典(上册) [M]. 上海: 上海科学技术出版社, 1986.

[3] Shi Q R, Shen Y H, Zhang C, *et al*. Chemical constituents of two original plants used as *Radix Tinosporae* [J]. *Chem J Nat Med*, 2008, 3(3): 186-190.

[4] 方圣鼎, 王怀女, 陈 嫣, 等. 千金藤属生物碱的研究 II. 黄叶地不容中的生物碱 [J]. 中草药, 1981, 12(2): 1-3.

[5] Yonemitsu M, Fukada N, Kimura T, *et al*. Studies on the constituents of *Jateorhiza palmata* Miers (Colombo root) II: Separation and structure of six new furanoid diterpene glucosides: palmatoside B, C, D, E, F, and G [J]. *Liebigs Ann Chem*, 1987, 35(1): 193-197.

[6] Miller R W, Clardy J, Kozlowski J, *et al*. Phytoecdysteroids of *Diploclisia glaucescens* seed [J]. *Planta Med*, 1985, 51(1): 40-42.

[7] Suksamrarn A, Promrangsan N, Chitkul B, *et al*. Ecdysteroids of the root bark of *Vitex canescens* [J]. *Phytochemistry*, 1997, 45(6): 1149-1152.

[8] 张治针, 果德安, 李长龄, 等. 滇白珠木脂素苷的研究 [J]. 药学学报, 1999, 34(2): 128-131.

[9] 于德泉, 杨峻山主编. 分析化学手册(第 2 版)(第七分册) [M]. 北京: 化学工业出版社, 1999.

高翅果菊化学成分及 lactuside B 的抗脑缺血活性研究

詹合琴[1], **郭兰青**[2], **崔建敏**[3], **闫福林**[1] *

(1. 新乡医学院药学院, 河南 新乡 453003; 3. 新乡医学院护理学院, 河南 新乡 453003;
3. 河南中医学院, 河南 郑州 450008)

摘 要:**目的** 研究高翅果菊 *Pterocypsela elata* 根茎中的主要化学成分, 探讨 lactuside B 的抗脑缺血活性。**方法**

---

①**收稿日期**:2009-10-24

作者简介:詹合琴(1957—), 女, 硕士, 副教授, 研究方向为心脑血管药理。
*通讯作者 闫福林 Tel/Fax:(0373)3029882 E-mail:yanfulin03@xxmu.edu.cn