# AMIDES FROM *Uvaria microcarpa*

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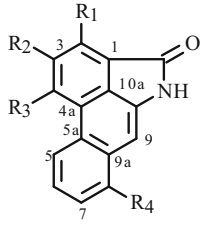
The dried stems of *Uvaria microcarpa* Champ. ex Benth. have significant antiplasmodia activity [1]. Previous studies showed that this plant contained a number of phenanthrene-carboxylic acid lactams [2].

Nine phenanthrene-carboxylic acid lactams and one amide were isolated from the EtOAc fraction of extracts of the stems of *Uvaria microcarpa* Champ. ex Benth., of which velutinam (**1**), enterocarpam II (**2**), goniopedaline (**3**), uvariadiamide (**9**), aristololactam B (**10**) were obtained from this plant for the first time.

The stems of *Uvaria microcarpa* Champ. ex Benth. were collected from Hainan Province in June 2007 and identified by Mr. Zhu Ping, Hainan Tropical Botanic Garden of the Chinese Academy of Sciences. A voucher specimen has been deposited at the Department of Natural Medicinal Chemistry, School of Pharmacy, Second Military Medical University, Shanghai.

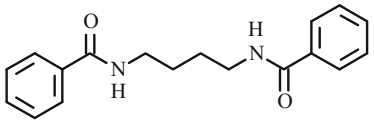
The dried and chopped stems of *Uvaria microcarpa* Champ. ex Benth. (10 kg) were extracted with 95% EtOH (5 L × 4) under reflux, then evaporated in vacuum. The residue (530 g) was further suspended in water and extracted successively with petroleum ether, EtOAc, and BuOH. The EtOAc extract was separated by repeated column chromatography using silica gel and Sephadex LH-20 to afford compounds **1**–**10**. All compounds were identified by comparison of their $^1$H and $^{13}$C NMR data. The spectroscopic data of all compounds were in good agreement with the literature data [3–8]. The $^1$H NMR data are shown in Tables 1 and 2. The $^{13}$C NMR data are shown in Table 3.

**Uvariadiamide (9)**. Colorless needles ($CH_3OH$). $C_{18}H_{20}N_2O_2$, 296. $^1$H NMR (DMSO-$d_6$, δ, ppm, J/Hz): 1.57 (4H, br.t, J = 5.4, 2, 3-H), 3.27 (4H, br.t, J = 5.4, 1, 4-H), 7.42–7.83 (10H, m, Ar-H); $^{13}$C NMR (DMSO-$d_6$): 168.1 (C=O), 26.7 (2, 3-C), 39.9 (1, 4-C), 127.1, 128.2, 131.0, 134.7 (Ar-C), $^1$H NMR and $^{13}$C NMR spectra have been published [8].

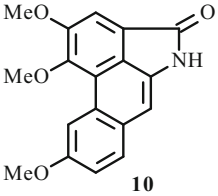



**1 - 8**

**1:** $R_1$ = H, $R_2$ = $R_3$ = $OCH_3$, $R_4$ = OH
**2:** $R_1$ = H, $R_2$ = OH, $R_3$ = $R_4$ = $OCH_3$
**3:** $R_1$ = $R_3$ = $OCH_3$, $R_2$ = OH, $R_4$ = H
**4:** $R_1$ = $R_4$ = H, $R_2$ = OH, $R_3$ = $OCH_3$
**5:** $R_1$ = H, $R_2$ = $R_4$ = OH, $R_3$ = $OCH_3$
**6:** $R_1$ = H, $R_2$ = $R_4$ = $OCH_3$, $R_3$ = OH
**7:** $R_1$ = H, $R_2$ = $R_3$ = $R_4$ = $OCH_3$
**8:** $R_1$ = $R_4$ = H, $R_2$ = $R_3$ = $OCH_3$




**9**




**10**

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TABLE 1. $^{1}$H NMR Data for Compounds **1–5** (600 MHz, DMSO-$d_6$, δ, ppm, J/Hz)

| C atom | Velutinam (**1**) | Enterocarpam II (**2**) | Goniopedaline (**3**) | Aristololactam A II (**4**) | Aristololactam A Ia (**5**) |
|---|---|---|---|---|---|
| 2 | 7.61 s | 7.83 s | | 7.63 s | 7.70 s |
| 5 | 8.77 (d, J = 8.4) | 8.62 (d, J = 8.4) | 9.08 (d, J = 5.4) | 9.13 (d, J = 7.8, 1.8) | 8.59 (d, J = 8.4) |
| 6 | 7.45 (t, J = 8.4, 7.8) | 7.35 (t, J = 7.8, 8.4) | 7.51 (m, J = 10.2) | 7.54 m | 7.31 (t, J = 7.8, 8.4) |
| 7 | 7.15 (d, J = 7.8) | 7.08 (d, J = 7.2) | 7.51 (m, J = 10.2) | 7.54 m | 7.10 (d, J = 8.4) |
| 8 | | | 7.92 (d, J = 5.4) | 7.93 (d, J = 7.8, 1.8) | 7.36 s |
| 9 | 7.31 s | 7.41 s | 7.15 s | 7.02 s | |
| 2-OMe | | | 4.34 | | |
| 3-OMe | 4.01 | 4.03 | | | |
| 4-OMe | 3.96 | 3.99 | 4.01 | 4.02 | 3.97 |
| OH | 10.01 | 10.08 | 9.54 | 9.15 | 9.54, 9.60 |
| N-H | 10.65 | 10.76 | 10.87 | 10.75 | 10.72 |

TABLE 2. $^{1}$H NMR Data for Compounds **6–8**, **10** (600 MHz, DMSO-$d_6$, δ, ppm, J/Hz)

| C atom | Uvarilactam (**6**) | Aristololactam B I (**7**) | Aristololactam B II (**8**) | Aristololactam B III (**10**) |
|---|---|---|---|---|
| 2 | 7.62 s | 7.86 s | 7.85 s | 7.81 s |
| 5 | 8.74 (d, J = 8.4) | 8.74 (d, J = 8.4) | 9.12 (d, J = 7.8) | 8.73 (d, J = 7.8) |
| 6 | 7.48 (t, J = 8.4, 8.4) | 7.49 (t, J = 2.4,1.8) | 7.57 m | 7.31 (t, J = 8.4, 8.4) |
| 7 | 7.19 (d, J = 8.4) | 7.21 (d, J = 7.8) | 7.57 m | 7.20 (d, J = 7.8) |
| 8 | | | 7.94 (d, J = 6.6) | |
| 9 | 7.38 s | 7.42 s | 7.14 s | 7.14 s |
| 3-OMe | 4.01 | 4.04 | 4.04 | 4.03 |
| 4-OMe | | 4.01 | 4.03 | 4.01 |
| 6-OMe | | | | 3.98 |
| 8-OMe | 4.10 | 3.98 | | |
| OH | 10.30 | | 4.01 | |
| N-H | 10.75 | 10.79 | 10.84 | 10.86 |

TABLE 3. $^{13}$C NMR Data for Compounds **1–7**, **10** (150 MHz, DMSO-$d_6$, δ, ppm)

| C atom | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **10** |
|---|---|---|---|---|---|---|---|---|
| 1 | 125.2 | 125.7 | 109.3 | 125 | | 126.8 | 125.7 | |
| 2 | 110.5 | 109.9 | 148.6 | 103.2 | | 113.8 | 108.2 | |
| 3 | 154.9 | 154.2 | 143.9 | 149.3 | 152.5 | 148.9 | 154.3 | 154.3 |
| 4 | 149.6 | 150.6 | 149.6 | 149.2 | 149.3 | 152.2 | 150.6 | 150.5 |
| 4 | 121.8 | 124 | 133.6 | 121.7 | | 120.4 | 121.6 | |
| 5a | 128.7 | 117.9 | 115.7 | 126.2 | | 121.8 | 119.3 | |
| 5 | 119.4 | 121.6 | 126.4 | 126.9 | | 125.4 | 119.9 | |
| 6 | 125 | 123.3 | 125.7 | 120.3 | | 124.9 | 123.1 | 157 |
| 7 | 114.7 | 112.1 | 125.9 | 127 | | 107.9 | 110.2 | |
| 8 | 155.2 | 153.7 | 128.7 | 128.8 | 153.9 | 155.3 | 155.3 | |
| 9a | 124.9 | 127.1 | 125.7 | | | 119.2 | 126.7 | |
| 9 | 96.2 | 98.7 | 103.9 | 79.2 | | 97.2 | 97.9 | |
| 10 | 135.1 | 133.9 | 134.7 | 135.5 | | 134.9 | 134.7 | |
| 10a | 120.3 | 120.2 | 121.4 | | | 122.1 | | |
| C=O | 169 | 168.3 | 166.7 | 168.9 | 168.9 | 168.4 | 168.3 | |
| 2-OMe | | | 62.4 | | | | | |
| 3-OMe | 55.9 | | | | | 55.9 | 59.9 | |
| 4-OMe | 58.9 | 59.9 | 59.6 | 59.1 | 59.7 | | 57 | |
| 8-OMe | | 57 | | | | 59.5 | 55.9 | |

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