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DIONCOPELTINE A AND DIONCOLACTONE A: ALKALOIDS FROM *TRIPHYOPHYLLUM PELTATUM**

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Key Word Index—*Triphyophyllum peltatum*; Dioncophyllaceae; naphthylisoquinoline alkaloids; dioncopeltine A; dioncolactone A.

Abstract—The isolation of two novel alkaloids from *Triphyophyllum peltatum* is described. The complete stereostructure of dioncopeltine A, which is closely related to dioncophylline A, is established by spectroscopic, chiroptical, and degradative methods, and is furthermore confirmed by its transformation to *O*-methyl-dioncopophylline A, as well as by X-ray crystallography. Dioncolactone A, which can be transformed into dioncopeltine A by reductive ring-opening, is the first naturally occurring representative of this novel type of 'axially prostereogenic' biaryl alkaloids.

INTRODUCTION

Triphyophyllum peltatum is a West African medicinal plant [2], which was recently found to develop carnivorous organs temporarily [3]. From this Dioncophyllaceae species, a series of naphthylisoquinoline alkaloids [4–7] was isolated, one of which, dioncophylline A (**1**), has been fully structurally elucidated [8–12] and totally synthesized [1, 9]. We report the isolation and structure elucidation of dioncopeltine A (**2**) and the related pentacyclic lactone **3**, a new structural type of natural product previously known only as un-natural intermediates in the chemical total synthesis of naphthylisoquinoline alkaloids [1, 9, 13–15] and other biaryls [for a review, see ref. 16]. Some of the results described herein have recently been published in a preliminary form [17].

RESULTS AND DISCUSSION

The root bark of *T. peltatum* was extracted with dichloromethane. The late fractions of column chromatography [silica gel, dichloromethane–methanol (10%)] gave a crystalline nitrogen-containing compound. Spectroscopic methods (NMR, MS, IR) revealed the presence of a naphthylisoquinoline alkaloid, structurally closely related to dioncophylline A (**1**), including the 7-1′ coupling type and the relative *trans*-configuration at C-1 vs C-3 ($\delta_{H\text{-}3}$ 3.36, cp. lit. [11]), but exhibiting an oxygen function at the naphthalene C_1-substituent, as evident from the signal of the two isochronic benzylic protons at δ4.50, and from the missing methyl signal for Me-2′ in **1**. A further structural feature different from **1** is the lack of one of the *O*-methyl groups. The position of the resulting phenolic function was deduced from a mutual NOE of the remaining *O*-methyl group with H-3′. Consequently, this alkaloid formally corresponds to triphyopeltine [7], for which no stereochemical information had been given—neither for the stereogenic centres nor for the biaryl axis. Yet, as the optical rotation ($[\alpha]_D$ −13.1°, $CHCl_3$; *c* 0.528) of our isolated alkaloid differed with the one described for 'triphyopeltine' ($[\alpha]_D$ −125°, $CHCl_3$; *c* 0.68 [17]) and as no authentic example of 'triphyopeltine' was available [Bruneton, J. and Lavault, M., personal communication], we decided to name our alkaloid within the series of Dioncophyllaceae alkaloids as 'dioncopeltine A'.

Oxidative degradation of dioncopeltine A with $RuCl_3$–$NaIO_4$, according to a procedure recently described [11, 17], gave (*R*)-3-aminobutyric acid (**4**) and D-alanine (**5**), the configurations of which were unambiguously determined by GC-analysis (fused silica capillary column 0.33 mm (i.d.) * 30 m coated with OV-225) after Mosher-type derivatization [18] of the methyl esters, thus clearly establishing that dioncopeltine A possesses *R*-configuration at both stereogenic centres.

The last stereochemical information required, the absolute configuration at the biaryl linkage, could be deduced from the CD spectrum, which exhibited a first positive Cotton effect at 240 nm ($\Delta\varepsilon$ +21) and a second negative Cotton effect at 219 nm ($\Delta\varepsilon$ −35), practically identical to that of dioncophylline A.

These investigations show dioncopeltine to have structure **2**, i.e. closely related to that of dioncophylline A (**1**), yet with a free phenolic oxygen function at C-5′ and a hydroxymethyl- instead of a methyl group at C-2′. For a

*Part 24 in the series 'Acetogenic Isoquinoline Alkaloids'. For Part 23, see ref. [1].

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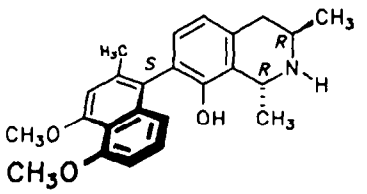
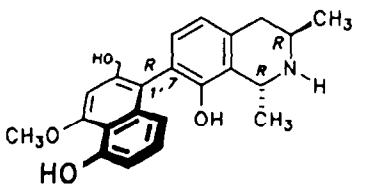


1
Dioncophylline A



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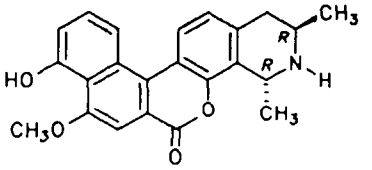
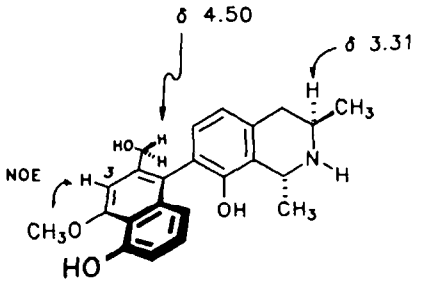
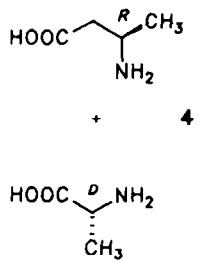
Dioncopeltine A



3
Dioncolactone A



2



Scheme 1. Oxidative degradation of dioncopeltine A (2).

confirmation of this stereochemical identity* of **2** and **1**, we transformed both compounds into a joint 'derivative', the known [8] *O*-methyl-dioncophylline A (**11**), by *N*-protection, *O*-methylation, *N*-deprotection and (in the case of dioncopeltine A) deoxygenation. Both products **11** thus obtained proved to be fully identical with respect to their chromatographic, spectroscopic and chiroptical properties.

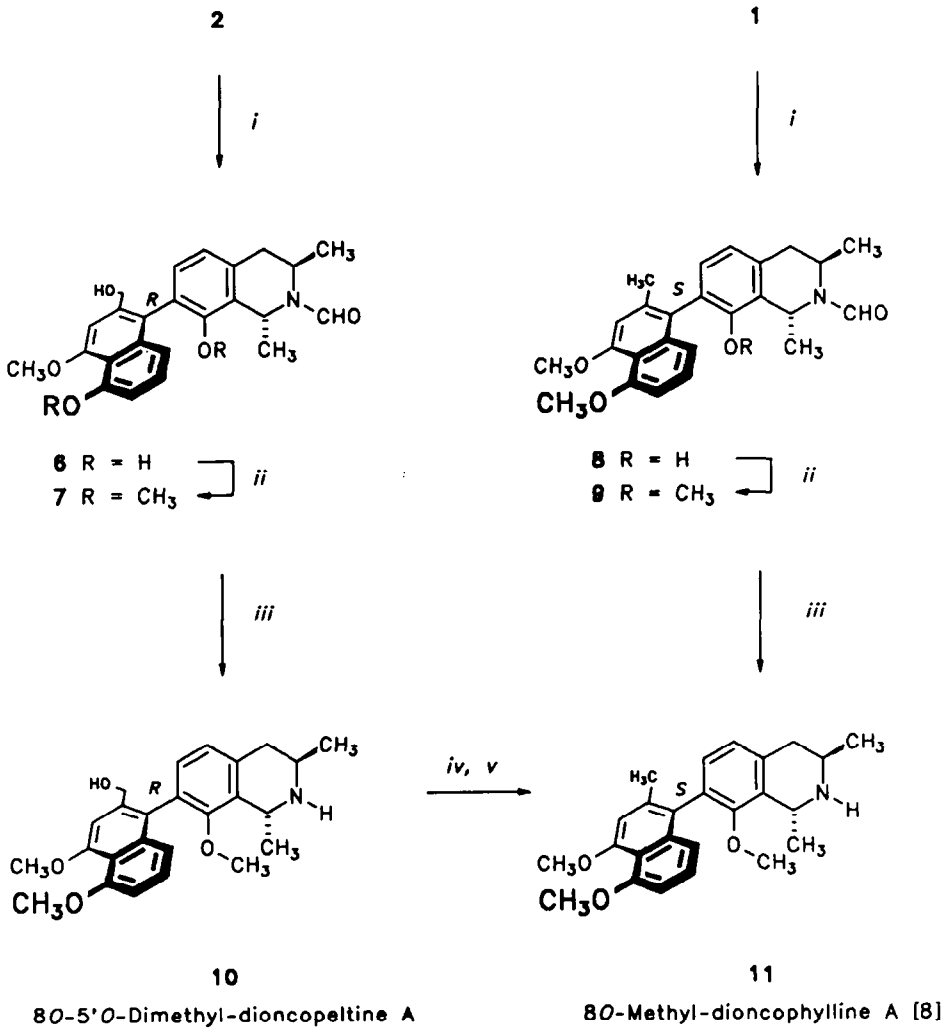
Furthermore, we finally managed to get crystals of sufficient quality for performing an X-ray analysis of **2** (Fig. 1), which fully confirms the constitution and the (relative) configuration established above. This structure determined by X-ray crystallography very satisfactorily matches with the structure predicted independently by force field and semiempirical AM [21] calculations (Fig. 2) (and is analogous to the structure of its dimethyl-ether **10**, as calculated previously [18]).

From the less polar fractions (0.1–0.5% methanol in dichloromethane, silica gel) we could furthermore isolate another nitrogen-containing compound. This from its spectroscopic data, especially its strong and brilliant blue fluorescence [λ_{max} (emission) = 442 nm] and from the unusual low-field shift of the ^{1}H NMR of the 'bay protons' H-6 and H-8,* indicates the polycyclic compound **3**, structurally related to dioncophylline A and especially to dioncopeltine A, from which it is formally derived by oxidation and lactone-type junction of the free phenolic 8-oxygen with the functionalized C_1-group at C-2'. For an additional stereochemical correlation of this interesting natural product with the alkaloids described above, the lactone ring was opened with $LiAlH_4$, giving rise to the two atropo-diastereomeric alcohols **12a** and **b**, one of which, **12a**, was identical to **2**.

Hence, this product has structure **3**, with *1R,3R*-configuration at the stereogenic centres, and with no stereochemical information at the flattened biaryl axis, and can thus be referred to as dioncopeltine A-lactone or 'dioncolactone A'—a most surprising coincidence as exactly this structural type of flattened, 'axially prostereogenic' [14] biaryl lactones has been used, in an appropriately *O*- and *N*-derivatized form, as a synthetic intermediate for our regio- and stereoselective total synthesis of dioncophylline A [1, 9]. Regarding the distinct

*Note that despite this stereochemical relationship the Cahn–Ingold–Prelog desriptor of **1** (and its derivatives **8**, **9**, **11**) is opposite to that of **2** (and its derivatives **6**, **7**, **10**).

*For reasons of comparability, the framework numbering for this alkaloid was adapted to that of **1** and **2**.



Scheme 2. Synthesis of *O*-methyl-dioncophylline A (**11**) from dioncophylline A (**1**) and dioncopeltine A (**2**). Reagents and conditions: (i) EtOCHO. (ii) Me_2SO4_4, PTC. (iii) MeOH–HCl. (iv) $C_2Br_2Cl_4$–PPh_3 [19]. (v) $LiAlH_4$–THF.

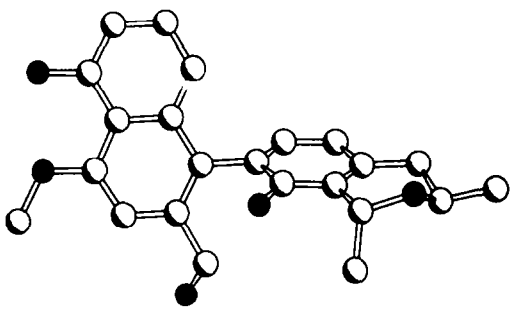


Fig. 1. Schakal plot [20] of the structure of dioncopeltine A (**2**), as determined by X-ray crystallography.

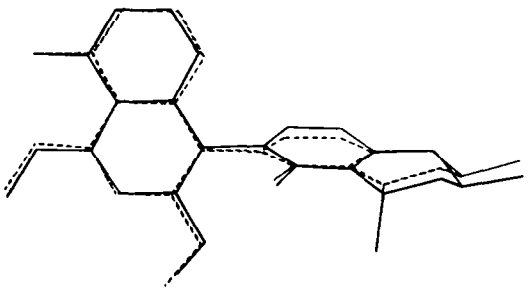
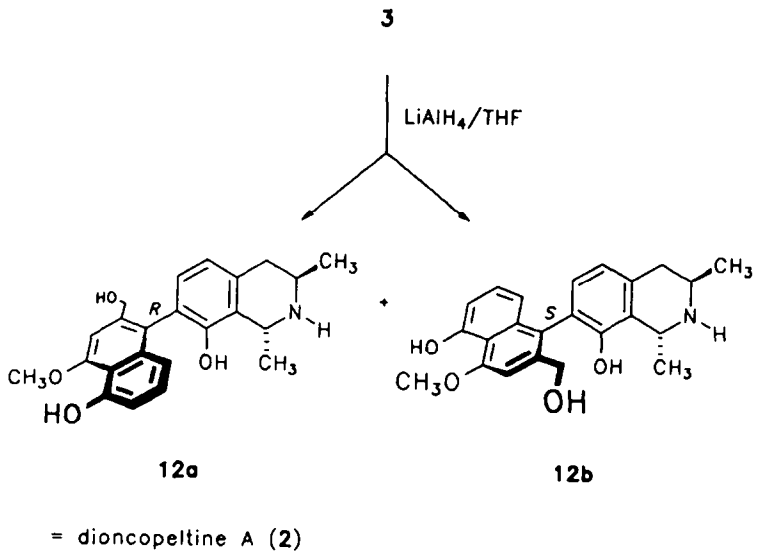
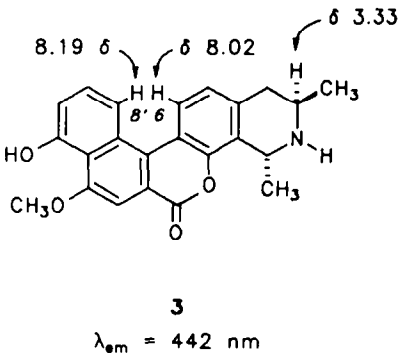


Fig. 2. Superimposed view of the measured (X-ray) and the independently calculated (AM 1) structure of dioncopeltine A (**2**).



Scheme 3. Partial synthesis of dioncopeltine A (2) by reductive cleavage of dioncolactone A (3).



tendency of such lactones to undergo *in vitro* ring-opening reactions with nucleophiles—as evident from our chemical studies [16]—the isolation of this novel type of polycyclic isoquinoline alkaloids gives rise to many interesting questions concerning its eventual relevance to the biosynthetic biaryl coupling step and its biological role.

EXPERIMENTAL

General. Mps: uncorr. Optical rotations: 20°, 10 cm cell, $CHCl_3$ (filtered through basic Al_2O_3). CD: 20°, EtOH, IR: KBr. ^1H NMR (200 or 400 MHz) and ^{13}C NMR (50 MHz) spectra were recorded in $CDCl_3$ with TMS as int. standard. MS: 70 eV. Analyses (C, H and N) were performed by the Institute of Inorganic Chemistry, University of Würzburg. CC: Silica gel (60–200 mesh, Merck) by addition of 7.5% aq. NH_3. TLC: precoated silica gel 60 F_{254} plates (Merck), deactivated with NH_3. Spots were visualized under UV and by Dragendorff's reagent.

Plant material. Stem bark of *Triphyophyllum peltatum* was collected in West Ivory Coast in January 1988 and identified by one of us (L. Aké Assi). A voucher specimen is deposited at Conservatoire et Jardin Botaniques de l'Université d'Abidjan, République de Côte d'Ivoire.

Extraction and isolation. The root bark (*ca* 6 kg) was extracted with CH_2Cl_2 and 5% NH_4OH in a Soxhlet apparatus. On TLC, the extract contained a mixt. of at least 7 alkaloids. The soln was evapd and the residue (33.5 g) was subjected to CC on 850 g silica gel. The column was eluted with mixts of CH_2Cl_2–MeOH of increasing polarity.

Isolation of 'dioncolactone A' (3). The early frs with 0.1–0.5% MeOH in CH_2Cl_2 contained a fluorescent compound, 'dioncolactone A' as an amorphous yellow solid (250 mg). $[\alpha]_D$ −64.0° ($CHCl_3$; *c* 0.26). IR ν_{max} cm^{-1}: 3380 (O–H), 2940, 2910, 2840 (C–H), 1710 (C=O), 1590, (C=C), 1110 (C–O). ^1H NMR (200 MHz): δ1.22 (3H, *d*, *J* = 6.3 Hz, Me-3), 1.54 (3H, *d*, *J* = 6.7 Hz, Me-1), 2.48 (1H, *dd*, J_{gem} = 16.9 Hz, J_{ax} = 10.9 Hz, H_{ax}-4), 2.83 (1H, *dd*, J_{gem} = 17.0 Hz, J_{eq} = 3.9 Hz, H_{eq}-4), 3.33 (1H, m_c, H-3), 4.11 (3H, *s*, OMe-4'), 4.69 (1H, *q*, *J* = 6.7 Hz, H-1), 6.99 (1H, *d*, *J* = 8.42 Hz, H-5), 7.07 (1H, *d*, *J* = 7.75 Hz, H-6'), 7.43 (1H, *s*, H-3') 7.47 (1H, *t*, *J* = 8.11 Hz, H-7'), 8.09 (1H, *d*, *J* = 8.4 Hz, H-6), 8.19 (1H, *d*, *J* = 8.5 Hz, H-8'). MS *m/z* (rel. int.): 376 [M + H] (7), 375 $[M]^+$ (20), 374 [M − H] (38), 361 [M + H − Me] (27), 360 [M − Me] (100).

Isolation of dioncopeltine A (2). The late frs, as eluted with 5–10% MeOH in $CHCl_2$, afforded dioncopeltine A as crystals, mp 233–234° (ref. for 'triphyopeltine' [6], 241°). $[\alpha]_D$ −13.1° ($CHCl_3$; *c* 0.528). CD: $\Delta\varepsilon_{219}$ −35, $\Delta\varepsilon_{240}$ +22, $\Delta\varepsilon_{261}$ +1, $\Delta\varepsilon_{280}$ +13. IR ν_{max} cm^{-1}: 3500 (O–H), 3320, 3280 (N–H), 2960, 2900 (C–H), 1600 (C=C), 1380 (C–H), 1235, 1110 (C–O). ^1H NMR

(400 MHz): δ1.24 (3H, *d*, J=6.3 Hz, Me-3), 1.45 (3H, *d*, J=6.7 Hz, Me-1), 2.53 (1H, *dd*, J_{gem}=16.5 Hz, J_{ax}=10.7 Hz, H_{ax}-4), 2.83 (1H, *dd*, J_{gem}=16.7 Hz, J_{eq}=4.0 Hz, H_{eq}-4), 3.36 (1H, m_c, H-3), 4.15 (3H, *s*, OMe-4'), 4.40 (1H, *q*, J=6.7 Hz, H-1), 4.50 (2H, *s*, CH_2–OH), 6.76–6.90 (3H, *m*, Ar-H), 7.09 (1H, *s*, H-3'), 7.21–7.31 (2H, *m*, Ar-H), 9.41 (1H, *s*, OH-5'). MS *m/z* (rel. int.): 379 $[M]^+$ (11), 364 $[M-CH_3]$ (100). Found: C, 72.90; H, 6.78; N, 3.65. $C_{23}H_{35}O_4N$ requires: C, 72.80; H, 6.64; N, 3.64%.

X-Ray analysis of dioncopeltine A (**2**). The unit cell of **2** belongs to the space group $P2_1$ with a=10.786 Å, b=9.721 Å, c=9.833 Å, α=90°, β=98.34° and γ=90°. Some of other obtained crystallographic data are: calculated density, 1.235 g cm^{-3}. Crystal size 0.45 * 0.9 *0.1 [mm]. Radiation wavelength (Mo-K_α) 0.7107 Å. Collected number of reflections, 2613. Observed number of reflections (with $F>3\sigma$), 1933. The positional parameters are tabulated in Table 1. All the crystallographic details are deposited at the Cambridge Crystallographic Data Centre.

Synthesis of 8-O-*methyl-dioncophylline A* (**11**) *from dioncopeltine A* (**2**). A soln of dioncopeltine A (**2**) (650 mg, 1.71 mmol) in 20 ml HCO_2Et and 1 ml HCO_2H was heated under reflux for 24 hr. After cooling, the reaction mixt. was poured into 80 ml H_2O and neutralized with satd $NaHCO_3$ soln. Chromatographic purification afforded *N*-formyl-dioncopeltine *A* (**6**) (462 mg, 1.13 mmol, 66%) as an amorphous solid.

N-*Formyl-dioncopeltine* (**6**). $[\alpha]_D$+31.0° ($CHCl_3$; *c* 0.372). CD: $\Delta\varepsilon_{210}$ −54, $\Delta\varepsilon_{238}$ +62, $\Delta\varepsilon_{262}$ + 1, $\Delta\varepsilon_{280}$ + 14. IR ν_{max} cm^{-1}: 3370 (O–H), 2920 (C–H), 1635 (C=O), 1595 (C=C), 1385 (C–H), 1220 (C–O). ^{1}H NMR (200 MHz): δ0.94–1.36 (6H, complex, Me-1 and Me-3), 2.58, 3.07 (2H, *m*, H_{ax}-4, $4H_{eq}$), 3.90 (1H, *m*, H-3), 4.00 (3H, *s*, OMe-4'), 4.41 (2H, *s*, CH_2-OH), 5.07, 5.51 (1H, *m*, 1-H), 6.65–7.25 (6H, complex, Ar-H), 7.85, 7.96 (1H, *s*, CHO), 9.32 (1H, *s*, OH-5'). MS *m/z* (rel. int.): 408 $[M+H]$ (17), 407 $[M]^+$ (62), 392 $[M-Me]$ (7), 389 $[M-H_2O]$ (12), 375 $[M+H-H_2O-Me]$ (26), 374 $[M-H_2O-Me]$ (100). Found: C, 69.12; H, 6.48; N, 3.36. $C_{24}H_{25}O_5N$ requires: C, 70.75; H, 6.18; N, 3.44%.

O-Methylation of N-*formyl-dioncopeltine A* (**6**). *N*-Formyl-dioncopeltine A (**6**) (462 mg, 1.13 mmol) dissolved in 20 ml CH_2Cl_2 was treated with an excess of Me_2SO_4 in 2 ml 2 M KOH under phase transfer catalysis. Usual work-up afforded the 8*O*,5'*O*-dimethyl-*N*-formyl-dioncopeltine (**7**) (289 mg, 0.66 mmol, 58%) as an amorphous solid. $[\alpha]_D$+74.8° ($CHCl_3$; *c* 0.371). CD: $\Delta\varepsilon_{210}$ −40, $\Delta\varepsilon_{241}$ +60. IR ν_{max} cm^{-1}: 3390 (O–H), 2920 (C–H), 1640 (C=O), 1580 (C=C), 1380 (C-H), 1255 (C–O). ^{1}H NMR (200 MHz): δ0.94–1.44 (6H, complex, Me-1 and Me-3), 2.75, 3.10 (2H, *m*, H_{ax}-4, $4H_{eq}$), 3.13 (3H, *s*, OMe-8), 3.91 (3H, *s*, OMe-5'), 3.95 (3H, *s*, OMe-4'), 4.10 (1H, *m*, H-1), 4.36 (2H, *m*, CH_2–OH), 5.09, 5.60 (1H, *q*, J=6.6 Hz, H-1), 6.80–7.45 (6H, complex, Ar-H), 8.32, 8.36 (1H, *s*, CHO). MS *m/z* (rel. int.): 435 $[M]^+$ (34), 434 $[M-H]$ (100), 420 $[M-Me]$ (11). Found: C, 69.83; H, 6.40; N, 3.11. $C_{26}H_{29}O_5N$ requires: C, 71.70; H, 6.71; N, 3.22%.

Deformylation of 8*O*,5'O-*dimethyl*-N-*formyl-dioncopeltine A* (**7**) *to give* 8*O*,5'*O*-*dimethyl-dioncopeltine A* (**10**). A soln of 8-*O*,5,'-*O*-dimethyl-*N*-formyl-dioncopeltine (**7**) (450 mg, 1.03 mmol) was dissolved in MeOH (5% HCl) and heated under reflux. After 5 hr the reaction was complete and the solvent removed. Usual work-up gave the desired 8*O*,5'*O*-dimethyl-dioncopeltine A (**10**) (289 mg, 0.71 mmol, 69%). $[\alpha]_D$+40.0° ($CHCl_3$; *c* 0.38). CD: $\Delta\varepsilon_{225}$ −36, $\Delta\varepsilon_{242}$ +32. Mp 230°. IR ν_{max} cm^{-1}: 3380 (O–H), 2950 (C–H), 1580 (C=C), 1385 (C–H), 1255 (C–O). ^{1}H NMR (200 MHz): δ1.55 (3H, *d*, J=6.3 Hz, Me-3), 1.66 (3H, *d*, J=6.7 Hz, Me-1), 2.94 (2H, *m*, CH_2-4), 3.11 (3H, *s*, OMe-8), 3.58 (3H, *m*, H-3), 3.95 (3H, *s*, OMe-5'), 4.00 (3H, *s*, OMe-4'), 4.29 (2H, *s*, CH_2–OH), 4.65 (1H, *m*, H-1), 6.80–7.30 (6H, *m*, Ar-H). MS *m/z* (rel. int.): 408 $[M+H]$ (5), 407 $[M]^+$ (19), 393 $[M+H-Me]$ (27), 392 $[M-Me]$. Found: C, 73.61; H, 7.38; N, 3.36. $C_{25}H_{29}O_4N$ requires: C, 73.68; H, 7.17; N, 3.44%.

Synthesis of 8-O-*methyl-dioncophylline A* (**11**). 8*O*,5'*O*-Dimethyldioncopeltine (**10**) (250 mg, 0.61 mmol) were dissolved in 10 ml abs. CH_2Cl_2 and treated with triphenylphosphane (315 mg), $(CCl_2Br)_2$ (390 mg) at room temp. After 2 hr the solvent was removed and the residue dissolved in THF. Treatment with $LiAlH_4$ and subsequent chromatographic purification led to the desired *O*-methyl-dioncophylline A (**11**) (148 mg, 0.38 mmol, 62%). Mp 248–249° (hydrochloride). $[\alpha]_D$+2.7° ($CHCl_3$; *c* 0.34). CD: $\Delta\varepsilon_{226}$ −27, $\Delta\varepsilon_{241}$ +23. IR ν_{max} cm^{-1}: 3430 (O–H), 2950, 2910 (C–H), 1580 (C=C), 1260 (C–O). ^{1}H NMR (200 MHz, free base): δ1.26 (3H, *d*, J=6.2 Hz, Me-3), 1.48 (3H, *d*, J=6.6 Hz, Me-1), 2.19 (3H, *s*, Me-2'), 2.54 (1H, *dd*, J_{gem}=16.5 Hz, J_{ax}=11.0 Hz, H_{ax}-4), 2.84 (1H, *dd*, J_{gem}=16.6 Hz, J_{eq}=4.1 Hz, H_{eq}-4), 3.11 (3H, *s*, OMe-8), 3.38 (1H, m_c, H-3), 3.97 (3H, *s*, OMe-5' or OMe-5'), 4.00 (3H, *s*, OMe-4', OMe-5'), 4.43 (1H, *q*, J=6.6 Hz, H-1), 6.73–7.22 (6H, *m*, Ar-H). MS *m/z* (rel. int.): 392 $[M+H]$ (6), 391 $[M]^+$ (22), 377 $[M+H-Me]$ (26), 376 $[M-Me]$ (100). Found: C, 69.95; H, 7.14; N, 3.22 $C_{25}H_{30}ClNO_3$ requires: C, 70.16; H, 7.06; N, 3.27%).

N-*Formylation of dioncophylline A* (**2**). Formylation of dioncophylline A (**2**) (110 mg, 0.26 mmol), as described above for dioncopeltine A (**2**) afforded *N*-formyl-dioncophylline A (**8**) (82.5 mg, 0.20 mmol, 77%) as crystals, mp 233–234°. $[\alpha]_D$+9.1° ($CHCl_3$; *c* 0.384). CD: $\Delta\varepsilon_{206}$ −39.5, $\Delta\varepsilon_{235}$ 36.6, $\Delta\varepsilon_{260}$ 0, $\Delta\varepsilon_{280}$ +7.3, $\Delta\varepsilon_{302}$ −4.1. IR ν_{max} cm^{-1}: 3430 (O–H), 2970, 2920 (C–H), 1660 (C=O), 1260 (C–O). ^{1}H NMR (200 MHz) for rotamer I: δ1.12 (3H, *d*, J=6.5 Hz, Me-3), 1.50 (3H, *d*, J=6.7 Hz, Me-1),

Table 1. Positional parameters and equivalent isotropic temperature factors of non-hydrogen atoms for compound **2**

Atom†	X(*10^4)	Y(*10^4)	Z(*10^4)	U_{eq}
C-1	8004	1783	4592	42
C-2	8239	607	3853	44
C-3	8429	682	2514	43
O-3	8674	−447	1743	62
C-4	8376	1970	1803	42
C-5	8588	2128	419	50
O-5	8899	1034	−349	74
C-6	8496	3385	−205	60
C-7	8196	4540	509	58
C-8	7992	4430	1851	47
C-9	8089	3169	2538	41
C-10	7916	3055	3962	42
C-11	7649	4323	4739	42
C-12	6530	4469	5300	43
O-12	5576	3539	5081	54
C-13	6355	5585	6150	42
C-14	5132	5654	6746	50
N-15	4936	7088	7220	56
C-16	6027	7667	8124	67
C-17	7077	7835	7276	65
C-18	7279	6568	6431	48
C-19	8384	6444	5846	52
C-20	8558	5321	5037	49
C-21	5639	9050	8673	109
C-22	5085	4580	7881	73
C-23	7878	1606	6094	52
O-24	8860	752	6702	67
C-25	8777	−1771	2405	78

†Crystallographic numbering, different from the chemical.

2.19 (3H, *s*, Me-2'), 2.72 (1H, *dd*, J_{gem} = 15.4 Hz, J_{ax} = 7.4 Hz, H_{ax}-4), 3.25 (1H, *dd*, J_{gem} = 15.2 Hz, J_{eq} = 4.8 Hz, H_{eq}-4), 3.96 (3H, *s*, OMe-4'), 4.00 (3H, *s*, OMe-5'), 4.69 (1H, m_c, 3-H), 5.21 (1H, *q*, *J* = 6.7 Hz, H-1), 6.76–7.3 (6H, *m*, Ar-H), 8.36 (1H, *s*, COH); for rotamer II: δ 1.40 (3H, *d*, *J* = 6.7 Hz, Me-1 or Me-3), 1.48 (3H, *d*, *J* = 6.6 Hz, Me-1 or Me-3), 2.19 (3H, *s*, Me-2'), 2.76 (1H, *dd*, J_{gem} = 16.4 Hz, J_{ax} = 7.2 Hz, H_{ax}-4), 3.16 (1H, *dd*, J_{gem} = 16.3 Hz, J_{eq} = 4.4 Hz, H_{eq}-4), 3.95 (3H, *s*, OMe-4' or OMe-5'), 3.99 (3H, *s*, OMe-4' or OMe-5'), 4.14 (1H, m_c, H-3), 5.72 (1H, *q*, *J* = 6.3 Hz, H-1), 6.72–7.3 (6H, *m*, Ar-H), 8.34 (1H, *s*, COH). MS *m/z* (rel. int.): 406 [M + H] (17), 405 [M]$^+$ (63), 391 [M + H − Me] (27), 390 [M − Me] (100). Found: C, 73.87; H, 6.61; N, 3.31. $C_{24}H_{25}NO_3$ requires: C, 73.64; H, 6.54; N, 3.48%).

O-Methylation of N-formyl-dioncophylline A (**8**) *and subsequent N-deformylation.* Methylation of *N*-formyl-dioncophylline A (**8**) gave **9**, which due to its instability towards basic Al_2O_3, was immediately deformylated to afforded 8-*O*-methyl-dioncophylline A (**11** · HCl) as fine needles (mp 248°, $[\alpha]_D$ + 2.7° [$CHCl_3$; *c* 0.30], NMR, IR, mass spectra fully identical with the material obtained above.

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