12α-hydroxy-N-demethyl-sauroxine, a Lycodane type alkaloid from *Phlegmariurus saururus*

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12α-hydroxy-N-demethyl-sauroxine (1), another new Lycopodium alkaloid from the Lycodane group, was isolated from *Phlegmariurus saururus* (Lam.) B. Øllg. (Lycopodiaceae). Elucidation of the chemical structure and relative stereochemistry were stated by spectroscopic data and chemical correlation. In addition, the inhibitory activity on acetylcholinesterase for 1 was determined as well as for N-methyllycodine (2), a derivative with the same nucleus, previously identified in *P. saururus* (IC$_{50}$ = 33.8 ± 0.8 μM and 547.5 ± 0.5 μM, respectively) and N-demethylsauroxine (3) whose inhibition in the actual conditions was better than the previously informed.

Keywords: *Phlegmariurus saururus*; 12α-hydroxy-N-demethyl-sauroxine; Lycopodium alkaloids; Acetylcholinesterase inhibition
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Table S1. NMR data of 12α-hydroxy-N-demethyl-sauroxine (1).

| position | $\delta^a$   | $\delta^b$* (multi, $J$ in Hz) |
|----------|--------------|---------------------------------|
| 1        | 170.8 (C)    | ---                             |
| 2        | 31.1 (CH$_2$)| 2.50 (2H, m)                    |
| 3a       | 19.3 (CH$_2$)| 2.24 (1H, m)                    |
| 3b       |              | 2.51 (1H, br d, 5.3)            |
| 4        | 112.4 (C)    | ---                             |
| 5        | 131.1 (C)    | ---                             |
| 6a       | 32.4 (CH$_2$)| 1.87 (1H, m)                    |
| 6b       |              | 2.48 (1H, dd, 19.3, 6.2)        |
| 7        | 37.4 (CH)    | 1.94 (1H, m)                    |
| 8a       | 38.7 (CH$_2$)| 1.10 (1H, dd, 12.8, 3.9)       |
| 8b       |              | 1.42 (1H, br d, 12.5)           |
| 9a       | 42.0 (CH$_2$)| 2.53 (1H, t, 11.4)             |
| 9b       |              | 2.82 (1H, br d, 11.2)           |
| 10a      | 31.0 (CH$_2$)| 1.41 (1H, m)                    |
| 10b      |              | 1.87 (1H, m)                    |
| 11a      | 32.0 (CH$_2$)| 1.87 (1H, m)                    |
| 11b      |              | 2.48 (1H, br d, 9.3)            |
| 12       | 69.1 (C)     | ---                             |
| 13       | 59.1 (C)     | ---                             |
| 14a      | 37.2 (CH$_2$)| 1.35 (1H, d, 14.2)             |
| 14b      |              | 1.82 (1H, t, 13.5)              |
| 15       | 25.6 (CH)    | 1.66 (1H, m)                    |
| 16       | 23.6 (CH$_3$)| 0.95 (3H, d, 6.4)              |

*a 100 MHz, CDCl$_3$

*b 400 MHz, CDCl$_3$
Figure S1. Sauroxine.
Figure S2. Selected 2D NMR correlations for 1.
Figure S3. Selected NOESY correlations for 1.
Figure S4.A. NMR $^1$H spectrum (400 MHz, CDCl$_3$).
Figure S4.B. NMR $^1$H spectrum (enlargement).
Figure S5.A. NMR $^{13}$C spectrum.
Figure S5.B. NMR $^{13}$C spectrum (enlargement). C-7 and C-14, C-2 and C-10, and C6 with C11 signals are overlapped.
Figure S6. COSY spectrum (400 MHz, CDCl₃).
Figure S7. HSQC spectrum (400 MHz, CDCl$_3$).
Figure S8.A. HMBC spectrum (400 MHz, CDCl$_3$).
Figure S8.B. HMBC spectrum (400 MHz, CDCl₃).
Figure S9. NOESY spectrum (400 MHz, CDCl₃). Selected signals are marked; other correlations have been developed by COSY as well.
Figure S10. ESIMS spectrum.

| Meas. m/z | #  | Formula   | m/z    | err [ppm] | Mean err [ppm] | rdb | N-Rule | e⁻ | Conf | mSigma |
|-----------|----|-----------|--------|-----------|----------------|-----|---------|----|------|--------|
| 277.19191 | 1  | C₁₆H₂₅N₂O₂ | 277.19105 | -3.07     | 0.42           | 5.5 | ok      | even | 25.8   |
Figure S11. MS spectrum.
Figure S12. IR spectrum.