

# Semisynthetic Analogues of Toxiferine I and Their Pharmacological Properties at $\alpha$ 7 nAChRs, Muscle-type nAChRs, and the Allosteric Binding Site of Muscarinic M<sub>2</sub> Receptors

Darius P. Zlotos,<sup>\*,†</sup> Christian Tränkle,<sup>‡</sup> Ulrike Holzgrabe,<sup>§</sup> Daniela Gündisch,<sup>⊥</sup> and Anders A. Jensen<sup>||</sup>

<sup>†</sup>The German University in Cairo, Department of Pharmaceutical Chemistry, New Cairo City, 11835 Cairo, Egypt

<sup>‡</sup>Pharmacology and Toxicology Section, Institute of Pharmacy, Rheinische Friedrich-Wilhelms-University, D-53121 Bonn, Germany

<sup>§</sup>Institute of Pharmacy and Food Chemistry, University of Würzburg, 97074 Würzburg, Germany

<sup>⊥</sup>Department of Pharmaceutical Sciences, Daniel K. Inouye College of Pharmacy, University of Hawai'i at Hilo, Hilo, HI 96720, United States

<sup>||</sup>Department of Drug Design and Pharmacology, Faculty of Health and Medical Sciences, University of Copenhagen, DK-2100 Copenhagen, Denmark

\* Corresponding author E-mail: [darius.zlotos@guc.edu.eg](mailto:darius.zlotos@guc.edu.eg). Tel: +20 2 2758 1041. Fax: +20 2 2758 1041.

**Figure S1.** NOESY spectrum of **3** (aliphatic section, 600 MHz, CDCl<sub>3</sub>)

**Figure S2.** <sup>1</sup>H NMR (CDCl<sub>3</sub>, 600 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **2**

**Figure S3.** <sup>1</sup>H NMR (CDCl<sub>3</sub>, 600 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **3**

**Figure S4.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **3a**

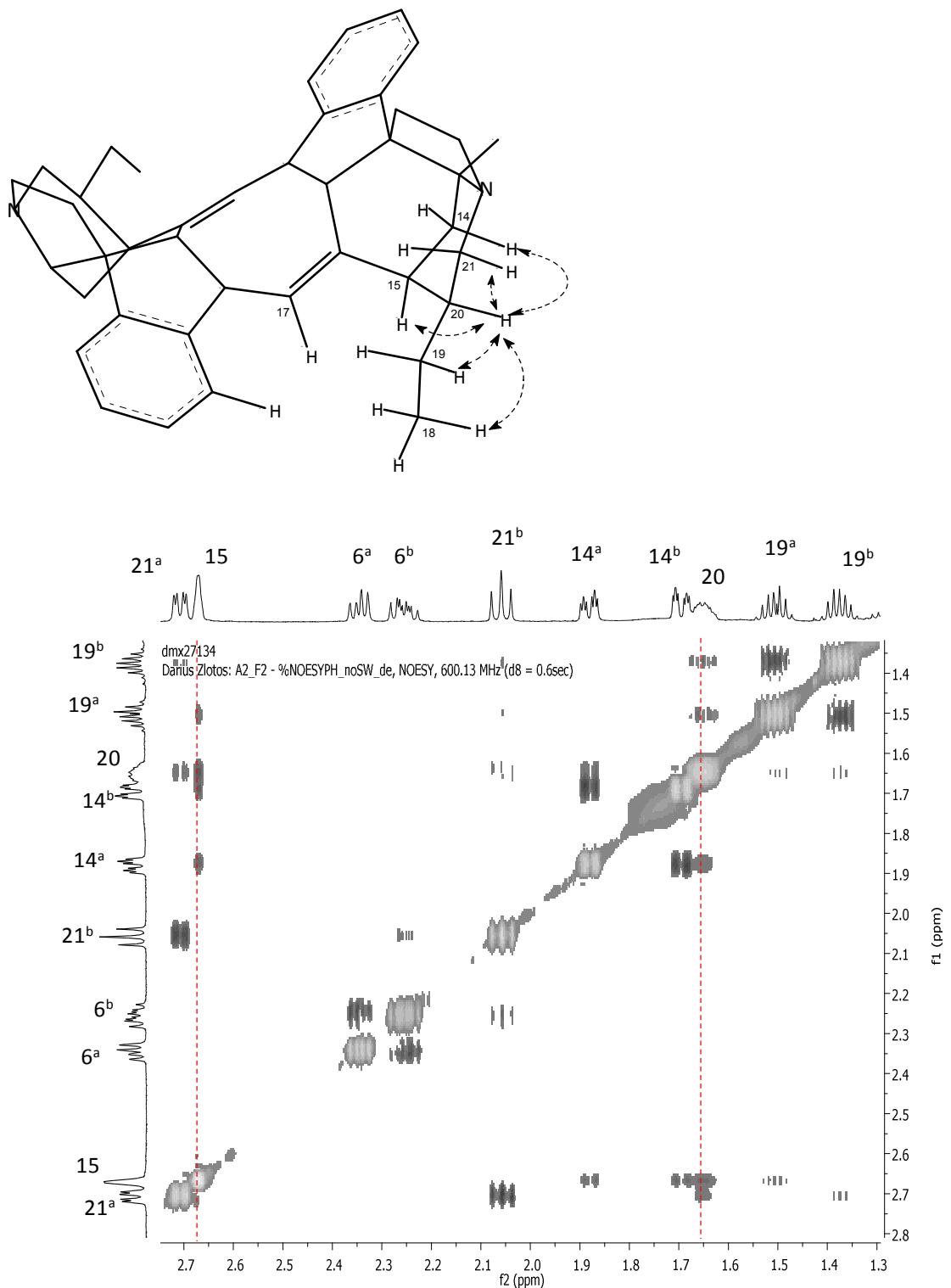
**Figure S5.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **3b**

**Figure S6.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **3c**

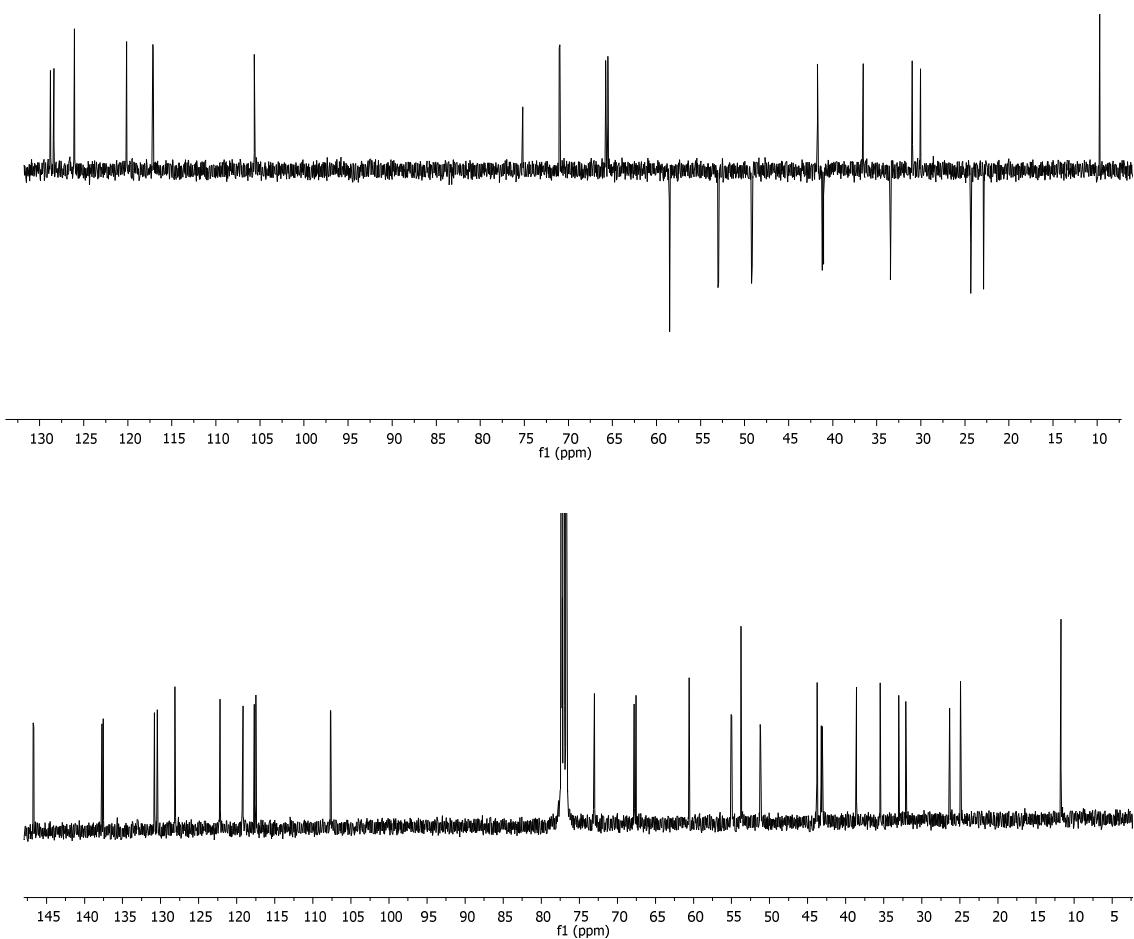
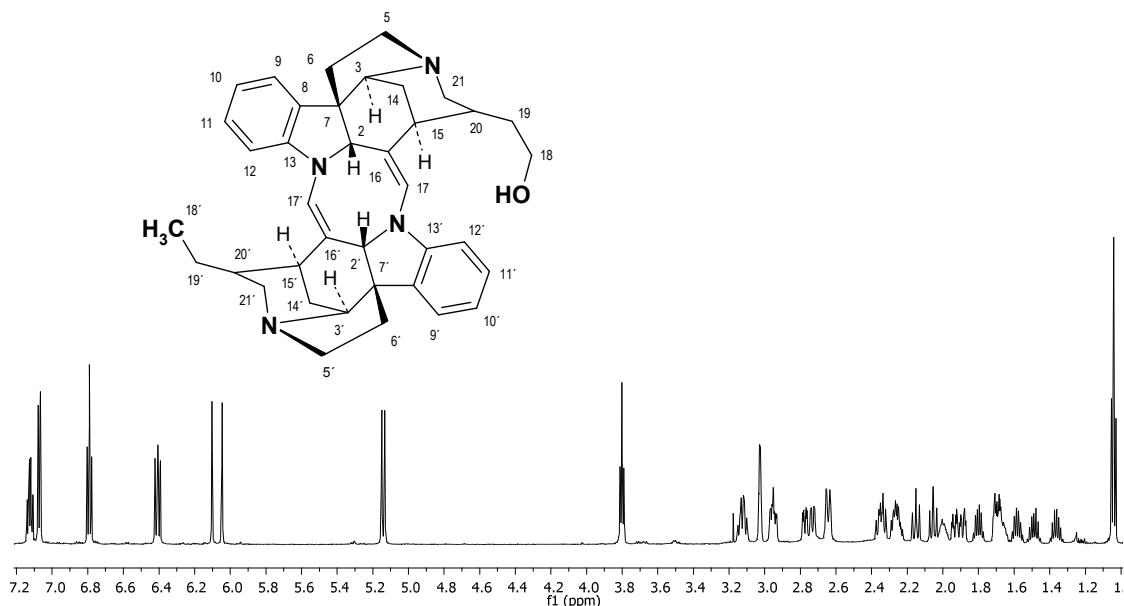
**Figure S7.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **2a**

**Figure S8.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **2b**

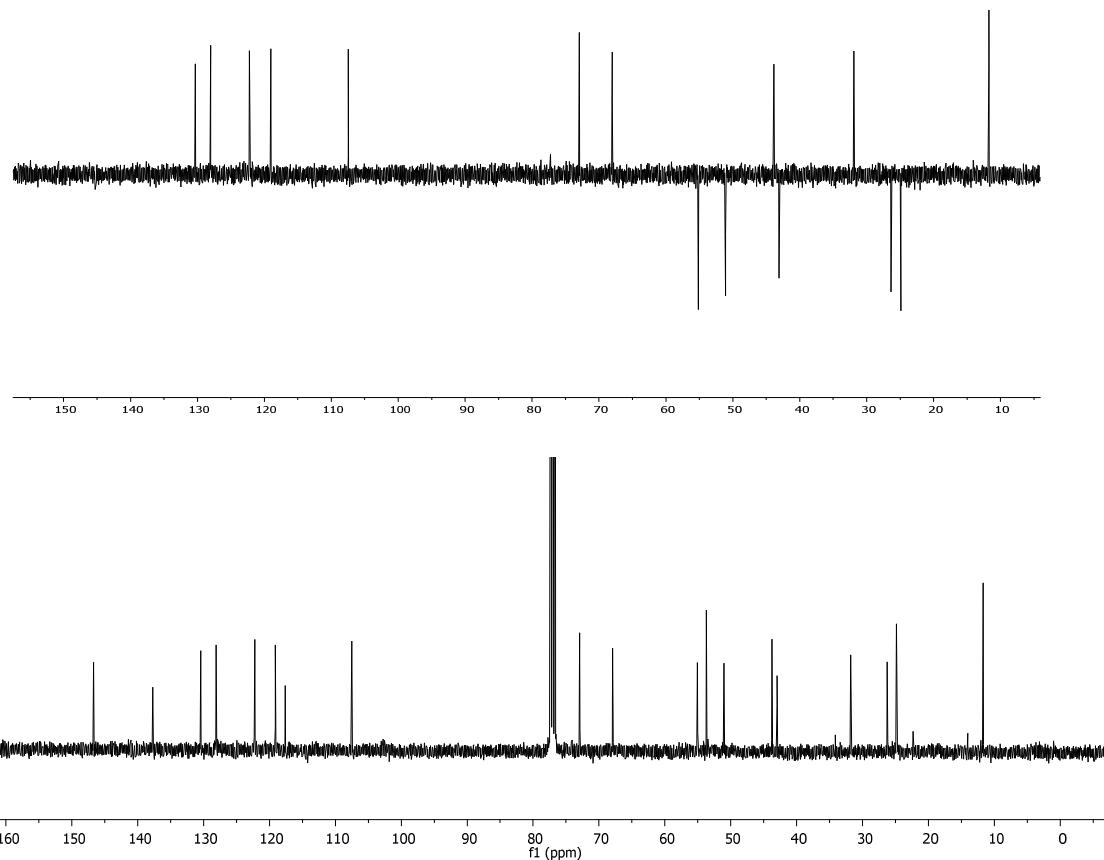
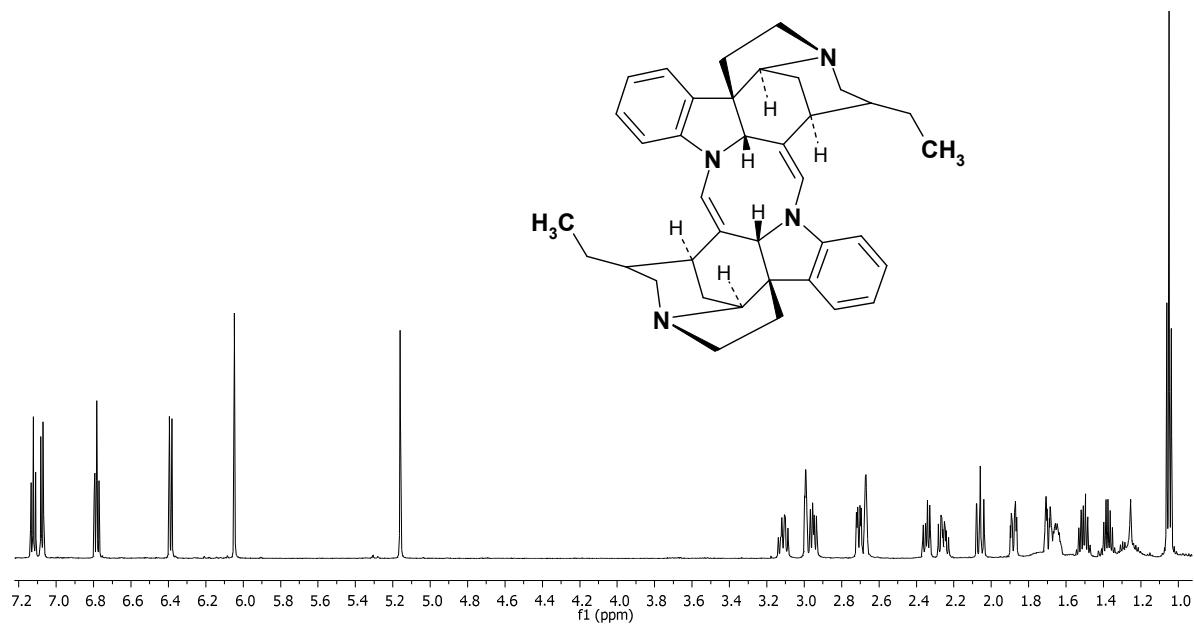
**Figure S9.** <sup>1</sup>H NMR (DMSO-d<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz) spectra of **2c**



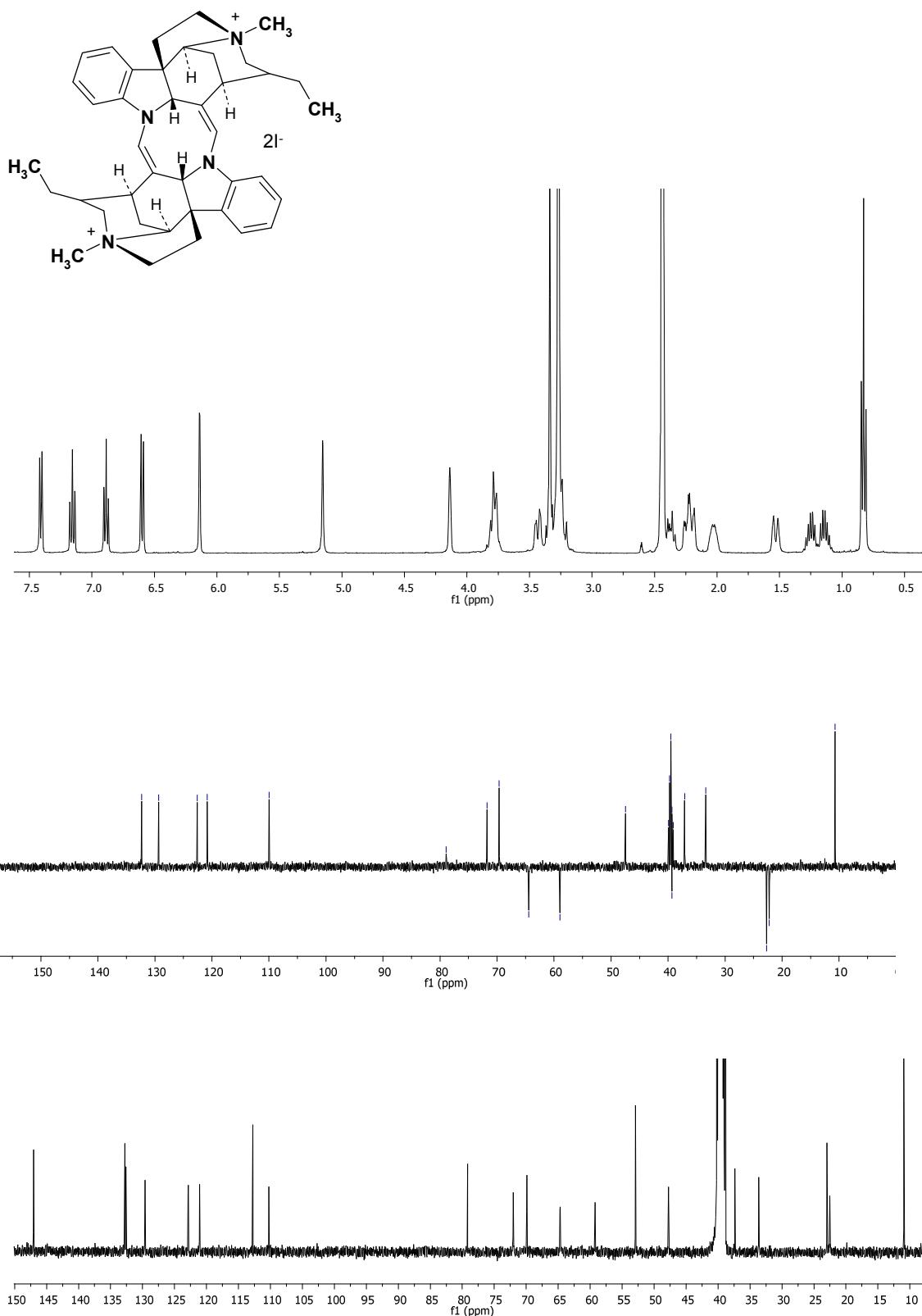
**Figure S1.** NOESY spectrum of compound 3 (aliphatic section, 600 MHz,  $\text{CDCl}_3$ )



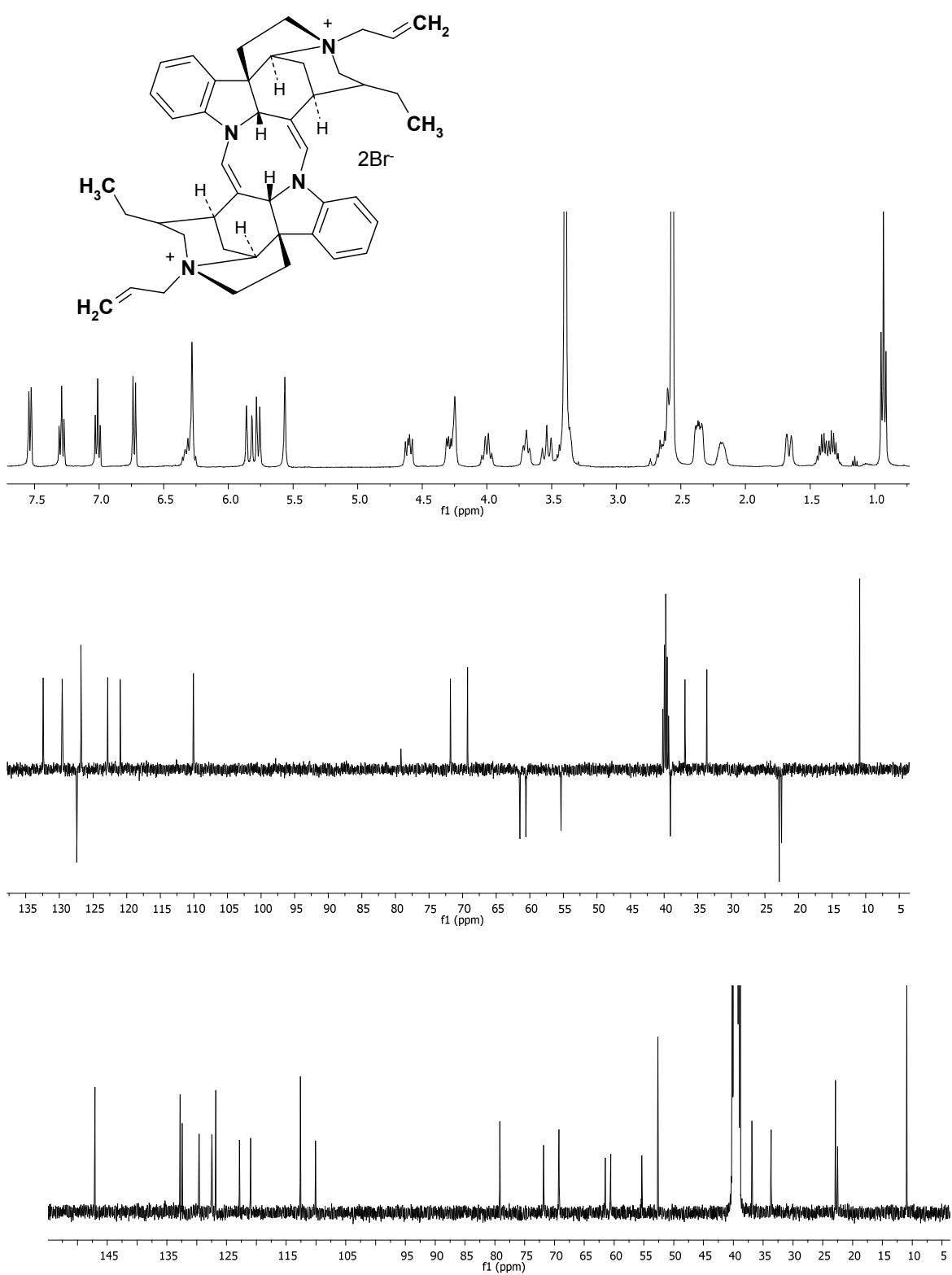
**Figure S2.** <sup>1</sup>H NMR ( $\text{CDCl}_3$ , 600 MHz) and <sup>13</sup>C NMR (100 MHz, including DEPT-135 subspectrum) spectra of compound 2



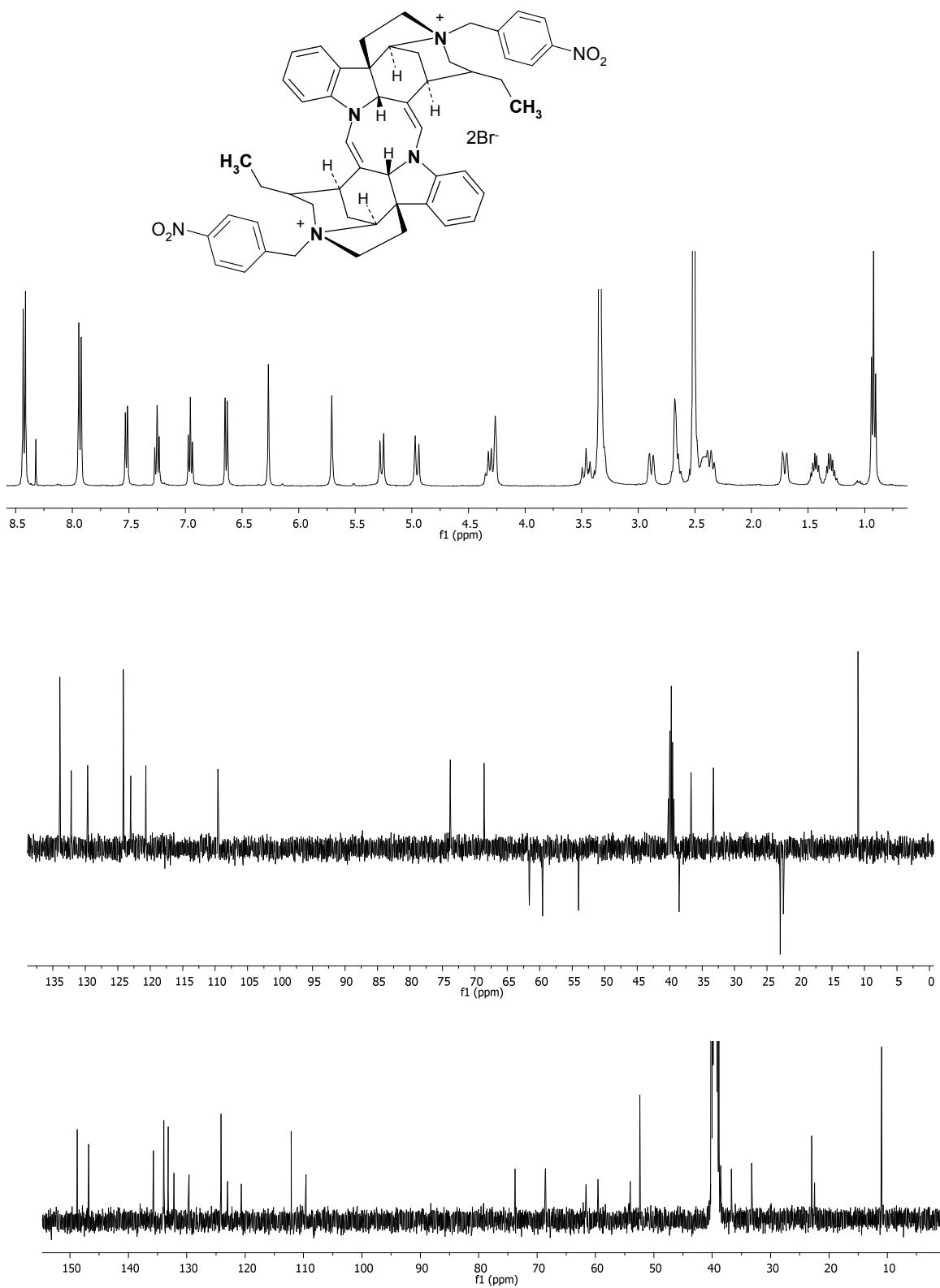
**Figure S3.**  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 600 MHz) and  $^{13}\text{C}$  NMR (100 MHz, including DEPT-135 subspectrum) of compound 3



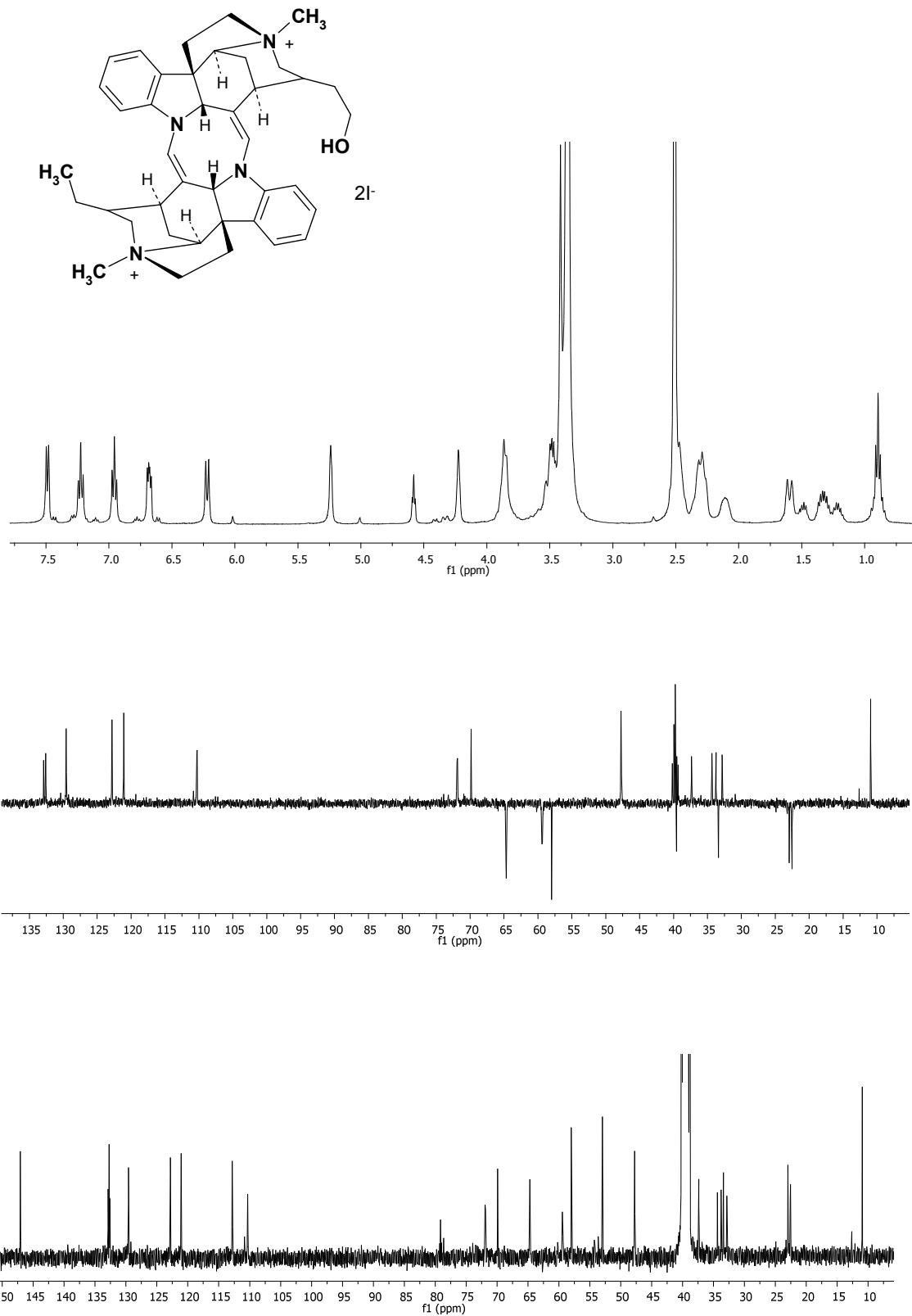
**Figure S4.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz, including DEPT-135 subspectrum) of compound 3a



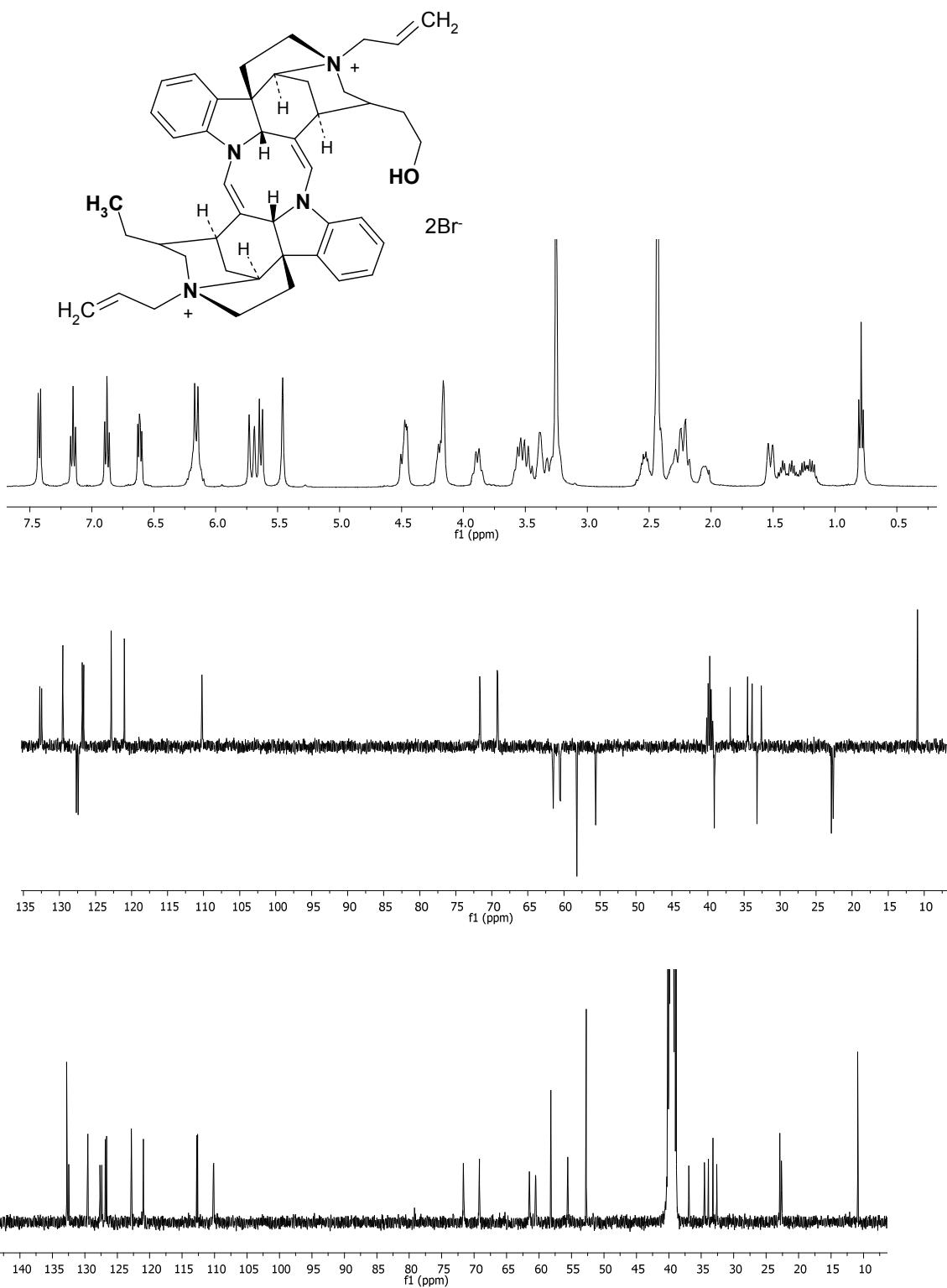
**Figure S5.**  $^1\text{H}$  NMR ( $\text{DMSO}-d_6$ , 400 MHz) and  $^{13}\text{C}$  NMR (100 MHz, including DEPT-135 subspectrum) of compound **3b**



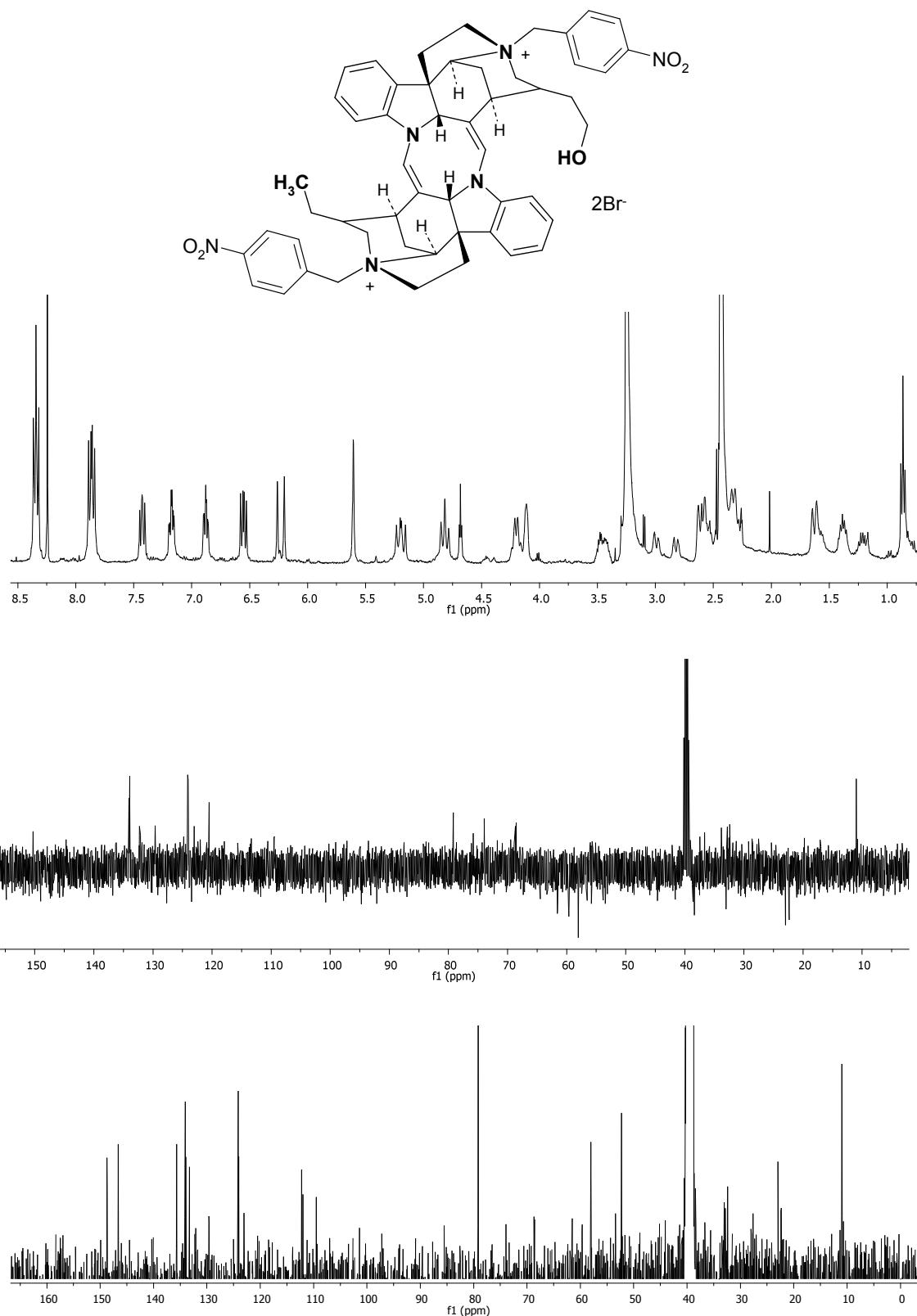
**Figure S6.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz, including DEPT-135 subspectrum) of compound 3c



**Figure S7.**  $^1\text{H}$  NMR (DMSO-*d*<sub>6</sub>, 400 MHz) and  $^{13}\text{C}$  NMR (100 MHz, including DEPT-135 subspectrum) of compound **2a**



**Figure S8.** <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>, 400 MHz) and <sup>13</sup>C NMR (100 MHz, including DEPT-135 subspectrum) of compound **2b**



**Figure S9.**  $^1\text{H}$  NMR (DMSO- $d_6$ , 400 MHz) and  $^{13}\text{C}$  NMR (100 MHz, including DEPT-135 subspectrum) of compound **2c**