

## Supplementary Materials

# Novel small-molecule antibacterials against Gram-positive pathogens of *Staphylococcus* and *Enterococcus* species

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4-(1*H*-Indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole (**3a**). Yield 35%, white powder; mp 242-246 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.50 (s, br, 1H, N'-H), 11.26 (s, 1H, NH), 8.00 (d, *J* = 0.8 Hz, 1H, 10-H), 7.64 (d, *J* = 2.4 Hz, 1H, 2'-H), 7.57 (d, *J* = 8.2 Hz, 1H, 7'-H), 7.42 (d, *J* = 7.1 Hz, 1H, 8-H), 7.40 (d, *J* = 5.2 Hz, 1H, 2-H), 7.24 (dd, *J* = 8.2, 7.1 Hz, 1H, 7-H), 7.16 (dd, *J* = 8.2, 6.7 Hz, 1H, 6'-H), 7.11 (dd, *J* = 5.5, 0.8 Hz, 1H, 3-H), 7.02 (d, *J* = 7.2 Hz, 1H, 5-H), 6.97 (d, *J* = 7.9 Hz, 1H, 4'-H), 6.90 (dd, *J* = 7.9, 6.7 Hz, 1H, 5'-H), 6.72 (dd, *J* = 8.2, 7.2 Hz, 1H, 6-H); *m/z* (ESI) 337.49 (M-H<sup>+</sup>).

6-Chloro-4-(5-chloro-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole (**3b**). Yield 74%, white powder; mp 230-233 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.41 (s, br, 1H, N'-H), 11.00 (s, 1H, NH), 8.54 (d, *J* = 0.8 Hz, 1H, 10-H), 8.00 (d, *J* = 2.4 Hz, 1H, 2'-H), 8.13 (d, *J* = 8.6 Hz, 1H, 7'-H), 7.94 (d, *J* = 8.5 Hz, 1H, 8-H), 7.84 (d, *J* = 5.6 Hz, 1H, 2-H), 7.74 (dd, *J* = 8.5, 2.1 Hz, 1H, 7-H), 7.67 (dd, *J* = 8.6, 2.1 Hz, 1H, 6'-H), 7.62 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H), 7.59 (d, *J* = 2.1 Hz, 1H, 5-H), 7.53 (d, *J* = 2.1 Hz, 1H, 4'-H); *m/z* (ESI) 405.31 (M-H<sup>+</sup>).

7-Chloro-4-(6-chloro-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole (**3c**). Yield 49%, white powder; mp 250-253 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.68 (s, br, 1H, N'-H), 11.45 (s, 1H, NH), 8.06 (d, *J* = 0.8 Hz, 1H, 10-H), 7.72 (d, *J* = 2.5 Hz, 1H, 2'-H), 7.61 (d, *J* = 1.2 Hz, 1H, 7'-H), 7.46 (d, *J* = 2.2 Hz, 1H, 8-H), 7.45 (d, *J* = 5.4 Hz, 1H, 2-H), 7.10 (dd, *J* = 5.4, 0.8 Hz, 1H, 3-H), 6.92 (m, 2H, 4'-, 5'-H), 6.91 (d, *J* = 8.4 Hz, 1H, 5-H), 6.81 (dd, *J* = 8.4, 2.2 Hz, 1H, 6-H); *m/z* (ESI) 405.52 (M-H<sup>+</sup>).

6-Bromo-4-(5-bromo-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole (**3d**). Yield 74%, white powder; mp 212-215 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.81 (d, *J* = 2.6 Hz, 1H, N'-H), 11.51 (s, 1H, NH), 8.08 (d, *J* = 0.8 Hz, 1H, 10-H), 7.77 (d, *J* = 2.6 Hz, 1H, 2'-H), 7.58 (d, *J* = 8.5 Hz, 1H, 7'-H), 7.48 (d, *J* = 5.6 Hz, 1H, 2-H), 7.43-7.39 (m, 2H, 7-, 8-H), 7.31 (dd, *J* = 8.5, 1.9 Hz, 1H, 6'-H), 7.09-7.06 (m, 2H, 3-, 5-H), 7.05 (d, *J* = 1.9 Hz, 1H, 4'-H); *m/z* (ESI) 495.39 (M-H<sup>+</sup>).

7-Bromo-4-(6-bromo-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole (**3e**). Yield 68%, yellow powder; mp 239-242 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.68 (d, *J* = 2.4 Hz, 1H, N'-H), 11.45 (s, 1H, NH), 8.07 (d, *J* = 0.8 Hz, 1H, 10-H), 7.75 (d, *J* = 1.7 Hz, 1H, 7'-H), 7.71 (d, *J* = 2.4 Hz, 1H, 2'-H), 7.60 (d, *J* = 1.8 Hz, 1H, 8-H), 7.46 (d, *J* = 5.6 Hz, 1H, 2-H), 7.10 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H), 7.04 (dd, *J* = 8.5, 1.8 Hz, 1H, 6-H), 6.93 (dd, *J* = 8.5, 1.7 Hz, 1H, 5'-H), 6.88 (d, *J* = 8.5 Hz, 1H, 5-H), 6.85 (d, *J* = 7.9 Hz, 1H, 4'-H); *m/z* (ESI) 495.38 (M-H<sup>+</sup>).

4-(5-Cyano-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole-6-carbonitrile (**3f**). Yield 64%, white powder; mp 206-209 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 12.22 (d, *J* = 2.5 Hz, 1H, N'-H), 12.00 (s, 1H, NH), 8.20 (d, *J* = 0.8 Hz, 1H, 10-H), 8.00 (d, *J* = 2.5 Hz, 1H, 2'-H), 7.80 (dd, *J* = 8.5, 0.7 Hz, 1H, 7'-H), 7.67 (d, *J* = 8.4 Hz, 1H, 7-H), 7.61 (dd, *J* = 8.4, 0.7 Hz, 1H, 8-H), 7.57 (dd, *J* = 8.5, 1.5 Hz, 1H, 6'-H), 7.56 (d, *J* = 5.6 Hz, 1H, 2-H), 7.41 (dd, *J* = 1.4, 0.7 Hz, 1H, 5-H), 7.17 (dd, *J* = 1.5 Hz, 0.7 Hz, 1H, 4'-H), 7.11 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H); *m/z* (ESI) 387.54 (M-H<sup>+</sup>).

4-(6-Cyano-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazole-7-carbonitrile (**3g**). Yield 48%, yellow powder; mp 260-263 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 12.19 (d, *J* = 2.6 Hz, 1H, N'-H), 11.81 (s, 1H, NH), 8.18 (d, *J* = 0.8 Hz, 1H, 10-H), 8.10 (d, *J* = 1.5 Hz, 1H, 7'-H), 8.04 (d, *J* = 2.6 Hz, 1H, 2'-H), 7.91 (d, *J* = 1.5 Hz, 1H, 8-H), 7.52 (d, *J* = 5.6 Hz, 1H, 2-H), 7.25 (dd, *J* = 8.3, 1.5 Hz, 1H, 6-H), 7.17 (dd, *J* = 8.2, 1.5 Hz, 1H, 5'-H), 7.09 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H), 7.08 (d, *J* = 8.2 Hz, 1H, 4'-H), 6.99 (d, *J* = 8.3 Hz, 1H, 5-H); *m/z* (ESI) 387.53 (M-H<sup>+</sup>).

4-(5-Hydroxy-1*H*-indol-3-yl)-9*H*-thieno[2,3-*b*]carbazol-6-ol (**3h**). Yield 43%, yellow powder; mp > 226 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.17 (d, *J* = 2.5 Hz, 1H, N'-H), 10.87 (s, 1H, NH), 8.55 (s, 1H, OH), 8.48 (s, 1H, OH), 7.89 (d, *J* = 0.8 Hz, 1H, 10-H), 7.47 (d, *J* = 2.5 Hz, 1H, 2'-H), 7.35 (d, *J* = 8.5 Hz, 1H, 7'-H), 7.34 (d, *J* = 5.6 Hz, 1H, 2-H), 7.21 (d, *J* = 8.5 Hz, 1H, 8-H), 7.02 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H), 6.78 (dd, *J* = 8.5, 2.4 Hz, 1H, 7-H), 6.67 (dd, *J* = 8.5, 2.4 Hz, 1H, 6'-H), 6.61 (d, *J* = 2.4 Hz, 1H, 5-H), 6.33 (d, *J* = 2.4 Hz, 1H, 4'-H); *m/z* (ESI) 369.47 (M-H<sup>+</sup>).

4-(6-Hydroxy-1H-indol-3-yl)-9H-thieno[2,3-b]carbazol-7-ol (**3i**). Yield 54%, white powder; mp 188-191 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.02 (d, *J* = 2.3 Hz, 1H, N'-H), 11.94 (s, 1H, NH), 9.30 (s, 1H, OH), 8.97 (s, 1H, OH), 7.85 (d, *J* = 0.8 Hz, 1H, 10-H), 7.34 (d, *J* = 2.3 Hz, 1H, 2'-H), 7.34 (d, *J* = 5.5 Hz, 1H, 2-H), 7.09 (dd, *J* = 5.5, 0.8 Hz, 1H, 3-H), 6.89 (d, *J* = 2.2 Hz, 1H, 7'-H), 6.86 (d, *J* = 8.6 Hz, 1H, 5-H), 6.75 (d, *J* = 2.0 Hz, 1H, 8-H), 6.73 (d, *J* = 8.5 Hz, 1H, 4'-H), 6.43 (dd, *J* = 8.5, 2.2 Hz, 1H, 5'-H), 6.22 (dd, *J* = 8.6, 2.0 Hz, 1H, 6-H); *m/z* (ESI) 369.49 (M-H<sup>+</sup>).

6-Benzyloxy-4-(5-benzyloxy-1H-indol-3-yl)-9H-thieno[2,3-b]carbazole (**3j**). Yield 77%, white powder; mp 199-202 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.44 (d, *J* = 2.6 Hz, 1H, N'-H), 11.05 (s, 1H, NH), 7.95 (d, *J* = 0.8 Hz, 1H, 10-H), 7.60 (d, *J* = 2.6 Hz, 1H, 2'-H), 7.54 (dd, *J* = 5.7, 0.8 Hz, 1H, 7'-H), 7.38 (d, *J* = 5.7 Hz, 1H, 2-H), 7.31 (d, *J* = 8.7 Hz, 1H, 8-H), 7.28-7.17 (m, 8H, phenylic H), 7.15 (dd, *J* = 5.7, 0.8 Hz, 1H, 3-H), 7.10 (dd, *J* = 6.4, 1.9 Hz, 2H, *o*-phenylic H), 6.97 (dd, *J* = 8.7, 2.6 Hz, 1H, 7-H), 6.95 (dd, *J* = 8.8, 2.4 Hz, 1H, 6'-H), 6.69 (d, *J* = 2.6 Hz, 1H, 5-H), 6.57 (d, *J* = 2.4 Hz, 1H, 4'-H), 4.78 (q, *J* = 12.0 Hz, 2H, OCH<sub>2</sub>), 4.55 (q, *J* = 12.0 Hz, 2H, OCH<sub>2</sub>); *m/z* (ESI) 549.21 (M-H<sup>+</sup>).

7-Benzyloxy-4-(6-benzyloxy-1H-indol-3-yl)-9H-thieno[2,3-b]carbazole (**3k**). Yield 47%, white powder; mp 217-220 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.27 (d, *J* = 2.4 Hz, 1H, N'-H), 11.14 (s, 1H, NH), 7.92 (d, *J* = 0.8 Hz, 1H, 10-H), 7.51-7.47 (m, 2H, *o*-phenylic H), 7.47 (d, *J* = 2.4 Hz, 1H, 2'-H), 7.46-7.42 (m, 2H, *o*-phenylic H), 7.37 (d, *J* = 5.6 Hz, 1H, 2-H), 7.42-7.27 (m, 6H, *m*-, *p*-phenylic H), 7.12 (d, *J* = 2.3 Hz, 1H, 7'-H), 7.10 (dd, *J* = 5.6, 0.8 Hz, 1H, 3-H), 6.98 (d, *J* = 2.3 Hz, 1H, 8-H), 6.92 (d, *J* = 8.7 Hz, 1H, 5-H), 6.84 (d, *J* = 8.6 Hz, 1H, 4'-H), 6.65 (dd, *J* = 8.6, 2.3 Hz, 1H, 5'-H), 6.47 (dd, *J* = 8.7, 2.3 Hz, 1H, 6-H), 5.15 (s, 2H, OCH<sub>2</sub>), 5.11 (s, 2H, OCH<sub>2</sub>); *m/z* (ESI) 549.26 (M-H<sup>+</sup>).

10-(1H-Indol-3-yl)-5H-thieno[3,2-b]carbazole (**4a**). Yield 31%, pale yellow powder; mp 286-289 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.54 (s, br, 1H, N'-H), 11.26 (s, 1H, NH), 7.89 (s, 1H, 4-H), 7.73 (d, *J* = 2.5 Hz, 1H, 2'-H), 7.65 (d, *J* = 5.5 Hz, 1H, 2-H), 7.58 (dd, *J* = 8.2, 1.0 Hz, 1H, 7'-H), 7.53 (d, *J* = 5.5, 1H, 3-H), 7.42 (d, *J* = 8.2 Hz, 1H, 6-H), 7.25 (dd, *J* = 8.2, 7.1 Hz, 1H, 6'-H), 7.17 (dd, *J* = 8.2, 6.9 Hz, 1H, 7-H), 6.97 (d, *J* = 7.9 Hz, 2H, 4'-, 9-H), 6.90 (ddd, *J* = 7.9, 6.8, 1.0 Hz, 1H, 5'-H), 6.72 (dd, *J* = 7.9, 6.9 Hz, 1H, 8-H); *m/z* (ESI) 337.48 (M-H<sup>+</sup>).

8-Chloro-10-(5-chloro-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole (**4b**). Yield 14%, white powder; mp 266-269 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.44 (s, br, 1H, N'-H), 11.00 (s, 1H, NH), 8.46 (s, 1H, 4-H), 8.30 (d, *J* = 2.5 Hz, 1H, 2'-H), 8.14 (d, *J* = 8.5 Hz, 1H, 7'-H), 8.08 (d, *J* = 5.5 Hz, 1H, 2-H), 7.98 (d, *J* = 5.5 Hz, 1H, 3-H), 7.94 (d, *J* = 8.5 Hz, 1H, 6-H), 7.74 (dd, *J* = 8.6, 2.1 Hz, 1H, 7-H), 7.68 (dd, *J* = 8.5, 2.1 Hz, 1H, 6'-H), 7.58-7.50 (m, 2H, 9-, 4'-H); *m/z* (ESI) 405.56 (M-H<sup>+</sup>).

7-Chloro-10-(6-chloro-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole (**4c**). Yield 37%, white powder; mp 179-182 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.72 (s, br, 1H, N'-H), 11.46 (s, 1H, NH), 7.94 (s, 1H, 4-H), 7.81 (d, *J* = 2.3 Hz, 1H, 2'-H), 7.69 (d, *J* = 5.5 Hz, 1H, 2-H), 7.62 (d, *J* = 1.2 Hz, 1H, 7'-H), 7.55 (d, *J* = 5.5 Hz, 1H, 3-H), 7.46 (d, *J* = 1.9 Hz, 1H, 6-H), 6.96-6.92 (m, 2H, 4'-, 5'-H), 6.89 (d, *J* = 8.5 Hz, 1H, 9-H), 6.81 (dd, *J* = 8.5, 1.9 Hz, 1H, 8-H); *m/z* (ESI) 405.59 (M-H<sup>+</sup>).

7-Bromo-10-(6-bromo-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole (**4e**). Yield 20%, yellow powder; mp 164-167 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.72 (d, *J* = 2.5 Hz, 1H, N'-H), 11.45 (s, 1H, NH), 7.94 (s, 1H, 4-H), 7.80 (d, *J* = 2.5 Hz, 1H, 2'-H), 7.62 (d, *J* = 1.8 Hz, 1H, 7'-H), 7.70 (d, *J* = 5.5 Hz, 1H, 2-H), 7.60 (d, *J* = 1.8 Hz, 1H, 6-H), 7.55 (d, *J* = 5.5 Hz, 1H, 3-H), 7.04 (dd, *J* = 8.5, 1.8 Hz, 1H, 5'-H), 6.93 (dd, *J* = 8.4, 1.8 Hz, 1H, 8-H), 6.88 (d, *J* = 8.5 Hz, 1H, 4'-H), 6.83 (d, *J* = 8.4 Hz, 1H, 9-H); *m/z* (ESI) 495.36 (M-H<sup>+</sup>).

10-(5-Cyano-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole-8-carbonitrile (**4f**). Yield 11%, white powder; mp 314-317 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>) δ = 11.40 (s, br, 1H, N'-H), 11.03 (s, 1H, NH), 8.12 (s, 1H, 4-H), 8.06 (d, *J* = 2.6 Hz, 1H, 2'-H), 7.90 (dd, *J* = 8.5, 0.8 Hz, 1H, 7'-H), 7.71 (d, *J* = 5.6 Hz, 1H, 2-H), 7.68 (dd, *J* = 8.5, 0.8

Hz, 1H, 6-H), 7.64 (dd,  $J = 8.5, 1.6$  Hz, 1H, 7-H), 7.60 (d,  $J = 5.6$  Hz, 1H, 3-H), 7.59 (dd,  $J = 8.5, 1.6$  Hz, 1H, 6'-H), 7.56 (dd,  $J = 1.6, 0.8$  Hz, 1H, 4'-H), 7.39 (dd,  $J = 1.6, 0.8$  Hz, 1H, 9-H);  $m/z$  (ESI) 387.48 (M-H<sup>+</sup>).

10-(6-Cyano-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole-7-carbonitrile (**4g**). Yield 37%, yellow powder; mp 212-215 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>)  $\delta = 12.23$  (d,  $J = 2.7$  Hz, 1H, N'-H), 11.81 (s, 1H, NH), 8.13 (d,  $J = 2.7$  Hz, 1H, 2'-H), 8.11 (d,  $J = 1.8$  Hz, 1H, 7'-H), 8.04 (s, 1H, 4-H), 7.91 (d,  $J = 1.4$  Hz, 1H, 6-H), 7.78 (d,  $J = 5.5$  Hz, 1H, 2-H), 7.61 (d,  $J = 5.5$  Hz, 1H, 3-H), 7.26 (dd,  $J = 8.3, 1.8$  Hz, 1H, 5'-H), 7.18 (dd,  $J = 8.2, 1.4$  Hz, 1H, 8-H), 7.09 (d,  $J = 8.3$  Hz, 1H, 4'-H), 6.98 (d,  $J = 8.2$  Hz, 1H, 9-H);  $m/z$  (ESI) 387.52 (M-H<sup>+</sup>).

10-(5-Hydroxy-1H-indol-3-yl)-9H-thieno[3,2-b]carbazol-8-ol (**4h**). Yield 24%, yellow powder; mp > 228 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>)  $\delta = 11.20$  (d,  $J = 2.6$  Hz, 1H, N'-H), 10.86 (s, 1H, NH), 8.53 (s, 1H, OH), 8.47 (s, 1H, OH), 7.79 (s, 1H, 4-H), 7.60 (d,  $J = 5.6$  Hz, 1H, 2-H), 7.55 (d,  $J = 2.6$  Hz, 1H, 2'-H), 7.48 (d,  $J = 5.6$  Hz, 1H, 3-H), 7.35 (d,  $J = 8.7$  Hz, 1H, 7'-H), 7.21 (d,  $J = 8.6$  Hz, 1H, 6-H), 6.78 (dd,  $J = 7.21, 2.2$  Hz, 1H, 7-H), 6.67 (dd,  $J = 8.7, 2.3$  Hz, 1H, 6'-H), 6.53 (d,  $J = 2.2$  Hz, 1H, 9-H), 6.33 (d,  $J = 2.3$  Hz, 1H, 4'-H);  $m/z$  (ESI) 369.47 (M-H<sup>+</sup>).

10-(6-Hydroxy-1H-indol-3-yl)-9H-thieno[3,2-b]carbazol-7-ol (**4i**). Yield 38%, grey powder; mp 193-196 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>)  $\delta = 11.07$  (d,  $J = 2.3$  Hz, 1H, N'-H), 10.93 (s, 1H, NH), 9.32 (s, 1H, OH), 9.00 (s, 1H, OH), 7.74 (s, 1H, 4-H), 7.55 (d,  $J = 5.5$  Hz, 1H, 2-H), 7.46 (d,  $J = 5.5$  Hz, 1H, 3-H), 7.44 (d,  $J = 2.3$  Hz, 1H, 2'-H), 6.90 (d,  $J = 2.2$  Hz, 1H, 7'-H), 6.81 (d,  $J = 8.6$  Hz, 1H, 9-H), 6.75 (d,  $J = 2.0$  Hz, 1H, 6-H), 6.73 (d,  $J = 8.5$  Hz, 1H, 4'-H), 6.43 (d,  $J = 8.5$  Hz, 1H, 5'-H), 6.22 (dd,  $J = 8.6, 2.0$  Hz, 1H, 8-H);  $m/z$  (ESI) 369.49 (M-H<sup>+</sup>).

8-Benzyloxy-10-(5-benzyloxy-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole (**4j**). Yield 9%, white powder; mp 193-196 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>)  $\delta = 11.48$  (d,  $J = 2.6$  Hz, 1H, N'-H), 11.05 (s, 1H, NH), 7.84 (s, 1H, 4-H), 7.70 (d,  $J = 2.6$  Hz, 1H, 2'-H), 7.64 (d,  $J = 5.5$  Hz, 1H, 2-H), 7.54 (d,  $J = 8.9$  Hz, 1H, 7'-H), 7.51 (d,  $J = 5.5$  Hz, 1H, 3-H), 7.31 (d,  $J = 8.6$  Hz, 1H, 6-H), 7.26-7.18 (m, 8H, phenylic H), 7.10 (dd,  $J = 6.4, 1.8$  Hz, 2H, *o*-phenylic H), 6.98 (dd,  $J = 8.6, 2.7$  Hz, 1H, 7-H), 6.97 (dd,  $J = 8.9, 2.6$  Hz, 1H, 6'-H), 6.66 (d,  $J = 2.7$  Hz, 1H, 9-H), 6.59 (d,  $J = 2.6$  Hz, 1H, 4'-H), 4.76 (q,  $J = 14$  Hz, 2H, OCH<sub>2</sub>), 4.52 (q,  $J = 17$  Hz, 2H, OCH<sub>2</sub>);  $m/z$  (ESI) 549.22 (M-H<sup>+</sup>).

7-Benzyloxy-10-(6-benzyloxy-1H-indol-3-yl)-9H-thieno[3,2-b]carbazole (**4k**). Yield 27%, yellow powder; mp 244-247 °C; <sup>1</sup>H NMR (DMSO-*d*<sub>6</sub>)  $\delta = 11.31$  (d,  $J = 2.5$  Hz, 1H, N'-H), 11.13 (s, 1H, NH), 7.81 (s, 1H, 4-H), 7.59 (d,  $J = 5.5$  Hz, 1H, 2-H), 7.56 (d,  $J = 2.5$  Hz, 1H, 2'-H), 7.51-7.46 (m, 2H, *o*-phenylic H), 7.49 (d,  $J = 5.5$  Hz, 1H, 3-H), 7.47-7.40 (m, 2H, *o*-phenylic H), 7.44-7.25 (m, 6H, *m*-, *p*-phenylic H), 7.13 (d,  $J = 2.3$  Hz, 1H, 7'-H), 6.98 (d,  $J = 2.2$  Hz, 1H, 6-H), 6.88 (d,  $J = 8.7$  Hz, 1H, 9-H), 6.84 (d,  $J = 8.6$  Hz, 1H, 4'-H), 6.65 (dd,  $J = 8.6, 2.3$  Hz, 1H, 5'-H), 6.46 (dd,  $J = 8.7, 2.2$  Hz, 1H, 8-H), 5.15 (s, 2H, OCH<sub>2</sub>), 5.12 (s, 2H, OCH<sub>2</sub>);  $m/z$  (ESI) 549.22 (M-H<sup>+</sup>).