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Synthesis of Functionalized Spiroaziridine-oxindoles from 3-Ylideneoxindoles: An Easy Route to 3-(Aminoalkyl)oxindoles

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Novel potentially bioactive spiroaziridine-oxindoles have been prepared by treatment of easily accessible 3-ylideneoxindoles with *N*-{[(4-nitrophenyl)sulfonyl]oxy}carbamate ($NsONHCO_2Et$) in the presence of CaO. These compounds gave new 3-(aminoalkyl)oxindole derivatives through easy and regioselective reductive aziridine ring-opening reactions.

Introduction

Because of their highly remarkable biological activities, heterocyclic spiro compounds occupy a key place among the various classes of organic molecules.[1] The synthetic interest in compounds of this type arises from the presence of the spiro carbon atom, which induces a relative steric strain and allows easy rearrangements, yielding new heterocycle derivatives.[2] A well-known class of spirocyclic molecules are based on the spirooxindole system, which represents a common main feature of a variety of medicinal agents and natural products. Such exceptional characteristics have inspired many efforts directed towards their synthesis.[3] The spiro architectures of many of these compounds are based on a variety of heterocyclic moieties.

Spirotryprostatins A (**1**, Figure 1) and B (**2**), for example, isolated from the fermentation broth of *Aspergillus fumigatus*, are pentacyclic compounds with potential antineoplastic activity,[4] synthesized by Danishefsky's[5a] and Williams's[5b,5c] groups, respectively. Several total syntheses of the structurally simpler tricyclic horsfiline (**3**) have also been reported,[6] and its derivatives have been identified as cancer cell growth inhibitors.[5a]

Otherwise, spirooxindoles in which the oxindole core is fused with an aziridine ring have not been dealt with until now, except for one synthesis of spiroaziridine-oxindole derivatives by Renuka.[7] On the other hand, aziridines spirofused with cyclic moieties have been widely described.[8] In addition to the biological importance of compounds characterized by aziridine rings,[9] the reactivities of these three-membered heterocycles in modern organic chemistry are also well documented; ring-opening, for instance, can be effected by various carbon and heteroatom nucleophiles, even in regiocontrolled processes to produce a variety of functionalized amino compounds.[10]

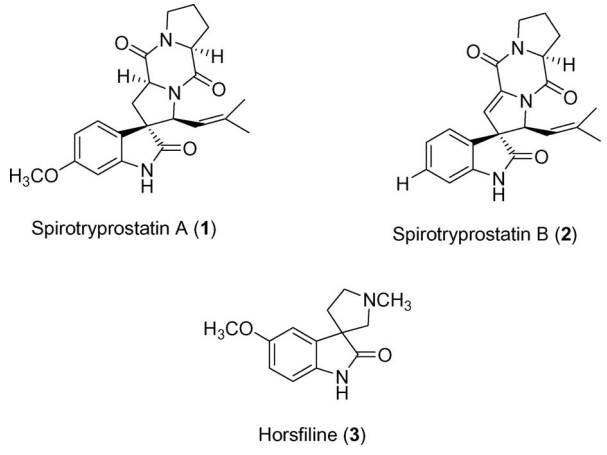

Figure 1. Natural products containing the spirooxindole system.

As part of our ongoing research into aziridines derived from electron-poor olefins, we have accomplished the synthesis of *N*-(ethoxycarbonyl)spiroaziridines from unsaturated heterocycles such as α-ylidene-γ-lactones[11] and α-methylene-γ- and -δ-lactams[8e] with the aid of $NsONHCO_2Et$ and CaO. Our first investigation of application of the aziridination protocol to *N*-methyl-3-methyleneoxindole was successful.[8e] By subsequent reductive aziridine ring-opening we obtained the corresponding 3-(aminomethyl)oxindole derivative (Scheme 1, R = Me; R^1 = H; R^2 = H; R^3 = Et).

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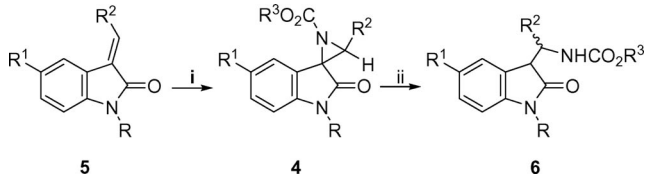
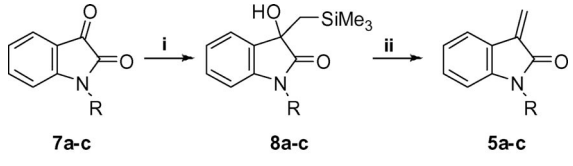


Scheme 1. Reaction conditions: i) $NsONHCO_2R^3$, CaO, CH_2Cl_2; ii) Pd/C, $HCO_2^-NH_4^+$.

The effectiveness of the aziridination protocol and the interest of spirooxindoles mentioned above paved the way to the synthesis of spiroaziridino oxindoles **4** from the starting 3-ylideneoxindoles **5** with different substituents either on the aza group or on the double bond (Scheme 1). In addition, the amino oxindole derivatives **6**, quite remarkable targets,[12] could easily be obtained by the reductive ring-opening reaction.

Results and Discussion

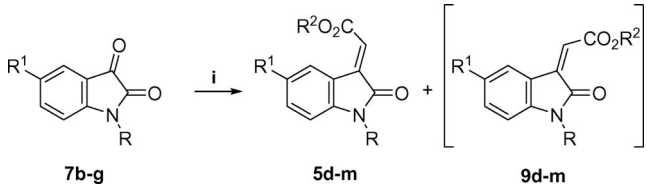
The synthesis of the 3-methyleneoxindoles **5a**–**c** was achieved by a slightly modified Rossiter procedure.[13] Optimization of the reported synthetic protocol was necessary in order to avoid the polymerization of the desired products **5a**–**c** (Scheme 2). We found that the substrates had to be rapidly used once synthesized, without complete evaporation of the solvent (dichloromethane) involved in the workup.[8e] The two-step procedure that we followed starts directly from the commercially available isatin (**7a**, R = H) and *N*-methylisatin (**7b**, R = CH_3), whereas the precursor **7c** (R = CH_2CO_2Et) had to be prepared by a *N*-alkylation reaction reported in the literature.[14] It is noteworthy that the intermediates **8a**–**c** were isolated and that the new alcohol **8c** has been fully characterized.



(**a**) R = H; (**b**) R = CH_3; (**c**) R = CH_2CO_2Et

Scheme 2. Synthesis of substrates **5a**–**c**. Reaction conditions i) Me_3SiCH_2MgCl, THF anhydrous, –78 °C→room temp.; ii) $BF_3{\cdot}OEt_2$, CH_2Cl_2, –78 °C→0 °C.

Substrates **5d**–**m** (Scheme 3), each bearing an alkoxycarbonyl group on the double bond, were obtained by Horner–Wadsworth–Emmons reactions[15] between **7b**–**g** and triethyl phosphonoacetate (R^2 = CH_2CH_3) or trimethyl phosphonoacetate (R^2 = CH_3). Quite good results were achieved with THF as solvent and aqueous K_2CO_3 as base (Table 1). The main product was always the *E* isomer (**5d**–**m**),[16] whereas the minor *Z* isomers (**9d**–**m**) rapidly turned into the corresponding *E* ones during the workup. The parent substrates **7d**–**g** were prepared as described in the literature.[17]



Scheme 3. Synthesis of 3-ylideneoxindoles **5d**–**m**. Reaction conditions: i) $R^2O_2CCH_2PO(OR^2)_2$, K_2CO_3, H_2O/THF.

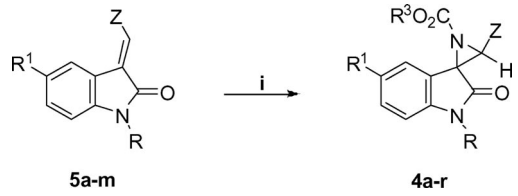
Table 1. Synthesis of 3-ylideneoxindoles **5d**–**m**.

Entry	**7**[a]	R	R^1	**5**[a]	R^2	% Yield
1	**b**	Me	H	**d**[16a]	Et	90
2	**b**	Me	H	**e**[16b]	Me	77
3	**c**[14]	CH_2CO_2Et	H	**f**	Me	71
4	**c**[14]	CH_2CO_2Et	H	**g**	Et	77
5	**d**[17a]	Bn	H	**h**[16c]	Me	70
6	**e**[17a]	Bn	OMe	**i**	Me	70
7	**f**[17a]	Bn	*i*Pr	**l**	Me	50
8	**g**[17b]	Ph	H	**m**	Me	61

[a] The spectroscopic data for **7c**–**g**, **5d**, **5e** and **5h** were in agreement with those reported in the literature.

Compounds **5d**–**m** are very stable and were purified by chromatography on silica gel (hexane/AcOEt). Their structures were confirmed by ^1H NMR and ^{13}C NMR analysis.

The aziridination reactions were carried out with substrates **5a**–**m** in CH_2Cl_2 as in the reported procedure by portionwise addition of $NsONHCO_2R^3$ and CaO (Scheme 4, Table 2).[8e]



Scheme 4. Synthesis of spiroaziridine-oxindoles **4a**–**r**. Reaction conditions: i) $NsONHCO_2R^3$, CaO, CH_2Cl_2, r.t.

The reactions of **5a**–**c** were quantitative with use of only one equivalent of each reagent, whereas when starting from **5d**–**m** two equivalents were required. The aziridines **4a**–**m** were easily isolated by chromatography on silica gel (hexane/AcOEt) in the reported yields (Table 2).

With the aim of accessing aziridine derivatives bearing a more easily removable protecting group on the nitrogen, we carried out the optimized aziridination reaction with $NsONHCO_2tBu$ as aminating agent.[18] With the 3-methyleneoxindoles **5a**–**c**, aziridination was successful with 2 equiv. of reagent and 3 equiv. of base. The *N*-Boc-protected spiroaziridines **4n**–**p** (Entries 12–14) were obtained as pure materials in good yields (70% to 92%) without any need for further purification.

The presence of a carboxylate group on the double bond (Entries 15–16) reduced the reactivities of the 3-ylideneoxindoles. Indeed, on application of the described amination protocol to the substrates **5d** and **5e** the reactions were very sluggish and the desired products were detected only in

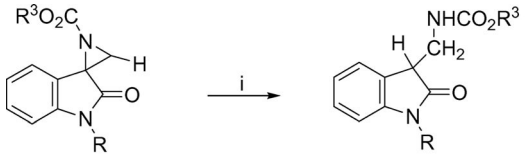
Table 2. Synthesis of spiroaziridine-oxindoles **4**.

Entry	**5**	R	R^1	Z	Molar ratio[a]	**4**	R^3	% Yield
1	**a**	H	H	H	1:1:1	**a**	Et	62
2	**b**	Me	H	H	1:1:1	**b**	Et	72
3	**c**	CH_2CO_2Et	H	H	1:1:1	**c**	Et	62
4	**d**	Me	H	CO_2Et	1:2:2	**d**	Et	52
5	**e**	Me	H	CO_2Me	1:2:2	**e**	Et	51
6	**f**	CH_2CO_2Et	H	CO_2Me	1:2:2	**f**	Et	48
7	**g**	CH_2CO_2Et	H	CO_2Et	1:2:2	**g**	Et	49
8	**h**	Bn	H	CO_2Me	1:2:2	**h**	Et	57
9	**i**	Bn	OMe	CO_2Me	1:2:2	**i**	Et	44
10	**l**	Bn	*i*Pr	CO_2Me	1:2:2	**l**	Et	60
11	**m**	Ph	H	CO_2Me	1:2:2	**m**	Et	59
12	**a**	H	H	H	1:2:3	**n**	*t*Bu	70
13	**b**	Me	H	H	1:2:3	**o**	*t*Bu	92
14	**c**	CH_2CO_2Et	H	H	1:2:3	**p**	*t*Bu	90
15	**d**	Me	H	CO_2Et	1:6:6	**q**	*t*Bu	trace[b]
16	**e**	Me	H	CO_2Me	1:8:8	**r**	*t*Bu	trace[b]

[a] **5**/NsONHCO$_2$R^3/CaO. [b] Evaluated by ^{1}H NMR analysis of the crude reaction mixture.

traces even though 8 equiv. of reactants were employed. We therefore did not examine the other hindered 3-ylideneoxindoles **5f**–**m**.

With the spiroaziridine-oxindoles **4a**–**p** to hand, we proceeded with the ring-opening reactions, which were carried out with ammonium formate and Pd/C,[19] conditions already successfully used for compound **4b**.[8e] The reactions always proved fruitful and regioselective, giving only 3-(aminoalkyl)oxindole derivatives (Scheme 5).



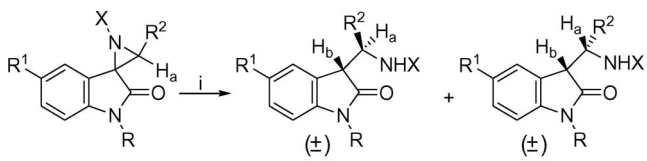
4a-c **6a-c** R^3 = Et, (50-66%)

4n-p **6n-p** R^3 = *t*Bu, (40-55%)

Scheme 5. Ring-opening reactions. Reaction conditions: i) $HCO_2^-NH_4^+$, Pd/C.

When the reactions were carried out on **4a**–**c** and **4n**–**p**, the corresponding *N*-ethoxycarbonyl-3-(aminoalkyl)oxindoles were formed as single compounds after 1 h. The structures were confirmed by ^{1}H NMR and ^{13}C NMR analyses.

With the spiroaziridines **4d**–**m** the ring-opening reactions were complete within 2 h. These reactions afforded mixtures of racemic amino diasteroisomers **6d**–**m**, which were isolated by chromatography as *syn*/*anti* mixtures in 1:1 ratios (Scheme 6) as shown by their spectroscopic data. Indeed, by means of shift correlation spectroscopy experiments (COSY, HMQC, HMBC) we clearly identified the diagnostic signals of each stereoisomer.



4d-m **6 d-m** (syn/anti = 1/1)

X = CO_2Et

Scheme 6. Ring-opening reactions. Reaction conditions: i) $HCO_2^-NH_4^+$, Pd/C.

Conclusions

In conclusion, we have developed a versatile strategy to obtain novel spiroaziridine-oxindoles, potentially biologically active molecules, starting from easily accessible 3-ylideneoxindoles. Moreover, the easy and regioselective aziridine ring-opening reactions proved to be a straightforward tool for the preparation of the new 3-(aminoalkyl)-oxindole derivatives **6a**–**m**. The application of this methodology to asymmetric 3-ylideneoxindoles is currently under investigation.

Experimental Section

General Methods: Solvents and common reagents were purchased from a commercial source and were used without further purification. All reactions were monitored by GC-MS with a HP 5890 system fitted with a phenylmethylsilicone capillary column (15 m, 0.15 mm i.d.) and by thin-layer chromatography (TLC) carried out on Merck F-254 a silica glass plates and visualized with the aid of UV light and I_2. ^{1}H NMR spectra were recorded with Varian Gemini 200 (200 MHz) and Bruker AVS 400 instruments. Chemical shifts are expressed in parts per million (δ scale) and are referenced to the residual protons of the NMR solvent ($CHCl_3$: δ = 7.26 ppm): (br. s) = broad singlet, (br. d) = broad doublet, (s) = singlet, (d) = doublet, (t) = triplet, (q) = quartet, (dd) = double doublet, (sept) = septuplet, (m) = multiplet. Coupling constants (*J*) are expressed in Hz. ^{13}C NMR spectra were recorded with a Varian Gemini 200 (50 MHz) instrument. Chemical shifts are expressed in parts per million (δ scale) and are referenced to the carbon of the NMR solvent ($CHCl_3$: δ = 77.0 ppm). Most of the signals were assigned by 2D NMR experiments (H-H-COSY, HMQC, HMBC), recorded with Bruker AVS 400, Bruker DRX 400 or Bruker DRX 500 instruments. Infrared (IR) spectra were obtained with a Perkin–

Elmer 1600 (FT-IR) instrument; data are presented as the frequencies of absorption. HRMS spectra were recorded with a Micromass Q-TOF *micro* Mass Spectrometer (Waters) and a Micromass LCT (ESI) with Lock-Spray-Injector (Injection Loop-Modus in a HPLC system, Waters, Alliance 2695). Microanalyses were carried out with a CE Instruments EA1110 machine.

Ethyl [3-Hydroxy-2-oxo-3-(trimethylsilyl)methyl-2,3-dihydroindol-1-yl]acetate (8c): Ethyl (2,3-dioxo-2,3-dihydro-1*H*-indol-1-yl)acetate (**7c**, 500 mg, 2.15 mmol) was suspended in dry THF (8.6 mL) and the resulting mixture was cooled to –78 °C. [(Trimethylsilyl)methyl]magnesium chloride (2.1 mL of a 1 M solution in diethyl ether, 2.1 mmol) was added with stirring. The mixture was stirred at –78 °C for 15 min and was then allowed to warm to room temperature, with stirring, for a further 3 h. The reaction was quenched with methanol, and then the mixture was concentrated in vacuo to give a brown viscous liquid, which was triturated first with hexane/ethyl acetate 1:1 and then with ethyl acetate. After filtration, the combined organic phases were concentrated in vacuo to give pure **8c** as an orange viscous liquid. (587 mg, 1.83 mmol, 85% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = –0.25 [s, 9 H, $Si(CH_3)_3$], 1.26 (t, J = 7.3 Hz, 3 H, CH_3CH_2), 1.56 (s, 2 H, $SiCH_2$), 2.56 (br. s, 1 H, OH), 4.22 (q, J = 7.3 Hz, 2 H, CH_3CH_2), 4.34 (d, J = 17.2 Hz, 1 H, NC*H*H), 4.51 (d, J = 17.2 Hz, 1 H, NCH*H*), 6.71 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.09 (m, 1 H, CH_{arom}) 7.24–7.42 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = –1.1, 14.1, 28.2, 41.5, 61.7, 75.5, 108.6, 123.3, 124.2, 129.6, 131.1, 141.7, 167.4, 178.1 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3605, 1740, 1700 cm^{-1}. GC-MS: *m*/*z* (%) = 321 (12) $[M]^+$, 158 (100). HRMS: calcd. for $C_{16}H_{23}NNaO_4Si$ 344.1294; found 344.1290.

Ethyl (3-Methylidene-2-oxo-2,3-dihydro-1*H*-indol-1-yl)acetate (5c): Ethyl (3-hydroxy-2-oxo-3-(trimethylsilyl)methyl-2,3-dihydroindol-1-yl)acetate (**8c**, 350 mg, 1.1 mmol) in dry CH_2Cl_2 (28 mL) was cooled to –78 °C and boron trifluoride diethyl etherate (774 mg, 2.5 mmol) was added. The mixture was stirred at –78 °C for 2 h and then at 0 °C for another 1 h. The mixture was poured into saturated aqueous $NaHCO_3$ solution and extracted with CH_2Cl_2 (4 × 50 mL). The combined organic layers were washed with $NaHCO_3$ and dried with $NaSO_4$, and the solvent was partially evaporated to give a concentrated solution of pure product **5c**, which was immediately treated as described below. An analytical sample was concentrated to dryness for ^{1}H NMR spectroscopic confirmation. ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.26 (t, J = 7.3 Hz, 3 H, CH_3CH_2), 4.22 (q, J = 7.3 Hz, 2 H, CH_3CH_2), 4.49 (s, 2 H, NCH_2), 6.15 (s, 1 H, C=C*H*H), 6.43 (s, 1 H, C=CH*H*), 6.71 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.06 (m, 1 H, CH_{arom}), 7.23–7.54 (m, 2 H, CH_{arom}) ppm.

Ethyl Methyl (2′*E*)-2,2′-(2-Oxo-1*H*-indol-1-yl-3-ylidene)diacetate (5f): Trimethyl phosphonoacetate (546 mg, 3.0 mmol) and a solution of K_2CO_3 (1.2 g, 8.7 mmol) in water (1.8 mL) were added at 0 °C to a stirred solution of **7c** (640 mg, 2.7 mmol) in THF (9 mL). The mixture was stirred at 0 °C for 15 min. After the system had been kept for 3 h at room temperature, diethyl ether (50 mL) was added and the organic phase was washed with brine and dried with anhydrous Na_2SO_4. After solvent evaporation the crude mixture was chromatographed on silica gel (hexane/ethyl acetate 7:3) to provide (*E*)-**5f** as an orange solid (555 mg, 1.9 mmol, yield 71%). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.25 (t, J = 7.3 Hz, 3 H, CH_2CH_3), 3.87 (s, 3 H, CO_2CH_3), 4.22 (q, J = 7.3 Hz, 2 H, CH_2CH_3), 4.48 (s, 2 H, NCH_2), 6.69 (d, J = 7.7 Hz, 1 H, CH_{arom}), 6.94 (s, 1 H, CH=), 7.02–7.44 (m, 2 H, CH_{arom}), 8.59 (d, J = 7.7 Hz, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.0, 41.5, 52.1, 61.8, 108.2, 119.9, 122.4, 123.2, 128.9, 132.4, 137.5, 144.7, 165.9, 167.2, 167.5 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1740, 1618 cm^{-1}. HRMS: calcd. for $C_{15}H_{15}NNaO_5$ 312.0848; found 312.0845.

Diethyl (2′*E*)-2,2′-(2-Oxo-1*H*-indol-1-yl-3-ylidene)diacetate (5g): Compound **5g** was prepared from **7c** (818 mg, 3.5 mmol) and triethyl phosphonoacetate (851 mg, 3.8 mmol) by the procedure described for **5f**. After solvent evaporation, the crude mixture was chromatographed over silica gel (hexane/ethyl acetate 7:3) to provide the isomer (*E*)-**5g** (816 mg, 2.7 mmol, 77% yield) as an orange solid. ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.26 (t, J = 7.1 Hz, 3 H, CH_2CH_3), 1.37 (t, J = 7.1 Hz, 3 H, CH_2CH_3), 4.22 (q, J = 7.1 Hz, 2 H, CH_2CH_3), 4.30 (q, J = 7.1 Hz, 2 H, CH_2CH_3), 4.48 (s, 2 H, NCH_2), 6.70 (d, J = 7.7 Hz, 1 H, CH_{arom}), 6.94 (s, 1 H, CH=), 7.01–7.45 (m, 2 H, CH_{arom}), 8.90 (d, J = 7.7 Hz, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.6, 13.7, 53.2, 59.2, 59.6, 120.3, 123.4, 124.0, 126.4, 126.8, 127.9, 135.9, 150.3, 162.3, 165.0, 171.0 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1731, 1613 cm^{-1}. HRMS: calcd. for $C_{16}H_{17}NNaO_5$ 326.1004; found 326.1008.

Methyl (2*E*)-(1-Benzyl-5-methoxy-2-oxo-1,2-dihydro-3*H*-indol-3-ylidene)ethanoate (5i): Compound **5i** was prepared from **7e** (500 mg, 1.8 mmol) and trimethyl phosphonoacetate (364 mg, 2.0 mmol) by the procedure described for **5f**. After solvent evaporation, the crude mixture was chromatographed over silica gel (hexane/ethyl acetate 7:3) to provide the isomer (*E*)-**5i** (408 mg, 1.2 mmol, 70% yield) as an orange solid. ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 3.77 (s, 3 H, OCH_3), 3.86 (s, 3 H, CO_2CH_3), 4.86 (s, 2 H, NCH_2), 6.55 (d, J = 8.5 Hz, 1 H, CH_{arom}), 6.78 (dd, J = 8.5, 2.5 Hz, 1 H, CH_{arom}), 6.94 (s, 1 H, CH=), 7.28 (m, 5 H, CH_{arom}), 8.27 (d, J = 2.5 Hz, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 43.7, 51.9, 55.6, 109.4, 114.4, 118.1, 120.4, 122.0, 127.0, 127.5, 128.6, 135.4, 138.3, 155.6, 165.7, 167.2 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1742, 1607 cm^{-1}. HRMS: calcd. for $C_{19}H_{19}NNaO_4$ 346.1055; found 346.1052.

Methyl (2*E*)-[1-Benzyl-2-oxo-5-(propan-2-yl)-1,2-dihydro-3*H*-indol-3-ylidene]ethanoate (5l): Compound **5l** was prepared from **7f** (500 mg, 1.7 mmol) and trimethyl phosphonoacetate (364 mg, 2.0 mmol) by the procedure described for **5f**. After solvent evaporation, the crude mixture was chromatographed over silica gel (hexane/ethyl acetate 7:3) to provide the isomer (*E*)-**5l** (285 mg, 0.8 mmol, 50% yield) as an orange solid. H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.24 [d, J = 6.9 Hz, 6 H, $(CH_3)_2CH$], 2.90 [sept, J = 6.9 Hz, 1 H, $(CH_3)_2CH$], 3.89 (s, 3 H, CO_2CH_3), 4.91 (s, 2 H, NCH_2), 6.62 (d, J = 8.1 Hz, 1 H, CH_{arom}), 6.97 (s, 1 H, CH=), 7.13 (dd, J = 8.1, 1.7 Hz, 1 H, CH_{arom}), 7.29 (m, 5 H, CH_{arom}), 8.51 (d, J = 1.7 Hz, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 23.9, 33.6, 44.2, 52.2, 111.0, 117.9, 123.3, 127.6, 128.2, 129.2, 134.9, 136.8, 141.2, 143.8, 145.0, 149.0, 158.7, 162.3 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1739, 1623 cm^{-1}. HRMS: calcd. for $C_{21}H_{21}NNaO_3$ 358.1419; found 358.1422.

Methyl (2*E*)-(2-Oxo-1-phenyl-1,2-dihydro-3*H*-indol-3-ylidene)ethanoate (5m): Compound **5m** was prepared from **7g** (500 mg, 2.2 mmol) and trimethyl phosphonoacetate (448 mg, 2.4 mmol) by the procedure described for **5f**. After solvent evaporation, the crude mixture was chromatographed over silica gel (hexane/ethyl acetate 7:3) to provide the isomer (*E*)-**5m** (375 mg, 1.3 mmol, 61% yield) as an orange solid. ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 3.85 (s, 3 H, OCH_3), 6.76 (d, J = 8.0 Hz, 1 H, CH_{arom}), 6.96 (s, 1 H, CH=), 7.06 (m, 1 H, CH_{arom}), 7.27 (m, 1 H, CH_{arom}), 7.33–7.57 (m, 5 H, CH_{arom}), 8.64 (d, J = 7.7 Hz, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 51.8, 109.0, 119.5, 122.0, 123.0, 126.2, 127.9, 128.7, 129.4, 132.1, 133.6, 137.6, 145.7, 165.7, 166.5 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1741, 1615 cm^{-1}. HRMS: calcd. for $C_{17}H_{13}NNaO_3$ 302.0793; found 302.0791.

Ethyl 2′-Oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1-carboxylate (4a): $NsONHCO_2Et$ (246 mg, 0.8 mmol) and CaO (48 mg, 0.8 mmol) were added portionwise to a stirred solution of the substrate **5a** (123 mg, 0.8 mmol) in CH_2Cl_2 (0.5 mL). After 1 h, pentane was added and the mixture was stirred for an additional hour. The organic phase was filtered and the solid residue was washed first with pentane/CH_2Cl_2 (8:2) and then with pentane/CH_2Cl_2 (1:1). The combined organic phases were concentrated under vacuum and the crude mixture was chromatographed on silica gel (hexane/ethyl acetate 7:3) to provide the product **4a** (116 mg, 0.5 mmol, 62% yield) as a yellow solid. ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.23 (t, J = 7.3 Hz, 3 H, OCH_2CH_3), 2.85 (d, J = 1.5 Hz, 1 H, NC*H*H), 3.12 (d, J = 1.5 Hz, 1 H, NCH*H*), 4.20 (q, J = 7.3 Hz, 2 H, OCH_2CH_3), 6.97 (d, J = 8.2 Hz, 1 H, CH_{arom}), 7.01–7.35 (m, 3 H, CH_{arom}), 8.46 (br. s, 1 H, NH) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.2, 39.2, 45.1, 63.0, 110.7, 121.8, 122.7, 124.0, 129.6, 141.9, 160.1, 172.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3217, 1716, 1623 cm^{-1}. HRMS: calcd. for $C_{12}H_{12}N_2NaO_3$ 255.0746; found 255.0742. $C_{12}H_{12}N_2O_3$ (232.23): calcd. C 62.06, H 5.21, N 12.06; found C 62.04, H 5.20, N 12.02.

Ethyl 1′-(2-Ethoxy-2-oxoethyl)-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1-carboxylate (4c): Compound **4c** was prepared from **5c** (231 mg, 1.0 mmol) by the procedure described for **4a**. The product was obtained as a yellow solid (197 mg, 0.6 mmol, 62% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.22 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 1.27 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 2.87 (d, J = 1.5 Hz, 1 H, NC*H*H), 3.15 (d, J = 1.5 Hz, 1 H, NCH*H*), 4.13–4.28 (m, 4 H, $NCO_2CH_2CH_3$, $CH_2CO_2CH_2CH_3$), 4.42 (d, J = 17.6 Hz, 1 H, NC*H*HCO_2), 4.61 (d, J = 17.6 Hz, 1 H, NCH*H*CO_2), 6.81 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.06–7.13 (m, 2 H, CH_{arom}), 7.29–7.42 (m, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.1, 14.2, 39.3, 41.8, 44.6, 61.8, 63.0, 108.7, 121.7, 123.2, 123.5, 129.6, 143.4, 166.8, 170.4, 173.9 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1732, 1710, 1621 cm^{-1}. HRMS: calcd. for $C_{16}H_{18}N_2NaO_5$ 341.1113; found 341.1110. $C_{16}H_{18}N_2O_5$ (318.32): calcd. C 60.37, H 5.70, N 8.80; found C 60.34, H 5.72, N 8.79.

Diethyl 1′-Methyl-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4d): Compound **4d** was prepared from **5d** (450 mg, 1.9 mmol) by the procedure described for **4a**, with a substrate/$NsONHCO_2Et$/CaO molar ratio of 1:2:2 being reached. The crude product was chromatographed on silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (300 mg, 0.9 mmol, 52% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.25 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 1.26 (t, J = 7.1 Hz 3 H, $CO_2CH_2CH_3$), 3.28 (s, 3 H, NCH_3), 3.86 (s, 1 H, NCHCO), 4.11 (q, J = 7.1 Hz, 2 H, $CO_2CH_2CH_3$), 4.22 (q, J = 7.1 Hz, 2 H, $CO_2CH_2CH_3$), 6.92 (d, J = 8.9 Hz, 1 H, CH_{arom}), 7.08 (m, 1 H, CH_{arom}), 7.34–7.44 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.9, 14.0, 26.6, 47.8, 48.7, 61.9, 63.3, 108.6, 120.5, 122.9, 124.1, 130.2, 145.0, 158.2, 164.8, 168.6 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1740, 1715, 1623 cm^{-1}. HRMS calcd. for $C_{16}H_{18}N_2NaO_5$ 341.1113; found 341.1116. $C_{16}H_{18}N_2O_5$ (318.32): calcd. C 60.37, H 5.70, N 8.80; found C 60.35, H 5.68, N 8.81.

1-Ethyl 3-Methyl 1′-Methyl-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4e): Compound **4e** was prepared from **5e** (450 mg, 2.0 mmol) by the procedure described for **4a**, with a substrate/$NsONHCO_2Et$/CaO molar ratio of 1:2:2 being reached. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (325 mg, 1.0 mmol, 51% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.26 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 3.28 (s, 3 H, NCH_3), 3.78 (s, 3 H, CO_2CH_3), 3.86 (s, 1 H, NCHCO), 4.24 (q, J = 7.1 Hz, 2 H, $CO_2CH_2CH_3$), 6.92 (m, 1 H, CH_{arom}), 7.08 (m, 1 H, CH_{arom}), 7.34–7.44 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.3, 26.9, 48.0, 49.1, 52.7, 63.6, 108.8, 120.8, 123.2, 124.4, 130.4, 145.3, 158.3, 165.6, 168.8 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1738, 1720, 1631 cm^{-1}. HRMS calcd. for $C_{15}H_{16}N_2NaO_5$ 327.0957; found 327.0955. $C_{15}H_{16}N_2O_5$ (304.30): calcd. C 59.21, H 5.30, N 9.21; found C 59.24, H 5.32, N 9.18.

1-Ethyl 3-Methyl 1′-(2-Ethoxy-2-oxoethyl)-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4f): Compound **4f** was prepared from **5f** (82 mg, 0.2 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (36 mg, 0.1 mmol, 48% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.22 (m, 6 H, $NCO_2CH_2CH_3$, $CH_2CO_2CH_2CH_3$), 3.74 (s, 3 H, CO_2CH_3), 3.86 (s, 1 H, NCHCO), 4.19 (m, 4 H, $NCO_2CH_2CH_3$, $CH_2CO_2CH_2CH_3$), 4.42 (d, J = 17.5 Hz, 1 H, C*H*$HCO_2CH_2CH_3$), 4.53 (d, J = 17.5 Hz, 1 H, CH*H*$CO_2CH_2CH_3$), 6.79 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.06 (m, 1 H, CH_{arom}), 7.25–7.45 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.9, 14.0, 41.9, 48.0, 48.7, 52.6, 61.9, 63.5, 108.8, 120.4, 123.4, 124.6, 130.3, 143.9, 165.3, 166.7, 169.0, 176.5 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1742, 1630 cm^{-1}. HRMS calcd. for $C_{18}H_{20}N_2NaO_7$ 399.1168; found 399.1165. $C_{18}H_{20}N_2O_7$ (376.36): calcd. C 57.44, H 5.36, N 7.44; found C 57.40, H 5.31, N 7.40.

Diethyl 1′-(2-Ethoxy-2-oxoethyl)-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4g): Compound **4g** was prepared from **5g** (776 mg, 2.5 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (477 mg, 1.2 mmol, 49% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.16–1.29 (m, 9 H, $CO_2CH_2CH_3$), 3.85 (s, 1 H, NCH), 4.11–4.27 (m, 4 H, $CO_2CH_2CH_3$), 4.43 (d, J = 17.5 Hz, 1 H, NC*H*H), 4.54 (d, J = 17.5 Hz, 1 H, NCH*H*), 6.80 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.06 (m, 1 H, CH_{arom}), 7.27–7.49 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.7, 13.8, 41.5, 47.8, 48.4, 61.5, 61.8, 63.1, 108.6, 120.2, 123.0, 124.2, 130.0, 143.6, 158.0, 164.5, 166.5, 168.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1741, 1618 cm^{-1}. HRMS calcd. for $C_{19}H_{22}N_2NaO_7$ 413.1325; found 413.1329. $C_{19}H_{22}N_2O_7$ (390.39): calcd. C 58.46, H 5.68, N 7.18; found C 58.47, H 5.69, N 7.17.

1-Ethyl 3-Methyl 1′-Benzyl-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4h): Compound **4h** was prepared from **5h**[16c] (104 mg, 0.35 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (76 mg, 0.2 mmol, 57% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.24 (t, J = 7.3 Hz, 3 H, CH_2CH_3), 3.79 (s, 3 H, CO_2CH_3), 3.95 (s, 1 H, NCHCO), 4.23 (q, J = 7.3 Hz, 2 H, CH_2CH_3), 4.83 (d, J = 15.8 Hz, 1 H, NC*H*HPh), 5.11 (d, J = 15.8 Hz, 1 H, NCH*H*Ph), 6.79 (d, J = 7.6 Hz, 1 H, CH_{arom}), 7.04 (m, 1 H, CH_{arom}), 7.22–7.46 (m, 7 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.1, 44.2, 47.9, 48.9, 52.6, 66.5, 109.7, 120.8, 123.2, 124.4, 127.1, 127.8, 128.8, 130.2, 134.9, 144.3, 158.3, 165.5, 169.0 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1738, 1620 cm^{-1}. HRMS: calcd. for $C_{21}H_{20}N_2NaO_5$ 403.1270; found 403.1272. $C_{21}H_{20}N_2O_5$ (380.39): calcd. C 66.31, H 5.30, N 7.36; found C 66.34, H 5.30, N 7.32.

1-Ethyl 3-Methyl 1′-Benzyl-5′-methoxy-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4i): Compound **4i** was prepared from **5i** (250 mg, 0.9 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (165 mg, 0.4 mmol, 44% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.25 (t, J = 7.1 Hz, 3 H, CH_2CH_3), 3.74 (s, 3 H,

$COCH_3$), 3.80 (s, 3 H, CO_2CH_3), 3.95 (s, 1 H, NCHCO), 4.24 (q, J = 7.1, Hz, 2 H, CH_2CH_3), 4.80 (d, J = 15.8 Hz, 1 H, NCH*H*Ph), 5.10 (d, J = 15.8 Hz, 1 H, NC*H*HPh), 6.64–6.83 (m, 2 H, CH_{arom}), 7.06 (d, J = 2.5 Hz, 1 H, CH_{arom}), 7.26–7.36 (m, 5 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.1, 44.4, 47.9, 49.1, 52.6, 55.7, 63.5, 110.3, 110.8, 115.6, 121.9, 127.1, 127.7, 128.7, 135.0, 137.5, 156.2, 158.3, 165.4, 168.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1743, 1602 cm^{-1}. HRMS: calcd. for $C_{22}H_{22}N_2NaO_6$ 433.1376; found 433.1374. $C_{22}H_{22}N_2O_6$ (410.42): calcd. C 64.38, H 5.40, N 6.83; found C 64.34, H 5.42, N 6.80.

1-Ethyl 3-Methyl 1′-Benzyl-2′-oxo-5′-(propan-2-yl)-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4l): Compound **4l** was prepared from **5l** (468 mg, 1.4 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (359 mg, 0.8 mmol, 60% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.13–1.30 [m, 9 H, $(CH_3)_2CH$, CH_2CH_3], 2.85 [sept, J = 6.8 Hz, 1 H, $(CH_3)_2CH$], 3.79 (s, 1 H, NCHCO), 3.80 (s, 3 H, CO_2CH_3), 4.24 (q, J = 7.1 Hz, 2 H, CH_2CH_3), 4.82 (d, J = 15.7 Hz, 1 H, NCH*H*Ph), 5.06 (d, J = 15.7 Hz, 1 H, NC*H*HPh), 6.71 (d, J = 8.1 Hz, 1 H, CH_{arom}), 7.11 (dd, J = 8.1, 1.8 Hz, 1 H, CH_{arom}), 7.26–7.36 (m, 6 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.0, 23.7, 24.0, 33.6, 44.3, 47.8, 49.0, 52.5, 63.3, 109.4, 111.8, 120.6, 122.2, 127.1, 127.6, 128.7, 135.0, 142.0, 144.0, 158.3, 165.4, 168.8 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1721, 1618 cm^{-1}. HRMS: calcd. for $C_{24}H_{26}N_2NaO_5$ 445.1739; found 445.1743. $C_{24}H_{26}N_2O_5$ (422.47): calcd. C 68.23, H 6.20, N 6.63; found C 68.24, H 6.22, N 6.62.

1-Ethyl 3-Methyl 2′-Oxo-1′-phenyl-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1,3-dicarboxylate (4m): Compound **4m** was prepared from **5m** (386 mg, 1.3 mmol) by the procedure described for **4d**. The crude product was purified by chromatography over silica gel (hexane/ethyl acetate 7:3) to provide a yellow solid (280 mg, 0.8 mmol, 59% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.26 (t, J = 7.1 Hz, 3 H, CH_2CH_3), 3.82 (s, 3 H, CO_2CH_3), 3.96 (s, 1 H, NCHCO), 4.23 (q, J = 7.1 Hz, 2 H, CH_2CH_3), 6.90 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.12 (m, 1 H, CH_{arom}), 7.27–7.60 (m, 7 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.3, 44.5, 45.7, 55.4, 57.2, 120.6, 125.4, 126.5, 127.1, 127.5, 127.8, 128.3, 133.4, 139.3, 145.3, 159.3, 171.1, 172.0 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1776, 1615 cm^{-1}. HRMS: calcd. for $C_{20}H_{18}N_2NaO_5$ 389.1113; found 389.1117. $C_{20}H_{18}N_2O_5$ (366.37): calcd. C 65.57, H 4.95, N 7.65; found C 65.54, H 4.97, N 7.63.

***tert*-Butyl 2′-Oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1-carboxylate (4n):** $NsONHCO_2tBu$ (120 mg, 0.38 mmol) and CaO (32 mg, 0.58 mmol) were added portionwise every hour to a stirred solution of **5a** (46 mg, 0.32 mmol) in CH_2Cl_2 (2.0 mL), with a substrate/$NsONHCO_2tBu$/CaO molar ratio of up to 1:2:3 being reached. After 2 h, pentane was added and the mixture was stirred for an additional hour. The organic phase was filtered and the solid residue was washed first with pentane/CH_2Cl_2 (8:2) and then with pentane/CH_2Cl_2 (1:1). The combined organic phases were concentrated under vacuum to give the product **4n** as a yellow solid (58 mg, 0.2 mmol, 70% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.44 [s, 9 H, $C(CH_3)_3$], 2.80 (d, J = 1.7 Hz, 1 H, NCH*H*), 3.07 (d, J = 1.7 Hz, 1 H, NC*H*H), 6.94 (d, J = 7.8 Hz, 1 H, CH_{arom}) 7.03 (m, 2 H, CH_{arom}), 7.23–7.33 (m, 1 H, CH_{arom}), 9.09 (br. s, 1 H, NHCO) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 27.9, 39.0, 45.1, 82.5, 110.6, 121.9, 122.7, 124.3, 129.6, 141.9, 158.6, 172.8 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1730, 1620 cm^{-1}. HRMS: calcd. for $C_{14}H_{16}N_2NaO_3$ 283.1059; found 283.1055. $C_{14}H_{16}N_2O_3$ (260.29): calcd. C 64.60, H 6.20, N 10.76; found C 64.64, H 6.22, N 10.72.

***tert*-Butyl 1′-Methyl-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1-carboxylate (4o):** $NsONHCO_2tBu$ (127 mg, 0.4 mmol) and CaO (22 mg, 0.4 mmol) were added portionwise every hour to a stirred solution of the substrate **5b** (64 mg, 0.4 mmol) in CH_2Cl_2 (1 mL), with a substrate/$NsONHCO_2tBu$/CaO molar ratio of up to 1:2:3 being reached. After 3 h, pentane was added and the mixture was stirred for an additional hour. The organic phase was filtered and the solid residue was washed first with pentane/CH_2Cl_2 (8:2) and then with pentane/CH_2Cl_2 (1:1). The organic phases were concentrated under vacuum to provide **4o** as a yellow solid (101 mg, 0.3 mmol, 92% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.42 [s, 9 H, $C(CH_3)_3$], 2.78 (d, J = 1.8 Hz, 1 H, NC*H*H), 3.04 (d, J = 1.8 Hz, 1 H, NCH*H*), 3.26 (s, 3 H, NCH_3), 6.90 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.04 (m, 2 H, CH_{arom}), 7.33 (m, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 27.8, 29.6, 38.9, 44.7, 82.3, 108.5, 121.5, 122.6, 123.9, 129.4, 144.6, 158.4, 170.5 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1776, 1615 cm^{-1}. HRMS: calcd. for $C_{15}H_{18}N_2NaO_3$ 297.1215; found 297.1213. $C_{15}H_{18}N_2O_3$ (274.31): calcd. C 65.68, H 6.61, N 10.21; found C 65.69, H 6.60, N 10.22.

***tert*-Butyl 1′-(2-Ethoxy-2-oxoethyl)-2′-oxo-1′,2′-dihydro-1*H*-spiro[aziridine-2,3′-indole]-1-carboxylate (4p):** Compound **4p** was prepared from **5c** (46 mg, 0.2 mmol) by the procedure described for **4o**, with a substrate/$NsONHCO_2tBu$/CaO molar ratio of 1:2:3 being reached. The organic phases were concentrated under vacuum to provide **4p** as a yellow solid (62 mg, 0.18 mmol, yield 90%). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.26 (t, J = 7.1 Hz, 3 H, CH_3CH_2), 1.43 [s, 9 H, $C(CH_3)_3$], 2.82 (d, J = 1.7 Hz, 1 H, NC*H*H), 3.11 (d, J = 1.7 Hz, 1 H, NCH*H*), 4.22 (q, J = 7.1 Hz, 2 H, CH_2CH_3), 4.44 (d, J = 17.5 Hz, 1 H, NC*H*HCO$_2$), 4.60 (d, J = 17.5 Hz, 1 H, 1 H, NCH*H*CO$_2$), 6.80 (d, J = 7.8 Hz, 1 H, CH_{arom}), 7.04–7.13 (m, 2 H, CH_{arom}), 7.25–7.37 (m, 1 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.1, 27.8, 39.3, 41.7, 44.7, 61.7, 82.5, 108.6, 121.7, 123.0, 123.7, 129.5, 143.4, 158.4, 167.2, 170.6 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 1723, 1617 cm^{-1}. HRMS: calcd. for $C_{18}H_{22}N_2NaO_5$ 369.1426; found 369.1423. $C_{18}H_{22}N_2O_5$ (346.38): calcd. C 62.42, H 6.40, N 8.09; found C 62.44, H 6.44, N 8.11.

Ethyl [(2-Oxo-2,3-dihydro-1*H*-indol-3-yl)methyl]carbamate (6a): Anhydrous ammonium formate (64.8 mg, 1.0 mmol) was added in a single portion to a stirred suspension of **4a** (84 mg, 0.36 mmol) and Pd/C (10%, 144 mg) in dry methanol (1.8 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. The catalyst was removed by filtration through a celite pad and washed with methanol. The filtrate was concentrated under reduced pressure and then purified by chromatography on silica gel (hexane/ethyl acetate 6:4) to provide the product **6a** (56 mg, 0.24 mmol, yield 66%). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.19 (t, J = 7.1 Hz, OCH_2CH_3), 3.38–3.95 (m, 2 H, $CHCH_2NH$), 3.76–3.98 (m, 1 H, $CHCH_2NH$), 4.07 (q, J = 7.1 Hz, 2 H, OCH_2CH_3), 5.69 (br. s, 1 H, N*H*CO$_2$CH$_2$), 6.88 (d, J = 7.6 Hz, 1 H, CH_{arom}), 6.98–7.05 (m, 1 H, CH_{arom}), 7.15–7.38 (m, 2 H, CH_{arom}), 9.17 (br. s, 1 H, N*H*COCH) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.5, 41.1, 46.1, 61.2, 110.0, 123.0, 124.4, 126.6, 128.5, 141.7, 156.6, 179.3 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3424, 1705, 1609 cm^{-1}. HRMS: calcd. for $C_{12}H_{14}N_2NaO_3$ 257.0902; found 257.0899. $C_{12}H_{14}N_2O_3$ (234.25): calcd. C 61.53, H 6.02, N 11.96; found C 61.55, H 6.00, N 11.92.

Ethyl (3-{[(Ethoxycarbonyl)amino]methyl}-2-oxo-2,3-dihydro-1*H*-indol-1-yl)acetate (6c): Compound **6c** was prepared from **4c** (147 mg, 0.46 mmol) by the procedure described for **6a**. The product **6c** was obtained as a yellow solid (53 mg, 0.2 mmol, yield 50%). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.19 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 1.26 (t, J = 7.1 Hz, 3 H, $CO_2CH_2CH_3$), 3.55 (m, 1

H, CHC*H*HNH), 3.65 (m, 1 H, C*H*CH_2NH), 3.95 (m, 1 H, CHCH*H*NH), 4.07 (q, *J* = 7.1 Hz, 2 H, $CO_2CH_2CH_3$), 4.21 (q, *J* = 7.1 Hz, 4 H, $CO_2CH_2CH_3$), 4.37 (d, *J* = 17.5 Hz, 1 H, NC*H*HCO_2), 4.53 (d, *J* = 17.5 Hz, 1 H, NCH*H*CO_2), 5.42 (br. s, 1 H, NH), 6.72 (m, 1 H, CH_{arom}), 7.08 (m, 1 H, CH_{arom}), 7.30 (m, 2 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.0, 14.5, 41.2, 41.3, 45.4, 60.9, 61.8, 108.1, 123.0, 124.5, 125.7, 128.5, 143.0, 156.6, 167.4, 176.8 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3420, 1711, 1615 cm^{-1}. HRMS: calcd. for $C_{16}H_{20}N_2NaO_5$ 343.1270; found 343.1267. $C_{16}H_{20}N_2O_5$ (320.34): calcd. C 59.99, H 6.29, N 8.74; found C 60.04, H 6.30, N 8.72.

Ethyl [(Ethoxycarbonyl)amino](1-methyl-2-oxo-2,3-dihydro-1*H*-indol-3-yl)acetate (6d): Anhydrous ammonium formate (315 mg, 5.0 mmol) was added in a single portion to a stirred suspension of **4d** (317 mg, 1.0 mmol) and Pd/C (10%, 315 mg) in dry methanol (13 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. The workup of the reaction was the same as had been followed for the preparation of compound **6a**. Product **6d** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (176 mg, 0.5 mmol, 55% yield). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 0.95–1.35 (m, 12 H, 4 × OCH_2CH_3), 3.20 (s, 6 H, 2 × NCH_3), 3.88 (br. s, 1 H, C*H*CHNH), 4.07–4.16 (m, 9 H, 4 × OCH_2CH_3, C*H*CHNH), 5.09 (m, 2 H, 2 × CHC*H*NH), 5.50 (br. d, *J* = 8.1 Hz, 1 H, NH), 5.60 (br. d, *J* = 10.5 Hz, 1 H, NH), 6.80 (d, *J* = 7.7 Hz, 1 H, CH_{arom}), 6.83 (d, *J* = 7.7 Hz, 1 H, CH_{arom}), 7.03 (m, 2 H, CH_{arom}), 7.15–7.35 (m, 4 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 13.9, 14.5, 26.3, 47.0, 48.1, 54.0, 54.3, 61.5, 61.8, 62.0, 108.1, 108.5, 122.6, 122.8, 123.9, 124.3, 124.5, 124.9, 128.8, 129.1, 144.7, 144.9, 156.1, 156.2, 169.6, 170.3, 174.3, 174.9 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3426, 1711, 1612 cm^{-1}. HRMS: calcd. for $C_{16}H_{20}N_2NaO_5$ 343.1270; found 343.1269. $C_{16}H_{20}N_2O_5$ (320.34): calcd. C 59.99, H 6.29, N 8.74; found C 59.95, H 6.27, N 8.72.

Methyl [(Ethoxycarbonyl)amino](1-methyl-2-oxo-2,3-dihydro-1*H*-indol-3-yl)acetate (6e): Anhydrous ammonium formate (362 mg, 5.7 mmol) was added in a single portion to a stirred suspension of **4e** (350 mg, 1.1 mmol) and Pd/C (10%, 356 mg) in dry methanol (15 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. Workup of the reaction was the same as had been followed for the preparation of compound **6a**. Products **6e** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (197 mg, 0.6 mmol, 56% yield). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 1.13–1.27 (m, 6 H, 2 × OCH_2CH_3), 3.20 (s, 3 H, NCH_3), 3.21 (s, 3 H, NCH_3), 3.70 (s, 3 H, CO_2CH_3), 3.71 (s, 3 H, CO_2CH_3), 3.89 (m, 1 H, C*H*CHNH), 4.02–4.14 (m, 4 H, 2 × OCH_2CH_3), 4.15 (m, 1 H, C*H*CHNH), 5.08–5.20 (m, 2 H, 2 × CHC*H*NH), 5.39 (br. d, *J* = 7.0 Hz, 1 H, NH), 5.53 (br. d, *J* = 9.0 Hz, 1 H, NH), 6.82 (d, *J* = 7.7 Hz, 1 H, CH_{arom}), 6.85 (d, *J* = 7.7 Hz, 1 H, CH_{arom}), 7.06 (m, 2 H, CH_{arom}), 7.20–7.38 (m, 4 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 13.3, 13.7, 35.0, 35.4, 43.5, 43.7, 50.4, 51.0, 56.7, 56.9, 58.1, 109.0, 121.3, 124.3, 124.6, 127.6, 127.7, 130.0, 130.4, 142.1, 142.6, 157.4, 157.5, 166.2, 167.0, 171.7, 171.9 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3424, 1713, 1613 cm^{-1}. HRMS: calcd. for $C_{15}H_{18}N_2NaO_5$ 329.1113; found 329.1111. $C_{15}H_{18}N_2O_5$ (306.31): calcd. C 58.82, H 5.92, N 9.15; found C 58.84, H 5.90, N 9.12.

Methyl [(Ethoxycarbonyl)amino][1-(2-ethoxy-2-oxoethyl)-2-oxo-2,3-dihydro-1*H*-indol-3-yl]acetate (6f): Anhydrous ammonium formate (251 mg, 3.9 mmol) was added in a single portion to a stirred suspension of **4f** (300 mg, 0.8 mmol) and Pd/C (10%, 244 mg) in dry methanol (10 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. Workup of the reaction was the same as had been followed for the preparation of compound **6a**. The product **6f** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (147 mg, 0.4 mmol, 50% yield). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 1.10–1.30 (m, 12 H, 4 × OCH_2CH_3), 3.73 (s, 3 H, OCH_3), 3.75 (s, 3 H, OCH_3), 4.02 (m, 1 H, C*H*CHNH), 3.99–4.28 (m, 5 H, 2 × OCH_2CH_3, C*H*CHNH), 4.32 (d, *J* = 17.6 Hz, 1 H, NC*H*HCO_2), 4.45 (m, 2 H, NCH_2CO_2), 4.57 (d, *J* = 17.6 Hz, 1 H, NCH*H*CO_2), 5.14 (dd, *J* = 8.3, 3.1 Hz, 1 H, CHC*H*NH), 5.19 (dd, *J* = 9.1, 3.3 Hz, 1 H, CHC*H*NH), 5.43 (br. d, *J* = 9.1 Hz, 1 H, NH), 5.49 (br. d, *J* = 8.3 Hz, 1 H, NH), 6.71 (m, 2 H, CH_{arom}), 7.07 (m, 2 H, CH_{arom}), 7.14–7.39 (m, 4 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 14.2, 14.5, 41.5, 47.0, 47.9, 53.0, 53.9, 54.3, 61.4, 61.5, 61.9, 62.0, 108.2, 108.6, 123.2, 123.3, 123.4, 124.5, 124.7, 128.8, 129.2, 143.3, 143.6, 156.2, 156.3, 167.3, 167.4, 170.2, 170.7, 174.5, 174.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3424, 1713, 1613 cm^{-1}. HRMS: calcd. for $C_{18}H_{22}N_2NaO_7$ 401.1325; found 401.1328. $C_{18}H_{22}N_2O_7$ (378.38): calcd. C 57.14, H 5.86, N 7.40; found C 57.12, H 5.88, N 7.42.

Ethyl [(Ethoxycarbonyl)amino][1-(2-ethoxy-2-oxoethyl)-2-oxo-2,3-dihydro-1*H*-indol-3-yl]acetate (6g): Anhydrous ammonium formate (403 mg, 6.4 mmol) was added in a single portion to a stirred suspension of **4g** (500 mg, 1.2 mmol) and Pd/C (10%, 396 mg) in dry methanol (16 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. Workup of the reaction was the same as had been followed for the preparation of compound **6a**. The product **6g** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (240 mg, 0.6 mmol, yield 48% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.12–1.28 (m, 18 H, 6 × OCH_2CH_3), 3.98–4.26 (m, 14 H, 6 × OCH_2CH_3, 2 × C*H*CHNH), 4.27–4.61 (m, 4 H, 2 × NCH_2), 5.12–5.21 (m, 2 H, 2 × CHC*H*NH), 5.40–5.41 (m, 2 H, 2 × NH), 6.67–6.69 (m, 2 H, CH_{arom}), 7.12–7.38 (m, 6 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 13.9, 14.0, 14.3, 14.5, 41.5, 47.0, 47.7, 53.1, 53.9, 54.3, 61.3, 61.5, 61.9, 62.1, 108.3, 108.6, 123.5, 124.5, 124.8, 129.2, 143.3, 143.5, 156.2, 156.3, 167.3, 167.5, 170.2, 170.7, 174.5, 174.6 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3426, 1713, 1613 cm^{-1}. HRMS: calcd. for $C_{19}H_{24}N_2NaO_7$ 415.1481; found 415.1480. $C_{19}H_{24}N_2O_7$ (392.40): calcd. C 58.16, H 6.16, N 7.14; found C 58.14, H 6.14, N 7.12.

Methyl (1-Benzyl-2-oxo-2,3-dihydro-1*H*-indol-3-yl)[(ethoxycarbonyl)amino]acetate (6h): Anhydrous ammonium formate (319 mg, 5.0 mmol) was added in a single portion to a stirred suspension of **4h** (450 mg, 1.0 mmol) and Pd/C (10%, 312 mg) in dry methanol (13 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. The workup was the same as had been followed for the preparation of compound **6a**. The product **6h** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (247 mg, 0.5 mmol, 55% yield). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 1.14–1.24 (m, 6 H, 2 × OCH_2CH_3), 3.62 (s, 3 H, CO_2CH_3), 3.69 (s, 3 H, CO_2CH_3), 4.01 (m, 1 H, C*H*CHNH), 4.03–4.28 (m, 5 H, 2 × OCH_2CH_3, C*H*CHNH), 4.76 (d, *J* = 15.5 Hz, 1 H, NCH*H*Ph), 4.84 (d, *J* = 15.5 Hz, 1 H, NC*H*HPh), 4.96 (d, *J* = 15.5 Hz, 1 H, NCH*H*Ph), 5.07 (d, *J* = 15.5 Hz, 1 H, NC*H*HPh), 5.17 (m, 1 H, CHC*H*NH), 5.25 (dd, *J* = 9.5, 3.9 Hz, 1 H, CHC*H*NH), 5.50 (br. d, *J* = 7.3 Hz, 1 H, NH), 5.54 (br. d, *J* = 9.5 Hz, 1 H, NH), 6.72 (m, 2 H, CH_{arom}), 7.01 (m, 2 H, CH_{arom}), 7.12–7.37 (m, 14 H, CH_{arom}) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 14.5, 14.6, 43.9, 44.0, 47.1, 48.4, 52.8, 52.9, 54.0, 54.2, 61.5, 61.6, 109.1, 109.6, 122.7, 122.9, 123.7, 124.2, 124.7, 124.8, 127.4, 127.6, 127.8, 127.9, 128.8, 128.9, 129.1, 135.6, 135.7, 143.8, 144.0, 156.2, 170.3, 170.8, 174.4, 174.9 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3412, 1719, 1613 cm^{-1}. HRMS calcd. for $C_{21}H_{22}N_2NaO_5$ 405.1426; found 405.1429. $C_{21}H_{22}N_2O_5$ (382.41): calcd. C 65.96, H 5.80, N 7.33; found C 65.98, H 5.83, N 7.32.

Methyl [(Ethoxycarbonyl)amino](1-benzyl-5-methoxy-2-oxo-2,3-dihydro-1*H*-indol-3-yl)acetate (6i): Anhydrous ammonium formate (166 mg, 2.6 mmol) was added in a single portion to a stirred suspension of **4i** (250 mg, 0.5 mmol) and Pd/C (10%, 160 mg) in dry methanol (6 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. By the same workup as for compound **6a**, the product **6i** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (238 mg, 0.3 mmol, yield 56%). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 1.24 (t, J = 7.1 Hz, 6 H, 2×OCH$_2$CH_3), 3.63 (s, 3 H, OCH$_3$), 3.69 (s, 3 H, OCH$_3$), 3.74 (s, 3 H, OCH$_3$), 3.75 (s, 3 H, OCH$_3$), 3.98 (m, 1 H, C*H*CHNH), 4.07–4.27 (m, 5 H, 2×OCH_2CH$_3$, C*H*CHNH), 4.73 (d, J = 15.8 Hz, 1 H, NC*H*HPh), 4.82 (d, J = 15.8 Hz, 1 H, NCH*H*Ph), 4.92 (d, J = 15.8 Hz, 1 H, NC*H*HPh), 5.04 (d, J = 15.8 Hz, 1 H, NCH*H*Ph), 5.14 (m, 1 H, CHC*H*NH), 5.22 (dd, J = 9.7, 3.6 Hz, 1 H, CHC*H*NH), 5.50 (br. d, J = 7.3 Hz, 1 H, NH), 5.54 (br. d, J = 9.7 Hz, 1 H, NH), 6.55–6.97 (m, 6 H CH$_{arom}$), 7.24–7.32 (m, 10 H, CH$_{arom}$) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 14.6, 44.1, 47.5, 52.8, 54.0, 55.8, 61.6, 109.5, 110.0, 111.7, 112.0, 112.3, 113.2, 113.3, 125.1, 127.4, 127.6, 127.7, 128.8, 128.9, 135.6, 135.8, 137.2, 137.4, 155.9, 156.0, 156.2, 170.7, 174.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3416, 1725, 1617 cm^{-1}. HRMS: calcd. for $C_{22}H_{24}N_2NaO_6$ 435.1532; found 435.1537. $C_{22}H_{24}N_2O_6$ (412.43): calcd. C 64.07, H 5.87, N 6.79; found C 64.04, H 5.89, N 6.80.

Methyl [(Ethoxycarbonyl)amino][1-benzyl-2-oxo-5-(propan-2-yl)-2,3-dihydro-1*H*-indol-3-yl]acetate (6l): Anhydrous ammonium formate (116 mg, 1.8 mmol) was added in a single portion to a stirred suspension of **4l** (160 mg, 0.4 mmol) and Pd/C (10%, 129 mg) in dry methanol (5 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. By the same workup as for compound **6a**, product **6l** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (77 mg, 0.2 mmol, 48% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.11–1.28 [m, 18 H, 2×(CH_3)$_2$CH, 2×OCH$_2$CH_3], 2.75–2.90 [m, 2 H, 2×(CH$_3$)$_2$C*H*], 3.63 (s, 3 H, CO$_2$CH$_3$), 3.66 (s, 3 H, CO$_2$CH$_3$), 3.97 (m, 1 H, C*H*CHNH), 4.01–4.27 (m, 5 H, 2×OCH_2CH$_3$, C*H*CHNH), 4.72 (d, J = 15.2 Hz, 1 H, NC*H*HPh), 4.82 (d, J = 15.5 Hz, 1 H, NCH*H*Ph), 4.92 (d, J = 15.5 Hz, 1 H, NC*H*HPh), 5.03 (d, J = 15.2 Hz, 1 H, NCH*H*Ph), 5.15 (m, 1 H, CHC*H*NH), 5.23 (m, 1 H, CHC*H*NH), 5.48 (br. d, J = 8.1 Hz, 1 H, NH), 5.64 (br. d, J = 9.4 Hz, 1 H, NH), 6.64 (m, 2 H, CH$_{arom}$), 7.01 (m, 2 H, CH$_{arom}$), 7.14–7.38 (m, 12 H, CH$_{arom}$) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.6, 24.3, 33.9, 34.0, 44.1, 47.3, 52.7, 52.9, 54.2, 61.6, 108.9, 109.4, 122.6, 123.1, 124.9, 125.4, 127.5, 127.7, 127.8, 128.9, 135.8, 136.0, 141.8, 143.6, 157.3, 167.2, 172.0 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3417, 1720, 1615 cm^{-1}. HRMS: calcd. for $C_{24}H_{26}N_2NaO_5$ 447.1896; found 447.1899. $C_{24}H_{26}N_2O_5$ (422.47): calcd. C 68.23, H 6.20, N 6.63; found C 68.26, H 6.25, N 6.65.

Methyl [(Ethoxycarbonyl)amino](2-oxo-1-phenyl-2,3-dihydro-1*H*-indol-3-yl)acetate (6m): Anhydrous ammonium formate (166 mg, 2.7 mmol) was added in a single portion to a stirred suspension of **4m** (190 mg, 0.5 mmol) and Pd/C (10%, 165 mg) in dry methanol (7 mL), and the resulting mixture was stirred at room temperature under argon for 1 h. By the same workup as for compound **6a**, product **6m** was isolated as a *syn*/*anti* mixture (1:1) of two diastereoisomers (58 mg, 0.16 mmol, 30% yield). ^{1}H NMR ($CDCl_3$, 400 MHz, 25 °C): δ = 1.23 (t, J = 7.1 Hz, 6 H, 2×OCH$_2$CH_3), 3.69 (s, 6 H, 2×CO$_2$CH$_3$), 4.03 (m, 1 H, C*H*CHNH), 4.08–4.17 (m, 4 H, 2×OCH_2CH$_3$), 4.35 (m, 1 H, C*H*CHNH), 5.19–5.27 (m, 2 H, 2×CHC*H*NH), 5.57 (br. d, J = 7.0 Hz, 1 H, NH), 5.82 (br. d, J = 10.5 Hz, 1 H, NH), 6.68–6.73 (m, 2 H, CH$_{arom}$), 7.05–7.12 (m, 2 H, CH$_{arom}$), 7.19–7.27 (m, 2 H, CH$_{arom}$), 7.35–7.45 (m, 8 H, CH$_{arom}$), 7.47–7.55 (m, 4 H, CH$_{arom}$) ppm. ^{13}C NMR ($CDCl_3$, 100 MHz, 25 °C): δ = 14.5, 47.2, 48.5, 53.0, 54.5, 54.7, 61.6, 109.5, 109.8, 123.2, 123.3, 124.4, 124.8, 126.4, 126.7, 128.3, 128.4, 128.8, 129.1, 129.7, 129.8, 134.3, 144.7, 145.0, 156.2, 170.1, 170.7, 173.7, 174.7 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3417, 1720, 1615 cm^{-1}. HRMS: calcd. for $C_{20}H_{20}N_2NaO_5$ 391.1270; found 391.1269. $C_{20}H_{20}N_2O_5$ (368.38): calcd. C 65.21, H 5.47, N 7.60; found C 65.25, H 5.44, N 7.65.

***tert*-Butyl [(2-Oxo-2,3-dihydro-1*H*-indol-3-yl)methyl]carbamate (6n):** Compound **6n** was prepared from **4n** (104 mg, 0.4 mmol) by the procedure described for **6a**. The product **6n** was obtained as a yellow solid (58 mg, 0.2 mmol, 55% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.41 [s, 9 H, C(CH$_3$)$_3$], 3.38–3.95 (m, 2 H, CHCH_2NH), 3.76–3.98 (m, 1 H, C*H*CH$_2$NH), 5.69 (br. s, 1 H, NHCO$_2$*t*Bu), 6.88 (m, 1 H, CH$_{arom}$), 6.98–7.05 (m, 1 H, CH$_{arom}$), 7.15–7.38 (m, 2 H, CH$_{arom}$), 9.17 (br. s, 1 H, N*H*COCH) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 28.0, 41.1, 46.1, 82.5, 109.7, 123.3, 124.4, 126.7, 128.3, 155.0, 156.7, 177.3 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3425, 1705, 1609 cm^{-1}. HRMS: calcd. for $C_{14}H_{18}N_2NaO_3$ 285.1215; found 285.1219. $C_{14}H_{18}N_2O_3$ (262.30): calcd. C 64.10, H 6.92, N 10.68; found C 64.14, H 6.90, N 10.66.

Ethyl [(1-Methyl-2-oxo-2,3-dihydro-1*H*-indol-3-yl)methyl]carbamate (6o): Compound **6o** was prepared from **4o** (82 mg, 0.3 mmol) by the procedure described for **6a**. The product **6o** was obtained as a yellow solid (33 mg, 0.12 mmol, 40% yield). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.40 [s, 9 H, C(CH$_3$)$_3$], 3.18 (s, 3 H, NCH$_3$), 3.32 (m, 1 H, CHC*H*HNH), 3.65 (m, 1 H, C*H*CH$_2$NH), 3.84–4.04 (m, 1 H, CHCH*H*NH), 5.42 (br. s, 1 H, NH), 6.84 (d, J = 7.8 Hz, 1H CH$_{arom}$), 7.06 (m, 1 H, CH$_{arom}$), 7.30 (m, 2 H, CH$_{arom}$) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 26.2, 27.3, 41.2, 45.8, 82.5, 108.0, 123.2, 124.4, 125.6, 128.4, 144.3, 156.5, 176.6 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3420, 1709, 1613 cm^{-1}. HRMS: calcd. for $C_{15}H_{20}N_2NaO_3$ 299.1372; found 299.1370. $C_{15}H_{20}N_2O_3$ (276.33): calcd. C 65.20, H 7.30, N 10.14; found C 65.04, H 7.28, N 10.12.

Ethyl (3-{[(Ethoxycarbonyl)amino]methyl}-2-oxo-2,3-dihydro-1*H*-indol-1-yl)acetate (6p): Compound **6p** was prepared from **4p** (138 mg, 0.4 mmol) by the procedure described for **6a**. The product **6p** was obtained as a yellow solid (67 mg, 0.2 mmol, yield 48%). ^{1}H NMR ($CDCl_3$, 200 MHz, 25 °C): δ = 1.23 (t, J = 7.1 Hz, 3 H, CH_3CH$_2$), 1.38 [s, 9 H, C(CH$_3$)$_3$], 3.53–3.56 (m, 1 H, CHC*H*HNH), 3.65 (m, 1 H, C*H*CH$_2$NH), 3.93–3.56 (m, 1 H, CHCH*H*NH), 4.21 (q, J = 7.1 Hz, 4 H, OCH_2CH$_3$), 4.37 (d, J = 17.0 Hz, 1 H, NC*H*HCO$_2$), 4.53 (d, J = 17.0 Hz, 1 H, 1 H, NHCH*H*CO$_2$), 5.40 (br. s, 1 H, NH), 6.70 (m, 1 H, CH$_{arom}$), 7.08 (m, 1 H, CH$_{arom}$), 7.32 (m, 2 H, CH$_{arom}$) ppm. ^{13}C NMR ($CDCl_3$, 50 MHz, 25 °C): δ = 14.0, 27.9, 41.2, 42.3, 45.4, 61.8, 82.5, 108.2, 123.1, 124.1, 125.7, 127.3, 142.5, 155.6, 167.1, 176.0 ppm. IR ($CHCl_3$): $\tilde{\nu}$ = 3418, 1711, 1615 cm^{-1}. HRMS: calcd. for $C_{18}H_{24}N_2NaO_5$ 371.1583; found 371.1585. $C_{18}H_{24}N_2O_5$ (348.39): calcd. C 62.05, H 6.94, N 8.04; found C 62.02, H 6.97, N 8.02.

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