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Synthesis of α-silylalkylbenzoxazoles and oxazoles from stable silylketenes

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ABSTRACT

Stable silylketenes, prepared by rhodium-catalysed decomposition of silyldiazoketones, undergo addition/cyclocondensation sequences with aminophenols and aminomalonate to give α-silylalkylbenzoxazoles and oxazoles, respectively. The silicon can be retained throughout functional group interconversions or can be removed by protodesilylation under acidic conditions as desired.

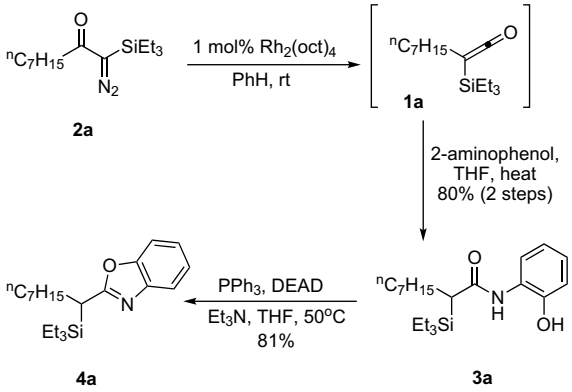
1. Introduction

Ketenes are generally highly reactive, unisolable species, and synthetic applications are therefore usually based upon their in situ generation and subsequent reaction.[1] By contrast, silylketenes are stable, isolable entities,[2,3] a property attributed to a combination of electronic stabilisation (most convincingly as a consequence of the excellent hyperconjugative donation possible from a C–Si σ-bond[4]) and steric hindrance to attack on the ketene LUMO by the bulk of the silyl substituent. Amongst the various methods for the preparation of silyl ketenes,[2] we reported a convenient method based upon an unexpected Wolff rearrangement of silylated diazoketones upon treatment with a rhodium(II) dicarboxylate catalyst.[5] This allows for the preparation of silylketenes with ready variation of both the silicon and carbon substituents. We have exploited these ketenes as synthetic intermediates, for example, in the synthesis of novel tri- and tetrasubstituted allenylsilanes.[6]

Silylketenes react readily with nucleophilic species, acting as synthetic equivalents of activated α-silylcarboxylic acids to give the corresponding α-silylesters or amides.[2,3] However, the further synthetic potential of intermediates prepared by this route has been little studied. One such example is the synthesis of coumarins by addition of *o*-acylphenols to trimethylsilylketene followed by intramolecular condensation of the resulting α-silylacetate and aldehyde.[7] In this chemistry, however, the silicon substituent is lost in the condensation process. We were interested to investigate whether silylketenes could be used as acyl cation equivalents for the assembly of heterocyclic motifs in which the silicon was retained on the alkyl substituent adjacent to the new heterocycle. The resulting α-silylalkylheterocycles could potentially be useful synthetic intermediates (e.g., for use in Peterson olefinations[8]). Additionally, the incorporation of silicon into pharmaceutical candidates is an area of growing interest,[9] and this chemistry would provide convenient entry to potentially pharmacologically active targets. In this paper, we describe the facile synthesis of α-silylalkylbenzoxazoles and oxazoles from silylketenes.

2. Results and discussion

We chose benzoxazoles as our initial targets, since they occur in a diverse range of biologically active natural products[10] and pharmaceutical targets.[11] We commenced our study by reaction of *o*-aminophenol with *n*-heptyl(triethylsilyl)ketene **1a**, generated by decomposition of (triethylsilyl)diazonanone **2a** according to our previously reported method.[5] We were pleased to find that addition of the aminophenol to the crude ketene gave a good yield of the expected amide **3a** (Scheme 1). We next sought to find conditions whereby heterocyclisation to the benzoxazole could be



Scheme 1. Development of a synthesis of α-silylalkylbenzoxazoles.

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effected whilst retaining the silicon substituent. The use of standard cyclodehydration reagents such as PPh_3/I_2 was successful in achieving benzoxazole formation but gave substantial amounts of protodesilylated material, likely as a result of the acidic by-products liberated in such reactions. The use of the neutral Mitsunobu conditions for cyclodehydration,[12] however, gave the α-silylalkylbenzoxazole **4a** in 81% yield with no trace of the desilylated product.

We then set out to establish the scope and limitations of these conditions with respect to both the silylketene substituents and substitution in the aminophenol coupling partner. The silyldiazoketones **2a**–**g** (prepared from the parent diazoketone according to the method of Regitz[13]) were therefore decomposed under rhodium octanoate catalysis, and the crude ketenes condensed with the appropriate *o*-aminophenol. The resulting amides were treated under Mitsunobu conditions to give the substituted benzoxazoles. The findings of this survey are reported in Table 1.

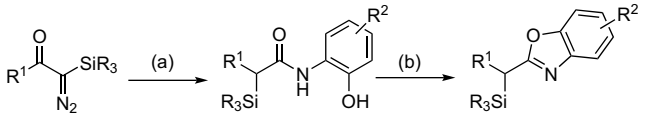
The alkyl-substituted ketenes derived from **2a** and **2b** behaved well in the heterocyclisations (entries a and b), though we found that the amides from aryl-substituted ketenes (from **2c**–**2e**) gave substantially lower yields in the heterocyclisation (entries c–e). We attribute this to competing protodesilylation in the cyclisation reaction (ca. 20% of the desilylated benzoxazole was observed in these cases) rather than any diminished reactivity of the arylketenes—full consumption of ketene was seen in all cases. The presence of an aryl substituent would be expected to labilise the C–Si bond to cleavage, since amide protonation and desilylation would give rise to an enol in conjugation with the aryl substituent. However, use of the *tert*-butyldimethylsilylketene **2f** gave an amide **3f** that was more robust in the heterocyclisation event, giving a higher yield of the desired benzoxazole without protodesilylation (entry f). In terms of variation in the aminophenol nucleophile, we elected to incorporate nitrogen substitution, since substituted 5- and 6-aminobenzoxazoles are found in natural products (e.g., calcimycin[10]) and drug substances such as the orexin-1 receptor antagonist SB-334867-A.[14] The use of 4-nitro-2-aminophenol as a nucleophile proved problematic: the attenuated nucleophilicity of the nitrogen slowed addition to the silylketene and required prolonged heating (five days) to effect good conversions. The potential for competing protodesilylation meant that the *tert*-butyldimethylsilyl-substituted ketenes were required to give good yields in the addition; Mitsunobu cyclisation of the resulting amide then proceeded in near-quantitative yield (entry g). Finally, we examined the use of aminophenols bearing (allyloxycarbonyl)amino substituents, in the expectation that subsequent removal of the allyloxycarbonyl group could be achieved under mild enough conditions to prevent protodesilylation. These highly nucleophilic aminophenols gave addition and cyclisation to alkyl(triethylsilyl)ketenes without any difficulties (entries h–k).

With the ring-functionalized α-silylalkylbenzoxazoles **4g**–**k** in hand, we next investigated whether conditions could be found for the manipulation and functionalisation of the nitrogen substituents without suffering competing protodesilylation. Deprotection of the allyloxycarbonyl groups of **4h**–**k** was carried out under the Kunz conditions,[15] using palladium(0) catalysis with *N*,*N*′-dimethylbarbituric acid to scavenge the resulting π-allyl palladium electrophile. Good to excellent yields of the resulting 5- and 6-aminobenzoxazoles **5a**–**d** were obtained (Scheme 2). Alternatively, the *tert*-butyldimethylsilyl-substituted 5-aminobenzoxazole **5e** could be accessed by reduction of the nitro group of **4g** using copper acetylacetonate and sodium borohydride.[16] The resulting amine was reacted with a range of electrophilic reagents representative of those widely used in medicinal chemistry (sulfonyl chlorides, carbamoyl chlorides, chloroformates, acid chlorides, isocyanates and isothiocyanates). In all cases, good yields of the functionalized products **6**–**11** were obtained without significant desilylation occurring.

Finally, we demonstrated that desilylation of the α-silylbenzoxazoles could be deliberately achieved by treatment under acidic conditions. Thus, exposure of compounds **4a**, **4f** and **5b** to trifluoroacetic acid in dichloromethane returned the desilylated benzoxazoles **12**–**14** in moderate to good yield (Scheme 3). Mechanistically, the reaction presumably occurs by protonation of the basic ring nitrogen, followed by loss of silicon (generating an *exo*-alkylidenebenzoxazoline) and rearomatising tautomerisation.

We also wished to demonstrate that silylketenes have the potential to act as electrophilic templates for the construction of α-silylalkylheterocycles other than benzoxazoles. We elected to

Table 1
Synthesis of α-silylalkylbenzoxazoles

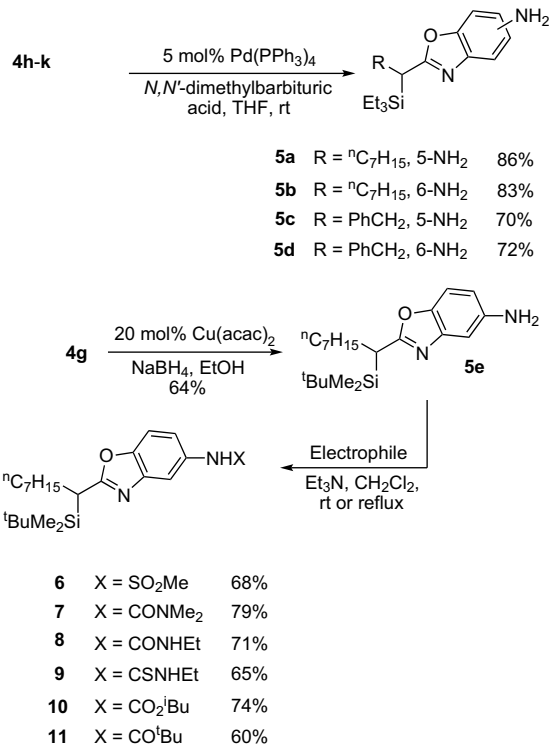


2a-g **3a-k** **4a-k**

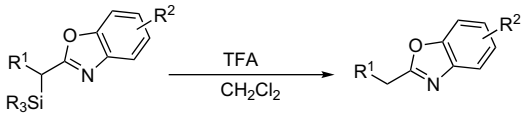
(a) 1 mol% $Rh_2(oct)_4$, PhH, then (substituted) 2-aminophenol,THF; (b) PPh_3, DEAD, Et_3N, THF, 50°C

Entry	SiR_3	R^1	R^2	Yield **3**[a] (%)	Yield **4** (%)
a	TES	$^nC_7H_{15}$	H	80	81
b	TES	$PhCH_2$	H	73	67
c	TES	4-$MeOC_6H_4$	H	52	34
d	TES	2-Furyl	H	45	42
e	TES	(*N*-Boc)Indolyl	H	66	47
f	TBS	(*N*-Boc)Indolyl	H	69	67
g	TBS	$^nC_7H_{15}$	5-NO_2[b]	79	95
h	TES	$^nC_7H_{15}$	5-NHAlloc[b]	75	56
i	TES	$^nC_7H_{15}$	6-NHAlloc[b]	78	70
j	TES	$PhCH_2$	5-NHAlloc[b]	75	54
k	TES	$PhCH_2$	6-NHAlloc[b]	77	73

[a] Yield over two steps from **2**.
[b] Numbering refers to position of substituent in benzoxazoles **4**.



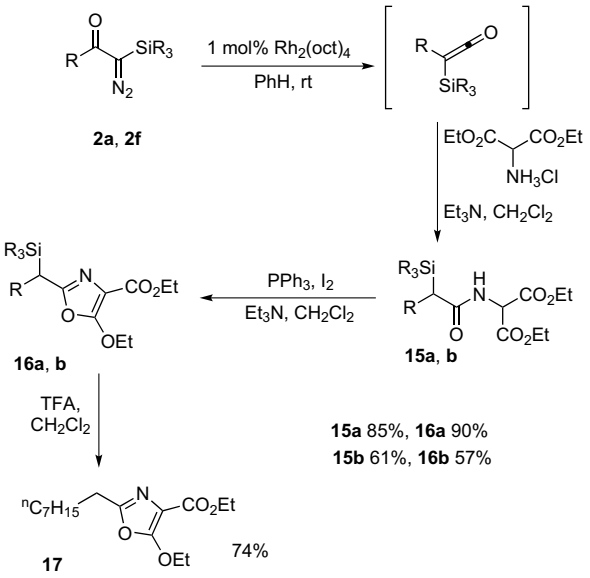
Scheme 2. Synthesis and functionalisation of (α-silylalkyl)aminobenzoxazoles.



4a	$R_1 = {}^nC_7H_{15}$, R_2 = H, R_3Si = TES	**12**	67%
4f	R_1 = indolyl, R_2 = H, R_3Si = TBS	**13**	57%
5b	$R_1 = {}^nC_7H_{15}$, R_2 = 6-NH_2, R_3Si = TES	**14**	79%

Scheme 3. Desilylation of α-silylalkylbenzoxazoles.

study the formation of non-benzannulated systems, and specifically focused on oxazoles, given their widespread occurrence in bioactive natural products[17] and synthetic drug substances such as the non-steroidal anti-inflammatory Oxaprozin. Moody has reported the formation of oxazoles by cyclodehydration of acylaminomalonates, which he prepared via rhodium-catalysed N–H insertion of diazomalonates to primary amides.[18] We recognised that condensation of commercial aminomalonate esters with silylketenes would afford similar intermediates, and were pleased to find that addition to ketenes derived from **2a** and **2f** gave the desired products **15a** and **15b** in excellent yields. In contrast to the benzoxazole series, cyclisation using PPh_3/I_2 (as used by Moody) proceeded without significant desilylation to give the desired oxazoles **16a** and **16b**. Finally, we showed that protodesilylation of **16a** could be achieved, if desired, using trifluoroacetic acid, giving a 74% yield of oxazole **17** (Scheme 4).



Scheme 4. Synthesis and reactions of α-silylalkyloxazoles.

3. Conclusions

In summary, we have demonstrated that silylketenes can be used as electrophilic templates for the construction of α-silylalkylbenzoxazoles and oxazoles. Conditions for the manipulation of these intermediates with retention of the silicon function can be found, allowing the preparation of diverse functionalised α-silylalkylheterocycles. The silicon function is found to be labile towards acidic reaction conditions, however, and this can be exploited to effect deliberate protodesilylation in good yield if desired. Further applications of this chemistry will be reported in due course.

4. Experimental

4.1. General information

Tetrahydrofuran and diethyl ether were freshly distilled from sodium benzophenone ketyl, benzene and toluene from sodium and dichloromethane from calcium hydride. Triethylamine and *N*,*N*-diisopropylethylamine were distilled from and stored over potassium hydroxide. All other solvents and reagents were used without purification. All glassware was oven dried at 130 °C prior to use. Reactions were carried out under an atmosphere of nitrogen, unless otherwise stated. Thin layer chromatography was performed on precoated glass backed plates (Merck Kieselgel 60 F_{254}) and visualised with ultraviolet light (254 nm), potassium permanganate, acidic ammonium molybdate(IV) or ninhydrin solution. Flash column chromatography was performed on Merck Kieselgel 60 (200–300 mesh) under pressure.

^1H and ^{13}C NMR spectra were recorded at the cited frequency. Coupling constants (*J*) were recorded in Hertz (Hz). Where two signals in the ^{13}C NMR are coincident they are labelled with an asterisk (*).

Melting points were determined using a Gallenkamp melting point apparatus. Elemental analyses were performed at the University of North London analytical laboratory.

4.2. Synthesis and nucleophilic trapping of silylketenes with aminophenols

*4.2.1. N-(2-Hydroxyphenyl)-2-triethylsilylnonamide (**3a**)*

Silyl diazoketone **2a** (464 mg, 1.65 mmol) and $Rh_2(oct)_4$ (13 mg, 1 mol %) were dissolved in benzene (10 mL) and stirred at rt until complete consumption of starting material was observed by TLC (10 min). The solvent was removed in vacuo and the silylketene dissolved in THF (10 mL). 2-Aminophenol (360 mg, 3.29 mmol) was added and the reaction mixture heated at 40 °C for 16 h, after which the solvent was removed in vacuo. The crude yellow oil was purified by column chromatography (8→15% ether/petrol) to give the amide **3a** (477 mg, 80%) as a colourless oil. R_f 0.22 (10% ether/petrol). Found: C, 69.6; H, 10.1; N, 3.7. $C_{21}H_{37}NO_2Si$ requires C, 69.35; H, 10.25; N, 3.85%. ν_{max} (NaCl/film)/cm^{-1} 3291 br, 2956 s, 2924 s, 2876 s, 2855 s, 1644 s, 1601 s, 1520 s, 1453 s, 1362 s, 1309 s, 1243 s and 1018 s; δ_H (270 MHz, $CDCl_3$) 0.68 (6H, q, *J* 7.5, Si(CH_2CH_3)$_3$), 0.85 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.98 (9H, t, *J* 7.5, Si(CH_2CH_3)$_3$), 1.13–1.38 (10H, m, $(CH_2)_5$), 1.41–1.52 (2H, m, 3-H), 2.03 (1H, dd, *J* 2.0 and 12.0, 2-H), 6.78–6.89 (2H, m, Ph*H*), 6.97–7.14 (2H, m, Ph*H*), 7.17 (1H, br s, NH) and 9.40 (1H, br s, OH); δ_C (67.5 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.4 (Si(CH_2CH_3)$_3$), 14.2 ($(CH_2)_6CH_3$), 22.7, 27.5, 29.2, 29.5, 30.7 and 31.9 ($(CH_2)_6$), 8.0 (C-2), 120.2, 120.3, 122.0 and 127.1 (C-3′, 4′, 5′ and 6), 137.1 (C-1′), 149.4 (C-2′) and 176.3 (C=O); *m*/*z* (CI$^+$) 364.2685 ([M+H]$^+$, $C_{21}H_{38}NO_2Si$ requires 364.2672), 364 ([M+H]$^+$, 100%), 290 (64), 255 (25) and 132 (43).

*4.2.2. N-(2-Hydroxyphenyl)-3-phenyl-2-triethylsilylpropanamide (**3b**)*

Prepared according to the method for **3a** on a 0.51 mmol scale. Purification by column chromatography (15→25% ether/petrol) gave amide **3b** (132 mg, 73%) as a colourless oil. R_f 0.28 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3346 m, 3062 w, 3027 w, 2953 s, 2876 m, 1746 m, 1640 m, 1515 s, 1497 s, 1453 s, 1241 m, 1040 m; δ_H (300 MHz, $CDCl_3$) 0.81 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 1.08 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 2.39 (1H, dd, *J* 2.5 and 12.0, 2-H), 2.85 (1H, dd, *J* 2.5 and 14.0, 3-H), 3.32 (1H, dd, *J* 12.0 and 14.0, 3-H), 6.76–6.79 (2H, m, Ar*H*), 6.95 (1H, d, *J* 7.5, Ar*H*), 7.08 (1H, m, Ar*H*), 7.20–7.31 (6H, m, 5×Ph*H* and NH) and 9.23 (1H, s, OH); δ_C (75 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.5 (Si(CH_2CH_3)$_3$), 33.5 (C-3), 40.6 (C-2), 119.8, 120.2, 122.0, 125.9, 126.4 and 126.9 (C-1′, 3′, 4′, 5′, 6′ and 4-*Ph*H), 128.1 and

128.7 (4C, *Ph*H), 141.9 and 149.1 (*Ph*C and C-2′) and 175.4 (C=O); *m*/*z* (CI^+) 356.2041 ($[M+H]^+$, $C_{21}H_{30}NO_2Si$ requires 356.2046), 356 ($[M+H]^+$, 100%), 247 (20) and 109 (45).

4.2.3. *N-(2-Hydroxyphenyl)-2-(4-methoxyphenyl)-2-triethylsilylethanamide (**3c**)*

Prepared according to the method for **3a** on a 0.52 mmol scale, with the first step carried out at 40 °C and the second step from −40 °C to rt. Purification by column chromatography (30% ether/petrol) gave amide **3c** (100 mg, 52%) as a very viscous yellow oil. ν_{max} (NaCl/film)/cm^{-1} 3304 m, 2953 s, 2910 m, 2882 m, 2836 m, 1638 m, 1508 s, 1454 m, 1246 m, 1179 m, 1033 m and 746 m; δ_H (300 MHz, $CDCl_3$) 0.72 (6H, q, *J* 7.5, Si(C*H*$_2$CH$_3$)$_3$), 0.97 (9H, t, *J* 7.5, Si(CH$_2$C*H*$_3$)$_3$), 3.51 (1H, s, 2-H), 3.84 (3H, s, OCH_3), 6.68–6.88 (2H, m, Ph*H*), 6.93 (2H, d, *J* 8.0, 3″- and 5″-H), 7.02 (1H, d, *J* 7.5, Ph*H*), 7.09 (1H, m, Ph*H*), 7.29 (2H, d, *J* 8.0, 2″- and 6″-H), 7.62 (1H, br s, NH) and 9.29 (1H, br s, OH); δ_C (75 MHz, $CDCl_3$) 3.3 (Si(*C*H$_2$CH$_3$)$_3$), 7.4 (Si(CH$_2$*C*H$_3$)$_3$), 44.3 (C-2), 55.3 (OCH_3), 114.5 (2C, C-3″ and 5″), 120.1, 120.2, 122.0, 125.9, 127.0 and 128.7 (C-1′, 3′, 4′, 5′, 6′ and 1″), 130.0 (2C, C-2″ and 6″), 149.0 and 158.3 (C-2′ and 4″) and 174.2 (C=O); *m*/*z* (CI^+) 372.1998 ($[M+H]^+$, $C_{21}H_{30}NO_3Si$ requires 372.1995), 372 ($[M+H]^+$, 100%), 258 (28) and 240 (34).

4.2.4. *N-(2-Hydroxyphenyl)-2-(2-furyl)-2-triethylsilylethanamide (**3d**)*

Prepared according to the method for **3a** on a 0.79 mmol scale, with the first step carried out at 50 °C and the second step from −40 °C to rt. Purification by column chromatography (20→25% ether/petrol) gave amide **3d** (118 mg, 45%) as a yellow solid. ν_{max} (NaCl)/cm^{-1} 3378 br, 2953 m, 2912 m, 2878 m, 1620 s, 1512 m, 1452 m, 1350 m, 1240 m, 1102 m and 1017 s; δ_H (300 MHz, $CDCl_3$) 0.76 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.98 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 3.76 (1H, s, 2-H), 6.22 (1H, d, *J* 2.5, Fur*H*), 6.34 (1H, d, *J* 2.5, Fur*H*), 6.85 (1H, t, *J* 8.0, Ph*H*), 7.02 (2H, d, *J* 8.0, Ph*H*), 7.12 (1H, t, *J* 8.0, Ph*H*), 7.47 (1H, s, Fur*H*), 8.11 (1H, s, NH) and 9.10 (1H, s, OH); δ_C (75 MHz, $CDCl_3$) 3.2 (Si(*C*H$_2$CH$_3$)$_3$), 7.1 (Si(CH$_2$*C*H$_3$)$_3$), 38.9 (C-2), 107.7 and 111.4 (C-3″ and 4″), 119.6, 120.3, 122.1, 125.7 and 126.9 (C-1′, 3′, 4′, 5′ and 6′), 142.0 (C-5″), 148.7 (C-2′), 150.5 (C-2″) and 171.6 (C=O); *m*/*z* (CI^+) 332.1679 ($[M+H]^+$, $C_{18}H_{26}NO_3Si$ requires 332.1682), 332 ($[M+H]^+$, 100%), 233 (17), 218 (32), 200 (21) and 120 (19).

4.2.5. *N-(2-Hydroxyphenyl)-2-[3-(1-tert-butoxycarbonyl)indolyl]-2-triethylsilylethanamide (**3e**)*

Prepared according to the method for **3a** on a 0.49 mmol scale, with the first step carried out at 40 °C and the second step from −40 °C. Purification by column chromatography (10→40% ether/petrol) gave amide **3e** (156 mg, 66%) as a yellow oil. ν_{max} (NaCl/film)/cm^{-1} 3307 br, 3110 w and 3052 w, 2948 m, 2930 m, 2913 m, 2877 m, 1734 s, 1642 m, 1601 m, 1526 s, 1497 s, 1371 s, 1257 s, 1156 s, 1075 m and 1018 m; δ_H (300 MHz, $CDCl_3$) 0.82 (6H, q, *J* 7.5, Si(C*H*$_2$CH$_3$)$_3$), 1.00 (9H, t, *J* 7.5, Si(CH$_2$C*H*$_3$)$_3$), 1.73 (9H, s, Boc), 3.80 (1H, s, 2-H), 6.76–6.82 (2H, m, Ph*H*), 7.00–7.13 (2H, m, Ph*H*), 7.30 (1H, m, Ind*H*), 7.40 (1H, t, *J* 7.5, Ind*H*), 7.54 (1H, d, *J* 7.5, Ind*H*), 7.69 (1H, s, NH), 7.77 (1H, s, Ind*H*), 8.18 (1H, d, *J* 7.5, Ind*H*) and 9.14 (1H, s, OH); δ_C (75 MHz, $CDCl_3$) 3.5 (Si(*C*H$_2$CH$_3$)$_3$), 7.4 (Si(CH$_2$*C*H$_3$)$_3$), 28.3 (Boc), 34.1 (C-2), 84.2 (Boc), 115.5, 115.7, 118.8, 120.0, 120.2, 122.1, 122.9, 123.8, 125.1, 125.7 and 127.1 (C-1′, 3′, 4′, 5′, 6′, 2″, 3″, 4″, 5″, 6″ and 7″), 130.2 (C-3a″), 135.1 (C-7a″), 149.6 (C-2′), 149.2 (Boc) and 173.3 (C=O, amide); *m*/*z* (CI^+) 481.2522 ($[M+H]^+$, $C_{27}H_{37}N_2O_4Si$ requires 481.2523), 481 ($[M+H]^+$, 100%), 430 (16), 381 (37), 349 (87), 248 (30) and 130 (16).

4.2.6. *N-(2-Hydroxyphenol)-2-[3-(1-tert-butoxycarbonyl)indolyl]-2-(tert-butyldimethylsilyl)ethanamide (**3f**)*

Prepared according to the method for **3a** on a 0.37 mmol scale, with the first step carried out at 40 °C and the second step from −40 °C to rt. Purification by column chromatography (30→50% ether/petrol) gave amide **3f** (122 mg, 69%) as a white foam. R_f 0.33 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3304 br, 3047 w, 2957 m, 2933 m, 2861 m, 1732 s, 1643 m, 1527 m, 1478 m, 1453 s, 1368 s, 1257 s, 1156 s and 1075 m; δ_H (300 MHz, $CDCl_3$) 0.11 (3H, s, $SiCH_3$), 0.32 (3H, s, $SiCH_3$), 0.95 (9H, s, SiC(CH$_3$)$_3$), 1.72 (9H, s, Boc), 3.81 (1H, s, 2-H), 6.78–6.87 (2H, m, Ph*H*), 7.01 (1H, d, *J* 9.0, Ph*H*), 7.10 (1H, t, *J* 8.0, Ph*H*), 7.28 (1H, t, *J* 8.0, Ind*H*), 7.37 (1H, t, *J* 7.0, Ind*H*), 7.54 (1H, d, *J* 7.0, Ind*H*), 7.77 (2H, br s, Ind*H* and NH), 8.17 (1H, d, *J* 8.0, Ind*H*) and 9.07 (1H, br s, OH); δ_C (75 MHz, $CDCl_3$) −5.9 ($SiCH_3$), −5.7 ($SiCH_3$), 18.0 (SiC(CH$_3$)$_3$), 27.0 (SiC(*C*H$_3$)$_3$), 28.3 (Boc), 34.5 (C-2), 84.1 (Boc), 115.5, 116.1, 118.8, 119.9, 120.3, 122.1, 122.8, 123.7, 124.9, 125.8 and 127.1 (C-1′, 3′, 4′, 5′, 6′, 2″, 3″, 4″, 5″, 6″ and 7″), 130.1 (C-3a″), 135.1 (C-7a″), 149.1 (Boc), 149.7 (C-2′) and 173.4 (C=O, amide); *m*/*z* (CI^+) 481.2522 ($[M+H]^+$, $C_{27}H_{37}N_2O_4Si$ requires 481.2523), 481 ($[M+H]^+$, 97%), 349 (100), 253 (56), 236 (95) and 134 (46).

4.2.7. *N-(2-Hydroxy-5-nitro)-2-(tert-butyldimethylsilyl)-nonamide (**3g**)*

Prepared according to the method for **3a** on a 4.36 mmol scale, with the second step carried out at reflux. Purification by column chromatography (10→30% ether/petrol) gave amide **3g** (1.40 g, 79%) as a yellow solid. R_f 0.14 (30% ether/petrol); mp 144–145 °C. ν_{max} (NaCl/film)/cm^{-1} 3124 br, 3035 w, 2956 s, 2929 s, 2858 s, 1649 m, 1595 m, 1529 m, 1340 m, 1286 m and 1080 m; δ_H (300 MHz, $CDCl_3$) 0.11 (3H, s, $SiCH_3$), 0.16 (3H, s, $SiCH_3$), 0.85 (3H, t, *J* 7.0, (CH$_2$)$_6$C*H*$_3$), 0.98 (9H, s, SiC(CH$_3$)$_3$), 1.19–1.54 (10H, m, (CH$_2$)$_5$), 1.64 (1H, m, 3-H), 1.98 (1H, m, 3-H), 2.27 (1H, dd, *J* 1.5 and 11.5, 2-H), 7.13 (1H, d, *J* 9.0, 3′-H), 7.99 (1H, dd, *J* 2.5 and 9.0, 4′-H), 8.15 (1H, d, *J* 2.5, 6′-H), 8.69 (1H, br s, NH) and 10.93 (1H, br s, OH); δ_C (75 MHz, $CDCl_3$) −7.0 ($SiCH_3$), −6.6 ($SiCH_3$), 14.1 ((CH$_2$)$_6$CH$_3$), 17.7 (SiC(CH$_3$)$_3$), 22.7 (CH$_2$), 26.8 (SiC(*C*H$_3$)$_3$), 28.5, 29.2, 29.5, 30.6 and 31.8 (5×CH$_2$), 38.4 (C-2), 117.0* (2C, C-3′ and 6′), 121.8 (C-4′), 126.3 (C-1′), 140.5 (C-5′), 153.7 (C-2′) and 177.3 (C=O); *m*/*z* (CI^+) 409.2540 ($[M+H]^+$, $C_{21}H_{37}N_2O_4Si$ requires 409.2523), 426 ($[M+NH_4]^+$, 58%), 409 ($[M+H]^+$, 39) and 379 (100).

4.2.8. *N-(5-Allyloxycarbonylamino-2-hydroxyphenyl)-2-triethylsilylnonamide (**3h**)*

Prepared according to the method for **3a** on a 0.72 mmol scale, with the second step carried out at 50 °C. Purification by column chromatography (30→50% ether/petrol) gave amide **3h** (246 mg, 75%) as a pale yellow oil. R_f 0.33 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3311 m, 2954 s, 2923 s, 2874 m, 2854 m, 1705 s, 1646 m, 1609 w, 1528 s, 1504 s, 1234 s and 1064 w; δ_H (300 MHz, $CDCl_3$) 0.69 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.88 (3H, t, *J* 7.0, (CH$_2$)$_6$C*H*$_3$), 1.00 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 1.20–1.39 (10H, m, (CH$_2$)$_5$), 1.45 (1H, m, 3-H), 1.97 (1H, m, 3-H), 2.05 (1H, d, *J* 12.0, 2-H), 4.67 (2H, d, *J* 5.5, Alloc), 5.29 (1H, dd, *J* 1.0 and 10.5, Alloc), 5.38 (1H, dd, *J* 1.5 and 17.0, Alloc), 5.98 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.60 (1H, br s, NH or 6′-H), 6.85 (1H, dd, *J* 2.0 and 8.5, 4′-H), 6.95 (1H, d, *J* 8.5, 3′-H), 7.37 (2H, br s, 2×NH or NH and 6′-H) and 9.17 (1H, s, OH); δ_C (75 MHz, $CDCl_3$) 2.5 (Si(*C*H$_2$CH$_3$)$_3$), 7.4 (Si(CH$_2$*C*H$_3$)$_3$), 14.1 ((CH$_2$)$_6$*C*H$_3$), 22.7, 27.4, 29.1, 29.5, 30.6 and 31.9 ((CH$_2$)$_6$), 37.9 (C-2), 65.9 (Alloc), 113.8 and 117.7 (C-6′ and C-3′ or 4′), 118.1 (Alloc), 119.3 (C-3′ or 4′), 126.5 and 130.3 (C-1′ and 5′), 132.4 (Alloc), 145.0 (C-2′), 154.0 (Alloc) and 176.4 (C=O, amide); *m*/*z* (CI^+) 463.3003 ($[M+H]^+$, $C_{25}H_{43}N_2O_4Si$ requires 463.2992), 480 ($[M+NH_4]^+$, 100%) and 463 ($[M+H]^+$, 87).

4.2.9. *N-(4-Allyloxycarbonylamino-2-hydroxyphenyl)-2-triethylsilylnonamide (**3i**)*

Prepared according to the method for **3a** on a 0.57 mmol scale, with the second step carried out at 55 °C. Purification by column chromatography (30→50% ether/petrol) gave amide **3i** (206 mg, 78%) as a yellow oil. R_f 0.29 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3308 br, 2953 s, 2925 s, 2875 s, 2855 s, 1708 s, 1644 s, 1611 s,

1514 s, 1458 m, 1428 m, 1363 m, 1299 m, 1227 s, 1063 s and 733 m; δ_H (300 MHz, $CDCl_3$) 0.69 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 0.88 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 1.00 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 1.18–1.37 (10H, m, $(CH_2)_5$), 1.46 (1H, m, 3-H), 1.98 (1H, m, 3-H), 2.07 (1H, d, *J* 11.5, 2-H), 4.67 (2H, d, *J* 5.5, Alloc), 5.28 (1H, dd, *J* 1.0 and 10.5, Alloc), 5.37 (1H, dd, *J* 1.0 and 17.0, Alloc), 5.97 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.74 (1H, br s, NH or Ph*H*), 6.83–6.94 (2H, m, Ph*H*), 7.02 (1H, br s, NH or Ph*H*), 7.39 (1H, br s, NH) and 9.53 (1H, br s, OH); δ_C (75 MHz, $CDCl_3$) 2.5 (Si(CH_2CH_3)$_3$), 7.4 (Si(CH_2CH_3)$_3$), 14.1 ((CH_2)$_6CH_3$), 22.7, 27.4, 29.2, 29.5, 30.7 and 31.9 ((CH_2)$_6$), 37.8 (C-2), 65.9 (Alloc), 109.6 and 111.0 (C-3′ and 5′), 118.2 (Alloc), 122.4 (C-6′), 122.4 (C-1′), 132.3 (Alloc), 135.9 (C-4′), 149.0 (C-2′), 153.6 (Alloc) and 176.0 (C=O, amide); *m*/*z* (CI^+) 463.2984 ($[M+H]^+$, $C_{25}H_{43}N_2O_4Si$ requires 463.2292), 463 ($[M+H]^+$, 100%), 405 (32) and 208 (22).

4.2.10. *N-(5-Allyloxycarbonylamino-2-hydroxyphenyl)-3-phenyl-2-triethylsilylpropanamide (**3j**)*

Prepared according to the method for **3a** on a 0.88 mmol scale, with the second step carried out at reflux. Purification by column chromatography (40→50% ether/petrol) gave amide **3j** (300 mg, 75%) as a yellow oil. R_f 0.26 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3310 br, 3085 w, 3061 w, 3025 w, 2954 s, 2911 m, 2876 m, 1703 s, 1646 m, 1606 m, 1530 s, 1505 s, 1454 m, 1235 s and 1064 m; δ_H (300 MHz, $CDCl_3$) 0.78 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 1.06 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 2.34 (1H, dd, *J* 2.0 and 12.0, 2-H), 2.82 (1H, dd, *J* 2.0 and 14.0, 3-H), 3.30 (1H, dd, *J* 12.0 and 14.0, 3-H), 4.63 (2H, d, *J* 5.5, Alloc), 5.27 (1H, dd, *J* 1.5 and 10.5, Alloc), 5.36 (1H, dd, *J* 1.5 and 17.0, Alloc), 5.95 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.51 (1H, br s, NH or 6′-H), 6.81 (1H, dd, *J* 2.5 and 8.5, 4′-H), 6.89 (1H, d, *J* 8.5, 3′-H), 7.09–7.23 (4H, m, NH, 2×Ph*H* and NH or 6′-H), 7.25–7.32 (3H, m, 3×Ph*H*) and 8.95 (1H, s, OH); δ_C (75 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.4 (Si(CH_2CH_3)$_3$), 33.3 (C-3), 40.4 (C-2), 65.9 (Alloc), 113.4 (C-3′ or 4′ or 6′), 118.2 (Alloc), 119.7 (C-3′ or 4′ or 6′), 128.3 (C-3′ or 4′ or 6′), 126.0 (C-1′ or 5′), 126.4 (4-*Ph*H), 128.1 and 128.7 (4C, *Ph*H), 130.0 (C-1′ or 5′), 132.4 (Alloc), 142.0 (*Ph*C), 145.3 (C-2′), 153.9 (Alloc) and 175.3 (C=O, amide); *m*/*z* (CI^+) 455.2371 ($[M+H]^+$, $C_{25}H_{35}N_2O_4Si$ requires 455.2367), 472 ($[M+NH_4]^+$, 25%) and 455 ($[M+H]^+$, 68).

4.2.11. *N-(4-Allyloxycarbonylamino-2-hydroxyphenyl)-3-phenyl-2-triethylsilylpropanamide (**3k**)*

Prepared according to the method for **3a** on a 0.57 mmol scale, with the second step carried out at reflux. Purification by column chromatography (30→50% ether/petrol) gave amide **3k** (182 mg, 77%) as a yellow oil. R_f 0.27 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3298 br, 3084 w, 3062 w and 3026 w, 2954 m, 2910 m, 2876 m, 1705 s, 1644 m, 1611 m, 1524 s, 1226 s and 1062 m; δ_H (300 MHz, $CDCl_3$) 0.79 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 1.06 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 2.33 (1H, dd, *J* 2.0 and 12.0, 2-H), 2.82 (1H, dd, *J* 2.0 and 14.0, 3-H), 3.29 (1H, dd, *J* 12.0 and 14.0, 3-H), 4.65 (2H, d, *J* 5.5, Alloc), 5.27 (1H, dd, *J* 1.0 and 10.5, Alloc), 5.37 (1H, dd, *J* 1.0 and 17.0, Alloc), 5.97 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.60 (1H, br s, NH or 5′-H), 6.63 (1H, d, *J* 8.5, 6′-H), 6.83 (1H, d, *J* 2.0, 3′-H), 6.94–7.11 (2H, m, 2×NH or NH and 5′-H), 7.17–7.23 (2H, m, 2×*Ph*H), 7.24–7.32 (3H, m, 3×Ph*H*) and 9.37 (1H, br s, OH); δ_C (75 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.5 (Si(CH_2CH_3)$_3$), 33.3 (C-3), 40.1 (C-2), 65.9 (Alloc), 109.4 and 111.1 (C-3′ and 5′), 118.3 (Alloc), 122.0 (C-1′), 122.5 (C-6′), 126.3 (4-*Ph*H), 128.2 and 128.6 (4C, *Ph*H), 132.3 (Alloc), 136.0 (C-4′), 142.2 (*Ph*C), 149.0 (C-2′), 153.6 (Alloc) and 175.1 (C=O, amide); *m*/*z* (CI^+) 455.2372 ($[M+H]^+$, $C_{25}H_{35}N_2O_4Si$ requires 455.2366), 455 ($[M+H]^+$, 100%), 397 (66) and 323 (48).

4.3. Cyclodehydration to α-silylalkylbenzoxazoles

4.3.1. *2-[1-(1-Triethylsilyl)octyl]benzoxazole (**4a**)*

Amide **3a** (42 mg, 0.12 mmol) was dissolved in THF (2 mL). Triethylamine (34 μL, 0.24 mmol), PPh_3 (36 mg, 0.14 mmol) and DEAD (22 μL, 0.14 mmol) were added and the solution heated at 55 °C for 4 h. The reaction mixture was washed with water (2 mL) and extracted with DCM (2×5 mL). The organic layer was dried over $MgSO_4$, filtered and the solvent removed in vacuo. The compound was purified by column chromatography (2% ether/petrol) to give the benzoxazole **4a** (30 mg, 81%) as a colourless oil. ν_{max} (NaCl/film)/cm^{-1} 2954 s, 2876 s, 2555 s, 1610 w, 1556 s, 1456 s, 1243 s and 742 s; δ_H (300 MHz, $CDCl_3$) 0.65 (6H, q, *J* 7.5, Si(CH_2CH_3)$_3$), 0.86 (3H, t, *J* 4.5, $(CH_2)_6CH_3$), 0.95 (9H, t, *J* 7.5, Si(CH_2CH_3)$_3$), 1.12–1.43 (10H, m, $(CH_2)_5$), 1.74 (1H, m, 2-H), 2.14 (1H, m, 2-H), 2.65 (1H, dd, *J* 2.5 and 12.0, 1-H), 7.24–7.30 (2H, m, Benz*H*), 7.46 (1H, dd, *J* 2.0 and 6.5, Benz*H*) and 7.65 (1H, dd, *J* 2.0 and 7.0, Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.3 (Si(CH_2CH_3)$_3$), 14.1 ((CH_2)$_6CH_3$), 22.7 and 28.0 (2×CH_2), 28.7 (C-1), 29.2, 29.3, 30.3 and 31.9 (4×CH_2), 109.9 (C-7′), 118.9 (C-4′), 123.5 and 123.8 (C-5′ and 6′), 142.0 (C-3a′), 150.6 (C-7a′) and 170.5 (C-2′); *m*/*z* (CI^+) 346.2561 ($[M+H]^+$, $C_{21}H_{36}NOSi$ requires 346.2566), 346 ($[M+H]^+$, 100%), 232 (28), 153 (33) and 104 (58).

4.3.2. *2-[1-(2-Phenyl-1-triethylsilyl)ethyl]benzoxazole (**4b**)*

Prepared according to the method for **4a** on a 0.25 mmol scale. Purification by column chromatography (10% DCM/petrol) gave benzoxazole **4b** (57 mg, 67%) as a colourless oil. ν_{max} (NaCl/film)/cm^{-1} 3062w, 2953 m, 2910 m, 2876 m, 1609 w, 1555 s, 1496 w, 1455 s, 1242 s and 1003 m. δ_H (300 MHz, $CDCl_3$) 0.74 (6H, q, *J* 7.5, Si(CH_2CH_3)$_3$), 1.02 (9H, t, *J* 7.5, Si(CH_2CH_3)$_3$), 3.05 (1H, dd, *J* 3.0 and 12.0, 1-H), 3.11 (1H, dd, *J* 3.0 and 14.5, 2-H), 3.51 (1H, dd, *J* 12.0 and 14.5, 2-H), 7.13–7.31 (7H, m, 5×Ph*H* and 2×Benz*H*), 7.44 (1H, dd, *J* 2.0 and 6.5, Benz*H*), 7.64 (1H, dd, *J* 2.5 and 7.0, Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.6 (Si(CH_2CH_3)$_3$), 7.3 (Si(CH_2CH_3)$_3$), 30.8 (C-2), 33.8 (C-1), 109.9 (C-7′), 119.0 (C-4′), 123.5, 123.8 and 126.2 (4-*Ph*H and C-5′ and 6′), 128.1 and 128.4 (4C, *Ph*H), 141.6 and 141.9 (*Ph*C and C-3a′), 150.5 (C-7a′) and 169.4 (C-2′); *m*/*z* (CI^+) 338.1946 ($[M+H]^+$, $C_{21}H_{28}NOSi$ requires 338.1940) and 338 ($[M+H]^+$, 100%).

4.3.3. *2-[(4-Methoxyphenyl)triethylsilylmethyl]benzoxazole (**4c**)*

Prepared according to the method for **4a** on a 0.50 mmol scale. Purification by column chromatography (5% ether/petrol) gave benzoxazole **4c** (60 mg, 34%) as a colourless oil. ν_{max} (NaCl/film)/cm^{-1} 3055 w, 3024 w, 2952 s, 2910 m, 2879 s, 2834 m, 1609 m, 1553 s, 1510 s, 1456 s, 1244 s, 1180 m, 1138 m, 1036 m, 1000 m and 826 m; δ_H (270 MHz, $CDCl_3$) 0.64 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 0.86 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 3.78 (3H, s, OCH_3). 3.97 (1H, s, 1-H), 6.86 (2H, d, *J* 9.0, 3″ and 5″-H), 7.20–7.29 (2H, m, Benz*H*), 7.39 (2H, d, *J* 9.0, 2″ and 6″-H), 7.45 (1H, m, Benz*H*) and 7.65 (1H, m, Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.7 (Si(CH_2CH_3)$_3$), 7.1 (Si(CH_2CH_3)$_3$), 35.8 (C-1), 55.3 (OCH_3), 110.0 (C-7′), 113.9 (2C, C-3″ and 5″), 119.4 (C-4′), 123.9 (C-5′ or 6′), 129.2 (C-1″), 129.4* (3C, C-5′ or 6′, 2″ and 6″), 141.8 (C-3a′), 150.6 (C-7a′), 157.8 (C-4″) and 167.9 (C-2′); *m*/*z* (CI^+) 354.1889 ($[M+H]^+$, $C_{21}H_{28}NO_2Si$ requires 354.1889), 354 ($[M+H]^+$, 100%), 240 (14) and 104 (12).

4.3.4. *2-[(2-Furyl)triethylsilylmethyl]benzoxazole (**4d**)*

Prepared according to the method for **4a** on a 0.36 mmol scale. Purification by column chromatography (5→30% ether/petrol) gave benzoxazole **4d** (47 mg, 42%) as a colourless oil. ν_{max} (NaCl/film)/cm^{-1} 3115 w, 3056 w, 2954 s, 2912 s, 2890 m, 1557 s, 1563 m, 1455 s, 1384 w, 1240 s, 1144 m, 1009 s, 946 m and 810 m; δ_H (300 MHz, $CDCl_3$) 0.73 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 0.93 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$), 4.25 (1H, s, 1-H), 6.34 (1H, d, *J* 3.0, Fur*H*), 6.38 (1H, d, *J* 3.0, Fur*H*), 7.25–7.33 (2H, m, Benz*H*), 7.40 (1H, s, Fur*H*), 7.49 (1H, m, Benz*H*) and 7.70 (1H, m, Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.9 (Si(CH_2CH_3)$_3$), 7.0 (Si(CH_2CH_3)$_3$), 30.2 (C-1), 106.5 (*Fur*H), 110.1 and 110.7 (C-7′ and *Fur*H), 119.5 (C-4′), 124.0* (2C, C-5′ and 6′), 141.1 (*Fur*H), 141.8 (C-3a′), 150.6 and 150.8 (C-7a′ and 2″) and 165.8 (C-2′); *m*/*z* (CI^+) 314.1575 ($[M+H]^+$, $C_{18}H_{24}NO_2Si$

requires 314.1576), 314 ([M+H]$^+$, 100%), 200 (15), 132 (10) and 104 (12).

4.3.5. 2-{[3-(1-tert-Butoxycarbonyl)indolyl]-triethylsilylmethyl}-benzoxazole (**4e**)

Prepared according to the method for **4a** on a 0.088 mmol scale. Purification by column chromatography (5→20% ether/petrol) gave benzoxazole **4e** (19 mg, 47%) as a colourless oil. ν_{max} (NaCl/film)/cm^{-1} 3053 w, 2954 s, 2930 s, 2884 s, 1730 s, 1608 m, 1553 s, 1453 s, 1368 s, 1248 m, 1013 m and 859 w; δ_H (300 MHz, $CDCl_3$) 0.72 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.92 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 1.73 (9H, s, Boc), 4.32 (1H, s, 1-H), 7.26–7.33 (4H, m, 2×Benz*H* and 2×Ind*H*), 7.49 (1H, m, Benz*H*), 7.58 (1H, d, *J* 7.5, Ind*H*), 7.66 (1H, m, Benz*H*), 7.95 (1H, s, Ind*H*) and 8.11 (1H, d, *J* 8.0, Ind*H*); δ_C (75 MHz, $CDCl_3$) 2.9 (Si(*C*H$_2$CH$_3$)$_3$), 7.2 (Si(CH$_2$*C*H$_3$)$_3$), 25.8 (C-1), 28.3 (Boc), 83.7 (Boc), 110.1 (C-7′), 115.3 (C-7″), 115.8 (C-3″), 118.8 (*Ind*H), 119.4 (C-4′), 122.4 (*Ind*H), 123.8, 123.9, 124.0 and 124.4 (C-5′, 6′ and 2×*Ind*H), 130.5 (C-3a″), 134.8 (C-7a″), 141.9 (C-3a′), 150.0 (Boc), 150.7 (C-7a′) and 167.5 (C-2′); *m*/*z* (CI$^+$) 463.2401 ([M+H]$^+$, $C_{27}H_{35}N_2O_3Si$ requires 463.2417), 463 ([M+H]$^+$, 100%), 406 (27), 363 (21) and 349 (15).

4.3.6. 2-{[3-(1-tert-Butoxycarbonyl)indolyl]tert-butyldimethylsilylmethyl}benzoxazole (**4f**)

Prepared according to the method for **4a** on a 0.11 mmol scale. Purification by column chromatography (5→20% ether/petrol) gave benzoxazole **4f** (33 mg, 67%) as a colourless oil. R_f 0.51 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3053 w, 2957 s, 2934 s, 2863 s, 1730 s, 1608 m, 1555 s, 1453 s, 1367 s, 1252 s, 1202 s, 1082 s and 1011 m; δ_H (300 MHz, $CDCl_3$) 0.07 (3H, s, SiCH$_3$), 0.22 (3H, s, SiCH$_3$), 0.88 (9H, s, SiC(CH$_3$)$_3$), 1.72 (9H, s, Boc), 4.37 (1H, s, 1-H), 7.25–7.37 (4H, m, 2×Benz*H* and 2×Ind*H*), 7.52 (1H, m, Benz*H*), 7.63–7.69 (2H, m, Benz*H* and Ind*H*), 7.91 (1H, s, Ind*H*) and 8.10 (1H, d, *J* 8.0, Ind*H*); δ_C (75 MHz, $CDCl_3$) −6.9 (SiCH$_3$), −5.8 (SiCH$_3$), 17.8 (Si*C*(CH$_3$)$_3$), 25.4 (C-1), 26.7 (SiC(*C*H$_3$)$_3$), 28.3 (Boc), 83.8 (Boc), 110.2 (C-7′), 115.3 (C-7″), 116.5 (C-3″), 119.0 (*Ind*H), 119.4 (C-4′), 122.5 (*Ind*H), 123.8, 124.0* and 124.4 (4C, C-5′, 6′ and 2×*Ind*H), 130.4 (C-3a″), 134.8 (C-7a″), 141.7 (C-3a′), 150.0 (Boc), 150.7 (C-7a′) and 167.5 (C-2′); *m*/*z* (CI$^+$) 463.2408 ([M+H]$^+$, $C_{27}H_{35}N_2O_3Si$ requires 463.2417), 463 ([M+H]$^+$, 100%), 406 (18) and 362 (23).

4.3.7. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-nitro-benzoxazole (**4g**)

Prepared according to the method for **4a** on a 3.40 mmol scale. Purification by column chromatography (1→5% ether/petrol) gave benzoxazole **4g** (1.26 g, 95%) as a colourless oil. R_f 0.55 (20% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3109 w, 2929 m, 2956 s, 2858 m, 1416 m, 1552 m, 1531 s, 1460 m, 1346 m, 1257 m, 1147 w and 1108 w; δ_H (300 MHz, $CDCl_3$) −0.10 (3H, s, SiCH$_3$), 0.14 (3H, s, SiCH$_3$), 0.79 (3H, t, *J* 7.0, (CH$_2$)$_6$C*H*$_3$), 0.83 (9H, s, SiC(CH$_3$)$_3$), 1.15–1.31 (10H, m, (CH$_2$)$_5$), 1.75 (1H, m, 2-H), 2.09 (1H, m, 2-H), 2.67 (1H, dd, *J* 2.5 and 12.5, 1-H), 7.53 (1H, d, *J* 9.0, 7′-H), 8.20 (1H, dd, *J* 2.0 and 9.0, 6′-H) and 8.48 (1H, d, *J* 2.0, 4′-H); δ_C (75 MHz, $CDCl_3$) −7.1 (SiCH$_3$), −6.9 (SiCH$_3$), 14.1 ((CH$_2$)$_6$*C*H$_3$), 17.5 (Si*C*(CH$_3$)$_3$), 22.6 (CH$_2$), 26.5 (SiC(*C*H$_3$)$_3$), 28.9, 29.0*, 29.1, 30.3 and 31.7 (6C, 5×CH$_2$ and C-1), 109.9, 115.1 and 119.9 (C-4′, 6′ and 7′), 142.3 and 145.0 (C-3a′ and 5′), 154.1 (C-7a′) and 174.1 (C-2′); *m*/*z* (CI$^+$) 391.2428 ([M+H]$^+$, $C_{21}H_{35}N_2O_3Si$ requires 391.2417) and 391 ([M+H]$^+$, 100%).

4.3.8. 5-Allyloxycarbonylamino-2-[1-(1-triethylsilyl)octyl]-benzoxazole (**4h**)

Prepared according to the method for **4a** on a 0.20 mmol scale. Purification by column chromatography (25→35% ether/petrol) gave benzoxazole **4h** (50 mg, 56%) as a colourless oil. R_f 0.35 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3252 br, 2956 s, 2935 s, 2876 m, 2855 m, 1734 m, 1706 m, 1550 s, 1262 w, 1221 m and 1054 w; δ_H (300 MHz, $CDCl_3$) 0.62 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.85 (3H, t, *J* 7.0, (CH$_2$)$_6$C*H*$_3$), 0.92 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 1.16–1.39 (10H, m, (CH$_2$)$_5$), 1.68 (1H, m, 2-H), 2.11 (1H, m, 2-H), 2.62 (1H, dd, *J* 3.0 and 12.0, 1-H), 4.69 (2H, d, *J* 5.5, Alloc), 5.26 (1H, dd, *J* 1.0 and 10.5, Alloc), 5.36 (1H, dd, *J* 1.5 and 17.0, Alloc), 5.98 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.95 (1H, br s, NH or Benz*H*), 7.31 (1H, br s, NH or Benz*H*), 7.36 (1H, d, *J* 8.5, 7′-H) and 7.64 (1H, s, NH or Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.5 (Si(*C*H$_2$CH$_3$)$_3$), 7.2 (Si(CH$_2$*C*H$_3$)$_3$), 14.1 ((CH$_2$)$_6$*C*H$_3$), 22.6, 27.9, 29.1, 29.2, 30.3 and 31.8 ((CH$_2$)$_6$), 28.8 (C-1), 65.9 (Alloc), 109.7, 110.0 and 115.7 (C-4′, 6′ and 7′), 118.2 (Alloc), 132.5 (Alloc), 134.1 (C-5′), 142.5 (C-3a′), 147.2 (C-7a′), 153.7 (Alloc) and 171.5 (C-2′); *m*/*z* (CI$^+$) 445.2885 ([M+H]$^+$, $C_{25}H_{41}N_2O_3Si$ requires 445.2886), 445 ([M+H]$^+$, 100%) and 387 (28).

4.3.9. 6-Allyloxycarbonylamino-2-[1-(1-triethylsilyl)octyl]-benzoxazole (**4i**)

Prepared according to the method for **4a** on a 0.64 mmol scale, using DIAD in place of DEAD. Purification by column chromatography (25→35% ether/petrol) gave benzoxazole **4i** (133 mg, 70%) as a colourless oil. R_f 0.21 (25% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3318 br, 3075 w, 2953 s, 2926 s, 2875 m, 2855 m, 1735 s, 1710 s, 1617 s, 1546 s, 1496 s, 1431 m, 1220 s and 1051 m; δ_H (270 MHz, $CDCl_3$) 0.59 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.82 (3H, t, *J* 7.0, (CH$_2$)$_6$C*H*$_3$), 0.90 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 1.12–1.39 (10H, m, (CH$_2$)$_5$), 1.65 (1H, m, 2-H), 2.10 (1H, m, 2-H), 2.57 (1H, dd, *J* 3.5 and 12.5, 1-H), 4.66 (2H, d, *J* 5.5, Alloc), 5.24 (1H, dd, *J* 1.5 and 10.5, Alloc), 5.35 (1H, dd, *J* 1.5 and 17.5, Alloc), 5.96 (1H, ddt, *J* 10.5, 17.5 and 5.5, Alloc), 6.90 (1H, br s, NH or 7′-H), 6.98 (1H, dd, *J* 2.0 and 8.5, 5′-H), 7.47 (1H, d, *J* 8.5, 4′-H) and 7.86 (1H, br s, NH or 7′-H); δ_C (67.5 MHz, $CDCl_3$) 2.6 (Si(*C*H$_2$CH$_3$)$_3$), 7.3 (Si(CH$_2$*C*H$_3$)$_3$), 14.1 ((CH$_2$)$_6$*C*H$_3$), 22.6 and 27.9 (2×CH$_2$), 28.7 (C-1), 29.1, 29.3, 30.3 and 31.8 (4×CH$_2$), 65.9 (Alloc), 101.5 and 115.4 (C-7′ and C-4′ or 5′), 118.2 (Alloc), 118.5 (C-4′ or 5′), 132.5 (Alloc), 134.5 and 137.8 (C-3a′, 6′), 151.0 (C-7a′), 153.7 (Alloc) and 170.4 (C-2′); *m*/*z* (CI$^+$) 445.2878 ([M+H]$^+$, $C_{25}H_{41}N_2O_3Si$ requires 445.2886) and 445 ([M+H]$^+$, 100%).

4.3.10. 5-Allyloxycarbonylamino-2-[1-(2-phenyl-1-triethylsilyl)-ethyl]benzoxazole (**4j**)

Prepared according to the method for **4a** on a 0.96 mmol scale. Purification by column chromatography (35→50% ether/petrol) gave benzoxazole **4j** (152 mg, 54%) as a yellow oil. R_f 0.41 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3323 br, 3082 w, 3063 w, 3027 w, 2954 s, 2911 s, 2877 s, 1731 s, 1709 s, 1621 m, 1554 s, 1486 m, 1224 s and 1053 m; δ_H (300 MHz, $CDCl_3$) 0.70 (6H, q, *J* 7.5, Si(C*H*$_2$CH$_3$)$_3$), 0.98 (9H, t, *J* 7.5, Si(CH$_2$C*H*$_3$)$_3$), 2.99 (1H, dd, *J* 3.0 and 12.0, 1-H), 3.06 (1H, dd, *J* 3.0 and 14.5, 2-H), 3.44 (1H, dd, *J* 12.0 and 14.5, 2-H), 4.69 (2H, d, *J* 5.5, Alloc), 5.28 (1H, dd, *J* 1.0 and 10.5, Alloc), 5.38 (1H, dd, *J* 1.0 and 17.0, Alloc), 5.99 (1H, ddt, *J* 10.5, 17.0 and 5.5, Alloc), 6.81 (1H, br s, NH or Benz*H*), 7.08–7.28 (6H, m, Benz*H* and 5×Ph*H*), 7.33 (1H, d, *J* 8.5, 7′-H) and 7.62 (1H, br s, NH or Benz*H*); δ_C (75 MHz, $CDCl_3$) 2.5 (Si(*C*H$_2$CH$_3$)$_3$), 7.3 (Si(CH$_2$*C*H$_3$)$_3$), 30.9 (C-1), 33.7 (C-2), 66.9 (Alloc), 109.8, 110.1 and 115.9 (C-4′, 6′ and 7′), 118.2 (Alloc), 126.2 (4-*Ph*H), 128.1 and 128.5 (4C, *Ph*H), 132.5 (Alloc), 134.2 (C-5′), 141.5 and 142.3 (C-3a′ and *Ph*C), 147.1 (C-7a′), 153.8 (Alloc) and 170.5 (C-2′); *m*/*z* (CI$^+$) 437.2259 ([M+H]$^+$, $C_{25}H_{33}N_2O_3Si$ requires 437.2260), 437 ([M+H]$^+$, 98%) and 379 (100).

4.3.11. 6-Allyloxycarbonylamino-2-[1-(2-phenyl-1-triethylsilyl)-ethyl]benzoxazole (**4k**)

Prepared according to the method for **4a** on a 0.59 mmol scale. Purification by column chromatography (30→50% ether/petrol) gave benzoxazole **4k** (128 mg, 73%) as a colourless oil. R_f 0.42 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3318 br, 3083 w, 3063 w, 3026 w, 2953 s, 2911 m, 2876 m, 1713 s, 1710 s, 1617 s, 1546 s, 1494 s, 1455 m, 1431 m, 1222 s and 1051 s; δ_H (300 MHz, $CDCl_3$) 0.71 (6H, q, *J* 8.0, Si(C*H*$_2$CH$_3$)$_3$), 0.98 (9H, t, *J* 8.0, Si(CH$_2$C*H*$_3$)$_3$), 2.98 (1H, dd, *J* 3.0 and

12.0, 1-H), 3.07 (1H, dd, *J* 3.0 and 14.0, 2-H), 3.43 (1H, dd, *J* 12.0 and 14.0, 2-H), 4.70 (2H, d, *J* 5.5, Alloc), 5.29 (1H, dd, *J* 1.5 and 10.0, Alloc), 5.39 (1H, dd, *J* 1.5 and 17.0, Alloc), 5.99 (1H, ddt, *J* 10.0, 17.0 and 5.5, Alloc), 6.82 (1H, br s, NH or 7′-H), 6.97 (1H, dd, *J* 2.0 and 8.5, 5′-H), 7.08–7.22 (5H, m, 5×Ph*H*), 7.47 (1H, d, *J* 8.5, 4′-H) and 7.87 (1H, br s, NH or 7′-H); δ_C (75 MHz, $CDCl_3$) 2.5 ($Si(CH_2CH_3)_3$), 7.3 ($Si(CH_2CH_3)_3$), 30.8 (C-1), 33.8 (C-2), 65.9 (Alloc), 101.4, 115.4 (C-7′ and C-4′ or 5′), 118.2 (Alloc), 118.6 (C-4′ or 5′), 126.2 (4-*Ph*H), 128.1 and 128.5 (4C, *Ph*H), 132.4 (Alloc), 134.4 (C-6′), 137.7 and 141.5 (C-3a′ and *Ph*C), 150.9 (C-7a′), 153.6 (Alloc) and 169.4 (C-2′); *m*/*z* (CI^+) 437.2266 ($[M+H]^+$, $C_{25}H_{33}N_2O_3Si$ requires 437.2260), 437 ($[M+H]^+$, 100%) and 379 (65).

4.4. Deprotection of allyloxycarbonyl groups

4.4.1. 5-Amino-2-[1-(1-triethylsilyl)octyl]benzoxazole (**5a**)

Protected aminobenzoxazole **4h** (20 mg, 45.0 μmol) was dissolved in THF (1 mL) with *N*,*N*′-dimethylbarbituric acid (70 mg, 0.45 mmol). Tetrakis(triphenylphosphine) palladium (3 mg, 5 mol %) was added to the solution and the mixture stirred at rt for 3.5 h. The solution was diluted with ether (10 mL) and washed with $NaHCO_3$ (satd, aq, 5 mL) and brine (satd, aq, 5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (30→70% ether/petrol) to give the aminobenzoxazole **5a** (14 mg, 86%) as a colourless oil. R_f 0.27 (70% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3339 br, 2953 s, 2925 s, 2874 s, 2854 m, 1624 w, 1551 s, 1487 m, 1450 m, 1184 m, 1009 w and 798 w; δ_H (300 MHz, $CDCl_3$) 0.63 (6H, q, *J* 8.0, $Si(CH_2CH_3)_3$), 0.86 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.93 (9H, t, *J* 8.0, $Si(CH_2CH_3)_3$), 1.17–1.41 (10H, m, $(CH_2)_5$), 1.75 (1H, m, 2-H), 2.12 (1H, m, 2-H), 2.58 (1H, dd, *J* 3.0 and 12.5, 1-H), 3.67 (2H, br s, NH_2), 6.59 (1H, dd, *J* 2.0 and 8.5, 6′-H), 6.94 (1H, d, *J* 2.0, 4′-H) and 7.22 (1H, d, *J* 8.5, 7′-H); δ_C (75 MHz, $CDCl_3$) 2.5 ($Si(CH_2CH_3)_3$), 7.2 ($Si(CH_2CH_3)_3$), 14.1 ($(CH_2)_6CH_3$), 22.6, 27.9 (2×CH_2), 28.7 (C-1), 29.1, 29.2, 30.3 and 31.8 (4×CH_2), 104.7, 109.9 and 111.7 (C-4′, 6′ and 7′), 143.0, 143.2 and 144.5 (C-3a′, 5′ and 7a′) and 170.9 (C-2′); *m*/*z* (CI^+) 361.2666 ($[M+H]^+$, $C_{21}H_{37}N_2OSi$ requires 361.2675) and 361 ($[M+H]^+$, 100%).

4.4.2. 6-Amino-2-[1-(1-triethylsilyl)octyl]benzoxazole (**5b**)

Prepared from **4i** according to the method for **5a** on a 0.30 mmol scale. Purification by column chromatography (40→60% ether/petrol) gave aminobenzoxazole **5b** (88 mg, 83%) as a yellow oil. R_f 0.42 (75% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3463 br w, 3334 br, 3219 br w, 3031 w, 2953 s, 2927 s, 2875 s, 2855 s, 1630 s, 1608 s, 1561 s, 1494 s and 1141 m; δ_H (300 MHz, $CDCl_3$) 0.63 (6H, q, *J* 8.0, $Si(CH_2CH_3)_3$), 0.86 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.93 (9H, t, *J* 8.0, $Si(CH_2CH_3)_3$), 1.14–1.42 (10H, m, $(CH_2)_5$), 1.42 (1H, m, 2-H), 2.09 (1H, m, 2-H), 2.56 (1H, dd, *J* 3.0 and 12.0, 1-H), 3.73 (2H, br s, NH_2), 6.64 (1H, dd, *J* 2.0 and 8.5, 5′-H), 6.79 (1H, d, *J* 2.0, 7′-H) and 7.39 (1H, d, *J* 8.5, 4′-H); δ_C (75 MHz, $CDCl_3$) 2.5 ($Si(CH_2CH_3)_3$), 7.3 ($Si(CH_2CH_3)_3$), 14.1 ($(CH_2)_6CH_3$), 22.6 and 28.0 (2×CH_2), 28.3 (C-1), 29.1, 29.3, 30.2 and 31.8 (4×CH_2), 96.6, 112.0 and 118.9 (C-4′, 5′ and 7′), 134.4 (C-6′), 143.6 (C-3a′), 151.7 (C-7a′) and 168.2 (C-2′); *m*/*z* (CI^+) 361.2666 ($[M+H]^+$, $C_{21}H_{37}N_2OSi$ requires 361.2675) and 361 ($[M+H]^+$, 100%).

4.4.3. 5-Amino-2-[1-(2-phenyl-1-triethylsilyl)ethyl]benzoxazole (**5c**)

Prepared from **4j** according to the method for **5a** on a 0.24 mmol scale. Purification by column chromatography (50→80% ether/petrol) gave aminobenzoxazole **5c** (58 mg, 70%) as a yellow oil. R_f 0.20 (75% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3349 br w, 3040 br, 3222 w, 3083 w, 3061 w and 3026 w, 2953 s, 2909 m, 2875 s, 1624 m, 1551 s, 1488 s, 1451 s, 1188 s and 1006 m; δ_H (300 MHz, $CDCl_3$) 0.69 (6H, q, *J* 8.0, $Si(CH_2CH_3)_3$), 0.98 (9H, t, *J* 8.0, $Si(CH_2CH_3)_3$), 2.95 (1H, dd, *J* 3.0 and 12.0, 1-H), 3.05 (1H, dd, *J* 3.0 and 14.5, 2-H), 3.44 (1H, dd, *J* 12.0 and 14.5, 2-H), 3.64 (2H, br s, NH_2), 6.58 (1H, dd, *J* 2.5 and 8.5, 6′-H), 6.91 (1H, d, *J* 2.5, 4′-H) and 7.08–7.22 (6H, m, 5×Ph*H* and 7′-H); δ_C (75 MHz, $CDCl_3$) 2.6 ($Si(CH_2CH_3)_3$), 7.3 ($Si(CH_2CH_3)_3$), 30.8 (C-1), 33.8 (C-2), 104.7, 109.9 and 111.8 (C-4′, 6′ and 7′), 126.5 (4-*Ph*H), 128.1 and 128.4 (4C, *Ph*H), 141.7, 142.9, 143.2 and 144.5 (*Ph*C, C-3a′, 5′ and 7a′) and 169.9 (C-2′); *m*/*z* (CI^+) 353.2047 ($[M+H]^+$, $C_{21}H_{29}N_2OSi$ requires 353.2049) and 353 ($[M+H]^+$, 100%).

4.4.4. 6-Amino-2-[1-(2-phenyl-1-triethylsilyl)ethyl]benzoxazole (**5d**)

Prepared from **4k** according to the method for **5a** on a 0.25 mmol scale. Purification by column chromatography (50→80% ether/petrol) gave aminobenzoxazole **5d** (64 mg, 72%) as a beige coloured solid. R_f 0.32 (75% ether/petrol); mp 102–103 °C. ν_{max} (NaCl/film)/cm^{-1} 3320 br, 3214 br, 3082 w, 3061 w, 3023 w, 2953 s, 2910 m, 2876 s, 1623 s, 1608 s, 1560 m, 1491 s, 1450 s and 1138 s; δ_H (300 MHz, $CDCl_3$) 0.71 (6H, q, *J* 8.0, $Si(CH_2CH_3)_3$), 0.98 (9H, t, *J* 8.0, $Si(CH_2CH_3)_3$), 2.92 (1H, dd, *J* 3.0 and 12.0, 1-H), 3.04 (1H, dd, *J* 3.0 and 14.5, 2-H), 3.42 (1H, dd, *J* 12.0 and 14.5, 2-H), 3.71 (2H, br s, NH_2), 6.61 (1H, dd, *J* 2.0 and 8.5, 5′-H), 6.75 (1H, d, *J* 2.0, 7′-H), 7.08–7.21 (5H, m, 5×Ph*H*) and 7.36 (1H, d, *J* 8.5, 4′-H); δ_C (75 MHz, $CDCl_3$) 2.6 ($Si(CH_2CH_3)_3$), 7.3 ($Si(CH_2CH_3)_3$), 30.5 (C-1), 33.9 (C-2), 96.6, 112.1 and 119.1 (C-4′, 5′ and 7′), 126.1 (4-*Ph*H), 128.2 and 128.4 (4C, *Ph*H), 134.4, 141.7 and 143.2 (*Ph*C, C-3a′ and 6′), 151.7 (C-7a′) and 167.2 (C-2′); *m*/*z* (CI^+) 353.2041 ($[M+H]^+$, $C_{21}H_{29}N_2OSi$ requires 353.2049) and 353 ($[M+H]^+$, 100%).

4.4.5. 5-Amino-2-[1-(1-tert-butyldimethylsilyl)octyl]benzoxazole (**5e**)

Nitrobenzoxazole **4g** (63 mg, 0.16 mmol) was dissolved in ethanol (2 mL). Copper acetylacetonate (8 mg, 20 mol %) and sodium borohydride (61 mg, 1.62 mmol) were added and the solution was stirred for 4 h. The solution was washed with water (2 mL) and the solvent removed in vacuo. The crude compound was purified by column chromatography (50→70% ether/petrol) to give the aminobenzoxazole **5e** (37 mg, 64%) as a colourless oil. R_f 0.11 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3352 w, 3340 m, 3224 w, 3031 w, 2956 s, 2929 s, 2858 s, 1625 m, 1552 m, 1488 m, 1452 m, 1361 w, 1268 m and 1184 m; δ_H (300 MHz, $CDCl_3$) −0.08 (3H, s, $SiCH_3$), 0.13 (3H, s, $SiCH_3$), 0.78–0.90 (12H, m, $SiC(CH_3)_3$ and $(CH_2)_6CH_3$), 1.15–1.33 (10H, m, $(CH_2)_5$), 1.70 (1H, m, 2-H), 2.05 (1H, m, 2-H), 2.58 (1H, dd, *J* 3.0 and 12.5, 1-H), 3.63 (2H, br s, NH_2), 6.59 (1H, dd, *J* 2.0 and 8.5, 6′-H), 6.93 (1H, d, *J* 2.0, 4′-H) and 7.21 (1H, d, *J* 8.5, 7′-H); δ_C (75 MHz, $CDCl_3$) −7.1 ($SiCH_3$), −6.8 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 17.5 ($SiC(CH_3)_3$), 22.6 (CH_2), 26.7 ($SiC(CH_3)_3$), 28.6, 29.0, 29.1, 29.2, 30.2 and 31.8 (5×CH_2 and C-1), 104.6, 110.0 and 111.8 (C-4′, 6′ and 7′), 142.9, 143.3 and 144.4 (C-3a′, 5′ and 7a′) and 170.9 (C-2′); *m*/*z* (CI^+) 361.2681 ($[M+H]^+$, $C_{21}H_{37}N_2OSi$ requires 361.2675) and 361 ($[M+H]^+$, 100%).

4.5. Electrophilic trapping of (α-silylalkyl)aminobenzoxazoles

4.5.1. 5-Methylsulfonylamino-2-[1-(1-tert-butyldimethylsilyl)octyl]benzoxazole (**6**)

Aminobenzoxazole **5e** (84 mg, 0.23 mmol) was dissolved in DCM (2 mL) with pyridine (21 μl, 0.26 mmol). The mixture was cooled to 0 °C and mesyl chloride (20 μl, 0.26 mmol) was added over 5 min. The solution was allowed to warm to rt and stirred for 6 h, after which it was quenched with water (5 mL) and extracted with DCM (3×4 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (50→80% ether/petrol) to give the sulfonamide **6** (70 mg, 68%) as a colourless oil. R_f 0.24 (75% ether/petrol). Found: C, 60.35; H, 8.95; N, 6.2. $C_{22}H_{38}N_2O_3SSi$ requires C, 60.25; H, 8.75; N, 6.4%. ν_{max} (NaCl/film)/cm^{-1} 3262 br, 2954 s, 2928 s, 2856 s, 1617 w, 1551 s, 1465 s, 1403 m, 1336 s, 1252 s, 1147 s, 974 m, 824 m, 761 m

and 669 w; δ_H (300 MHz, $CDCl_3$) −0.09 (3H, s, $SiCH_3$), 0.14 (3H, s, $SiCH_3$), 0.84 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.85 (9H, s, $SiC(CH_3)_3$), 1.10–1.34 (10H, m, $(CH_2)_5$), 1.73 (1H, m, 2-H), 2.07 (1H, m, 2-H), 2.63 (1H, dd, *J* 2.5 and 12.5, 1-H), 3.05 (3H, s, SO_2CH_3), 7.21 (1H, dd, *J* 2.0 and 8.5, 6′-H), 7.42 (1H, s, NH), 7.43 (1H, d, *J* 8.5, 7′-H) and 7.58 (1H, d, *J* 2.0, 4′-H); δ_C (75 MHz, $CDCl_3$) −7.0 ($SiCH_3$), −6.9 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 17.5 ($SiC(CH_3)_3$), 22.6 (CH_2), 26.6 ($SiC(CH_3)_3$), 28.8, 29.0, 29.1, 29.2, 30.3 and 31.8 (5×CH_2 and C-1), 39.2 (SO_2CH_3), 110.5, 113.1 and 119.0 (C-4′, 6′ and 7′), 132.7, 142.7 and 148.6 (C-3a′, 5′ and 7a′) and 172.3 (C-2′); *m*/*z* (CI^+) 439.2456 ($[M+H]^+$, $C_{22}H_{39}N_2O_3SSi$ requires 439.2451) and 439 ($[M+H]^+$, 100%).

4.5.2. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-dimethylaminocarbonylaminobenzoxazole (**7**)

Aminobenzoxazole **5e** (82 mg, 0.23 mmol) was dissolved in DCM (2 mL) with Et_3N (63 μl, 0.46 mmol). Dimethyl carbamoyl chloride (31 μl, 0.34 mmol) was added and the solution stirred for 16 h, washed with water (5 mL), extracted with DCM (3×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (100% ether) to give the urea **7** (78 mg, 79%) as a colourless oil. R_f 0.20 (100% ether). Found: C, 66.65; H, 9.7; N, 9.55. $C_{24}H_{41}N_3O_2Si$ requires C, 66.75; H, 9.6; N, 9.75%. ν_{max} (NaCl/film)/cm^{-1} 3322 s, 2952 s, 2933 s, 2858 s, 1646 s, 1619 m, 1544 s, 1479 s, 1427 m, 1367 m, 1255 m, 1199 m and 1112 m; δ_H (300 MHz, $CDCl_3$) −0.12 (3H, s, $SiCH_3$), 0.10 (3H, s, $SiCH_3$), 0.81 (3H, t, *J* 6.5, $(CH_2)_6CH_3$), 0.82 (9H, s, $SiC(CH_3)_3$), 1.10–1.32 (10H, m, $(CH_2)_5$), 1.69 (1H, m, 2-H), 2.03 (1H, m, 2-H), 2.58 (1H, dd, *J* 2.5 and 12.5, 1-H), 2.95 (6H, $N(CH_3)_2$), 6.78 (1H, s, NH or Benz*H*), 7.27 (2H, s, NH and Benz*H* or 2×Benz*H*) and 7.52 (1H, s, NH or Benz*H*); δ_C (75 MHz, $CDCl_3$) −7.1 ($SiCH_3$), −6.8 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 17.4 ($SiC(CH_3)_3$), 22.6 (CH_2), 26.6 ($SiC(CH_3)_3$), 28.6, 28.9, 29.1, 29.2, 30.2 and 31.8 (5×CH_2 and C-1), 36.5 ($N(CH_3)_2$), 109.5, 111.7 and 118.1 (C-4′, 6′ and 7′), 135.6, 142.0 and 146.9 (C-3a′, 5′ and 7a′), 156.4 (C=O) and 171.0 (C-2′); *m*/*z* (CI^+) 432.3052 ($[M+H]^+$, $C_{24}H_{42}N_3O_2Si$ requires 432.3046), 432 ($[M+H]^+$, 100%), 387 (84) and 336 (87).

4.5.3. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-ethylaminocarbonylaminobenzoxazole (**8**)

To a solution of aminobenzoxazole **5e** (27 mg, 75 μmol) in DCM (1 mL) was added ethyl isocyanate (12 μl, 150 μmol). The solution was stirred for 10 h, after which it was washed with water (3 mL), extracted with DCM (3×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (80% ether/petrol) to give the urea **8** (23 mg, 71%) as a colourless oil. R_f 0.12 (75% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3332 br, 2954 s, 2929 s, 2858 s, 1648 s, 1619 m, 1554 s, 1481 s, 1429 w, 1261 m and 1189 m; δ_H (300 MHz, $CDCl_3$) −0.09 (3H, s, $SiCH_3$), 0.14 (3H, s, $SiCH_3$), 0.84 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.85 (9H, s, $SiC(CH_3)_3$), 1.07 (3H, t, *J* 7.0, $CONHCH_2CH_3$), 1.15–1.35 (10H, m, $(CH_2)_5$), 1.72 (1H, m, 2-H), 2.06 (1H, m, 2-H), 2.61 (1H, dd, *J* 2.5 and 12.5, 1-H), 3.25 (2H, dq, *J* 6.0 and 7.0, $CONHCH_2CH_3$), 5.29 (1H, br t, *J* 6.0, $CONHCH_2CH_3$), 7.23 (1H, dd, *J* 2.0 and 8.5, 6′-H), 7.26 (1H, br s, BenzN*H*CO), 7.34 (1H, d, *J* 8.5, 7′-H) and 7.53 (1H, d, *J* 2.0, 4′-H); δ_C (75 MHz, $CDCl_3$) −7.0 ($SiCH_3$), −6.8 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 15.4 ($CONHCH_2CH_3$), 17.5 ($SiC(CH_3)_3$), 22.6 (CH_2), 26.6 ($SiC(CH_3)_3$), 28.7 (C-1), 29.0, 29.1, 29.2, 30.3 and 31.8 (5×CH_2), 35.1 ($CONHCH_2CH_3$), 110.0, 112.2 and 118.5 (C-4′, 6′ and 7′), 135.0, 142.4 and 147.3 (C-3a′, 5′ and 7a′), 156.7 (C=O) and 171.6 (C-2′); *m*/*z* (CI^+) 432.3050 ($[M+H]^+$, $C_{24}H_{42}N_3O_2Si$ requires 432.3046) and 432 ($[M+H]^+$, 100%).

4.5.4. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-ethylaminothiocarbonylaminobenzoxazole (**9**)

Ethyl isothiocyanate (10 μl, 0.11 mmol) was added to a solution of aminobenzoxazole **5e** (37 mg, 100 μl) in DCM (1 mL). The solution was stirred for 3 days, then washed with water (5 mL), extracted with DCM (3×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (40→50% ether/petrol) to give the thiourea **9** (29 mg, 65%) as a colourless oil. R_f 0.41 (75% ether/petrol). Found: C, 64.6; H, 9.25; N, 9.25. $C_{24}H_{41}N_3OSSi$ requires C, 64.4; H, 9.25; N, 9.4%. ν_{max} (NaCl/film)/cm^{-1} 2954 m, 2927 s, 2856 m, 1546 s, 1473 s, 1336 m, 1251 s and 1232 m; δ_H (300 MHz, $CDCl_3$) −0.07 (3H, s, $SiCH_3$), 0.16 (3H, s, $SiCH_3$), 0.85 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.88 (9H, s, $SiC(CH_3)_3$), 1.17–1.35 (10H, m, $(CH_2)_5$), 1.20 (3H, t, *J* 7.5, $CSNHCH_2CH_3$), 1.73 (1H, m, 2-H), 2.09 (1H, m, 2-H), 2.66 (1H, dd, *J* 3.0 and 12.5, 1-H), 3.69 (2H, dq, *J* 5.5 and 7.5, $CSNHCH_2CH_3$), 5.98 (1H, br t, *J* 5.5, $CSNHCH_2CH_3$), 7.11 (1H, dd, *J* 2.0 and 8.5, 6′-H), 7.47–7.54 (2H, m, 4′ and 7′-H) and 7.81 (1H, s, BenzN*H*CS); δ_C (75 MHz, $CDCl_3$) −7.0 ($SiCH_3$), −6.9 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 14.4 ($CSNHCH_2CH_3$), 17.5 ($SiC(CH_3)_3$), 22.6 (CH_2), 26.7 ($SiC(CH_3)_3$), 28.9, 29.0, 29.1, 29.2, 30.3 and 31.8 (5×CH_2 and C-1), 40.5 ($CSNHCH_2CH_3$), 111.2, 116.6 and 121.8 (C-4′, 6′ and 7′), 131.9, 143.2 and 149.4 (C-3a′, 5′ and 7a′), 172.8 (C-2′) and 180.9 (C=S); *m*/*z* (CI^+) 448.2813 ($[M+H]^+$, $C_{24}H_{42}N_3OSSi$ requires 448.2818) and 448 ($[M+H]^+$, 39%).

4.5.5. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-(2-methylpropyloxycarbonylamino)benzoxazole (**10**)

To a solution of aminobenzoxazole **5e** (38 mg, 106 μmol) and Et_3N (29 μl, 0.21 mmol) in DCM (1 mL) was added isobutyl chloroformate (27 μl, 0.21 mmol). The solution was stirred for 40 min after which it was washed with water (3 mL), extracted with DCM (3×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (20% ether/petrol) to give the carbamate **10** (36 mg, 74%) as a colourless oil. R_f 0.30 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3316 br, 3075 w, 2956 s, 2929 s, 2858 s, 1731 s, 1708 s, 1623 m, 1554 s, 1471 s, 1429 m, 1346 m, 1224 s, 1056 s and 825 s; δ_H (300 MHz, $CDCl_3$) −0.08 (3H, s, $SiCH_3$), 0.14 (3H, s, $SiCH_3$), 0.84 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 0.85 (9H, s, $SiC(CH_3)_3$), 0.97 (6H, d, *J* 7.0, $CH(CH_3)_2$), 1.15–1.36 (10H, m, $(CH_2)_5$), 1.72 (1H, m, 2-H), 1.98 (1H, m, 2″-H), 2.07 (1H, m, 2-H), 2.62 (1H, dd, *J* 2.5 and 12.5, 1-H), 3.97 (2H, d, *J* 6.5, 1″-H), 6.85 (1H, s, NH), 7.28–7.37 (2H, m, 6′ and 7′-H) and 7.64 (1H, s, 4′-H); δ_C (75 MHz, $CDCl_3$) −7.1 ($SiCH_3$), −6.8 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 17.5 ($SiC(CH_3)_3$), 19.1 ($CH(CH_3)_2$), 22.6 (CH_2), 26.6 ($SiC(CH_3)_3$), 28.0 and 28.7 (C-1 and C-2″), 29.0, 29.1, 29.2, 30.2, 31.8 (5×CH_2), 71.4 (C-1″), 109.8* and 115.8 (3C, C-4′, 6′ and 7′), 134.4, 142.3 and 147.0 (C-3a′, 5′ and 7a′), 154.2 (C=O) and 171.5 (C-2′); *m*/*z* (CI^+) 461.3201 ($[M+H]^+$, $C_{26}H_{45}N_2O_3Si$ requires 461.3199) and 461 ($[M+H]^+$, 100%).

4.5.6. 2-[1-(1-tert-Butyldimethylsilyl)octyl]-5-(1,1-dimethylethylcarbonylamino)benzoxazole (**11**)

Trimethylacetyl chloride (33 μl, 0.27 mmol) was added to a solution of aminobenzoxazole **5e** (48 mg, 133 μmol) and Et_3N (37 μl, 0.27 mmol) in DCM (1 mL). The solution was stirred for 1 h and washed with $NaHCO_3$ (satd, aq, 4 mL), extracted with DCM (3×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (30→40% ether/petrol) to give the amide **11** (35 mg, 60%) as a colourless oil. R_f 0.28 (40% ether/petrol). Found: C, 70.3; H, 9.85; N, 6.15. $C_{26}H_{44}N_2O_2Si$ requires C, 70.2; H, 9.95; N, 6.3%. ν_{max} (NaCl/film)/cm^{-1} 3334 br, 3070 w, 2952 s, 2929 s, 2858 s, 1656 s, 1619 m, 1544 s, 1477 s, 1363 m, 1253 s, 1191 s, 919 s and 823 s; δ_H (300 MHz, $CDCl_3$) −0.08 (3H, s, $SiCH_3$), 0.13 (3H, s, $SiCH_3$), 0.83 (3H, t, *J* 6.5, $(CH_2)_6CH_3$), 0.84 (9H, s, $SiC(CH_3)_3$), 1.17–1.30 (10H, m, $(CH_2)_5$), 1.33 (9H, s, $COC(CH_3)_3$), 1.72 (1H, m 2-H), 2.06 (1H, m, 2-H), 2.62 (1H, dd, *J* 2.0 and 12.5, 1-H), 7.36 (1H, d, *J* 8.5, 7′-H), 7.43 (1H, dd, *J* 2.0 and 8.5, 6′-H), 7.46 (1H, s, NH) and 7.72 (1H, d, *J* 2.0, 4′-H); δ_C (75 MHz, $CDCl_3$) −7.1 ($SiCH_3$), −6.8 ($SiCH_3$), 14.1 ($(CH_2)_6CH_3$), 17.5 ($SiC(CH_3)_3$),

23.0 (CH_2), 26.6 (SiC(CH_3)$_3$), 27.7 (COC(CH_3)$_3$), 28.7 (C-1), 28.9, 29.1, 29.2, 30.2, 31.8 (5×CH_2), 39.5 (COC(CH_3)$_3$), 109.7, 111.4 and 117.2 (C-4′, 6′ and 7′), 134.2, 142.2 and 147.4 (C-3a′, 5′ and 7a′), 171.4 (C-2) and 176.7 (C=O); *m*/*z* (CI$^+$) 445.3250 ([M+H]$^+$, $C_{26}H_{45}N_2O_2Si$ requires 445.3250) and 445 ([M+H]$^+$, 100%).

4.6. Desilylation of α-silylalkylbenzoxazoles

4.6.1. 2-(1-Octyl)benzoxazole (*12*)

Benzoxazole **4a** (31 mg, 89.9 μmol) was dissolved in DCM (1 mL), TFA (35 μl, 0.45 mmol) was added and the solution stirred for 18 h. The solvent was removed in vacuo and the crude compound purified by column chromatography (5→10% ether/petrol) to give the benzoxazole **12** (14 mg, 67%) as a colourless oil. R_f 0.45 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3058 w, 2955 s, 2934 s, 2855 s, 1717 w, 1615 m, 1573 m, 1455 m, 1242 m, 1147 w and 758 m; δ_H (300 MHz, $CDCl_3$) 0.89 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 1.21–1.50 (10H, m, $(CH_2)_5$), 1.90 (2H, pentet, *J* 7.5, 2-H), 2.94 (2H, t, *J* 7.5, 1-H), 7.26–7.35 (2H, m, Benz*H*), 7.50 (1H, m, Benz*H*) and 7.70 (1H, m, Benz*H*); δ_C (75 MHz, $CDCl_3$) 14.1 ($(CH_2)_6CH_3$), 22.7, 26.8, 28.7, 29.1, 29.2* and 31.8 (7C, $(CH_2)_7$), 110.3 (C-7′), 119.5 (C-4′), 124.1 and 124.4 (C-5′ and 6′), 141.4 (C-3a′), 150.8 (C-7a′) and 167.4 (C-2′); *m*/*z* (CI$^+$) 232.1706 ([M+H]$^+$, $C_{15}H_{22}NO$ requires 232.1701), 232 ([M+H]$^+$, 100%), 189 (21), 175 (42) and 133 (16).

4.6.2. 2-(3-Indolylmethyl)benzoxazole (*13*)

Benzoxazole **4f** (62 mg, 0.13 mmol) was dissolved in DCM (2 mL), TFA (66 μl, 0.86 mmol) was added and the solution heated at reflux for 10 h. The solvent was removed in vacuo and the crude material purified by column chromatography (20→80% ether/petrol) to give the desilylated and Boc deprotected benzoxazole **13** (19 mg, 57%). R_f 0.08 (40% ether/petrol); mp 132–133 °C. ν_{max} (NaCl/film)/cm^{-1} 3425 br; δ_H (300 MHz, $CDCl_3$) 4.46 (2H, s, 1-H), 7.14–7.38 (6H, m, 2×Benz*H* and 4×Ind*H*), 7.49 (1H, m, Benz*H*), 7.65–7.76 (2H, m, Benz*H* and Ind*H*) and 8.41 (1H, br s, NH); δ_C (75 MHz, $CDCl_3$) 25.5 (C-1), 109.1 (C-3″), 110.5 (C-7′), 111.4 (C-7″), 118.9, 119.7, 119.8, 122.4, 123.2, 124.2 and 124.6 (C-4′, 5′, 6′, 2″, 4″, 5″ and 6″), 127.0 (C-3a″), 136.3 (C-7a″), 141.4 (C-3a′), 151.0 (C-7a′) and 165.9 (C-2′); *m*/*z* (CI$^+$) 249.1022 ([M+H]$^+$, $C_{16}H_{13}N_2O$ requires 249.1028) and 249 ([M+H]$^+$, 100%).

4.6.3. 6-Amino-2-(1-octyl)benzoxazole (*14*)

Aminobenzoxazole **5b** (80 mg, 0.22 mmol) was dissolved in DCM (2.5 mL) with TFA (86 μl, 1.11 mmol) and stirred at rt for 2 h. The solvent was removed in vacuo and the crude compound purified by column chromatography (80→100% ether/petrol) to give the benzoxazole **5b** (43 mg, 79%) as a pale yellow oil. R_f 0.44 (100% ether). ν_{max} (NaCl/film)/cm^{-1} 3362 br, 3322 br, 3219 br, 2974 s, 2956 s, 2927 s, 2854 s, 1632 s, 1612 s, 1570 m, 1492 s, 1450 m, 1381 m, 1139 s and 1121 s; δ_H (300 MHz, $CDCl_3$) 0.89 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 1.18–1.48 (10H, m, $(CH_2)_5$), 1.85 (2H, pentet, *J* 7.5, 2-H), 2.86 (2H, t, *J* 7.5, 1-H), 3.78 (2H, br s, NH_2), 6.65 (1H, dd, *J* 2.0 and 8.5, 5′-H), 6.79 (1H, d, *J* 2.0, 7′-H) and 7.42 (1H, d, *J* 8.5, 4′-H); δ_C (75 MHz, $CDCl_3$) 14.1 ($(CH_2)_7CH_3$), 22.7, 26.8, 28.6, 29.1, 29.2* and 31.8 (7C, $(CH_2)_7$), 96.5, 112.5 and 119.6 (C-4′, 5′ and 7′), 133.9 (C-6′), 144.3 (C-3a′), 152.0 (C-7a′) and 165.3 (C-2′); *m*/*z* (CI$^+$) 247.1809 ([M+H]$^+$, $C_{15}H_{23}N_2O$ requires 247.1810) and 247 ([M+H]$^+$, 100%).

4.7. Synthesis of silylketenes and nucleophilic trapping with aminomalonates

4.7.1. N-(2-Diethylmalonyl)-2-triethylsilylnonamide (*15a*)

Silyl diazoketone **2a** (138 mg, 0.49 mmol) was dissolved in benzene (5 mL) with $Rh_2(oct)_4$ (4 mg, 1 mol%) and stirred for 30 min. The solvent was removed in vacuo and the silylketene redissolved in DCM (5 mL) with Et_3N (75 μl, 0.54 mmol). To this solution diethyl aminomalonate hydrochloride (114 mg, 0.54 mmol) was added in one portion and it was stirred for 2 h. The solution was diluted with ether (10 mL), washed with NH_4Cl (satd, aq, 10 mL) and brine (satd, aq, 10 mL), dried over $MgSO_4$, filtered and the solvent was removed in vacuo. The crude material was purified by column chromatography (15→50% ether/petrol) to give the amide **15a** (179 mg, 85%) as a colourless oil. R_f 0.34 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3316 w, 2954 s, 2929 s, 2875 m, 2856 m, 1758 s, 1743 s, 1666 s, 1504 m, 1465 m, 1371 m, 1201 s, 1180 s and 1022 m; δ_H (300 MHz, $CDCl_3$) 0.57 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 0.79 (3H, t, *J* 5.5, $(CH_2)_6CH_3$), 0.89 (9H, t, *J* 8.0, Si(CH_2CH_3)$_3$) 1.10–1.25 (10H, m, $(CH_2)_5$), 1.22 (6H, t, *J* 7.0, 2×$CO_2CH_2CH_3$), 1.30–1.40 (2H, m, 3-H), 1.83 (1H, m, 2-H), 4.10–4.27 (4H, m, 2×$CO_2CH_2CH_3$), 5.09 (1H, d, *J* 6.5, 2′-H) and 6.24 (1H, d, *J* 6.5, NH); δ_C (75 MHz, $CDCl_3$) 2.3 (Si(CH_2CH_3)$_3$), 7.3 (Si(CH_2CH_3)$_3$), 13.9 and 14.0 (3C, $(CH_2)_6CH_3$ and 2×$CO_2CH_2CH_3$), 22.6, 27.2, 29.1, 29.4, 30.4 and 31.8 ($(CH_2)_6$), 36.4 (C-2), 56.4 (C-1′), 62.3 (2×$CO_2CH_2CH_3$), 166.6 and 166.7 (C=O, esters) and 174.5 (C=O, amide); *m*/*z* (CI$^+$) 430.2976 ([M+H]$^+$, $C_{22}H_{44}NO_5Si$ requires 430.2989), 430 ([M+H]$^+$, 95%), 255 (33), 135 (37) and 102 (100).

4.7.2. N-(2-Diethylmalonyl)-2-[3-(1-tert-butoxycarbonyl)indolyl]-2-(tert-butyldimethylsilyl)ethanamide (*15b*)

Silyl diazoketone **2f** (145 mg, 0.36 mmol) was reacted with $Rh_2(oct)_4$ (3 mg, 1 mol%) in benzene (4 mL) for 10 min at 40 °C. The solvent was removed in vacuo and the silylketene redissolved in DCM (4 mL) with Et_3N (56 μl, 0.40 mmol) and cooled to −40 °C. To this solution diethyl aminomalonate hydrochloride (85 mg, 0.40 mmol) was added and it was warmed to rt over 15 min. The solution was washed with water (10 mL), extracted with DCM (3×10 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude material was purified by column chromatography (30→50% ether/petrol) to give the amide **15b** (122 mg, 61%) as a white foam. R_f 0.38 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 3293 br, 3069 w, 3006 m, 2944 m, 2911 m, 2858 s, 1758 s, 1733 s, 1677 s, 1465 m, 1368 s, 1255 m, 1158 s, 1074 m and 1020 m; δ_H (300 MHz, $CDCl_3$) 0.07 (3H, s, $SiCH_3$), 0.24 (3H, s, $SiCH_3$), 0.88 (9H, s, SiC(CH_3)$_3$), 1.24 (3H, t, *J* 7.0, $CO_2CH_2CH_3$), 1.26 (3H, t, *J* 7.0, $CO_2CH_2CH_3$), 1.68, (9H, s, Boc), 3.62 (1H, s, 2-H), 4.14–4.33 (4H, m, 2×$CO_2CH_2CH_3$), 5.13 (1H, d, *J* 6.5, 2′-H), 6.66 (1H, d, *J* 6.5, NH), 7.23–7.36 (2H, m, Ind*H*), 7.53 (1H, d, *J* 7.0, Ind*H*), 7.69 (1H, s, Ind*H*) and 8.15 (1H, d, *J* 7.0, Ind*H*); δ_C (75 MHz, $CDCl_3$) −6.2 ($SiCH_3$), −6.0 ($SiCH_3$), 14.0 (2×$CO_2CH_2CH_3$), 17.9 (SiC(CH_3)$_3$), 27.0 (SiC(CH_3)$_3$), 28.2 (Boc), 33.5 (C-2), 56.7 (C-2′), 62.6 (2×$CO_2CH_2CH_3$), 83.6 (Boc), 115.3 (C-7″), 116.2 (C-3″), 118.9, 122.4, 123.4 and 124.5 (C-2″, 4″, 5″ and 6″), 130.3 (C-3a″), 135.0 (C-7a″), 149.7 (Boc), 166.4 and 166.5 (C=O, esters) and 172.0 (C=O, amide); *m*/*z* (CI$^+$) 547.2845 ([M+H]$^+$, $C_{28}H_{43}N_2O_7Si$ requires 547.2840), 547 ([M+H]$^+$, 100%) and 490 (36).

4.8. Formation of α-silylalkyloxazoles

4.8.1. 5-Ethoxy-4-ethoxycarbonyl-2-[1-(1-triethylsilyl)-octyl]oxazole (*16a*)

A solution of triphenylphosphine–iodine was preformed by adding iodine (122 mg, 0.48 mmol) to a solution of PPh_3 (125 mg, 0.48 mmol) in DCM (2 mL). The resulting solution was added to a solution of amide **15a** (106 mg, 0.25 mmol) and Et_3N (0.14 mL, 0.98 mmol) in DCM (1 mL) and stirred for 18 h at rt. The solution was washed with water (5 mL), extracted with DCM (2×5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (15→30% ether/petrol) to give the oxazole **16a** (91 mg, 90%) as a colourless oil. R_f 0.33 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 2955 s, 2928 s, 2876 s, 2863 s, 1717 s, 1631 s, 1576 w, 1465 w, 1382 m, 1347 w, 1221 m, 1201 m, 1102 s and 1015 w; δ_H (300 MHz, $CDCl_3$) 0.55 (6H, q, *J* 8.0, Si(CH_2CH_3)$_3$), 0.82 (3H, t, *J* 6.0, $(CH_2)_6CH_3$), 0.87 (9H, t, *J*

8.0, $Si(CH_2CH_3)_3$), 1.18 (10H, m, $(CH_2)_5$), 1.31 (3H, t, *J* 7.0, CO_2CHCH_3 or OCH_2CH_3), 1.42 (3H, t, *J* 7.0, CO_2CHCH_3 or OCH_2CH_3), 1.52 (1H, m, 2-H), 1.80 (1H, m, 2-H), 2.36 (1H, dd, *J* 3.0 and 12.5, 1-H), 4.31 (2H, q, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3) and 4.37 (2H, q, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3); δ_C (75 MHz, $CDCl_3$) 2.5 ($Si(CH_2CH_3)_3$), 7.2 ($Si(CH_2CH_3)_3$), 14.0, 14.5 and 14.9 ($(CH_2)_6CH_3$, $CO_2CH_2CH_3$ and OCH_2CH_3), 22.6, 27.7*, 29.0, 29.1, 30.0 and 31.8 (7C, $(CH_2)_6$ and C-1), 60.3 and 67.4 ($CO_2CH_2CH_3$ and OCH_2CH_3), 106.9 (C-4′) and 157.0, 160.8 and 161.9 (C=O, C-2′ and 5′); *m*/*z* (CI^+) 412.2882 ($[M+H]^+$, $C_{22}H_{42}NO_4Si$ requires 412.2883), 412 ($[M+H]^+$, 100%), 102 (64) and 52 (56).

*4.8.2. 5-Ethoxy-4-ethoxycarbonyl-2-{[3-(1-tert-butoxycarbonyl)-indolyl]-(tert-butyldimethylsilyl)methyl}oxazole (**16b**)*

Prepared according to the method for **3a** on a 0.22 mmol scale. Purification by column chromatography (20→40% ether/petrol) gave oxazole **16b** (67 mg, 57%) as a pale yellow oil. R_f 0.40 (50% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 2979 m, 2961 m, 2932 m, 2859 m, 1730 s, 1631 s, 1582 w, 1452 m, 1369 s, 1308 m, 1257 m, 1156 s, 1077 s and 1014 w; δ_H (300 MHz, $CDCl_3$) −0.03 (3H, s, $SiCH_3$), 0.17 (3H, s, $SiCH_3$), 0.86 (9H, s, $SiC(CH_3)_3$), 1.34 (3H, t, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 1.52 (3H, t, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 1.68 (9H, s, Boc), 4.14 (1H, s, 1-H), 4.33 (2H, dq, *J* 3.0 and 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 4.50 (2H, dq, *J* 2.5 and 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 7.22–7.35 (2H, m, Ind*H*), 7.54 (1H, d, *J* 7.0, Ind*H*), 7.61 (1H, s, Ind*H*) and 8.07 (1H, br s, Ind*H*); δ_C (75 MHz, $CDCl_3$) −6.9 ($SiCH_3$), −5.9 ($SiCH_3$), 14.5 and 15.1 ($CO_2CH_2CH_3$ and OCH_2CH_3), 17.6 ($SiC(CH_3)_3$), 24.8 (C-1), 26.6 ($SiC(CH_3)_3$), 28.3 (Boc), 60.5 and 69.8 ($CO_2CH_2CH_3$ and OCH_2CH_3), 83.8 (Boc), 107.0 (C-4′), 115.2 (C-7″), 116.7 (C-3″), 119.1, 122.5, 122.9 and 124.6 (C-2″, 4″, 5″ and 6″), 130.1 (C-3a″), 134.7 (C-7a″), 149.8 (Boc) and 154.4, 161.2 and 161.8 (C=O, ester, C-2′ and 5′); *m*/*z* (CI^+) 529.2737 ($[M+H]^+$, $C_{28}H_{41}N_2O_6Si$ requires 529.2734) and 529 ($[M+H]^+$, 100%).

4.9. 5-Ethoxy-4-ethoxycarbonyl-2-(1-octyl)oxazole (17)

Oxazole **16a** (71 mg, 0.17 mmol) was dissolved in DCM (2 mL). TFA (39 μl, 0.51 mmol) was added and the reaction mixture stirred for 24 h. The solution was diluted with ether (10 mL) and washed with $NaHCO_3$ (satd, aq, 5 mL) and brine (satd, aq, 5 mL), dried over $MgSO_4$, filtered and the solvent removed in vacuo. The crude compound was purified by column chromatography (30→50% ether/petrol) to give the oxazole **17** (38 mg, 74%) as a colourless oil. R_f 0.10 (30% ether/petrol). ν_{max} (NaCl/film)/cm^{-1} 2999 m, 2957 m, 2928 m, 2855 m, 1718 s, 1632 s, 1596 m, 1466 m, 1425 m, 1390 m, 1296 m, 1201 m, 1081 s and 1017 m; δ_H (300 MHz, $CDCl_3$) 0.85 (3H, t, *J* 7.0, $(CH_2)_6CH_3$), 1.14–1.40 (10H, m, $(CH_2)_5$), 1.34 (3H, t, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 1.45 (3H, t, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3), 1.65–1.74 (2H, m, 2-H), 2.64 (2H, t, *J* 8.0, 1-H), 4.32 (2H, q, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3) and 4.45 (2H, q, *J* 7.0, $CO_2CH_2CH_3$ or OCH_2CH_3); δ_C (75 MHz, $CDCl_3$) 14.1, 14.5 and 15.0 ($(CH_2)_5CH_3$, $CO_2CH_2CH_3$ and OCH_2CH_3), 22.6, 26.8, 28.2, 29.0, 29.1* and 31.8 (7C, $(CH_2)_7$), 60.5 and 69.7 ($CO_2CH_2CH_3$ and OCH_2CH_3), 106.8 (C-4′) and 154.4, 161.2 and 161.7 (C=O, ester, C-2′ and 5′); *m*/*z* (CI^+) 298.2010 ($[M+H]^+$, $C_{16}H_{28}NO_4$ requires 298.2018) and 298 ($[M+H]^+$), 100%.

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