

A Manifold Three-Step Synthetic Route to Polycyclic Annulated Hydantoins *via* Cyclic Imines

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Dedicated to Professor *Dieter Seebach* on the occasion of his 75th birthday

A new three-step synthetic pathway to generate polycyclic annulated hydantoins *via* rarely investigated heterocyclic imines is described. This procedure includes a one-pot reaction forming imines as precursor structures (*e.g.*, *Asinger* reaction), followed by an *Ugi* reaction to build up a bisamide structure that allows a ring-closing reaction to the targeted hydantoins *via* substitution. This pathway leads to a multiplicity of substances with a potential pharmacological activity.

Introduction. – Hydantoins (=imidazolidine-2,4-diones) are a very interesting and well-known substance class [1]. A plenty of this cyclic ureides are important compounds because of their industrial relevance as intermediates in the production of α -amino acids [2] and their frequent use in a plethora of pharmaceutical products [3][4]. Those derivatives with an annulated five-membered thiazolidine ring show activities against neurodegenerative diseases, such as morbus *Alzheimer* [5]. Also anticancer activity was reported [6]. Therefore, we focused our attention to the synthesis of polycyclic hydantoins. For this purpose, we developed a sequential combination of reactions which involves the utilization of the rarely investigated heterocyclic imines 2,5-dihydro-1,3-oxazole [7] and 1,4-benzothiazine [8], in addition to the known 2,5-dihydro-1,3-thiazole [9][10]. The cyclic amine parts of these species are also privileged scaffolds in an array of different biologically and pharmaceutically active compounds [10][11][12]. For example linezolid, which is a famous antibacterial [12a], is a 1,3-oxazolidine derivative. The 3,4-dihydrobenzothiazine substructure builds the skeleton of some antibiotics and potent potassium and calcium channel openers [11b–e][13]. The biological and pharmacological activities of the hydantoins and the mentioned heterocycles, respectively, suggests that the combination of both structures would lead to compounds with interesting properties. Therefore, we developed a sequential three-step synthetic route to the target structures depicted in the *Figure*.

On the basis of the retrosynthetic consideration outlined in *Scheme 1*, the target annulated hydantoins can be synthesized from bisamides [14]. The required bisamides starting from the cyclic imines can be obtained by an *Ugi* three-component reaction (*U-3CR*) [15]. Leading to our research on cyclic imines, the above mentioned imines are accessible by one-pot conversion of α -halo aldehydes [8][16]. In the case of the thia- and oxazoles, this strategy results in the combination of two multicomponent reactions.

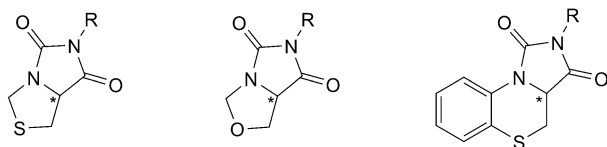
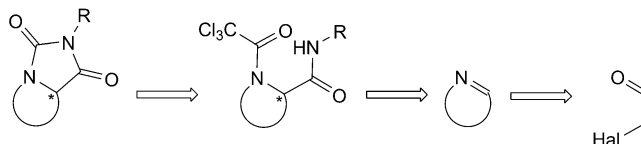


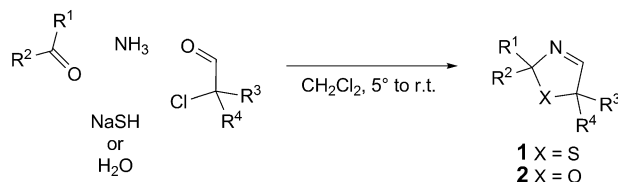
Figure. The target structures

Displaying a high substrate tolerance, the developed synthetic sequence provides products that are characterized by a high diversity.

Scheme 1. Retrosynthetic Consideration of the Target Structure



Results and Discussion. – *Synthesis of the Cyclic Imines.* The first of the three-step synthesis sequence to polycyclic hydantoines was the preparation of the cyclic imines. To investigate the diversity of our route, three different types of cyclic imines were prepared as precursors for the further reaction steps. Two of them, *i.e.*, the five-membered 2,5-dihydro-1,3-thiazoles **1** and 2,5-dihydro-1,3-oxazole **2**, were prepared by a modified *Asinger* reaction [7][16]. This multicomponent reaction is well-known for its efficient manifold synthesis of cyclic imines [17]. Following the prevalent procedure [16], an α -chloro aldehyde was treated with a second variable carbonyl compound, NH_3 , and NaHS or H_2O in CH_2Cl_2 to generate the imines **1** and **2** (Scheme 2).

Scheme 2. Four-Component Reaction to Form the 2,5-Dihydro-1,3-thiazoles [16] **1** and 2,5-Dihydro-1,3-oxazole [7] **2**

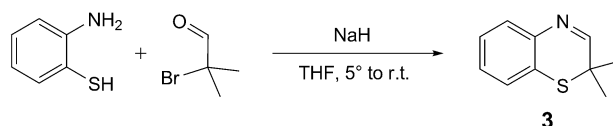
By means of the modified *Asinger* reaction, three different 2,5-dihydro-1,3-thiazoles **1** and one 2,5-dihydro-1,3-oxazole **2** were prepared as precursors (Table 1). The common cyclic imines **1a** [9], **1b** [18], and **2** [7], as well as the cyclic imine **1c**, which is reported for the first time, were obtained in moderate-to-good yields (up to 67%).

The annulated six-membered 2*H*-1,4-benzothiazine **3** [19] was synthesized from an α -bromo aldehyde, 2-aminothiophenol, and NaH in anhydrous THF (Scheme 3).

Table 1. Preparation of Hydantoins **7** and **8** via Five-Membered Cyclic Imines **1** and **2**

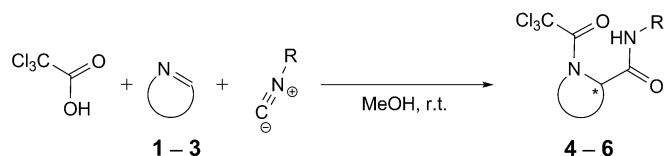
Entry	X	R ¹	R ²	R ³	R ⁴	R ⁵	1, 2			4, 5			7, 8		
							Yield ^{a)} [%]	Imine	Bisamide	Yield ^{a)} [%]	Hydantoin	Yield ^{a)} [%]			
1	S	Me	Me	Me	Me	CH ₂ =CHCH ₂	1a	64	4a	53	7a	85			
2	S	Me	Me	Me	Me	4-MeO-C ₆ H ₄ CH ₂		64	4b	52	7b	74			
3	S	Me	Me	Me	Me	Cyclohexyl		64	4c	30	7c	63			
4	S	Me	Me	Me	Me	(Naphthalen-2-yl)methyl	1b	64	4d	58	7d	84			
5	S	Me	Me	Me	Me	(Naphthalen-2-yl)methyl		67	4e	39	7e	94			
6	S	Me	Me	Me	Me	CH ₂ =CHCH ₂	1c	45	4f	45	7f	69			
7	S	Me	Me	Me	Me	4-MeO-C ₆ H ₄ CH ₂	1c	45	4g	32	7g	70			
8	S	Me	Me	Me	Me	PhCH ₂ CH ₂	1c	45	4h	56	7h	57			
9	O	Me	Me	Me	Me	CH ₂ =CHCH ₂	2	40	5a	55	8a	71			
10	O	Me	Me	Me	Me	4-MeO-C ₆ H ₄ CH ₂	2	40	5b	46	8b	52			
11	O	Me	Me	Me	Me	Cyclohexyl	2	40	5c	52	8c	76			
12	O	Me	Me	Me	Me	(Naphthalen-2-yl)methyl	2	40	5d	68	8d	78			

^{a)} Isolated yields.

Scheme 3. Synthesis of the 2H-1,4-Benzothiazines **3** [19]

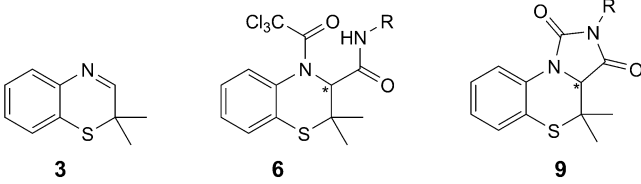
All three types of cyclic imines, **1–3**, are known for their reactivity, and they have been successfully utilized in the synthesis of different amides [7][20] and polycyclic structures [9][19][21].

Synthesis of the Bisamides. Adequate precursors for the final ring closure to the polycyclic hydantoin are α -bisamides containing at least one secondary amide, whereas the second amide group has to be affected by its electrophilicity and the presence of a leaving group [14]. An appropriate and efficient way to such structures is the *Ugi* reaction [14][22][23], which is one of the most efficient multicomponent reactions. In 1959, this reaction was described as a four-component reaction (*U-4CR*) to prepare bisamides from an amine, a carbonyl compound, a carboxylic acid, and an isocyanide [22]. Later, the *U-3CR* was developed to reduce the by-products [15][23]. Instead of the amine and the carbonyl compound, which were used in the *U-4CR* for the *in situ* formation of an imine compound, a pre-built imine was treated with a carboxylic acid and an isocyanide. The *U-3CR* was applied to the cyclic imines **1–3** in the recent past, too [8][18]. Following this strategy, the cyclic imines **1–3**, respectively, were reacted with Cl_3CCOOH and several isocyanides, which were commercially available or readily accessible, in anhydrous MeOH (*Scheme 4*). To amplify the scope of isocyanides, 2-(isocyanomethyl)naphthalene, which has never been reported before, was prepared from naphthalene-2-carbaldehyde.

Scheme 4. Ugi Three-Component Reaction [23] of the Imines **1–3** to Prepare the Desired Bisamides **4–6**, Respectively

As disclosed in *Table 1*, the imines **1** and **2** could be converted to the desired bisamides **4** and **5**, respectively, in moderate-to-good yields. Even when sterically hindered substrates, such as the imines **1b** and **1c**, or cyclohexyl isocyanide, were used in the reaction, the corresponding bisamides were obtained in moderate yields (*i.e.*, compounds **4c**, **4e**, **4f**, **4g**, **4h**, and **5c**). The *U-3CR* of the annulated six-membered imines **6** did not proceed in such high yields, but the expected bisamides **6a–6c** were obtained in all cases (*Table 2*). It is noteworthy to mention that the use of the new 2-(isocyanomethyl)naphthalene resulted in the highest yields (*i.e.*, compounds **4d** and **5d**).

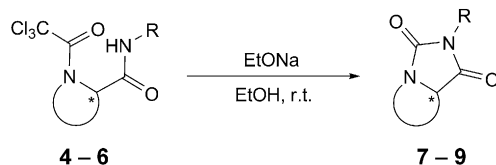
Cyclization to the Polycyclic Hydantoin. The synthetic route to the polycyclic hydantoin was finalized by a ring closure of the bisamides **4–6**. A deprotonation of the secondary amide group is prerequisite for the desired cyclization. Treatment of the

Table 2. Preparation of Hydantoins **9** via Annulated Six-Membered Cyclic Imines **3**


Entry	R	Imine	Yield ^{a)} [%]	Bisamide	Yield ^{a)} [%]	Hydantoin	Yield ^{a)} [%]
13	CH ₂ =CHCH ₂	3	57	6a	12	9a	67
14	4-MeO-C ₆ H ₄ CH ₂	3	57	6b	6	9b	78
15	PhCH ₂ CH ₂	3	57	6c	7	9c	63

^{a)} Isolated yields.

bisamides **4–6** with freshly prepared EtONa is a suitable procedure to realize this initiation step of the ring closure (*Scheme 5*). As a result of this deprotonation, the hydantoins **7–9** were generated *via* a replacement of the leaving group Cl₃C[–].

Scheme 5. Final Cyclization of the Bisamides 4–6 to the Polycyclic Hydantoins 7–9, Respectively

Starting from the bisamides **4** and **5**, the aimed products **7** and **8**, respectively, were obtained in good-to-excellent yields as compiled in *Table 1*. The cyclization of the bisamides **6** occurred in good yields, too (*Table 2*). Surprisingly, the best result for the final cyclization was accomplished starting from the bisamide **4e** (*Table 1*, *Entry 5*; 94%).

The structures of the products were verified by IR, ¹H- and ¹³C-NMR, and mass spectra. The shift of the signal arising from the methine group in the imine ring strongly evidenced the formation of the hydantoins. For example, the ¹H-NMR spectrum of the bisamide **4d** exhibited one signal of the methine group at 5.16 ppm, whereas the spectrum of the corresponding hydantoin **7d** displayed that signal at 4.43 ppm. Moreover, the presence of the hydantoins is substantiated by the finding that the signals arising from the NH and the CCl₃ moiety were missing in the ¹H- and ¹³C-NMR spectrum, respectively.

The obtained results (*Tables 1* and *2*) indicate the variability of the three-step synthesis sequence leading to polycyclic hydantoins. The cyclic imines, prepared in the first step, as well as the isocyanide compound, used in the second step, are variable in a wide range. It could be established that both five-membered cyclic imines containing S or O, *i.e.*, (**1** and **2**, resp.) and the six-membered annulated 2*H*-1,4-benzothiazine **3** could be converted to the desired hydantoins **7–9**. In addition to that, the applicability of five different isocyanides in the reaction sequence was also successfully examined.

Conclusions. – In summary, we developed a new three-step synthetic route to polycyclic hydantoins containing S or O in the annulated heterocycles. Starting from commercially available simple starting materials, the heterocyclic imines **1–3** were prepared in one-pot reactions. By functionalizing the highly reactive C=N bond of these precursors in the *Ugi* three-component reaction, we obtained the bisamides **4–6** characterized by a leaving group for a ring-closing reaction. In the final cyclization, initiated by treatment with EtONa, the annulated hydantoins **7–9** were synthesized. By following this synthetic route, it is possible to prepare a great number of products with high diversity.

Experimental Part

General. Synthetic procedures under Ar: vacuum line using standard *Schlenk* techniques. TLC: Merck SiO₂ F₂₅₄ plates on aluminium sheets. Column chromatography (CC): Grace SiO₂ (0.035–0.070 mm, type *KG 60*). M.p.: *Laboratory Devices*; uncorrected. IR Spectra: *Bruker Tensor 27* spectrometer, ‘*Golden Gate*’ diamond-ATR (attenuated total reflection) unit; in cm^{–1}. ¹H- and ¹³C-NMR spectra: *Bruker AMX R 500* instrument (at 500.1 and 125.8 MHz, resp.) or *Bruker Avance III 500* instrument (at 499.9 and 125.7 MHz, resp.), in CDCl₃, (D₆)DMSO, or CD₃OD; multiplicity of C-atoms from DEPT spectra; assignments from COSY techniques; δ in ppm rel. to the solvent signal (CDCl₃: 7.26 and 77.16 ppm, resp.; (D₆)DMSO: 2.50 and 39.52 ppm, resp.; CD₃OD: 3.31 and 49.00 ppm, resp.) [24], *J* in Hz; in case of phenylene compounds, the assignments (*o*-, *m*-) refer to the methylene group. MS: *Finnigan MAT 95* (EI, 70 eV, or CI (isobutane or NH₃)) or *Waters Q-TOF Premier* (ESI, pos.-ion mode) instrument; in *m/z* (rel. %).

2-Chloro-2-methylpropanal [7], 1-chlorocyclohexane-1-carbaldehyde [25], 2-bromo-2-methylpropanal [26], allyl isocyanide [27][28], 1-(isocyanomethyl)-4-methoxybenzene [29][30], cyclohexyl isocyanide [31][32], and (2-isocyanoethyl)benzene [33] were prepared according to published procedures. All other chemicals were commercially available (*Aldrich* and *Merck*) and used without further purification. MeOH was refluxed with Mg and freshly distilled prior to use. EtOH was refluxed with Na and freshly distilled prior to use.

2-(Isocyanomethyl)naphthalene. A soln. of naphthalene-2-carbaldehyde (675 mg, 4.3 mmol) and HCOOH (1.66 g, 36.1 mmol) in HCONH₂ (30 ml) was heated at 140–150° for 5 h. The mixture was poured into 35 ml of ice-water and basified with 2N NaOH soln. to pH 9. The soln. was extracted with CH₂Cl₂ (2 × 25 ml). The org. layer was washed with H₂O, dried (MgSO₄), and the solvent was removed at a rotary evaporator to afford a yellow solid. The crude *N*-(naphthalen-2-ylmethyl)formamide was used in the next step without further purification.

A soln. of the crude product, Ph₃P (1.36 g, 5.2 mmol), CCl₄ (664 mg, 4.3 mmol), and Et₃N (437 mg, 4.3 mmol) in 1,2-dichloroethane (5 ml) was heated at 60° for 3 h. The solvent was removed at a rotary evaporator. The residue was taken up in MeCN, cooled to –30° for 5 h, and filtered. The filtrate was concentrated at a rotary evaporator. The crude product was purified by CC (CH₂Cl₂/hexane 1:1). Yield: 328 mg (45%). Brown solid. M.p. 67°. *R*_f (CH₂Cl₂/hexane 1:2) 0.31. IR (ATR): 3057, 3024, 2966, 2919, 2850. ¹H-NMR (500.1 MHz, CDCl₃): 4.79 (s, CH₂); 7.40–7.42 (*m*, 1 arom. H); 7.51–7.55 (*m*, 2 arom. H); 7.83–7.89 (*m*, 4 arom. H). ¹³C-NMR (125.8 MHz, CDCl₃): 45.81 (CH₂); 124.16, 125.74, 126.69, 126.85, 127.87, 128.01, 129.05 (7 arom. CH); 129.72, 133.10, 133.28 (3 arom. C); 158.02 (NC). CI-MS: 185 (5, [*M* + H + NH₃]⁺). HR-CI-MS: 185.1077 ([*M* + H + NH₃]⁺, C₁₂H₁₃N₂⁺; calc. 185.1079).

2,5-Dihydro-2,2,5,5-tetramethylthiazole (1a) [9]. Acetone (22.54 g, 0.388 mol) was added dropwise to a soln. of NaHS·H₂O (14.37 g, 0.194 mol) and aq. NH₃ soln. (26.43 g, 0.388 mol, 25%). To this soln., 2-chloro-2-methylpropanal (20.67 g, 0.194 mol) was added dropwise at 5–10°. After diluting with CH₂Cl₂ (20 ml), the soln. was stirred overnight at r.t. The phases were separated, and the aq. phase was extracted with CH₂Cl₂ (2 × 20 ml). The recombined org. phases were dried (MgSO₄), and the solvent was removed at a rotary evaporator. The crude product was purified by recrystallization from hexane. Yield: 17.78 g (64%). Colorless solid.

7-Thia-14-azadispiro[5.1.5.2]pentadec-14-ene (1b) [18]. Cyclohexanone (8.19 g, 83.4 mol) was added dropwise to a soln. of NaHS · H₂O (3.07 g, 41.4 mmol) and aq. NH₃ soln. (5.68 g, 83.4 mmol, 25%). To this soln., 1-chlorocyclohexane-1-carbaldehyde (6.07 g, 41.4 mol) was added dropwise at 5–10°. After diluting with CH₂Cl₂ (20 ml), the soln. was stirred overnight at r.t. The phases were separated, and the aq. phase was extracted with CH₂Cl₂ (2 × 20 ml). The recombined org. phases were dried (MgSO₄), and the solvent was removed at a rotary evaporator. The crude product was purified by distillation (110°/0.067 mbar). Yield: 6.20 g (67%). Colorless oil.

2,2-Dimethyl-8-oxa-1-thia-4-azaspiro[4.5]dec-3-ene (1c). Oxan-4-one (2.50 g, 25.0 mmol) was added dropwise to a soln. of NaHS · H₂O (926 mg, 12.5 mmol) and aq. NH₃ soln. (426 mg, 25.0 mmol, 25%). To this soln., 2-chloro-2-methylpropanal (1.33 g, 12.5 mmol) was added dropwise at 5–10°. After diluting with CH₂Cl₂ (20 ml), the soln. was stirred overnight at r.t. The phases were separated, and the aq. phase was extracted with CH₂Cl₂ (2 × 20 ml). The recombined org. phases were dried (MgSO₄), and the solvent was removed at a rotary evaporator. The crude product was purified by distillation (95–100°/1.0 mbar). Yield: 960 mg (45%). Colorless solid. M.p. 45–46°. IR (ATR): 2962, 2944, 2917, 2847, 1651. ¹H-NMR (500.1 MHz, CDCl₃): 1.78 (s, 2 Me); 2.03–2.06, 2.43–2.49 (2m, CH₂CCH₃); 3.82–3.86, 4.19–4.25 (2m, CH₂OCH₂); 7.49 (s, CH). ¹³C-NMR (125.8 MHz, CDCl₃): 30.26 (2 Me); 42.36 (CH₂CCH₃); 63.72 (SCMe₂); 66.06 (CH₂OCH₂); 92.10 (SC(CH₃)₂N); 166.85 (CH). CI-MS: 186 (100, [M + H]⁺). HR-CI-MS: 186.0955 ([M + H]⁺, C₉H₁₆NOS⁺; calc. 186.0953).

2,5-Dihydro-2,2,5,5-tetramethyloxazole (2) [7]. 2-Chloro-2-methylpropanal (21.31 g, 0.200 mol) was added dropwise to a soln. of H₂O (14.23 g, 0.790 mol), aq. NH₃ soln. (53.81 g, 0.790 mol, 25%), and acetone (45.88 g, 0.790 mol) at 0–5°. After stirring for 1 h at 5°, the soln. was stirred overnight at r.t. The phases were separated, and the aq. phase was extracted with CH₂Cl₂ (2 × 30 ml). The recombined org. phases were dried (MgSO₄), and the solvent was removed at a rotary evaporator. The crude product was purified by distillation (47–55°/150 mbar). Yield: 10.17 g (40%). Colorless oil.

2,2-Dimethyl-2H-1,4-benzothiazine (3) [19]. Under Ar, a soln. of 2-aminothiophenol (6.00 g, 48.0 mmol) in 20 ml anh. THF was added to a suspension of NaH (2.00 g, 50.0 mmol, 60% in oil) in 70 ml anh. THF at 0°. The resulting foamy white/violet colored mixture was stirred for 2 h at r.t. 2-Bromo-2-methylpropanal (7.63 g, 50.5 mmol), dissolved in 15 ml anh. THF, was added dropwise. After stirring overnight at r.t., molecular sieves were added, and the mixture was stirred for 3 h. After filtration, the solvent was removed at a rotary evaporator. The crude product was purified by recrystallization from petroleum ether 40–60°. Yield: 4.84 g (57%). Colorless solid. M.p. 56–58°.

General Procedure (GP 1) for the Synthesis of the Bisamides 4, 5, and 6. A soln. of 1 equiv. of the respective isocyanide and 1 equiv. of Cl₃CCOOH in anh. MeOH (3 ml per mmol imine) was added to a soln. of 1 equiv. of the respective cyclic imine **1**, **2**, or **3** in anh. MeOH (3 ml per mmol imine). The progress of the reaction was monitored by TLC. The solvent was removed at the rotary evaporator. The purification of the crude product is described in the experiments.

(RS)-2,2,5,5-Tetramethyl-N-(prop-2-en-1-yl)-3-(trichloroacetyl)-1,3-thiazolidine-4-carboxamide (4a). According to GP 1: **1a** (286 mg, 2.00 mmol), allyl isocyanide (134 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 2 d. Purification by washing with ¹Pr₂O and pentane. Yield: 395 mg (53%). Colorless solid. M.p. 122°. IR (ATR): 3363, 2993, 2973, 2941, 2859, 1687, 1650. ¹H-NMR (499.9 MHz, CDCl₃): 1.45, 1.71, 2.01, 2.07 (4s, 4 Me); 3.80–3.85, 3.95–4.00 (2m, NHCH₂); 5.11 (s, NCH); 5.14–5.17, 5.23–5.27 (2m, CH=CH₂); 5.77–5.85 (m, CH=CH₂); 5.96–5.97 (m, NH). ¹³C-NMR (125.7 MHz, CDCl₃): 25.87, 29.72, 31.26, 33.01 (4 Me); 42.30 (CH₂); 51.77 (SCMe₂CH); 76.96 (SCMe₂N); 77.16 (NCH); 94.22 (CCl₃); 117.64 (CH=CH₂); 133.43 (CH=CH₂); 158.51 (NCO); 168.46 (NHCO). CI-MS: 373 (100, [M + H]⁺). HR-CI-MS: 372.0229 ([M + H]⁺, C₁₃H₁₉Cl₃N₂O₂S⁺; calc. 372.0233).

(RS)-N-(4-Methoxybenzyl)-2,2,5,5-tetramethyl-3-(trichloroacetyl)-1,3-thiazolidine-4-carboxamide (4b). According to GP 1: **1a** (286 mg, 2.00 mmol), 1-(isocyanomethyl)-4-methoxybenzene (294 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 5 d. Purification by CC ('BuOMe/hexane 3:7). Yield: 470 mg (52%). Colorless solid. M.p. 163–165°. *R*_f ('BuOMe/hexane 3:7) 0.18. IR (ATR): 3300, 3073, 2971, 2937, 2842, 1687, 1656, 1612, 1548, 1515. ¹H-NMR (500.1 MHz, CDCl₃): 1.45, 1.70, 1.99, 2.00 (4s, 2 Me₂C); 3.79 (s, MeO); 4.25 (dd, ²J = 14.4, ³J = 5.0, 1 H, CH₂); 4.48 (dd, ²J = 14.4, ³J = 6.0, 1 H, CH₂); 5.11 (s, NCH); 6.09–6.11 (m, NH); 6.84–6.86 (m, 2 m-CH); 7.17–7.19 (m, 2 o-CH). ¹³C-NMR (125.8 MHz, CDCl₃): 25.90, 29.46, 31.26, 32.96 (2 CMe₂); 43.70 (CH₂); 51.81 (SCMe₂CH); 55.41 (MeO);

76.95 (NCH); 76.98 (SCMe₂N); 94.15 (CCl₃); 114.34 (2 *m*-CH); 129.22 (C(Ar)CH₂); 129.48 (2 *o*-CH); 158.37 (NCO); 159.34 (C(Ar)OMe); 168.42 (NHCO). CI-MS: 453 (99, [*M* + H]⁺). HR-CI-MS: 453.0563 ([*M* + H]⁺, C₁₈H₂₄Cl₃N₂O₃S⁺; calc. 453.0573).

(RS)-N-Cyclohexyl-2,2,5,5-tetramethyl-3-(trichloroacetyl)-1,3-thiazolidine-4-carboxamide (**4c**). According to GP I: **1a** (286 mg, 2.00 mmol), cyclohexyl isocyanide (218 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 3 d. Purification by CC (AcOEt/hexane 3:7). Yield: 246 mg (30%). Colorless solid. M.p. 126°. *R*_f (AcOEt/hexane 3:7) 0.62. IR (ATR): 3333, 2930, 2855, 1687, 1522. ¹H-NMR (499.9 MHz, CDCl₃): 1.10–1.22 (*m*, 3 H, 2 CH₂); 1.30–1.40 (*m*, CH₂); 1.44 (*s*, Me); 1.57–1.62 (*m*, 1 H, CH₂); 1.66–1.69 (*m*, CH₂); 1.69 (*s*, Me); 1.87–1.90 (*m*, CH₂); 2.00, 2.08 (2*s*, 2 Me); 3.74–3.82 (*m*, NHCH); 5.04 (*s*, NCH); 5.74 (*d*, ³*J* = 7.8, NH). ¹³C-NMR (125.7 MHz, CDCl₃): 23.81, 24.56 (3 CH₂); 24.87, 28.72, 30.26 (3 Me); 31.89 (2 CH₂); 32.06 (Me); 47.79 (NHCH); 50.75 (SCMe₂CH); 75.82 (SCMe₂N); 76.13 (NCH); 93.28 (CCl₃); 157.51 (NCO); 166.48 (NHCO). CI-MS: 415 (98, [*M* + H]⁺). HR-EI-MS: 414.0712 (*M*⁺, C₁₆H₂₅Cl₃N₂O₂S⁺; calc. 414.0702).

(RS)-2,2,5,5-Tetramethyl-N-(naphthalen-2-ylmethyl)-3-(trichloroacetyl)-1,3-thiazolidine-4-carboxamide (**4d**). According to GP I: **1a** (286 mg, 2.00 mmol), 2-(isocyanomethyl)naphthalene (334 mg, 2.00 mmol) and Cl₃CCOOH (327 mg, 2.00 mmol); 2 d. Purification by washing with ³Pr₂O and pentane. Yield: 545 mg (58%). Colorless solid. M.p. 198°. IR (ATR): 3304, 2971, 2938, 1685, 1657, 1543. ¹H-NMR (499.9 MHz, CDCl₃): 1.48, 1.72, 2.01, 2.03 (4*s*, 4 Me); 4.49 (*dd*, ²*J* = 14.7, ³*J* = 5.1, 1 H, CH₂); 4.74 (*dd*, ²*J* = 14.7, ³*J* = 5.1, 1 H, CH₂); 5.16 (*s*, NCH); 6.22–6.24 (*m*, NH); 7.36–7.38 (*m*, 1 arom. H); 7.46–7.51 (*m*, 2 arom. H); 7.73–7.74 (*m*, 1 arom. H); 7.79–7.83 (*m*, 3 arom. H). ¹³C-NMR (125.7 MHz, CDCl₃): 25.95, 29.61, 31.30, 33.03 (4 Me); 44.32 (CH₂); 51.87 (SCMe₂CH); 77.05 (SCMe₂N); 77.16 (NCH); 94.22 (CCl₃); 125.90, 126.30, 126.59, 126.86, 127.86, 127.89, 128.92 (7 arom. CH); 132.99, 133.48, 134.74 (3 arom. C); 158.45 (NCO); 168.49 (NHCO). CI-MS: 473 (99, [*M* + H]⁺). HR-EI-MS: 472.0540 (*M*⁺, C₂₁H₂₃Cl₃N₂O₂S⁺; calc. 472.0546).

(RS)-N-(Naphthalen-2-ylmethyl)-14-(trichloroacetyl)-7-thia-14-azadispiro[5.1.5.2]pentadecane-15-carboxamide (**4e**). According to GP I: **1b** (670 mg, 3.00 mmol), 2-(isocyanomethyl)naphthalene (502 mg, 3.00 mmol) and Cl₃CCOOH (490 mg, 3.00 mmol); 3 d. Purification by crystallization from hexane. Yield: 646 mg (39%). Colorless solid. M.p. 220°. IR (ATR): 3315, 3060, 2931, 2855, 1682, 1652. ¹H-NMR (500.1 MHz, (D₆)DMSO): 1.04–2.03 (*m*, 17 H, CH₂, *c*-Hex); 2.57–2.63 (*m*, 1 H, CH₂, *c*-Hex); 2.80–2.90 (*m*, 2 H, CH₂, *c*-Hex); 4.28 (*dd*, ²*J* = 14.4, ³*J* = 4.9, 1 H, NHCH₂); 4.53 (*dd*, ²*J* = 14.4, ³*J* = 6.4, 1 H, NHCH₂); 5.28 (*s*, NCH); 7.37–7.39 (*m*, 1 arom. H); 7.47–7.53 (*m*, 2 arom. H); 7.75–7.76 (*m*, 1 arom. H); 7.85–7.90 (3*m*, 3 arom. H); 8.69–8.72 (*m*, NH). ¹³C-NMR (125.8 MHz, (D₆)DMSO): 21.95, 24.23, 24.27, 24.96, 25.12, 25.59, 34.35, 35.09, 35.46, 37.90 (10 CH₂, *c*-Hex); 42.99 (NHCH₂); 57.44 (SC(CH₂)₃CH); 75.32 (NCH); 83.14 (SC(CH₂)₃N); 94.35 (CCl₃); 125.88, 126.35, 126.63, 126.69, 127.53, 127.60, 127.96 (7 arom. CH); 132.13, 132.83, 136.25 (3 arom. C); 157.44 (NCO); 166.95 (NHCO). CI-MS: 554 (98, [*M* + H]⁺). HR-CI-MS: 553.1242 ([*M* + H]⁺, C₂₇H₃₂Cl₃N₂O₂S⁺; calc. 553.1245).

(RS)-2,2-Dimethyl-N-(prop-2-en-1-yl)-4-(trichloroacetyl)-8-oxa-1-thia-4-azaspiro[4.5]decane-3-carboxamide (**4f**). According to GP I: **1c** (278 mg, 1.50 mmol), allyl isocyanide (109 mg, 1.50 mmol), and Cl₃CCOOH (245 mg, 1.50 mmol); 4 d. Purification by CC (^tBuOMe/hexane 3:7). Yield: 282 mg (45%). Colorless solid. M.p. 201–202°. *R*_f (^tBuOMe/hexane 3:7) 0.08. IR (ATR): 3317, 2967, 2913, 2856, 1687, 1660, 1537. ¹H-NMR (499.9 MHz, CDCl₃): 1.49 (*s*, Me); 1.59–1.62 (*m*, 1 H, CH₂CCH₂); 1.67 (*s*, Me); 2.28–2.30 (*m*, 1 H, CH₂CCH₂); 3.34–3.44 (*m*, 3 H, CH₂CCH₂, CH₂OCH₂); 3.71–3.76 (*m*, 1 H, CH₂OCH₂); 3.81–3.86, 3.94–3.99 (2*m*, NHCH₂); 4.03–4.09 (*m*, 2 H, CH₂OCH₂); 5.15 (*s*, NCH); 5.15–5.17, 5.22–5.25 (2*m*, CH=CH₂); 5.76–5.83 (*m*, 2 H, CH=CH₂, NH). ¹³C-NMR (125.7 MHz, CDCl₃): 26.09, 33.11 (2 Me); 36.18 (CH₂CCH₂); 37.57 (CH₂CCH₂); 42.47 (NHCH₂); 51.36 (SCMe₂CH); 67.09 (CH₂OCH₂); 67.56 (CH₂OCH₂); 76.43 (NCH); 81.64 (SC(CH₂)₂N); 94.53 (CCl₃); 117.97 (CH=CH₂); 133.33 (CH=CH₂); 158.43 (NCO); 167.96 (NHCO). CI-MS: 415 (96, [*M* + H]⁺). HR-CI-MS: 432.0674 ([*M* + H + NH₃]⁺, C₁₅H₂₅Cl₃N₃O₃S⁺; calc. 432.0682).

(RS)-N-(4-Methoxybenzyl)-2,2-dimethyl-4-(trichloroacetyl)-8-oxa-1-thia-4-azaspiro[4.5]decane-3-carboxamide (**4g**). According to GP I: **1c** (278 mg, 1.50 mmol), 1-(isocyanomethyl)-4-methoxybenzene (221 mg, 1.50 mmol), and Cl₃CCOOH (245 mg, 1.50 mmol); 6 d. Purification by CC (^tBuOMe/hexane 3:7). Yield: 237 mg (32%). Colorless solid. M.p. 218–219°. *R*_f (^tBuOMe/hexane 3:7) 0.05. IR (ATR): 3299, 2962, 2932, 2856, 2839, 1689, 1656, 1612, 1544, 1513. ¹H-NMR (500.1 MHz, CDCl₃): 1.49 (*s*, 3 H,

Me₂C); 1.58–1.61 (*m*, 1 H, CH₂CCH₂); 1.65 (*s*, 3 H, Me₂C); 2.30–2.32 (*m*, 1 H, CH₂CCH₂); 3.33–3.35 (*m*, CH₂CCH₂, CH₂O); 3.37–3.40 (*m*, 1 H, CH₂CCH₂); 3.70–3.74 (*m*, 1 H, CH₂O); 3.80 (*s*, MeO); 3.99–4.00, 4.05–4.09 (2*m*, CH₂O); 4.24 (*dd*, ²*J* = 14.3, ³*J* = 4.9, 1 H, NHCH₂); 4.50 (*dd*, ²*J* = 14.3, ³*J* = 6.2, 1 H, NHCH₂); 5.12 (*s*, NCH); 5.85–5.87 (*m*, NH); 6.84–6.86 (*m*, 2 *m*-CH); 7.17–7.18 (*m*, 2 *o*-CH). ¹³C-NMR (125.8 MHz, CDCl₃): 26.17, 33.08 (CMe₂); 36.24 (CH₂CCH₂); 37.29 (CH₂CCH₂); 43.78 (NHCH₂); 51.36 (SCMe₂CH); 55.46 (MeO); 67.10, 67.58 (CH₂OCH₂); 76.29 (NCH); 81.68 (SC(CH₂)₂N); 94.48 (CCl₃); 114.39 (2 *m*-CH); 129.24 (C(Ar)CH₂); 129.65 (2 *o*-CH); 158.30 (NCO); 159.44 (C(Ar)OMe); 167.72 (NHCO). CI-MS: 496 (100, [*M* + H]⁺). HR-CI-MS: 495.0690 ([*M* + H]⁺, C₂₀H₂₆Cl₃N₂O₄S⁺; calc. 495.0679).

(*RS*)-2,2-Dimethyl-N-(2-phenylethyl)-4-(trichloroacetyl)-8-oxa-1-thia-4-azaspiro[4.5]decane-3-carboxamide (**4h**). According to *GP 1*: **1c** (278 mg, 1.50 mmol), (2-isocynoethyl)benzene (197 mg, 1.50 mmol), and Cl₃CCOOH (245 mg, 1.50 mmol); 8 d. Purification by CC (tBuOMe/hexane 2:3). Yield: 390 mg (56%). Colorless solid. M.p. 179–181°. *R*_f (tBuOMe/hexane 2:3) 0.16. IR (ATR): 3323, 3030, 2966, 2858, 1686, 1654, 1538. ¹H-NMR (500.1 MHz, CDCl₃): 1.43 (*s*, Me); 1.49–1.55 (*m*, 2 H, CH₂CCH₂); 1.62 (*s*, Me); 2.80–2.83 (*m*, PhCH₂); 3.10–3.21 (*m*, 2 H, CCH₂, CH₂OCH₂); 3.23–3.29 (*m*, 1 H, CCH₂); 3.55–3.70 (*m*, 3 H, CH₂OCH₂, NHCH₂); 3.81–3.84 (*m*, 1 H, CH₂OCH₂); 4.01–4.05 (*m*, 1 H, CH₂OCH₂); 5.07 (*s*, NCH); 5.72–5.74 (*m*, NH); 7.17–7.19 (*m*, 2 *o*-CH); 7.21–7.24 (*m*, 1 *p*-CH); 7.29–7.32 (*m*, 2 *m*-CH). ¹³C-NMR (125.8 MHz, CDCl₃): 25.98, 33.04 (2 Me); 35.28 (PhCH₂); 35.79, 37.32 (CH₂CCH₂); 40.48 (NHCH₂); 51.34 (SCMe₂CH); 66.99 (CH₂OCH₂); 67.41 (CH₂OCH₂); 76.47 (NCH); 81.29 (SC(CH₂)₂N); 94.43 (CCl₃); 127.00 (*p*-CH); 128.94, 129.04 (4 arom. CH); 138.15 (1 arom. C); 158.47 (NCO); 168.14 (NHCO). CI-MS: 479 (98, [*M* + H]⁺). HR-CI-MS: 496.0999 ([*M* + H + NH₃]⁺, C₂₀H₂₉Cl₃N₃O₄S⁺; calc. 496.0995).

(*RS*)-2,2,5,5-Tetramethyl-N-(prop-2-en-1-yl)-3-(trichloroacetyl)-1,3-oxazolidine-4-carboxamide (**5a**). According to *GP 1*: **2** (254 mg, 2.00 mmol), allyl isocyanide (134 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 4 d. Purification by CC (AcOEt). Yield: 390 mg (55%). Colorless solid. M.p. 157°. *R*_f (AcOEt) 0.82. IR (ATR): 3383, 2981, 2935, 1713, 1776. ¹H-NMR (500.1 MHz, CDCl₃): 1.09, 1.41, 1.44, 1.72 (4*s*, 4 Me); 3.99–4.01 (*m*, NHCH₂); 4.10 (*s*, NCH); 5.13–5.15, 5.19–5.23 (2*m*, CH=CH₂); 5.69–5.78 (*m*, CH=CH₂); 6.10–6.11 (*m*, NH). ¹³C-NMR (125.8 MHz, CDCl₃): 23.02, 25.88, 27.81, 30.51 (4 Me); 40.94 (CH₂); 69.91 (NCH); 79.44 (OCMe₂CH); 93.92 (CCl₃); 99.34 (OCMe₂N); 118.68 (CH=CH₂); 130.86 (CH=CH₂); 155.43 (NCO); 169.13 (NHCO). CI-MS: 357 (100, [*M* + H]⁺). HR-CI-MS: 357.0541 ([*M* + H]⁺, C₁₃H₂₀Cl₃N₂O₃⁺; calc. 357.0534).

(*RS*)-N-(4-Methoxybenzyl)-2,2,5,5-tetramethyl-3-(trichloroacetyl)-1,3-oxazolidine-4-carboxamide (**5b**). According to *GP 1*: **2** (336 mg, 2.65 mmol), 1-(isocyanomethyl)-4-methoxybenzene (389 mg, 2.65 mmol), and Cl₃CCOOH (433 mg, 2.65 mmol); 6 d. Purification by CC (tBuOMe/hexane 3:7). Yield: 528 mg (46%). Colorless solid. M.p. 167–168°. *R*_f (tBuOMe/hexane 3:7) 0.11. IR (ATR): 3289, 3087, 2978, 2941, 1687, 1657, 1610, 1556, 1511. ¹H-NMR (500.1 MHz, CDCl₃): 1.38, 1.49, 1.74, 1.80 (4*s*, 2 Me₂C); 3.79 (*s*, MeO); 4.24 (*dd*, ²*J* = 14.3, ³*J* = 5.0, 1 H, CH₂); 4.47 (*dd*, ²*J* = 14.3, ³*J* = 6.2, 1 H, CH₂); 4.78 (*s*, NCH); 5.91–5.92 (*m*, NH); 6.84–6.86 (*m*, 2 *m*-CH); 7.16–7.18 (*m*, 2 *o*-CH). ¹³C-NMR (125.8 MHz, CDCl₃): 25.79, 27.15, 27.60, 29.47 (2 Me₂C); 43.60 (CH₂); 55.44 (MeO); 70.67 (NCH); 82.53 (OCMe₂CH); 93.64 (CCl₃); 99.47 (OCMe₂N); 114.40 (2 *m*-CH); 129.27 (C(Ph)CH₂); 129.63 (2 *o*-CH); 157.76 (NCO); 159.42 (C(Ph)OMe); 168.35 (NHCO). CI-MS: 437 (17, [*M* + H]⁺). HR-CI-MS: 454.1071 ([*M* + H + NH₃]⁺, C₁₈H₂₇Cl₃N₂O₄⁺; calc. 454.1067).

(*RS*)-N-Cyclohexyl-2,2,5,5-tetramethyl-3-(trichloroacetyl)-1,3-oxazolidine-4-carboxamide (**5c**). According to *GP 1*: **2** (254 mg, 2.00 mmol), cyclohexyl isocyanide (218 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 3 d. Purification by crystallization from AcOEt and hexane. Yield: 414 mg (52%). Colorless solid. M.p. 198°. IR (ATR): 3358, 3007, 2973, 2932, 2858, 1689, 1656, 1533. ¹H-NMR (499.9 MHz, CDCl₃): 1.06–1.18 (*m*, 3 H, 2 CH₂); 1.29–1.35 (*m*, CH₂); 1.36, 1.48 (2*s*, 2 Me); 1.59–1.61 (*m*, 1 H, CH₂); 1.67–1.69 (*m*, CH₂); 1.74, 1.85 (2*s*, 2 Me); 1.87–1.88 (*m*, CH₂); 3.72–3.80 (*m*, NHCH); 4.73 (*s*, NCH); 5.66 (*d*, ³*J* = 7.9, NH). ¹³C-NMR (125.7 MHz, CDCl₃): 24.84, 25.48 (2 CH₂); 25.71, 27.12, 27.71, 29.50 (4 Me); 32.89, 33.11 (2 CH₂); 48.67 (NHCH); 70.66 (NCH); 82.50 (OCMe₂CH); 93.69 (CCl₃); 99.29 (OCMe₂N); 157.83 (NCO); 167.57 (NHCO). CI-MS: 399 (100, [*M* + H]⁺). HR-EI-MS: 398.0936 (*M*⁺, C₁₆H₂₅Cl₃N₂O₃⁺; calc. 398.0931).

(RS)-2,2,5,5-Tetramethyl-N-(naphthalen-2-ylmethyl)-3-(trichloroacetyl)-1,3-oxazolidine-4-carboxamide (**5d**). According to GP 1: **2** (254 mg, 2.00 mmol), 2-(isocyanomethyl)naphthalene (334 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 2 d. Purification by washing with ³Pr₂O and pentane. Yield: 625 mg (68%). Colorless solid. M.p. 209°. IR (ATR): 3303, 3082, 2987, 2947, 1687, 1658, 1554. ¹H-NMR (499.9 MHz, CDCl₃): 1.41, 1.49, 1.75, 1.82 (4s, 4 Me); 4.44 (dd, ²J = 14.5, ³J = 5.0, 1 H, CH₂); 4.71 (dd, ²J = 14.5, ³J = 6.4, 1 H, CH₂); 4.84 (s, NCH); 6.11–6.14 (m, NH); 7.33–7.35 (m, 1 arom. H); 7.46–7.51 (m, 2 arom. H); 7.69–7.70 (m, 1 arom. H); 7.78–7.83 (m, 3 arom. H). ¹³C-NMR (125.7 MHz, CDCl₃): 25.82, 27.15, 27.65, 29.48 (4 Me); 44.25 (CH₂); 70.75 (NCH); 82.56 (OCMe₂CH); 93.70 (CCl₃); 99.54 (OCMe₂N); 125.97, 126.37, 126.63, 127.08 (4 arom. CH); 127.87 (2 arom. CH); 128.99 (1 arom. CH); 133.01, 133.46, 134.67 (3 arom. C); 157.75 (NCO); 168.59 (NHCO). CI-MS: 457 (100, [M + H]⁺). HR-EI-MS: 456.0780 (M⁺, C₂₁H₂₃Cl₃N₂O₃⁺; calc. 456.0774).

(RS)-3,4-Dihydro-2,2-dimethyl-N-(prop-2-en-1-yl)-4-(trichloroacetyl)-2H-1,4-benzothiazine-3-carboxamide (**6a**). According to GP 1: **3** (354 mg, 2.00 mmol), allyl isocyanide (154 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 12 d. Purification by CC (tBuOMe/hexane 3:7). Yield: 99 mg (12%). Yellow solid. M.p. 135–137°. R_f (tBuOMe/hexane 3:7) 0.13. IR (ATR): 3302, 1681, 1661, 1578, 1538. ¹H-NMR (500.1 MHz, CDCl₃): 1.11, 1.71 (2s, 2 Me); 3.86–3.88 (m, NHCH₂); 5.01 (s, NCH); 5.10–5.16 (m, CH=CH₂); 5.73–5.81 (m, CH=CH₂); 6.03–6.04 (m, NH); 7.26–7.29 (m, 2 arom. H); 7.37–7.40, 7.66–7.68 (2m, 2 arom. H). ¹³C-NMR (125.8 MHz, CDCl₃): 26.76, 30.12 (2 Me); 41.98 (NHCH₂); 50.35 (Me₂C); 73.03 (NCH); 92.64 (CCl₃); 116.92 (CH=CH₂); 127.29, 128.22, 128.52, 130.75 (4 arom. CH); 132.68 (C(8a)); 133.57 (CH=CH₂); 136.06 (C(4a)); 162.49 (NCO); 167.42 (NHCO). CI-MS: 407 (94, [M + H]⁺). HR-CI-MS: 424.0421 ([M + H + NH₃]⁺, C₁₆H₂₃Cl₃N₃O₂S⁺; calc. 424.0420).

(RS)-3,4-Dihydro-N-(4-methoxybenzyl)-2,2-dimethyl-4-(trichloroacetyl)-2H-1,4-benzothiazine-3-carboxamide (**6b**). According to GP 1: **3** (382 mg, 2.15 mmol), 1-(isocyanomethyl)-4-methoxybenzene (317 mg, 2.15 mmol), and Cl₃CCOOH (351 mg, 2.15 mmol); 5 d. Purification by CC (AcOEt/hexane 3:7). Yield: 60 mg (6%). Colorless solid. M.p. 148–150°. R_f (AcOEt/hexane 3:7) 0.44. IR (ATR): 3287, 3069, 3013, 2967, 2930, 2837, 1677, 1659, 1614, 1544, 1515. ¹H-NMR (500.1 MHz, CDCl₃): 1.14, 1.68 (2s, Me₂C); 3.79 (s, MeO); 4.31 (dd, ²J = 14.6, ³J = 5.4, 1 H, CH₂); 4.39 (dd, ²J = 14.6, ³J = 5.7, 1 H, CH₂); 5.00 (s, NCH); 6.01–6.02 (m, NH); 6.82–6.83 (m, 2 m-CH); 7.10–7.11 (m, 2 o-CH); 7.21–7.28 (m, CH(6), CH(7)); 7.37 (dd, ³J = 7.4, ⁴J = 1.2, CH(8)); 7.56–7.58 (m, CH(5)). ¹³C-NMR (125.8 MHz, CDCl₃): 26.78, 30.23 (Me₂C); 43.33 (CH₂); 50.14 (Me₂C); 55.44 (MeO); 72.64 (NCH); 92.63 (CCl₃); 114.28 (2 m-CH); 127.20, 128.15, 128.31 (CH(5), CH(6), CH(7)); 129.13 (2 o-CH); 129.68 (C(Ar)CH₂); 130.65 (C(8)); 132.44 (C(8a)); 135.83 (C(4a)); 159.24 (C(Ar)OMe); 162.61 (NCO); 167.26 (NHCO). CI-MS: 487 (95, [M + H]⁺). HR-CI-MS: 487.0429 ([M + H]⁺, C₂₁H₂₂Cl₃N₃O₃S⁺; calc. 487.0417).

(RS)-3,4-Dihydro-2,2-dimethyl-N-(2-phenylethyl)-4-(trichloroacetyl)-2H-1,4-benzothiazine-3-carboxamide (**6c**). According to GP 1: **3** (354 mg, 2.00 mmol), (2-isocyanatoethyl)benzene (262 mg, 2.00 mmol), and Cl₃CCOOH (327 mg, 2.00 mmol); 8 d. Purification by CC (tBuOMe/hexane 3:7). Yield: 63 mg (7%). Yellow solid. M.p. 112–113°. R_f (tBuOMe/hexane 3:7) 0.19. IR (ATR): 3317, 3065, 2968, 2930, 1671, 1523. ¹H-NMR (500.1 MHz, CDCl₃): 1.00, 1.63 (2s, 2 Me); 2.77–2.80 (m, PhCH₂); 3.46–3.52, 3.61–3.69 (2m, NHCH₂); 4.94 (s, NCH); 5.79–5.80 (m, NH); 7.14–7.35 (m, 9 arom. H). ¹³C-NMR (125.8 MHz, CDCl₃): 26.51, 29.95 (2 Me); 35.36 (PhCH₂); 40.25 (NHCH₂); 50.55 (Me₂C); 73.21 (NCH); 92.59 (CCl₃); 126.85, 127.31, 128.17, 128.24 (4 arom. CH); 128.85, 128.97 (4 arom. CH); 130.86 (1 arom. CH); 132.91 (C(8a)); 135.98 (C(4a)); 138.41 (1 arom. C); 162.27 (NCO); 167.55 (NHCO). CI-MS: 471 (96, [M + H]⁺). HR-CI-MS: 488.0742 ([M + H + NH₃]⁺, C₂₁H₂₅Cl₃N₃O₂S⁺; calc. 488.0733).

General Procedure (GP 2) for the Synthesis of the Hydantoines 7–9. One equiv. of a EtONa soln. (1M) was added to a suspension of 1 equiv. of the respective bisamide **4**, **5**, or **6** in anh. EtOH (10 ml per mmol bisamide). After stirring at r.t. for 1 h, the solvent was removed at the rotary evaporator. The purification of the crude product is described in the experiments.

(RS)-1,1,3,3-Tetramethyl-6-(prop-2-en-1-yl)-1H-imidazo[1,5-c][1,3]thiazole-5,7(6H,7aH)-dione (**7a**). According to GP 2, with **4a** (250 mg, 0.67 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 144 mg (85%). Orange solid. M.p. 40°. IR (ATR): 2992, 2972, 2927, 1758, 1703. ¹H-NMR (500.1 MHz, CDCl₃): 1.39, 1.60, 1.72, 2.04 (4s, 4 Me); 4.03–4.05 (m, NCH₃); 4.42–4.43 (m, NCH); 5.18–5.20, 5.23–5.26 (m, CH=CH₂); 5.75–5.83 (m, CH=CH₂). ¹³C-NMR (125.8 MHz, CDCl₃):

25.75, 25.89, 30.16, 33.35 (4 Me); 40.96 (NCH₂); 53.27 (SCMe₂CH); 69.46 (SCMe₂N); 74.27 (NCH); 118.53 (CH=CH₂); 131.20 (CH=CH₂); 152.78 (NCON); 168.63 (NCOCH). CI-MS: 255 (100, [M + H]⁺). HR-EI-MS: 254.1092 (M⁺, C₂₁H₂₃Cl₃N₂O₃⁺; calc. 254.1089).

(RS)-6-(4-Methoxybenzyl)-1,1,3,3-tetramethyl-1H-imidazo[1,5-c][1,3]thiazole-5,7(6H,7aH)-dione (**7b**). According to GP 2, with **4b** (154 mg, 0.34 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 85 mg (74%). Yellow solid. M.p. 145–147°. IR (ATR): 2965, 2930, 2836, 1711, 1599, 1510. ¹H-NMR (500.1 MHz, CDCl₃): 1.37, 1.51, 1.74, 1.83 (4s, 2 Me₂C); 3.73 (s, MeO); 4.21 (d, ²J = 14.5, 1 H, CH₂); 4.27 (d, ²J = 15.4, 1 H, CH₂); 4.30 (s, NCH); 6.76–6.78 (m, 2 m-CH); 7.11–7.12 (m, 2 o-CH). ¹³C-NMR (125.8 MHz, CDCl₃): 26.71, 31.42, 32.58, 32.64 (2 Me₂C); 44.29 (CH₂); 48.48 (SCMe₂CH); 55.35 (OMe); 70.44 (SCMe₂N); 77.36 (NCH); 114.13 (2 m-CH); 129.05 (2 o-CH); 131.13 (C(Ar)CH₂); 157.46 (NCON); 158.89 (C(Ar)OMe); 177.01 (NCOCH). CI-MS: 352 (71, [M + H + NH₃]⁺). HR-CI-MS: 352.1691 ([M + H + NH₃]⁺, C₁₇H₂₆N₃O₃S⁺; calc. 352.1695).

(RS)-6-Cyclohexyl-1,1,3,3-tetramethyl-1H-imidazo[1,5-c][1,3]thiazole-5,7(6H,7aH)-dione (**7c**). According to GP 2, with **4c** (200 mg, 0.48 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 89 mg (63%). Orange solid. M.p. 86°. IR (ATR): 2928, 2858, 1767, 1750, 1704, 1672, 1599. ¹H-NMR (500.1 MHz, CDCl₃): 1.13–1.33; 1.63–1.65; 1.79–1.82; 2.07–2.16 (4m, 5 CH₂); 1.36, 1.58, 1.70, 2.03 (4s, 4 Me); 3.78–3.84 (m, NCHCH₂); 4.30 (s, NCHCO). ¹³C-NMR (125.8 MHz, CDCl₃): 25.15 (CH₂); 25.42, 25.81 (2 Me); 25.95, 29.38, 29.47 (3 CH₂); 30.11, 33.49 (2 Me); 51.83 (NCHCH₂); 53.49 (SCMe₂CH); 69.63 (SCMe₂N); 73.45 (NCHCO); 153.34 (NCON); 168.82 (NCOCH). ESI-MS: 321 (31, [M + Li⁺ + H₂O]⁺). HR-CI-MS: 297.1639 ([M + H]⁺, C₁₅H₂₅N₃O₃S⁺; calc. 297.1637).

(RS)-1,1,3,3-Tetramethyl-6-(naphthalen-2-ylmethyl)-1H-imidazo[1,5-c][1,3]thiazole-5,7(6H,7aH)-dione (**7d**). According to GP 2, with **4d** (250 mg, 0.53 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 158 mg (84%). Orange solid. M.p. 58°. IR (ATR): 3340, 2984, 1673, 1606, 1510. ¹H-NMR (500.1 MHz, CDCl₃): 1.30, 1.60, 1.71, 2.04 (4s, 4 Me); 4.43 (s, NCH); 4.76–4.77 (m, CH₂); 7.45–7.49 (m, 2 arom. H); 7.50–7.52 (m, 1 arom. H); 7.79–7.83 (m, 3 arom. H); 7.85–7.86 (m, 1 arom. H). ¹³C-NMR (125.8 MHz, CDCl₃): 25.69, 25.87, 30.18, 33.37 (4 Me); 42.71 (CH₂); 53.35 (SCMe₂CH); 69.53 (SCMe₂N); 74.29 (NCH); 126.29, 126.37, 126.57, 127.78, 128.00, 128.14, 128.65 (7 arom. CH); 133.04, 133.36, 133.55 (3 arom. C); 152.96 (NCON); 168.57 (NCOCH). CI-MS: 355 (100, [M + H]⁺). HR-EI-MS: 354.1405 (M⁺, C₂₀H₂₃N₃O₃S⁺; calc. 354.1402).

(RS)-6'-(Naphthalen-2-ylmethyl)dispiro[cyclohexane-1,1'-imidazo[1,5-c][1,3]thiazole-3',1''-cyclohexane]-5',7'(6'H,7a'H)-dione (**7e**). According to GP 2, with **4e** (277 mg, 0.50 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 205 mg (94%). Colorless solid. M.p. 168°. IR (ATR): 2939, 2857, 1755, 1700. ¹H-NMR (500.1 MHz, CDCl₃): 1.11–2.12 (m, 19 H, CH₂, c-Hex); 2.96–3.02 (m, 1 H, CH₂, c-Hex); 4.38 (s, NCH); 4.76–4.77 (m, NCH₂); 7.45–7.51 (m, 3 arom. H); 7.79–7.84 (m, 4 arom. H). ¹³C-NMR (125.8 MHz, CDCl₃): 22.38, 24.12, 24.67, 25.37, 25.44, 25.52, 32.64, 36.56, 37.62, 42.06 (10 CH₂, c-Hex); 42.58 (NCH₂); 58.93 (SC(CH₂)₅CH); 73.97 (NCH); 75.62 (SC(CH₂)₅N); 126.25, 126.35, 126.58, 127.78, 127.92, 128.13, 128.61 (7 arom. CH); 133.03, 133.38, 133.65 (3 arom. C); 152.82 (NCON); 168.97 (NCOCH). CI-MS: 435 (100, [M + H]⁺). HR-CI-MS: 435.2100 ([M + H]⁺, C₂₆H₃₁N₃O₃S⁺; calc. 435.2101).

(RS)-1,1-Dimethyl-6-(prop-2-en-1-yl)tetrahydro-1H-spiro[imidazo[1,5-c][1,3]thiazole-3,4'-pyran]-5,7(6H,7aH)-dione (**7f**). According to GP 2, with **4f** (163 mg, 0.39 mmol). Purification by washing with CH₂Cl₂ and drying in vacuum. Yield: 79 mg (69%). Colorless solid. M.p. 107–112°. IR (ATR): 2964, 2859, 1711, 1597, 1512. ¹H-NMR (499.9 MHz, CD₃OD): 1.44, 1.60 (2s, 2 Me); 1.67–1.70 (m, 1 H, CH₂CCH₂); 2.39–2.42, 3.11–3.17 (2m, CH₂CCH₂); 3.35–3.45 (m, 2 H, CH₂CCH₂, CH₂OCH₂); 3.62–3.70 (m, 1 H, CH₂OCH₂); 3.75–3.76 (m, NCH₂); 3.91–3.99 (m, 2 H, CH₂OCH₂); 4.14 (s, NCH); 5.04–5.06, 5.18–5.21 (2m, CH=CH₂); 5.83–5.90 (m, CH=CH₂). ¹³C-NMR (125.7 MHz, CD₃OD): 26.19, 34.91 (2 Me); 38.75 (CH₂CCH₂); 40.91 (CH₂CCH₂); 43.94 (NCH₂); 50.06 (SCMe₂CH); 68.60 (CH₂OCH₂); 68.98 (CH₂OCH₂); 78.35 (SC(CH₂)₂N); 79.28 (NCH); 115.54 (CH=CH₂); 136.56 (CH=CH₂); 157.95 (NCON); 176.45 (NCOCH). CI-MS: 297 (69, [M + H]⁺). HR-CI-MS: 314.1541 ([M + H + NH₃]⁺, C₁₄H₂₄N₃O₃S⁺; calc. 314.1538).

(RS)-6-(4-Methoxybenzyl)-1,1-dimethyltetrahydro-1H-spiro[imidazo[1,5-c][1,3]thiazole-3,4'-pyran]-5,7(6H,7aH)-dione (**7g**). According to GP 2, with **4g** (201 mg, 0.40 mmol). Purification by washing with cold EtOH and crystallization from AcOEt. Yield: 106 mg (70%). Colorless oil. M.p. 171–175°. IR

(ATR): 2960, 2855, 1710, 1601, 1511. $^1\text{H-NMR}$ (499.9 MHz, CD_3OD): 1.44, 1.60 (2s, Me_2C); 1.68–1.71 (*m*, 1 H, CH_2CCH_2); 2.42–2.44, 3.13–3.19 (2*m*, CH_2CCH_2); 3.36–3.54 (*m*, 2 H, CH_2CCH_2 , OCH_2); 3.62–3.67 (*m*, 1 H, OCH_2); 3.76 (*s*, OMe); 3.91–3.99 (*m*, 2 H, CH_2OCH_2); 4.14 (*s*, NCH); 4.27–4.28 (*m*, NCH_2); 6.85–6.86 (*m*, 2 *m*-CH); 7.22–7.23 (*m*, 2 *o*-CH). $^{13}\text{C-NMR}$ (125.7 MHz, CD_3OD): 26.20, 34.92 (CMe_2); 38.79 (CH_2CCH_2); 40.95 (CH_2CCH_2); 44.84 (NCH_2); 50.08 (SCMe_2CH); 55.68 (MeO); 68.62, 68.99 (CH_2OCH_2); 78.40 ($\text{SC}(\text{CH}_2)_2\text{N}$); 79.33 (NCH); 114.93 (2 *m*-CH); 129.54 (2 *o*-CH); 132.84 ($\text{C}(\text{Ar})\text{CH}_2$); 158.06 (NCON); 160.24 ($\text{C}(\text{Ar})\text{OMe}$); 176.41 (NCOCH). CI-MS: 395 (6, $[\text{M} + \text{H} + \text{NH}_3]^+$). HR-CI-MS: 394.1796 ($[\text{M} + \text{H} + \text{NH}_3]^+$, $\text{C}_{19}\text{H}_{28}\text{N}_3\text{O}_4\text{S}^+$; calc. 394.1801).

(*RS*)-1,1-Dimethyl-6-(2-phenylethyl)tetrahydro-1*H*-spiro[imidazo[1,5-*c*][1,3]thiazole-3,4'-pyran]-5,7(6*H*,7*aH*)-dione (**7h**). According to GP 2, with **4h** (141 mg, 0.29 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 60 mg (57%). Colorless solid. M.p. 129°. IR (ATR): 2962, 2945, 2913, 2842, 1763, 1702. $^1\text{H-NMR}$ (500.1 MHz, CDCl_3): 1.20, 1.58 (2s, 2 Me); 1.73–1.76 (*m*, 1 H, CH_2CCH_2); 1.92–1.95 (*m*, 1 H, CH_2CCH_2); 2.31–2.37 (*m*, 1 H, CH_2CCH_2); 2.89–2.99 (*m*, PhCH_2); 3.33–3.42 (*m*, 2 H, CH_2CCH_2 , CH_2OCH_2); 3.50–3.55 (*m*, 1 H, CH_2OCH_2); 3.65–3.71, 3.73–3.79 (2*m*, NCH_2); 3.97–3.99 (*m*, 1 H, CH_2OCH_2); 4.10–4.12 (*m*, 1 H, CH_2OCH_2); 4.35 (*s*, NCH); 7.19–7.24 (*m*, 3 arom. H); 7.26–7.30 (*m*, 2 arom. H). $^{13}\text{C-NMR}$ (125.8 MHz, CDCl_3): 25.73, 26.02 (2 Me); 33.98 (PhCH_2); 37.55 (CH_2CCH_2); 39.82 (NCH_2); 42.32 (CH_2CCH_2); 52.35 (SCMe_2CH); 65.83 (CH_2OCH_2); 67.18 (CH_2OCH_2); 72.91 ($\text{SC}(\text{CH}_2)_2\text{N}$); 73.45 (NCH); 126.86 (1 arom. CH); 128.67, 129.03 (4 arom. CH); 137.67 (1 arom. C); 152.93 (NCON); 168.57 (NCOCH). CI-MS: 362 (100, $[\text{M} + \text{H}]^+$). HR-CI-MS: 361.1584 ($[\text{M} + \text{H}]^+$, $\text{C}_{19}\text{H}_{25}\text{N}_3\text{O}_3\text{S}^+$; calc. 361.1586).

(*RS*)-1,1,3,3-Tetramethyl-6-(prop-2-en-1-yl)-1*H*-imidazo[1,5-*c*][1,3]oxazole-5,7(6*H*,7*aH*)-dione (**8a**). According to GP 2, with **5a** (358 mg, 1.00 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 170 mg (71%). Colorless solid. M.p. 197°. IR (ATR): 2991, 2942, 1639, 1591. $^1\text{H-NMR}$ (500.1 MHz, CD_3OD): 1.34, 1.44, 1.62, 1.71 (4s, 4 Me); 3.75–3.76 (*m*, CH_2); 3.95 (*s*, NCH); 5.03–5.05, 5.16–5.20 (2*m*, $\text{CH}=\text{CH}_2$); 5.81–5.88 (*m*, $\text{CH}=\text{CH}_2$). $^{13}\text{C-NMR}$ (125.8 MHz, CD_3OD): 25.81, 28.11, 28.88, 31.12 (4 Me); 43.43 (CH_2); 72.02 (NCH); 81.13 (OCMe_2CH); 96.49 (OCMe_2N); 115.40 ($\text{CH}=\text{CH}_2$); 136.35 ($\text{CH}=\text{CH}_2$); 156.78 (NCON); 176.44 (NCOCH). CI-MS: 239 (100, $[\text{M} + \text{H}]^+$). HR-CI-MS: 239.1392 ($[\text{M} + \text{H}]^+$, $\text{C}_{12}\text{H}_{19}\text{N}_2\text{O}_3^+$; calc. 239.1390).

(*RS*)-6-(4-Methoxybenzyl)-1,1,3,3-tetramethyl-1*H*-imidazo[1,5-*c*][1,3]oxazole-5,7(6*H*,7*aH*)-dione (**8b**). According to GP 2, with **5b** (184 mg, 0.42 mmol). Purification by CC (AcOEt/EtOH 4:1). Yield: 71 mg (52%). Colorless solid. M.p. 126–131°. R_f (AcOEt/EtOH 4:1) 0.58. IR (ATR): 2985, 2939, 2835, 1711, 1667, 1642, 1510. $^1\text{H-NMR}$ (499.9 MHz, CD_3OD): 1.33, 1.46, 1.64, 1.70 (4s, 2 Me_2C); 3.76 (*s*, MeO); 4.17 (*d*, $^2J = 15.4$, 1 H, CH_2); 4.37–4.39 (*m*, 2 H, CH_2 , NCH); 6.83–6.85 (*m*, 2 *m*-CH); 7.19–7.20 (*m*, 2 *o*-CH). $^{13}\text{C-NMR}$ (125.7 MHz, CD_3OD): 25.71, 28.15, 28.93, 30.83 (2 Me_2C); 44.34 (CH_2); 55.69 (MeO); 69.41 (NCH); 81.08 (OCMe_2CH); 96.90 (OCMe_2N); 114.76 (2 *m*-CH); 129.29 (2 *o*-CH); 133.23 ($\text{C}(\text{Ar})\text{CH}_2$); 156.97 (NCON); 160.11 ($\text{C}(\text{Ar})\text{OMe}$); 173.31 (NCOCH). CI-MS: 336 (5, $[\text{M} + \text{H} + \text{NH}_3]^+$). HR-CI-MS: 336.1930 ($[\text{M} + \text{H} + \text{NH}_3]^+$, $\text{C}_{17}\text{H}_{26}\text{N}_3\text{O}_4^+$; calc. 336.1923).

(*RS*)-6-Cyclohexyl-1,1,3,3-tetramethyl-1*H*-imidazo[1,5-*c*][1,3]oxazole-5,7(6*H*,7*aH*)-dione (**8c**). According to GP 2, with **5c** (200 mg, 0.50 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 107 mg (76%). Colorless solid. M.p. 57°. IR (ATR): 2978, 2932, 2857, 1765, 1705, 1603. $^1\text{H-NMR}$ (499.9 MHz, CDCl_3): 1.12 (*s*, Me); 1.15–1.33 (*m*, 2 CH_2); 1.44, 1.47 (2s, 2 Me); 1.62–1.67 (*m*, 2 CH_2); 1.75 (*s*, Me); 1.79–1.82, 2.05–2.16 (2*m*, CH_2); 3.80–3.86 (*m*, NCH); 4.02 (*s*, NCH). $^{13}\text{C-NMR}$ (125.7 MHz, CDCl_3): 22.87 (Me); 25.14 (CH_2); 25.93 (2 CH_2); 27.91 (Me); 29.16, 29.38 (2 CH_2); 30.70 (Me); 51.92 (NCHCH_2); 69.37 (NCH); 79.66 ($\text{OC}(\text{Me})_2\text{CH}$); 94.13 ($\text{OC}(\text{Me})_2\text{N}$); 156.11 (NCON); 169.72 (NCOCH). CI-MS: 281 (100, $[\text{M} + \text{H}]^+$). HR-CI-MS: 281.1858 ($[\text{M} + \text{H}]^+$, $\text{C}_{15}\text{H}_{25}\text{N}_3\text{O}_3^+$; calc. 281.1860).

(*RS*)-1,1,3,3-Tetramethyl-6-(naphthalen-2-ylmethyl)-1*H*-imidazo[1,5-*c*][1,3]oxazole-5,7(6*H*,7*aH*)-dione (**8d**). According to GP 2, with **5d** (300 mg, 0.66 mmol). Purification by washing with cold EtOH and drying in vacuum. Yield: 175 mg (78%). Colorless solid. M.p. 114°. IR (ATR): 2981, 2932, 1771, 1708. $^1\text{H-NMR}$ (500.1 MHz, CDCl_3): 1.04, 1.46, 1.49, 1.77 (4s, 4 Me); 4.15 (*s*, NCH); 4.78–4.79 (*m*, CH_2); 7.45–7.49 (*m*, 2 arom. H); 7.51–7.53 (*m*, 1 arom. H); 7.79–7.83 (*m*, 3 arom. H); 7.86–7.87 (*m*, 1 arom. H). $^{13}\text{C-NMR}$ (125.8 MHz, CDCl_3): 23.02, 26.00, 27.89, 30.59 (4s, 4 Me); 42.81 (CH_2); 70.03 (NCH); 79.64 ($\text{OC}(\text{Me})_2\text{CH}$); 94.07 ($\text{OC}(\text{Me})_2\text{N}$); 126.30, 126.36, 126.54, 127.76, 128.06, 128.12, 128.64 (7 arom. CH);

133.03 (1 arom. C); 133.34 (2 arom. C); 155.73 (NCON); 169.41 (NCOCH). CI-MS: 339 (100, $[M + H]^+$). HR-EI-MS: 338.1627 (M^+ , $C_{20}H_{22}N_2O_3^+$; calc. 338.1630).

(RS)-4,4-Dimethyl-2-(prop-2-en-1-yl)-3a,4-dihydro-1H-imidazo[5,1-c][1,4]benzothiazine-1,3(2H)-dione (**9a**). According to GP 2, with **6a** (62 mg, 0.15 mmol). Purification by CC (CH_2Cl_2). Yield: 30 mg (67%). Colorless solid. M.p. 84–89°. R_f (CH_2Cl_2) 0.30. IR (ATR): 2990, 2966, 2927, 2880, 1775, 1704. 1H -NMR (500.1 MHz, $CDCl_3$): 1.34, 1.74 (2s, 2 Me); 4.14–4.24 (m, NCH_2); 4.28 (s, NCH); 5.23–5.25, 5.29–5.33 (2m, $CH=CH_2$); 5.80–5.88 (m, $CH=CH_2$); 7.01–7.04 (m, CH(7)); 7.08–7.10 (m, CH(6)); 7.13–7.16 (m, CH(8)); 8.22–8.24 (m, CH(9)). ^{13}C -NMR (125.8 MHz, $CDCl_3$): 23.93, 24.87 (2 Me); 41.17 (CH_2); 42.29 (Me_2C); 64.91 (NCH); 119.10 ($CH=CH_2$); 121.03 (C(9)); 122.18 (C(5a)); 124.74, 125.49, 126.54 (C(6), C(7), C(8)); 130.62 (C(9a)); 130.67 ($CH=CH_2$); 153.42 (NCON); 167.66 (NCOCH). EI-MS: 228 (100, M^+). HR-EI-MS: 288.0939 (M^+ , $C_{15}H_{16}N_2O_3S^+$; calc. 288.0933).

(RS)-2-(4-Methoxybenzyl)-4,4-dimethyl-3a,4-dihydro-1H-imidazo[5,1-c][1,4]benzothiazine-1,3(2H)-dione (**9b**). According to GP 2, with **6b** (70 mg, 0.14 mmol). Purification by CC (BuOMe/hexane 3:7). Yield: 40 mg (78%). Colorless solid. M.p. 120°. R_f (BuOMe/hexane 3:7) 0.52. IR (ATR): 3000, 2967, 2932, 2835, 1771, 1704, 1614, 1586, 1515. 1H -NMR (499.9 MHz, $CDCl_3$): 1.19, 1.71 (2s, 2 Me_2C); 3.78 (s, MeO); 4.23 (s, NCH); 4.65–4.71 (m, CH_2); 6.83–6.85 (m, 2 *m*-CH); 7.00–7.03 (m, CH(7)); 7.07–7.08 (m, CH(6)); 7.12–7.15 (m, CH(8)); 7.37–7.38 (m, 2 *o*-CH); 8.21–8.23 (m, CH(9)). ^{13}C -NMR (125.7 MHz, $CDCl_3$): 23.83, 24.87 (2 Me_2C); 42.23 (CH_2); 42.41 (Me_2C); 55.39 (MeO); 64.88 (NCH); 114.20 (2 *m*-CH); 121.13 (C(9)); 122.28 (C(5a)); 124.73, 125.45, 126.55 (C(6), C(7), C(8)); 127.95 (C(9a)); 130.42 (2 *o*-CH); 130.68 (C(Ar) CH_2); 153.70 (NCON); 159.61 (C(Ar)OMe); 167.85 (NCOCH). CI-MS: 370 (100, $[M + H]^+$). HR-CI-MS: 369.1270 ($[M + H]^+$, $C_{20}H_{21}N_2O_3S^+$; calc. 369.1273).

(RS)-4,4-Dimethyl-2-(2-phenylethyl)-3a,4-dihydro-1H-imidazo[5,1-c][1,4]benzothiazine-1,3(2H)-dione (**9c**). According to GP 2, with **6c** (44 mg, 0.09 mmol). R_f (CH_2Cl_2) 0.65. Yield: 20 mg (63%). Colorless oil. IR (ATR): 2958, 2928, 2857, 1771, 1715. 1H -NMR (499.9 MHz, $CDCl_3$): 1.17, 1.69 (2s, 2 Me); 3.01–3.02 (m, $PhCH_2$); 3.79–3.85, 3.89–3.95 (2m, NCH_2); 4.21 (s, NCH); 7.02–7.05, 7.08–7.09 (2m, 2 arom. H); 7.13–7.31 (m, 6 arom. H); 8.21–8.23 (m, CH(9)). ^{13}C -NMR (125.7 MHz, $CDCl_3$): 23.76, 24.90 (2 Me); 33.82 ($PhCH_2$); 40.13 (NCH_2); 42.28 (Me_2C); 64.91 (NCH); 121.04 (C(9)); 122.33 (C(5a)); 124.73, 125.50, 126.58, 126.98 (4 arom. CH); 128.79, 129.05 (4 arom. CH); 130.74 (C(9a)); 137.59 ($PhCH_2$); 153.72 (NCON); 167.92 (NCOCH). EI-MS: 352 (100, M^+). HR-EI-MS: 352.1242 (M^+ , $C_{20}H_{20}N_2O_2S^+$; calc. 352.1246).

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