Asymmetric Synthesis of α-Substituted *N*-Methylsulfonamides

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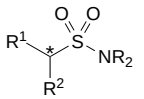
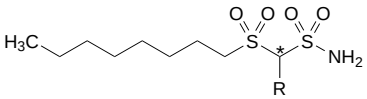
Dedicated to Professor *Dieter Seebach* on the occasion of his 65th birthday

A novel amine auxiliary for the asymmetric synthesis of α-substituted *N*-methylsulfonamides is described. The reaction of 4-([1,1′-biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-amine (**16**) with various aliphatic sulfonyl chlorides afforded the corresponding sulfonamides, which were lithiated and subsequently reacted with electrophiles to give the corresponding products in high yields and good-to-excellent asymmetric inductions (de 83–95%). Racemization-free cleavage of the auxiliary led to the α-alkylated *N*-methylsulfonamides in acceptable yields and high enantiomer purities (ee 91 to $\geq$98).

Introduction. – Since the discovery of the antibacterial activity of streptozone and sulfachrysoidine by *Domagk* (for reviews, see [1]), sulfonamides have found widespread application in the development of new antibiotics. Numerous examples of α-substituted sulfonamides of the general type **1a** displaying potent pharmacological activity are known. The racemic α-substituted sulfonylmethanesulfonamide derivatives **1b** and **1c** are reported to be inhibitors of carbonic anhydrase (CA) [2]. In particular, the fluorosulfonamide **1c** was determined as the most potent inhibitor among the compounds of this type examined.



1a



1b R = CH_3
1c R = F

Jones et al. [3] reported the synthesis and medical evaluation of a cyclic sulfonamido-prostaglandin analogue with a stereogenic center in the α-position to the sulfonamido group. Moreover, α-substituted sultam fragments have been utilized as P1 scaffolds in the synthesis and biological evaluation of novel HIV protease inhibitors [4].

Despite the obvious biological relevance of this class of compounds, only very few efficient methods for their asymmetric synthesis are known. *Davis et al.* [5] described the asymmetric synthesis of α-substituted primary sulfonamides involving the diastereoselective α-alkylation of *N*-sulfonylcamphorimine dianions. Acidic hydrolysis gave rise to the enantiomer-enriched sulfonamides with medium to good selectivities.

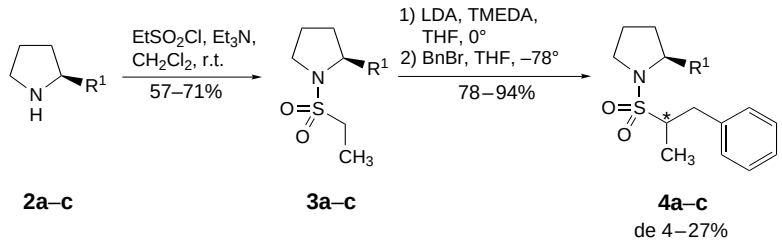
Huart and *Ghosez* reported an enantioselective synthesis of bicyclic cyclopentenones *via* stereoselective 1,4-addition of metalated enantiomerically pure sulfonamides to cyclic enones [6].

In a preceding communication, we described the enantioselective synthesis of *N*-methylsulfonamides by means of a novel amine as chiral auxiliary [7]. Herein, we present in detail the development of this methodology.

Results and Discussion. – The aim of our project was to develop an efficient chiral auxiliary that would allow, for the first time, efficient asymmetric α-alkylation of sulfonamides. In the course of this study, a large number of enantiomerically pure amines were converted to their sulfonamides to evaluate them for their diastereoselectivity of the α-alkylation reaction.

For first alkylation tests, various pyrrolidine derivatives were synthesized. The (2*S*)-[(methoxymethoxy)methyl]pyrrolidine (**2a**), (2*S*)-(methoxymethyl)pyrrolidine (**2b**), and (2*S*)-(1-methoxy-1-methylethyl)pyrrolidine (**2c**), which are known as precursors for hydrazine auxiliaries [8], were converted to the corresponding sulfonamides **3a**–**c** by treatment with ethanesulfonyl chloride (*Scheme 1*). The sulfonamides **3a**–**c** were then lithiated with lithium diisopropylamide (LDA) and allowed to react with benzyl bromide at $-78°$ to afford the alkylated sulfonamides **4a**–**c** (*Tables 1* and *2*).

Scheme 1



2a–c **3a–c** **4a–c**

de 4–27%

a R^1 = $MeOCH_2OCH_2$, **b** R^1 = $MeOCH_2$, **c** R^1 = $MeOC(Me)_2$

Table 1. *Synthesis of Chiral Sulfonamides* **3a**–**c**

Product	R^1	Yield [%]	$[\alpha]_D^{r.t.}$ (*c*, $CHCl_3$)
3a	$MeOCH_2OCH_2$	57	– 36.9 (1.0)
3b	$MeOCH_2$	63	– 43.0 (1.15)
3c	$MeOC(Me)_2$	71	– 19.4 (1.07)

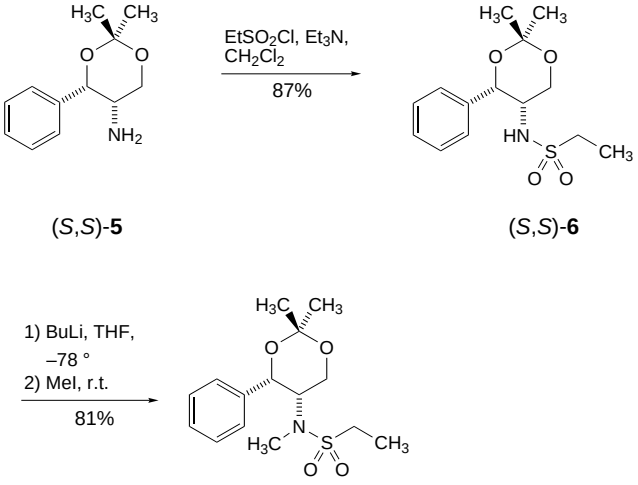
Table 2. *α-Benzylation of Sulfonamides* **3a**–**c** *Affording Sulfonamides* **4a**–**c**

Product	R^1	Yield [%]	de [%][a])
4a	$MeOCH_2OCH_2$	85	4
4b	$MeOCH_2$	94	11
4c	$MeOC(Me)_2$	78	27

[a]) Determined by ^{13}C-NMR spectroscopy.

Although all α-alkylated sulfonamides **4** were obtained in unsatisfactory diastereoselectivities, it was observed that better diastereoisomer excesses (de) could be obtained when the steric demand of the side chain at the pyrrolidine ring was increased. We then turned to the readily available amine auxiliary (4*S*,5*S*)-2,2-dimethyl-4-phenyl-1,3-dioxan-5-anine ((*S*,*S*)-**5**), which has already been applied in a series of auxiliary-controlled reactions [9] or in the preparation of a chiral ligand for chromium(0) complexes [10]. (*S*,*S*)-**5** was converted to the tertiary *N*-methylsulfonamide (*S*,*S*)-**7** in two steps *via* the secondary derivative (*S*,*S*)-**6** and subsequent *N*-methylation (*Scheme 2*).

Scheme 2

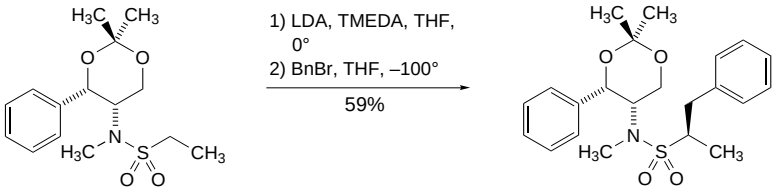


(*S*,*S*)-**5** (*S*,*S*)-**6**

(*S*,*S*)-**7**

(*S*,*S*)-**7** was lithiated with LDA in presence of *N,N,N′,N′*-tetramethylethane-1,2-diamine (TMEDA) and alkylated with benzyl bromide (*Scheme 3*). TMEDA was used to activate the intermediate carbanion to get satisfactory yields. After chromatography the corresponding α-alkylated sulfonamide (*S*,*S*,*R*)-**8** was isolated in 59% yield and an improved de of 63% (*Scheme 3*).

Scheme 3



(*S*,*S*)-**7** (*S*,*S*,*R*)-**8**

de 63% (96%, after chromatography)

(*S*,*S*,*R*)-**8** was obtained as the diastereomerically pure product after prep. HPLC purification (de $\geq$96%). To gain some insight into the mechanism of the α-alkylation and the origin of the asymmetric induction, the configuration of the newly formed stereogenic center had to be determined. Single-crystal X-ray analysis of (*S*,*S*,*R*)-**8** revealed the absolute configuration at C(α) to be *R* (*Fig. 1*).

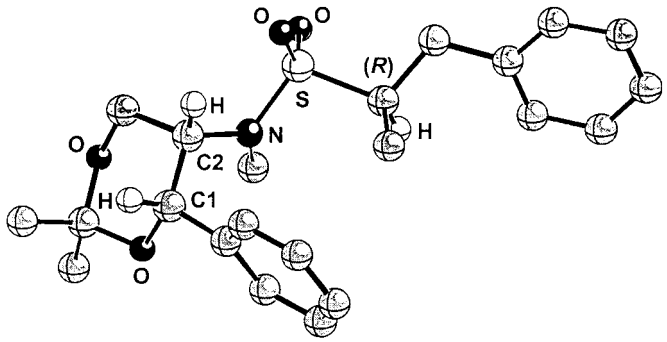
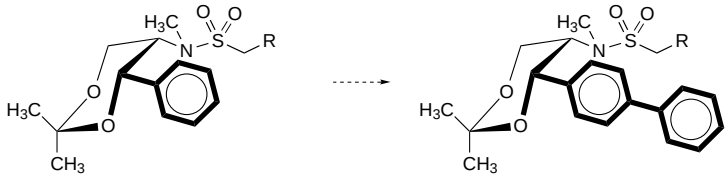


Fig. 1. *X-Ray crystal structure of (*S,S,R*)*-**8** (for the program for the graphical presentation, see [11])

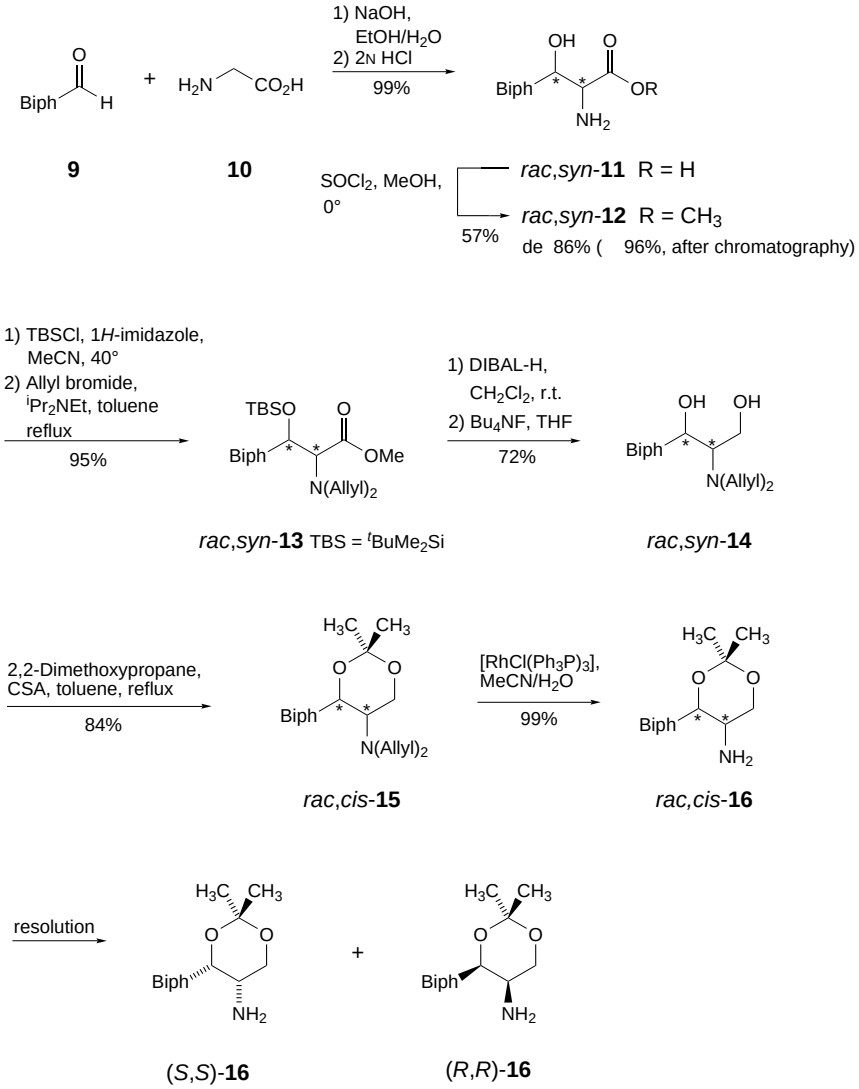
According to the information obtained from the X-ray structure, it was reasonable to assume that the phenyl group at the dioxane ring (substrate **A**, *Scheme 4*) should provide the main contribution to the diastereoselectivity of the alkylation process. An increase of the steric demand of the aromatic moiety should, therefore, give a better diastereofacial shielding of the prochiral reaction center. Therefore, we decided to synthesize a substrate bearing a biphenyl-yl group instead of the phenyl group at the dioxane moiety (substrate **B**, *Scheme 4*).

Scheme 4



A successful procedure was performed according to *Erlenmeyer*'s phenylserine synthesis [12] starting from [1,1′-biphenyl]-4-carbaldehyde (**9**) and glycine (**10**) (*Scheme 5*). The reaction afforded the aldol adduct *rac*,*syn*-**11**, which was transformed into the corresponding methyl ester *rac*,*syn*-**12**. The NMR spectra of the product showed a de of 86% for the *syn*-isomer. The diastereoisomerically pure *syn*-diastereoisomer was obtained by flash chromatography. Reduction of *rac*,*syn*-**12** with various reducing reagents gave rise to the corresponding diol, but in very low yield. Therefore, it was necessary to protect the functional groups. Protection of the OH group with (*tert*-butyl)dimethylsilyl chloride (TBSCl) and reaction of the amine moiety with allyl bromide resulted in the doubly protected compound *rac*,*syn*-**13**, which was subsequently converted to the diol *rac*,*syn*-**14** by reduction with diisobutylaluminium

Scheme 5

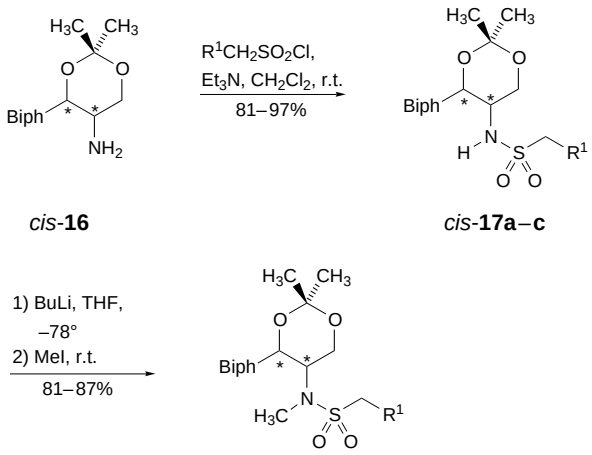


hydride (DIBAL-H) and deprotection of the OH group with Bu_4NF in 72% yield. Ring closure to the acetonide *rac*,*cis*-**15** and deprotection of the amino group by allylic rearrangement with *Wilkinson* catalyst [13] led to the racemic *cis*-configured amine *rac*,*cis*-**16**. The enantiomers were separated by resolution with tartaric acid.

The amines were converted to the *Mosher* amides to determine the absolute configuration by NOE experiments. Confirmation of the enantiomer purity was conducted by ^{13}C-NMR spectroscopy. In the course of these measurements, the ability of the amine **16** to act as a chiral shift reagent for molecules bearing an acidic proton was demonstrated in a parallel project [14].

After the development of a suitable synthesis of the amines (*S*,*S*)- and (*R*,*R*)-**16**, they were transformed *via* the secondary sulfonamides *cis*-**17a**–**c** into the corresponding sulfonamide precursors *cis*-**18a**–**c**, respectively, according to the procedure described in *Scheme 3* (see *Scheme 6* and *Table 3*).

Scheme 6



a R^1 = Me, **b** R^1 = Et, **c** R^1 = ^{i}Pr

Table 3. *Synthesis of the Sulfonamides* **17** *and* **18**

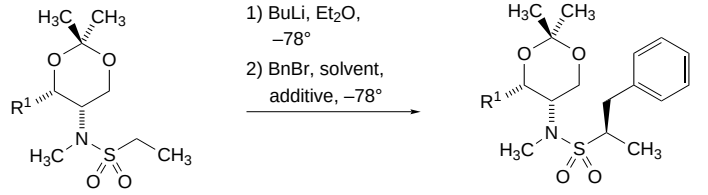
R^1	Product **17**	Yield [%]	Product **18**	Yield [%]
Me	(*S*,*S*)-**17a**	81	(*S*,*S*)-**18a**	87
Et	(*S*,*S*)-**17b**	97	(*S*,*S*)-**18b**	85
Et	(*R*,*R*)-**17b**	94	(*R*,*R*)-**18b**	83
^{i}Pr	(*R*,*R*)-**17c**	90	(*R*,*R*)-**18c**	81

The alkylation of (*S*,*S*)-**18a** and (*S*,*S*)-**7** was carried out with BuLi as base and benzyl bromide, and indeed the alkylation of (*S*,*S*)-**18a** resulted in a higher diastereoselectivity as compared to the corresponding reaction with (*S*,*S*)-**7** (*Scheme 7*; *Table 4*, *Entries 1* and *2*).

In further experiments, we examined the dependency of both the diastereoselectivity and the yield on the solvent and the effect of chelating additives (*Table 4*, *Entries 3–6*). By using 1 equiv. of hexamethylphosphoric triamide (HMPA), the yield could be improved without loss of selectivity (*Table 4*, *Entry 5*). In THF, the yield was higher but with a diminished diastereoselectivity (*Entry 6*).

Consequently, the enantiomerically pure sulfonamides *cis*-**18a**–**c** were metalated with 1 equiv. of BuLi in Et_2O at $-78°$ in the presence of HMPA (*Scheme 8*). Subsequent alkylation with aliphatic electrophiles R^2X (X = Br or I) gave α-substituted sulfonamides *cis*-**19a**–**j** in good yields (67–86%) and high diastereomer excesses (de

Scheme 7



(*S*,*S*)-**7** R^1 = Ph
(*S*,*S*)-**18a** R^1 = Biph

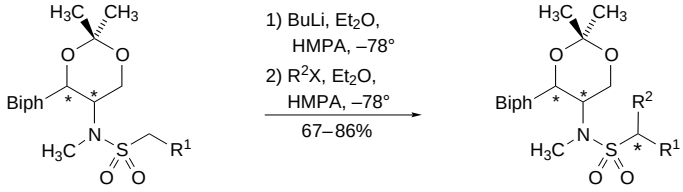
(*R*,*S*,*S*)-**8** R^1 = Ph
(*R*,*S*,*S*)-**19a** R^1 = Biph

Table 4. *Asymmetric α-Benzylation of Sulfonamides (*S,S*)-***7*** *and (*S,S*)-***18a*** *under Different Conditions Leading to Sulfonamides (*R,S,S*)-***8*** *and (*R,S,S*)-***19a***, *Respectively*

Entry	R^1	Solvent	Additive (equiv.)	Yield [%]	de [%][a])
1	Ph	Et_2O	–	29	59
2	Biph	Et_2O	–	35	83
3	Biph	Et_2O	TMEDA (3)	77	18
4	Biph	Et_2O	HMPA (3)	78	50
5	Biph	Et_2O	HMPA (1)	68	83
6	Biph	THF	HMPA (1)	77	75

[a]) Determined by ^{13}C-NMR spectroscopy.

Scheme 8



cis-**18a**–**c**

cis-**19a**–**j** [a])
de 83–94% (98%, after HPLC)

[a]) For R^1 and R^2, see *Table 5*.

72–94%, *Table 5*). Diastereoisomerically pure sulfonamides (de $\geq$98%) could be obtained by prep. HPLC purification.

With increasing steric demand of the substituent R^1, generally higher diastereoselectivity was observed when the same electrophile was used. In the case of MeI as electrophile, a rather low de of 72% was reached ($\rightarrow$(*R*,*R*,*R*)-**19h**). A higher de of 94% was achieved with dimethyl sulfate as electrophile. The configuration of the newly formed stereogenic center was determined to be *R* by single-crystal X-ray-analysis in the case of product (*R*,*S*,*S*)-**19a** [7]. By assuming a uniform reaction mechanism, all examples described should possess the same configuration.

To explain the high diastereofacial selectivity of the electrophilic substitutions in α-position to the sulfonamide function, the solution structure and aggregation of the

Table 5. *Asymmetric α-Alkylation of Sulfonamides* **18a–c** *Affording Sulfonamides* **19a–j**

Product	R^1	R^2	Yield [%]	de [%][a])[b])
(*R*,*S*,*S*)-**19a**	Me	$PhCH_2$	67	83 (≥ 98)
(*R*,*S*,*S*)-**19b**	Me	$CH_2{=}CHCH_2$	68	88
(*R*,*S*,*S*)-**19c**	Et	Bu	71	89 (≥ 98)
(*R*,*S*,*S*)-**19d**	Et	Pr	80	88 (≥ 98)
(*R*,*S*,*S*)-**19e**	Et	$Me(CH_2)_5$	62	83 (≥ 98)
(*R*,*S*,*S*)-**19f**	Et	$PhCH_2$	78	94
(*S*,*R*,*R*)-**19f**	Et	$PhCH_2$	76	94
(*S*,*R*,*R*)-**19g**	Et	4-^{t}Bu$C_6H_4CH_2$	82	91 (≥ 98)
(*R*,*R*,*R*)-**19h**	^{i}Pr	Me	86	72
(*R*,*R*,*R*)-**19h**	^{i}Pr	Me[c])	83	94
(*R*,*R*,*R*)-**19i**	^{i}Pr	$PhCH_2$	75	91
(*R*,*R*,*R*)-**19j**	^{i}Pr	$CH_2{=}CHCH_2$	78	92

[a]) Value in parentheses after prep. HPLC (SiO_2, pentane/Et_2O 1 : 1). [b]) Determined by ^{13}C-NMR spectroscopy. [c]) Dimethyl sulfate was used as electrophile.

lithiated chiral sulfonamide remains to be determined. However, a plausible hypothesis is based on earlier reported structural investigations of closely related α-lithiated sulfones [15] and carbanions in general (for a review about acceptor-substituted carbanions, see [16]). Therefore, we assume that the resulting alkyl-substituted α-sulfonamide carbanion is pyramidalized, and the lone pair of electrons is oriented *gauche* to the two sulfonyl O-atoms (*Fig. 2*).

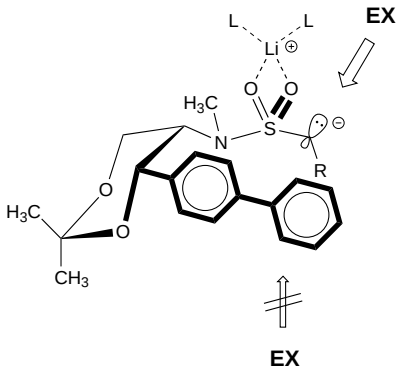


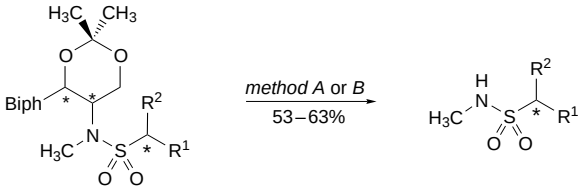
Fig. 2. *Electrophilic substitution by EX in α-position to the sulfonamide function*

On the rigid dioxane core, the sulfonamido group occupies the axial position and the sterically demanding biphenyl group the equatorial position. The main parameter that determines the asymmetric induction is the steric hindrance of the electrophilic attack by the 'biphenyl wall'. So the carbanionic reaction center would be accessible only from the less shielded face. Important facts concerning the favored preliminary substituent orientation at the reaction centre remain open. Therefore, information about the S–N(α) and S–C(α) rotation barrier and also the inversion barrier of the

carbanion should be investigated. The aggregation of the organolithium and the exact position of the lithium cation, which we suppose is bound to the sulfonyl O-atoms according to the references on α-lithiated sulfones, remains to be determined, too.

Finally, many procedures were screened for an efficient racemization-free cleavage of the auxiliary. The best results were achieved by refluxing the sulfonamides *cis*-**19** in conc. hydrochloric acid for three days (*Method A*). Although we expected an acidic hydrolysis giving sulfonic acids and the starting auxiliary, we obtained the *N*-methylsulfonamides **20** in good yields and enantioselectivities (*Scheme 9*, *Table 6*). For nonaromatic starting materials like (*R*,*S*,*S*)-**19c** and (*R*,*R*,*R*)-**19h**, better yields were achieved with 1 equiv. of conc. sulfuric acid in refluxing $CHCl_3$ (*Method B*).

Scheme 9



cis-**19**
de 91 to 98%

20a–**e**[a])
ee 91 to 98%

Method A: conc. HCl soln., reflux, 3 d;
Method B: H_2SO_4, $CHCl_3$, reflux, 1 d

[a]) For R^1 and R^2, see *Table 6*.

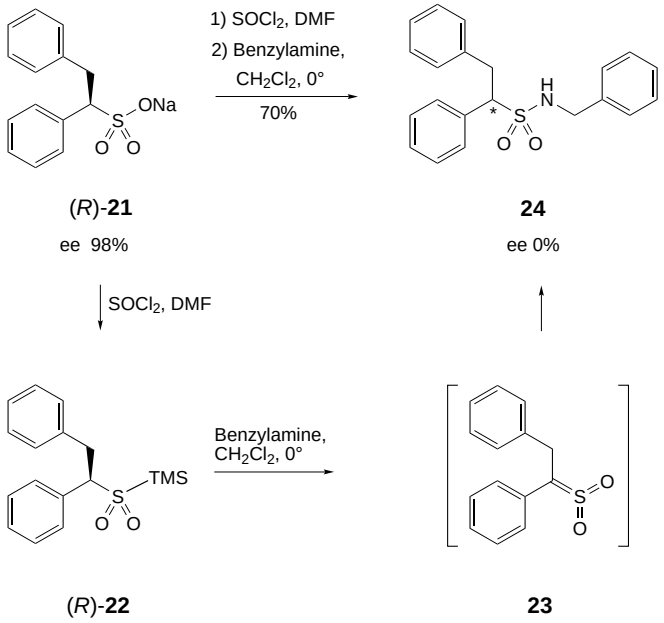
Table 6. *Removal of the Chiral Auxiliary from* **19a**–**i** *to Give the α-Alkylated Sulfonamides* **20a**–**e**

	Product	R^1	R^2	*Method*	Yield [%]	ee [%][a])	$[\alpha]_D^{r.t.}$ (*c*, $CHCl_3$)
(*R*,*S*,*S*)-**19a**	(*R*)-**20a**	Me	$PhCH_2$	*A*	55	≥ 98	− 3.1 (1.0)
(*R*,*S*,*S*)-**19c**	(*R*)-**20b**	Et	Bu	*B*	63	≥ 98	+ 4.0 (1.0)
(*R*,*S*,*S*)-**19f**	(*R*)-**20c**	Et	$PhCH_2$	*A*	53	94	+ 2.0 (1.0)
(*S*,*R*,*R*)-**19f**	(*S*)-**20c**	Et	$PhCH_2$	*A*	55	95	− 2.0 (1.0)
(*R*,*R*,*R*)-**19h**	(*R*)-**20d**	^{i}Pr	Me	*B*	54	94	− 5.1 (1.0)
(*R*,*R*,*R*)-**19i**	(*R*)-**20e**	^{i}Pr	$PhCH_2$	*A*	57	91	− 2.7 (1.0)

[a]) Determined by GC on chiral stationary phase (*Lipodex E*).

In another attempt to synthesize enantiomer-enriched α-substituted secondary sulfonamides, the amination of α-substituted sulfonyl chlorides was examined. An α-substituted sulfonyl chloride (*R*)-**22**, prepared from the corresponding sodium sulfonate (*R*)-**21** [17], was allowed to react with benzylamine (*Scheme 10*). This amination gave the sulfonamide **24** in a good yield but with complete racemization. The racemization during the amination is due to the intermediate formation of the achiral sulfene **23** [18]. The result is the formation of the racemic sulfonamide **24**. Consequently, at present, our protocol seems to be the method of choice to synthesize enantiomer-enriched α-substituted secondary sulfonamides.

Scheme 10



Conclusions. – We have developed a novel and efficient method for the asymmetric α-alkylation of sulfonamides bearing the chirality information in the amine moiety, cleavable under acidic conditions. The racemization-free acidic hydrolysis led to the title secondary sulfonamides in acceptable overall yields and with high enantiomer purities (ee 91 to ≥ 98).

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Experimental Part

General. All reagents were purchased from commercial suppliers and used without further purification. Asymmetric alkylations were carried out under Ar in dry solvents. BuLi (1.6M in hexane) was purchased from *Merck*, Darmstadt. DIBAL-H (1.0M in CH_2Cl_2) was purchased from *Aldrich*. The 2-methylpropanesulfonyl chloride was prepared as described in [19]. HMPA, TMEDA, and $^iPr_2NH$ were distilled from CaH_2 and kept under Ar. The sodium sulfonate (*R*)-**21** was prepared from the corresponding methyl sulfonate [20]. FC = flash chromatography. M.p.: *Tottoli* melting-point apparatus; uncorrected. Optical rotations: *Perkin-Elmer P-241* polarimeter. IR Spectra: *Perkin-Elmer 1750-FT-IR* spectrometer; in cm^{-1}. ^1H- and ^{13}C-NMR Spectra: at 300 or 400 MHz and 75 or 100 MHz, resp.; *Varian Gemini 300* or *Varian Inova 400*; δ in ppm rel. to $SiMe_4$ as internal standard, *J* in Hz; δs of minor diastereoisomers in brackets. Electron-impact (EI) MS: *Finnigan SSQ 7000* and, for high-resolution (HR), *Finnigan MAT 95*; in *m*/*z* (rel. %). Microanalyses were performed on *Elementar Vario EL*.

General Procedure A (*GP A*): *Sulfonamides by Amination of Sulfonyl Chlorides.* A soln. of the amine (1.0 equiv.) and Et_3N (1.2 equiv.) in CH_2Cl_2 (2 ml/mmol amine) was cooled to 0°. After adding the sulfonyl

chloride (1.1 equiv.), the soln. was stirred overnight at r.t. The mixture was then washed with brine, the org. layer dried ($MgSO_4$) and evaporated, and the residue purified by FC (silica gel).

General Procedure B (*GP B*): *Metallation of the Enantiomerically Pure Sulfonamides with LDA and Subsequent Alkylation*. The sulfonamide (1.0 equiv.) was dissolved in dry THF (10 ml/mmol sulfonamide) and metallated with LDA (1.0 equiv., freshly prepared 0.25M soln. in THF) at 0° in the presence of TMEDA (3 equiv.). After 1 h, the mixture was cooled to −78° and the electrophile (1.2 equiv.) was added dropwise. After 24 h, the reaction was quenched by addition of sat. NH_4Cl soln. (2 ml). The mixture was partitioned between H_2O and CH_2Cl_2, the aq. layer extracted 3 × with CH_2Cl_2, the combined org. phase dried ($MgSO_4$) and evaporated, and the crude product purified by FC (silica gel).

General Procedure C (*GP C*): *Tertiary Sulfonamides from Secondary Sulfonamides and Methyl Iodide*. A soln. of the secondary sulfonamide (1.0 equiv.) in dry THF (7 ml/mmol sulfonamide) was cooled to −78°. After 30 min, BuLi (1.0 equiv.) was added dropwise. The soln. was then stirred for an additional hour after which MeI (1.1 equiv.) was added dropwise. After 2 h, the reaction was quenched by addition of sat. NH_4Cl soln. (2 ml/mmol). The mixture was then partitioned between H_2O and CH_2Cl_2, the aq. layer extracted 3 × with CH_2Cl_2; the combined org. phase dried ($MgSO_4$) and evaporated and the crude product purified by FC (silica gel).

General Procedure D (*GP D*): *Metallation of the Enantiomerically Pure Sulfonamides with BuLi and Subsequent Alkylation*. A soln. of the sulfonamide (1.0 equiv.) and HMPA (1.0 equiv.) in dry Et_2O was cooled to −78°. After 30 min, BuLi (1.1 equiv.) was added dropwise. The soln. was then stirred for an additional hour after which the electrophile (2.0 equiv.) was added dropwise. After 24 h, the reaction was quenched by addition of sat. NH_4Cl soln. (2 ml/mmol). The mixture was partitioned between H_2O and CH_2Cl_2, the aq. layer further extracted 3 × with CH_2Cl_2, the combined org. phase dried ($MgSO_4$) and evaporated and the crude product purified by FC (silica gel).

General Procedure E (*GP E*): *Removal of the Chiral Auxiliary with Hydrochloric Acid* (*Method A*). The suspension of the sulfonamide in conc. HCl soln. was refluxed for 3 days and then extracted 10 × with CH_2Cl_2. The combined org. phase was washed with sat. $NaHCO_3$ soln. and then with brine, dried (Na_2SO_4), and evaporated, and the crude product purified by FC (silica gel).

General Procedure F (*GP F*): *Removal of the Chiral Auxiliary with Sulfuric Acid* (*Method B*). To the soln. of the sulfonamide in $CHCl_3$, conc. H_2SO_4 soln. (1.0 equiv.) was added. The mixture was refluxed for 24 h and was then extracted 10 × with CH_2Cl_2. The combined org. phase was washed with $NaHCO_3$ soln. and then with brine, dried (Na_2SO_4), and evaporated, and the crude product purified by FC (silica gel).

(2S)-1-(Ethylsulfonyl)-2-[(methoxymethoxy)methyl]pyrrolidine (**3a**). According to GP A, with **2a** (0.72 g, 5.00 mmol), ethanesulfonyl chloride (0.71 g, 5.50 mmol), Et_3N (0.61 g, 6.00 mmol), and CH_2Cl_2 (10 ml). FC (pentane/AcOEt 3:2) gave **3a** (0.67 g, 57%). Colorless oil. $[\alpha]_D^{30} = -36.9$ ($c = 1.10$, $CHCl_3$). IR (Film): 2943, 2884, 2825, 1459, 1415, 1330, 1288, 1241, 1200, 1149, 1111, 1040, 991, 967, 919, 814, 783. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.38 (*t*, *J* = 7.4, *Me*CH_2SO_2); 1.85–2.10 (*m*, CH_2CH_2CH_2N); 3.03 (*q*, *J* = 7.4, MeCH_2SO_2); 3.30–3.52 (*m*, CH_2N); 3.37 (*s*, MeO); 3.49 (*dd*, *J* = 6.8, 9.9, 1 H, OCH_2CHN); 3.63 (*dd*, *J* = 4.9, 9.9, 1 H, OCH_2CHN); 4.04 (*m*, CHN); 4.63 (*s*, MeOCH_2O). ^{13}C-NMR (75 MHz, $CDCl_3$): 8.0; 24.8; 29.0; 44.9; 48.9; 55.4; 58.8; 70.2; 96.7. EI-MS (70 eV): 206 (3, $[C_9H_{19}SO_4N - MeO]^+$), 176 (5, $[C_9H_{19}SO_4N - C_2H_5O_2]^+$), 162 (100, $[C_9H_{19}SO_4N - C_3H_7O_2]^+$), 70 (67, $C_4H_8N^+$). HR-MS: 206.0851 ($[C_9H_{19}SO_4N - MeO]^+$; calc. 206.0851).

(2S)-1-(Ethylsulfonyl)-2-(methoxymethyl)pyrrolidine (**3b**). According to *GP A*, with **2b** (5.61 g, 48.70 mmol), ethanesulfonyl chloride (6.92 g, 53.60 mmol), Et_3N (5.94 g, 58.44 mmol), and CH_2Cl_2 (100 ml). FC (hexane/AcOEt 1:1) gave **3b** (6.34 g, 63%). Pale yellow oil. $[\alpha]_D^{27} = -43.0$ ($c = 1.15$, $CHCl_3$). IR ($CHCl_3$): 2978, 2939, 2882, 2830, 1460, 1417, 1384, 1330, 1288, 1241, 1198, 1146, 1112, 1047, 990, 972, 813, 782, 718, 620, 602, 557. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.37 (*t*, *J* = 7.4, *Me*CH_2SO_2); 1.86–2.04 (*m*, CH_2CH_2CH_2N); 3.04 (*m*, MeCH_2-SO_2); 3.29–3.50 (*m*, CH_2N, MeOCH_2CHN); 3.36 (*s*, MeO); 3.98 (*m*, CHN). ^{13}C-NMR (75 MHz, $CDCl_3$): 8.0; 24.8; 28.9; 45.0; 48.8; 58.6; 59.0; 75.0. EI-MS (70 eV): 162 (100, $[C_8H_{17}NO_3S - C_2H_5O]^+$), 114 (6, $[C_8H_{17}NO_3S - C_2H_5SO_2]^+$), 98 (4), 82 (3), 70 (92, $C_4H_8N^+$), 55 (4), 45 (13, $C_2H_5O^+$). Anal. calc. for $C_8H_{17}NO_3S$ (207.30): C 46.35, H 8.27, N 6.76; found: C 46.66, H 8.44, N 6.94.

(2S)-1-(Ethylsulfonyl)-2-(1-methoxy-1-methylethyl)pyrrolidine (**3c**). According to *GP A*, with **2c** (4.85 g, 33.86 mmol), ethanesulfonyl chloride (4.81 g, 37.25 mmol), Et_3N (4.1 g, 40.63 mmol), and CH_2Cl_2 (70 ml). FC (hexane/AcOEt 2:1) gave **3c** (5.67 g, 71%). Pale yellow oil. $[\alpha]_D^{27} = -19.4$ ($c = 1.07$, $CHCl_3$). IR ($CHCl_3$): 2979, 2943, 2903, 2831, 1633, 1461, 1416, 1385, 1366, 1328, 1287, 1242, 1217, 1180, 1138, 1109, 1087, 1065, 996, 933, 917, 895, 860, 795, 755, 723, 667, 613. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.14 (*s*, 3 H, MeOC(*Me*)$_2$CHN); 1.17 (*s*, 3 H, MeOC(*Me*)$_2$CHN); 1.37 (*t*, *J* = 7.4, MeCH_2SO_2); 1.74–2.03 (*m*, 4 H, CH_2CH_2CH_2N); 3.04–3.19 (*m*, MeCH_2-SO_2, 1 H of CH_2N); 3.21 (*s*, 3 H); 3.82 (*ddd*, *J* = 2.8, 7.4, 11.7, 1 H, CH_2N); 4.09 (*dd*, *J* = 4.7, 8.4, CHN). ^{13}C-NMR (75 MHz, $CDCl_3$): 8.1; 21.3; 21.6; 26.4; 27.3; 46.7; 49.3; 50.1; 66.1; 78.0. EI-MS (70 eV): 162 (15, $[C_{10}H_{21}NO_3S -$

$C_4H_9O]^+$), 73 (100, $C_4H_9O^+$), 70 (37, $C_4H_8N^+$), 57 (12, $C_4H_9^+$), 55 (10, $C_4H_8^+$). Anal. calc. for $C_{10}H_{21}NO_3S$ (235.35): C 51.03, H 8.99, N 5.95; found: C 51.17, H 9.12, N 6.08.

*(2*S*)-2-[(Methoxymethoxy)methyl]-1-{[(1*S*)-and(1*R*)-1-methyl-2-phenylethyl]sulfonyl}pyrrolidine* (**4a**). According to *GP B*, with **3a** (0.25 g, 1.1 mmol), LDA (1.1 mmol), benzyl bromide (0.21 g, 1.2 mmol), TMEDA (0.35 g, 3.3 mmol), and THF (10 ml). FC (pentane/AcOEt 2:1) gave **4a** (0.22 g, 85%). Colorless oil. de 4% (^{13}C-NMR). IR (Film): 3062, 3028, 2939, 2882, 2824, 1603, 1496, 1455, 1377, 1323, 1245, 1202, 1142, 1111, 1042, 991, 919, 757. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.24 [1.23] (*d*, *J* = 6.9, $PhCH_2CH(Me)SO_2$); 1.86 – 2.13 (*m*, $CH_2CH_2CH_2N$); 2.67 [2.65] (*dd*, *J* = 11.0, 12.7, 1 H, $PhCH_2CH(Me)SO_2$); 3.25 – 3.68 (*m*, 4 H, $PhCH_2CH(Me)SO_2$, CH_2N); 3.37 (*s*, MeO); 3.54 [3.52] (*dd*, *J* = 6.3, 9.9, 1 H, OCH_2CHN); 3.64 [3.62] (*dd*, *J* = 4.7, 9.9, 1 H, OCH_2CHN); 4.18 [4.20] (*m*, CHN); 4.65 [4.62] (*s*, 2 H, $MeOCH_2O$); 7.16 – 7.36 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.4 [13.2]; 25.1; 29.0 [28.9]; 36.4; 49.3 [49.2]; 55.4; 58.9 [59.1]; 59.5 [59.7]; 69.7 [67.1]; 96.7; 126.8; 128.7; 129.2; 137.6 [137.7]. EI-MS (70 eV): 296 (2, $[C_{16}H_{25}NO_4S - OCH_3]^+$), 252 (68, $[C_{16}H_{25}NO_4S - C_3H_7O_2]^+$), 188 (45), 119 (46, $C_9H_11^+$), 91 (100, $C_7H_7^+$), 70 (55, $C_4H_8N^+$). Anal. calc. for $C_{16}H_{25}NO_4S$ (235.35): C 58.69, H 7.70, N 4.28; found: C 58.57, H 7.73, N 4.51.

*(2*S*)-2-(Methoxymethyl)-1-{[(1*S*)-and(1*R*)-1-methyl-2-phenylethyl]sulfonyl}pyrrolidine* (**4b**). According to *GP B*, with **3b** (0.61 g, 2.90 mmol), LDA (2.90 mmol), benzyl bromide (0.59 g, 3.43 mmol), TMEDA (1.0 g, 8.70 mmol), and THF (30 ml). FC (hexane/AcOEt 4:1) gave **4b** (0.81 g, 94%). Colorless oil. de 11% (^{13}C-NMR). IR ($CHCl_3$): 3027, 2977, 2935, 2878, 2830, 1603, 1496, 1456, 1377, 1323, 1245, 1201, 1142, 1112, 1063, 991, 926, 757, 723, 700, 631, 583. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.23 (*d*, *J* = 7.1, $PhCH_2CH(Me)SO_2$); 1.84 – 2.08 (*m*, $CH_2CH_2CH_2N$); 2.66 [2.67] (*dd*, *J* = 11.3, 13.3, $PhCH_2(Me)SO_2$); 3.26 – 3.51 (*m*, 5 H, $PhCH_2CH(Me)SO_2$, CH_2CHN, CH_2N); 3.34 [3.38] (*s*, MeO); 3.58 [3.66] (*m*, 1 H, CH_2N); 4.19 [4.18] (*m*, CHN); 7.17 – 7.35 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.2 [13.3]; 25.2; 28.8; 36.4 [36.5]; 49.2 [49.4]; 58.9 [58.8]; 58.9; 59.7 [59.6]; 75.0 [74.9]; 126.8; 128.7; 129.16; 129.19; 137.9 [137.7]. EI-MS (70 eV) (CI): 252 (63, $[C_{15}H_{23}NO_3S - C_2H_5O]^+$), 188 (50), 119 (54, $C_9H_11^+$), 91 (100, $C_7H_7^+$), 77 (4, $C_6H_5^+$), 70 (73, $C_4H_8N^+$), 65 (4, $C_5H_5^+$), 55 (4), 41 (15, $C_2H_5O^+$) Anal. calc. for $C_{15}H_{23}NO_3S$ (297.42): C 60.58, H 7.79, N 4.71; found: C 60.52, H 8.00, N 4.95.

*(2*S*)-2-(1-Methoxy-1-methylethyl)-1-{[(1*S*)- and (1*R*)-1-methyl-2-phenylethyl]sulfonyl}pyrrolidine* (**4c**). According to *GP B*, with **3c** (0.67 g, 2.83 mmol), LDA (2.80 mmol), benzyl bromide (0.58 g, 3.40 mmol), TMEDA (0.99 g, 8.50 mmol), and THF (30 ml). FC (hexane/AcOEt 6:1) gave **4c** (0.72 g, 78%). White foam. de 27% (^{13}C-NMR). IR (KBr): 3085, 3067, 3026, 2985, 2973, 2942, 2880, 2284, 1603, 1497, 1455, 1385, 1370, 1354, 1323, 1306, 1253, 1219, 1142, 1113, 1087, 1065, 1055, 998, 938, 790, 752, 729. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.08 [1.18] (*s*, $MeOC(Me)_2CHN$); 1.14 [1.20] (*s*, 3 H, $MeOC(Me)_2CHN$); 1.21 [1.23] (*d*, *J* = 6.9, $PhCH_2CH(Me)SO_2$); 1.68 – 2.11 (*m*, 4 H, $CH_2CH_2CH_2N$); 2.64 [2.63] (*dd*, *J* = 11.5, 13.3, 1 H, $CH_2CH_2CH_2N$); 3.02 (*m*, $PhCH_2CH(Me)SO_2$); 3.23 [3.25] (*s*, MeO); 3.53 [3.41] (*dd*, *J* = 3.0, 13.3, 1 H, $CH_2CH_2CH_2N$); 3.68 (*m*, 1 H, $PhCH_2CH(Me)SO_2$); 3.98 (*m*, 1 H, $PhCH_2CH(Me)SO_2$); 4.31 [4.34] (*dd*, *J* = 6.0, 8.7, CHN); 7.18 – 7.34 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.3; 20.6; 21.5; 26.9; 28.1; 36.2; 49.3; 50.9; 59.9; 65.8; 78.2; 126.6; 128.6; 129.2; 138.2. EI-MS (70 eV): 252 (11, $[C_{17}H_{27}NO_3S - C_4H_9O]^+$), 188 (13), 142 (8, $[C_{17}H_{27}NO_3S - C_9H_{11}SO_2]$, 119 (18, $C_9H_11^+$), 91 (34, $C_7H_7^+$), 73 (100, $C_4H_9O^+$), 70 (34, $C_4H_8N^+$), 43 (9, $C_2H_5N^+$). Anal. calc. for $C_{17}H_{27}NO_3S$ (325.47): C 62.74, H 8.36, N 4.30; found: C 62.83, H 8.35, N 4.40.

N-*[(4*S*,5*S*)-2,2-Dimethyl-4-phenyl-1,3-dioxan-5-yl]ethanesulfonamide* ((*S*,*S*)-**6**). According to *GP A*, with (*S*,*S*)-**5** (2 g, 10 mmol), ethanesulfonyl chloride (1.4 g, 11 mmol), Et_3N (1.1 g, 11 mmol), and CH_2Cl_2 (20 ml). FC (pentane/AcOEt 3:1) gave (*S*,*S*)-**6** (2.6 g, 87%). Colorless solid. M.p. 79°. $[\alpha]_D^{25} = +104$ (*c* = 1.05, $CHCl_3$). IR ($CHCl_3$): 3310, 2998, 2940, 2880, 1503, 1455, 1415, 1380, 1310, 1210, 1170, 1145, 1130, 971, 945, 920, 865, 845, 792, 746, 710, 652. ^{1}H-NMR ($CDCl_3$): 0.77 (*t*, *J* = 7.4, $MeCH_2SO_2$); 1.53 (*s*, 1 Me–C(2)); 1.54 (*s*, 1 Me–C(2)); 2.07 (*dq*, *J* = 7.1, 14.1, 1 H, $MeCH_2SO_2$); 2.28 (*dq*, *J* = 7.4, 14.1, 1 H, $MeCH_2SO_2$); 3.50 (*dddd*, *J* = 9.7, 2.0, 2.0, 2.0, H–C(5)); 3.98 (*dd*, *J* = 2.0, 12.1, 1 H–C(6)); 4.27 (*dd*, *J* = 2.0, 12.1, 1 H–C(6)); 5.13 (*d*, *J* = 2.0, H–C(4)); 5.26 (*d*, *J* = 9.74, NH); 7.20 – 7.41 (*m*, Ph). ^{13}C-NMR ($CDCl_3$): 7.8; 18.6; 29.6; 47.8; 52.7; 66.2; 72.4; 99.7; 125.8; 127.8; 128.4; 139.2. EI-MS (70 eV): 284 (5, $[C_{14}H_{21}NO_4S - Me]^+$), 134 (100), 106 (83), 91 (22), 77 (11, $C_6H_5^+$). Anal. calc. for $C_{14}H_{21}NO_4S$ (299.38): C 56.17, H 7.07, N 4.68; found: C 56.04, H 7.26, N 4.64.

N-*[(4*S*,5*S*)-2,2-Dimethyl-4-phenyl-1,3-dioxan-5-yl]*-N-*methylethanesulfonamide* ((*S*,*S*)-**7**). According to *GP C*, with **6** (2.0 g, 6.7 mmol), BuLi (6.7 mmol), MeI (1.7 g, 7.3 mmol), and THF (45 ml). FC (hexane/AcOEt 3:1) gave (*S*,*S*)-**7** (1.7 g, 81%). Colorless solid. M.p. 94°. $[\alpha]_D^{27} = +77.0$ (*c* = 1.00, $CHCl_3$). IR (KBr): 3065, 3034, 2994, 2966, 2945, 2885, 2834, 1637, 1608, 1501, 1453, 1413, 1382, 1328, 1282, 1269, 1246, 1205, 1182, 1159, 1131, 1082, 1043, 1023, 976, 954, 940, 924, 900, 839, 782, 753, 734, 633, 571. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.84 (*t*, *J* = 7.4, $MeCH_2SO_2$); 1.56 (*s*, 2 Me–C(2)); 1.96 (*dq*, *J* = 7.4, 7.4, 1 H, $MeCH_2SO_2$); 2.25 (*dq*, *J* = 7.4, 7.4, 1 H, $MeCH_2SO_2$); 3.17 (*s*, MeN); 4.06 (*ddd*, *J* = 1.6, 3.6, 3.8, H–C(5)); 4.13 (*dd*, *J* = 1.6, 12.9, 1 H–C(6)); 4.45 (*dd*, *J* = 3.8, 12.9, 1 H–C(6)); 5.28 (*d*, *J* = 3.6, H–C(4)); 7.26 – 7.44 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 7.7;

18.7; 29.3; 33.9; 45.9; 52.6; 65.7; 73.4; 99.5; 125.7; 127.7; 128.4; 139.1. EI-MS (70 eV): 298 (5, $[C_{15}H_{23}NO_4S - Me]^+$), 255 (3), 238 (6, $[C_{15}H_{23}NO_4S - Me]^+$), 207 (3), 149 (80, $C_5H_{11}SO_2N^+$), 120 (100), 105 (3, $C_8H_9^+$), 91 (8, $C_7H_7^+$), 77 (5, $C_6H_5^+$), 57 (23). Anal. calc. for $C_{15}H_{23}NO_4S$ (313.42): C 57.48, H 7.40, N 4.47; found: C 57.24, H 7.38, N 4.66.

(αR)-N-[(4S,5S)-2,2-Dimethyl-4-phenyl-1,3-dioxan-5-yl]-N,α-dimethylbenzeneethanesulfonamide ((*S*,*S*,*R*)-**8**). According to *GP B*, with (*S*,*S*)-**7** (0.31 g, 1.00 mmol), LDA (1.1 mmol), benzyl bromide (0.19 g, 1.10 mmol), TMEDA (0.11 g, 3.00 mmol), and THF (10 ml). FC (pentane/Et_2O 3:1) gave (*S*,*S*,*R*)-**8** (0.24 g, 59%). Colorless solid. de 63% (^{13}C-NMR). The major diastereoisomer was isolated by HPLC. de ≥96% (^{13}C-NMR). M.p. 101°. IR ($CHCl_3$): 3055, 3032, 2992, 2975, 2962, 2940, 2873, 1638, 1605, 1586, 1499, 1453, 1382, 1366, 1321, 1305, 1265, 1240, 1200, 1177, 1153, 1131, 1083, 972, 948, 929, 895, 852, 832, 762, 730, 704, 670, 656. ^{1}H-NMR (major diastereoisomer, 300 MHz, $CDCl_3$): 0.75 (*d*, *J* = 6.9, $PhCH_2CH(Me)SO_2$); 1.56 (*s*, 2 Me–C(2)); 2.35 (*dd*, *J* = 11.3, 12.9, 1 H, $PhCH_2CH(Me)SO_2$); 2.9 (*ddq*, *J* = 3.1, 6.9, 11.3, $PhCH_2CH(Me)SO_2$); 3.01 (*dd*, *J* = 3.1, 12.9, 1 H, $PhCH_2CH(Me)SO_2$); 3.21 (*s*, MeN); 4.08 (*ddd*, *J* = 1.4, 3.6, 3.6, H–C(5)); 4.17 (*dd*, *J* = 1.4, 12.9, 1 H–C(6)); 4.43 (*dd*, *J* = 3.6, 12.9, 1 H–C(6)); 5.31 (*d*, *J* = 3.6, H–C(4)); 6.96–7.45 (*m*, 2 Ph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 12.9; 18.5; 29.2; 34.8; 36.0; 52.7; 58.9; 65.6; 73.5; 99.6; 125.8; 126.7; 127.7; 128.3; 128.5; 129.2; 137.3; 138.5. EI-MS (70 eV): 388 (2, $[C_{22}H_{29}NO_4S - Me]^+$), 328 (1, $[C_{22}H_{29}NO_4S - C_3H_7O_2]^+$), 264 (2), 239 (59), 146 (5), 118 (100), 105 (3, $C_8H_9^+$), 91 (98, $C_7H_7^+$), 84 (25), 77 (4, $C_6H_5^+$), 70 (5), 58 (38). Anal. calc. for $C_{22}H_{29}NO_4S$ (403.55): C 65.48, H 7.24, N 3.47; found: C 65.57, H 7.34, N 3.73.

Crystal-Structure Analysis of (S,S,R)-**8**. A suitable crystal (colorless, *ca.* 0.3 × 0.3 × 0.3 mm) of (*S*,*S*,*R*)-**8** was obtained by recrystallization from hexane/CH_2Cl_2. The compound ($C_{22}H_{29}NO_4S$, M_r 403.5) crystallizes in the monoclinic space group $P2_1(4)$ with the cell parameters *a* = 9.078(4) Å, *b* = 12.361(3) Å, *c* = 12.259(1) Å, and β = 114.74(1)°. *V* = 1045.5 Å^3 and *Z* = 2 yield a calculated density ρ_{calc} = 1.282 g cm^{-3}. At r.t., 4936 reflections (Θ_{max} = 75.2°) were collected on an *Enraf-Nonius CAD4* diffractometer with graphite-monochromated CuK_α radiation (λ 1.54179 Å). Data were corrected for *Lorentz* and polarization factors but not for absorption effects (μ = 1.56 mm^{-1}). The structure was solved by direct methods as implemented in the Xtal3.2 set of crystallographic routines [21], employing GENSIN for the generation of structure-invariant relationships and GENTAN for the general tangent phasing procedure. In the final full-matrix least-squares refinement on *F*, 1968 observed reflections ($I > 2\sigma(I)$) were included, involving 252 parameters and converging at $R(R_w) = 0.052$ (0.050, $w = \sigma^{-2}$), a residual electron density of −0.5/+0.3 eÅ^{-3}, and a goodness-of-fit *S* = 2.501. The absolute configuration as shown in *Fig. 1* was determined by the known configuration at atoms C(1) and C(2) of the starting material. The H-atoms were calculated in idealized positions. Their equivalent displacement parameters were fixed at 1.5 *U* of the relevant heavy atom. All H-atom parameters were kept constant in the refinement process. Supplementary crystallographic data for this paper have been deposited with the *Cambridge Crystallographic Data Centre* as CCDC No. 186700. These data can be obtained free of charge *via* www.ccdc.cam.ac.uk/conts/retrieving.html (or from the CCDC, 12, Union Road, Cambridge CB2 1EZ, UK (fax: +44 1223 336033; e-mail: deposit@ccdc.cam.ac.uk).

rac,syn-*2-Amino-3-([1,1′-biphenyl]-4-yl)-3-hydroxypropanoic Acid* (*rac*,*syn*-**11**). To a soln. of glycine (20.6 g, 274 mmol) and NaOH (27.4 g, 685 mmol) in H_2O (70 ml), [1,1′-biphenyl]-4-carbaldehyde (**9**; 100 g, 548 mmol) was added, and the mixture was warmed slightly. After precipitation of a colorless solid, EtOH (170 ml) and H_2O (60 ml) were added, and the mixture was allowed to stand for further 3 h. After addition of EtOH (100 ml) and H_2O (50 ml), the mixture was stirred for 1.5 h. Then 2N HCl (700 ml) was added, and the mixture was refluxed until a clear soln. was obtained and a green oil separated. After the separation of the green oil, the hot aq. soln. was poured into an ice-cooled sat. NaOAc soln. (2 l). The solid that precipitated was filtered by suction and air-dried for 5 days: 75 g of *rac*,*syn*-**11**. Colorless product that was used in the next step without further purification.

Methyl rac,syn-*2-Amino-3-([1,1′-biphenyl]-4-yl)-3-hydroxypropanoate* (*rac*,*syn*-**12**). To MeOH (450 ml), $SOCl_2$ (138 g, 1.17 mol) was added, followed by *rac*,*syn*-**11** (75 g) in small portions. The mixture was then refluxed for 5 h. After evaporation of the solvent, the crude product was dissolved in CH_2Cl_2 and the mixture treated carefully with sat. $NaHCO_3$ soln. until the formation of CO_2 stopped. After separation of the org. layer, the aq. soln. was extracted 3× with CH_2Cl_2, the combined org. layer dried ($MgSO_4$) and evaporated, and the residue purified by FC (CH_2Cl_2/MeOH 9:1): *rac*,*syn*-**12** (42.2 g, 57%). Colorless solid. de 86% (^{13}C-NMR). The major diastereoisomer was separated by FC. de ≥96% (^{13}C-NMR). M.p. 112°. IR (KBr): 3147, 1725, 1586, 1488, 1451, 1435, 1405, 1385, 1355, 1285, 1273, 1252, 1214, 1193, 1158, 1132, 1121, 1054, 1011, 918, 830, 763, 743. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 3.70 (*d*, *J* = 4.4, H–C(2)); 3.71 (*s*, COOMe); 4.96 (*d*, *J* = 4.4, H–C(3)); 7.31–7.61 (*m*, 9 H, Biph). ^{13}C-NMR (major diastereoisomer, 75 MHz, $CDCl_3$): 52.3; 60.5; 73.9;

126.5; 127.1; 127.2; 127.4; 128.8; 140.0; 173.7. EI-MS (70 eV): 271 (1, $C_{16}H_{17}NO_3^+$), 212 (3, $[C_{16}H_{17}NO_3 - C_2H_3O_2]^+$), 183 (24, $C_{13}H_{11}O^+$), 153 (20, $C_{12}H_9^+$), 89 (100, $C_3H_7NO^+$), 74 (5, $C_3H_6O^+$). Anal. calc. for $C_{16}H_{17}NO_3$ (271.32): C 70.83, H 6.32, N 5.16; found: C 71.03, H 6.14, N 5.09.

Methyl rac,syn-*3-([1,1′-Biphenyl]-4-yl)-3-[[*(tert-*butyl)dimethylsilyl]oxy]-2-[di(prop-2-enyl)amino]propanoate* (*rac*,*syn*-**13**). A soln. of *rac*,*syn*-**12** (42.2 g, 156 mmol) in MeCN (187 ml) was treated with TBSCl (28.2 g, 187 mmol) in the presence of 1*H*-imidazole (22.4 g, 390 mmol). After heating the mixture for 3 h at 40°, the solvent was evaporated. Et_2O was then added to the residue, and the mixture was washed twice with brine. The aq. soln. was then extracted 3 times with Et_2O. The combined org. phase was dried ($MgSO_4$) and evaporated. The crude product was dissolved in toluene (250 ml), and the mixture was treated with allyl bromide (41.5 g, 343 mmol) in the presence of $^i Pr_2NEt$ (38.3 g, 390 mmol). The mixture was then refluxed for 4 days. The mixture was filtered, the soln. evaporated, and the residue purified by FC (pentane/AcOEt 20:1): *rac*,*syn*-**13** (69 g, 95%). Yellow oil. IR (Film): 3078, 3029, 3006, 2953, 2929, 2894, 2857, 1734, 1487, 1472, 1463, 1362, 1255, 1204, 1161, 1115, 1089, 1019, 1007, 921, 838. ^{1}H-NMR (300 MHz, $CDCl_3$): −0.21 (*s*, 1 MeSi); 0.06 (*s*, 1 MeSi); 0.89 (*s*, ^{t}BuSi); 3.21 (*dd*, *J* = 7.4, 14.7, 2 H, $(CH_2{=}CHCH_2)_2N$); 3.54–3.60 (*m*, 5 H, $(CH_2{=}CHCH_2)_2N$, COOMe); 3.66 (*d*, *J* = 5.8, H−C(2)); 5.00 (*d*, *J* = 10.2, 2 H, H_{cis} of $(CH_2{=}CHCH_2)_2N$); 5.06 (*d*, *J* = 17.3, 2 H, H_{trans} of $(CH_2{=}CHCH_2)_2N$); 5.24 (*d*, *J* = 5.8, H−C(3)); 5.60 (*m*, $(CH_2{=}CHCH_2)_2N$); 7.15–7.65 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): −5.2; −4.4; 18.1; 25.8; 51.0; 54.8; 68.3; 75.3; 116.4; 126.4; 127.0; 127.2; 127.7; 128.8; 137.3; 139.9; 141.0; 141.3; 171.9. EI-MS (70 eV): 406 (2, $[C_{28}H_{39}NSiO_3 - C_2H_3O_2]^+$), 297 (100, $C_{19}H_{25}SiO^+$), 283 (2), 226 (4), 168 (34, $C_9H_{14}NO_2^+$), 115 (4, $C_6H_{15}Si^+$), 73 (59, $C_3H_5O_2^+$), 59 (5, $C_2H_3O_2^+$). Anal. calc. for $C_{28}H_{39}NSiO_3$ (465.71): C 72.21, H 8.44, N 3.32; found: C 72.26, H 8.32, N 3.30.

rac,syn-*3-([1,1′-Biphenyl]-4-yl)-2-[di(prop-2-enyl)amino]propane-1,3-diol* (*rac*,*syn*-**14**). To a soln. of *rac*,*syn*-**13** (69 g, 148 mmol) in dry CH_2Cl_2 (150 ml), a soln. of DIBAL-H (440 mmol) was added slowly at 0°. The mixture was stirred for 8 h, and the reaction was then quenched by adding MeOH (22 ml) and H_2O (67 ml), and the precipitate was removed by filtration. The filtrate was then partitioned between H_2O and CH_2Cl_2, and the aq. layer was further extracted 3× with CH_2Cl_2. The combined org. phase was dried ($MgSO_4$) and evaporated. The residue was dissolved in THF (200 ml), and the soln. was treated with Bu_4NF (148 mmol). After stirring for 2 h, evaporation and FC (pentane/AcOEt 3:1) gave *rac*,*syn*-**14** (34.5 g, 72%). Colorless solid. M.p. 69°. IR (KBr): 3462, 3203, 3079, 3032, 3004, 2978, 2915, 2865, 1643, 1487, 1452, 1405, 1315, 1292, 1274, 1255, 1193, 1154, 1114, 1067, 987, 922, 844, 764, 730. ^{1}H-NMR (300 MHz, $CDCl_3$): 3.01 (*ddd*, *J* = 4.1, 7.7, 9.6, H−C(2)); 3.30 (*dd*, *J* = 7.4, 14.0, 2 H, $(CH_2{=}CHCH_2)_2N$); 3.49–3.60 (*m*, 4 H, $(CH_2{=}CHCH_2)_2N$, CH_2OH); 4.46 (*d*, *J* = 9.6, H−C(3)); 5.20 (*d*, *J* = 9.9, 2 H, H_{cis} of $(CH_2{=}CHCH_2)_2N$); 5.21 (*d*, *J* = 17.3, 2 H, H_{trans} of $(CH_2{=}CHCH_2)_2N$); 5.88 (*m*, $(CH_2{=}CHCH_2)_2N$); 7.25–7.60 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 53.6; 59.1; 66.7; 71.2; 117.9; 127.1; 127.3; 127.4; 127.6; 128.8; 136.5; 140.8; 141.0; 141.1. EI-MS (70 eV): 324 (3, $[C_{21}H_{25}NO_2 + 1]^+$), 297 (3), 181 (9), 155 (16, $C_{12}H_{11}^+$), 140 (100, $C_8H_{14}NO^+$), 98 (25), 77 (16, $C_6H_5^+$), 70 (29), 55 (8). HR-MS: 323.1885 ($C_{21}H_{25}NO_2^+$; calc. 323.1883).

rac,cis-*4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl*-N,N-*di(prop-2-enyl)-1,3-dioxan-5-amine* (*rac*,*cis*-**15**). To a soln. of *rac*,*syn*-**14** (34.4 g, 107 mmol) in toluene (200 ml), 2,2-dimethoxypropane (55.8 g, 535 mmol) was added, and the mixture was refluxed for 4 days in the presence of camphorsulfonic acid (CSA; 1.24 g, 5.0 mmol). The soln. was then evaporated and FC (pentane/AcOEt 15:1) gave *rac*,*cis*-**15** (32.67 g, 84%). Colorless solid. M.p. 93°. IR (KBr): 3374, 3029, 2991, 2939, 2921, 2859, 2809, 2865, 1641, 1488, 1450, 1418, 1314, 1263, 1239, 1224, 1199, 1181, 1157, 1131, 1085, 1020, 998, 964, 918, 855, 754. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.46 (*s*, 1 Me−C(2)); 1.50 (*s*, 1 Me−C(2)); 2.83 (*ddd*, *J* = 1.4, 3.8, 4.1, H−C(5)); 3.02 (*dd*, *J* = 8.0, 14.8, 2 H, $(CH_2{=}CHCH_2)_2N$); 3.49–3.57 (*m*, 2 H, $(CH_2{=}CHCH_2)_2N$); 4.00 (*dd*, *J* = 3.8, 11.8, 1 H−C(6)); 4.10 (*dd*, *J* = 1.4, 11.8, 1 H−C(6)); 4.88 (*d*, *J* = 16.6, 2 H, H_{trans} of $(CH_2{=}CHCH_2)_2N$); 4.90 (*d*, *J* = 11.0, 2 H, H_{cis} of $(CH_2{=}CHCH_2)_2N$); 5.17 (*d*, *J* = 4.1, H−C(4)); 5.44 (*m*, $(CH_2{=}CHCH_2)_2N$); 7.15–7.60 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 19.1; 29.1; 54.1; 54.4; 59.8; 74.1; 99.0; 115.8; 126.1; 126.5; 126.7; 127.0; 137.7; 139.3; 141.1. EI-MS (70 eV): 364 (1, $[C_{24}H_{29}NO_2 + 1]^+$), 348 (4, $[C_{24}H_{29}NO_2 - Me]^+$), 288 (3, $[C_{24}H_{29}NO_2 - C_3H_7O_2]^+$), 276 (8), 181 (17), 165 (12), 138 (17), 122 (100, $C_8H_{12}N^+$), 108 (40), 81 (36), 68 (16), 55 (26). Anal. calc. for $C_{24}H_{29}NO_2$ (363.50): C 79.30, H 8.07, N 3.85; found: C 79.26, H 7.92, N 3.65.

rac,cis-*4-([1,1′Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-amine* (rac,cis-**16**). A soln. of *rac*,*cis*-**15** (32.6 g, 90 mmol) in MeCN (252 ml) and H_2O (48 ml) was refluxed in the presence of $[RhCl(Ph_3P)_3]$ (1.00 g, 1.00 mmol), and the formed propanal was distilled off during the procedure. After 1.5 h, the solvent was evaporated. FC (CH_2Cl_2/MeOH 9:1) gave *rac*,*cis*-**16** (25.2 g, 99%). Colorless solid. M.p. 116°. IR (KBr): 3375, 2988, 2938, 2913, 2857, 1489, 1378, 1361, 1238, 1197, 1160, 1127, 1074, 1050, 942, 859, 761. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.56 (*s*, 1 Me−C(2)); 1.58 (*s*, 1 Me−C(2)); 2.80 (*ddd*, *J* = 1.0, 1.9, 2.2, H−C(5)); 3.94 (*dd*, *J* = 1.9, 11.8, 1 H−C(6)); 4.31 (*dd*, *J* = 2.2, 11.8, 1 H−C(6)); 5.15 (*d*, *J* = 1.0, H−C(4)); 7.25–7.64 (*m*, 9 H, Biph). ^{13}C-NMR

(75 MHz, $CDCl_3$): 18.6; 29.8; 49.7; 66.2; 73.7; 99.3; 126.2; 127.1; 127.2; 127.3; 128.8; 138.7; 140.4; 140.9. EI-MS (70 eV): 284 (2, $[C_{18}H_{21}NO_2+1]^+$), 268 (21, $[C_{18}H_{21}NO_2-Me]^+$), 225 (49), 208 (70, $[C_{18}H_{21}NO_2-C_3H_7O_2]^+$), 182 (57), 152 (100, $C_{12}H_8^+$), 150 (23), 114 (15), 101 (75, $C_5H_9O_2^+$), 77 (24, $C_6H_5^+$), 59 (21) Anal. calc. for $C_{18}H_{21}NO_2$ (283.37): C 76.29, H 7.47, N 4.94; found: C 76.24, H 7.45, N 4.92.

*(4*R*,5*R*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-amine* ((*R*,*R*)-**16**). *rac*-**16** (17 g, 60 mmol) was refluxed in EtOH (100 ml). After a clear soln. was obtained, D(−)-tartaric acid (9,0 g, 60.0 mmol) was added. To the formed salt, EtOH was added successively under reflux until a clear soln. was obtained. The soln. was kept at +2° for 24 h, and the formed crystals were separated by filtration and recrystallized again in EtOH. The isolated crystals were dissolved in 2N NaOH, and the aq. layer was extracted 3× with CH_2Cl_2. The combined org. phase was dried ($MgSO_4$) and evaporated: 3.54 g (22%) of enantiomerically pure (*R*,*R*)-**16**. Recrystallization of the concentrated mother liquors gave further 3 g (19%) of (*R*,*R*)-**16**. $[\alpha]_D^{25} = -5.6$ ($c = 1.00$, $CHCl_3$).

*(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-amine* ((*S*,*S*)-**16**). The resolution of *rac*-**16** was performed with L-(+)-tartaric acid as resolving agent according to the above described procedure: (*S*,*S*)-**16**. $[\alpha]_D^{25} = +5.6$ ($c = 1.00$, $CHCl_3$).

N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]ethanesulfonamide* ((*S*,*S*)-**17a**). According to *GP A*, with (*S*,*S*)-**16** (1.98 g, 7.0 mmol), ethanesulfonyl chloride (1.0 g, 7.7 mmol), Et_3N (0.85 g, 8.4 mmol), and CH_2Cl_2 (15 ml). FC (pentane/AcOEt 3:1) gave (*S*,*S*)-**16** (2.14 g, 81%). Colorless solid. M.p. 173°. $[\alpha]_D^{30} = +8.8$ ($c = 1.00$, $CHCl_3$). IR (KBr): 3271, 3030, 2981, 2963, 2882, 1602, 1487, 1462, 1451, 1421, 1382, 1333, 1313, 1286, 1267, 1236, 1206, 1166, 1143, 1124, 1077, 1010, 970, 853, 832. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.79 (*t*, *J* = 7.4, *Me*CH_2SO_2); 1.56 (*s*, 1 Me−C(2)); 2.17 (*dq*, *J* = 7.4, 14.8, 1 H, MeC*H*$_2SO_2$); 2.37 (*dq*, *J* = 7.4, 14.8, 1 H, MeC*H*$_2SO_2$); 3.52 (*dddd*, *J* = 1.7, 1.9, 1.9, 9.9, H−C(5)); 4.02 (*dd*, *J* = 1.9, 12.1, 1 H−C(6)); 4.30 (*dd*, *J* = 1.7, 12.1, 1 H−C(6)); 5.19 (*d*, *J* = 1.9, H−C(4)); 7.32–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 7.8; 18.5; 29.6; 48.0; 52.7; 66.0; 73.3; 99.8; 126.2; 127.0; 127.5; 128.9; 138.0; 140.6; 140.9. EI-MS (70 eV): 375 (1, $C_{20}H_{25}NO_4S^+$), 360 (2, $[C_{20}H_{25}NO_4S-Me]^+$), 317 (15, $[C_{20}H_{25}NO_4S-C_3H_6O]^+$), 300 (11, $[C_{20}H_{25}NO_4S-C_3H_7O_2]^+$), 194 (11), 182 (100, $C_{13}H_{10}O^+$), 163 ($C_6H_{13}NO_2S^+$), 152 (17, $C_{12}H_8O^+$), 135 (60, $C_4H_9NO_2S^+$), 106 (46). Anal. calc. for $C_{20}H_{25}NO_4S$ (375.49): C 63.97, H 6.71, N 3.73; found: C 63.47, H 6.67, N 3.65.

N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]propane-1-sulfonamide* ((*S*,*S*)-**17b**). According to *GP A*, with (*S*,*S*)-**16** (2.83 g, 10.0 mmol), propanesulfonyl chloride (1.57 g, 11.0 mmol), Et_3N (1.21 g, 12 mmol), and CH_2Cl_2 (20 ml). FC (pentane/AcOEt 3:1) gave (*S*,*S*)-**17b** (3.78 g, 97%). Colorless foam. $[\alpha]_D^{28} = +8.5$ ($c = 1.00$, $CHCl_3$). IR (KBr): 3260, 3054, 3031, 2990, 2970, 2934, 2861, 1600, 1490, 1455, 1423, 1408, 1385, 1330, 1317, 1288, 1263, 1234, 1199, 1167, 1145, 1131, 1086, 1015, 972, 832. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.60 (*t*, *J* = 7.4, *Me*$CH_2CH_2SO_2$); 1.05–1.40 (*m*, MeC*H*$_2CH_2SO_2$); 1.57 (*s*, 1 Me−C(2)); 1.58 (*s*, 1 Me−C(2)); 2.08–2.28 (*m*, $MeCH_2CH_2SO_2$); 3.54 (*dddd*, *J* = 1.7, 1.9, 1.9, 9.9, H−C(5)); 4.02 (*dd*, *J* = 1.9, 12.1, 1 H−C(6)); 4.30 (*dd*, *J* = 1.7, 12.1, 1 H−C(6)); 5.19 (*d*, *J* = 1.9, H−C(4)); 7.33–7.64 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 12.7; 16.9; 18.5; 29.6; 52.8; 55.4; 66.1; 72.4; 99.8; 126.2; 127.0; 127.5; 128.9; 138.0; 140.5; 141.0. EI-MS (70 eV): 388 (1, $C_{21}H_{26}NO_4S^+$), 374 (3, $[C_{21}H_{26}NO_4S-CH_3]^+$), 331 (15, $[C_{21}H_{26}NO_4S-C_3H_6O]^+$), 314 (11, $[C_{21}H_{26}NO_4S-C_3H_7O_2]^+$), 194 (10), 182 (100, $C_{13}H_{10}O^+$), 149 ($C_5H_{11}NO_2S^+$), 106 (17). HR-MS: 374.1424 ($[C_{21}H_{26}NO_4S-Me]^+$; calc. 374.1426).

N-*[(4*R*,5*R*)-4-[(1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]propane-1-sulfonamide* ((*R*,*R*)-**17b**). According to *GP A*, with (*R*,*R*)-**16** (1.4 g, 5.0 mmol), propanesulfonyl chloride (0.79 g, 5.5 mmol), Et_3N (0.61 g, 6.0 mmol), and CH_2Cl_2 (20 ml). FC (pentane/AcOEt 3:1) gave (*R*,*R*)-**16** (1.78 g, 94%). Colorless foam. $[\alpha]_D^{28} = -8.5$ ($c = 1.00$, $CHCl_3$).

N-*[(4*R*,5*R*)-4-[1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]-2-methylpropane-1-sulfonamide* ((*R*,*R*)-**17c**). According to *GP A*, with (*R*,*R*)-**16** (3.63 g, 12.8 mmol), 2-methylpropanesulfonyl chloride (2.21 g, 14.1 mmol), Et_3N (1.56 g, 15.4 mmol), and CH_2Cl_2 (25 ml). FC (pentane/AcOEt 3:1) gave (*R*,*R*)-**17c** (4.64 g, 90%). Colorless foam. $[\alpha]_D^{25} = -7.6$ ($c = 1.10$, $CHCl_3$). IR (KBr): 3282, 3058, 3030, 2990, 2961, 2873, 1601, 1489, 1467, 1451, 1408, 1384, 1331, 1311, 1264, 1234, 1200, 1168, 1147, 1130, 1080, 1009, 969, 939. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.71 (*d*, *J* = 6.6, 3 H, *Me*$_2$CHCH_2SO_2); 0.75 (*d*, *J* = 6.6, 3 H, *Me*$_2$CHCH_2SO_2); 1.56 (*s*, 1 Me−C(2)); 1.57 (*s*, 1 Me−C(2)); 1.76 (*m*, $Me_2CHCH_2SO_2$); 1.89 (*dd*, *J* = 6.9, 14.1, 1 H, $Me_2CHCH_2SO_2$); 2.08 (*dd*, *J* = 6.9, 14.0, 1 H, $Me_2CHCH_2SO_2$); 3.55 (*dddd*, *J* = 1.6, 1.7, 1.9, 9.9, H−C(5)); 4.01 (*dd*, *J* = 1.9, 12.1, 1 H−C(6)); 4.30 (*dd*, *J* = 1.7, 12.1, 1 H−C(6)); 5.18 (*d*, *J* = 1.6, H−C(4)); 7.32–7.64 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 18.5; 22.2; 22.3; 24.3; 29.5; 52.6; 61.1; 66.2; 72.4; 99.7; 126.5; 127.0; 127.4; 128.8; 138.2; 140.5; 140.8. EI-MS (70 eV): 388 (2, $[C_{22}H_{29}NO_4S-Me]^+$), 345 (17, $[C_{22}H_{29}NO_4S-C_3H_6O]^+$), 328 (11, $[C_{22}H_{29}NO_4S-C_3H_7O_2]^+$), 182 (100, $C_{13}H_{10}O^+$), 163 (11, $C_6H_{13}NO_2S^+$), 152 (12, $C_{12}H_8^+$), 57 (17, $C_4H_9^+$). HR-MS: 388.1583 ($[C_{22}H_{29}NO_4S-Me]^+$; calc. 388.1584).

N-*[(4S,5S)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylethanesulfonamide* ((*S*,*S*)-**18a**). According to *GP C*, with (*S*,*S*)-**17a** (2.14 g, 5.7 mmol), BuLi (5.7 mmol), MeI (0.89 g, 6.3 mmol), and THF (40 ml). FC (pentane/AcOEt 3:1) gave (*S*,*S*)-**18a** (1.93 g, 87%). Colorless solid. M.p. 125–128°. $[\alpha]_D^{30} = +6.6$ ($c = 1.00$, $CHCl_3$). IR (KBr): 3028, 2993, 2941, 2876, 1600, 1487, 1459, 1382, 1327, 1288, 1267, 1237, 1198, 1180, 1132, 1107, 1085, 1019, 976, 900, 850, 822. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.81 (*t*, *J* = 7.4, *Me*CH_2SO_2); 1.55 (*s*, 1 Me–C(2)); 1.56 (*s*, 1 Me–C(2)); 2.05 (*dq*, *J* = 7.4, 14.8, 1 H, MeCH_2SO_2); 2.31 (*dq*, *J* = 7.4, 14.8, 1 H, MeCH_2SO_2); 3.19 (*s*, MeN); 4.13 (*ddd*, *J* = 1.4, 3.6, 3.6, H–C(5)); 4.15 (*dd*, *J* = 1.4, 12.9, 1 H–C(6)); 4.43 (*dd*, *J* = 3.6, 12.9, 1 H–C(6)); 5.31 (*d*, *J* = 3.6, H–C(5)); 7.30–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 7.6; 18.7; 29.3; 34.0; 46.0; 52.6; 65.6; 73.2; 99.5; 126.1; 126.9; 127.0; 127.5; 128.9; 138.2; 140.6; 140.7. EI-MS (70 eV): 374 (1, $[C_{21}H_{27}NO_4S - Me]^+$), 314 (7, $[C_{21}H_{27}NO_4S - C_3H_7O_2]^+$), 182 (12, $C_{13}H_{10}O^+$), 149 (100, $C_3H_{11}NO_2S^+$), 120 (93), 57 (20). Anal. calc. for $C_{21}H_{27}NO_4S$ (389.52): C 64.74, H 6.99, N 3.60; found: C 64.32, H 7.10, N 3.40.

N-*[(4S,5S)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylpropane-1-sulfonamide* ((*S*,*S*)-**18b**). According to *GP C*, with (*S*,*S*)-**17b** (0.67 g, 1.7 mmol), BuLi (1.7 mmol), MeI (0.29 g, 2 mmol), and THF (20 ml). FC (pentane/AcOEt 4:1) gave (*S*,*S*)-**18b** (0.59 g, 85%). $[\alpha]_D^{26} = +6.7$ ($c = 1.00$, $CHCl_3$). IR (KBr): 3059, 3031, 2991, 2967, 2939, 2876, 1601, 1490, 1460, 1408, 1383, 1323, 1292, 1267, 1241, 1199, 1181, 1160, 1131, 1106, 1079, 1020, 977, 950, 900, 852, 822, 762. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.61 (*t*, *J* = 7.4, *Me*$CH_2CH_2SO_2$); 1.15–1.45 (*m*, MeC$H_2CH_2SO_2$); 1.52 (*s*, 1 Me–C(2)); 1.55 (*s*, 1 Me–C(2)); 1.82 (*m*, 1 H, MeCH_2CH_2SO_2); 2.22 (*m*, 1 H, MeCH_2CH_2SO_2); 3.19 (*s*, MeN); 4.08 (*ddd*, *J* = 1.1, 3.3, 3.6, H–C(5)); 4.10 (*dd*, *J* = 1.2, 12.9, 1 H–C(6)); 4.42 (*dd*, *J* = 3.6, 12.9, 1 H–C(6)); 5.28 (*d*, *J* = 3.3, H–C(4)); 7.28–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.5; 17.4; 19.3; 30.0; 34.5; 53.2; 53.9; 66.3; 73.9; 100.1; 126.9; 127.6; 128.1; 128.5; 139.0; 141.1; 141.2. EI-MS (70 eV): 388 (2, $[C_{22}H_{29}NO_4S - Me]^+$), 345 (1, $[C_{22}H_{29}NO_4S - C_3H_6O]^+$), 328 (11, $[C_{22}H_{29}NO_4S - C_3H_7O_2]^+$), 210 (8), 182 (10, $C_{13}H_{10}O^+$), 163 (100, $C_6H_{13}NO_2S^+$), 120 (44), 57 (62). Anal. calc. for $C_{22}H_{29}NO_4S$ (403.54): C 65.48, H 7.24, N 3.74; found: C 65.19, H 7.25, N 3.44.

N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylpropane-1-sulfonamide* ((*R*,*R*)-**18b**). According to *GP C*, with (*R*,*R*)-**17b** (0.4 g, 1.0 mmol), BuLi (1.0 mmol), MeI (0.15 g, 1.2 mmol), and THF (12 ml). FC (pentane/AcOEt 4:1) gave (*R*,*R*)-**18b** (0.33 g, 83%). Colorless foam. $[\alpha]_D^{26} = -6.7$ ($c = 1.00$, $CHCl_3$).

N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl)*-N,*2-dimethylpropane-1-sulfonamide* ((*R*,*R*)-**18c**). According to *GP C*, with (*R*,*R*)-**17c** (1.99 g, 4.9 mmol), BuLi (4.9 mmol), MeI (0.77 g, 5.4 mmol), and THF (35 ml). FC (pentane/AcOEt 4:1) gave (*R*,*R*)-**18c** (1.65 g, 81%). Colorless solid. M.p. 116°. $[\alpha]_D^{25} = -6.4$ ($c = 1.20$, $CHCl_3$). IR (KBr): 3060, 3029, 2998, 2968, 2939, 2877, 1600, 1493, 1460, 1410, 1383, 1323, 1292, 1267, 1241, 1199, 1181, 1160, 1131, 1106, 1079, 1020, 977, 950, 903, 855, 822, 766. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.75 (*d*, *J* = 6.9, 3 H, *Me*$_2$CHCH_2SO_2); 0.77 (*d*, *J* = 6.9, 3 H, *Me*$_2$CHCH_2SO_2); 1.58 (*s*, 2 Me–C(2)); 1.41 (*dd*, *J* = 7.1, 13.7, 1 H, Me$_2$CHCH_2SO_2); 1.84 (*m*, Me$_2$C*H*CH_2SO_2); 2.16 (*dd*, *J* = 7.1, 13.7, 1 H, Me$_2$CHCH_2SO_2); 3.20 (*s*, MeN); 4.11–4.17 (*m*, 1 H–C(6)); 4.48 (*dd*, *J* = 3.9, 13.2, 1 H–C(6)); 5.31 (*d*, *J* = 3.3, H–C(4)); 7.32–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 18.7; 22.3; 22.5; 24.3; 29.4; 33.5; 52.4; 58.2; 65.8; 73.5; 99.6; 126.4; 127.0; 127.1; 127.5; 128.9; 138.3; 140.5; 140.8. EI-MS (70 eV): 402 (2, $[C_{23}H_{31}NO_4S - Me]^+$), 359 (1, $[C_{23}H_{31}NO_4S - C_3H_6O]^+$), 342 (7, $[C_{23}H_{31}NO_4S - C_3H_7O_2]^+$), 222 (5), 182 (16, $C_{13}H_{10}O^+$), 177 (95, $C_7H_{15}NO_2S^+$), 152 ($C_{12}H_8^+$), 120 (23), 98 (27), 57 (100, $C_4H_9^+$). Anal. calc. for $C_{23}H_{31}NO_4S$ (417.57): C 66.16, H 7.48, N 3.35; found: C 65.81, H 7.44, N 3.26.

(αR)-N-*[(4S,5S)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N,*α-dimethylbenzeneethanesulfonamide* ((*R*,*S*,*S*)-**19a**). According to *GP D*, with (*S*,*S*)-**18a** (0.39 g, 1.00 mmol), BuLi (1.1 mmol), benzyl bromide (0.34 g, 2.0 mmol), HMPA (0.17 g, 1 mmol), and Et_2O (20 ml). FC (pentane/AcOEt 4:1) gave (*R*,*S*,*S*)-**19a** (0.32 g, 67%). Colorless solid. de 83% (^{1}H-NMR). The major diastereoisomer was separated by HPLC. de ≥ 98% (^{1}H-NMR). M.p. 165°. IR (KBr): 3060, 3029, 2990, 2939, 2868, 1602, 1490, 1456, 1382, 1316, 1266, 1239, 1200, 1176, 1131, 1107, 1082, 1018, 974, 949, 898, 848, 821, 762, 731, 699. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 0.78 (*d*, *J* = 6.9, PhCH_2CH(*Me*)SO_2); 1.58 (*s*, 2 Me–C(2)); 2.33 (*dd*, *J* = 11.5, 13.0, 1 H, PhCH_2CH(Me)SO_2); 2.90 (*ddq*, *J* = 3.3, 6.9, 11.5, PhCH_2C*H*(Me)SO_2); 2.99 (*dd*, *J* = 3.3, 13.0, 1 H, PhCH_2CH(Me)SO_2); 3.25 (*s*, MeN); 4.13 (*ddd*, *J* = 1.5, 3.6, 3.6, 1 H, H–C(5)); 4.21 (*dd*, *J* = 1.5, 12.9, 1 H–C(6)); 4.45 (*dd*, *J* = 3.6, 12.9, 1 H–C(6)); 5.36 (*d*, *J* = 3.6, H–C(4)); 6.91–7.65 (*m*, 14 H, Ph, Biph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 13.0; 18.8; 29.3; 35.1; 36.0; 52.8; 59.3; 65.7; 73.3; 99.7; 126.3; 126.6; 127.0; 127.1; 127.4; 128.5; 128.8; 129.2; 137.1; 137.4; 137.7; 140.4; 140.5. EI-MS (70 eV): 464 (3, $[C_{28}H_{33}NO_4S - Me]^+$), 404 (5, $[C_{28}H_{33}NO_4S - C_3H_7O_2]^+$), 340 (4), 239 (55, $C_{12}H_{17}NO_2S^+$), 152 (8, $C_{12}H_8^+$), 118 (100, $C_{10}H_{10}^+$), 91 (89, $C_7H_7^+$), 57 (19, $C_4H_9^+$). Anal. calc. for $C_{28}H_{33}NO_4S$ (479.64): C 70.12, H 6.93, N 2.92; found: C 70.11, H 6.86, N 2.81.

*(2*R*)*-N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylpent-4-ene-2-sulfonamide* ((*R*,*S*,*S*)-**19b**). According to *GP D*, with (*S*,*S*)-**18a** (0.39 g, 1.0 mmol), BuLi (1.1 mmol), allyl bromide (0.24 g, 2.0 mmol), HMPA (0.17 g, 1 mmol), and Et_2O (20 ml). FC (pentane/AcOEt 4:1) gave (*R*,*S*,*S*)-**19b** (0.29 g, 68%). Colorless solid. de 88% (^{1}H-NMR). IR (KBr): 3076, 3061, 3038, 2998, 2987, 2937, 2885, 1602, 1487, 1452, 1410, 1383, 1371, 1328, 1306, 1286, 1260, 1232, 1210, 1200, 1171, 1133, 1117. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.92 [0.70] (*d*, *J* = 7.1, CH_2=CHCH$_2$CH(*Me*)SO$_2$); 1.57 (*s*, , 2 Me−C(2)); 1.83 (*m*, 1 H, CH_2=CHC*H*$_2$CH(Me)SO$_2$); 2.06 (*m*, 1 H, CH_2=CHC*H*$_2$CH(Me)SO$_2$); 2.51 (*m*, 1 H, CH_2=CHCH$_2$C*H*(Me)SO$_2$); 3.22 (*s*, MeN); 4.01 (*ddd*, *J* = 1.4, 3.6, 3.6, H−C(5)); 4.18 (*dd*, *J* = 1.4, 12.9, 1 H−C(6)); 4.43 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 4.82 (*dd*, *J* = 1.4, 11.5, H_{cis} of C*H*$_2$=CHCH$_2$CH(Me)SO$_2$); 4.91 (*dd*, *J* = 1.4, 15.7, 1 H, H_{trans} of C*H*$_2$=CHCH$_2$CH(Me)-SO$_2$); 5.24 (*m*, CH_2=C*H*CH$_2$CH(Me)SO$_2$); 5.34 (*d*, *J* = 3.6, H−C(4)); 7.30–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.0; 18.7; 29.3; 34.4; 35.0; 52.9 [53.2]; 57.5; 65.7; 73.2; 99.6; 118.1 [118.0]; 126.1; 127.1; 127.4; 128.8; 133.6; 137.9; 140.6; 140.7. EI-MS (70 eV): 413 (3, $[C_{24}H_{31}NO_4S - Me]^+$), 353 (4, $[C_{24}H_{31}NO_4S - C_3H_7O_2]^+$), 189 (14, $C_8H_{15}NO_2S^+$), 161 (100, $C_6H_{11}NO_2S^+$), 83 (27, $C_5H_9^+$), 57 (13, $C_4H_9^+$). Anal. calc. for $C_{24}H_{31}NO_4S$ (428.57): C 67.10, H 7.27, N 3.26; found: C 66.73, H 7.45, N 3.10.

*(3*R*)*-N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylheptane-3-sulfonamide* ((*R*,*S*,*S*)-**19c**). According to *GP D*, with (*S*,*S*)-**18b** (1.87 g, 4.6 mmol), BuLi (5.1 mmol), BuI (1.7 g, 9.3 mmol), HMPA (0.78 g, 4.6 mmol), and Et_2O (40 ml). FC (pentane/AcOEt 5:1) gave (*R*,*S*,*S*)-**19c** (1.5 g, 71%). Colorless oil. de 89% (^{1}H-NMR). The major diastereoisomer was separated by HPLC. de ≥98% (^{1}H-NMR). IR ($CHCl_3$): 3058, 3029, 2990, 2958, 2871, 1601, 1489, 1461, 1407, 1382, 1314, 1265, 1239, 1200, 1177, 1158, 1124, 1106, 1082, 1019, 1009, 975, 950, 898, 853, 822. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 0.71 (*t*, *J* = 7.4, *Me*(CH$_2$)$_3$CH(MeCH$_2$)SO$_2$); 0.76 (*t*, *J* = 7.4, Me(CH$_2$)$_3$CH(*Me*CH$_2$)SO$_2$); 0.80–1.42 (*m*, Me(C*H*$_2$)$_3$CH-(MeC*H*$_2$)SO$_2$); 1.56 (*s*, 1 Me−C(2)); 1.57 (*s*, 1 Me−C(2)); 2.32 (*m*, CHSO$_2$); 3.19 (*s*, MeN); 4.04 (*ddd*, *J* = 1.7, 3.6, 3.6, H−C(5)); 4.18 (*dd*, *J* = 1.7, 12.9, 1 H−C(6)); 4.44 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 5.33 (*d*, *J* = 3.6, H−C(4)); 7.31–7.64 (*m*, 9 H, Biph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 10.7; 13.7; 18.8; 20.6; 22.9; 26.8; 28.0; 29.3; 34.8; 52.8; 63.4; 65.8; 73.3; 99.6; 126.1; 126.9; 127.0; 127.4; 128.8; 138.0; 140.4; 140.5. EI-MS (70 eV): 444 (1, $[C_{26}H_{37}NO_4S - Me]^+$), 384 (1, $[C_{26}H_{37}NO_4S - C_3H_7O_2]^+$), 219 (32, $C_{10}H_{21}NO_2S^+$), 204 (23), 152 (5, $C_{12}H_8^+$), 57 (30, $C_4H_9^+$). Anal. calc. for $C_{26}H_{37}NO_4S$ (459.65): C 67.94, H 8.11, N 3.05; found: C 67.98, H 8.17, N 2.96.

(3R)-N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylhexane-3-sulfonamide* ((*R*,*S*,*S*)-**19d**). According to *GP D*, with (*S*,*S*)-**18b** (1.32 g, 3.3 mmol), BuLi (3.6 mmol), PrI (1.1 g, 6.5 mmol), HMPA (0.59 g, 3.3 mmol), and Et_2O (33 ml). FC (pentane/Et_2O 2:1) gave (*R*,*S*,*S*)-**19d** (1.2 g, 80%). Colorless solid. de 88% (^{1}H-NMR). The major diastereoisomer was separated by HPLC. de ≥98% (^{1}H-NMR). M.p. 178°. IR ($CHCl_3$): 3027, 2991, 2964, 2935, 2873, 1601, 1488, 1463, 1463, 1382, 1318, 1238, 1216, 1200, 1178, 1158, 1124, 1106, 1084, 1020, 1009, 975, 949, 898, 853, 821, 761, 727, 699, 668. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 0.69–1.50 (*m*, *Me*(C*H*$_2$)$_2$CH(*Me*C*H*$_2$)SO$_2$); 1.57 (*s*, 1 Me−C(2)); 1.58 (*s*, 1 Me−C(2)); 2.33 (*m*, Me(CH$_2$)$_2$C*H*(MeCH$_2$SO$_2$); 3.20 (*s*, MeN); 4.05 (*ddd*, *J* = 1.7, 3.6, 3.6, H−C(5)); 4.18 (*dd*, *J* = 1.65, 12.9, 1 H−C(6)); 4.46 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 5.33 (*d*, *J* = 3.57, H−C(4)); 7.30–7.70 (*m*, 9 H, Biph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 10.8; 14.2; 18.8; 19.3; 20.7; 29.2; 29.3; 34.8; 52.8; 63.3; 65.8; 73.3; 99.6; 126.1; 126.9; 127.0; 127.4; 128.8; 137.9; 140.5. EI-MS (70 eV): 430 (6, $[C_{25}H_{35}NO_4S - Me]^+$), 387 (2, $[C_{25}H_{35}NO_4S - C_3H_6O]^+$), 370 (7, $[C_{25}H_{35}NO_4S - C_3H_7O_2]^+$), 205 (65), 190 (46), 181 (11), 126 (15), 85 (19), 57 (100, $C_4H_9^+$). Anal. calc. for $C_{25}H_{35}NO_4S$ (445.62): C 67.38, H 7.92, N 3.14; found: C 67.27, H 8.36, N 3.44.

*(3*R*)*-N-*[(4*S*,5*S*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methylnonane-3-sulfonamide* ((*R*,*S*,*S*)-**19e**). According to *GP D*, with (*S*,*S*)-**18b** (0.8 g, 2.0 mmol), BuLi (2.2 mmol), hexyl iodide (0.85 g, 4.0 mmol), HMPA (0.36 g, 2 mmol), and Et_2O (20 ml). FC (pentane/AcOEt 5:1) gave (*R*,*S*,*S*)-**19e** (0.6 g, 62%). Colorless oil. de 83% (^{1}H-NMR). The major diastereoisomer was separated by HPLC. de ≥98% (^{1}H-NMR). M.p. 99°. IR (KBr): 3061, 3030, 2986, 2953, 2939, 2888, 2867, 1601, 1489, 1460, 1408, 1384, 1365, 1305, 1283, 1263, 1237, 1195, 1175, 1124, 1108, 1083, 1018, 973, 949, 896, 855, 842, 824. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 0.73–0.81 (*m*, *Me*(CH$_2$)$_5$CH(*Me*CH$_2$)SO$_2$); 1.00–1.43 (*m*, Me(C*H*$_2$)$_5$CH-(MeC*H*$_2$)SO$_2$); 1.53 (*s*, 1 Me−C(2)); 1.56 (*s*, 1 Me−C(2)); 2.30 (*m*, CHSO$_2$); 3.19 (*s*, MeN); 4.02 (*ddd*, *J* = 1.2, 3.6, 3.6, H−C(5)); 4.17 (*dd*, *J* = 1.2, 12.9, 1 H−C(6)); 4.43 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 5.31 (*d*, *J* = 3.6, H−C(4)); 7.29–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 10.7; 14.0; 18.7; 20.5; 22.5; 25.8; 27.0; 29.3; 29.5; 31.6; 34.8; 52.8; 63.4; 65.8; 73.3; 99.5; 126.1; 126.8; 127.4; 128.8; 138; 140.3; 140.4. EI-MS (70 eV): 472 (1, $[C_{28}H_{41}NO_4S - Me]^+$), 412 (2, $[C_{28}H_{41}NO_4S - C_3H_7O_2]^+$), 247 (34, $C_{12}H_{25}NO_2S^+$), 232 (20, $C_{11}H_{22}NO_2S^+$), 222 (6), 183 (15, $C_{13}H_{11}O^+$), 121 (14), 85 (16, $C_6H_{13}^+$), 71 (25, $C_5H_{11}^+$), 57 (100, $C_4H_9^+$). Anal. calc. for $C_{28}H_{41}NO_4S$ (487.71): C 68.96, H 8.47, N 2.87; found: C 68.49, H 8.60, N 2.69.

(αR)-N-*[(4S,5S)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl-α-ethyl*-N-*methylbenzeneethanesulfonamide* ((*R*,*S*,*S*)-**19f**). According to *GP D*, with (*S*,*S*)-**18b** (1.32 g, 3.3 mmol), BuLi (3.6 mmol), benzyl bromide (1.11 g, 6.5 mmol), HMPA (0.89 g, 3.3 mmol), and Et_2O (33 ml). FC (pentane/AcOEt 5:1) gave (*R*,*S*,*S*)-**19f** (1.27 g, 78%). Colorless foam. de 94% (^{1}H-NMR). IR (KBr): 3061, 3028, 2991, 2939, 2900, 2877, 1601, 1489, 1456, 1409, 1384, 1315, 1263, 1238, 1197, 1177, 1157, 1132, 1108, 1080, 1017, 974, 950, 897, 855, 846, 822, 764, 739, 728, 697. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.65 (*t*, *J* = 7.2, $PhCH_2CH(MeCH_2)SO_2$); 1.30 (*m*, $PhCH_2CH(MeCH_2)SO_2$; 1.57 (*s*, 1 Me−C(2)); 1.58 (*s*, 1 Me−C(2)); 2.56 (*dd*, *J* = 10.2, 13.5, 1 H, $PhCH_2CH(MeCH_2)SO_2$); 2.80 (*m*, $CHSO_2$); 2.89 (*dd*, *J* = 3.9, 13.5, 1 H, $PhCH_2CH(MeCH_2)SO_2$); 3.24 [3.25] (*s*, MeN); 4.13 (*ddd*, *J* = 1.7, 3.6, 3.6, H−C(5)); 4.18 (*dd*, *J* = 1.7, 12.9, 1 H−C(6)); 4.46 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 5.35 (*d*, *J* = 3.6, H−C(4)); 6.93–7.64 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 11.1; 18.8; 21.0; 29.3; 34.0; 34.8; 52.8; 64.4; 65.7; 73.4 [73.2]; 99.6; 126.2; 126.6; 127.0; 127.1; 127.4; 128.5; 128.8; 129.0; 137.4; 137.7; 140.5; 140.6. EI-MS (70 eV): 478 (2, $[C_{29}H_{35}NO_4S - Me]^+$), 418 (3, $[C_{29}H_{35}NO_4S - C_3H_7O_2]^+$), 253 (55, $C_{13}H_{19}NO_2S^+$), 132 (86, $C_{10}H_{12}^+$), 91 (100, $C_7H_7^+$), 57 (30, $C_4H_9^+$). Anal. calc. for $C_{29}H_{35}NO_4S$ (493.67): C 70.56, H 7.15, N 2.84; found: C 70.52, H 7.02, N 2.81.

(αS)-N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]-α-ethyl*-N-*methylbenzeneethanesulfonamide* ((*S*,*R*,*R*)-**19f**). According to *GP D*, with (*R*,*R*)-**18b** (1.32 g, 3.3 mmol), BuLi (3.6 mmol), benzyl bromide (1.11 g, 6.5 mmol), HMPA (0.89 g, 3.3 mmol), and Et_2O (20 ml). FC (pentane/AcOEt 5:1) (*S*,*R*,*R*)-**19f** (1.23 g, 76%). Colorless foam. de 94% (^{1}H-NMR).

(αS)-N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]-4-(*tert-*butyl)-α-ethyl*-N-*methylbenzeneethanesulfonamide* ((*S*,*R*,*R*-**19g**). According to *GP D*, with (*R*,*R*)-**18b** (0.8 g, 2.0 mmol), BuLi (2.2 mmol), 4-(*tert*-butyl)benzyl bromide (0.9 g, 4.0 mmol), HMPA (0.36 g, 2.0 mmol), and Et_2O (20 ml). FC (pentane/Et_2O 3:1) gave (*S*,*R*,*R*)-**19g** (0.9 g, 82%). Colorless solid. de 91% (^{1}H-NMR). The major diastereoisomer was separated by HPLC. de ≥98% (^{1}H-NMR). M.p. 158°. IR (KBr): 2965, 2869, 2190, 1621, 1583, 1563, 1545, 1511, 1486, 1461, 1409, 1384, 1365, 1309, 1267, 1241, 1197, 1180, 1133, 1085, 1018, 974, 91, 923, 897, 760, 700, 570. ^{1}H-NMR (major diastereoisomer; 300 MHz, $CDCl_3$): 0.69 (*t*, *J* = 7.42, 3 H, ^{t}Bu$C_6H_4CH_2CH(MeCH_2)SO_2$); 1.22 (*s*, ^{t}Bu); 1.33 (*m*, ^{t}Bu$C_6H_4CH_2CH(MeCH_2)SO_2$); 1.57 (*s*, 1 Me−C(2)); 1.58 (*s*, 1 Me−C(2)); 2.54 (*dd*, *J* = 10.4, 13.5, 1 H, ^{t}Bu$C_6H_4CH_2CH(MeCH_2)SO_2$); 2.76 (*m*, $CHSO_2$); 2.83 (*dd*, *J* = 3.9, 13.5, 1 H, ^{t}Bu$C_6H_4CH_2CH(MeCH_2)SO_2$); 3.25 (*s*, MeN); 4.14 (*ddd*, *J* = 1.7, 3.6, 3.6, H−C(5)); 4.19 (*dd*, *J* = 1.7, 12.9, 1 H−C(6)); 4.46 (*dd*, *J* = 3.9, 12.9, 1 H−C(6)); 5.35 (*d*, *J* = 3.6, H−C(4)); 6.80–7.70 (*m*, 13 H, ^{t}Bu$C_6H_4CH_2CH(MeCH_2)SO_2$, Biph). ^{13}C-NMR (major diastereoisomer; 75 MHz, $CDCl_3$): 10.9; 18.8; 20.9; 29.2; 31.3; 33.4; 34.3; 34.9; 52.8; 64.5; 65.8; 73.3; 99.6; 125.3; 126.2; 127.0; 127.1; 127.2; 128.6; 128.8; 127.4; 134.1; 137.8; 140.4. EI-MS (70 eV): 534 (1, $[C_{33}H_{43}NO_4S - Me]^+$), 309 (30), 188 (100), 147 (63), 57 (26, $C_4H_9^+$). Anal. calc. for $C_{33}H_{43}NO_4S$ (549.77): C 72.10, H 7.88, N 2.55; found: C 71.79, H 7.71, N 2.39.

(2R)-N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N,*3-dimethylbutane-2-sulfonamide* ((*R*,*R*,*R*)-**19h**). According to *GP D*, with (*R*,*R*)-**18c** (1.12 g, 2.7 mmol), BuLi (3.0 mmol), dimethyl sulfate (0.68 g, 5.4 mmol), HMPA (0.48 g, 2.7 mmol), and Et_2O (30 ml). FC (pentane/AcOEt 5:1) gave (*R*,*R*,*R*)-**19h** (0.96 g, 83%). Colorless solid. de 94% (^{1}H-NMR). M.p. 108°. IR (KBr): 3030, 2990, 2965, 2943, 2874, 1602, 1489, 1467, 1406, 1383, 1315, 1265, 1240, 1200, 1177, 1159, 1129, 1081, 1019, 973, 949, 896, 846, 821, 762. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.60 (*d*, *J* = 6.9, 3 H, $Me_2CHCH(Me)SO_2$); 0.71 (*d*, *J* = 6.9, 3 H, $Me_2CHCH(Me)SO_2$); 0.80 (*d*, *J* = 7.1, $Me_2CHCH(Me)SO_2$); 1.56 (*s*, 2 Me−C(2)); 2.04–2.14 (*m*, $CHSO_2$); 3.24 (*s*, MeN); 3.95 (*ddd*, *J* = 1.7, 3.6, 3.6, H−C(5)); 4.17 (*dd*, *J* = 1.7, 12.9, 1 H−C(6)); 4.45 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 5.32 (*d*, *J* = 3.6, 1 H−C(4)); 7.32–7.62 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 7.9; 16.5; 18.7; 21.4; 27.4; 29.7; 34.9; 53.2; 63.3; 65.8; 73.4; 99.6; 126.2; 127.0; 127.1; 127.5; 128.9; 138.2; 140.6; 140.8. EI-MS (70 eV): 416 (1, $[C_{24}H_{33}NO_4S - Me]^+$), 373 (1, $[C_{24}H_{33}NO_4S - C_3H_6O]^+$), 356 (1, $[C_{24}H_{33}NO_4S - C_3H_7O_2]^+$), 191 (31, $C_8H_{17}NO_2S^+$), 182 (13, $C_{13}H_{10}O^+$), 152 (10, $C_{12}H_8^+$), 71 (49, $C_7H_{11}^+$), 57 (100, $C_4H_9^+$). Anal. calc. for $C_{24}H_{33}NO_4S$ (431.60): C 66.79, H 7.71, N 3.25; found: C 66.46, H 7.78, N 3.14.

(αR)-N-*[(4R,5R)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N-*methyl-α-(1-methylethyl)benzeneethanesulfonamide* ((*R*,*R*,*R*)-**19i**). According to *GP D*, with (*R*,*R*)-**18c** (1.25 g, 3.0 mmol), BuLi (3.3 mmol), benzyl bromide (1.0 g, 4.5 mmol), HMPA (0.54 g, 3.0 mmol), and Et_2O (30 ml). FC (pentane/AcOEt 6:1) gave (*R*,*R*,*R*)-**19i** (1.14 g, 75%). Colorless foam. de 91% (^{1}H-NMR). IR (KBr): 3029, 2991, 2989, 2964, 2938, 2872, 1602, 1489, 1456, 1407, 1382, 1315, 1267, 1240, 1200, 1176, 1158, 1126, 1106, 1081, 1018, 973, 949, 896, 850, 821, 762. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.63 (*d*, *J* = 7.2, 3 H, $Me_2CHCH(PhCH_2SO_2)$; 0.90 [0.95] (*d*, *J* = 7.1, 3 H, $Me_2CHCH(PhCH_2)SO_2$); 1.53 (*s*, 1 Me−C(2)); 1.54 (*s*, 1 Me−C(2)); 1.72 (*m*, $Me_2CHCH(PhCH_2)SO_2$); 2.69–2.98 (*m*, 3 H, $Me_2CHCH(PhCH_2)SO_2$); 3.13 [3.22] (*s*, MeN); 4.10 (*ddd*, *J* = 1.4, 3.6, 3.6, H−C(5)); 4.36 (*dd*, *J* = 3.6, 12.9, 1 H−C(6)); 4.48 (*dd*, *J* = 3.9, 13.2, 1 H−C(6)); 5.31 (*d*, *J* = 3.6, H−C(4)); 6.98–7.64 (*m*, 9 H, Ph, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 18.1; 18.8; 20.6; 27.7; 29.2; 31.1; 34.2; 52.5 [52.1]; 65.4 [65.7];

68.1 [68.0]; 73.5 [73.1]; 99.5; 126.2; 126.9; 127.0; 127.3; 128.5; 128.8; 128.9; 137.7; 138.7; 140.4; 140.6. EI-MS (70 eV): 492 (1, $[C_{30}H_{37}NO_4S - Me]^+$), 342 (1, $[C_{30}H_{37}NO_4S - C_3H_7O_2]^+$), 267 (31, $C_{14}H_{21}NO_2S^+$), 182 (9, $C_{13}H_{10}O^+$), 146 (71, $C_{11}H_{14}^+$), 105 (2, $C_8H_9^+$), 91 (100, $C_7H_7^+$), 57 (52, $C_4H_9^+$). Anal. calc. for $C_{30}H_{37}NO_4S$ (507.70): C 70.97, H 7.35, N 2.76; found: C 70.67, H 7.42, N 2.48.

*(3*R*)*-N-*[(4*R,5R*)-4-([1,1′-Biphenyl]-4-yl)-2,2-dimethyl-1,3-dioxan-5-yl]*-N,*2-dimethylhex-5-ene-3-sulfonamide* ((*R,R,R*)-**19j**). According to *GP D*, with (*R,R*)-**18c** (0.6 g, 1.4 mmol), BuLi (1.6 mmol), allyl bromide (0.34 g, 2.8 mmol), HMPA (0.25 g, 1.4 mmol), and Et_2O (15 ml). FC (pentane/AcOEt 6:1) gave (*R,R,R*)-**19j** (0.5 g, 78%). Colorless oil. de 92% (^{1}H-NMR). IR ($CHCl_3$): 3077, 3061, 3029, 2990, 2965, 2940, 2874, 1678, 1641, 1602, 1488, 1464, 1436, 1408, 1382, 1324, 1265, 1239, 1200, 1177, 1157, 1130, 1106, 1082, 1019, 1009, 974, 950, 897, 846, 822, 762. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.78 (*d*, *J* = 7.1, 3 H, CH_2=CHCH$_2$CH(*Me*$_2$CH)SO$_2$); 0.90 [0.95] (*d*, *J* = 7.1, 3 H, CH_2=CHCH$_2$CH(*Me*)$_2$CH)SO$_2$); 1.53 (*s*, 1 Me–C(2)); 1.55 (*s*, 1 Me–C(2)); 1.86 (*ddd*, *J* = 1.9, 7.1, 7.1, CH_2=CHCH$_2$CH(Me$_2$C*H*)SO$_2$); 2.07–2.40 (*m*, CH_2=CHC*H*$_2$C*H*(Me$_2$CH)SO$_2$); 3.20 [3.17] (*s*, MeN); 4.00 (*ddd*, *J* = 1.4, 3.6, 3.6, H–C(5)); 4.17 (*dd*, *J* = 1.4, 12.9, 1 H–C(6)); 4.42 (*dd*, *J* = 3.6, 12.9, 1 H–C(6)); 4.82 (*dd*, *J* = 1.4, 9.9, 1 H, H_{cis} of C*H*$_2$ = CHCH$_2$CH(Me$_2$CH)SO$_2$); 4.91 (*dd*, *J* = 1.4, 17.0, 1 H, H_{trans} of C*H*$_2$=CHCH$_2$CH(Me$_2$CH)SO$_2$); 5.28 (*m*, CH_2=C*H*CH$_2$CH(Me$_2$CH)SO$_2$); 5.32 (*d*, *J* = 3.6, H–C(4)); 7.30–7.63 (*m*, 9 H, Biph). ^{13}C-NMR (75 MHz, $CDCl_3$): 18.1 [17.7]; 18.7; 20.6 [21.0]; 27.6 [27.4]; 29.3 [29.6]; 30.0 [29.7]; 34.7 [34.5]; 52.9 [52.4]; 65.8 [65.7]; 66.9 [66.5]; 73.2 [73.1]; 99.5; 116.8 [116.6]; 126.1 [126.0]; 127.1 [127.3]; 127.4; 128.8 [128.7]; 135.5 [136.0]; 138.0; 140.5; 140.6. EI-MS (70 eV): 442 (3, $([C_{25}H_{32}NO_4S - Me]^+$), 382 (1, $[C_{25}H_{32}NO_4S - C_3H_7O_2]^+$), 217 (31, $C_{10}H_{19}NO_2S^+$), 189 (92, $C_8H_{15}NO_2S^+$), 153 (36), 124 (18), 97 (26), 83 (66), 55 (100). HR-MS: 442.2053 ($[C_{25}H_{32}NO_4S - Me]^+$); calc. 442.2052).

*(α*R*)*-N,*α-Dimethylbenzeneethanesulfonamide* ((*R*)-**20a**). According to *GP E*, with (*R,S,S*)-**19a** (290 mg, 0.6 mmol) and conc. HCl soln. (10 ml). FC (pentane/AcOEt 4:1) gave (*R*)-**20a** (71 mg, 55%). Colorless solid. M.p. 69°. $[\alpha]_D^{25} = -3.1$ (*c* = 1.1, $CHCl_3$). ee ≥ 98% (GC, *Lipodex E*). IR (KBr): 3305, 3028, 2979, 2937, 1602, 1496, 1455, 1429, 1311, 1147, 1081, 1019, 845. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.32 (*d*, *J* = 7.4, PhCH$_2$CH(*Me*)SO$_2$); 2.72 (*dd*, *J* = 3.6, 13.5, 1 H, PhC*H*$_2$CH(Me)SO$_2$); 2.78 (*d*, *J* = 5.2, MeN); 3.28 (*ddq*, *J* = 3.6, 4.4, 7.4, 1 H, PhCH$_2$C*H*(Me)SO$_2$); 3.38 (*dd*, *J* = 4.4, 13.5, 1 H, PhC*H*$_2$CH(Me)SO$_2$); 3.88 (*q*, *J* = 5.2, NH); 7.20–7.36 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 13.7; 29.7; 36.7; 58.2; 126.9; 128.8; 129.1; 137.5. EI-MS (70 eV): 118 (100, $C_9H_{10}^+$), 91 (83, $C_7H_7^+$), 77 (7, $C_6H_5^+$), 65 (9, $C_5H_5^+$). Anal. calc. for $C_{10}H_{15}NO_2S$ (213.3): C 56.31, H 7.09, N 6.57; found: C 56.19, H 7.04, N 6.48.

*(3*R*)*-N-*Methylheptane-3-sulfonamide* ((*R*)-**20b**). According to *GP F*, with (*R,S,S*)-**19c** (770 mg, 1.7 mmol), conc. H_2SO_4 soln. (167 mg, 1.7 mmol), and $CHCl_3$ (30 ml). FC (pentane/AcOEt 4:1) gave (*R*)-**20b** (203 mg, 63%). Colorless oil. $[\alpha]_D^{25} = +4.0$ (*c* = 1.1, $CHCl_3$). ee ≥ 98% (GC, *Lipodex E*). IR (Film): 3306, 2959, 2937, 2873, 1462, 1428, 1384, 1310, 1232, 1139, 1083, 855. ^{1}H-NMR (300 MHz, $CDCl_3$): 0.93 (*t*, *J* = 7.1, *Me*(CH$_2$)$_3$CH-(MeCH$_2$SO$_2$); 1.07 (*t*, *J* = 7.1, Me(CH$_2$)$_3$CH(*Me*CH$_2$)SO$_2$); 1.29–1.97 (*m*, Me(C*H*$_2$)$_3$CH(MeC*H*$_2$)SO$_2$); 2.79 (*d*, *J* = 5.2, MeN); 2.84 (*m*, Me(CH$_2$)$_3$C*H*(MeOH$_2$)SO$_2$); 4.55 (*q*, *J* = 5.2, NH). ^{13}C-NMR (75 MHz, $CDCl_3$): 11.2; 13.9; 21.7; 22.7; 27.8; 28.9; 29.6; 62.5. EI-MS (70 eV): 194 (8, $[C_8H_{19}NO_2S + 1]^+$), 163 (32, $C_7H_{15}SO_2^+$), 98 (54, $C_7H_{14}^+$), 57 (100, $C_4H_9^+$). Anal. calc. for $C_8H_{19}NO_2S$ (193.31): C 49.71, H 9.91, N 7.25; found: C 49.93, H 10.29, N 7.59.

*(α*R*)-α-Ethyl*-N-*methylbenzeneethanesulfonamide* ((*R*)-**20c**). According to *GP E*, with (*R,S,S*)-**19f** (380 mg, 0.8 mmol) and conc. HCl soln. (10 ml). FC (pentane/AcOEt 4:1) gave (*R*)-**20c** (96 mg, 53%). Colorless oil. $[\alpha]_D^{25} = +2.0$ (*c* = 1.1, $CHCl_3$). ee 94% (GC, *Lipodex E*). IR ($CHCl_3$): 3307, 3028, 2970, 2938, 2880, 1602, 1495, 1455, 1429, 1386, 1311, 1232, 1146, 1077, 1031, 857, 828. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.02 (*t*, *J* = 7.4, PhCH$_2$CH(*Me*CH$_2$)SO$_2$); 1.76 (*m*, 1 H, PhCH$_2$CH(MeC*H*$_2$)SO$_2$); 1.90 (*m*, 1 H, PhCH$_2$CH(MeC*H*$_2$)SO$_2$); 2.64 (*d*, *J* = 5.2, MeN); 2.89 (*dd*, *J* = 7.7, 13.2, 1 H, PhC*H*$_2$CH(MeCH$_2$)SO$_2$); 3.22 (*m*, 2 H, PhC*H*$_2$C*H*(MeCH$_2$)SO$_2$); 4.51 (*q*, *J* = 5.2, NH); 7.21–7.34 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 11.9, 22.3, 30.0, 35.5, 64.0, 127.5, 129.4, 129.6, 138.6. EI-MS (70 eV): 132 (91, $C_{10}H_{13}^+$), 117 (73), 91 (5, $C_7H_7^+$), 77 (8, $C_6H_9^+$), 65 (14, $C_5H_5^+$). Anal. calc. for $C_{11}H_{17}NO_2S$ (227.32): C 58.12, H 7.54, N 6.16; found: C 58.11, H 7.55, N 6.38.

*(α*S*)-α-Ethyl*-N-*methylbenzeneethanesulfonamide* ((*S*)-**20c**). According to *GP E*, with (*S,R,R*)-**19f** (550 mg, 1.1 mmol) and conc. HCl soln. (10 ml). FC (pentane/AcOEt 4:1) gave (*S*)-**20c** (139 mg, 55%). Colorless oil. $[\alpha]_D^{25} = -2.0$ (*c* = 1.1, $CHCl_3$). ee 95% (GC, *Lipodex E*).

*(2*R*)*-N,*3-Dimethylbutane-2-sulfonamide* ((*R*)-**20d**). According to *GP F*, with (*R,R,R*)-**19h** (830 mg, 1.9 mmol), conc. H_2SO_4 soln. (186 mg, 1.9 mmol), and $CHCl_3$ (40 ml). FC (pentane/AcOEt 3:1) gave (*R*)-**20d** (169 mg, 54%). Colorless oil. $[\alpha]_D^{25} = -5.1$ (*c* = 1.1, $CHCl_3$). ee ≥ 94% (GC, *Lipodex E*). IR (Film): 3307, 2965, 2879, 1467, 1450, 1427, 1393, 1310, 1257, 1159, 1137, 1069, 844. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.02 (*d*, *J* = 7.4, 3 H, *Me*$_2$CHCH(Me)SO$_2$); 1.04 (*d*, *J* = 7.4, 3 H, *Me*$_2$CHCH(Me)SO$_2$); 2.42 (*dqq*, *J* = 2.9, 7.1, 7.1, Me$_2$C*H*CH(Me)-SO$_2$); 2.76 (*d*, *J* = 5.0, MeN); 2.99 (*dq*, *J* = 2.9, 7.1, Me$_2$CHC*H*(Me)SO$_2$); 5.12 (*q*, *J* = 5.0, NH). ^{13}C-NMR

(75 MHz, $CDCl_3$): 9.0; 17.2; 22.1; 27.9; 29.8; 61.0. EI-MS (70 eV): 166 (1, $[C_6H_{15}NO_2S+1]^+$), 94 (10, $CH_4NO_2S^+$), 71 (100, $C_5H_{11}^+$), 55 (72, $C_4H_7^+$). Anal. calc. for $C_6H_{15}NO_2S$ (165.26): C 43.61, H 9.15, N 8.48; found: C 43.70, H 9.21, N 8.78.

(αR)-N-Methyl-α-(1-methylethyl)benzeneethanesulfonamide ((*R*)-**20e**). According to *GP E*, with (*R*,*R*,*R*)-**19i** (630 mg, 1.2 mmol) and conc. HCl soln. (10 ml). FC (pentane/AcOEt 4:1) gave (*R*)-**20e** (167 mg, 57%). Colorless oil. $[\alpha]_D^{25} = -2.7$ ($c = 1.1$, $CHCl_3$). ee 91% (GC, *Lipodex E*). IR ($CHCl_3$): 3300, 3025, 2967, 2921, 2876, 1603, 1496, 1464, 1420, 1391, 1311, 1265, 1243, 1150, 1125, 1091, 1030, 842, 757. ^{1}H-NMR (300 MHz, $CDCl_3$): 1.07 (*d*, $J = 7.1$, 3 H, Me_2CHCH(PhCH$_2$)SO$_2$); 1.13 (*d*, $J = 7.1$, 3 H, Me_2CHCH(PhCH$_2$)SO$_2$); 2.37 (*d*, $J = 5.2$, MeN); 2.50 (*dqq*, $J = 2.2$, 7.1, 7.1, Me$_2$C*H*CH(PhCH$_2$)SO$_2$); 2.96 (*dd*, $J = 5.5$, 14.6, 1 H, Me$_2$CHCH(PhC*H*$_2$)SO$_2$); 3.08 (*dd*, $J = 7.7$, 14.6, 1 H, Me$_2$CHCH(PhC*H*$_2$)SO$_2$); 3.21 (*ddd*, $J = 2.2$, 5.5, 7.7, Me$_2$CHC*H*(PhCH$_2$)SO$_2$); 4.06 (*q*, $J = 5.2$, NH); 7.18–7.34 (*m*, Ph). ^{13}C-NMR (75 MHz, $CDCl_3$): 18.6; 21.5; 28.5; 29.6; 31.7; 67.2; 127.4; 129.3; 129.4; 139.6. EI-MS (70 eV): 146 (79, $C_{11}H_{14}^+$), 131 (68), 91 (100, $C_7H_7^+$), 77 (7, $C_6H_5^+$), 65 (12, $C_5H_5^+$). Anal. calc. for $C_{12}H_{19}NO_2S$ (241.36): C 59.72, H 7.93, N 5.80; found: C 59.68, H 8.36, N 5.78.

rac-N-*Benzyl-α-phenylbenzeneethanesulfonamide* (**24**). To a soln. of (*R*)-**21** (0.2 g, 0.7 mmol), in dry DMF (10 ml), $SOCl_2$ (0.3 ml) was added slowly at 0°. The mixture was stirred for 2 h and poured into ice-water. The aq. phase was then extracted with AcOEt and the org. phase washed with H_2O. The org. phase was dried ($MgSO_4$) and evaporated. The crude product was then dissolved in CH_2Cl_2 (5 ml), and the mixture was treated with benzylamine (0.22 g, 2.1 mmol). After 20 min, the mixture was washed with H_2O and the org. phase was dried ($MgSO_4$) and evaporated. FC (pentane/Et_2O 1:1) gave **24** (0.17 g, 70%). Colorless solid M.p. 137°. IR (KBr): 3279, 3029, 2964, 2943, 1601, 1585, 1496, 1454, 1413, 1310, 1143, 1056, 923, 892, 847, 821, 793, 750, 699, 635, 549, 501. ^{1}H-NMR (400 MHz, $CDCl_3$): 3.34 (*dd*, $J = 11.0$, 14.0, 1 H, PhC*H*$_2$CH(Ph)SO$_2$); 3.71 (*dd*, $J = 3.9$, 14.0, 1 H, PhC*H*$_2$CH(Ph)SO$_2$); 3.90 (*dd*, $J = 6.1$, 14.0, 1 H, PhC*H*$_2$NH); 4.05 (*dd*, $J = 6.0$, 14.0, 1 H, PhC*H*$_2$NH); 4.23 (*dd*, $J = 3.9$, 11.0, PhCH$_2$C*H*(Ph)SO$_2$); 4.29 (*dd*, $J = 6.0$, 6.1, NH); 6.90–7.40 (*m*, 3 Ph). ^{13}C-NMR (100 MHz, $CDCl_3$): 36.2; 47.6; 70.7; 126.5; 127.8; 127.9; 128.2; 128.5; 128.6; 128.7; 128.8; 129.5; 132.9; 136.6; 136.9. EI-MS (70 eV): 261 (1, $[C_{21}H_{21}NO_2S - C_7H_7]^+$), 245 (2, $[C_{21}H_{21}NO_2S - C_7H_7NH]^+$), 196 (32), 181 (100, $[C_{21}H_{21}NO_2S - C_7H_7NHSO_2]^+$), 166 (14), 91 (11, $C_7H_7^+$), 77 (8, $C_6H_5^+$). Anal. calc. for $C_{21}H_{21}NO_2S$ (351.46): C 71.77, H 6.02, N 3.99; found: C 71.79, H 5.86, N 3.84.

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